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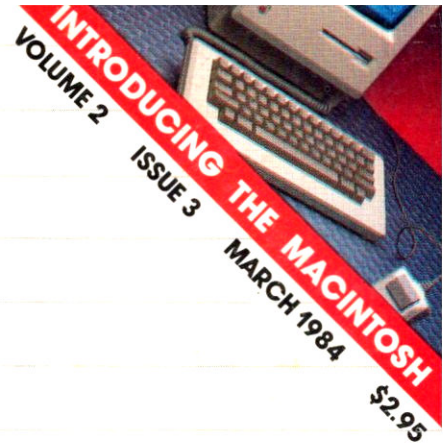

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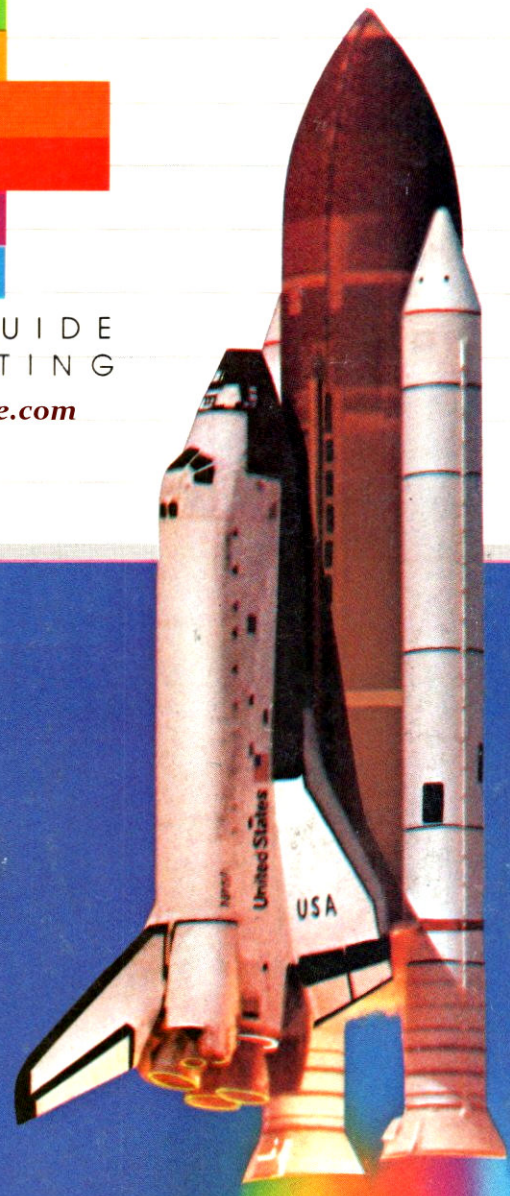

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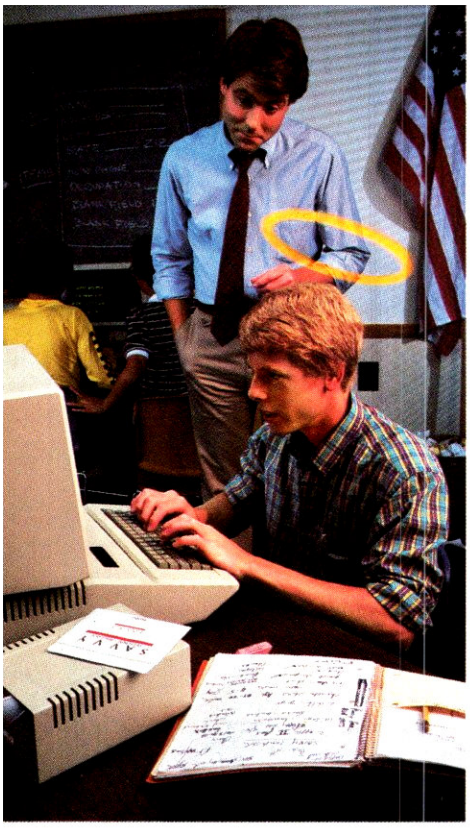

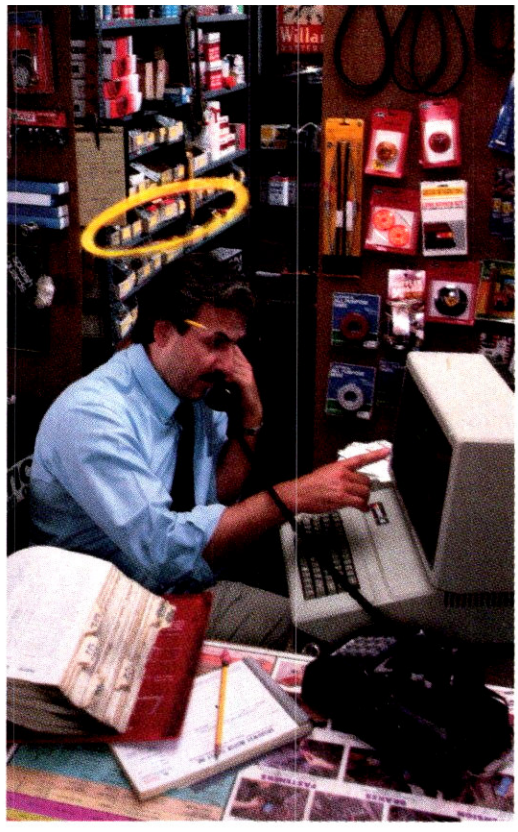

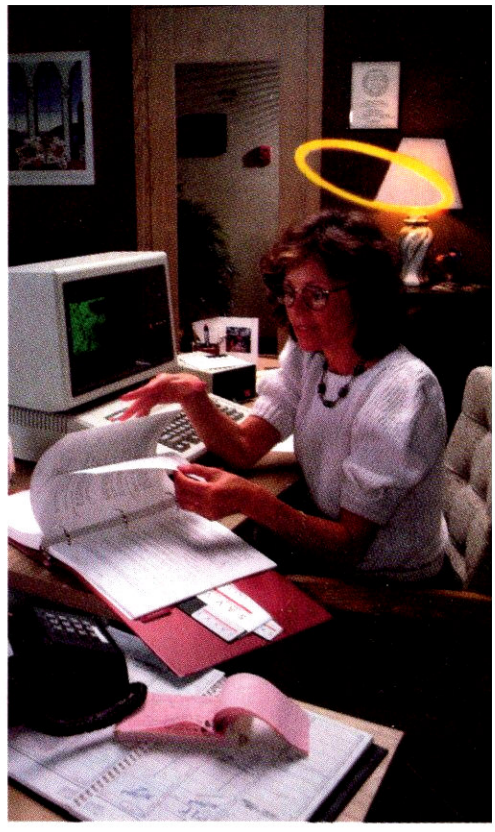

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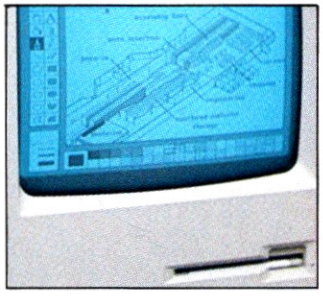

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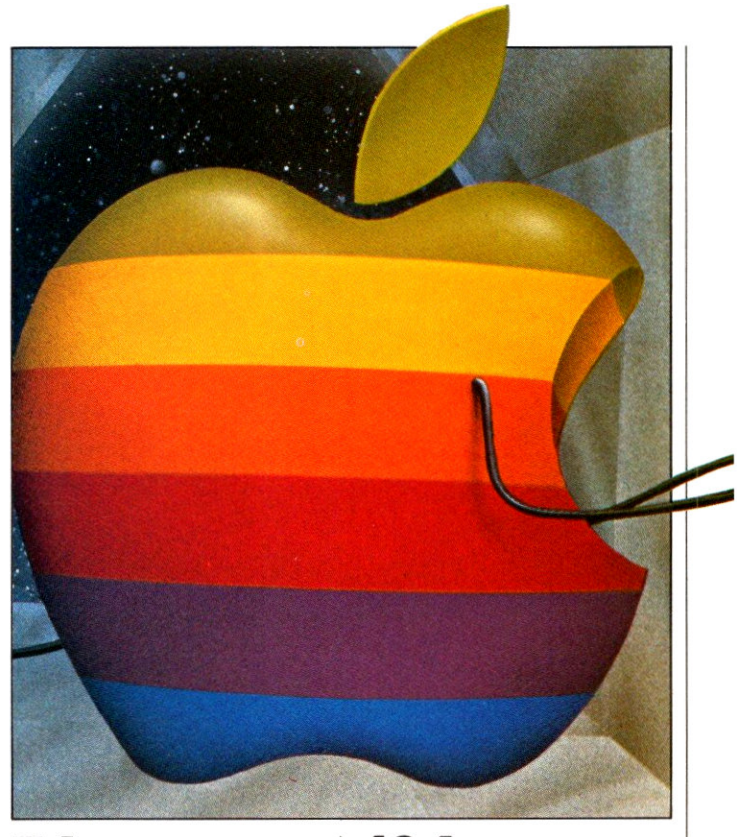

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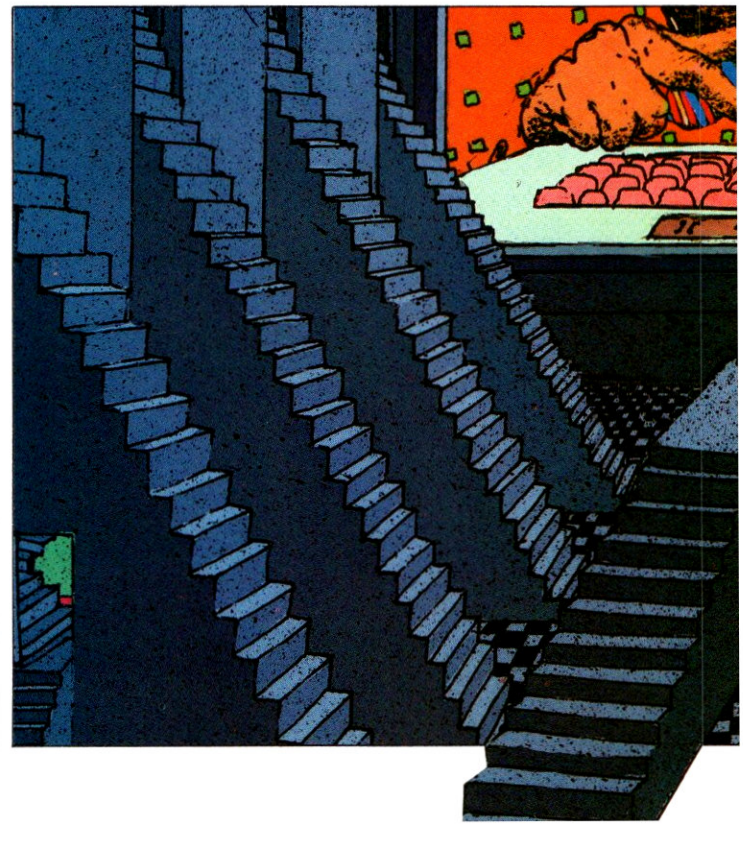

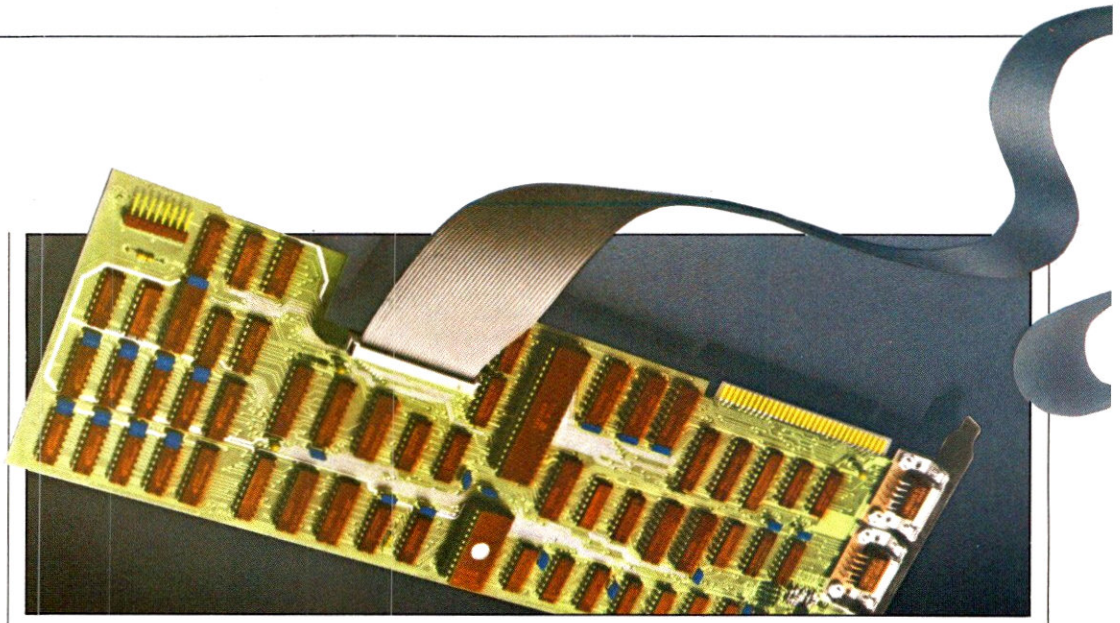

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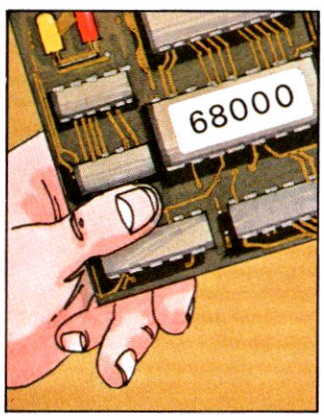

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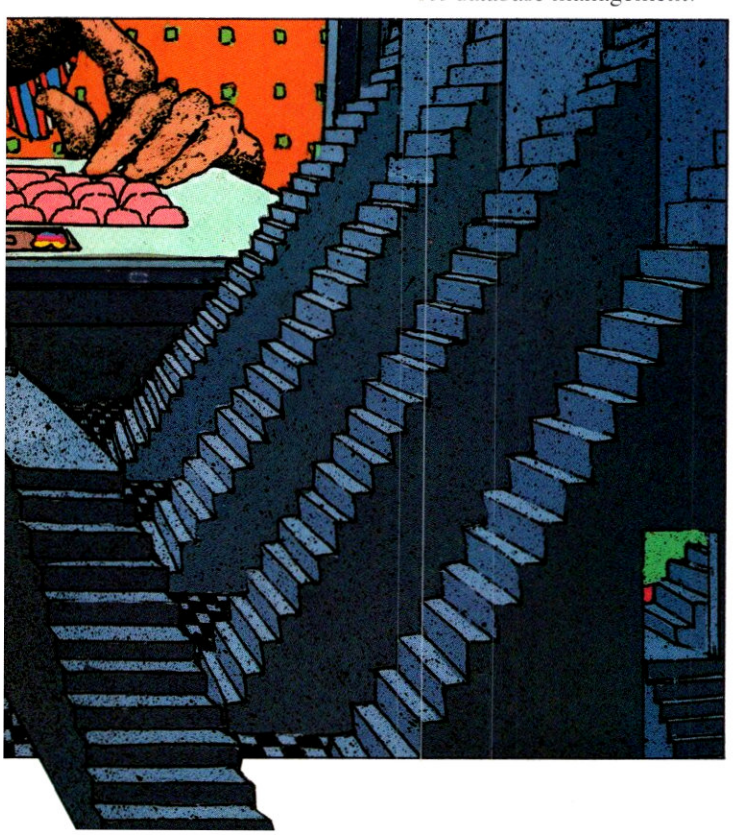

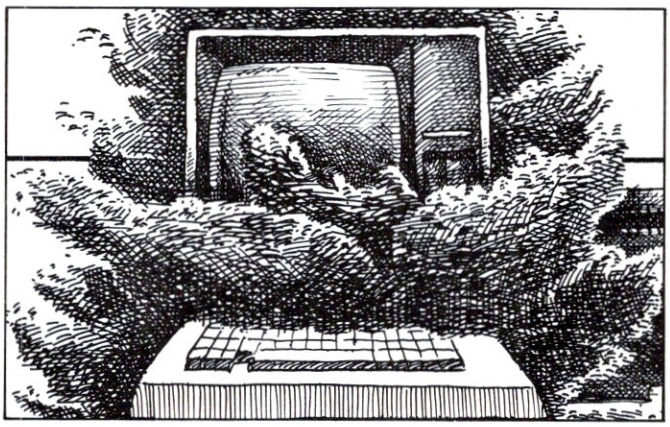

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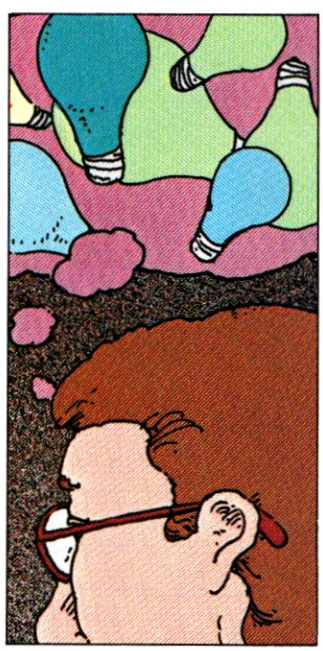

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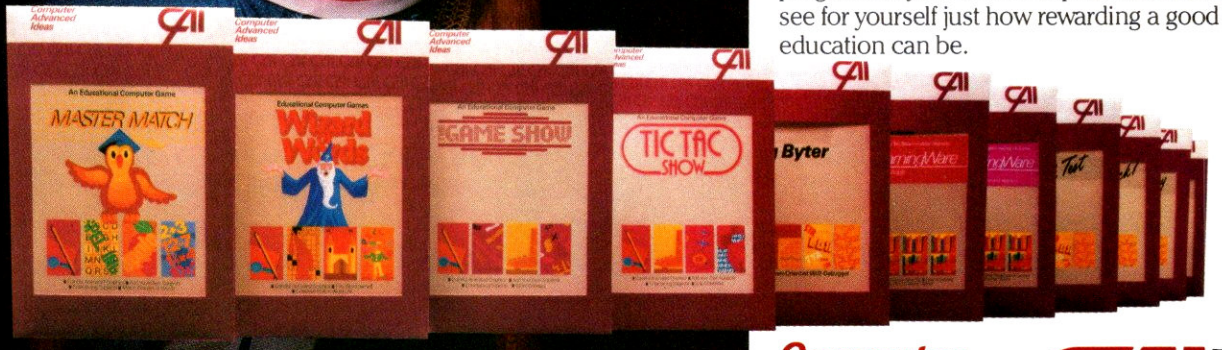

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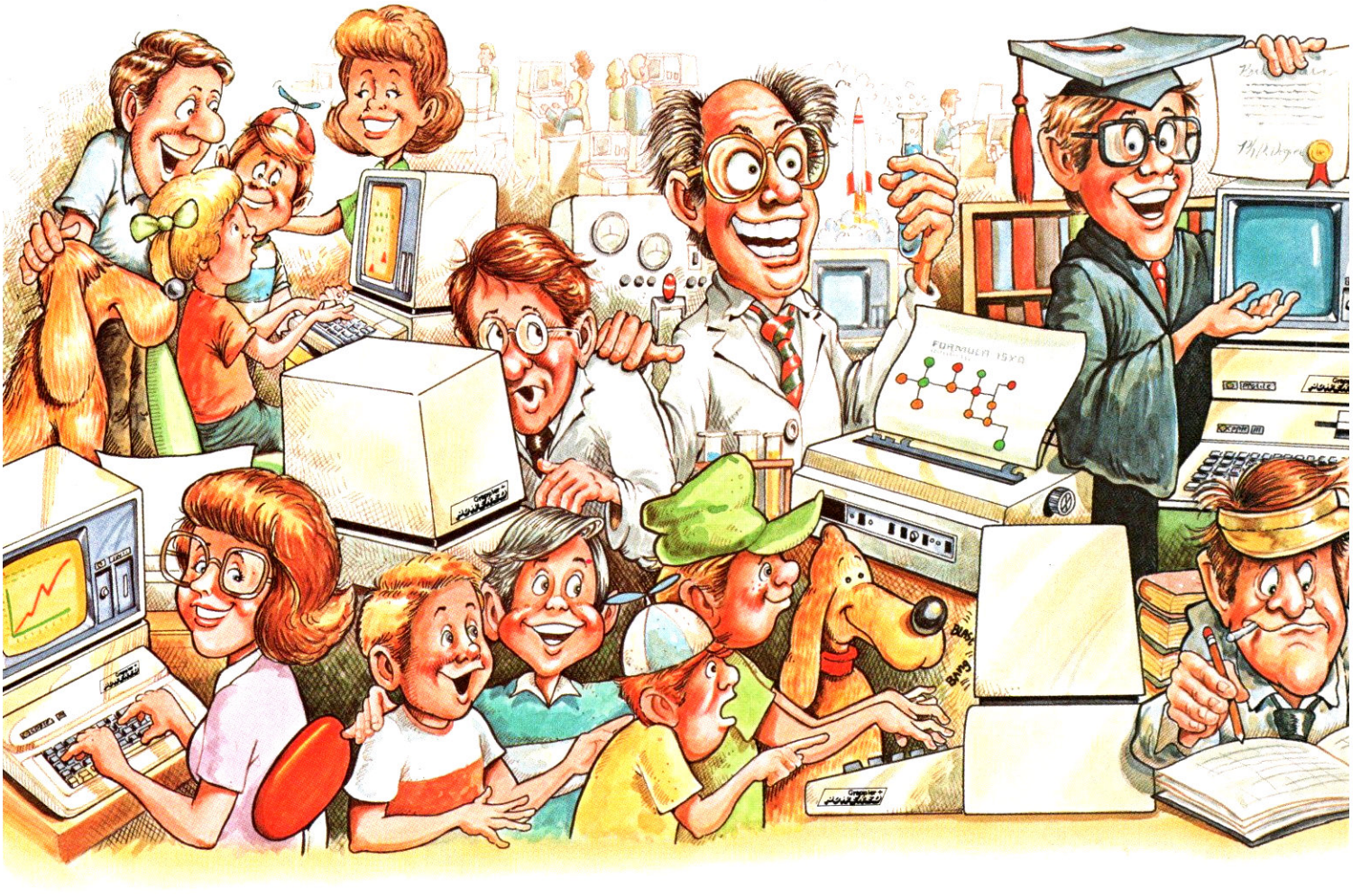

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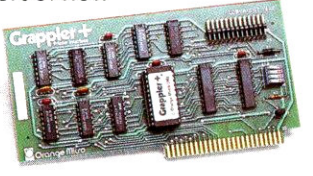

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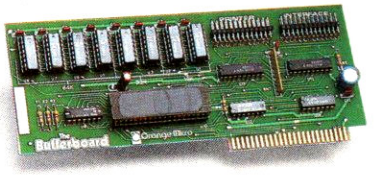

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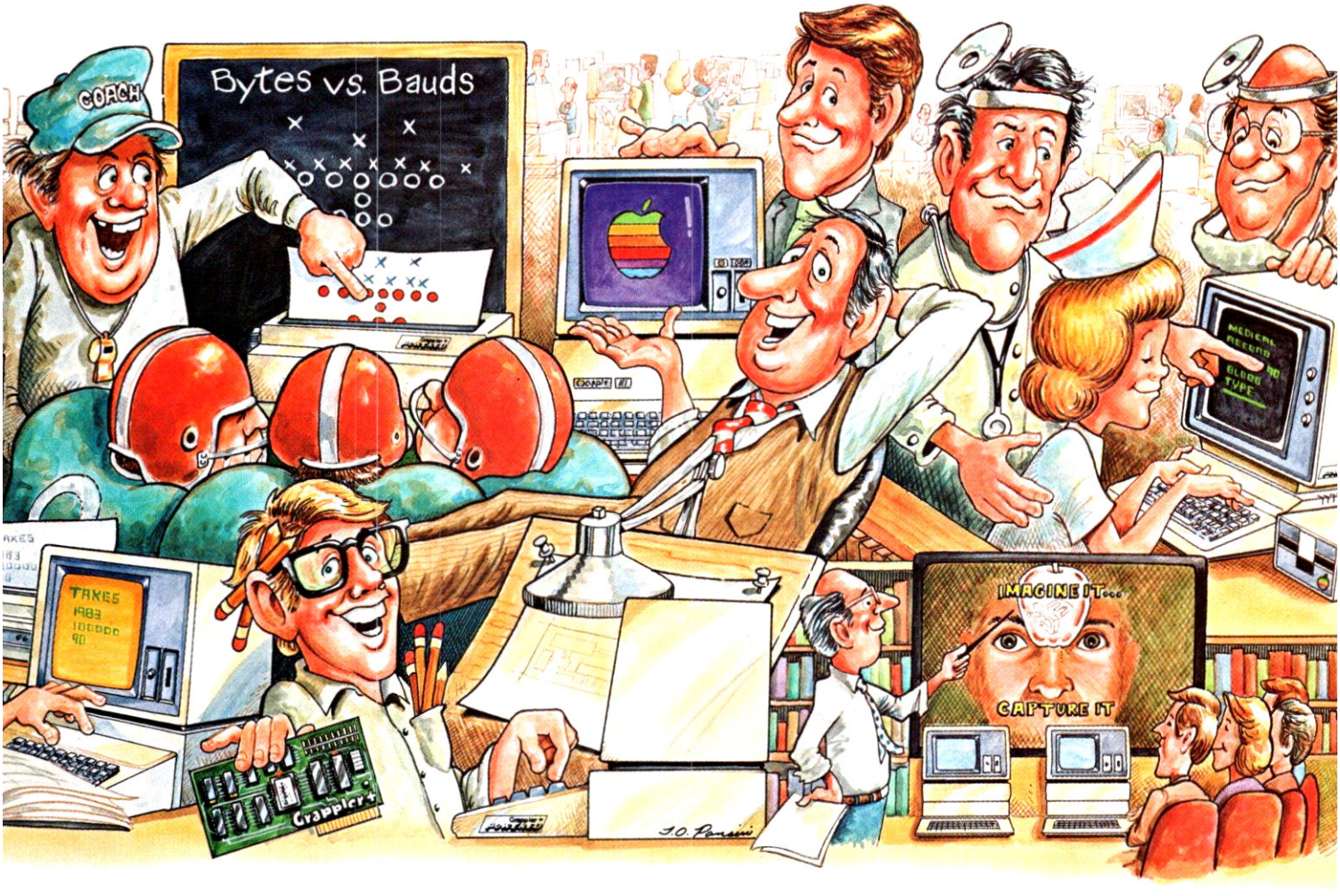

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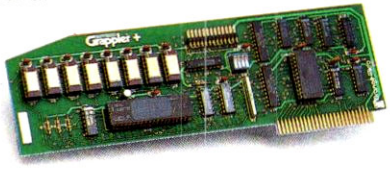

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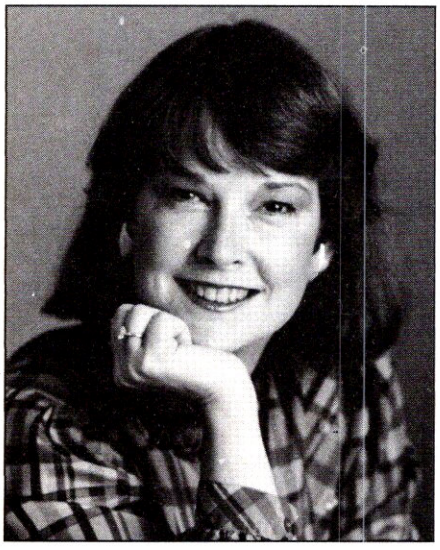
EDITORIAL
A MESSAGE FROM MAGGIE



This issue is packed with interesting information. Hold on to your hats while we cover the introduction of Apple's newest product, the Macintosh, and the launching of an Apple II into space in SpaceLab, and delve into the newest trend in computing—coprocessors.

For nearly a year before Apple Computer introduced its latest product, rumors about the new machine abounded. Speculation had the product embodying so many different forms that it could have been anything from a $200 portable to a $20,000 minicomputer! Well, the rumors have finally been laid to rest, along with the code names and veils of secrecy—the Macintosh was officially announced on January 24.

The most apparent difference between the Macintosh and most of the other new computers that have been introduced lately is the innovativeness of the machine. Any company can market a computer that performs adequately, but few dare to move from the comfort of safe solutions to opt for the progressive world of new computer technology.

The best decision Apple made was to go with the Motorola 68000 microprocessor. The preferred chip of many programmers, the 68000 guarantees the development of exciting new software for the Macintosh. But Apple didn't stop at the chip level. Apple decided to be in the vanguard with one of the latest developments in microcomputing—the mouse. The designers also chose 3½-inch disk drives instead of the ubiquitous 5¼-inch drives.

As far as software is concerned, Apple is adamantly declaring that it is not in the software business, but it has determined the nature of future software offerings for the Macintosh by employing the Lisa type of user interface. Users manipulate pictures and icons with a mouse cursor controller instead of with keyboard command sequences, which are difficult to learn and understand.

Living Together

My grandmother invented a saying to define the various relationships of her relatives—"I have my in-laws, my ex-laws, and my out-laws," she says. She explains that her in-laws are married, her ex-laws are divorced, and her out-laws are living together. The theme of this issue is "living together"—although we're not writing about people or the morality of the situation but about microprocessors and the convenience of having two or more microprocessors living together in your Apple.

In this issue, we will bring you up-to-date with the increasingly prevalent trend of adding boards to your system. These boards allow you to run software that has been developed for other microprocessors, such as the Intel 8088, which runs the IBM personal-computer products; the Motorola 68000, which is the power behind the Lisa and the Macintosh; and the Zilog Z80, which is the base for the ubiquitous CP/M operating system.

The most common and well-known example of microprocessors living together in the same machine is when the popular CP/M boards move in with an Apple. With the introduction of the Softcard, Microsoft of Bellevue, Washington, was one of the first companies to recognize the importance of enabling Apple users to use the CP/M operating system, which had rapidly become the de facto standard for 8-bit computer systems. Other companies such as ALS and PCPI have followed suit with their versions of CP/M boards. An estimated 40–60% of Apple owners now use the vast library of CP/M software through the use of the add-on boards. If you want to join them, you'll find Charlie Allen's article, which discusses the relative merits of the various CP/M boards available, interesting reading.

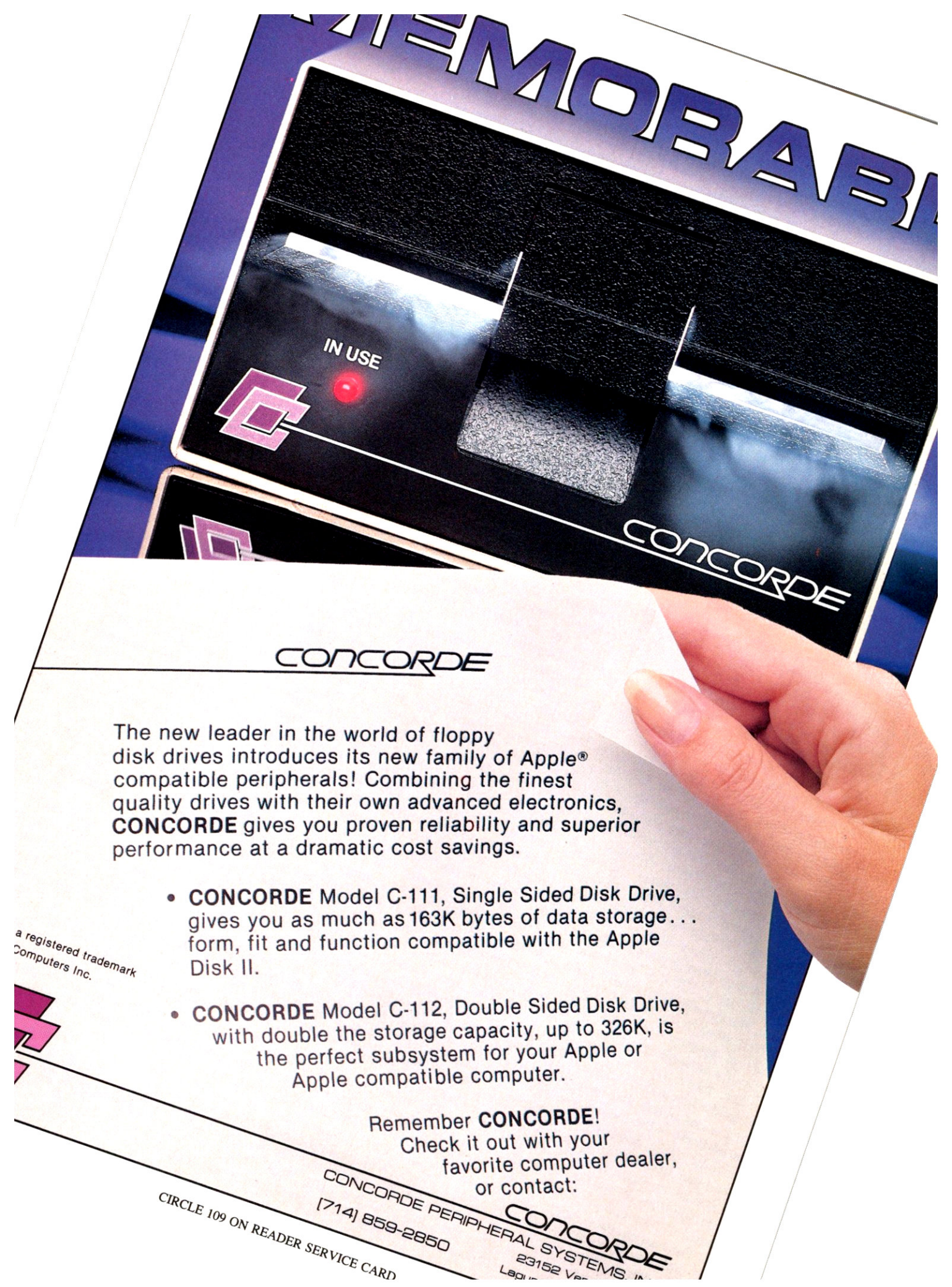
The ability to run the software written for the IBM PC and PCjr is becoming increasingly important—software developers are clamoring to exploit the new markets that the IBM products are creating. Because the IBM PC is based on the pseudo 16-bit processor, the Intel 8088, we include an article on an 8088 board from ALF. This, as do several boards still in development, enables you to take advantage of the IBM software library. Although it isn't nearly as extensive as the Apple's library of software, it's reassuring to know that you can use those products if you need to.

Another microprocessor, the Motorola 68000, is popularly recognized as one of the most versatile and powerful chips being used in computer systems today. As a result, several companies have now created boards containing a 68000 that you can use on your Apple computer. These new 68000 cards open up yet another growing universe of software that is being developed for systems based on the Motorola processor.

Apple in Orbit

Also in this issue, join Patty Winter as she covers the historic launching of the SpaceLab in the ninth space-shuttle mission, which took an Apple along for the ride to perform scientific experiments.

Maggie Canon



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CIRCLE 109 ON READER SERVICE CARD

LETTERS TO THE EDITOR

Dear *A+*,

Thank you for including our press release on GradeCalc in your magazine. We have had a number of positive responses. Our business phone number was printed incorrectly, however, and this has made a few of our customers a little upset in long distance phone calls. The correct phone number is (406) 821-4596.

Jeri Prowse
Tamarack Software
Darby, MT

Dear *A+*,

The article "Appleweave" by Paulina Boorsook and the Weave Program itself are quite interesting. There is a typographical error in the listing. It occurs on page 127 in the 13th line:

```
60BC: 0D 2E 03
```

should be

```
60DC: 0D 2E 03
```

I would like to suggest one change in the Applesoft Driver. Replace line

```
9000 END
```

with

```
9000 PRINT CHR$(7):GET
   A$:HGR:TEXT:HOME:END
```

This will cause the computer to "beep" after the design is displayed, and when any key is depressed, the high-resolution screen will be cleared and switched to the text screen, which is cleared, and then the program ends.

John A. Wenzel
Michigan

Dear *A+*

In reference to your volume 1, issue 1, *A+* Dispatches article, "A Matter of Policy" (pp. 24–25): Your statement that ". . . no insurance firm appears to be offering a stand-alone personal computer policy . . ." seems to be in error. The Chubb Group of Insurance Companies through Emett & Chandler (the thirteenth-largest insurance broker in the United States) is offering an "Insure Your Apple" policy. For an easy and affordable rate (I paid only $25 for the year), dependent upon the amount of coverage you need, you can insure your entire Apple system, hardware, software, and accessories for up to a maximum of $25,000. Only your computer need be an Apple, and all other hardware and software accessories will then be covered. If a loss occurs, the insurance company will pay for repair or replacement *without deduction for depreciation*. Your system is covered in your home, in transit, and anywhere in the world for direct physical loss, including earthquake, flood, electrical and mechanical breakdowns due to external blowouts, electrical surges, or power failures.

The deductible is $100, and the company gives you a letter when you sign up for the insurance that waives this $100 deductible only on your first claim. The company covers your Apple system from the date your application is postmarked. This insurance coverage certainly seems to meet the needs of almost anyone who owns an Apple system and exceeds the coverage available on most homeowner's policies (which not all of us have if we do not own a home!).

Your authorized Apple dealer should have the application forms in his store (basically you need your Apple's serial number, a check, and an idea of how much your system is worth, so you can choose the proper amount of coverage). My Apple dealer called Emett & Chandler with a question I had, and the Emett & Chandler personnel were quite helpful.

Janet M. Calvert
Bloomfield, NJ

Dear *A+*,

I just finished browsing through the first issue of *A+*. Congratulations on the debut of this interesting, much needed publication.

Unfortunately, I must lodge one complaint. Your hardware review of Apple-compatible printers ignored one of the giants of the industry: our client, the Okidata Corporation.

Depending on whose figures you hear, Okidata has the largest share of the printer market, or the second largest behind Epson. Okidata is compatible with Apple computers and even offers an optional "Plug 'N Play" module to make interfacing simple for even the novice computer user. Your readers deserved to know that.

Thanks for your consideration, and continued success with *A+*.

Timothy Kelly
Account Executive
Shimer vonCantz, Inc.
Philadelphia, PA

Thanks for alerting us to Okidata. Look for coverage in future issues of A+.
—Editors

Dear *A+*,

I read with great interest the article by Charlie Allen on 128K RAMcards for the Apple II family in the December '83 *A+*. As a user of several of these products and related software both at home and at work, I can say that it is an excellent article and that I agree with practically all of Mr. Allen's observations.

I am writing because I feel that Mr. Allen overlooked the most innovative product in the field. Since there are many more cards than those mentioned and this one comes from a small new company, I can understand the omission, but I hope you will publish this letter and thereby correct it. The card of which I speak is the Know-Drive, manufactured by Abacus Enterprises, P.O. Box 1836, Detroit, MI 48231 (313) 524-2444.

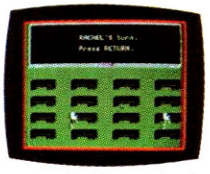
Large-capacity RAM expansion cards for the Apple II family use two kinds of bank-addressing protocols. Of the cards mentioned in Mr. Allen's article, those made by Titan Technologies (formerly Saturn Systems) and Vergecourt Ltd. (distributed in the U.S. by Omega Microware) use one; those made by Legend Industries use the other. The Alpha-Byte board mentioned in the article supports both by means of on-board jumper

The classic Milton Bradley games you loved as a child are now computer games for the whole family!

Remember how much fun you had as a kid playing Go to the Head of the Class and Game of the States? They were so much fun you didn't realize you were learning at the same time!

Now, Milton Bradley is proud to announce that these ever-popular educational games have been formatted for use with Apple II, IIe home computers.

GO TO THE HEAD OF THE CLASS



This highly competitive general knowledge game is designed for ages 8 and up. Players advance from desk to desk by giving correct answers to over 300 questions on vocabulary, geography, math and history. Three levels of play are available — junior, senior, or graduate — so the whole family can play at once!

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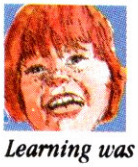
How much do you know about the 50 states? This game gives you five ways to find out: Name the State; Name the Capital City; Abbreviation Game; Name the Neighbors; and Major Cities.

Plus, Milton Bradley offers a variety of other exciting, challenging games, including Hey Taxi!, in which you become a Cabbie; Extra! Extra!, a reading skills game of news reporting; and Put Together, Take Away, that pits your child's knowledge of addition and subtraction against the clock.

For more information on these new fun-filled games, or on any of Milton Bradley's quality educational products, call Bev Oski at 1-800-628-8608.



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CIRCLE 228 ON READER SERVICE CARD

selection. The Know-Drive supports both also, but it does it by means of an optional external switch, so that you can use software designed for either protocol with equal ease.

This ability may seem unimportant until you use the different software. If you are using VisiCalc (as opposed to, say, MagiCalc which supports a mixture of both types of cards) you may want to use Omega's Super Expander Plus preboot because of the many advanced features it adds. Omega's RAMcard software is usable only with Saturn cards. For disk emulation under DOS 3.3 there may be good reason to use a disk emulator that runs in the "Legend" mode, such as the one furnished with the Know-Drive. In addition to a super-fast DOS, it provides a fast RAMcard upload utility that automatically transfers all 31 data tracks plus the catalog of any normally formatted, unprotected Apple disk to the RAMcard on boot. The entire operation takes only 18 seconds and does not require adding lengthy files to the disk to be uploaded.

By the time you read this, Abacus should also have a CP/M disk emulator compatible with Microsoft's Softcard and Applied Engineering's Z80+ card. Unlike the others I am familiar with, this one will support both Version 2.20 (the version that provides 56K on 64K Apples) and Version 2.23 (the 60K version).

Abacus is not content to stop there. Already available is Play-back, a program that makes use of the Apple's non-maskable interrupt line in conjunction with the Know-Drive to allow making backup copies of many protected programs. It is one of the most ethical backup schemes I know of, since the copies only run on a system with a Know-Drive, and then only if the card is in the same slot as the one in the system on which the backup copy was made.

There are two more reasons why I feel so positive about the product. The price, although not the lowest of any Apple RAMcard, when considered along with all the features, clearly makes the Know-Drive the best value. And the service rendered by Richard Lee is absolutely second to none. Since becoming an Apple owner I have had some favorable experiences with support from vendors and some unfavorable ones, but Mr. Lee stands out! Once he even called me long distance at his own expense and transferred some software to me via modem to help me out.

Dan Strassberg
Arlington, MA

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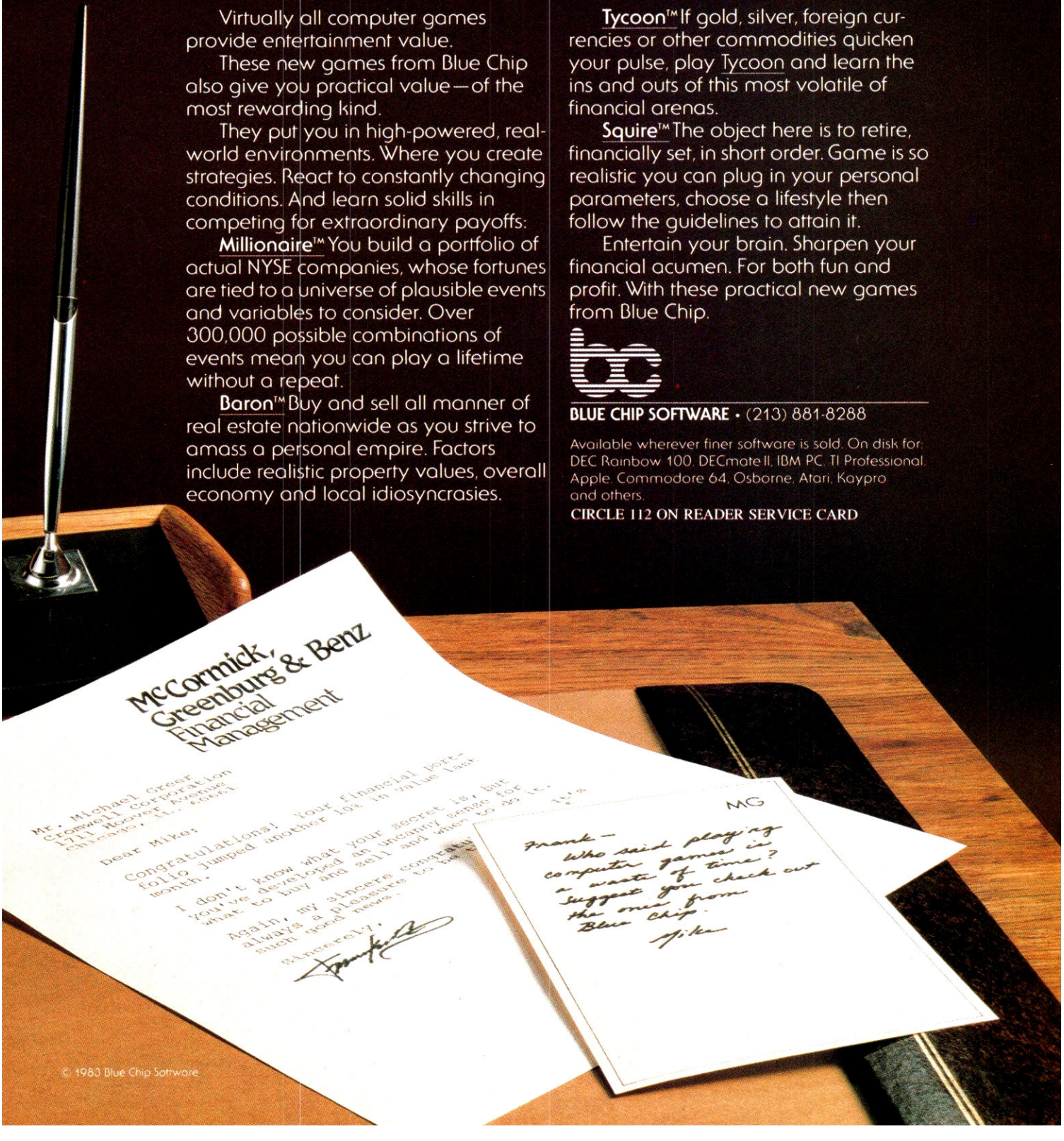

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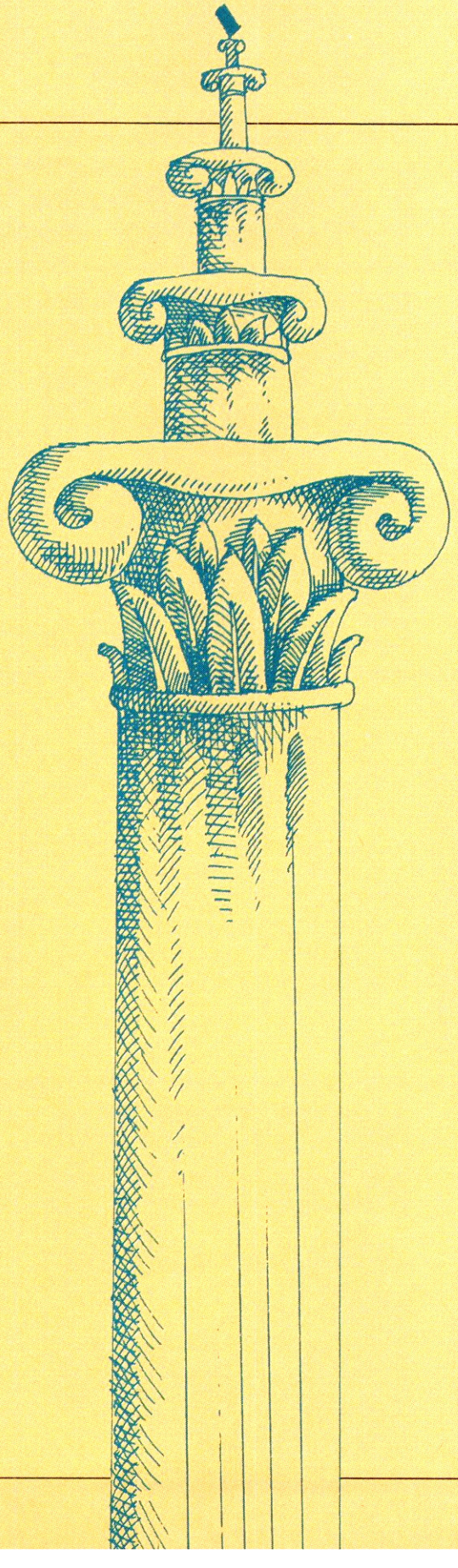
A+ DISPATCHES



WHEN THE CHIPS ARE UP

If you have any doubt that we've entered the age of the computer, a short list should dispel any uncertainty. According to *Fortune* magazine, 8 of 11 items it labeled as Products of the Year depend on the humble microchip for their success. The winning products are:

- Lotus 1-2-3, a software package that integrates word-processing, accounting, and database-management programs, by Lotus Development Corporation
- Digital Disc Player by Sony Corporation of America and N.V. Phillips of the Netherlands
- Kodacolor VR 1000 film by Eastman Kodak Company
- Cellular Mobile Telephone by Ameritech Mobile Telephone, a subsidiary of AT&T Corporation
- The PCjr by IBM Corporation
- The Lisa by Apple Computer, Inc.
- Nuclear Magnetic Resonance machines, which use magnets to form images of human tissues.
- Bravo! an application program by Applicon, Inc.
- Chocolate chip cookies by Duncan Hines
- Today Contraceptive Sponge by VLI
- The Mini-Van by Chrysler Corporation.

A CURE FOR HACKING

Seymour Papert, professor of mathematics and education at MIT and the inventor of the educational language Logo, took hard-liners on the hacker issue to task at the recent Computer Security Conference. Our goal as a society should not be to punish young computer "experts," involved in illegal activities or not, but to help them express their knowledge, he said.

Since hacking is a response to being excluded from other pursuits, said Papert, we should adopt the ideal of a computer for every child, not just the economically advantaged. Doing otherwise will further divide the United States into haves and have-nots.

"We now have in this country one computer for every 150 children," he said "That's not enough to make a difference in anyone's life."

APPLE SERIAL CARD III

For Apple III users who need to use more than one serial communications device, Apple Computer has announced the Apple Serial Card III.

The card fits into one of the Apple III's internal slots, enabling a person to communicate, using a variety of modems, plotters, printers, and other serial RS-232 communications devices without changing the system's cable arrangement. You can use up to four cards at once, depending on your communications needs. With the Apple Serial Card III, you can print documents, plot graphs, and communicate via modem simultaneously. The card costs $225.

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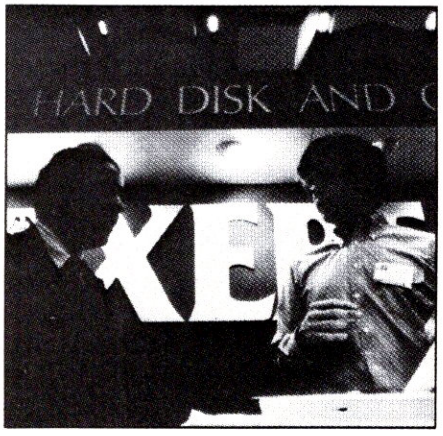

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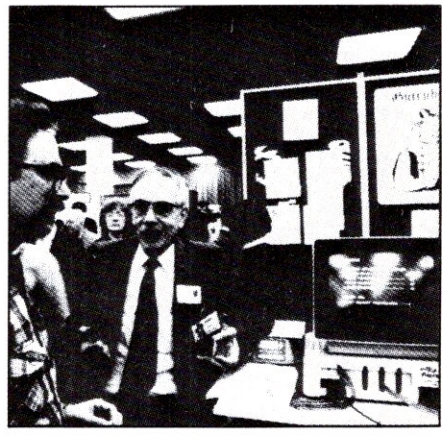

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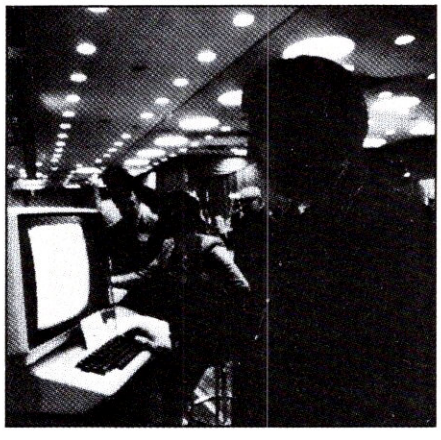

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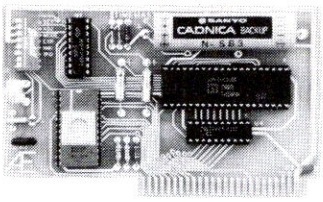

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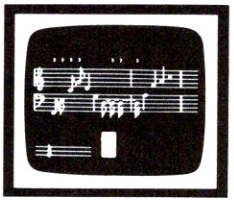

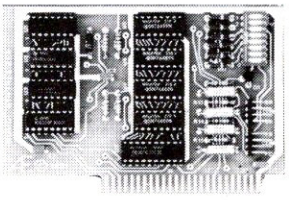

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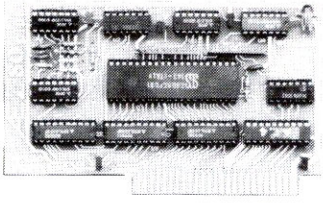

- TOTALLY compatible with ALL CP/M software.
- The only Z-80 card with a special 2K "CP/M detector" chip.
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- Specifically designed for high speed operation in the Apple IIe (runs just as fast in the II+ and Franklin).
- Red "CP/M WORKING" LED indicator, the Z-80 Plus does not interfere with non-CP/M programs.
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- Does EVERYTHING the other Z-80 boards do, plus Z-80 interrupts.

Don't confuse the Z-80 Plus with crude copies of the microsoft card. The Z-80 Plus employs a much more sophisticated and reliable design. With the Z-80 Plus you can access the largest body of software in existence. Two computers in one and the advantages of both, all at an unbelievably low price.

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VIEWMASTER	**169**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**
SUP'RTERM	MORE	NO	YES	NO	NO	NO	NO	YES	YES
WIZARD80	MORE	NO	NO	NO	NO	YES	NO	YES	YES
VISION80	MORE	YES	YES	NO	NO	YES	NO	NO	NO
OMNIVISION	MORE	NO	YES	NO	NO	NO	NO	YES	YES
VIEWMAX80	MORE	YES	YES	NO	NO	YES	NO	NO	YES
SMARTERM	MORE	YES	YES	NO	NO	NO	YES	YES	NO
VIDEOTERM	MORE	NO	NO	YES	NO	YES	YES	NO	YES

The VIEWMASTER 80 works with all 80 column applications including CP/M, Pascal, WordStar, Format II, Easywriter, Apple Writer II, VisiCalc, and all others. The VIEWMASTER 80 is THE MOST compatible 80 column card you can buy at ANY price!

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- PRO-DOS will use the MemoryMaster IIe as a high speed disk drive.
- Lowest power consuming 128K card AVAILABLE.
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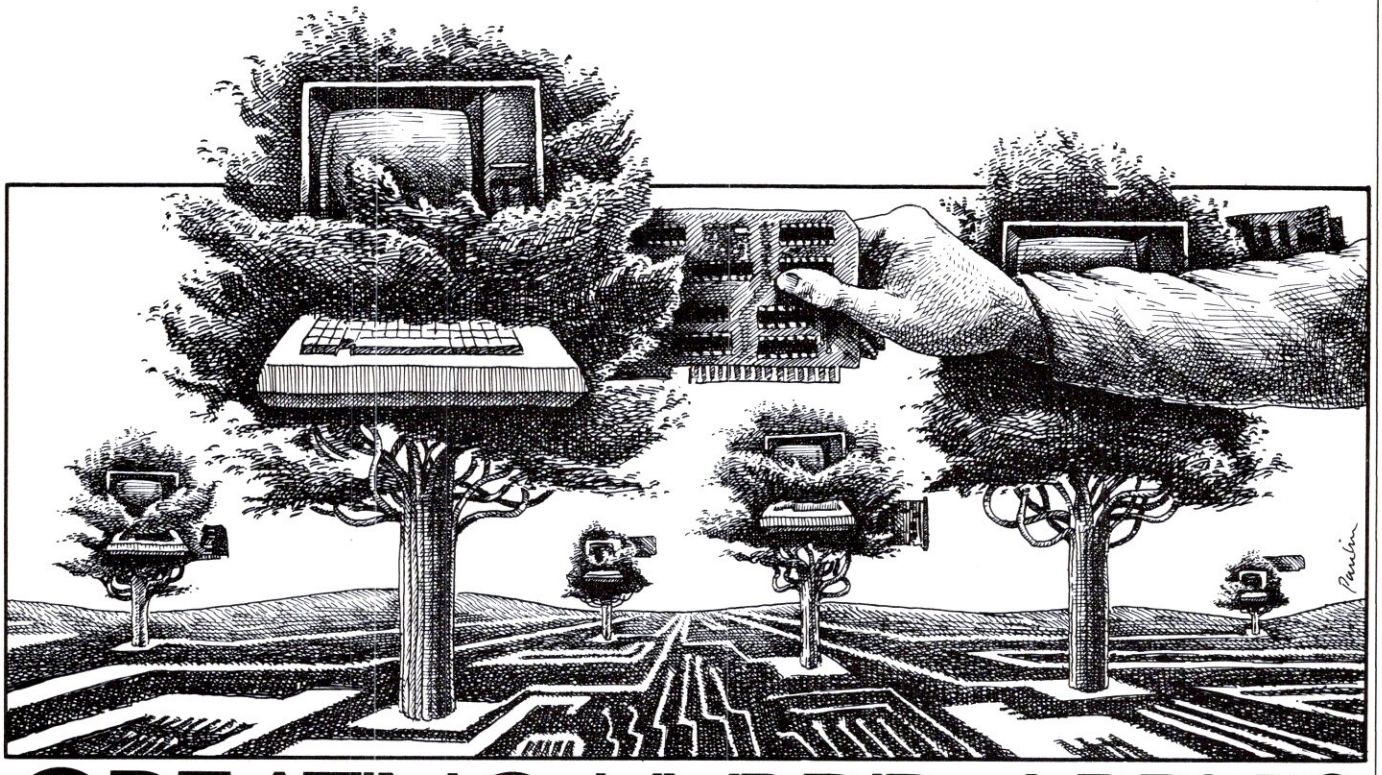

CREATING HYBRID APPLES

Out in nature's apple orchards, growers often find they can produce a better crop by crossbreeding or by grafting two varieties together. You can do the same with your Apple computer.

If you combine your existing Apple with an add-on processor board, you can produce a more useful, durable, and speedier machine without sacrificing much of the computer's original accessibility and ease of use. You can also continue to make use of the experience you've accumulated on your Apple thus far. In most cases, the cost of upgrading your computer is small compared to the cost of starting over.

Furthermore, the trend in personal-computer design is to emphasize flexibility and universality. An increasing number of machines initially contain more than one processor, and many offer a coprocessor option. As software continues to become more important than hardware, manufacturers are realizing that the central processing unit (CPU) chip is one of the least expensive and least crucial parts of the total system—rather than build the identity of a system around a specific chip, it's better to fit chips into a total overall design. And if one microprocessor chip is good, two might be even better.

Soon, you'll be able to do the equivalent of genetic engineering.

If you have an Apple II family computer, the CPU already contains a 6502 microprocessor chip. One of the ways to enhance your system is to add another microprocessor chip as a coprocessor.

As in nature, there are several ways you can make the combination. You can cross your Apple with other computer varieties to produce a hybrid that is more useful than either one alone, or you can keep your Apple as the rootstock and add a new processor as a graft on top. Fairly soon, you'll be able to do the equivalent of genetic engineering to upgrade your current central processor.

Processor Combinations

Hybrid Apple combinations are the most popular, because you retain your Apple's existing good qualities, as well as adding new ones, such as the Z80 CPU or the more recent 8088 and 68000 varieties.

The Z80 combination is particularly popular because it supports the code you need to run programs that depend on the CP/M operating system. This operating

system is a distant cousin of the DOS that the Apple uses, and both were designed to support floppy disks, a user at a keyboard, a printer, and a few other input and output devices.

Although you can find thousands of programs for the Apple, many programs come only in CP/M versions. Many business applications, such as accounting packages, are written for CP/M rather than Apple DOS, as are many compiler programs for high-level languages.

You need a Z80 card to run these programs because not only CP/M, but also the programs themselves, are written with the instructions for the Z80 processor (or the subset used on the 8080 chip). Therefore, even if you could get the Apple's 6502 chip to simulate the operation of CP/M, it would not know what to do with the program code. Running a program by simulating the operation of the Z80 hardware with 6502 hardware might be a useful way for you to learn about a new chip, but it is not a viable way to get work done on an everyday basis—a simulated operation typically takes 10 to 100 times longer than a straightforward one.

Once you plug in a CP/M card and boot your system, you can operate your Apple as though it originally had been designed with a Z80 chip. It behaves as though you had a Z80 CP/M computer that just happened to have Apple disk drives, keyboard, screen, and maybe a printer. Inside, however, most cards still use the 6502 for input and output, and the Z80 handles CP/M and the application program.

A few cards are available that let you pass information directly between the Z80 and the 6502, but not many programs have been written to exploit this ability. Most cards, however, do include utility programs for transferring data between Apple DOS and CP/M.

CP/M Varieties

During the last year, companies that make boards for the Apple have begun to offer two different types of CP/M cards. The original cards contain a Z80 and the circuitry needed to allow it to plug into and run on the Apple. These cards use the Apple's existing memory, along with some on-chip, read-only memory. Cards from established companies include a copy of the most popular version of CP/M for the Z80, CP/M 2.2.

You can also buy a basic Z80 card and purchase CP/M directly from its maker, Digital Research. The structure of the licensing fees, though, is such that it is cheaper for hardware manufacturers to include CP/M with their products than for you to buy a copy directly. In addition, if you buy CP/M yourself, you have to run through a complex installation procedure.

Now that memory is becoming less expensive, Digital Research has released a new version of CP/M that keeps track of more than 64K of memory. This version, known both as CP/M 3 and CP/M Plus, can use extra memory either to speed up disk processing or to run programs longer than 64,000 bytes. CP/M 3 also runs programs, unchanged, that were originally for CP/M 2.2.

Apple coprocessor cards for CP/M Plus generally contain an additional 64K of memory. With the existing Apple memory, the total size of the CP/M system's memory is 128K. The added memory is particularly important on the Apple, since you can use it to speed up disk accesses. In addition, some companies use memories that allow a fast Z80B chip to run at full speed when it accesses the card's on-board memory and to slow down for the slower memory in the Apple.

The added memory is particularly important on the Apple, since you can use it to speed up disk accesses.

Adding an 8088

Since the arrival of the IBM PC computer, a lot of software has been written for the chip family that it uses. These chips include the 8086, 8088, 80186, and 80188. The PC actually uses the 8088, but the other chips all run the same software.

The 8086 family of processors execute instructions in the same way, but they are built slightly differently. The 8088 processes 16 bits internally but reads and stores data 8 bits at a time. The chip makes two, successive 8-bit transfers when it transfers a full 16-bit value. You'll see claims that cards using the 8086 run faster than others, but their speed depends heavily on how much the program handles input and output functions, how much it refers to memory, and how much it manipulates data in the internal registers.

Apple coprocessors based on the 8088 are just starting to appear, so no design is standard yet. Some boards attempt to emulate the IBM PC, and others run the CP/M-86 and MS-DOS operating systems but can't necessarily run software written specifically for the PC.

It's not easy to run PC software on an Apple, even if you have a coprocessor that can handle the instructions correctly. Most programs for the IBM PC depend not only on the PC-DOS variety of Microsoft's MS-DOS operating system, but they also use routines that are built into the PC's ROM chips.

Other companies can buy MS-DOS, and many are now using it for other 8088-based computers. The differences between MS-DOS and PC-DOS are not great, and most programs won't find them a problem (you can patch standard MS-DOS to eliminate the few problems when they occur). MS-DOS's output routines, however, do cause problems.

MS-DOS, like the original CP/M on which it was based, has no provisions for graphics or other fancy forms of screen output. One of the main attractions of using computers such as the Apple or the IBM, though, is that they can take advantage of the advances that have been made in display technology since the introduction of the standard teletypewriter. Thus, most programs written for the IBM PC bypass the MS-DOS output routines entirely.

To produce a nice display, most IBM programs lean heavily on the graphics routines in the PC's ROMs and on the peculiarities of the IBM video-output circuitry. Without duplicating this circuitry or illegally copying the ROMs, you'll have trouble obtaining the same output performance. Although the Apple also has screen graphics and its own set of ROMs, these are not compatible with the IBM variety, so you can't easily duplicate the IBM video system on the Apple.

Some programs for the IBM PC use CP/M-86 instead of MS-DOS. At first glance, this operating system looks just like CP/M for the Z80, but it is actually coded in the instructions of the 8088 and 8086 family. Although CP/M-86 is less popular on the IBM, many brands of 16-bit computers use it, and a large amount of business-oriented software runs under it.

As with MS-DOS, the standard output routines for CP/M-86 assume that you have a teletypewriter or simple video terminal, so programs that run on CP/M-86 should run well on Apple-and-coprocessor combinations. Some programs for the IBM version do make use of the peculiarities of that machine,

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Software manufacturers are increasingly offering their IBM-oriented software in versions that can run on standard MS-DOS- or CP/M-86-based systems and are also offering other custom versions for specific 8086-family machines. If enough people add 8088 coprocessors to their Apples, you'll soon see some 8088 software in special Apple versions.

A Coprocessor's Coprocessor

Once you start adding additional computing power to your Apple, you don't have to stop at just a new CPU. Some of the advanced processor chips can work with their own coprocessor—your 6502's assistant can have its own helpers. The most common of the "co-coprocessors" is a math chip.

Although an 8088 chip is better at arithmetic operations than a Z80 or 6502 chip, the mathematical abilities of this chip are still small. You need lengthy software routines to perform most calculations based on floating-point numbers (ones with fractions or decimal points), since the chip is limited to a few built-in arithmetic commands.

A chip such as the 8086 or 8088 is already internally complex, so it's not possible to internally add the circuitry for more complex math at this time. To speed up the processing of applications that require a lot of calculation, the 8086 chip family's designers instead use an external chip.

A companion chip for the 8086 family is the 8087, which specializes in fast mathematical operations. Depending on the exact operation, this chip can do some calculations 100 times as fast as an 8086 that is using software, which in turn is several times faster than the Apple's 6502.

For the Apple, you can already obtain an 8087 as a companion to the ALF 8088 Processor Card (see "The 8088 Card," pp. 58-62). Used as a math processor for speeding up Applesoft, the 8087 chip tremendously improves the rate at which you can calculate mathematical routines such as multiplication, division, and trignometric functions. It can also speed processing in MS-DOS and CP/M-86 programs. Manufacturers have announced other coprocessor chips for the 8086 family, although none are popular choices yet as Apple add-ons. During the next year or two, you might be able to buy co-coprocessors for video display, input and output, and storage and disk control.

Try the 68000

Despite IBM's selection of the 8088, many people feel the Motorola 68000 family is a superior choice for personal-computer design. For example, Apple's Lisa and Macintosh models use these chips.

The 68000 family is based on a chip that uses 32 bits internally, which gives it still more processing power than chips that have an internal 16-bit architecture. More importantly, it handles large amounts of memory more easily, and it is better at complex tasks that require it to keep track of several parts of programs simultaneously. Software developers thus require less effort to write complex programs—which should result in better and less expensive software.

The UNIX operating system, which has long been a favorite of minicomputer users at universities and research departments, is one program that is easier to use on the 68000. You can already buy UNIX for the Apple Lisa, and, eventually, you should see a version for the Apple II family with a 68000 coprocessor. Even though the Apple II might not

Some of the advanced processor chips can work with their own coprocessor.

be the optimal machine for UNIX, you could then expand the software available to you once again without investing in a new machine.

As with the 8086 family, 68000-family chips come in various models, including models that use an internal bus-interface unit designed for an 8-bit data bus. The original 68000 chip uses a 16-bit data bus. The QWERTY Q68K board (discussed in "68000 × 3," pp. 46-50) uses the 68008, and the PDQ II and Saybrook boards use the 68000.

At present, even though it can run UNIX, the software available for 68000 systems is limited, and this will be true for a while yet. There are many minicomputer UNIX programs that can be brought over to the 68000 for use on personal computers, but the process will take a while. Many of the personal and departmental-size computers that use the 68000 are aimed at commercial or industrial markets, and their software tends to cost much more than software for personal or ordinary office use.

One of the main reasons to buy a 68000 coprocessor for your Apple II might be to exploit the situation and

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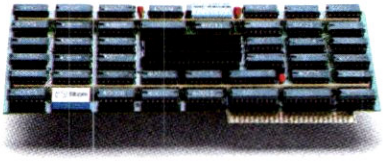

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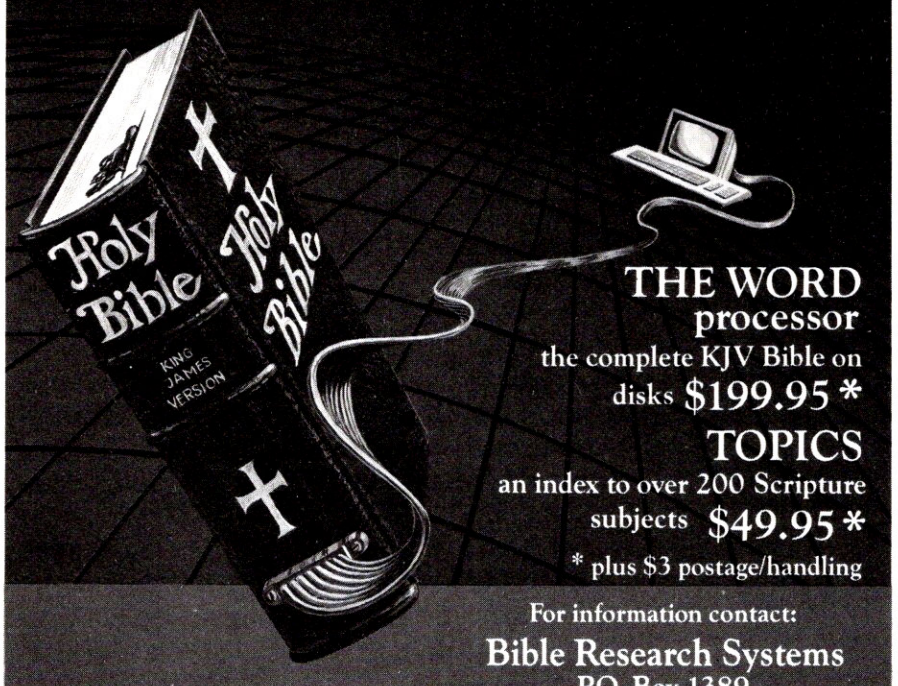

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write some software. The makers of all three 68000 boards we looked at think that software developers comprise the most important part of their initial market.

Reengineering the CPU

In some machines, the microprocessor chip is on a plug-in card, but on the Apple, the CPU is built into the main board. If you want to change the CPU, the only easy route is to change the chip.

Until this year, no other processors could plug into the 6502 socket on your Apple and replace that CPU chip, but, sometime this spring, the first such chip should make its appearance. This chip, the 65816, operates as a normal 6502 unless you tell it otherwise. With a single instruction, however, you can tell the 65816 to shed its 6502 appearance and operate as a full 16-bit computer. Since the 65816 can't operate as both a 6502 and a 16-bit chip simultaneously, it is not, strictly speaking, a coprocessor. In practice, it's as though you had two chips running in tandem.

The advantage of this method of extending your Apple is that the hardware should be inexpensive (you only have to change the chip, which should cost under $50). The 65816 chip won't require special software since it mostly uses existing 6502 code, adding and converting only the sections for which 16-bit performance is necessary. The chip's low cost will make it possible for many Apple owners to make the upgrade, thus providing many inexpensive development systems to write software that makes increasing use of the 16-bit instructions.

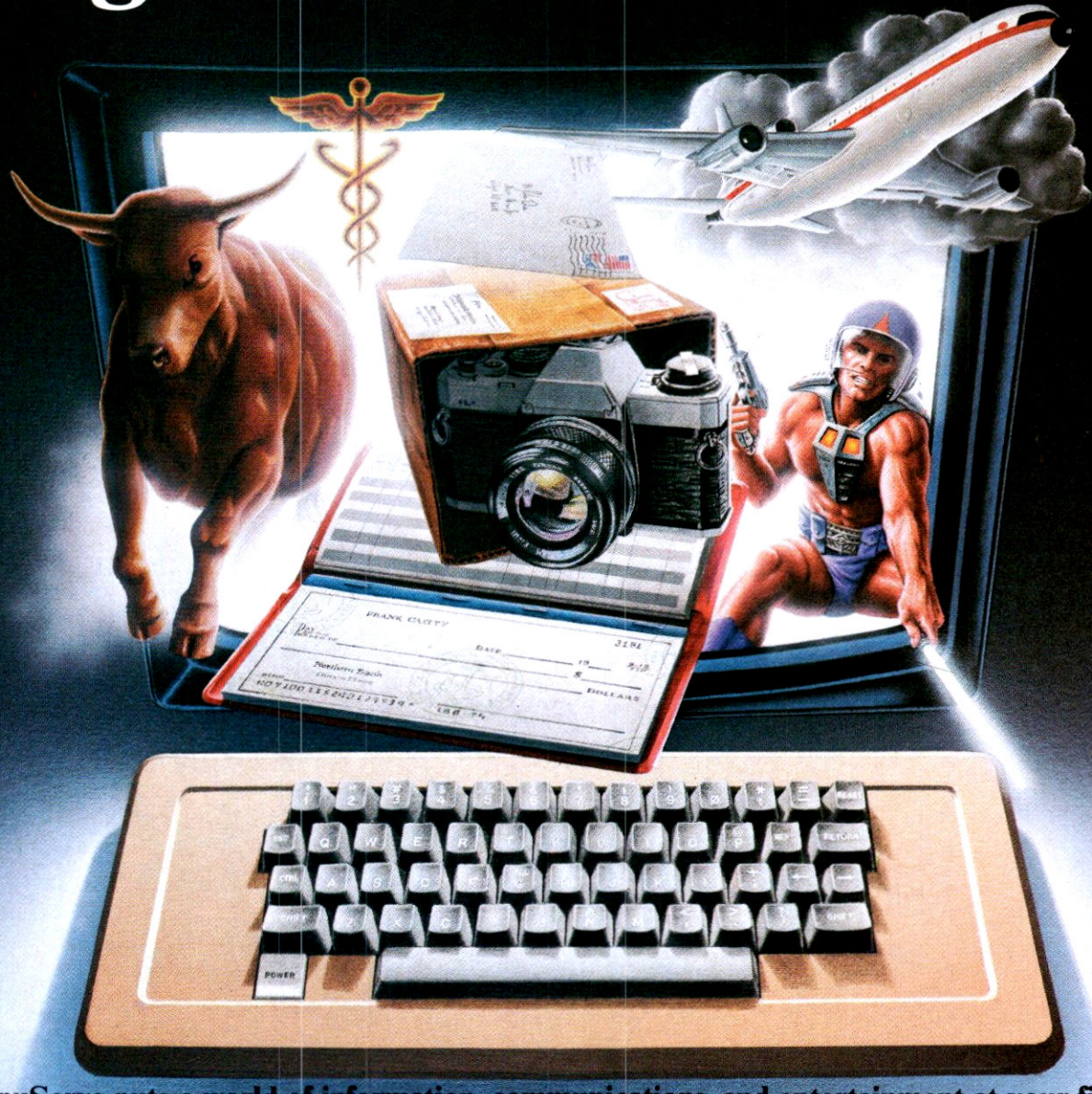
Expressing the Potentials

Adding a coprocessor can enable you to use new types of programs or speed up your calculations, but it won't totally transform your Apple. If you want maximum performance, you'll still need to add a hard disk for faster data transfer and one of the add-on higher-resolution video cards.

A+ has started to cover some of those possibilities and will continue to do so. In past issues, we've discussed voice input and output and keyboards. In the months to come, we'll also bring you information about hard disks for your Apple and telecommunications.

Even the smallest Apple can be worthwhile, but, if you have the need, the inclination, and the resources, you can make your Apple grow. If your Apple's case is unbowed, the drives are still running and its monitor still bright, your Apple can blossom. ✚

We don't care which computer you own. We'll help you get the most out of it.



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COVER STORY/BY MAGGIE CANON AND STEVE ROSENTHAL

A+ takes a look at the newest apple on the tree—the Macintosh.

By now you have seen or heard of it, either in a commercial or at your local computer store. You may also have heard lots of rumors that speculated about the new computer's microprocessor, amount of memory, and even the correct spelling of its name—Macintosh—and now it is official!

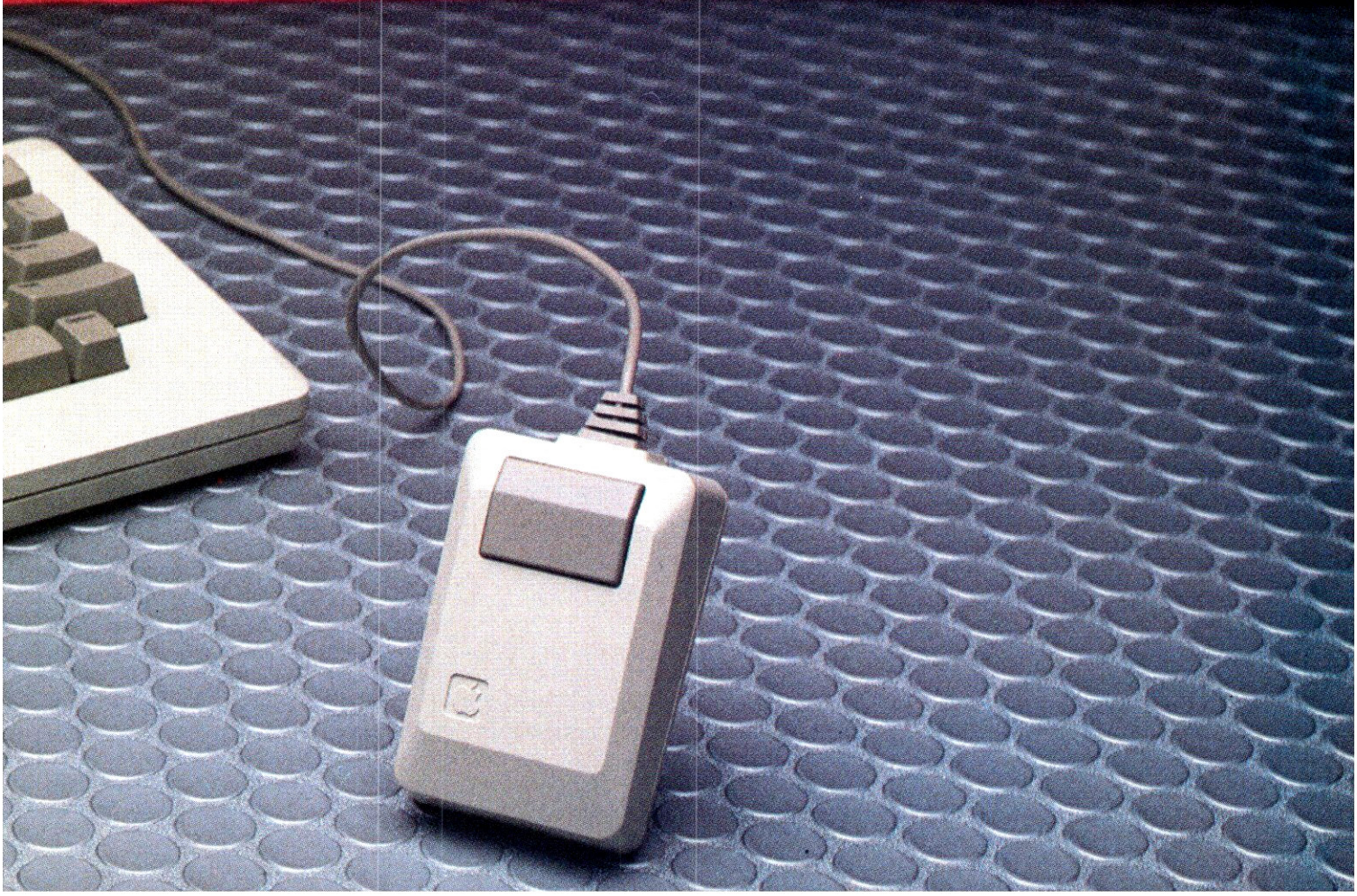
Like the IBM PCjr, the Macintosh has aroused much anticipation in the computing community. During the fall of 1983, Apple Computer invited *A+* to come view its new product. Although the Macintosh was yet to be completed, we got a good idea of what it would offer.

Mac, as the machine is affectionately called, is small, weighing in at a transportable 21 pounds. The system consists of a 9-inch black-and-white monitor in a tan casing that houses the Motorola 8-MHz 68000 microprocessor, a Sony 3½-inch disk drive, and 128K of memory. The system comes with a mouse cursor controller and a detachable keyboard. On the back of the monitor are five I/O ports including a sound port, two serial-interface ports (RS-232 and RS-422) for a 230K-baud modem and a printer, a disk-drive port and a printer port. You can get the Macintosh and its resident operating system for $2495. For an additional $99 you can buy MacWrite and MacPaint. MacPaint is the Macintosh version of LisaDraw, the exceptional drawing program for Macintosh's cousin, the Lisa. MacWrite is a basic word-processing program. Apple's goal in developing the Macintosh was to bring the Lisa technology down to the level of ordinary businessmen by making a more affordable version. The company has accomplished its goal—the Macintosh is a little Lisa.

Macintosh is an innovative product that offers consumers an alternative to what is safe but ordinary. Apple Computer is committing itself to the new and as yet unproven mouse technology because it believes that the mouse can help uninitiated users use the computer quickly.

The mouse is a separate device, about the size of a deck of cards, that you roll on any surface next to the computer. It has a key that you depress when you want to get at a file or move around on the screen. Apple first employed this novel technology in the Lisa. As with the Lisa, you use the Macintosh mouse in conjunction with the keyboard to point at and move the icons and files on the screen. This device is fun to operate once you get the hang of using it, but no one can offer conclusive evidence yet that it makes new users more comfortable with computers.

Although the Macintosh relies heavily on the mouse for input, you still have to use a keyboard to enter words and numbers. In Apple's view, however, the keyboard plays second fiddle. The Mac-



The system consists of a monitor, a 3½-inch disk drive, 128K of memory, a mouse, and a detachable keyboard.

intosh keyboard is a basic typewriter-style unit. Unlike some other recent keyboards, which are designed to meet the low-profile European standards, the Macintosh keyboard is nearly three inches high. The keyboard does not come with a numeric keypad, but a keypad is available as a separate unit with its own cord. The Macintosh keyboard has no special-function keys or arrow keys. Apple probably figured that you would use the mouse if you wanted to do any moving or pointing and that the typical Mac user is not likely to program special-function keys.

Although you don't get arrow keys on the keyboard, you do get separate Return and Enter keys. Separate keys do make sense (for use when you want to type in several lines of input before the program starts processing them), but some users may find them initially confusing. On most keyboards, Enter and Return are synonymous, and either key sends the code for carriage return. As part of the effort to keep the Macintosh small and lightweight, its designers equipped it with a 3½-inch disk drive. Although the diskette is the standard Sony design, the drive design and disk format are all Apple. Each disk stores 400 kilobytes of information (400,000 characters), which will accommodate most general office uses such as letters, reports, and financial spreadsheets.

According to Apple, the paramount concern in the disk-system design was reliability.

The 3½-inch diskette comes in a hard plastic shell instead of in a flexible envelope such as those that encase standard 5¼-inch floppies. The diskette's head opening is covered by a spring-loaded shutter when it is out of the drive, so you can safely carry or store it without a separate envelope. These disks are supposed to be so convenient that "you can stick them in your shirt pocket." From all reports, the Sony diskettes are reliable and virtually indestructible. Apple staffers have great fun demonstrating how well the diskettes hold up by throwing them back and forth to each other.

According to Apple, the paramount concern in the disk-system design was reliability. For that reason, the Macintosh will first be available with single-sided drives, but double-sided drives will be incorporated when the company sees this technology as more dependable.

The Macintosh lacks a color screen because color-screen technology is still too expensive to include in a low-cost system.

Like most recent Apple-designed disk drives, the Macintosh drive has electronic speed control to vary the rotation rate, depending on which track is being accessed. This system allows data storage at a constant high density on the entire diskette, even though a track near the center is much shorter than one near the outer edge of the diskette. In contrast, normal constant-speed drives must either squeeze data tightly together on the inner tracks or spread it out on the outer ones. The disk drive is relatively fast (500 kilobytes per second, which is twice the speed of a 5¼-inch disk drive and equal to the speed of an 8-inch drive) for a floppy-based system. It will probably suffice for most novice users, but most experienced computer users will want to purchase the optional external disk drive. Apple had not determined the retail price of this disk drive at the time of our meeting.

The Macintosh screen looks almost identical to that of the Lisa. It is a nine-inch, diagonal, 512 × 342-pixel bit-mapped, black-and-white display. It contains icons and files, as does the Lisa. The Macintosh lacks a color screen because color-screen technology is still too expensive to include in a low-cost system such as the Macintosh, according to Apple. Although the Macintosh has

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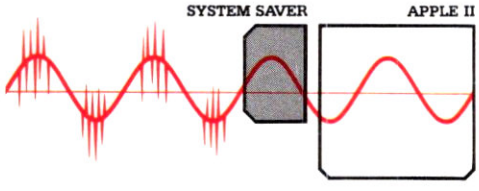

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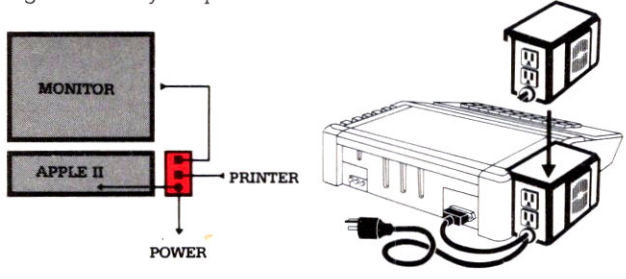

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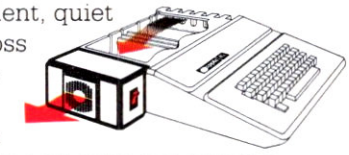

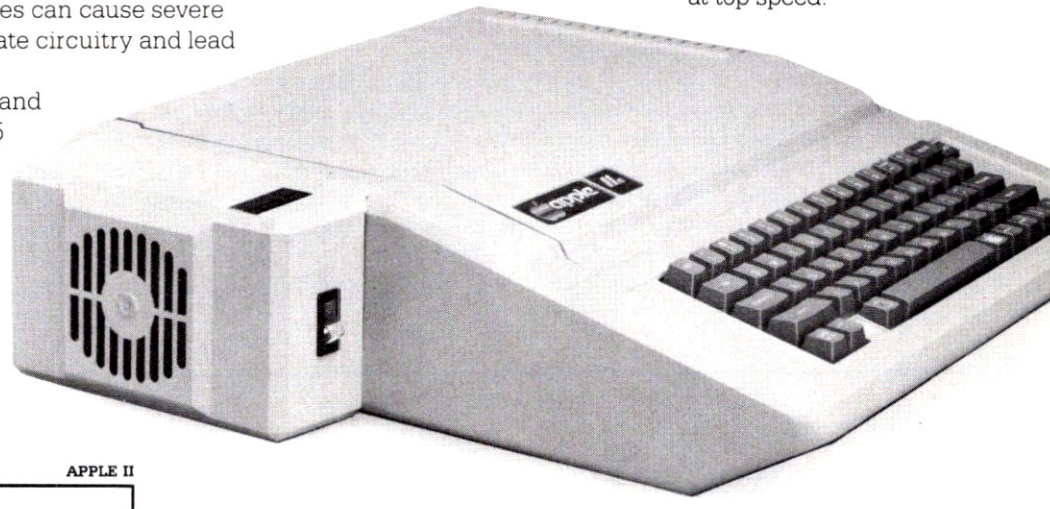

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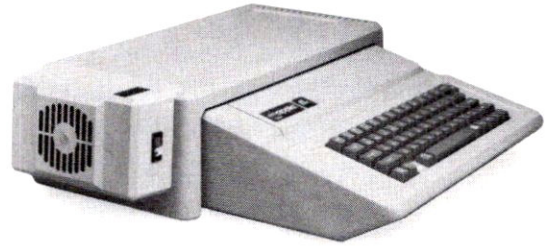

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CIRCLE 132 ON READER SERVICE CARD

*Softsel Computer Products Hot List. **PC Magazine. March 1983.

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the display hardware and processing power to provide windows, which give you several types of display simultaneously on the screen, Apple has chosen not to offer that mode of operation on its new computer. In Apple's view, if you want to work on two jobs at once, you should get a Lisa. The Macintosh is a single-user machine that works on one task at a time. You put away each task before starting a new one, although there are a few exceptions. You can pull a simulated desk calculator onto the screen without losing what you were doing, for instance.

Since the Macintosh has the same 68000 processor as the Lisa and the same high-density screen, future software offerings should be able to let the Macintosh show several tasks on the screen at the same time. We have already seen prerelease versions of software with windowing ability from independent vendors.

You don't have to know what's inside the Macintosh's case to use it, any more than you have to be intimately familiar with the gasoline engine to drive a car. But in case you're interested, here's some of what you'll find under the Macintosh's hood. The Macintosh is a single-board computer, with all its digital functions packed onto one small card. You don't have to make any internal adjustments, and in normal use, you won't ever have to open the case.

The Motorola 68000 32-bit microprocessor runs at a speed of 8 megahertz (eight million pulses per second). Sixteen RAM chips, each 64,000 bits long by 1 bit wide inside, provide 128,000 bytes of read/write memory. Two ROM chips, each of which holds 256,000 bits, provide the 64,000 bytes of permanent memory.

The Macintosh is a single-user machine that works on one task at a time. You put away each task before starting a new one.

A serial-communications chip and a parallel-interface chip help out with the input and output chores, but the machine needs no video coprocessor—the 68000 handles the screen formatting and display. Eight custom chips help hold everything together and speed up the inner workings.

The software available for the Macintosh was limited when we viewed the new product, but this computer will undoubtedly spur the development of many interesting new products.

MacPaint and MacWrite were ready for the Macintosh's introduction. MacPaint is an impressive program for creative artistic uses. MacWrite was not finished when we tried it, so it is not fair to judge the product, but what we saw seemed adequate for simple memos and letters.

Apple is determined to stay out of the software business at this time. The company will be developing tools for software developers such as MacPascal, MacBASIC, MacAssembler/Debugger, MacTerminal, MacProject, and MacLogo, but Apple emphatically states that it will depend on third-party developers to create the software market for the Macintosh. Apple says it has seeded more than 200 companies with Macintoshes

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CIRCLE 266 ON READER SERVICE CARD

The word is out on word processors. Format-II™ ranked number one.

We've always thought of Format-II as the finest, easiest to use word processor for Apple® II+, IIe and Franklin® computers. We're pleased that Peelings II magazine agrees. They judged Format-II best out of 18 leading word processors. Here's why:

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The Peelings II reviewer said, *"Format-II is one of the few word processors that is so comfortable and predictable, I would consider it as an addition to my small library of personal software."*

Peelings II Magazine Rating

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APPLE WRITER II™	8
PERFECT WRITER™	9
CORRESPONDENT™	10
SPELLBINDER™	11
MAGIC WINDOW II™	12
ZARDAX™	13
SUPERTEXT 40/80™	14
GUTENBERG™	15
WORD HANDLER™	16
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SANDY™	18

Reviewed by John Martellaro, September 1983, based on Peelings II rating system for performance and performance to price ratio.

In the words of the Peelings II reviewer: *"This is the best program I have seen for people who do a lot of work with mailing lists, form letters and short correspondence."*

An easy to follow manual.
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Put it all together. Then add features such as support of hard disk drives and a standard DOS text file format compatible with spellers and communications programs, and it's not hard to see why Format-II has earned the number one rating.

The words of the Peelings II reviewer sum it up: *"I cannot think of another word processor that would be better overall for business use."*

Thanks Peelings II. We couldn't have said it better ourselves.

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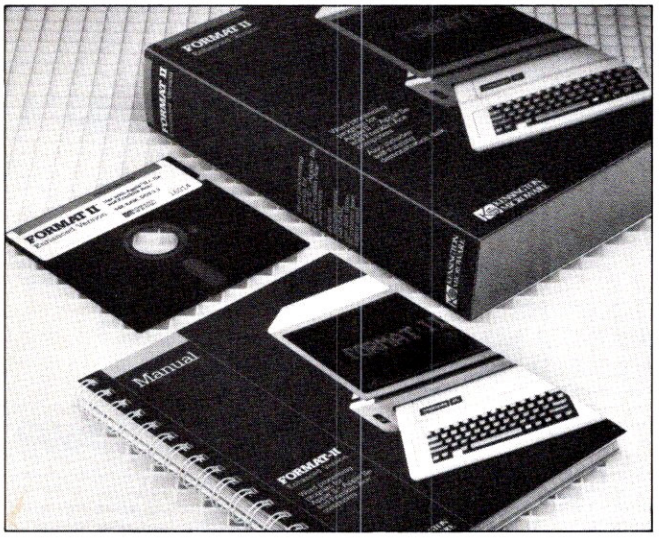

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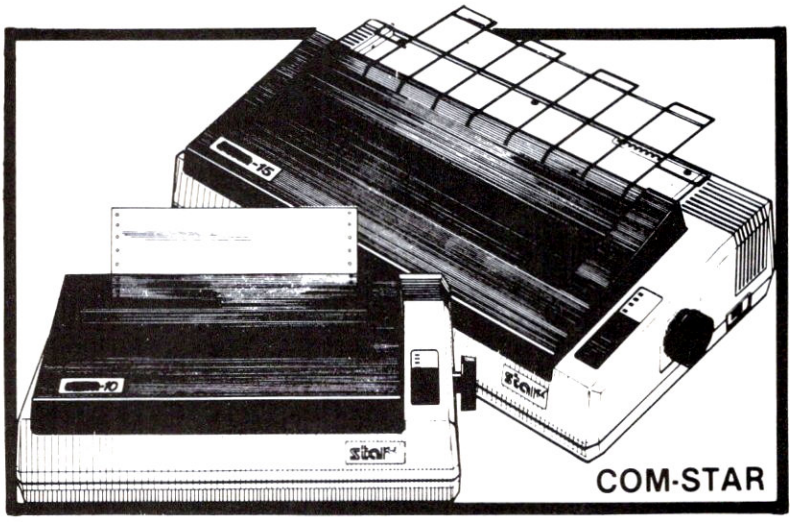
Format-II requires 64K and an 80 column card.

CIRCLE 277 ON READER SERVICE CARD



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and Lisas for software development. Some of the best-known companies are committing substantial resources to software development for the Macintosh. They include Microsoft, which will have Multiplan ready for the Mac when it is announced; Software Publishing, publisher of the popular *pfs* series; and Lotus Development Corporation, publisher of the hit 1-2-3 integrated-software package. Although Apple is staying out of the software business per se, it has built in the tools for a universal user interface so that products such as Multiplan can be rewritten to take advantage of the mouse and icons on the screen.

Contrary to some of the rumors that were floating around, the Macintosh can communicate with a vast array of products on the market today. Apple is well aware of the importance of communication within its own product line and with other manufacturers' equipment. The Mac will be completely compatible with the Lisa II, another new product which Apple announced when it demonstrated the Macintosh to us. It will also be able to communicate with the IBM PC and mainframe computers, as well as be able to transfer files from the Apple II and III product lines. The necessary communications programs were not all completed upon the Macintosh's introduction, but Apple expects to have them ready during 1984.

The Macintosh design team-members are, left to right, Andy Hertzfeld, Chris Espinosa, Joanna Hoffman, George Crow, Bill Atkinson, Burrell Smith, and Jerry Manock.

The Lisa II, code-named Pepsi (for those of you who don't get this inside joke, it refers to the previous job of Apple's new president, John Sculley—he was president of Pepsi Co.), will have an internal ten-megabyte Winchester hard disk and will also house a 3½-inch Sony disk drive, creating the compatibility with the Macintosh. Both machines are based on the 68000 microprocessor and both use bit-mapped graphics; they also feature a similar method of operation. The Macintosh is limited to 128K of user memory, however, and has no slots for hardware expansion. The Lisa can work with close to one million bytes

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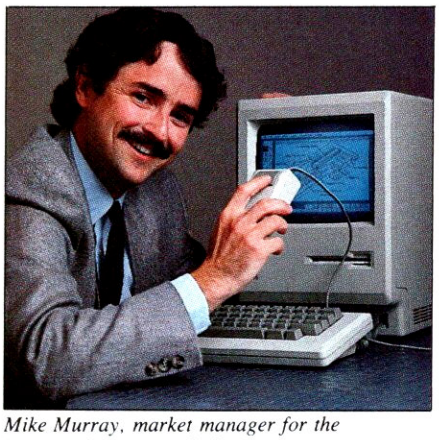

Mike Murray, market manager for the Macintosh, poses with the new computer.

of user memory, has expansion slots, and is multitasking and multiuser. Apple's plan obviously is to offer companies a full line of compatible products, which is the strategy that has made IBM so successful.

Many large computers and networks cannot communicate with personal computers such as the Macintosh, but they are able to communicate with one or more common terminals. Thus, one program that Apple is developing for its new machine is the MacTerminal "terminal emulator." This software package lets the big machine think it's talking with a simple terminal while letting you make use of at least some of the power of the Macintosh.

The first release of the MacTerminal will directly mimic the DEC VT100 and the IBM 3278. The VT100 emulation is accomplished with software, while the 3278 requires both the terminal-emulation program and a $1500 converter box.

Using MacTerminal, you'll be able to dial up a local mainframe or The Source, CompuServe, or another network, and conduct a dialogue just as if you were at a terminal. But with MacTerminal, you can also capture the data in memory and write it out to the disk. Later, you can edit it or run it through a spreadsheet such as the Macintosh version of Multiplan.

Apple plans to add many other features to MacTerminal. With later releases, you'll be able to use MacTerminal to send files, exchange data between Macintoshes, and possibly imitate other popular terminals. The company is also working on a "script" capability, which lets the Macintosh repeat standard sequences of responses for logging onto networks or for doing regular file transfers.

One feature that Apple figures will make the Macintosh and Lisa machines popular for office use is that both can be part of the Applebus local-area network. The network will enable these and possibly other Apple computers to exchange data at 230,000 bits per second.

The Macintosh already has the basic hardware for the Applebus built in. Most of the network control will be done by software, much of which is presently under development. If everything goes as planned, a Macintosh-based Applebus network should cost only slightly more than the price of coaxial cables and connectors—in addition to whatever you spend on the computers you want to hook together.

Initially, Apple is planning to limit the network to simple data exchange. Later plans include a low-cost, high-speed, laser printer and a high-capacity hard disk. Each network will be able to support several dozen stations, spread out over a few hundred feet of cable. High-speed serial ports or gateways between the Applebus and other networks will make larger networks possible.

The Macintosh comes in an attractive box that includes the hardware, an owners' manual, a "Guided Tour" learning disk and tape, two Apple decals, a blank diskette, a system disk, a power cord, and a programmer's switch. You can also purchase various optional pieces of equipment, including Imagewriter (a printer), an external disk drive, a modem, a numerical keypad, a security kit, and a ten-pack diskette package. Product details and prices were not available for these products at the time of our preview.

With later releases, you'll be able to use MacTerminal to send files, exchange data between Macintoshes, and possibly imitate other popular terminals.

All in all, the Macintosh is an impressive new addition to the Apple line of products. The technology it is based on is solid and innovative, and it is portable and easy to use. If third-party software developers come out with software quickly and Apple does the same with the networking capabilities, the Macintosh promises to be a huge success. ✚

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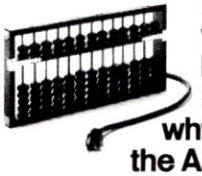

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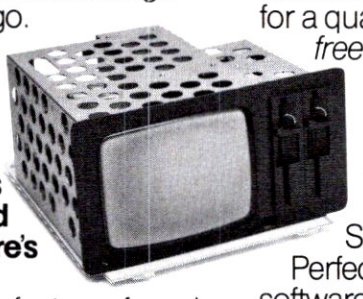

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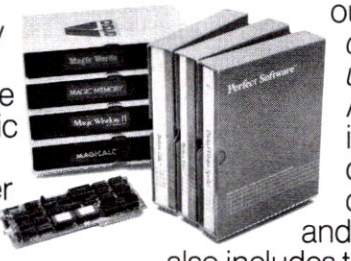

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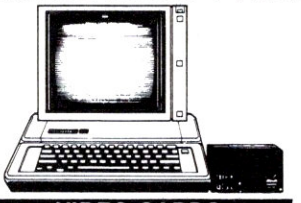

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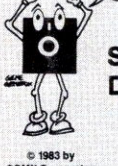

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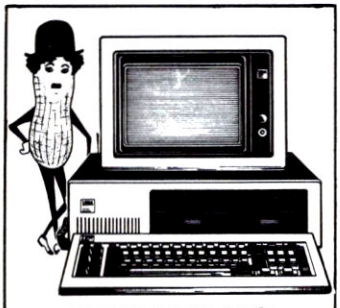

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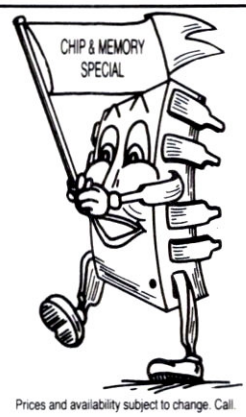

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▸COVER STORY
BY PATTY WINTER

APPLE RIDES THE SHUTTLE

SpaceLab scientists monitor seedling growth.

November 28, 1983—At Kennedy Space Center in Florida, the space shuttle Columbia sits poised on launchpad 39A, ready for the ninth mission of the Space Transportation System program. Underneath Columbia's flight deck, stowed in a locker, is a group of sunflower seedlings. Further down, in the European-built science center called SpaceLab, sits the hardware for Experiment 101, which will investigate how these plants grow in a zero-gravity environment. Aside from the human intervention needed to change plants and videotapes, Experiment 101 will be controlled for the next ten days by an Apple II computer.

Even if you're not planning to run an experiment on a space shuttle, the principles of spaceborne electronics can readily apply to earthbound laboratories. Today's powerful microcomputers are a natural for automating functions such as environmental control and data acquisition. Automating a laboratory that must

operate in zero gravity—after withstanding a rocket launch—just adds a few interesting challenges to the problem.

The countdown reaches zero; Columbia climbs on an orange pillar of fire into the Florida sky, quickly disappearing into a cloud bank. Three and a half hours later, the STS-9 science crew enters its workplace for the first time in space. Over their radios, they hear a voice from mission control in Houston say, "Welcome to SpaceLab."

The major requirements for the hardware of Experiment 101 were small size, self-sufficiency, and reliability. The control system, videocassette recorder, video monitor, plant-storage drawer, centrifuges, and control panel all had to fit into a rack two feet wide by two feet deep by six feet high. Although the spacecraft would supply electrical power, internal regulation was necessary in case of voltage fluctuations.

Except for once-a-day attention by the shuttle payload specialists (to insert new plants into the photo chamber and change videotapes), the experiment would have to run itself, turning on the VCR every ten minutes for nine days. Obviously, the equipment had to work flawlessly, or years of planning would be wasted.

It had literally been years of planning. Consultant Dr. Joseph Willson of Interactive Structures, Inc., of Bala Cynwyd, Pennsylvania, began the electronics design in 1977; the module had to be delivered to NASA more than two years before launch. Rather than using costly and time-consuming custom electronics, Willson wanted to rely as much as possible on off-the-shelf equipment. The Apple II was invented in time.

"The Apple was the first microcomputer designed to look ahead to the fact that people were going to want to plug things in," notes Willson. "Previous micros were incredibly hard to get running. It was a joy to find this Apple—you'd press two characters, and it would read a tape. It came up [on booting] being a smart machine."

From that auspicious beginning, Willson developed a system consisting of a modified Apple II with several interface cards. The computer is somewhat difficult to recognize: It's no longer in its distinctive Apple box but resides in a metal case that mounts in one of SpaceLab's racks. Also, the keyboard has been removed. (The IC socket for it remains, however—a keyboard had to be hooked up for preflight testing.)

The standard initialization chip, which includes some version of BASIC, has been replaced with a custom ROM that sends a hello message to SpaceLab's computers and puts a start-up status report on the Apple's monitor screen. Because the electrical power SpaceLab provides is nominally 28 volts, the standard Apple 110v power supply was replaced by a 28v supply. (With 16 other experiments running on the same electrical bus, the supply has to be able to smooth out most voltage fluctuations.)

Five interface cards are in the Apple's expansion slots: two to handle digital control (such as turning the VCR on and off and adjusting the speed of the centrifuges), one for analog inputs (such as temperature monitoring), one as a video switcher (so the payload specialists can look at camera or computer output), and one to communicate with one of SpaceLab's Remote Acquisition Unit (RAU) computers for relay of data to earth.

The centrifuges were entirely under the control of a DI09 card.

Even before it went into space, this system proved itself tremendously valuable to Dr. Allan Brown of the University of Pennsylvania and his fellow plant researchers. The Apple was used to analyze movies of sunflower seedlings grown on earth and to train the SpaceLab payload specialists on how to maintain Experiment 101.

Thirteen hours into the flight of STS-9, German scientist Dr. Ulf Merbold floats from SpaceLab into Columbia's middeck, and returns with a container holding sunflower seedlings and unsprouted seeds. As Columbia soars over China and the North Pacific, Merbold puts the oldest plants into the "dark box" for photography under zero g, others in centrifuges for a couple days of preliminary growth under one g, and the rest in the storage drawer.

On earth, most plant seedlings spiral as they grow, instead of going straight up. If this effect is caused by the earth's gravity, it will disappear in space. If it's caused by the plants' own genetics, it won't. Simulations of the zero-gravity environment on earth (using sophisticated rotation machines called clinostats) have shown a damping of the spiraling effect. In the almost total lack of gravity on SpaceLab, would the spiraling stop altogether or remain, in a reduced form? Both theories have their proponents. The purpose of Experiment 101 was to find out which theory was correct.

To eliminate all variables except gravity, the sunflower plants had to be kept under rigid environmental conditions during the SpaceLab experiment. Temperature had to remain within a tight range, and the centrifuges had to maintain exactly one earth gravity.

Two products from Interactive Structures handled most of this control. An AI02 analog-input card monitored the temperature. If it required adjustment, one of the DI09 digital cards turned heaters on or off, although there was no recourse if the temperature in SpaceLab got too high.

The centrifuges (or rotors) were entirely under the control of a DI09 card, using its bidirectional capabilities. Since the DI09 has timing circuits, it could measure the speed of the rotors accurately and then send out commands to adjust rotation speed as necessary. On earth, this same capability could also be used for centrifuges or to turn the Apple into a flow meter for liquid or gas flowing through a pipe.

During the STS-9 mission, Dr. Brown and his associates monitored the temperature and centrifuge speed whenever Columbia was within radio range. They were pleased with the operation of the environmental system, since both factors stayed perfectly on target throughout the entire flight.

Lighting requirements were minimal in this experiment. Since the effects of gravity were the subject of the experiment, normal lighting would have interfered, by providing the plants with clues of which way was up. So, the experimenters used infrared lights during the photo sessions, switched on by a DI09 card. The DI09 and its relatives can perform more sophisticated light-level control when necessary, though. For instance, an analog card (the AI13 is the current version of the older AI02) connected to a photosensor can detect cloudiness in a chemical during manufacture, in which case a DI09 shuts down the process until the problem is cleared up.

Two and a half days into the first flight of SpaceLab, a problem arises with the video monitoring system on Experiment 101. One rotor camera is not holding synchronization, and the video cannot be viewed. Merbold manages to com-

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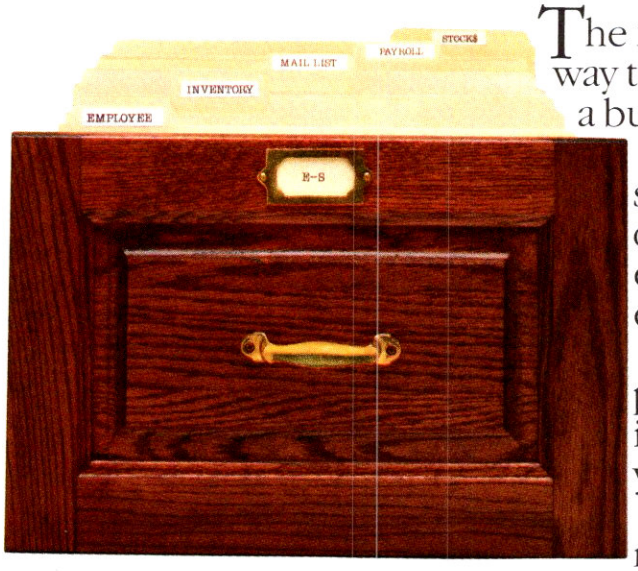

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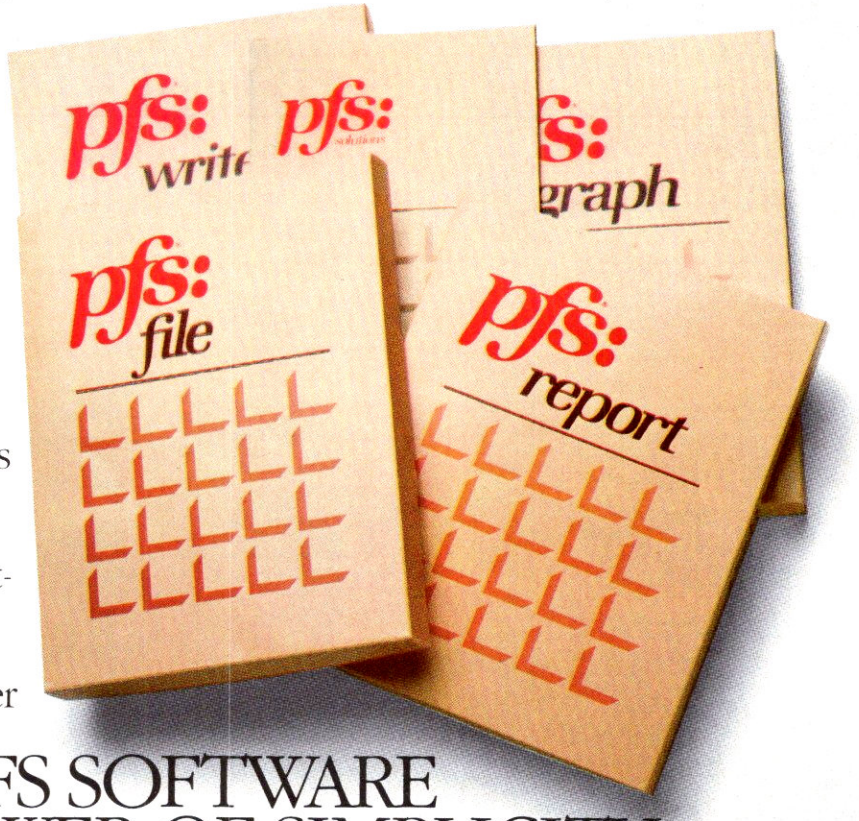

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CIRCLE 281 ON READER SERVICE CARD

plete the daily plant selection by holding the candidate plants in front of the other rotor's camera, but the process is time-consuming.

Later, he and the other payload specialist, Dr. Byron Lichtenberg, take turns working with the 101 team in Houston to troubleshoot the problem. It turns out that something is wrong with the shuttle's own sync system. Disconnecting 101 from the orbiter's sync signals solves the problem but prevents the earthbound scientists from observing the plant chambers anymore.

Although Experiment 101 was designed to be almost self-sufficient, the astronauts had various ways to communicate with it for daily status checks and in case of problems such as the one with the video. In earthbound laboratories, these same methods can be helpful whenever equipment must be remotely controlled.

A control panel near the top of the experiment's rack substituted for the keyboard typically used to command the computer. One of the DI09 cards, which responded to commands from the control panel, could turn on alarm lights on the panel as necessary.

The SpaceLab scientists' most common use of the control panel was to control the video output to the small built-in monitor. This procedure brought into play the fifth card in the Apple's expansion slots—a video switcher. The scientists could monitor the output of the computer itself to get status reports (temperature, rotor speed, voltage), or they could ask for video from one of the three cameras. During the troubleshooting of the video problem, they switched among all these outputs several times.

Experiment 101 was designed to be almost self-sufficient.

Another method of interaction between scientist and experiment in Experiment 101 was an audiocassette recorder for notes during maintenance procedures. All the payload specialist had to do was press one button on the control panel, and the DI09 started the cassette machine's recording function.

Elapsed time in the STS-9 mission now stands at 5 days, 16 hours. Merbold is supposed to be doing his daily maintenance on Experiment 101, selecting the best plants from the rotors for observation, but he's being distracted by the beautiful view of the Swiss Alps out his window and asks STS-9 commander John Young to take some photos from the cockpit. Calling from mission control in Houston, alternate payload specialist Dr. Wubbo Ockels finally gets Merbold's attention, and they proceed with the plant selection.

Once the plants are in the "dark box" (illuminated only by infrared light), the real job of collecting data for Experiment 101 begins. As on earth, data acquisition and transmission are excellent candidates for computer control.

"Data recording is the most common use for a computer in a laboratory," notes Dr. Willson, "and an Apple II is about half the price of a dedicated data logger. Just about any quantity you can think of—temperature, sound frequency—can be interpreted by an analog input card."

In Experiment 101, the data collection began with three CCD video cameras: one near each of the two rotors and one in the dark box. All were capable of responding to infrared light. The cam-

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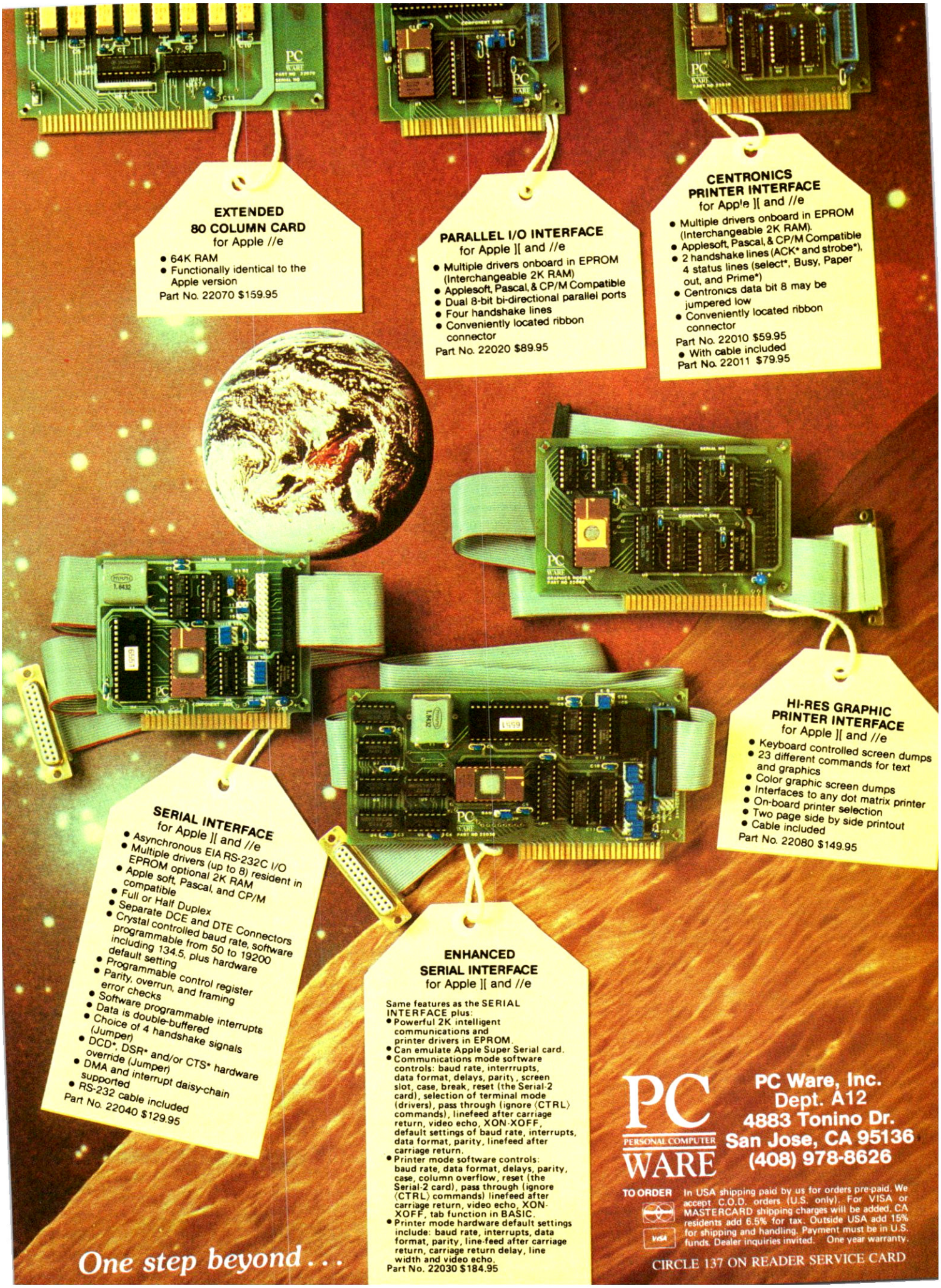

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CIRCLE 238 ON READER SERVICE CARD

eras near the rotors allowed the orbiting scientists to look through the infrared-sensitive windows of the small plant modules and see the young plants displayed on the system's monitor. The astronaut selected the best plants and moved them to the dark box.

Once in the dark box, the plants were available for observation by the third camera and the videocassette recorder. During the approximately 24 hours that each group of four plants was in the dark box, they were photographed for about 12 seconds every 10 minutes. Going through one of the DI09 interfaces, the Apple turned the VCR, its camera, and the infrared lights on and off. The AI02 card verified that recording was taking place by looking for current flow across the record head of the VCR. If it didn't detect any, the system illuminated a signal light on the control panel.

To provide accurate minute-by-minute information to the earthbound scientists in charge of Experiment 101, the Apple II had to send data to the shuttle's computers for relay to earth. Willson's team constructed a custom interface card to provide a link between the Apple and one of SpaceLab's RAU computers. From the RAU, the data went into the main shuttle telemetry system for broadcast to earth.

After nearly ten days in space, the crew of STS-9 prepares to come home. Mission specialist Robert Parker deactivates Experiment 101, leaving it on battery power so it can continue monitoring the last batch of sunflower plants through reentry. During a pause in the activities, mission control in Houston announces, "We'll stand by." Parker replies, "We'll float by." Eighteen hours later—delayed by a computer failure (not the Apple)—the space shuttle Columbia descends over California, leaving a trail of sonic booms in its wake.

Back on earth, Allan Brown's Apples (he now has some IIe's, as well as the older models) will help interpret the mass of information gleaned from this space-shuttle flight, just as computers traditionally do for more prosaic experiments. Brown will continue preparing the hardware—including two Apple IIe's—for a scheduled 1986 SpaceLab experiment that will monitor the growth of wheat and oat sprouts.

That flight will be even more ambitious than this first one. One set of plants will be subjected to varying amounts of light and the other to varying degrees of gravity (including amounts over one g). Since the proper ranges of light and gravity aren't well determined, scientists will have to adjust the amount of stimuli during the mission. This means Brown and his associates will have to do some immediate interpretation of how the sprouts are growing—and he'll have an Apple IIe with him in Houston to help.

The Apple will digitize continuous video from the plant chambers and analyze it to determine whether the plants are getting too much or too little light and gravity. The investigators will then ask the payload-specialist astronaut to give the on-board Apples new commands to adjust the parameters. Thus, Apples and scientists on the ground and in space will be working together to make the experiment a success, a continuation of the successful first SpaceLab mission.

What implications does this first flight hold for the future of Apples in space? Willson and his staff are "just as pleased as we can be" about the success of the Apple II and its Interactive Structures support electronics. "We're glad we told Dr. Brown to go ahead with using Apples for the next experiment."

'Space experiments are a known technology with Apples now.'

As alternate payload specialist Ockels remarked at a prelaunch press conference, "Space is an environment where people want to use reliable equipment." He went on to note that "when the Apple comes back and it has worked, it will be a space-qualified computer!" To which Willson adds, "Space experiments are a known technology with Apples now, right?"

With Brown poring over the data from STS-9 and getting ready to deliver to NASA the hardware for his next experiment, the future looks bright for the use of Apples in the space program. Based on the experience of SpaceLab 1, the Apple IIe's on Brown's next mission will take good care of their horticultural charges. Switching to wheat and oats may eliminate the only remaining possible problem: SpaceLab 1 mission specialist Parker jokingly claimed on Day 7 of the ten-day flight, "I think we ate all the sunflower seeds yesterday afternoon." ✚

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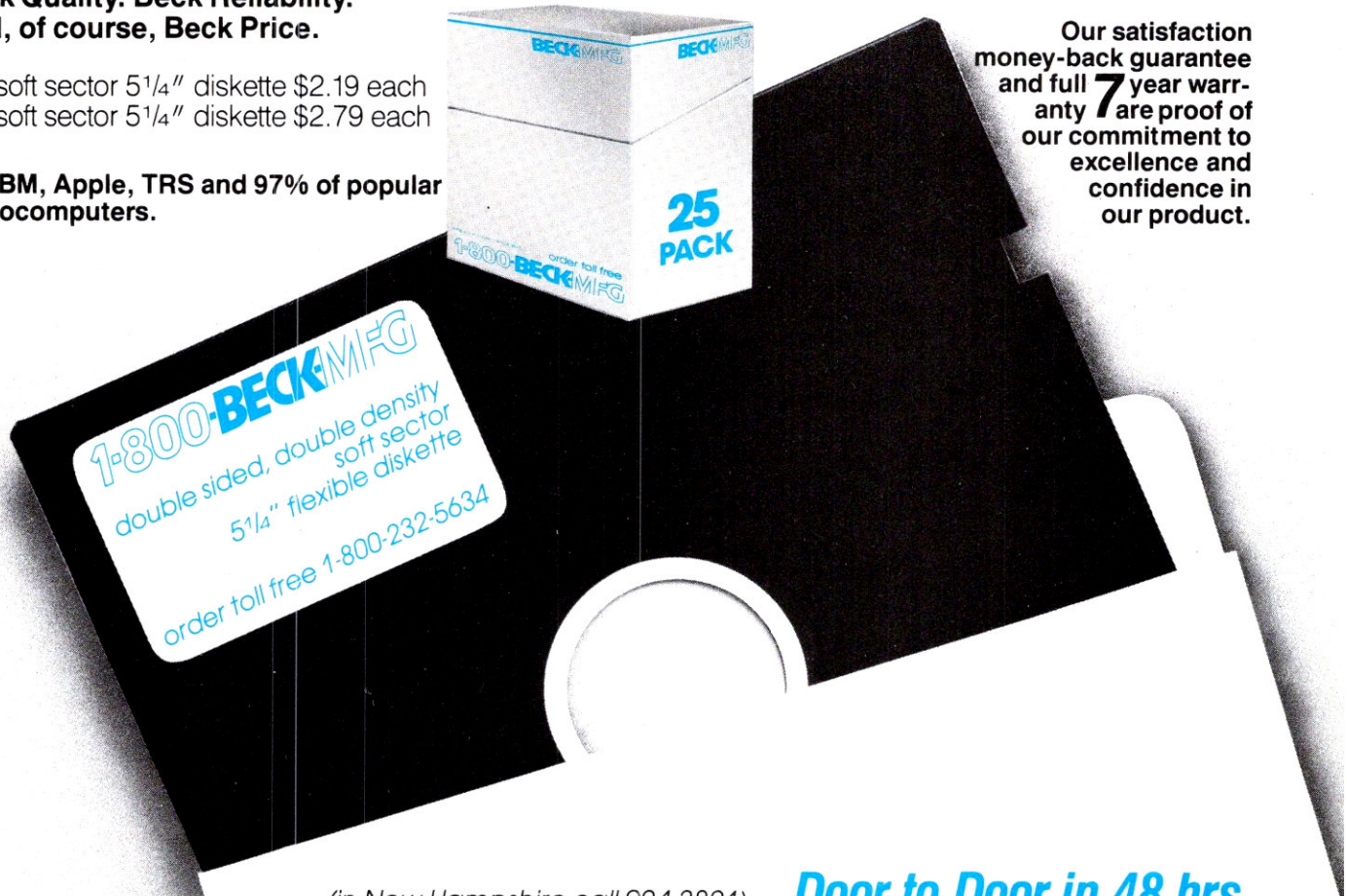

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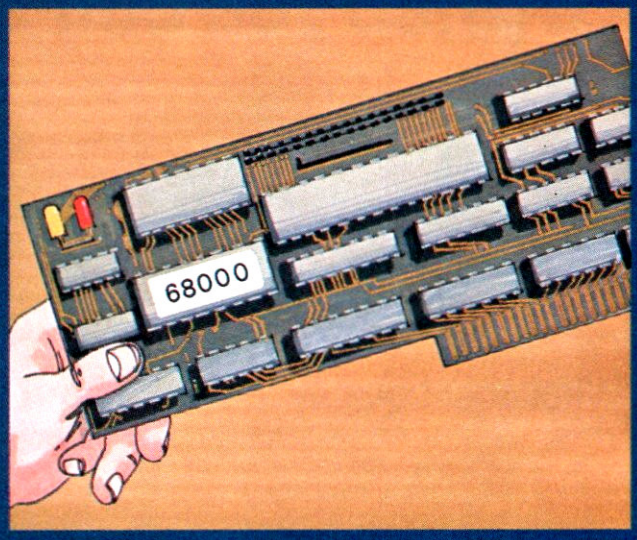
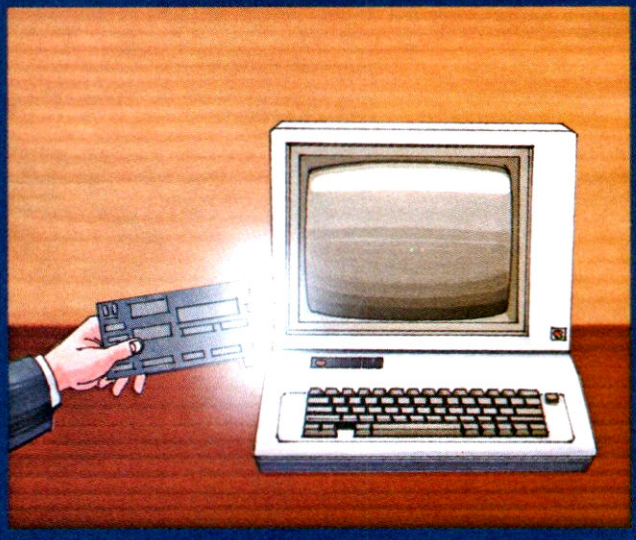
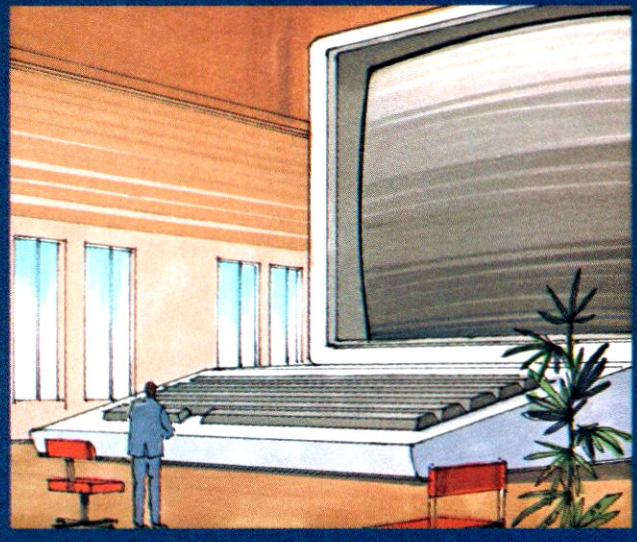
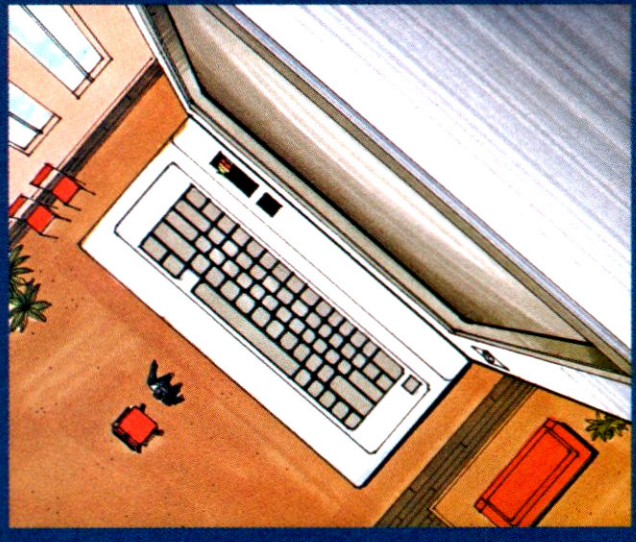








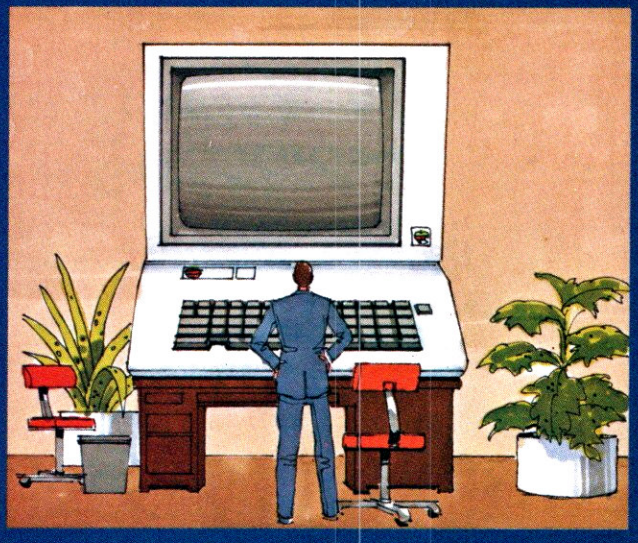
68000 × 3

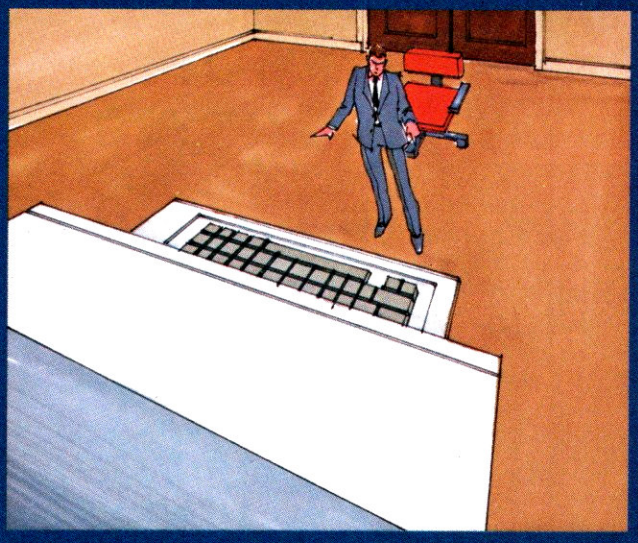
A+ looks at three new coprocessor boards.

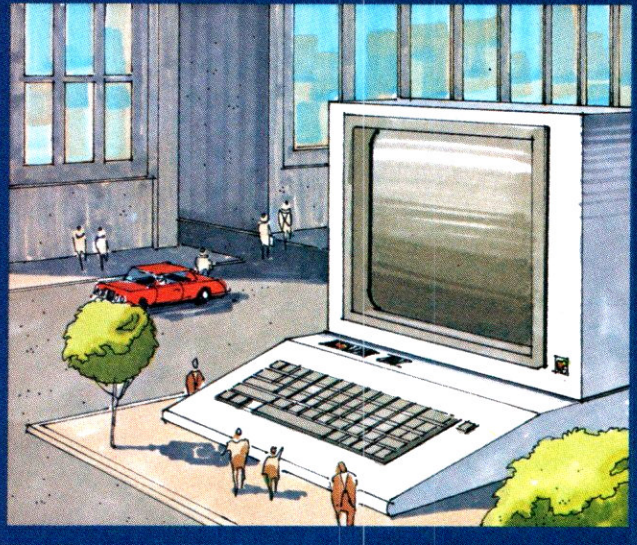
The Motorola 68000 microprocessor chip is one of the most powerful chips around today—and now you can put it to work right in your own Apple II, II Plus, or IIe. So far, these add-in boards won't change your II into a Macintosh or Lisa, but they will let you develop and run software for the 68000 family of machines.

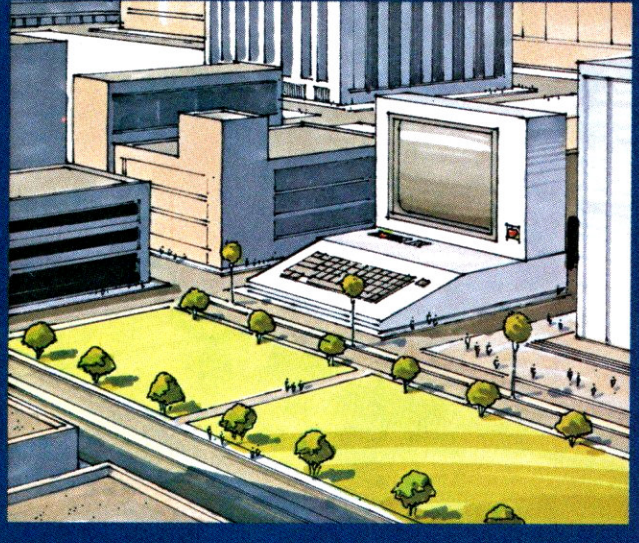
We looked at three new 68000 boards for the Apple II for this article. The PDQ // (from Enhancement Technology Corporation) and the Saybrook (Analytical Engines) use the original 68000 chip and feature software based on the UCSD p-System. The PDQ // also gives you fast 68000 BASIC that is compatible with Applesoft. The Qwerty Q-68 (Qwerty, Inc.) uses the 68008 chip, and its software concentrates on assembly language.

Software for all three boards is still fairly sparse, but one major application that all three companies are targeting is software development. You can take any one of these boards and turn your Apple into a 68000 software-development system. Just as the availability and affordability of the original Apple led to a blos-









soming of application software, the relatively low price for a development system for the 68000 should ensure a greater flow of programs.

Looking at Hardware

The boards *A+* looked at for this article are all standard-size Apple II-family boards that plug into the regular card slots. All three are built to high-quality industrial standards.

The PDQ // actually is a two-board set: one board contains the MC68000 processor, and the other carries 256K or more of RAM. The two cards connect with their own 60-pin bus connectors.

The two PDQ // system boards occupy two physical slots within the Apple computer; as shipped, they have to be in adjacent slots to allow the 60-pin connector to reach between them. If you have only nonadjacent slots available, you can order an extender cable.

You can put the PDQ // boards in any two slots, except for the usual restriction on slot 0. Even though it consists of two boards, the PDQ // system occupies only one "logical" slot. If you have a IIe with an 80-column card, you can still put the memory card in slot 3, which you normally cannot use, since it shares an address with the 80-column card.

You don't need any other special hardware to run the PDQ //—along with

Complex processors such as the 68000 series consume relatively large amounts of power, typically run at higher-than-usual temperatures, and generate large amounts of heat.

the added boards, you need only an Apple IIe with 64K or more of RAM or an Apple II or II Plus with 48K of RAM or more, one or more disk drives, and a monitor. This system also supports more disk drives, most 80-column cards (including the IIe Extended card), most printer cards, and, according to ETC, most hard disks.

The Saybrook add-in is a single-board package, with a 68000 CPU chip and 128K of standard memory. According to Analytical Engines, the board can accommodate up to 512K. It has address-control lines for up to four megabytes and a connector for external memory expansion.

The Q-68 is the simplest of the three boards. The processor is the 68008 version of the 68000, which uses 8-bit memory (but still computes internally using 32 bits). Instead of supplying its own memory, the Q-68 uses the standard Apple memory (although an expansion connector on the board can be used for memory expansion later). You can plug the Q-68 board into any slot from #1 to #7.

The Qwerty board requires the least supporting hardware of the three. You can run this coprocessor in a 48K Apple with at least one disk drive. A 16K (language) card (or IIe) is highly recommended, so that you can write large programs without having to save sections of them on disk.

Power

One problem that all these coprocessor packages have to face is the limited current available from the standard Apple power supply and the Apple's limited ability to dispose of excess heat. Complex processors such as the 68000 series consume relatively large amounts of power, typically run at higher-than-usual temperatures, and generate large amounts of heat.

The PDQ // package includes a combination fan and power supply that mounts on the left edge of the Apple case. This added supply runs the PDQ // boards—you connect them with an included 16-conductor cable. As an added convenience, you can plug your Apple and two other peripherals (such as your monitor) into power outlets on the PDQ // power supply, using only one cord to the wall socket and gaining a single switch that turns the whole system on and off.

The Saybrook package also includes a power supply, but it replaces the existing power supply in the Apple. We believe that most people who can change a light bulb will have no trouble making the switch—all you have to do is remove four screws on the bottom of the Apple and unplug a standard Molex connector from the main CPU board. It doesn't come with a fan—the Saybrooks' makers do recommend that you install one, however.

The Qwerty's makers are more optimistic about the capability of the original Apple supply. In the manual they note

▸THEY'RE NOT JUST FOR PROGRAMMERS

Ask any programmer to explain the significance of adding a coprocessor to an Apple, and you're likely to spend your next hour listening to wild tales of incredible speed, flexibility, and new microcomputer horizons to conquer. But programmers aren't the only ones who see value in this latest trend in microcomputer peripherals. Professionals from business, science, and the arts are exploring the possibilities of add-on processor boards.

In pursuing a personal project, Conley Powell, of the Space Institute at the University of Tennessee, in Knoxville, is using his ALF 8088 board (see "The 8088 Card," page 58) to determine if an undiscovered planet exists in our solar system. "It seems fairly clear there is a tenth planet," he claims. With an Apple II Plus, an ALF 8088 board, an 8087 board, an 8K memory cache, and an Axlon 320 disk emulator, Powell feels he's well armed to take on the enormous load of numbers that need to be crunched to figure out if there's another planet. "It would be very difficult to find it by surveying the sky with a telescope, because we have no idea how bright it would be or how fast it would be moving," explains Powell. With a computed orbit, he can predict positions for the planet and couple that with a rough estimate of its brightness. From there, enough information is available to scan the sky with a telescope to locate the planet.

"The speed of my present system is fantastic—to put it mildly," he says. His Apple performs calculations over ten times faster than it used to.

The speed of the ALF 8088 is also lauded by George Henry, Jr., of Keck Consulting Services of Williamston, Michigan, a geological consulting company that specializes in groundwater problems. "On some of our contouring programs, the 8088 has increased the Apple's speed by 7.25 times," he says. A contouring program provides a geographical map of the concentration of water contaminants in a given location. "If a contaminant gets into the groundwater, we have to come up with a way to get rid of it," explains Henry. This means a lot of numbers to crunch, which is a sure but slow process with the Apple's 6502 processor. The ALF 8088 speeds the initial troubleshooting stage immensely—working through the numbers to predict the problem areas graphically in a minimum of time.

Using an entirely different coprocessor to solve distinctly different problems, Janik Kalichak of MicroGraphic Images Corporation in Long Beach, California, finds that the Saybrook 68000 has opened up new possibilities for his Apple II. With the Saybrook 68000 board, he has developed a comprehensive graphics package that he's been marketing to graphic artists and business people since January. Among other things, the package offers artists a drawing system that allows them to create a picture with a minimum of 16 colors—256 colors displayable at one time—with a resolution of 512 lines by 512 pixels per line. The system can also display mainframe graphic software on the Apple II. The 68000 board is essential to the system because it allows software to run on the Apple that would do nothing with the 6502 processor alone. Then, of course, there's speed. "It's very fast," says Kalichak. "Using a coprocessor lets you do various and wonderful things with the Apple."

that despite a specified limit of half an ampere for all accessory cards, most supplies seem to be able to supply as much as 2 amps without any problems. The Q-68 uses 400 milliamps (0.4 amps) maximum, but Qwerty also suggests you get a fan.

If you have a lightly loaded Apple, you may be able to get by with your present supply with any of these boards, but if you haven't installed a fan, you ought to at least leave the cover off until you do so.

High-level Software

The PDA // package includes two high-level software systems, an Applesoft-compatible BASIC and the UCSD p-System.

PDQ // BASIC is an interpretive BASIC for the 68000 that accepts programs written for Applesoft. No changes are necessary in the source programs. By using the more powerful 68000 chip, PDQ // BASIC runs much faster than Applesoft, which uses the Apple's native 6502. The PDQ // manual claims that the speed improvement is as much as a factor of 30. We confirmed this claim for programs with a lot of computation, but programs that do much input and output only improve by a smaller ratio.

As an option, you can order the PDQ // with the UCSD p-System, along with a Pascal compiler. The p-System is a complete operating system, editor, and file-management package that runs on a wide variety of microcomputers. Apple Computer's Apple Pascal is the p-System on the Apple II.

You can use the p-System for program development or for running packaged p-System software. Since PDQ's is a standard p-System, you can also use other p-System software (although not all p-System software is offered on Apple-format disks). With the PDQ // p-System package, you also get turtle-graphics routines, which let you do easy screen graphics.

According to the PDQ // people, the MC68000 version of the p-System is up to 20 times faster than the 6502 version. It also supports features not available in the Apple 1.1 p-System, including concurrent processes, subsidiary volumes, and 128K program space.

You also get some software with the PDQ // aimed at letting you use some of the 256K of added memory to speed up your programs. Under either DOS 3.3 or the p-System, you can define part of the RAM as a pseudodisk (RAM disk). Since transferring data to and from RAM is much faster than going directly to the disk, this definition can greatly increase program speed. You can pick from several different pseudodisk sizes.

You can also use some of the PDQ // memory for printer or communications buffering. When you're running the p-System, standard p-System spooler utility can manage this buffer.

With the Saybrook package, you get even more p-System software. You get not just one but two complete versions of the UCSD p-System itself—one uses two bytes for integer storage and the other four. The two-byte version runs much faster but can't handle numbers as large in integer form.

The p-System provides the core editing and file-handling capabilities for the Saybrook. You also get a full repertoire of p-System compilers, including both Pascal and BASIC. Again, since it is a standard p-System implementation, you can run packaged p-System programs, providing you can read them into your Apple.

The Qwerty 68 does not include any high-level language support. If you wanted to, you probably could install CP/M-68K (the 68000 version of the CP/M operating system) or the UCSD p-System, but neither is provided.

For Assembly-Language Work

All three of these boards come with monitor programs and assemblers for working with the 68000 at the assembly-language level.

The PDQ // uses a RAM memory-resident program that provides abilities similar to those of the Apple system-monitor program. It automatically loads into PDQ // memory during the PDQ // preboot process, or you can load it from Apple DOS. You also get a disk-based assembler program for translating your assembly-language projects.

The Saybrook uses a slightly modified version of one of the standard Motorola 68000 monitors. Although not an exciting piece of software, it performs all the standard monitor functions you need for stand-alone operation (without Apple DOS) or program development. The Saybrook also provides a 68000 macroassembler that runs on the p-System but generates 68000 code. Once you load it from the disk, the assembler runs from memory.

The Q-68 editor/assembler (from S-C Software Corporation) is a macro assembler that runs under the Apple II disk-operating system. The entire edit/assemble package remains in memory during program development, so you can quickly move back and forth between the Edit and Assembly modes.

As the most assembly-language-oriented package of the three, the Q-68 has the best debugger package. Unlike the others, which use the display only like a printer or teletype writer does, the Q-68 debugger uses several full-screen displays. Depending on what information you want to see, you use the cursor controls to go between the screens.

For example, the disassembly screen shows you the disassembly listing in the upper window and status information in the lower window. The upper window shows the program code in hex and assembly-language code. The lower shows the program counter, status register, previous and current instructions, and a menu of available debug commands. The help screen lets you postpone memorizing every command.

Using the debugger, you can run a 68000 program and stop program execution at any predetermined address and inspect what is going on (set breakpoints).

You can then resume execution exactly where your program left off. Or, if you choose, you can run your code one instruction at a time and stop anywhere and view the results.

If you're doing serious machine-language-level debugging, you can even inspect and alter memory. You can look at memory in hex format, in ASCII to spot character strings, or in 68000-instruction form. You can also put labels on memory locations to help you recognize important information.

Documentation

Documentation for all these products is adequate, but none is all that it should be.

The PDQ // manuals seem most appropriate for system integrators or OEMs (original-equipment manufactur-

Since PDQ's is a standard p-System, you can also use other p-System software (although not all p-System software is offered on Apple-format disks).

ers) rather than users. The sections on the hardware are the best, but the information about the p-System software is skimpy.

The manual does include a table of contents and a forward outlining the chapters, but it lacks an index. Only the hardware-installation section has photos, and there is no tutorial.

If you purchase the PDQ // p-System, you also get two of the standard UCSD p-System manuals but not the full set.

The Saybrook package does include the full p-System manual set (with Saybrook covers), as well as two separate volumes about the Saybrook board. Although the instructions for using the board are easy to follow, the manual was produced on a dot-matrix printer and does not include any illustrations.

Although the Saybrook manual does get high marks for including a tutorial and step-by-step procedures, it also seems to have the most small errors.

Our Qwerty package included a note that said that revised documentation would be out shortly, so by the time you read this, there will have been some changes.

As it stands, the Qwerty manual is good but sparse. It includes full examples on how to use all the board's features. Along with the manual, you get complete 68000 source code for the examples, in addition to listings of what appears in memory.

In addition to its own manual, Qwerty also gives you a veritable library of books about the 68000 chip. Our package included *The 68000: Principles and Programming,* by Leo Scanlon; *68000 Assembly Language Programming,* by Kane, Hawkins, & Leventhal; *MC68008 16-Bit Microprocessor with 8-Bit Data Bus* (Motorola); and *The 68000 User's Guide* (Motorola).

Using the Boards

We found all three of the boards easy to install and use, although we did have to check the documentation first.

Our PDQ // boards arrived with the cable between the two hooked on backwards. Fortunately, the installation section of the manual was the illustrated part, so we were able to spot and correct the error in time. After that, it took only a few minutes more of reading, and then we were able to boot and run the system.

Once we had the system running, though, it still took several hours to sort out the software, arrange the programs on working disks, and back everything up.

Getting the Saybrook running was also a short procedure. The actual boot process takes longer than that of the PDQ //, but that's because the board does several seconds of self-checking during the boot process.

One characteristic of the Saybrook that we are not fond of is the reset scheme. If you bomb the system (a likely event during software development), you can't press Reset or Control-Reset and reboot.

Instead, you have to turn the system off, wait a few seconds for various parts to discharge, and then start the system up again.

The system we tested did not use any of the memory for a disk emulator, which considerably limited the speed of programs that had to access disk storage, but there were instructions for adding a standard Apple RAM disk, and a RAM disk-driver program for use with the Saybrook.

The Qwerty Q-68 was the easiest to use of the three boards. The editor/assembler package is simple, and the full-screen editor is fun to use. We had to spend only a few minutes to boot up this system and start using it. Along with the system software, the single disk in the package also includes some sample 68000 assembly-language software. We would have liked some more useful programs, though.

Which One Is for You?

From the point of view of a potential user, the PDQ // board and the Saybrook are similar in function. The Qwerty really belongs in another class.

The two reasons that might induce you to buy one of the two full-featured 68000 boards are to get speedier performance out of your existing Apple programs or to develop new software or hardware.

Another more unusual reason would be if you were to find a software package that ran only under the 16-bit version of the UCSD p-System and should want to run it without investing in all-new hardware.

Each of these boards could prove useful, depending on what you had in mind. All of them, however, are targeted to software developers and sophisticated programmers, rather than casual users. The Qwerty Q-68 board can also serve as a teaching tool.

If you like the Saybrook board, you'll probably want to get a RAM disk with it. Unless your application is unusually focused on computation, you'll find that the disk-transfer time is still the limiting factor in program performance.

If you're a user rather than a programmer, you might prefer the Saybrook. At this point, at least, its packaging is better, and you get more included software.

On the other hand, if you're an expert who puts systems together for other people, you might prefer the PDQ // board. It comes with better hardware and software documentation about the board itself, but less about the p-System.

The Qwerty board should be your choice if you're doing simple 68000 hardware development or just learning how the 68000 works. If you like playing with the machines, this one is the most fun. It runs 68000 programs, so you can actually use it to get work done. But until it has high-level-langauge support, you ought to pass it by if you're not a hacker at heart. ✚

▸PRODUCT INFORMATION

PDQ //
Enhancement Technology Corporation
P.O. Box 1267
Pittsfield, MA 01202
(413) 445-4263
List Price: Base system—$995
Super system (includes p-System)—$1495
Warranty: One-year warranty
Support: Call company directly
Availability: Contact company for dealer information, or you can order directly.

Saybrook
3415 Greystone, Suite 305
Austin, TX 78731
(512) 346-8430
List Price: Varies according to speeds:
8 megahertz—$1550
12 megahertz—$1950
14 megahertz—$2250
Warranty: 6 months; will repair or replace system as required.
Support: Call company directly.
Availability: Contact company for dealer information, or you can order directly.

Qwerty 68000
Qwerty, Inc.
9252 Chesapeake Drive
San Diego, CA 92123
(619) 569-5283
List Price: $695
Warranty: Standard 90-day warranty
Support: Call company directly.
Availability: Contact company for dealer information, or you can order directly (the company offers a 30-day free trial).

COMPARING CP/M CARDS

Microsoft's Premium Softcard IIe, ALS's CP/M Card, and PCPI's Appli-Card let you run CP/M-based programs on your Apple.

You can open up a whole new world of programs for your Apple by adding a CP/M card. For Apple users in general, the main attraction of CP/M is the vast library of programs written to run under this operating system. Another common reason for Apple users to consider using CP/M is a desire to run a specific program that is available only in CP/M. For example, CP/M-based bookkeeping programs are available specifically for bowling alleys, construction companies, and lumber companies.

What's on a CP/M Board?

The computers that first used CP/M used the Intel 8080 microprocessor; later computers use the upwardly compatible Intel 8085 and Zilog Z80. CP/M is written for the 8080 chip and is therefore not directly compatible with the 6502-based Apple. Apple CP/M boards contain an on-board Z80 microprocessor to execute the 8080 instructions of CP/M. Since some CP/M applications use the expanded (but 8080-compatible) instruction set of the Z80, all of the CP/M cards available for the Apple have a Z80 microprocessor. The cards also provide circuitry that allows communication between the Apple's hardware and the Z80 on the card.

FOR APPLE USERS, THE MAIN ATTRACTION OF CP/M IS THE VAST LIBRARY OF PROGRAMS.

The first generation of CP/M cards had little beyond the Z80 and the interface to the Apple. The Z80 runs at 2 MHz, and is limited by the speed of the RAM and associated support circuitry on the motherboard of the Apple. Since the Z80 takes many clock cycles to complete each instruction, these early CP/M boards may take longer to execute similar programs than does the Apple's 6502 microprocessor (although its clock is 1 MHz, it takes only one to three clock cycles to complete each instruction). The second generation of CP/M cards has 64K of high-speed (200-nanosecond) RAM on board and runs the Z80 at 6 MHz, which speeds execution by 300% compared to the older cards.

Microsoft's Premium Softcard IIe

As the name suggests, this card works only with the Apple IIe. Residing in the auxiliary slot of the Apple IIe, the Premium Softcard IIe not only has a Z80 and 64K of RAM but also has an 80-column-display generator. The 80-column-display section of the Softcard is software-compatible with Apple's 80-column board for the IIe, and you can use it from DOS 3.3 and Pascal.

Microsoft supplies CP/M, Version 2.2, and its own interpretive Microsoft BASIC—the Microsoft BASIC Compiler is available as an option. The documentation for this card consists of a well-written, 160-page *Installation and Operation Manual*, a manual for the Microsoft BASIC interpreter, and the book *Osborne CP/M User Guide* by Thom Hogan. *The Installation and Operation Manual* is by far the best manual for a CP/M card that I have yet seen.

As with the other CP/M boards, the system automatically recognizes a printer card in slot 1. Microsoft lists several peripheral boards that are compatible with the Premium Softcard, including recommended slot assignments. As for boards not specifically listed, the manual states: "As a general rule, any accessory board or I/O device that is directly compatible with the Apple Pascal operating system without requiring any software modifications will be compatible with CP/M as well."

You can interface other devices with the Premium Softcard and CP/M if you use the CONFIGIO program. This program can configure the screen interface, redefine keyboard characters, and load I/O software drivers for nonstandard devices (the manufacturer of the I/O device normally writes this software).

THESE EARLY CP/M BOARDS MAY TAKE LONGER TO EXECUTE SIMILAR PROGRAMS.

The first section of CONFIGIO, configuration of the screen interface, sets up translations of command sequences for screen functions, such as clearing the screen or positioning the cursor. The default setup converts incoming screen commands from the Soroc-terminal format (a common format many CP/M programs use) to commands compatible with the Apple's 80-column card.

The second section of CONFIGIO redefines keyboard characters so that you can enter all ASCII characters from the Apple IIe keyboard. You can also redefine commonly used keys, such as converting the backspace character that the Apple generates to the rubout character that many CP/M programs expect. CONFIGIO also links nonstandard driv-

PRODUCT INFORMATION

Microsoft Premium Softcard IIe
Microsoft Corporation
10700 Northup Way
Bellevue, WA 98004
(206) 828-8099
List Price: $495
Requires: Apple IIe; at least one disk drive
Features: Z80 microprocessor; 64K RAM; on-board 80-column video-display generator
Display: Built-in 80-column board can be used by CP/M, DOS 3.3, or Pascal
Software: CP/M 2.2; Microsoft BASIC Interpreter
Related Products: Softcard, the first widely used CP/M card: When you use it with a 16K RAM card and the Videx Videoterm, the Softcard provides the same features as does the Premium Softcard IIe, but the Premium Softcard IIe executes programs three times faster than the Softcard.
Microsoft BASIC Compiler
COBOL Compiler
FORTRAN-80 Compiler

ALS CP/M Card
Advanced Logic Systems
1195 East Arques Avenue
Sunnyvale, CA 94086
(800) 538-8177; (408) 730-0306
List Price: $399
Requires: Apple II or II Plus; 48K RAM; two disk drives (some utilities require an 80-column-display card)
Features: 6-MHz Z80 microprocessor; 64K; real-time clock interrupt
Display: Apple 40-column display; 80-column display using ALS Smarterm II or Videx Videoterm
Software: CP/M Plus (CP/M 3); CBASIC Compiler
Related Products: Z-Card (2-MHz Z80 card, without RAM) ALS Smarterm II 80-column-video board

PCPI Appli-Card
Personal Computer Products, Inc.
16776 Bernardo Center Drive
San Diego, CA 92128
(619) 485-8411
List Price: $295 (for 4-MHz Version); $375 (6-MHz version)
Requires: Apple II, II Plus, or IIe; at least one disk drive
Features: 4- or 6-MHz Z80 microprocessor; 64K on-board RAM
Displays: Apple 40-column display; 80-column boards, such as Videx Videoterm; 70 columns, using PCPI-supplied software
Software: CP/M, Version 2.2
Related Products: 64K and 128K expansion boards

er routines to CP/M. (An example of a peripheral that requires a nonstandard driver routine is a hard-disk drive.) The manufacturer of the peripheral usually supplies these routines.

ALS CP/M Card

The ALS CP/M Card works with all three versions of the Apple II—the older Apple II, the II Plus, and the newer IIe.

The ALS card contains the latest release of CP/M, CP/M Plus (also known as CP/M 3). This latest version of CP/M has several enhancements, including date/time stamping of disk files and an increase in the size of memory it supports. You also no longer need to type Control-C each time you swap disks in the active disk drive. A helpful minor enhancement is that every time you use a Control-P to switch on the printer, you hear a beep, but, when you use Control-P to switch the printer off, you don't.

ALS also provides Digital Research's CBASIC compiler with the CP/M Card but does not include an interpreted BASIC. Using an interpreter is usually preferable when you want to write short programs—you don't have to recompile the programs after each change or correction you make to them. A CBASIC compiler has an advantage over interpreted BASIC only if you want to write larger programs and are sensitive about the execution speed.

The ALS CP/M Card has an on-board real-time clock interrupt, which differs from a complete real-time clock in that the ALS board uses the Z80 microprocessor and RAM to keep track of the date and time; the real-time clock interrupt merely generates a periodic timing signal. Since the Z80 counts the time and stores it in RAM, you must reset the time each time you turn on the Apple. Still, it is a useful feature when combined with the date/time stamping ability of CP/M Plus. If you enable date/time stamping, CP/M records the date and time in the file directory each time you access or update a file.

For documentation ALS supplies a 40-page *User's Guide,* Digital Research's *CP/M Plus Operating System User's Guide,* and the Digital Research *CBASIC Reference Guide.* A 12-page update to the *User's Guide* also comes with the CP/M Card. This update affects about one-third of the pages of the *User's Guide,* and I found myself constantly flipping back and forth between the *User's Guide* and the update.

I had another problem when I tried to use the time-stamping features. To see the dates, I had to type in the command DIR [DATES]—I had to go through a lot of trial and error to figure out that when the Videx Videoterm is in the uppercase mode, a Control-K enters a [and a Shift-M enters a].

I found a more serious problem when, even though I'd followed the installation and startup procedures to the letter, I could not get the card to work at first.

CAUTIONS AND RECOMMENDATIONS

1. Not all CP/M programs work with the Apple. Check with the software supplier if you are in any doubt.

2. Even if a program uses only standard CP/M features and runs on the Apple, you can have difficulty getting it to work if the program is only available in 8-inch-disk format. If this is so, you must first load the program into a CP/M-based computer with an 8-inch disk drive and then transfer it to the Apple using either a modem or a serial port. The program should then run.

Obviously, it's much easier if the software supplier can deliver disks in the Apple format.

3. If you intend to use any unusual peripherals, you should check with the manufacturer to ensure that patches or software drivers are available for the particular CP/M board that you are considering. Most peripherals that Pascal automatically recognizes work with all CP/M cards, but other peripherals, such as hard-disk drives, need a special software interface.

4. The Microsoft and PCPI cards do not support the latest release of CP/M. Most software runs on the version they support, CP/M 2.2, but if you require CP/M Plus (also known as CP/M 3), you must use the ALS card.

WHAT IS CP/M?

CP/M (Control Program for Microcomputers) is an operating system that dates back to early industrial microcomputers and personal models, including S-100-bus computers such as IMSAI, Altair, North Star, and Cromemco.

Gary Kildall wrote the first version of CP/M in 1973. He was then a consultant for Intel and later became founder of Digital Research, the supplier of CP/M.

Prior to the development of CP/M, the owners of the various machines with 8080 CPU chips primarily used cassette tapes as their mass storage, and there was little compatibility between the recording schemes of the different manufacturers.

The original microcomputer manufacturers, small hardware-oriented companies, embraced CP/M as a way of quickly adding a disk-operating system to their computers. CP/M became the de facto disk-operating-system standard as the S-100-bus personal-computer industry matured, and an extensive library of CP/M programs is now available.

Digital Research acquired the rights to CP/M in 1976 and has continued to improve it, taking advantage of improvements and cost reductions in computer hardware. CP/M is now probably operating on more different types of computers than any other operating system.

Operating Systems

Above, I called CP/M an operating system. Perhaps I should explain what is meant by *operating system*. An operating system is a "master program" that controls the overall operation of a computer. The operating system provides the common functions that nearly all programs need, so that each programmer does not have to reinvent the wheel with each new *application program*. An application program is a program designed for a specific task, and each application program uses the operating system for such support functions as disk I/O (input/output). The three popular operating systems for the Apple are DOS 3.3, Pascal, and CP/M. Examples of application programs are VisiCalc, Apple Writer, video games, and Pie Writer. The basic function of an operating system is to control the loading and execution of application programs. Other functions include file management and I/O management. *File management* is a fancy term for maintaining and displaying disk catalogs or directories. Also included in file management are such functions as "locking" a file and displaying file sizes and space left on a disk.

Sometimes my Apple would boot up, display a greeting message, and then just ignore any keystrokes; sometimes it seemed to boot properly but would not run the Hello program described in the manual. After duplicating the problem on a second computer, I found that the Hello program works only if you have installed an 80-column card. Making the system run a different program when you boot it cures the problem, but ALS should have detected and corrected such a simple problem before it marketed the software.

The ALS CP/M Card automatically recognizes a Videx Videoterm in slot 3 and a standard Apple parallel card in slot 1. It also works with the ALS Smarterm II 80-column board and either ALS's Dispatcher serial card or PrinterMate parallel card in slot 1 and with the Dispatcher serial card in slot 2, for use with a modem. As with all the CP/M boards, a more comprehensive list of compatible peripherals would be of assistance in configuring a complete Apple system.

Appli-Card

The unique feature of the Appli-Card from PCPI (Personal Computer Products, Inc.) is the SoftVideo software that uses the Apple's high-resolution graphics screen for a 70-column video display. Other SoftVideo features include uppercase and lowercase characters, 40- to 255-column horizontal scrolling, and escape sequences that enable you to enter characters that aren't available on the Apple keyboard. If you install an 80-column card in slot 3, the Appli-Card recognizes it while booting and automatically uses the 80-column screen.

The Appli-Card configuration utility includes an option for you to use an 80-column board installed in the auxiliary slot of an Apple IIe and several options for emulating other terminals. PCPI has configured the software to emulate a Soroc or TeleVideo terminal, since these terminals are the most popular terminals for use with S-100 computers running CP/M, and because many CP/M programs use the screen-formatting features of the Soroc terminal.

FOUND THAT THE HELLO PROGRAM WORKS ONLY IF YOU HAVE INSTALLED AN 80-COLUMN CARD.

PCPI supplies CP/M, Version 2.2, but does not supply a BASIC interpreter or compiler with the Appli-Card. This information is important only to those of you who intend to write your own CP/M-based programs.

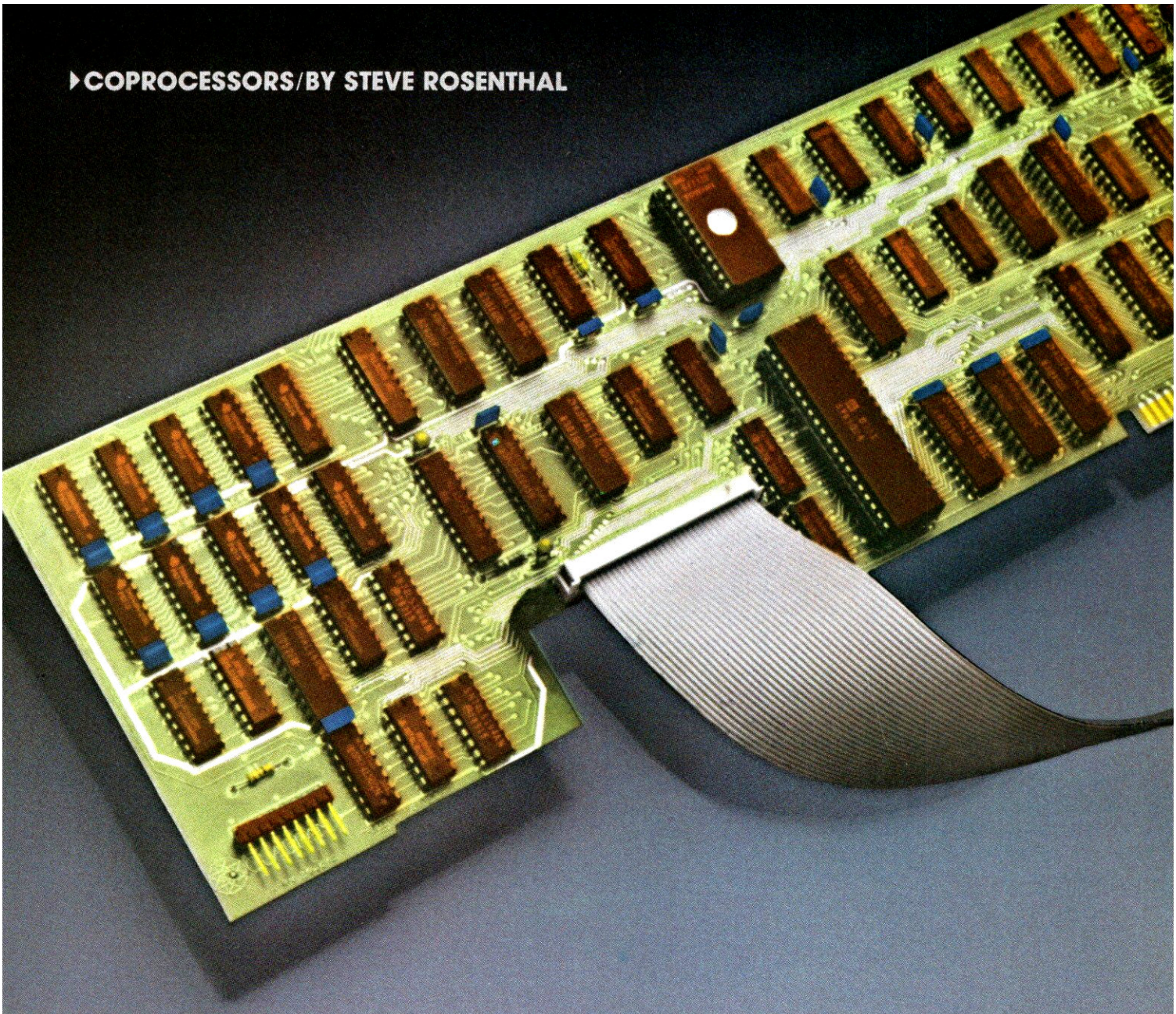
One problem I had with CP/M 2.2 is that you must type Control-C each time you put a new disk in a drive. If you don't, CP/M either detects the new disk and refuses to write to it or, even worse, goes astray and forces you to reboot the system. When this first happened to me, I could not decipher the cryptic error message BDOS ERROR ON A: R/O. Indeed, I only understood what had happened when I later read Hogan's *Osborne CP/M User Guide*. This problem is apparently due to CP/M 2.2 and is not PCPI's fault. (CP/M, Version 3, supplied with the ALS card, does not have this irritating problem.)

Two of the PCPI-supplied utilities are particularly useful: a DOS-to-CP/M and CP/M-to-DOS transfer program and a program that sets up the Appli-Card's on-board 64K RAM as a pseudodisk that you can use from DOS 3.3.

PCPI's documentation consists of a concise, well-organized 30-page manual and the book *CP/M Primer*, by Stephen Murtha and Mitchell Waite. The *CP/M Primer* is adequate, but I much prefer the *Osborne CP/M User Guide*—I found it to be better both as a tutorial and as a reference manual.

Choosing One

All three boards are quality products and can run most current CP/M 2.2 programs. I prefer the ALS CP/M Card over the others, though, since it alone supports the latest version of CP/M, CP/M Plus. By selecting the ALS Card, you can not only run present-day CP/M 2.2 programs, but also future programs that will require the extra features of CP/M Plus. ✚



QUAD

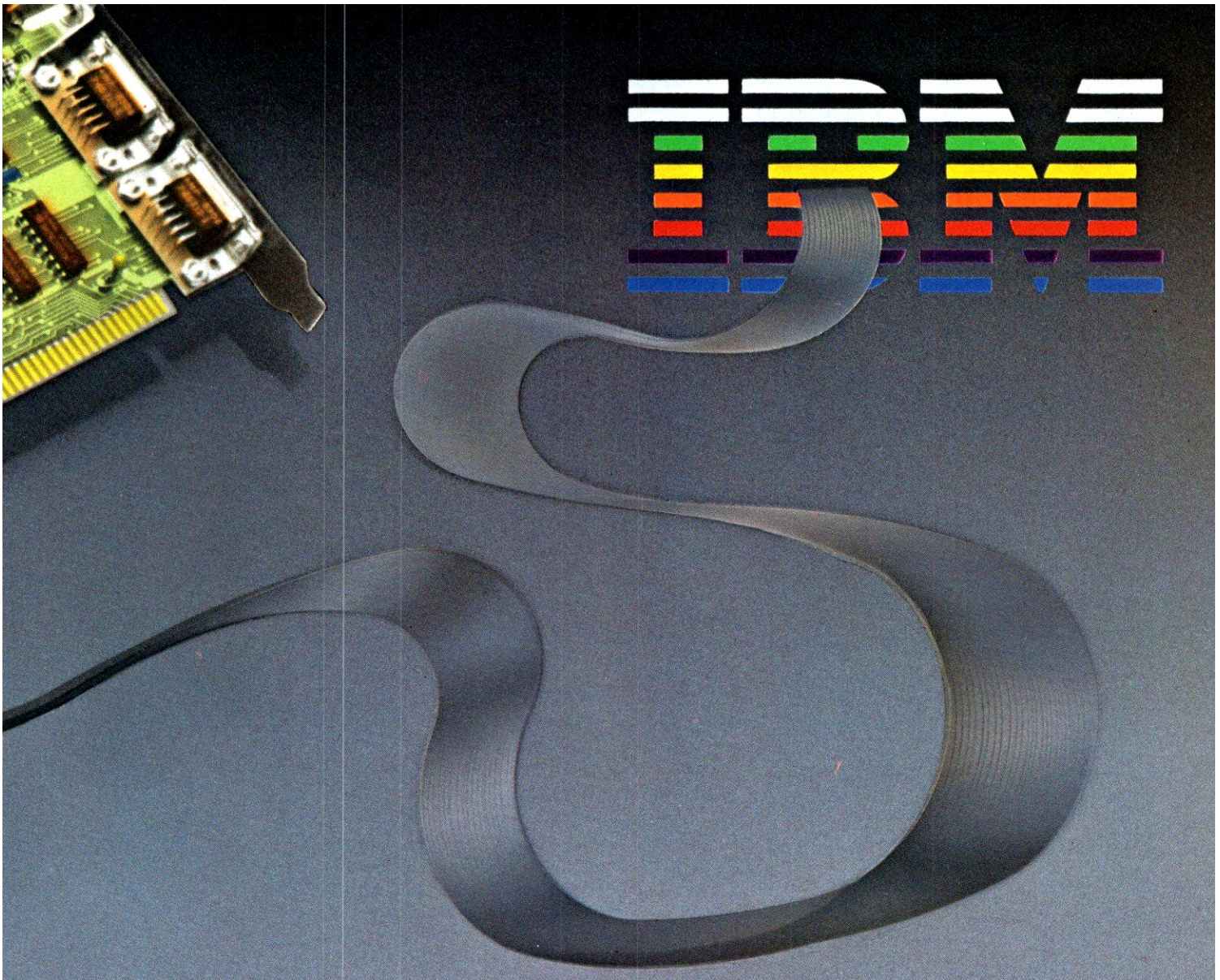
This coprocessor board makes the IBM Personal Computer think it's an Apple.

You may not have to give up using your Apple-based programs if you become an IBM user. Without losing any of its own abilities, your IBM PC or equivalent can also add a degree of Apple II look-alike performance to its repertoire with the Quadlink board from Quadram. Before you let go of your Apple, though, take a close look at exactly what you get—there still may be many times when you'll want that familiar sloped-front box.

The Quadlink board executes Apple software, exactly as claimed. After you install the board and boot up the included disks, you simply pretend that you're running an Apple II Plus with a slightly funny keyboard and screen. But note, claims in Quadram ads to the contrary, that not all Apple-oriented programs will work on your hybrid—you only have a 40-column screen and you may not be able to read copy-protected disks. At $680, the Quadlink board is a major investment, so you ought to take a close look at what it does and doesn't do.

What It Does

Essentially, the Quadlink board provides a complete 6502 processor with 64K of memory that sits inside your IBM and runs programs written for the Apple. The Quad-



LINK

link suspends operation of normal PC and PC-DOS operations any time you wish and pretends to be an Apple II. If you want Apple-mode operation, you simply type CTL-ALT-A. To switch to the IBM mode, you type CTL-ALT-I. (CTL and ALT are among the special shift keys on the IBM keyboard.)

In the Apple mode, you can reboot (from a bootable Apple DOS 3.3 format disk), run programs, read and write disks, and generally act as if you are using an ordinary Apple.

In the IBM mode, you operate normally, just as if you hadn't changed your machine. In fact, you can leave your Quadlink board inside your machine all the time, even if you only occasionally need to use an Apple-format program.

Adding the Quadlink does not interfere in any way with normal PC operation in the PC-DOS mode. According to Quadram's technical-support people, the only likely interference is if another company's board uses the same IBM I/O addresses picked for the Quadlink. Unfortunately, the addresses are not yet included in the documentation, but so far this omission has not been a problem.

If you have Quadlink in your PC, you won't know if someone slips into your chair and runs an Apple program while you are out on a break. Once the visitor switches back to the IBM mode, the screen returns to exactly where you left off (as your "Apple" screen will be wait-

ing for the visitor if he goes back the other way). The system doesn't offer windowing or parallel processing, and when you select the IBM or Apple mode, the other system waits patiently for your return before continuing.

Some of the Apple-format software Quadram lists for its board includes VisiCalc, Bank Street Writer, Apple Writer I and II, Terrapin Logo, and the Pinball Construction Set. Games in its list include Sargon II, Olympic Decathlon, Crossfire, and Stickeybear ABC. I used various languages, utilities, word processors, and game programs without any trouble. Note, however, that by including a list of compatible programs in the manual, Quadram is admitting that not all Apple programs can run on its board.

What It Doesn't Do

The Quadlink does not make your IBM completely Apple-compatible. The main area in which that may be a problem is disk I/O.

Apple drives are nominally 35 tracks and one-sided, and those tracks are the same as the first 35 of the 40 on the standard IBM floppy. The Apple drive, unlike the IBM drive, can read at positions between tracks, however. In fact, many copy-protection schemes rely on this ability and thus render the disk unreadable by the Quadram-IBM combination.

Opinions vary widely about the number of programs protected in this way. In any case, the number is significant, so consider that fact before you put down your money. If you have a particular program in mind, try it on a Quadlink at a dealership before making your decision.

The Quadlink is just a single board and not a complete system.

You can use a few IBM peripherals and your Apple game paddles, but you can't plug in any other Apple cards on the system.

Quadram gives you an equivalent to Applesoft called FP (floating point) BASIC. Commands are the same, including the graphics routines.

Installation

Installing the Quadram board is not difficult—it's mostly unplugging and reconnecting cables. The only tool you need is a small screwdriver to take out the screws that hold the PC's cover and circuit boards in place.

The manual is helpful for installation, with straightforward instructions and clear photos of all the connections. You are guided, step by step, in rearranging the drive cable, the speaker cable, and the video connector on the back of the main system unit. All connectors are polarized, so you can't put them in backwards by mistake.

If you glance at the board itself, you'll see a 6502 processor (the same as the one in the Apple), 64K of memory (so the Apple and IBM each have their own memory), and several PLA chips that handle the special requirements of running in the IBM PC environment. The board quality seems good.

Software installation is also simple, but the manual is less clear on that topic. Essentially, you make an IBM-format disk with the Quadlink boot program on it. The boot program consists of an AUTOEXEC file and an .EXE file, and you simply move both to an otherwise standard, bootable IBM disk using the standard PC-DOS Copy command. You need not set parameters or choose from options. You use this boot disk to wake up the Quadlink board and set up the linkages on the PC side. Then you load the Apple software for the Quadlink mode.

Startup

Because Apple disks are so different in format from IBM disks and the Apple operating system cannot legally be supplied on the Quadlink board, you must prepare the system each session by loading in the boot program and a copy of the Apple DOS.

Teaching the IBM to read Apple disks is the job of the boot disk that you made during initial software installation. Note that the boot disk is an IBM-format disk, meant to be read by the PC when it is operating in the IBM mode. You can reboot and have the AUTOEXEC file automatically load the Apple disk program, or you can execute the file from PC-DOS.

Once the Quadlink program is booted, you read the Apple DOS software into memory. You do that by running a PC-DOS program that reads Central Point Software's Filer program into Apple memory. Central Point has a license to use Apple's DOS 3.3 code, so that takes care of the legal problems. The Quadlink package includes a special Filer disk that has an extra program for transferring data between Apple- and IBM-format disks.

All this preparation is necessary only at the start of the session—once you load in the Apple code, you can reboot Apple disks, switch modes, and continue with normal IBM programs without other special procedures.

Quadram gives you an equivalent to Applesoft called FP (floating point) BASIC. Commands are the same, including the graphics routines.

If you want to use Integer BASIC, you must supply it yourself. According to the manual, running INT "requires that the Quadlink was booted with DOS 3.3 Master or equivalent."

All of the Quadlink's display modes are identical, so you have the standard text and low-res and hi-res graphics. Even the Apple's idiosyncratic hi-res color scheme is preserved. If you want to switch modes, the soft switches are in their usual location.

I/O

You can't plug Apple I/O cards into an IBM, so even with the Quadlink board you're operating at best a medium-sized Apple system. You have a keyboard, two disks, a screen, and a few I/O ports. In the Apple mode, you can use IN#0, IN#2, and IN#6. For output, you have PR#0, PR#1, PR#2, and PR#6.

All of the Quadlink's display modes are identical, so you have the standard text and low-res and hi-res graphics.

IN#0, as usual, sets the system for input through the keyboard. IN#2 gets characters from the device that you set in the normal IBM mode as COM1 (often a modem or remote terminal). IN#6 boots the Apple DOS back in

from the disk in drive A.

Going out, PR#0 is the screen, PR#1 is the device set in the IBM mode as LPT1, and PR#2 is COM1. PR#6, like IN#6, boots from drive A.

If you attempt to input from the missing IN#1, 3, 4, 5, or 7, or output to PR#3, 4, 5, or 7, the system hangs up. You must reset to get going again, although a soft reset (entered as Control-Break) often gets you back to DOS without wiping out memory.

The Quadlink board processes information as rapidly as an Apple does, but input and output operations are slightly slower. That's because many operations must be performed twice—once from the Quadlink to the PC and once from the PC to the external world. Aside from some fast animation, the slower speed should not be critical.

Miscellaneous Limitations

If you use the IBM monochrome adapter or an equivalent, you'll notice one minor problem right away. Because of differences in the machines' video systems, the "Apple" video image takes up only the lower two-thirds of the monitor screen. As a result, displayed images look squashed horizontally. The distortion is particularly noticeable on programs using Apple hi-res graphics. The problem does not occur with a color-graphics card.

You won't be able to move data directly between your IBM and Apple programs yet. Last December, the only way Quadram supplied to interchange data was the special cross-format disk-file copy routines in the Filer program. You couldn't send data from one to the other through memory, nor could you read disks formatted by one while running an ordinary program in the other mode. And you could not instruct a program running in either mode to call the other mode.

According to Quadram, those software limitations are being solved. The company also experienced a delay in delivering the file-transfer program, so perhaps they're just backlogged down there in Georgia.

Support

Quadram's direct support of Quadlink seems good. The unit is guaranteed for a year, and repairs are made by a dealer or directly by Quadram in Georgia. My calls to its technical-support department were answered quickly, and the responses were always helpful.

As I mentioned before, the Quadlink manual is good on the topic of installation and then declines in quality. Quadram says a new manual is "at the printers," so some of my comments may not apply when the new edition comes out. In the existing manual, the installation section has enough photographs and drawings and is clearly written.

The remainder of the manual is short on details and unclear on some points. For example, the authors promise several times to explain certain topics in the chapter on BASIC—a chapter that is not in the manual. Similarly, there are references to using the Quadlink with a Language Card, a feat that would defy the rules of electrical connection. One section deals with problems, but it is not extensive or helpful, aside from reminding you that the most common problem is failure to plug in and turn on your equipment.

If you have the PC but no experience on the Apple, it is unlikely that you'd want to start with the Quadlink.

Apple software is often less expensive than the IBM equivalent, and some packages are written only for the Apple.

The sections on Apple DOS are a bit skimpy, but then the principal market for the board is people who are already Apple addicts. Perhaps Quadram felt it would be in bad taste to simply refer you to the Apple manual, but once you install your card and learn the few idiosyncrasies of the Apple mode, you probably won't need to look at the Quadlink manual again.

In appearance, the manual is nicely typeset and presented in a three-ring binder with tab dividers for each section. It includes a glossary but no index.

Should You Buy One?

If you have an Apple program or database that you've invested hundreds of hours on, the Quadlink board may save you the time and expense of converting it into a form that can run on the IBM PC. If you don't have the modems or the network to move data directly between your Apple and a PC, the Quadlink will do this job for you. But if you have the PC but no experience on the Apple, it is unlikely that you'd want to start with the Quadlink.

The system costs almost $700 and requires an hour to install (unless you can get your dealer to do it) plus another half hour to familiarize yourself with its operation. If you want to write your own software to mix Apple and IBM processing, your time investment could go much higher.

What you save is the necessity of finding space for two computers, the cost of two sets of peripherals (especially disk drives and printers), and the worry of keeping two systems running. Apple software is often less expensive than the IBM equivalent, and some packages are written only for the Apple. If you already have the software, the savings on one or two major packages could easily outweigh the cost of the board.

All in all, it's a tough decision—one that neither an Apple nor a PC can make much easier. You just have to decide for yourself. ✚

▸PRODUCT INFORMATION

Quadlink
Quadram Corporation
4355 International Blvd.
Norcross, GA 30093
(404) 923-6666

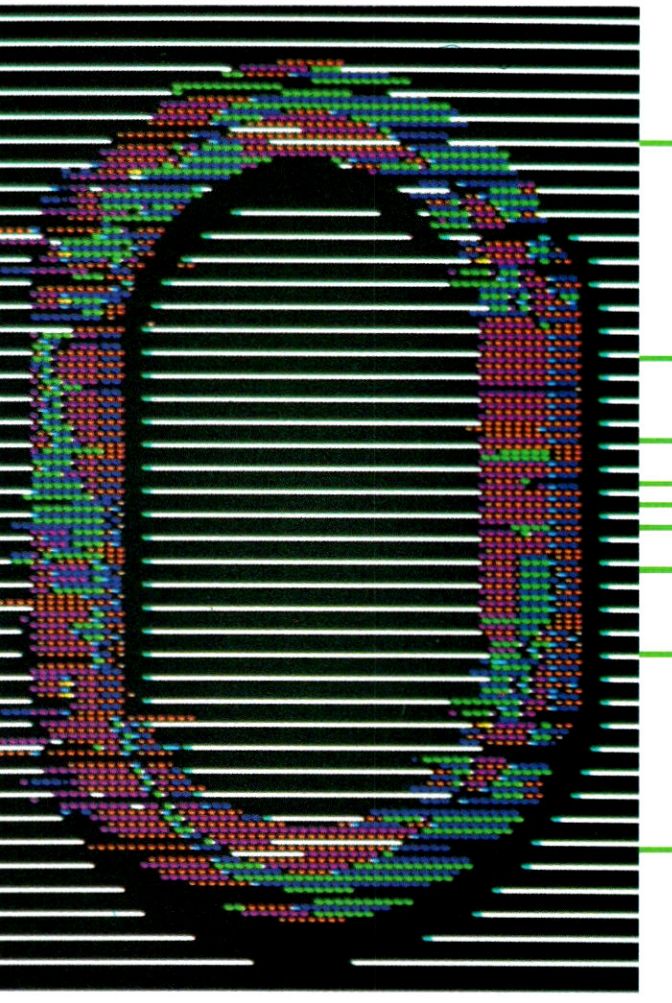
List Price: $680

Requires: IBM Personal Computer; one or more disk drives

▸A+ REPORT CARD

Quadlink	
Usefulness	B
Performance	B
Ease of Use	A
Construction Quality	A
Manual	C
User Support	A
Meets Claims and Specs	C
Overall	B+

THE

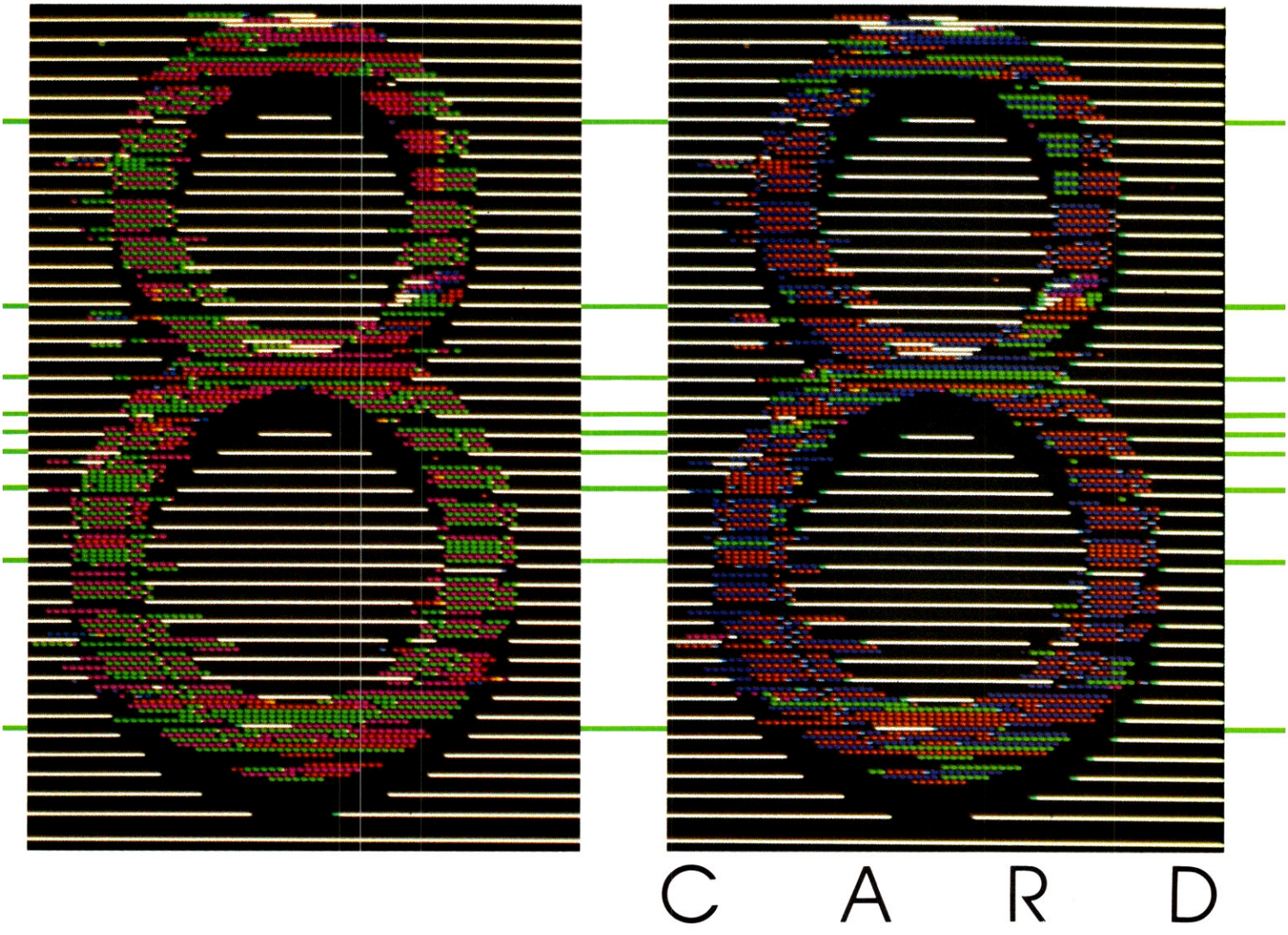


Make your Apple act like an IBM PC with this coprocessor board.

If you still like your Apple but wish you could run some of the software for the IBM Personal Computer, ALF may have the board for you. The ALF 8088 Processor Card is one of the first of what should be a succession of 8088 coprocessors for the Apple II family of computers. You can use this board with its 8088 16-bit processor chip either to make your Apple a close relative of the IBM PC or to speed up the rate at which you can process Applesoft programs. If you're a true hacker, you can program directly in assembly language for the 8088 processor as well.

The ALF entry actually consists of two boards: a main processor board and a memory and math-processor support board. ALF's Processor Card adds the 8088 CPU processor chip to your Apple II (or Apple II-compatible system). The memory board supports up to 128K of memory and also has a space for an optional 8087 math chip. The 8088 chip alone does most types of arithmetic operations faster than the Apple's 6502, but the addition of the 8087 brings processing speed for mathematical operations close to the speed of many minicomputers.

Because of the way this processor board is designed, the 8088 and the Apple's



6502 run simultaneously. Theoretically, you could use both at one time to speed up processing vastly—but in practice, the main application is to let the Apple handle input and output while the 8088 handles program execution.

The 8088 has access to all of the Apple's memory, so the 8088 can run programs that take up to 64K without adding extra memory. The overlapped memory includes the Apple text and graphics screens. The 8088 can also access all peripheral cards in the Apple's expansion slots.

When you use the Processor Card with the AD128K Memory Card loaded with a full 128K, you can use the additional memory to emulate a disk drive. Since data transfer to memory is much faster than to a disk drive, this RAM disk lets programs that must store and read data run much faster than they would otherwise. Of course, if you want to save the data, you have to transfer the information from the RAM disk to an actual floppy before you turn the power off.

The ALF board also provides an often-suggested barrier to software piracy. Each Processor Card contains a serial number encoded in the on-board memory. You can therefore write programs that you can back up and copy to hard disks but that can run only on a particular CPU. For this antipiracy system to make any real impact, however, more companies in the industry, including most software firms, would have to support it.

SINCE THE 8088 PROCESSOR IS FASTER THAN THE APPLE'S 6502 PROCESSOR, IT COMPUTES THE MATH FUNCTIONS MORE QUICKLY.

The Software

The ALF board supports three different classes of software: emulation and system software to make the board into a relative of the IBM PC, speed-up software to make your Applesoft programs run faster, and pure 8088 code for projects that require more computing than a 6502 can handle.

The IBM PC software for the ALF board comes from a company called Clone Software. The firm says that it wants to make an Apple with the ALF 8088 board act as much like an IBM PC as possible. In software developers' language, Clone is attempting to "port" the two IBM PC operating systems to the Apple/ALF 8088 board combination.

When we looked at this board, only one part of the IBM-type system software was available. Although ALF and Clone are promising to support both of the two main operating system families on the IBM PC (CP/M-86 and MS-DOS), only the CP/M-86 version was available at the time of our tests.

Clone Software's CP/M package consists of a special boot routine, plus the actual version of CP/M-86 the IBM PC uses. Once you boot the program, the operating differences—other than the smaller screen size—are minor, and virtually all CP/M-86 software should work.

You also get a set of utilities for reading and writing Apple-compatible diskettes while running CP/M-86. You can use them to share files between modes or even to port your data between an Apple and a PC (running CP/M-86). The utilities support both 13- and 16-sector diskettes for the Apple.

The principal differences are ones based on the different nature of the hardware itself. Using your normal Apple drives, you can read only a single-sided diskette, using up to 35 tracks, and you don't have the IBM's ten function keys on your Apple.

Although both CP/M-86 and MS-DOS can run on a system with only 64K of memory, many application programs require at least a 128K system. Clone therefore recommends that you buy the ALF 128K memory board if you're going to run commercial programs under either of these operating systems.

Fast Applesoft

The ALF 8088 Processor Card can also speed up existing Applesoft programs without making you rewrite code. Many Applesoft programs are limited in speed because the 6502 was not designed for fast arithmetic processing. FTL (Formula Transfer

▸CP/M-86 AND MS-DOS

CP/M-86 and MS-DOS are the two most popular operating systems for 16-bit personal computers. Both run on the IBM PC, but by far the more popular is the PC-DOS version of MS-DOS.

When people talk about PC-DOS, they're generally referring to both the MS-DOS code slightly customized for the PC, plus the routines in the IBM PC's ROM chips that programs use for screen output, graphics, and assorted other functions. If an operating environment is to be truly IBM-compatible, it must include both the MS-DOS part plus a functional equivalent of the ROM routines. Any program that runs under the generic variety of MS-DOS can run on an IBM. Similarly, programs that run under standard CP/M-86 run on the IBM version of CP/M-86.

Because ALF and Clone have tried to emulate the operation of the IBM PC, many programs written for the IBM and CP/M-86 or MS-DOS will run on an Apple with the Processor Card. As more and more computers come out that are compatible with CP/M-86 and MS-DOS, programmers have more incentive to write programs that work on any CP/M-86 or MS-DOS-compatible computer (rather than gearing the program to one particular system).

Because generic MS-DOS and CP/M-86 programs run on the IBM PC, you can use the ALF card to develop programs on your Apple that can run on the IBM PC system. You can also develop software for other machines that use the 8088 or 8086 chips, including models from Texas Instruments and Digital Equipment Corporation.

Link), a software program that comes with the Processor Card, solves this problem by transferring most math functions to the 8088 for fast evaluation. (The functions it transfers are multiply, divide, exponentiate, SQR, LOG, EXP, COS, SIN, TAN, and ATN). Since the 8088 processor is faster than the Apple's 6502 processor, it computes the math functions more quickly.

We found FTL easy to use. It works something like a preboot program—you run it first, but you don't have to modify your existing Applesoft programs.

The command is simply RUN FTL. After FTL starts, it asks you the number of the slot into which you've put your 8088 card. After you answer, you can load and run Applesoft programs, which execute much faster than usual.

FTL works by copying Applesoft from ROM into RAM (where Integer BASIC normally stays) and replacing the math routines with calls to 8088 math routines. These fast calls remain in memory, speeding up all your Applesoft programs, until the RAM area FTL uses is erased.

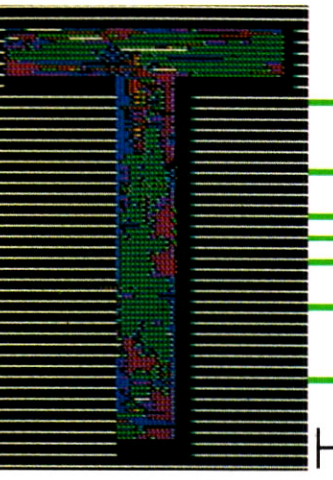
FTL actually consists of three separate sections. The part that does the fast math is 8088 code, stored in the 8088 card's memory area. Using these routines plus some stored in the on-board ROMs, the 8088 performs the requested calculations.

The second section is 6502 machine-language commands that patch Applesoft to call the 8088 for math functions. The FTL commands change the beginning of each math routine in Applesoft, redirecting the normal program flow. The third section is the loader and initialization routine. Its job is to load the two other sections into the right spots in 8088 and 6502 memory.

Note that when you use the FTL package for precision arithmetic, your results will be somewhat different than with standard Applesoft. Applesoft and FTL use different algorithms for their calculations, and their results may differ slightly.

The Pascal Patch

If you happen to be an Apple Pascal user, you can also use the Processor Card to speed your numeric processing. ALF distributes a program from MicroMagic called The Pascal Patch. This program routes math functions in Apple Pascal to the 8088, using a method similar to FTL's. Internally, the Pascal Patch changes the p-machine, replacing the MPR (multiply real), DVR (divide real), and MOV (block memory move) instructions with



THE ALF 8088 PROCESSOR CARD CAN ALSO SPEED UP EXISTING APPLESOFT WITHOUT MAKING PROGRAMS YOU REWRITE CODE.

▸HOW CAN A 6502 AND AN 8088 COMMUNICATE?

The Apple's 6502 and the ALF Processor Card's 8088 communicate through a series of "mailbox" locations in the Apple memory space that they both can read and write to.

These ports, as ALF calls the message locations, are located at Apple memory addresses COxp (where x is 8 for slot 0 to F for slot 7, and p is the port number, 0 to F). In decimal notation, that's SLOT*16-16256+P (where SLOT is the slot number, 0 to 7, and P is the port number, 0 to 15).

One main use of these message drops is to let the two processors know when the other has a result waiting. Programs can also exchange information by leaving data in specified memory locations.

▸CP/M-86 SOFTWARE FOR THE APPLE

In addition to software written for PC-DOS, you can also use CP/M-86 software with an ALF 8088 Processor Card. You can order many CP/M-86 programs in Apple/CP/M disk format from several software distributors. A complete list of CP/M-86 programs is certainly too long for inclusion here; you can get a more complete catalog from some of the large software distributors or your dealer. Some of the better-known programs include Access Manager and Display Manager (Digital Research); DataStar, InfoStar, CalcStar, WordStar, SpellStar, MailMerge, and SuperSort (MicroPro); SuperCalc and SpellGuard (Sorcim); and dBase II, Bottom Line Strategist, and The Financial Planner (Ashton-Tate).

8088 versions.

The ALF package also includes one pure 8088 utility program. MET, the Multiple Event Timer, is a program that allows the Processor Card to serve as a timer. MET doesn't access the Apple's memory while it is set up for timing and thus doesn't affect the execution speed of the Apple's processor. Therefore, you can use it to measure the execution time of programs or routines the Apple processor runs.

Using the Board

We had to spend more time than we'd anticipated to get these boards installed and running for the first time. Most of our problems involved configuring the package to use the optional 8087 math processor. When you use this chip, you also have to move the 8088 CPU chip from the processor board to the memory-and-8087 board.

After you set up the boards, you have to figure out where to install them in your Apple.

The instructions for removing the chip and reinserting it are clear, but actually getting all the pins back in without bending any is not so easy. On our first attempt, we did bend one pin under. If you're not used to installing chips, you might want to get someone with experience to do it for you.

After you set up the boards, you have to figure out where to install them in your Apple. The manual lists various possible slot combinations, but depending on what else you have in your Apple, these alternatives might or might not work. Although the recommended list did not include slot 0, the manual does say you can use any slot—and slot 0 worked best for us.

After you have installed everything, you can choose whether you're going to work in the Apple or the IBM-look-alike mode. If you're running in the Apple mode (including the speed-up utilities), you load and run programs under DOS in the normal way. If you're going to run IBM-format software, you run the Clone Software preboots, followed by the standard CP/M-86 (and soon MS-DOS/PC-DOS) disks. (See "CP/M-86 and MS-DOS").

Documentation

The manuals for the boards are generally good. They are not super-slick productions with four-color photos, but they get the job done, especially the parts explaining how to put the hardware together. They provide step-by-step instructions on installation and operating the boards. They include schematics of the boards as well as an index, which is a particularly important part of a manual. If you get the Clone Software versions of CP/M-86 or MS-DOS, you get a booklet from Clone explaining their use, in addition to a full set of standard operating-system manuals.

Our Recommendations

If you want to run CP/M-86 or MS-DOS programs on your Apple, this board gives you that option at a far lower cost than that of starting with a new system. You can run most standard versions of these programs and some of the special versions intended for the IBM PC.

Because of the differences between the PC and the Apple, you still won't exactly have a PC-compatible machine, so if that distinction is important to you, this is not the way to go. ALF may be releasing a IBM PC-compatible disk controller for the Apple later this year, but until then the two computers use different disk formats. The Apple keyboard has no equivalent to the function keys on the IBM, and the Apple displays 24 lines instead of 25.

If you have an Applesoft application that involves a lot of calculating, you might want to get both the memory-and-8087 board and the 8088, just to use the 8087. The FTL software is easy to use and effective. It won't help, however, if your programs are limited by disk-transfer speeds or nonarithmetic processing.

If you want to write 8088 code for a stand-alone application, adding this board to your Apple is one of the lowest-cost software-development improvements you can make. ✚

You can load the FTL program and speed up the Applesoft.

Programs that graph the results of complex computations run a lot faster.

AN ALTERNATIVE: THE PCPI 88 CARD

For another choice in 8088 cards for your Apple, look also at the PCPI 88Card. This card provides an 8088 and 64K of memory (for a total of 128K with a 64K Apple). The $595 list price gets you the full MS-DOS software and manual set. You can also buy the card bundled with the Lattice C Compiler for $695.

Personal Computer Products, Inc.
16776 Bernardo Center Drive
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PRODUCT INFORMATION

Alf 8088 Processor Card
ALF Products, Inc.
1315F Nelson Street
Denver, CO 80215
(303) 234-0871

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PC-DOS—$100
CP/M-86—$100
IBM Assembler—pricing not yet determined

Requires: Apple II, II Plus, or IIe; 64K RAM; one disk drive (many programs require two); monitor

Warranty: ALF—one-year warranty
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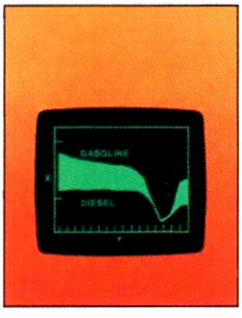

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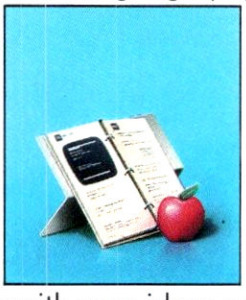

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Multi-Protocol File Transfer Capability

Softerm 1 offers file transfer methods flexible enough to match any host computer requirement. These include the *character* protocol with user-definable characteristics to provide maximum flexibility for text file transfers to any computer. The CP/M User's Group standard *XMODEM* protocol may be used for binary file transfers with systems using the CP/M operating system. The intelligent *Softrans* protocol can be used to transfer *any* type file and provides automatic binary encoding and decoding, error detection and automatic retransmission, and data compression to enhance line utilization. A FORTRAN 77 source program is supplied with Softerm 1 which is easily adaptable to any host computer to allow communications with Softerm using the Softrans protocol. Specific host computer versions of the Softrans FORTRAN program are available on request.

Softerm file transfer utilizes an easy to use *command language* which may be executed interactively or from a *macro* command file which has been previously entered and saved on disk. Twenty-three high-level commands include *DIAL, CATALOG, SEND, RECEIVE, ONERR, MONITOR, HANGUP,* and others. A *SCHEDULE* command even allows file transfers at a specific date and time.

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SOFTWARE REVIEW/BY ELLEN THRO

DOLLARS AND·SENSE

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Monograph
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List Price: $99.95; $20 for backup disks

Requires: Apple II or IIe; 48K RAM; one disk drive

Unlike those wonderfully organized people who know their expenses down to the penny and their net worth to the nearest $50,000, my financial management is, shall we say, casual. The last time I really sat down and put figures on paper

Everyone should consider a lifetime strategy for insurance and retirement financing, beginning now.

(aided only by a desk calculator) was a few years ago when I made a major investment, and even then I didn't do any long-range planning. So when *A+* asked me to review a new software package called Dollars and Sense, I thought that perhaps my Apple and this software could help me do it right and stick to it. I decided to start out by boning up on the latest in financial-management techniques.

First step: browsing through various books on personal financial planning.

Next step: ransacking the literature racks at my local bank and hauling away a sheaf of pamphlets on money management and preparation of financial statements.

Third step: retrieving from the trash a special section on personal investing from a recent Sunday newspaper.

Now I was getting somewhere. My reading informed me that I should expect to set my money priorities according to my present finances and life-style but that I should recognize that anticipated changes require new priorities. For instance, a single wage earner may have surplus income to devote to risky stock-market investments, but an anticipated marriage may cause the investor to consider switching some of this money into the purchase of a home. A childless, two-income couple may be saving money for a boat or vacation home, but if they decide to start a family, they should consider switching some of their investment goals toward long-term money growth for a future college education. People in their 50s should begin actively to rearrange assets for their retirement life, and everyone should consider a lifetime strategy for insurance and retirement financing, beginning now.

The basis for all this planning is a pair of documents called a statement of net worth and an income-and-expense, or net-income, statement.

The net-worth statement adds up assets (cash, securities, personal property, real estate, pension-plan contributions, and retirement accounts) and liabilities (debts, taxes, and mortgages). Subtracting liabilities from assets gives net worth.

The income statement covers wages, interest, dividends, alimony, profits from sale of assets, and all other items on IRS form 1040. Expenses include all the money you pay out, from rent and taxes to food, medical care, and recreation. Subtracting all the expenses from the total income shows the amount of money

Expenses include all the money you pay out, from rent and taxes to food, medical care, and recreation.

available for savings, investment, or payment of debts.

Aha! This is the figure that says whether I can afford 36 months of new-car payments or 30 years of mortgage payments. And the net worth tells me (and anyone who needs to know) how well I manage my finances.

Now I know what a financial-software package should help me do:

- Put all my present information on assets, liabilities, income, and expenses down on a diskette.
- Easily update it periodically as those items change.
- Play "what if" games: What if I need a new car; how large a monthly payment can I afford? Suppose my income doubles; how can I best use the extra funds?
- Consider different ways to rearrange my finances so I can prepare for alterations in life-style.
- Quickly use this information to pre-

pare income-tax and other financial documents.

Dollars and Sense

I had a feeling Dollars and Sense and I were on the same wavelength when I read in the manual that

1. Its account categories include assets, liabilities, income, expenses, and custom categories I may want to create.
2. It offers a selection of tax-preparation accounts as well as accounts for home and office (you can use them or compile your own).
3. It provides monthly, quarterly, or annual summaries of net income and net worth, as well as up-to-date reports and graphs on all or some accounts.

I had a feeling Dollars and Sense and I were on the same wavelength.

Dollars and Sense requires 48K of memory and one disk drive, although two are more convenient. It works with both the Apple II and IIe, with 40- or 80-column display, with or without lowercase display, and with or without a printer. With a 40-column display, however, the screen is split vertically, requiring you to use a control command to shuttle between the right and left halves of the screen. This procedure is less of a nuisance than it seems, however, since the groupings are usually logical and you can get along momentarily without the other half of the screen. Two control characters for the Apple II differ from those listed on the screen that pertain to the IIe. Apple II users must simply memorize these differences.

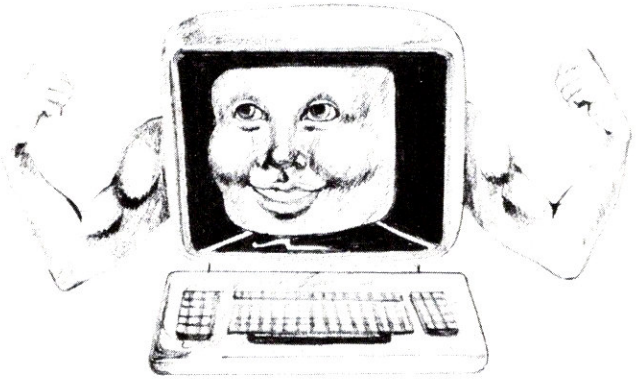
You can view all reports on the screen or on printouts. For printing all the information, 132 columns in normal or compressed type are required. A menu provides automatic configuration for ten well-known printers and an option for entering decimal ASCII commands for other brands or models. You can display graphs on the screen but cannot print them with Dollars and Sense unless the computer contains a Grappler card. An appropriate printer is also necessary. You can also print graphs saved on a disk, with various graphics programs.

The Dollars and Sense package includes a boot disk (for starting up), a system disk, and, on their backs, a tutorial. The manual consists of a three-ring, loose-leaf binder containing 130 pages, with sections on getting started, applications, a reference to commands and options, a sampling of reports and graphs, a glossary, and an index.

The disk tutorial, accompanied by the manual, provides a typical use and a step-by-step introduction, including illustrations of the various menus of selections. If you want to plunge right in with your own data, you can follow the tutorial section of the manual, substituting your own figures. The format of the program is for standard, double-entry bookkeeping.

A menu provides automatic configuration for ten well-known printers.

After you boot the system for the first time, you must provide information on printer type, column width, and paper length and width. Then the system requests the title and the starting month and year for a new-account disk. After you provide those facts, the system initializes a disk that you can use for that information. Each disk can hold 120 accounts or money classifications and 12



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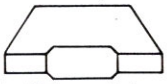

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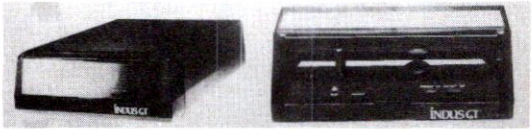

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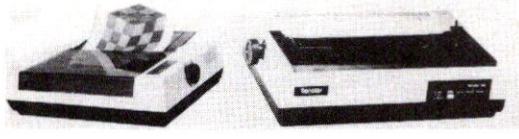

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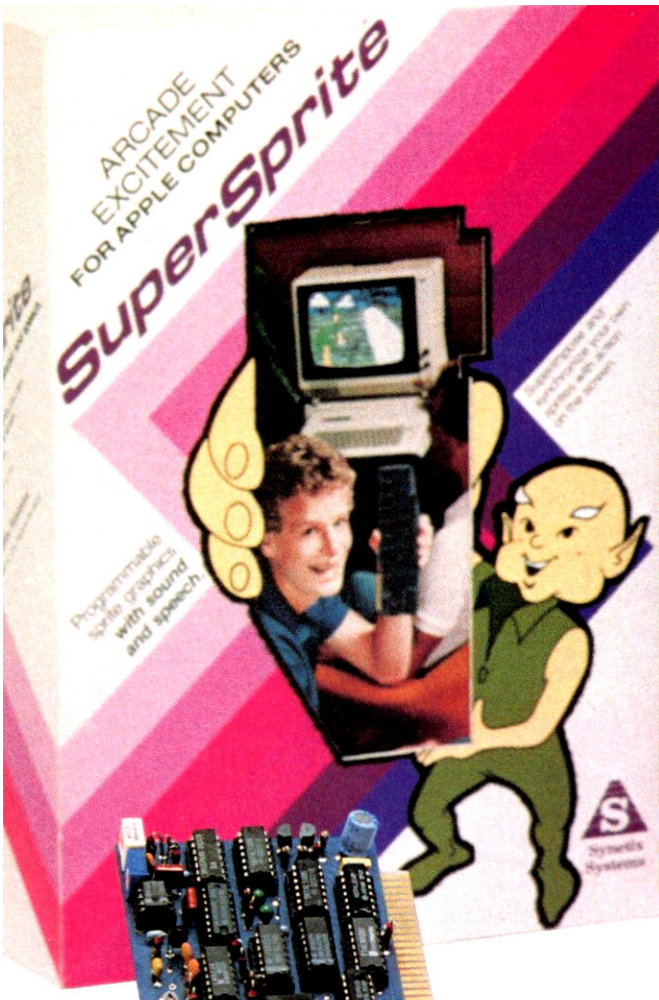

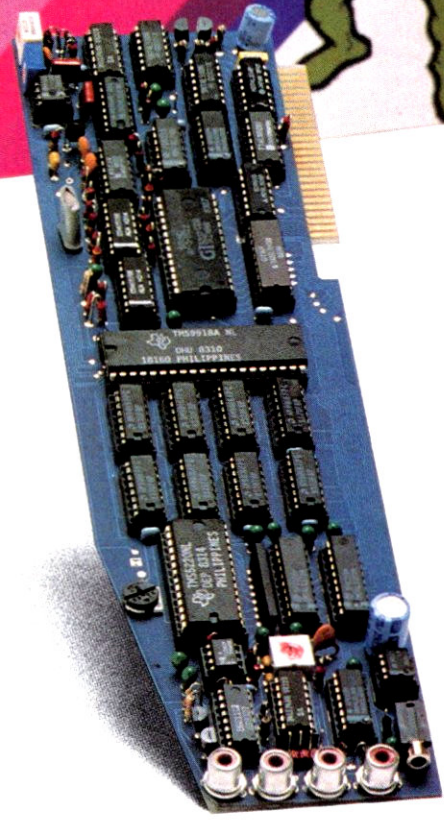

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checking accounts. You can expand the system by using multiple disks.

Setting It Up

Next comes setting up a budget. Although I resist this sort of thing in my heart of hearts, I found that it is actually a fairly painless procedure. You can select one of the preset groups of accounts or create a custom list. Accounts are required for check charges (an expense account), check interest (an income account), and checking. You set up each account with a number (for sorting by the program when creating reports), an opening amount, and a monthly budget. This budget can be the same each month, or variable, taking account of quarterly income-tax installments, for instance. You can enter any item as zero dollars either for budgetary purposes or for unused months when you begin with the system in mid-year.

Each disk can hold 120 accounts or money classifications.

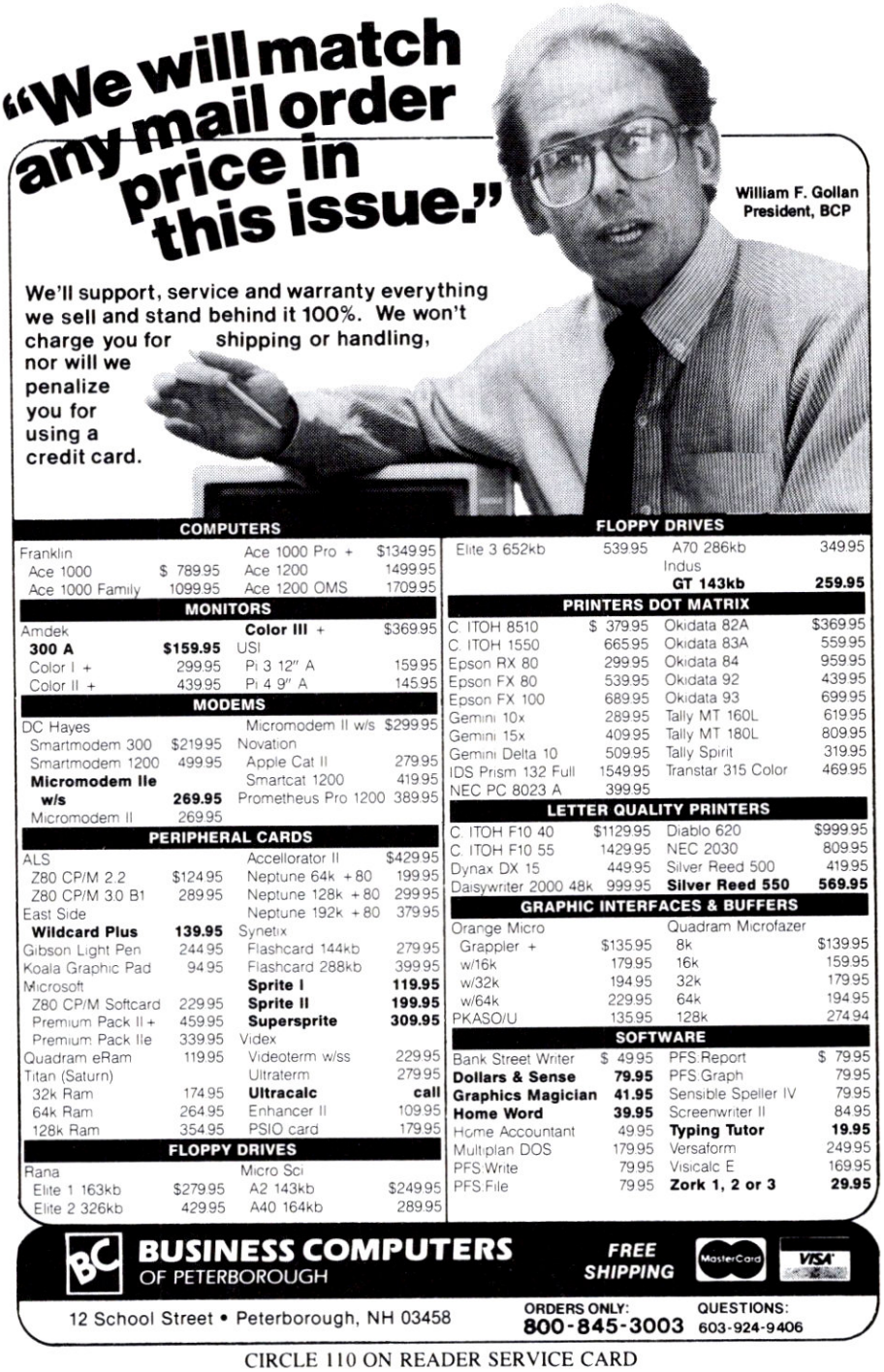
These screen entries are not incorporated into the system until you press Control-C and are not saved on the account disk until you perform a two-step Save routine. This procedure, which applies to all data changes, allows you to make tentative changes or play "what if" games without altering what you have already stored. As a safeguard, you can alter or add to data only after you issue a Fix or New command.

The system is flexible enough to let you select any account as the base account into which you enter data. After some thought, I decided to use the obvious checking account, since it is my main conduit for receipts and payouts of money. If you use Dollars and Sense to manage property or prepare tax statements, for example, you might choose other accounts for the base account. You enter check information in familiar check-register style.

To speed entry, the program lets you enter just a few letters of the category names and press Return, filling in the rest of the letters automatically. The same procedure is possible when you set up graphs and reports with the account names. (This method doesn't always produce the expected results, however. When I entered *mort*, Dollars and Sense responded with *mort.int.* when I meant *mortgage*. So I simply backed up and entered the whole word.) Similarly, a dollar amount entered as *3000* appears as *3,000.00*.

The preliminaries, including creating a list of accounts and entering information, took me 60 to 75 minutes, including a handwritten tryout of accounts and checkbook transactions. Then the fun began, as I chose from the six types of graphs and six types of reports to display my data. Graphs available are: actual vs. budgets, actuals/budget values, account contribution to total, monthly actuals/budget, monthly net income, and monthly net worth. Report types are: account year-to-date summary, monthly budget totals, monthly actual totals, net-income statement, balance sheet of net worth, and cash flow.

Some of these graphs and reports use standard budget categories; others use customized ones. I constructed a graph combining medical, dental, and health insurance into a category called Healthcare. At most selection points, pressing Control-N displays on the screen a list of all the accounts you have created or selected, so you never have to remember



CIRCLE 110 ON READER SERVICE CARD

them by precise name.

I selected graphs comparing actual spending to my budget, displayed in both dollars and percentages; net income and net worth month by month; and relative size of various expense accounts in the budget and in actual dollars spent. I also displayed reports summarizing all accounts in the year to date (figure 1), net worth (figure 2), and transaction activity for various accounts, such as Mortgage (figure 3). One useful projection in a "what if" situation is to set up an ideal budget showing percentages you would like to devote to savings, debt reduction, household, shelter, and other categories, and then see the impact of new items or higher income.

Dollars and Sense also functions as a checkbook manager, automatically reconciling its data with the bank statement. And it prints checks on blanks that can be ordered using a form in the manual.

Flexibility

The outstanding feature of Dollars and Sense is its flexibility. I found this aspect particularly heartening, since I

ACCOUNT YTD SUMMARY FOR: Ellen Thro
DATE LAST ENTRY: 01/20/84

<------ACCOUNT------> NUM	NAME	TYPE	LAST UPDATE	NUM ENT	<--TOTAL FOR YEAR--> ACTUALS	BUDGETS	CURRENT/TAX BALANCE
900	checking acct	Check	01/20	6	225	0	725
100	condo	Asset	01/01	0	0	0	50,000
101	car	Asset	01/01	0	0	0	3,000
102	money mkt acct	Asset	01/15	1	200	0	1,200
103	stocks	Asset	01/01	0	0	0	4,000
104	other property	Asset	01/01	0	0	0	5,000
200	mortgage	Liability	01/05	1	100	100	29,900
201	taxes	Liability	01/01	0	0	250	2,000
202	debts payable	Liability	01/01	0	0	200	2,000
300	cash rcpts	Income	01/10	1	1,000	1,500	0
301	interest	Income	01/01	0	0	200	0
302	dividends	Income	01/20	1	100	3,000	0
999	Check Interest	Income	01/01	0	0	0	0
400	health ins	Expense	01/01	0	0	0	0
401	medical	Expense	01/01	0	0	30	0
402	fed. inc. tax	Expense	01/15	1	250	250	0
403	mort. int.	Expense	01/05	1	300	300	0
404	household	Expense	01/10	1	25	200	0
405	misc.	Expense	01/01	0	0	200	0
998	Check Charges	Expense	01/01	0	0	0	0

Figure 1: A display of reports summarizing all accounts in the year to date

BALANCE SHEET FOR: Ellen Thro
ASSET ACCOUNTS DATE LAST ENTRY: 01/20/84

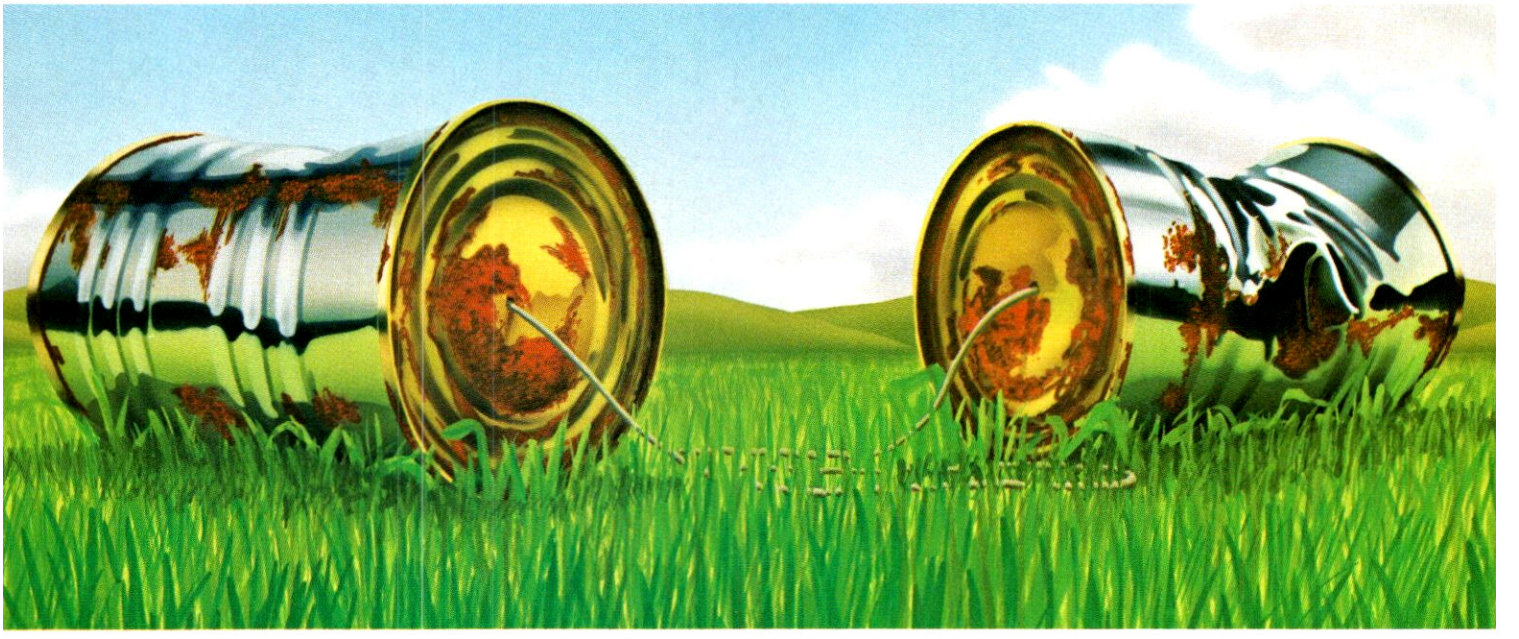
ASSET ACCOUNTS	BEGINNING BALANCE	ENDING BALANCE	<---ANNUAL CHANGE---> DECREASE	INCREASE
checking acct	500.00	725.00		225.00
condo	50,000.00	50,000.00		0.00
car	3,000.00	3,000.00		0.00
money mkt acct	1,000.00	1,200.00		200.00
stocks	4,000.00	4,000.00		0.00
other property	5,000.00	5,000.00		0.00
TOTAL ASSET	63,500.00	63,925.00		425.00

BALANCE SHEET FOR: Ellen Thro
LIABILITY ACCOUNTS DATE LAST ENTRY: 01/20/84

LIABILITY ACCOUNTS	BEGINNING BALANCE	ENDING BALANCE	<---ANNUAL CHANGE---> DECREASE	INCREASE
mortgage	30,000.00	29,900.00	100.00	
taxes	2,000.00	2,000.00		0.00
debts payable	2,000.00	2,000.00		0.00
TOTAL LIABILITY	34,000.00	33,900.00	100.00	
[NET WORTH]	29,500.00	30,025.00		525.00

Figure 2: A balance sheet displaying net worth

NOVATION



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And it's all simple to operate. Just follow the menu. No programming. No fussing. It's all there.

They're at your dealers.

No waiting. He has them right now along with all the details. See him today and you can be on-line tonight.

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CIRCLE 231 ON READER SERVICE CARD

PRO-MODEM 1200

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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.

PRO-MODEM does more. It lets you build a full telecommunications system with features like Auto Dialer, Incoming and Outgoing Message Buffering, Business/Personal Phone Directory, Programmable Operating Instructions, a 12-Character Alpha-Numeric Time and Message Display, and versatile PRO-COM Software. PRO-MODEM commands are Hayes compatible so you can use most existing telecommunications software without modification.

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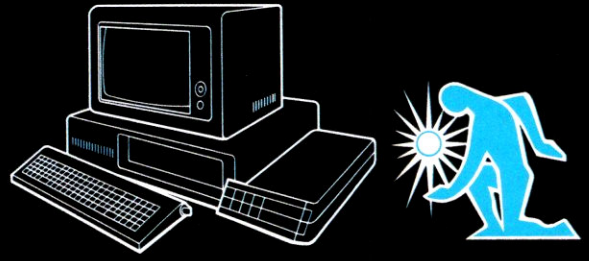


PROMETHEUS

CIRCLE 122 ON READER SERVICE CARD

TRANSACTION ACTIVITY SUMMARY FOR: Ellen Thro

ACCOUNT: mortgage DATE LAST ENTRY: 01/20/84

T X	DATE MO/DA/YR	TRANSACTION TITLE	DISTRIBUTION ACCOUNT	AMOUNTS ($) PAYMENT	PURCHASE
	01/05/84	1st natl bank		100.00	
			checking acct		400.00
			mort. int.	300.00	

TRANSACTION ACTIVITY SUMMARY FOR: Ellen Thro
ACCOUNT: mortgage DATE LAST ENTRY: 01/20/84

<----------ACCOUNT----------> NUM	NAME	TYPE	NUM ENT	TOTAL AMOUNT	CURRENT BALANCE
900	checking acct	Check	1	<400.00>	725.00
200	mortgage	Liability	1	100.00	29,900.00
403	mort. int.	Expense	1	300.00	300.00

Figure 3: A display of transaction activity for a specific account (in this case, Mortgage).

want my financial-management system to be as simple as possible and provide information with the least amount of effort on my part. For example, if I have a sum of money that I might want to invest in the stock market, I can create a fictional portfolio on a separate account disk and invest in it with imaginary funds, "buying" and "selling" to see how well I do before actually taking the plunge. If you decide to invest in real estate, you can create a separate set of accounts for that purpose. Self-employed people can have one personal set and one for business.

You can also use it to anticipate lifestyle changes. People planning to retire can keep two sets of accounts, one showing current monetary habits and another simulating life on a fixed income. This setup will help them decide which financial adjustments will be most satisfactory when retirement actually comes. Couples expecting a child can do the same before-and-after comparison.

On the whole, Dollars and Sense does a credible job of meeting the requirements I set for a financial program. It lets me enter information in a pattern mostly of my own choosing, update it easily, manipulate it, and simulate changes. The printed account summaries will be helpful at tax time. Whether the program will "save you time and money in a variety of ways," as the manual claims, is debatable—I tend to think that I am the only one who can save me money, but the organization of data it permits is certainly a step in the right direction.

Documentation

Dollars and Sense is one of those programs in which the manual and explanatory information on the screen makes its operation seem more complicated than it really is. I like documentation that starts out simply—"the boot disk does so-and-so, the system disk does this-and-that." The Dollars and Sense manual starts with an overview of operation, including screen illustrations, and then goes into the tutorial. I often had questions (about how to create a custom category, for example) that forced me to flip back and forth among sections before I found the answers. The manual would also be easier to use if it gave a step-by-step summary of various operations, without examples.

Dollars and Sense does a credible job of meeting the requirements I set for a financial program.

When I tried to create a special category of accounts to display on a graph, the category name did not appear on the screen in the list of existing accounts. I thought I was neglecting to finalize mine somehow, since the manual was unclear. So I tried doing it several times, using various names—all with no success. Only later, when I displayed the list again, did all my created categories appear.

At the top of each data screen, a list of relevant commands is displayed, but it is too cluttered and abbreviated to be really helpful. You must refer to the manual for clarification. A pullout summary card for quick reference would be a great help. Also, the list of accounts does not appear on the screen in the configuration shown in the manual.

Other minuses: the program comes without backup disks, although you can purchase them for $20 each. The manual lists the phone number of a "hotline." But if my experience is typical, "cold-line" would be a better name. First, it is not an 800 toll-free line. Second, I had a problem and tried to talk to someone four times in a two-day period. Twice I was told, "Someone will call you back," which finally happened on day 3. The other two times, no one answered the phone, although I held on for more than 15 rings.

In summary, Dollars and Sense is a program with many options that you can use for many different purposes. Its few shortcomings were not enough to discourage me from using it, and I actually found myself enjoying creating the graphs and reports—something I never expected. ✚

▶SOFTWARE REVIEW/BY MARTY PETERSEN

SAVVY

THIS MULTIFACETED OPERATING SYSTEM/DATABASE MANAGER MEASURES UP WELL.

Savvy (Release 2.2)
Excalibur Technologies
800 Rio Grande Blvd. N.W.
Albuquerque, NM 87104
(505) 242-3333
List Price: Savvy One, $349; Savvy Pro, $495; Business Savvy, $950
Requires: Apple II, II Plus, or IIe; 48K RAM

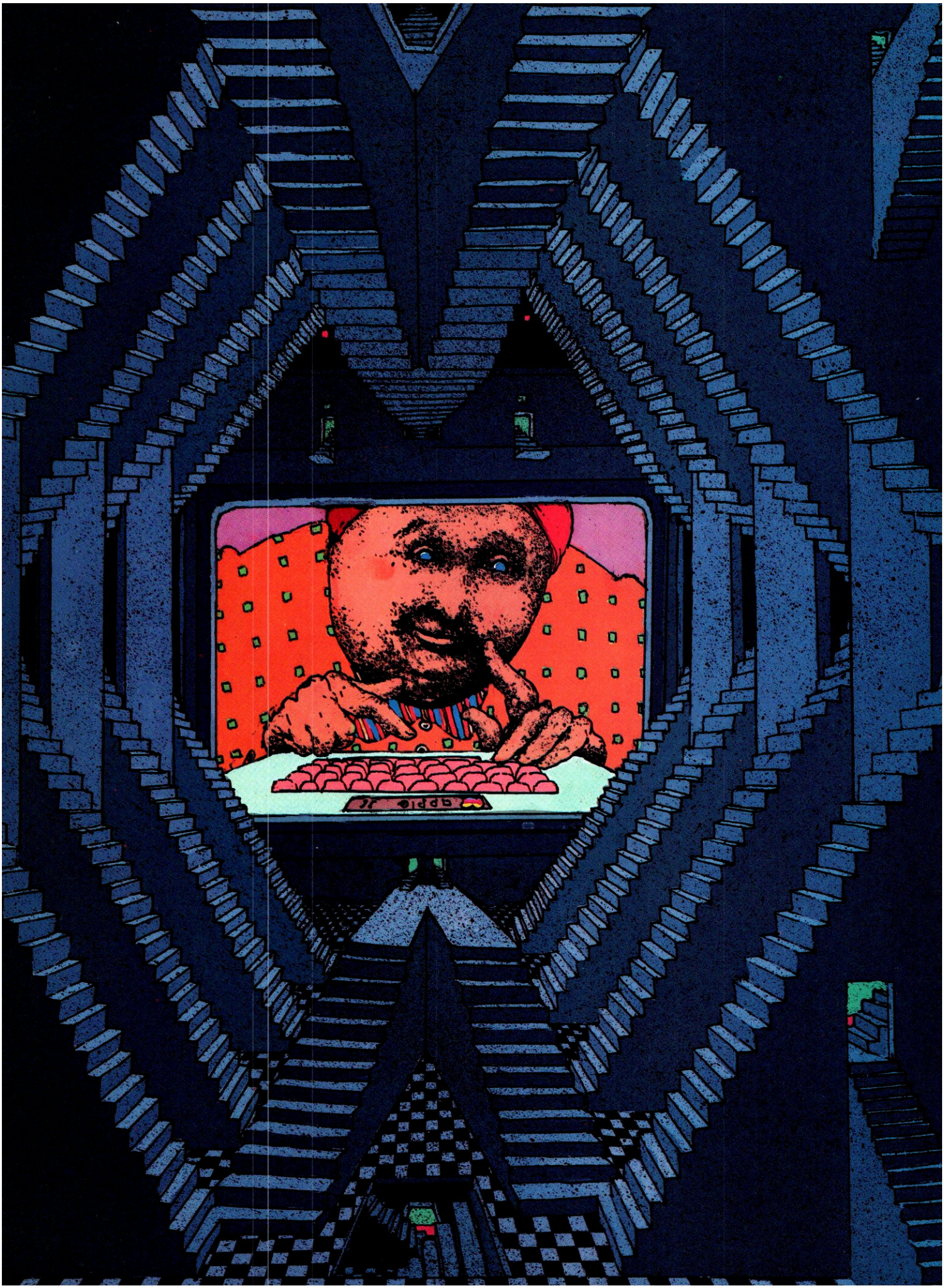
Savvy, a multifaceted computer program/system, is more than it appears to be on the surface. It is an operating system, a database manager, a language, an automatic program generator, and more. Release 2.2 is for any Apple II with 48K of memory. Having a language card or an Apple IIe with its built-in 64K of memory is of no advantage, since the system operates in a 44K CP/M environment. Furthermore, the up- and down-arrow keys, the open- and closed-apple keys, the tab key, and the delete key on the Apple IIe are unusable with the program.

Each of the three versions of the system, Savvy One, Savvy Pro, and Business Savvy, consists of hardware and software. The hardware is a single coprocessor board that plugs into slot #7 and contains a 2-MHz Z80 microprocessor. When you don't use the board with Savvy, you can use it with the CP/M operating system, although the software to do so does not come with the product. (I asked the manufacturer if the Savvy system could work if a user already had a Z80 card, such as a Microsoft Softcard or a PCPI Applicard, and I was informed that a feasibility study was in progress.) Savvy One has one board, and the other two versions use a different board. Thus, you cannot run a Savvy Pro or Business Savvy master program on a computer equipped with a Savvy One board, but you can start with a Savvy One board and upgrade to Savvy Pro or Business Savvy. The difference in the boards relates to the ROM software.

Savvy One is designed for a single-disk system only. Its software includes two diskettes, both of which you can copy for backup purposes. The master disk contains the Savvy operating system, a ready-to-use database, and an address/phone directory. The system produces a 40-column display or an 80-column display if you have the necessary hardware, which does not come with the package. The second disk is a demo disk called "Let's Use Savvy"; it steps you through some of the main features of the program without making you glean them from the manual.

The other two versions of Savvy need two or more disk drives, one of which can be a Corvus hard-disk system. The system-master disk must always reside in drive #1; the application programs use whatever capacity you have in your soft/hard-disk combination. Savvy allows you to use the entire Corvus (up to 20 megabytes) as one section, or you can divide it into two sections and use different master disks to bring up the different sections. A virtual-memory-management system lets you develop application programs limited only by the capacity of your disk system.

A formatted application disk in the Savvy system has space for 140K (called "rooms" in Savvy) for user-generated


apple jr

programs or data, whereas a similar disk formatted for use with the dBASE II system on the Apple II allows 126K for user information. I noticed when I formatted a disk with Savvy, using one of its utility programs, that it reported the speed of my disk drive. Another handy utility feature even lets you adjust the speed of any of your drives for optimum performance.

The application software in both the Savvy Pro and Business Savvy versions includes the same address/phone directory program that comes with Savvy One, in addition to a mailing list, a document writer, a mathematics package, and a loan-amortization program. The Business Savvy package also includes ready-to-run application programs for inventory control, accounts receivable, accounts payable, general ledger, and payroll.

Here are some system statistics: The largest and smallest numbers the math package can handle are 10E26 and 10E-26 respectively (that's a 1 with 26 zeros after or before it). Persons with scientific applications will appreciate the tremendous range of digital precision this program offers. The maximum number of files (called "folders" in Savvy) is 10,000; the largest number of pages (records) in a folder is 20,000; and the greatest number of items (fields) per page is 254.

Speaking Your Language

I'm sure you have booted up many a program for the first time, tingling with high expectations, only to be greeted by

It's one of the most impressive examples of 'user-friendliness' I've seen in any operating system.

a blank screen except for a >, [, or . staring at you. Wouldn't you prefer a more communicative response, such as, "What would you like me to do now?" Savvy is a program that interacts with you in this way. You instruct it, and it responds. As long as you correctly provide 60% or more of an expression that Savvy is familiar with, the program will figure out what you probably mean and act accordingly. It's not "AI" (artificial intelligence), but "APRP" (adaptive pattern-recognition processing). It's one of the most impressive examples of "user-friendliness" I've seen in any operating system in that Savvy learns from you and eventually speaks *your* language.

For example, Savvy, as it comes from the factory, has a vocabulary of 65 words. One of these words, CLEAR, clears the screen. If you type CLAER, CALER, RAELC, or any other possible combination of those five letters, Savvy will know you mean CLEAR and respond accordingly. If you type a lowercase *clear,* however, or CEAR, CLEER, CLLER, or CLEA, Savvy won't know what you're talking about and will ask you to try again.

How far should pattern recognition go? What should be the dividing line between recognizing and disregarding something? In some instances a wide range is desirable (the lowercase *clear,* for example), and in other cases being even one character off could be disastrous (CLEAR and CLEAN, for instance, have very different meanings). Savvy accommodates both kinds of ranges by providing two commands called Free and Literal in its vocabulary. The default command is Free, in which case the computer responds, "I'll use my best judgment," and invokes pattern recognition. If you enter Literal, the computer responds, "I'll make no assumptions," and operates accordingly until you give it the Free command again. You can add to Savvy's basic vocabulary (whose capacity is limited only by disk space) by associating your own words and phrases with Savvy's. Thus, if you tell the program that CR, Kill the Screen, or Erase the Picture means CLEAR, then Savvy will respond to any of those phrases. Thus, you don't have to use English to communicate with the computer, if English is not your native language. You can train Savvy to respond to any language you want.

Here's another example of the ramifications of pattern recognition: Figure a Loan is a program on the demo disk that comes with the Savvy Pro and Business Savvy systems. If you are in the Literal mode of operation, the only way you can access the program when the computer prompts, "What do you want me to do now?" is to enter the exact name of the program. In the Free mode, however, you can enter FIGURE LOAN, CALCULATE A LOAN, HEY MAC! FIGGER OUT A LOAN, FIGUER A LONNA, FIGUIR OUT THE LAON, or even DA LOAN FIGURE IT FOR ME, and the program will know what you mean. If you don't want to use any of these terms, you can make up something else. Maybe you want to say AMORTIZE LOANS. To do so, you can type ASSOCIATE and then enter the new and old phrases. Then, if you or somebody else types DO THE THING TO AMORTIZE THE LOANS, the computer will follow your instructions.

What It Does

If you have seen any of Savvy's ads, you may have gotten the wrong impression of what the program really is. The

You can train Savvy to respond to any language you want.

ads concentrate so much on the nature of the operating system and the language capabilities of the program that you might not realize what the program does. What Savvy does is manage information. Savvy is a relational database-management system, and the pickings are slim in this category for the Apple II line of computers. The key word here is *relational*. Many file-management programs for the Apple II can handle one file at a time, but none can handle more than one at a time except dBASE II. You cannot run dBASE II directly on the Apple, though,—you need a Z80 card. dBASE II allows you to use a "primary file" and a "secondary file." You open the primary file; then, when you want to access information in the secondary file, you "hold your place" in the primary file while you scan the secondary file. If you want to use a third file, the programming becomes quite complex—you must hold your place in the secondary file as well as the primary file while you temporarily close the primary file (remembering where you are) so that you can rename the primary file with the name of the third file and . . . . Oh, did I lose you already?

This kind of confusing situation contrasts with what you'll encounter with Savvy, which can work with thousands of files concurrently, not just with one or two. You don't have to open and close files, either. You just ask for the information you need by specifying the name of the folders you need and the pages the information is on. It's as logically laid out as if you were opening up a conventional filing cabinet and extracting the information.

Simplified Programming

The people who actually use computer applications, believe it or not, are best

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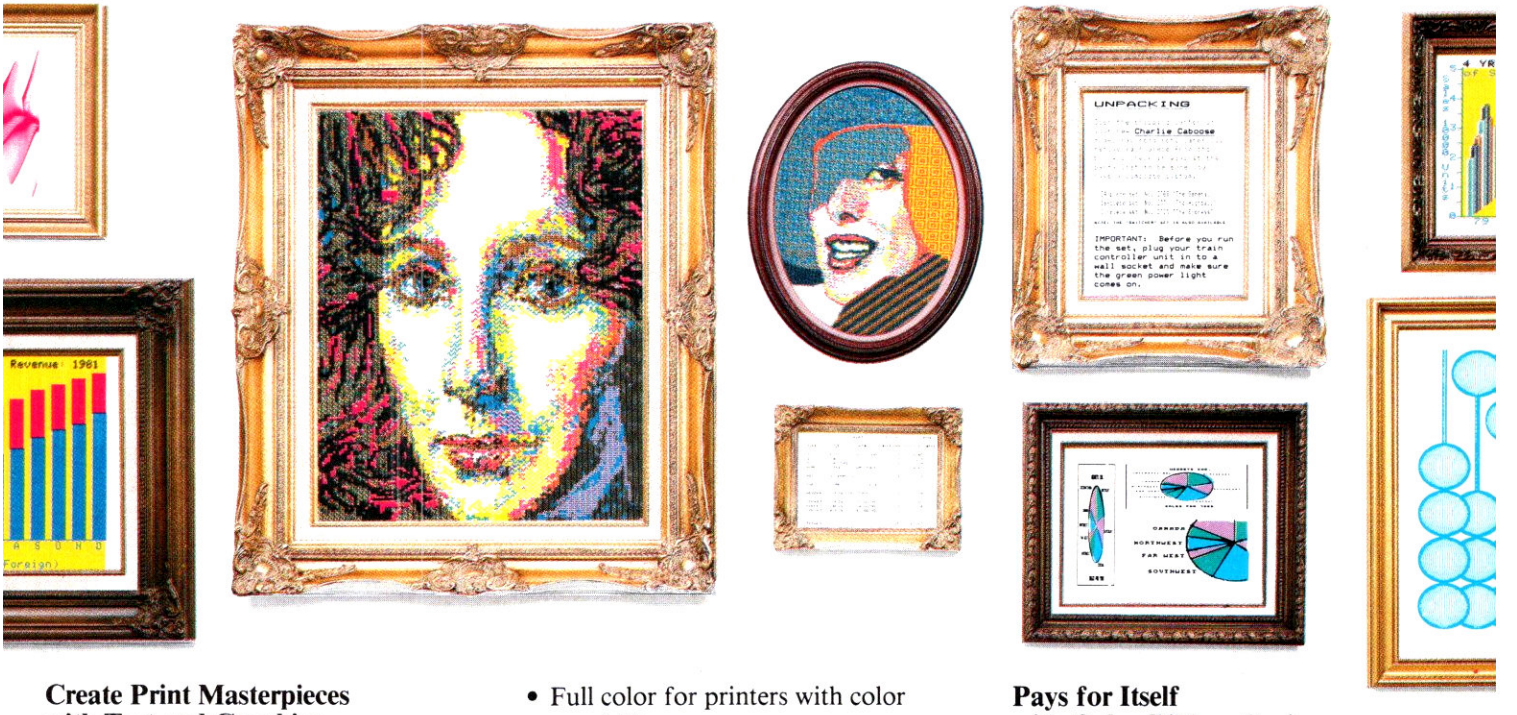

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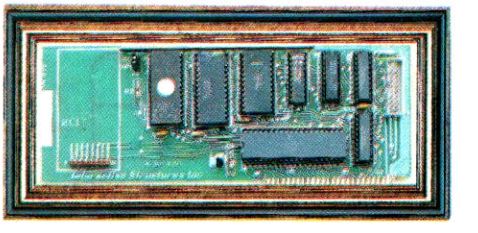

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CIRCLE 274 ON READER SERVICE CARD

qualified to program them. They are the ones who really know the intimate details of the applications they are trying to accomplish. Unfortunately, the people who know the applications do not necessarily know programming languages such as BASIC, FORTRAN, or Pascal. If you have used dBASE II, you know that it is a tremendously flexible program, but one look at a typical application program written in dBASE II is enough to frighten any novice. With Savvy and its plain language, however, program writing is easier for beginners or nontechnical people, because the program practically writes itself, responding to the user's input by prompting for the next input. Even if you never employ the Savvy programs you write as actual Savvy programs, a skilled programmer can use them as models to translate into another language. Your plain English programs will be clear enough for any programmer to translate into flowcharts and finished, running programs. In contrast, try handing a BASIC program to even a skilled programmer and have him try to decipher it.

Most programmers know that a large program is not really complicated—it just looks that way. A large program is nothing more than a collection of simple subroutines. In Savvy these are called "tasks." When you program, you define simple tasks. Then you define tasks that use other tasks, and before you know it you have a program that's so gigantic that you can't even keep track of the details, but the computer can.

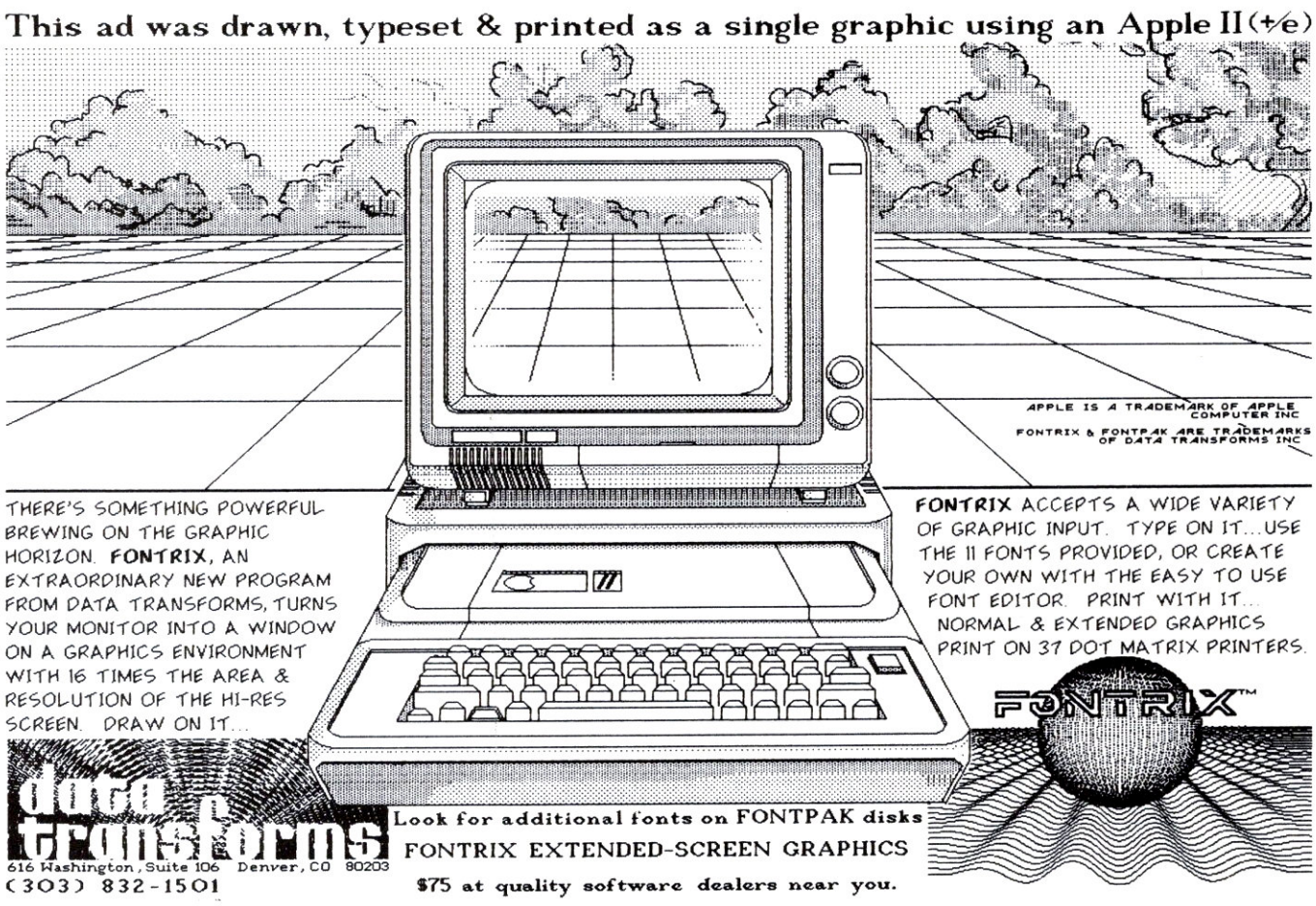
The treatment of subroutines is one of the significant differences between Savvy and dBASE II. What Savvy calls *tasks*, dBASE II calls *commands*. You can create and modify a command in dBASE and then nest this command inside of a larger command, and so on, just as you can nest tasks in Savvy. But because CP/M limits disk-directory entries to 64 and each dBASE II command occupies one disk-directory entry, the maximum number of commands you can use in dBASE II is 64. With Savvy, on the other hand, the number of tasks you can create is limited only by your available disk space.

The number of tasks you can create is limited only by your available disk space.

Another difference between Savvy and dBASE II is that dBASE II appears to process data faster than Savvy does. Savvy's pattern-recognition feature accounts for some of this extra time, because the computer needs to evaluate possibly erroneous entries before proceeding. Another reason is that, in dBASE II, you do not have to sort files. You can create one or more index files (which represent a sorted file for any given category or field) for any given database. You can have as many different index files as you want to accompany any type of reporting scheme you have in mind. With Savvy you must include the index key as an item for each folder you create, and if you decide to change indexing parameters (which you are certain to do as you dream up more and different ways to report the information) you are required to re-sort the pages in the folder.

Reading about It

The documentation that accompanies Savvy is very good. Savvy is not the type of program that you just boot up and plunge into without reading the manual, despite what the advertising claims may insinuate. The tutorial section is excellent, but you must not be impatient and read only a few pages before deciding



CIRCLE 272 ON READER SERVICE CARD

you don't need to do the examples. If you work through the tutorial step by step and try all of the examples, you will find that your knowledge of what Savvy is and does is enlarged, but you may not yet feel confident about proceeding on your own. You may find that you have to repeat the tutorial to gain some additional confidence. The manual is heavily augmented with appendices on every conceivable subject: getting started, utilities, "what do I do if . . . ," factory vocabulary, technical overview, writing applications programs, and suggested references.

What It Comes With

I can't say I am impressed with all of the application programs that come with the system. The Document Writer application program, for instance, is the pits—the absolute pits. Don't compare Document Writer with any kind of word processor, if that's what you're thinking of because of the name. With Document Writer you have to enter information one line at a time, with no editing facilities whatsoever. I was impressed, however, with the robot programmer that generates databases automatically. What you do is specify the name of the folder and the names of each item on the page, and the program writes all of the tasks you need to run the program. What's nice about this feature is that you can edit all of these programs and tasks to customize them to your own requirements. You can even edit the robot programmer to customize the programs it creates. The more you use Savvy, the more skill you will acquire in doing things like this.

In summary, I feel that Savvy is a very good program, not only in form (the way the program does what it does—e.g., the common-language interface between you and the computer) but also in content (the actual performance of the program—the processing and reporting of data).

You find yourself having to adjust to the 'rules' of the program.

I would caution you, however, not to take the ads too literally when they imply that you can be operating the program in a few hours. *Operating* and *operating with confidence* are two different things, and in my opinion I needed just as much intense concentration to learn the Savvy language as I needed to learn dBASE II. The Savvy ads proclaim, "To err is human, to forgive is Savvy." You will find, while you're learning how to use it, that Savvy isn't as forgiving as you might like it to be, and you find yourself having to adjust to the "rules" of the program in much the same way you have to with any other program. Once you submit to Savvy's ways, though, the rewards are ample.

My opinion of the price structure of the various Savvy programs is that the differential between Savvy Pro and Business Savvy is too large for the additional software programs the price differential represents. True, it all comes down to supply and demand, and I feel that Savvy represents technology that is ahead of its time, but a $950 price tag is going to scare many potential customers off.

As a closing comment, I would like to make a few suggestions to Excalibur Technologies: Explore the possibility of upgrading Savvy's hardware to support a 64K CP/M environment; provide CP/M software to allow the board to function in that environment when it's not being used with Savvy; and continue to study the feasibility of having Savvy run on other Z80 boards. ✚

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3. **TLIST Lists all Text Files, random or sequential to screen/printer.**
4. **DUMP Memory to screen/printer in Hex with Ascii on right side.**
5. **DISA disassembles Binary to screen or printer.**
6. **AL prints last loaded program Address & Length in decimal & hex.**
7. **HIDOS moves DOS to Language Card & continues operation of program.**
8. **/ is a one keystroke Catalog in addition to the original command.**
9. **DATE prints with any clock. Also File Dating with clock or manual.**
10. **FIND prints address's of hex found in 64k memory. Hidos cmd only.**

Compatible

All DOS entry addresses have been preserved. DOS is original length and compatible with most software. David-Dos II is copyable and creates fully copyable updated disks. DAVID-DOS II is licensed by programmers for inclusion in the software they sell. Init areas were used for David-Dos II. Works with all Apple IIs including IIe 80 Col, Franklin & Hard Disks, such as Corvus & Xebec. Requires 48K. Complete documentation for screen or printing and many utilities are on the disk.

All times in seconds. (Time Test programs available)		DAVID DOS-II	ProDOS	DIVERSI DOS	DOS 3.3
TEXTFILES (100 Sectors)	TSAVE	8.0	NO	NO	NO
	TLOAD	6.2	NO	NO	NO
(791 Strings,	WRITE	29.3	28.0	29.4	88.4
32 chars ea)	READ	24.3	16.3	24.3	83.8
	PRINT/READ	44.2	45.9	45.1	117.1
(442 Sectors, 7 x 500)	APPEND	142.3	142.9	151.1	1231.2
APPLESOFT (100 Sectors)	*SAVE	7.1	16.4	6.4	33.1
	LOAD	5.0	4.0	5.0	23.5
INTEGER (100 Sectors)	*SAVE	7.3	NO	6.6	33.4
	LOAD	4.9	NO	4.9	23.4
BINARY (100 Sectors)	*BSAVE	7.8	18.4	7.3	28.7
	BLOAD	5.8	4.8	5.8	24.5
48K PROGRAM SPACE	APPLESOFT	36,352	NO	36,352	36,352
(With 3 Bufs avail)	INTEGER	36,352	NO	36,352	36,352
	BINARY	36,352	34,816	36,352	36,352
64K PROGRAM SPACE	APPLESOFT	46,592	31,232	45,658	35,162
(With 5 Bufs avail)	INTEGER	46,592	NO	35,162	35,162
	BINARY	46,592	40,704	45,658	35,162
NUMBER OF DOS COMMANDS		37	29	31	28
CLOCK FILE DATING		YES	YES	NO	NO
MANUAL FILE DATING		YES	NO	NO	NO
ONE KEYSTROKE CATALOG		YES	NO	YES	NO
AUTO USE INTEGER CARD ANY SLOT		YES	NO	NO	NO

Each Program was tested twice W/Apple Clock Card on a newly formatted disk containing DOS.
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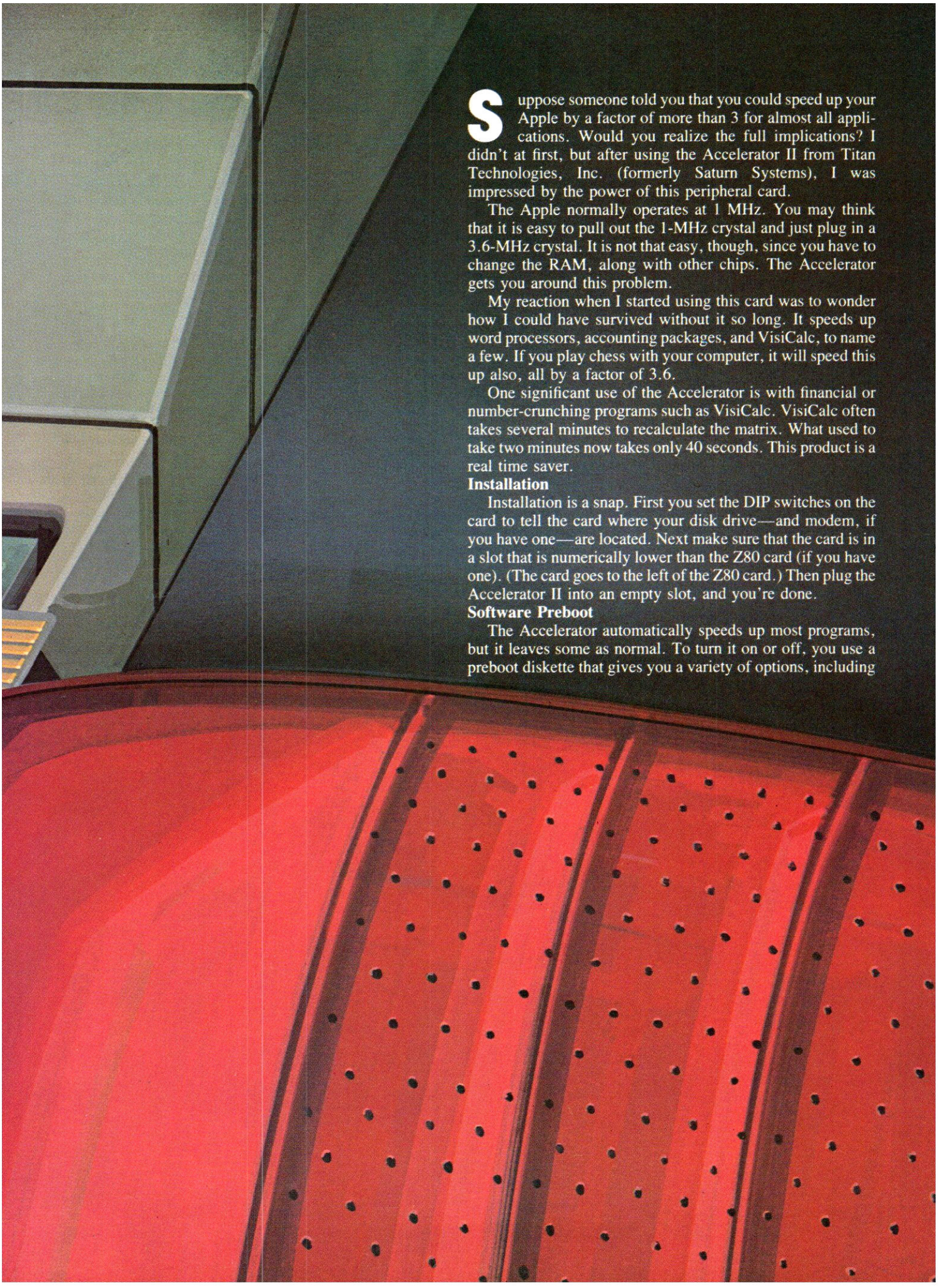
CIRCLE 385 ON READER SERVICE CARD

▸ HARDWARE REVIEW/BY NEIL LIPSON

ACCELERATOR II

This peripheral card can make your Apple work more than three times faster than usual.



Suppose someone told you that you could speed up your Apple by a factor of more than 3 for almost all applications. Would you realize the full implications? I didn't at first, but after using the Accelerator II from Titan Technologies, Inc. (formerly Saturn Systems), I was impressed by the power of this peripheral card.

The Apple normally operates at 1 MHz. You may think that it is easy to pull out the 1-MHz crystal and just plug in a 3.6-MHz crystal. It is not that easy, though, since you have to change the RAM, along with other chips. The Accelerator gets you around this problem.

My reaction when I started using this card was to wonder how I could have survived without it so long. It speeds up word processors, accounting packages, and VisiCalc, to name a few. If you play chess with your computer, it will speed this up also, all by a factor of 3.6.

One significant use of the Accelerator is with financial or number-crunching programs such as VisiCalc. VisiCalc often takes several minutes to recalculate the matrix. What used to take two minutes now takes only 40 seconds. This product is a real time saver.

Installation

Installation is a snap. First you set the DIP switches on the card to tell the card where your disk drive—and modem, if you have one—are located. Next make sure that the card is in a slot that is numerically lower than the Z80 card (if you have one). (The card goes to the left of the Z80 card.) Then plug the Accelerator II into an empty slot, and you're done.

Software Preboot

The Accelerator automatically speeds up most programs, but it leaves some as normal. To turn it on or off, you use a preboot diskette that gives you a variety of options, including

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CIRCLE 225 ON READER SERVICE CARD

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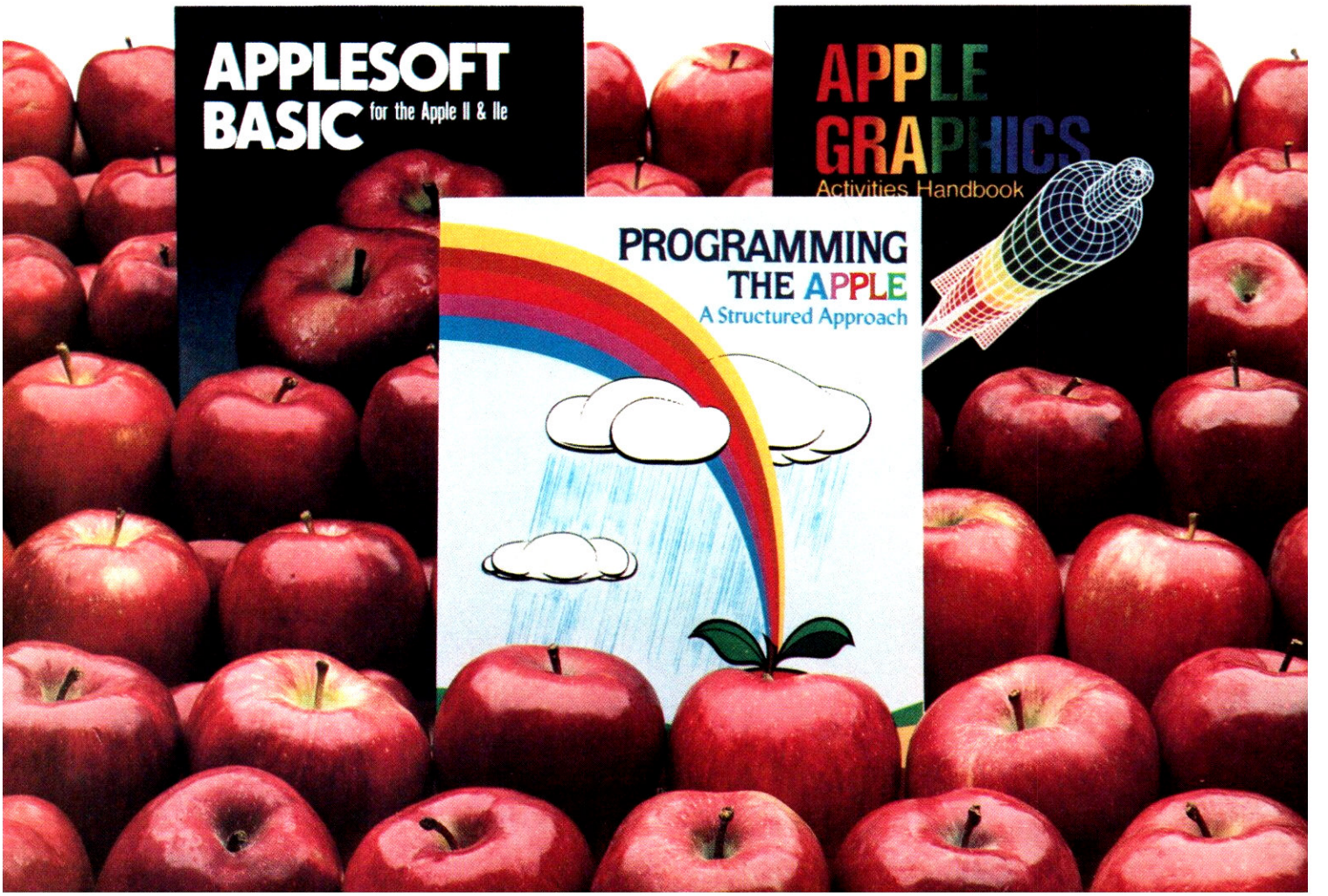


turning off the card (games, for instance, are unplayable speeded up 3.6 times) or Fast Applesoft for speedup of both BASIC and machine-language programs.

To choose the appropriate option, you use the arrow keys to select the one you want, replace the preboot diskette with your normal program, and push the space bar. If you want to set the disk permanently, press S to save this configuration on the disk.

When you choose the Fast Applesoft option, the preboot disk moves Applesoft BASIC from the ROM in the computer to the Accelerator. Titan recommends that you make copies of the preboot diskette and configure them for the four possible options. The options are:

1. Phantom 0: You use this option for software written in Integer, BASIC or Pascal, as well as programs that use the Language Card. The only exception is when you use the Language Card for data.
2. Fast Applesoft: This option is for software written in Applesoft BASIC.
3. Disable: This option is for software that uses CP/M with the Microsoft Z80 card.
4. Standard: No preboot is necessary for binary programs that do not use the Language Card.

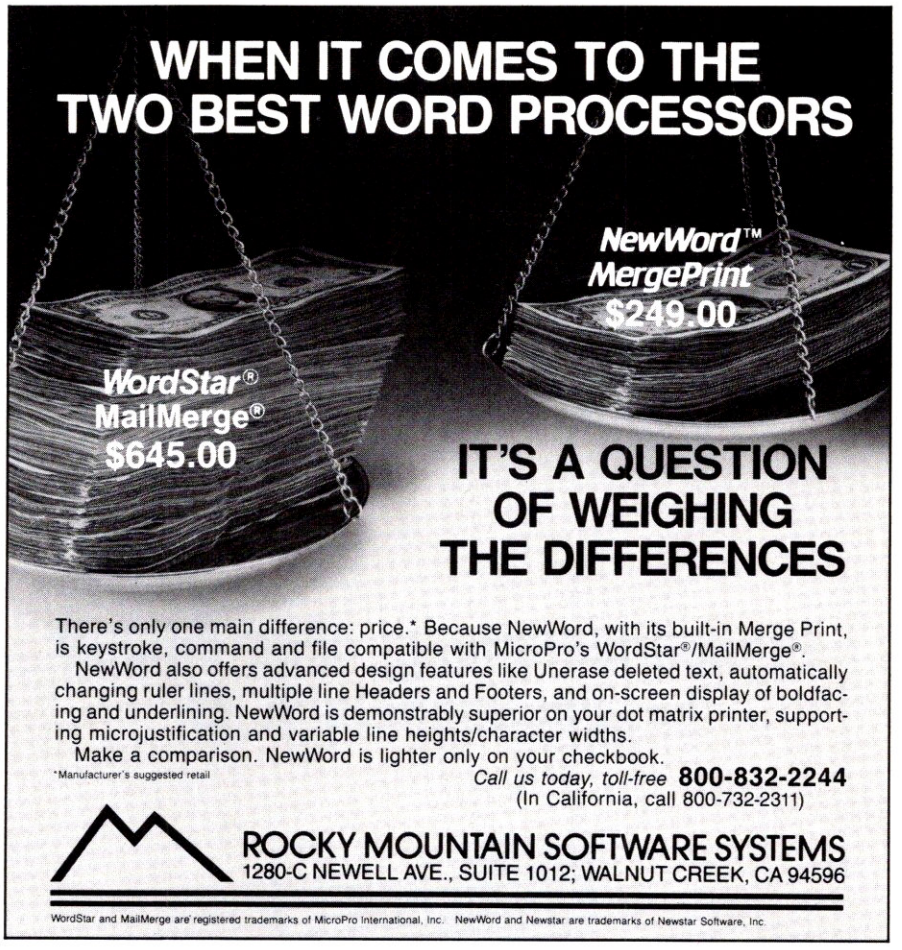
The card draws a lot of current, so you have to be careful if you are using it in an old Apple II or Apple II Plus that contains many other cards. You do not have to worry as much if you have an Apple IIe. The IIe has a reduced number of chips on the motherboard, so more power is available to the peripheral cards.

The Accelerator works perfectly with many cards. For example, it works with the California Computer Systems 7811 Arithmetic Processor card, giving blinding speed in Applesoft BASIC calculations. The trick in using this combination is to load Applesoft BASIC into the language-card portion of the computer, as the 7811 modifies Applesoft BASIC to work properly. After you do this, you will find that the 7811 runs much faster. It runs fast the way it is presently, so each improvement gives another speed increase.

One card that you cannot use the Accelerator with is Microsoft's Z80 card (see box, page 86). I got some interesting results using the Accelerator with the PCPI high-speed Z80 card. The Accelerator did speed it up, but not by a factor of 3.6. I tried the test four times and got consistent results. In MBASIC, I ran a short program that took 20 seconds without the Accelerator but 16 seconds with it. Keep in mind that the PCPI has a 6-MHz clock that is about three times faster, in general, than the clock on the Microsoft Z80 card. The program would normally have taken about 40 seconds on the Microsoft card, so even here the Accelerator did offer faster speed.

I found the Accelerator compatible with almost all programs. The card did not work with Quick-VIS from Kraft Systems or with Zaxxon from Datasoft, however. Both of these programs needed the disable function as well as the Microsoft card.

One of the most interesting uses of the card is with large RAM cards and disk emulators. Disk emulation on a large RAM card can give you high-speed disk



▶TIMING TABLES

Item	Normal	With Disk Emulator & Accelerator
BLOAD		
34 sector	10 sec	1/12 sec.
Sorting 60 names	4 min.	1.2 min.
Text files	2 min.	4 sec.

Item	Normal	With Arithmetic Processor	With Accelerator
Multiply (5000 times)	22.3 sec.	17.3 sec.	8.6 sec.
EXP (5000 times)	130.6 sec.	25.4 sec.	12.7 sec.
LOG (5000 times)	114.3 sec.	26.4 sec.	13.0 sec.

Item	Normal	With Accelerator
Applesoft	10 sec.	3.3 sec.
High-speed Z80	20 sec.	16 sec.

access, but some improvements can further enhance their speed. First, use a fast DOS, and then use the Accelerator II and stand back. I was able to load a 34-sector file in about 1/12 of a second. Reading in text files that normally took two minutes took about one second. I wasn't sure that someone hadn't replaced my system with a mainframe computer.

Timing Tests

I conducted some timing tests of the Accelerator II by itself and also with some other cards and software speedup tricks. The results varied from about 30% faster to 360% faster, the latter improvement being more common. Some of the additional items I used in the test were fast-load programs, disk emulators, arithmetic processors, and high-speed Z80 cards (see box, page 85).

With almost all Applesoft programs and machine-language programs, the Accelerator was 100% effective, operating at 3.6 times the normal Apple speed. With VisiCalc, database programs, and the like, this speed increase was obvious.

With disk emulation the improvement was about 2, which is still an improvement. The Accelerator improved the speed of a system using an arithmetic processor by approximately a factor of 2. I did have to use the special preboot with the arithmetic processor, but it wasn't too much trouble. With text-file access in disk emulation, the improvement was again about 2.

I gather that the Accelerator is influenced by whatever peripheral cards you use it with. The Accelerator didn't seem to interfere with the other cards, but I had to follow the directions carefully to achieve maximum speed.

Limitations

The Accelerator does not speed up printers, modems, and other similar devices. You cannot get a 300-baud modem to put out 1200-baud. In addition, it does not speed up disk drives, either floppy units or hard-disk units.

Unfortunately, the Accelerator comes without any diagnostics. I would have felt much better if I could have diagnosed the card once in a while, since it contains 64K of sensitive RAM chips. The way around this is to use any diag-

THEORY OF OPERATION

The Apple 6502 chip operates at 1 MHz. You could speed up the Apple by putting in a higher-speed crystal, but you could only push it so much. What the Accelerator II does is allow the Apple to use its memory for the video display and memory control, while the Accelerator uses its memory for all calculations. Both processors work at the same time.

The Accelerator has a processor, called the 6502C, that is much faster than the regular 6502. Because of its high speed of operation, the RAM must also be high-speed. Therefore, all of the RAM chips on this 64K card must be able to operate at the speed of the new 6502C.

The Accelerator has a built-in language card, and for maximum efficiency, the software that you're running must be in the Accelerator's memory. The data for the program can be anywhere, such as in a large RAM card, but the program itself must be in the Accelerator RAM.

Normally, any card that uses the direct-memory-access (DMA) lines won't work with the Accelerator board. For example, you cannot use the Accelerator at the same time as the Microsoft Z80 card. One exception is the CCS 7811, which uses the DMA in a special way that is compatible with the Accelerator board.

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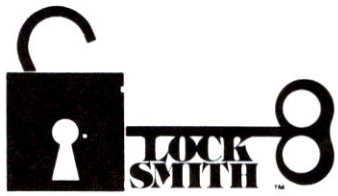

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CIRCLE 149 ON READER SERVICE CARD

nostic program. When I ran the Apple diagnostics, they too ran 3.6 times faster than normal, which caused me to believe that the RAM being tested was that on the Accelerator instead of the computer memory. Thus, to test the Accelerator, merely use any diagnostic program, and when you want to check the Apple's memory, simply remove the card.

Conclusion

In general, I was quite impressed with the Accelerator II. Titan Technologies typically produces high-quality products, and its product support is second to none. An advantage of this card is that it is compatible with the Titan RAM cards, giving you high-speed disk emulation. This card is especially useful for business applications such as high-speed sorting, number crunching and calculations, database manipulation, and spreadsheet use. It enhances compiler speed both in Applesoft BASIC and in Pascal, provides extremely high-speed graphics and animation, and speeds up accounting packages.

The unit retails for $599, which is not cheap. Is this price justified? I am sure that the hardware on the card (there is quite a bit) is expensive, especially with the high-speed memory, but you have to decide if it pays for you to have this speed. If you are a heavy user of VisiCalc, need the fastest disk emulation, or just want fast Applesoft BASIC programs, this card can pay for itself, but I cannot see the average computer user paying this price. Then again, the average user probably does not have a disk emulator.

If you want this kind of speed, you do not have many alternatives. Rewriting your programs can speed things up, but this approach is not practical if you want to speed up more than a few programs. Also, many "canned" programs are difficult or impossible to rewrite. Since the Accelerator II is one of a kind, you may have no choice but to buy one to give you the speed you require.

I think that this card would make an excellent addition to any Apple and strongly recommend it if you need the advantages it provides. ✚

▸PRODUCT INFORMATION

Accelerator II
Titan Technologies, Inc.
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Ann Arbor, MI 48107
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List Price: $599
Requires: Apple II, II Plus, or IIe

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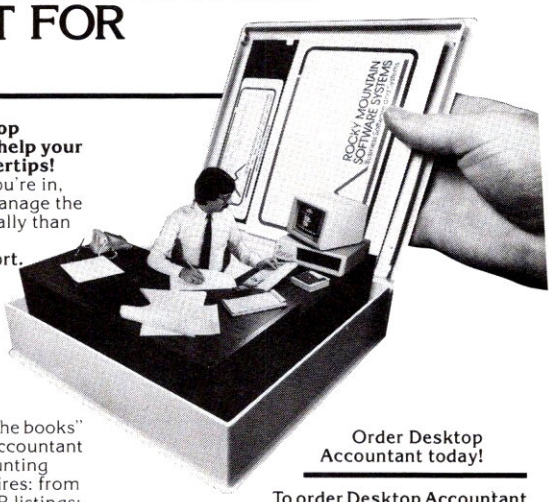

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2	Print selected rows and columns!		
3	Insert commas in large numbers!		
4	Replace 0/0.00 with -0- or other options!		
5	Add local or global $ signs!		
6	Add spaces between columns!		
7	Add centered, multi-line report headers!		
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CIRCLE 185 ON READER SERVICE CARD

MANAGE THOSE FILES!

How to teach your old diskettes new organizational tricks

When you were new to computers, it probably didn't take you long to build a catalog of files—some valuable and some not so valuable. Whatever the case, we first appreciate disk drives when we have something in the computer's memory that is too valuable to lose when we switch off the computer and too long to want to retype.

Whenever we have saved more files on a diskette than we can remember the names for, we have to face the problems of file management and the need to delete, rename, or relocate some of these files to another diskette, a tedious and time-consuming task. From the moment you conclude that this file-management business is a major part of computer operation, you join the club of frustrated file organizers.

What If?

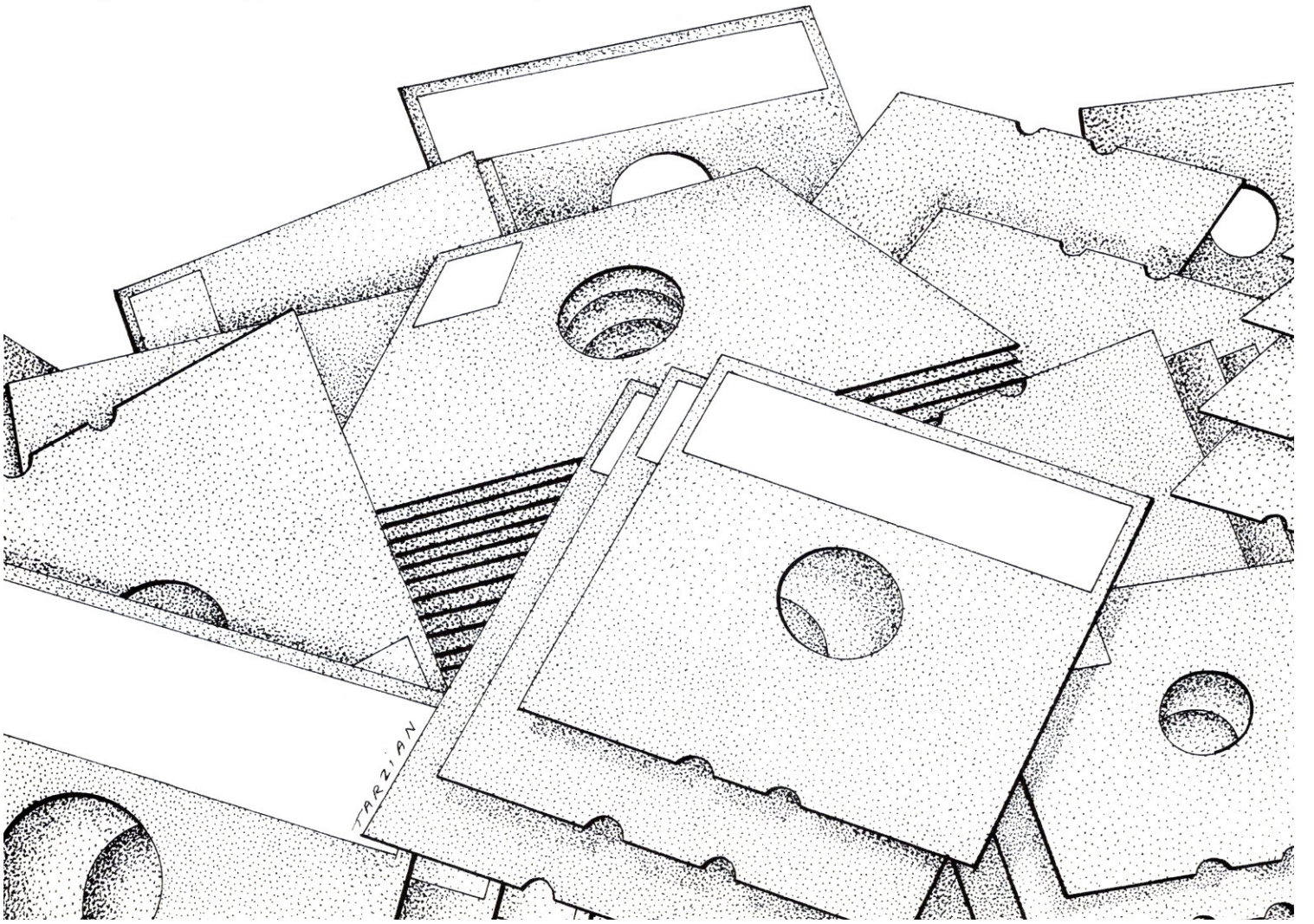
What if the boot program on each diskette could automatically display the diskette catalog and provide you with single-key menu choices for

- displaying the catalog of either drive,
- reviewing a catalog again without making you retype the full command specification,
- printing a paper copy of the catalog, and
- booting another diskette.

What if this little "AUTO/CAT/BOOT" (ACB) program were short enough to ride every diskette without stealing too much of your work space? Before long, it would probably become a respected friend. If this scenario sounds appealing to you, try copying the program in figure 1 and initializing a diskette with it.

But first, let's quickly review some of the reasons why you might want to use this program. Faced with the need to find a particular file on one of several possible diskettes, you might go through an internal monologue—something like this:

> How can I quickly find the file in that stack of diskettes? I wonder if the catalog printout taped to each diskette is really current? Guess I'll have to step through the catalog for each diskette and type CATALOG each time I want to see a listing. With two disk drives, I'll have to type CATALOG,D1 or D2 every time I want to examine a diskette in a drive different from the one I used last. Hmmm—let's see, which one did I last use? Of course, having two disk drives makes things go a bit faster. A third drive would be even better, but to address it I



```
10 HOME
20 ONERR GOTO 380
30 INVERSE
40 PRINT ''TLM DATAMATICS    AUTO/CAT/BOOT''
45 HTAB (7): PRINT ''COPYRIGHT.C.1983''
50 NORMAL
60 D$ = '' '' : REM D$ = CTRL-D
70 VTAB (4): PRINT ''C A T A L O G     DRIVE-1''
75 PRINT '' . . . . . ''
80 PRINT D$; ''CATALOG,D1''
90 REM

100 PRINT : PRINT ''  . . . . . ''
110 PRINT ''*  B    BOOTS ANOTHER DISKETTE''
120 PRINT ''*  1    SHOWS DRIVE-1 CATALOG AGAIN''
130 PRINT ''*  2    SHOWS DRIVE-2 CATALOG''
140 PRINT ''*  3    PAPER COPY OF CATALOG''
150 PRINT ''* . . . . . TO PROGRAM, PRESS -RTN-''
160 PRINT : INVERSE : PRINT ''PLEASE SELECT: '';
170 REM

180 GET MENU$
190 IF MENU$ = ''B'' THEN 260
200 IF MENU$ = ''1'' THEN  10
210 IF MENU$ = ''2'' THEN 290
220 IF MENU$ = ''3'' THEN 330
230 IF MENU$ =   CHR$ (13) THEN 410
240 GOTO 180
260 HOME : NORMAL : PR# 6
270 GOTO 10
280 REM

290 HOME : PRINT ''C A T A L O G     DRIVE-2'': NORMAL
300 PRINT D$; ''CATALOG,D2''
310 GOTO 100
320 REM

330 PRINT D$;''IN#6''
340 PRINT D$;''PR#1'': PRINT D$;''CATALOG''
350 PRINT D$;''PR#0''
360 GOTO 10
370 REM


380 HOME : INVERSE : VTAB (5): HTAB (14)
390 PRINT ''I/O ERROR'': NORMAL
395 PRINT : PRINT : HTAB (13): PRINT ''CHECK DRIVE''
400 FOR PAUSE = 1 TO 2800: NEXT : HOME : GOTO 10
410 HOME : PRINT ''APPLESOFT BASIC. GO FOR IT!''
    : NORMAL : NEW
```

Figure 1: The AUTO/CAT/BOOT program

would need to specify the particular slot in the Apple to which it connects. Some of these catalogs are so long that they won't fit on one screen display. Perhaps I should print these out on my printer so I can see the list at one glance. And that involves a set of commands to transfer output to the printer; activate the proper drive; and, at the end, return output to the monitor!

Chances are that you have already had this kind of a discussion with yourself, but if you haven't, perhaps this little sample monologue has given you some notion of the kinds of involved procedures that can separate you from the joys of computing.

Without further breastbeating, then, let's see how the ACB program can help speed us through the routines of file management. The objective is to create a diskette on which the boot program is a copy of the ACB program listed in figure 1. The most direct way to do this is first to boot your DOS System Master diskette. When the drive stops, type NEW and press Return to clear memory for the ACB program you are going to copy.

Initializing a New Diskette

Type the ACB program as shown, unless you want to add new features of your own. When you have finished copying the program, remove the DOS System Master diskette and replace it with a blank diskette or one containing files you don't care about. Type INIT AUTO/CAT/BOOT—when the disk drive is quiet again, you should have a diskette that contains only the AUTO/CAT/BOOT boot program and can boot up, automatically display the catalog, and perform the other functions I've described. (CAUTION: Remember that the INIT command wipes a diskette clean before installing its boot program.)

To make the ACB program the boot program on a diskette that already contains valuable files, you can do one of three things.

Replacing an Old Boot Program

To make the ACB program the boot program on a diskette that already contains valuable files, you can do one of three things:

1. With the ACB program already in memory, place the destination diskette into your drive. Save the ACB program to this diskette, using the same filename as that of the existing boot program on this diskette. At the end of the process, you should have an ACB program that behaves as you expect it to, but under the name of the old boot program.

The preexisting boot program will, of course, be overwritten and destroyed. So, if you value it, make a duplicate copy of it before your ACB program is in memory. Do this by loading it into memory and saving it back to disk under a new name.

2. Another way to make the AUTO/CAT/BOOT program the boot program on a diskette that already contains valuable files is first to put your DOS System diskette into the drive and type BRUN MASTER CREATE. The first thing MASTER CREATE asks for is the name you want to call the boot program. Type in the name you want; replace the system

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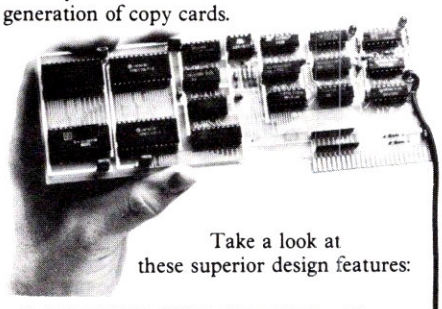

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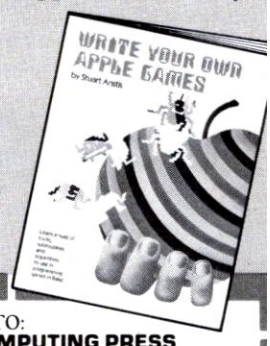

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diskette with your destination diskette; press Return; and then Escape to exit from MASTER CREATE.

At this point you don't yet have a working boot program. MASTER CREATE has only reserved a name for you and placed it at the top of your catalog. If you load the AUTO/CAT/BOOT program into memory, though, and save it back to your destination diskette under the same name you gave MASTER CREATE, you will then have an AUTO/CAT/BOOT diskette (with whatever name you've given it).

```
TLM DATAMATICS AUTO/CAT/BOOT
      COPYRIGHT.C.1983
      C A T A L O G DRIVE-1
. . . . . .
DISK VOLUME 254

A 005 AUTO/CAT/BOOT
T 030 CURRENT B
T 022 A+1.1 BACKUP 10/22
T 030 A+1.3 10/24
T 030 A+1.4 10/26
T 095 PRACTICUM 4
        .
        .
. . . . . .
*  B    BOOTS ANOTHER
       DISKETTE
*  1    SHOWS DRIVE-1 CATALOG
       AGAIN
*  2    SHOWS DRIVE-2 CATALOG
*  3    PAPER COPY OF CATALOG
*  . . . . . TO PROGRAM,
       PRESS -RTN-
PLEASE SELECT:
```

Figure 2: Sample screen image of ACB

3. The third way (and there may be others) is to copy the ACB program and save it directly to your destination diskette. Next, place your system diskette in the drive and type BRUN MASTER CREATE. Answer the prompt with the same name you used when you saved the ACB program to your destination diskette. Replace the system diskette with your destination diskette and press Return. When the drive is quiet, you will have made the ACB program the new boot program on your diskette. The difference between this procedure and the one immediately above it is that the boot file resulting from this last procedure could be anywhere in your catalog instead of at the top. The top of the catalog is said to be the most efficient place for DOS to find it, though.

Comments on AUTO/CAT/BOOT

You can enjoy the benefits of the ACB program simply by copying it as it appears in figure 1. The program listing is divided into sections that call attention to what is happening in the various parts of the program. Even without being a programmer, you might guess, for example, that lines 10–90 provide for the title of the program. So, if you wanted to put your own title on the program, you would work with this section.

Likewise, lines 100–170 display the menu choices; 180–240 read your choice and send the program off to begin executing your choice at line 260, 10, 270, 310, 360, or 410. (Note: Line 60 has a hidden character, Control-D, between the quotation marks.)

Those of you who are concerned about the amount of diskette space the program occupies will want to know that it uses 70 of the 560 sectors on a 35-track, 16-sectored Apple DOS II diskette. Its size will probably make you hesitate to add new "bells and whistles" to the program. For me, the time this program saves and the convenience it provides far outweigh the loss of 12% of my disk space. So give it a try, and see if it helps you stay closer to the things you enjoy about personal computing. ✚

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▸ APPLES AT WORK

BY DONALD KENNEDY

TED TURNER TAKES ON APPLES

Ted Turner is taking on the networks, and Apple computers are a part of his plan.

Atlanta's WTBS television station does not hesitate to promote itself. Beamed by satellite to hundreds of thousands of cable users around the country, WTBS unabashedly calls itself the "Super Station." Coupled with the 24-hour-a-day Cable News Network, it forms the backbone of TBS, the Turner Broadcasting System, a new and growing venture that many broadcast-industry insiders consider the first real threat to the nearly complete control of the public airwaves by the three major commercial networks.

A visitor to the TBS offices and studios sees a virtual storehouse of high-tech equipment: cameras, monitors, control panels, miles of thick cable. And, always present it seems, are hundreds of Apple computers, working quietly to store and make sense of the immense amount of information needed to make a broadcasting system work.

Rob Barnes is the director of data resources for TBS. He is responsible for choosing and purchasing the hardware and software for the corporation, which includes not only WTBS and Cable News Network, but also CNN Headline News, CNN Radio, Turner Outdoor Advertising Services, Turner Educational Services, the Atlanta Braves baseball franchise, and the National Basketball Association's Atlanta Hawks.

TBS Reluctance

Barnes is committed to the place of the Apple in making TBS a successful, growing concern. An early advocate of the Apple, he believes the company has accepted it as a necessary tool of its trade.

"My philosophy in this department is to strip away the stereotype of a white-collar high priest controlling data and to put information where people can process it and have access to it. The philosophy of CNN is to be high-tech and state of the art on everything. Apples came along as part of the process," he says.

It was not always so, and Barnes recalls clearly the struggles he had convincing others in the company to join the "A team."

"I read a lot of science fiction when I was a kid, especially Asimov, Heinlein, and Arthur Clarke. A computer wasn't even part of the plot. It was part of the wallpaper.

"So I was a prime candidate, somebody who'd been in high-tech industry, cinematography, and photography. In photography, you have ASAs, depth of field, shutter speeds, and things like that. I figured if you can cope with all those things, you can cope with a computer," Barnes explains.

In 1977, armed with the conviction that the complexities of computers were well within the grasp of a layperson, Barnes purchased, on his own, an Apple. With his new Apple in place, he observed the goings on at TBS. One day, after an exceptionally long search through the company's inventory for an electronics part, he went home and tried to solve the problem.

"I took a program by Bob Bishop called Card File, and I made it into an inventory file. When I came in and showed it to the chief engineer, he thought it was a toy. When I showed him what it could do, he said, 'Wow, that's neat,' " Barnes recalls.

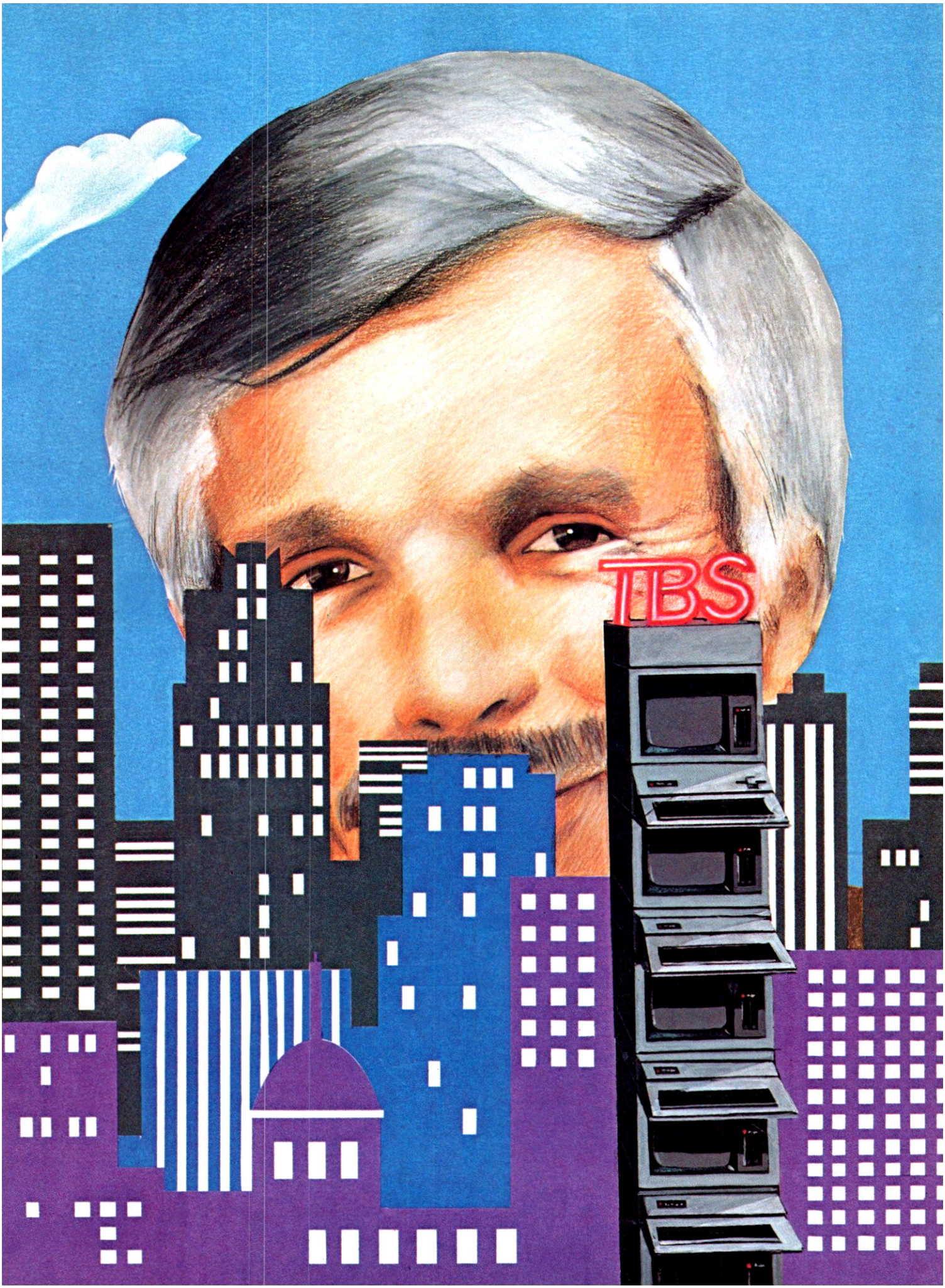
To gain final approval, he had to convince the other engineers that the Apple was a working tool and not a fancy toy.

They posed a long, involved mathematical equation for the Apple and compared the results with those obtained from a Texas Instruments calculating computer. The TI took longer, and it had rounded off most of the digits after the decimal point.

"We had the engineers' tacit approval," Barnes says. The Apple was on its way to becoming a staple in TBS's electronic diet.

Pays for Itself

Today an assortment of Apple IIe's and III's are used widely by members of the TBS staff. As expected, the company uses Apples for word processing; Apples are also being used for inventory control,


TBS

scheduling, financial planning, ratings analysis, and sales.

TBS was one of the test sites for DBMaster, and Barnes says they subsequently bought about 1500 copies, which they use extensively when there are records involving more than 1000 entries. He explains its usefulness for tracking equipment:

"If at any given moment, if war in the Falklands or in Chad breaks out, say, and you want to know where your equipment is, with DBMaster, you can track it down now.

"One time we found San Francisco had 3 battery packs for cameras, and New York had 20. So we shipped the battery packs, instead of buying them," he says. At several hundred dollars a pack, it is easy to see why Barnes concluded, "Little moments like that are what has allowed Apple to pay for itself."

Barnes points to TBS's satellite department, which coordinates the incoming feeds from the various outposts throughout the world, as another example of the Apple paying for itself.

"The satellite department must get feeds in from all the bureaus in a timely and economical fashion. Satellite fees can cost you $2000 for 30 minutes. The only way you can stay in business doing what we do is knowing what you're spending and not waiting for bills two months down the road. One computer pays for itself. It is definitely a case of a tool doing its job. I defy anyone reading your magazine to figure out another way to do this at less cost," he says.

Industry Standard

The Apples in use for scheduling, inventory, and accounts controls are only a small part of the computerization of TBS. In 1978 the owner of TBS, Ted Turner, stunned the broadcast world when he announced his plans to launch a project that would bring news to the air 24 hours a day. It was the birth of Cable News Network, CNN. Getting CNN off the ground was "the most fast-track project I've ever done," Barnes says.

"I insisted we'd need computerization for 24-hour-a-day news. Nobody had ever done it for television."

CNN developed a joint program with a company called Broadcast Automation Systems, or BASYS. Together, they created a system that Barnes says is now the standard for television systems. He points to its subsequent use by the BBC, New York's WOR-TV, Dallas's WFAA, and San Francisco's KRON.

"You've got to give BASYS credit for all of this," Barnes says as he guides a visitor through the newsroom, showing off the complex system that is the heart of the network.

The system uses 95 terminals running on a micro, with concentrators that partition 128K memories into 16K for each terminal. "The concentrator is like a traffic cop; it gets information off the main computer."

Expanded Uses

Out of this approach, TBS has developed an electronic-mail system to all offices. "You don't have to pick up a phone, spend that money, or even pick up a piece of paper," explains Barnes. "Everything in my system is available at any terminal in the U.S."

To prevent home-computer access to the system, Barnes's system does not have a teleport access. Barnes is planning to develop a security system soon, for he has found that many of TBS's top editors and producers have bought Apples for home use, and they would like to hook into the newsroom system in the future.

If 1977 was a year for convincing the people at TBS that Apples were in their

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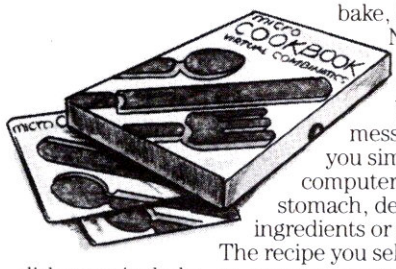

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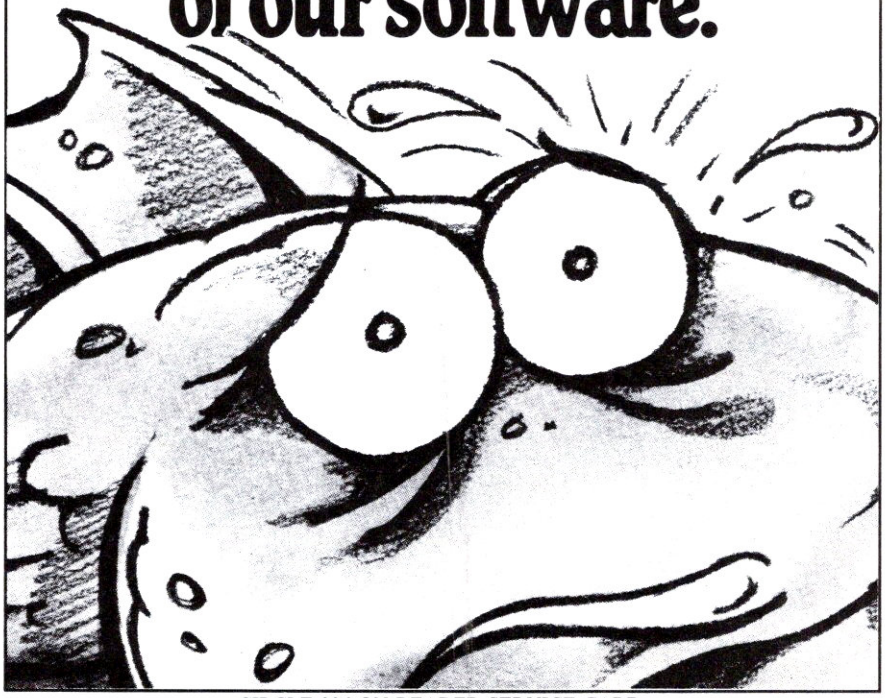

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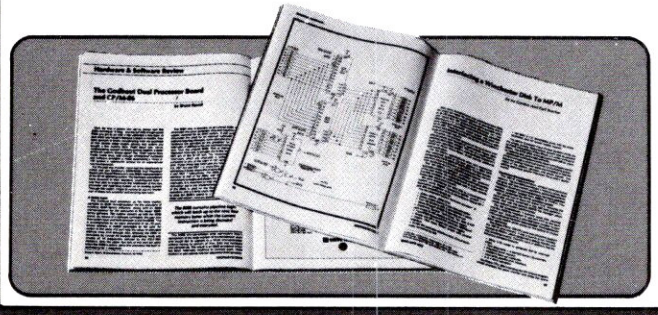

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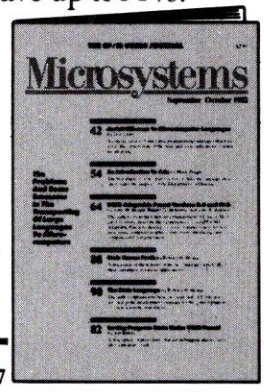

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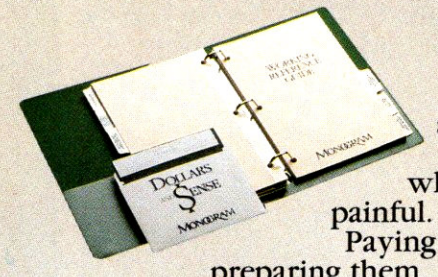

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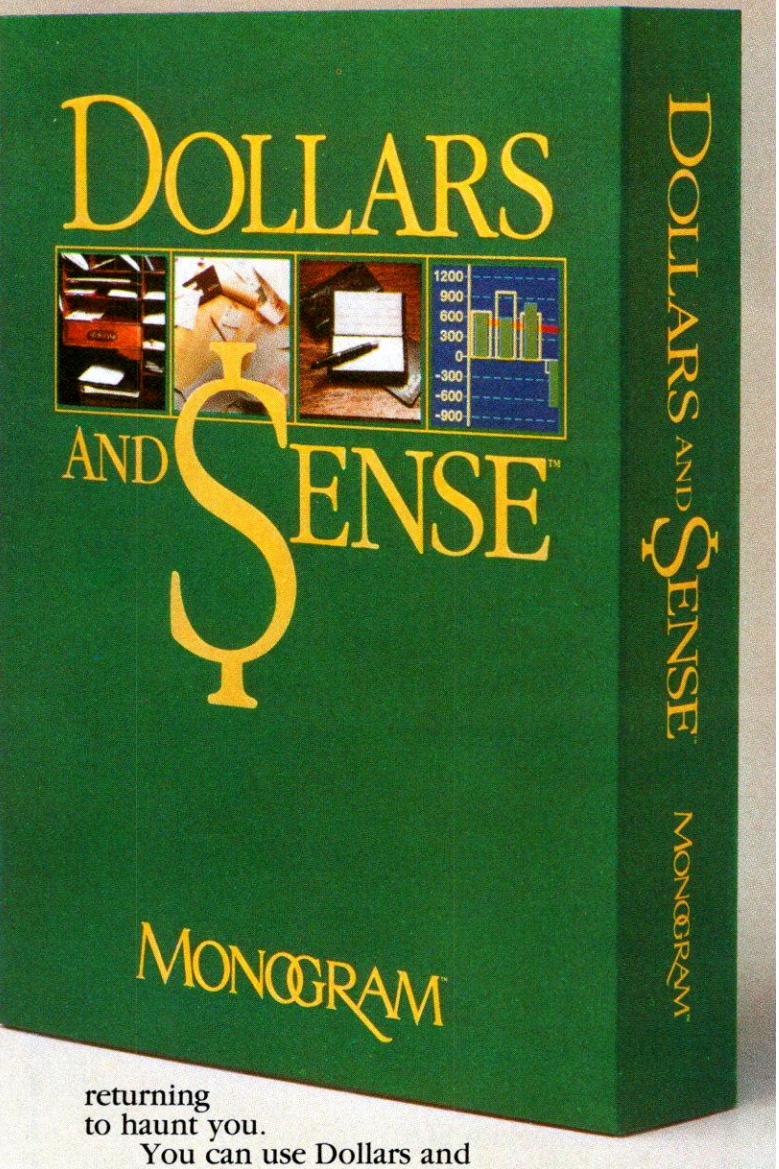

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future, 1984 seems to pose a different, if related, problem for Barnes.

He says his job is now actually composed of two parts. He must advance the technology within TBS while he advises people who think they need a computer but don't know why.

"A lot of people have heard about computers now and say they've got to have one, but they really don't know why. Also, nobody wants to look stupid, especially an executive. Everyone on my staff is dedicated to easing their fears."

Barnes and his staff wrote training manuals and now conduct special sessions for new Apple users. The manuals are usually developed from the material provided by the company and the various software creators. Barnes says that training is one of his easiest jobs.

Training will become increasingly important as TBS expands its Apple network outside the Atlanta headquarters into its offices in New York, Chicago, and Los Angeles. Most programs are "off the shelf," with VisiCalc, Apple Writer and Word Juggler the most common. A few departments have developed their own programs.

'Nobody wants to look stupid, especially an executive. Everyone on my staff is dedicated to easing their fears.'

As if proof of the Apples' popularity were needed, on the day I visited TBS in Atlanta, a senior staff member from CNN stopped Barnes in the hall to talk about how he had developed new programs on his home Apple and how he hoped to contribute to the first Apple Core meeting at TBS scheduled for later in the month.

His enthusiasm was evident, and Barnes smiled after the man left. "My staff says I've created a monster, because all the people who've got one want their assistants to have one now."

A few moments later, he was asked what he will do with his current Apples if a new and better model comes out. "Oh," he said with a big grin, "that's when we'll give their assistants the ones we have now." ✚

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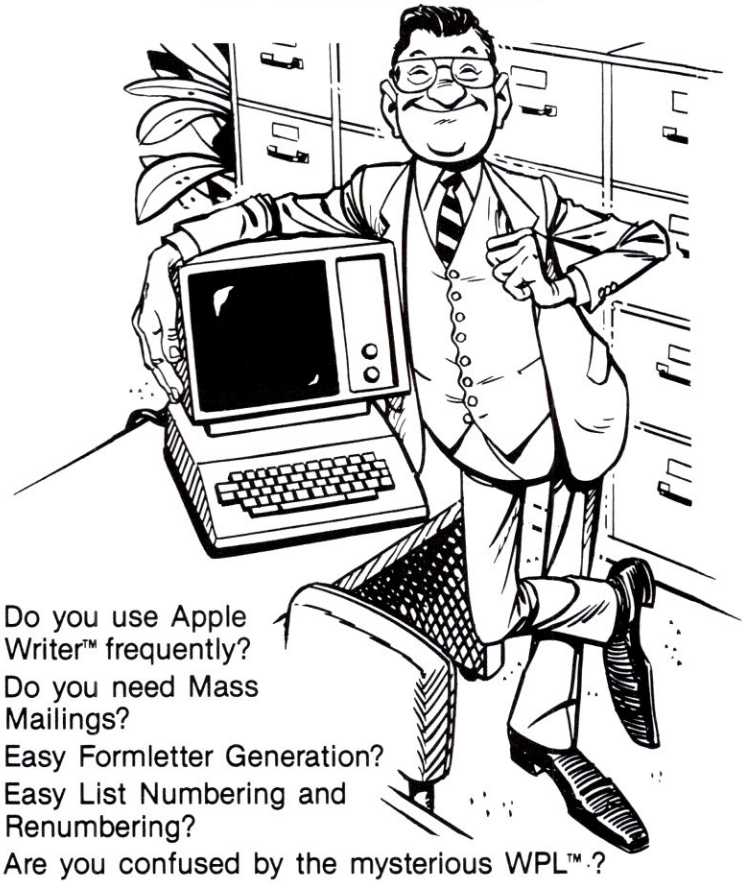

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CIRCLE 232 ON READER SERVICE CARD

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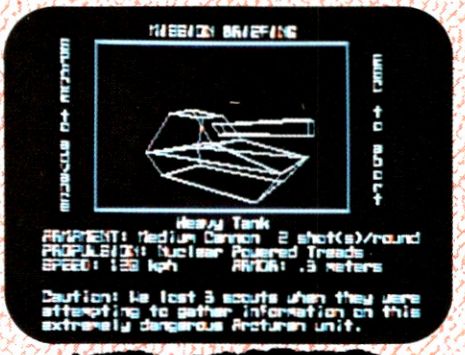
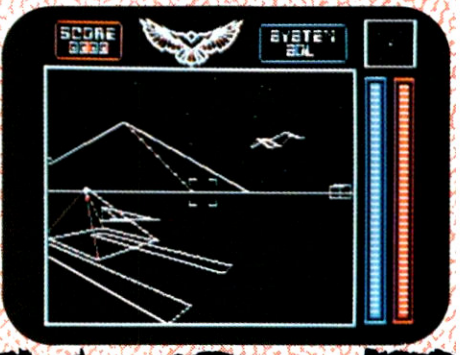
join the thousands of APPLE owners
already battling the Arcturan forces!

AWESOME!

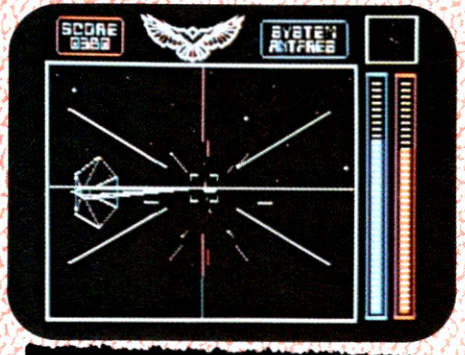
The following transmissions are from one of our pilots who never returned.



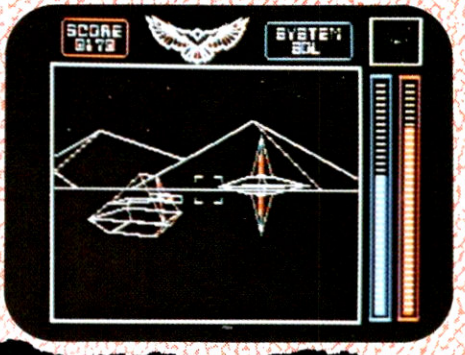
After intelligence briefed the pilot about the Arcturan forces, our star-cruiser dropped him off on Titan . . .



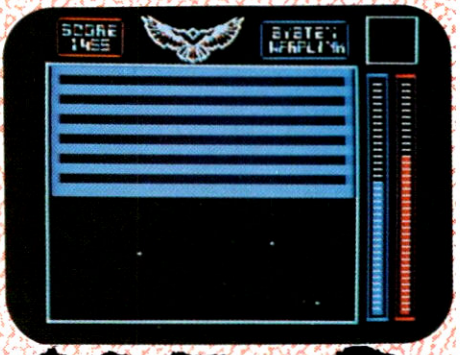
"Ground control, come in. Have safely landed on Titan, my mission begins . . ."



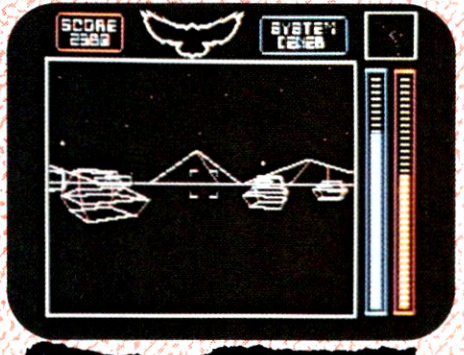
"Got him! I've just destroyed an Arcturan prowler."



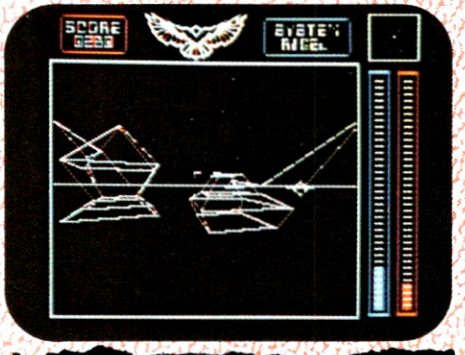
"A hovercraft is tenaciously guarding a warplink, I'll have to dispatch him . . ."



"Ground control, do you read? Am now warping to the next star system."



"Am being engaged by Arcturan heavy tanks, I'll slip away by activating my inviso cloak."



"Fuelbay is heavily defended, but I'll have to go in - I need the energy!"

"Situation desperate! Seekers dead ahead. Incoming skimmers! Send reinforcements."

ANIMATION SEQUENCES FROM *STELLAR 7*

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CIRCLE 133 ON READER SERVICE CARD

Available for Commodore 64, Apple II, II +, or IIe

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ALIEN MUNCHIES

Gentry Software
9411 Winnetka Avenue
Chatsworth, CA 91311
(213) 701-9228
List Price: $19.95
Requires: Apple II, 48K

CIRCLE 500 ON READER SERVICE CARD

Are computer-game manufacturers willing to try anything to make a buck? Yes, judging by Gentry's Alien Munchies.

This game requires a player to catch Munchies in a barbecue grill (!) and shoot down propane tanks in order to prolong play. The basic arcade "shoot-something-score-points" theme is present, but using barbecue grills to do this borders on the absurd. After all, just how interesting can barbecue grills get?

Not very.

The game can be played with a joystick or keyboard, which makes it accessible to any Apple II owner.

There are only two movements: right and left. The space bar or button on the joystick functions as the firing mechanism.

The object of the game is embarrassing. You wheel the barbecue grill across the patio and catch the alien Munchies as they fall from the sky. Munchies that don't get caught remain on the ground for several seconds and can be lethal if run over by the grill. The player must also shoot propane tanks from the sky in order to refuel.

When you've acquired 10,000 points, the Munchies on the ground get "thirsty" and "drink" your propane. The game ends—and not soon enough—when you run out of barbecue grills. Surprisingly, the game doesn't tell you to order out for fast-food Munchies.

Players with an eye for fluorescence may enjoy the multicolored aliens: green or orange, 25 points; purple or blue, 50 points. After 10,000 points, the values increase to 75 points for green or orange; 90 points for purple or blue. After 20,000 points, the values increase 100 and 150, respectively.

After all, just how interesting can barbecue grills get? Not very.

With the keyboard option, propane tanks can be shot down with the space bar. Unlike real propane tanks, they do not explode; they float gently down into the barbecue grill. The grill will explode, however, when you unwittingly roll it over a grounded alien.

If this description of the game sounds unexciting, it merely reflects Alien Munchies' overall lack of fuel. If Gentry is so convinced that barbecue grills are a game player's answer to arcade-mania, it could have at

least provided more interesting sound. As long as grills were being used, why not sizzling sound effects? Enough of the pings, pangs, and computerized frog noises.

As for the keyboard controls, they are inadequate. Not only is the barbecue grill difficult to maneuver, but when directed to the right, it runs to the left. The grill also frequently dashes off by itself, crashing into grounded propane tanks.

The real flaw in Alien Munchies is not its mediocre graphics, unrealistic sound, or dissident grill. Its pitfall is lack of integrity as a game.

On one level, games entertain, amuse, challenge,

The game ends when you run out of barbecue grills. Surprisingly, the game doesn't tell you to order for fast-food Munchies.

and provide diversion from the 6 o'clock news. These purposes are achieved via a game's form and function.

In Alien Munchies, you experience little challenge—moving the grill across the screen. A player is led to believe that the form—grills, aliens, and propane tanks—and function—catching the aliens and shooting propane tanks—fulfill the challenge.

But it doesn't work that way. After the game is played once, the challenge is gone. The form and function dissipate, and you are left with just another piece of mildly diversionary software.

Nell Fields

PENTAPUS

Turning Point Software
11A Main Street
Watertown, MA 02172
(617) 923-4441
List Price: $29.95
Requires: Apple II, 48K

CIRCLE 501 ON READER SERVICE CARD

When word got out that Jeremy Sagan was working on a computer game, many enthusiasts were eager to test the creation by the son of Carl Sagan. Their wait is over.

With the introduction of Pentapus, Sagan and Turning Point Software of Massachusetts may become as well known as the famous father.

What makes Pentapus so exciting is not its author, but its purpose: to challenge. The game is fun to play, a welcome change from the seemingly endless parade of mediocre arcade games.

Gone is the confinement of life at the bottom of the screen. Gone is the monotonous horizontal movement and the occasional hop, skip, and jump over a "bad guy."

With Pentapus, you can get right on top of the enemies—Drangels, Eagulls, Nagas, and Whirrs—with a colored box, which serves as a window.

Instead of using mere reflexes, players must skillfully monitor shots and choose the appropriate moment to shrink the window to avoid the mutants.

What makes Pentapus so exciting is not its author, but its purpose: to challenge.

After choosing one of four playing levels, you move the window, or Stargate, either horizontally or vertically on the screen over the aliens. Pushing the fire button makes an alien disappear. Once the aliens are gone in a particular phase, the player advances.

Each phase has its aliens: Drangel, 50 points; C-Alien, 100; Eagull, 200; Naga, 500; and in the last stage, the battle of the Pentapus, the Whirrs, 750 points. During the fourth phase, Nagas change into Drangels, thus altering value points.

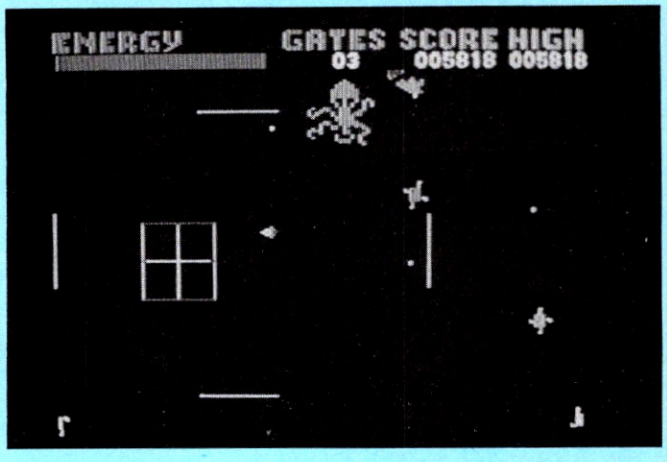
In the last phase, you must eliminate all the Whirrs, then destroy the Pentapus by zapping it between the eyes. If a player can defeat the Pentapus three times, the "universe is regained."

Pentapus is full of surprises during its five phases. In addition to being able to reduce the size of the Stargate, a player must watch for surprise attacks by the aliens. It is truly an edge-of-the-seat game.

Because of its sophisticated user movements, Pentapus must be played with a joystick. Although this enhances the game's operation, it is limiting.

Aside from that major drawback, Pentapus offers some good high-resolution color graphics. Turning Point, an innovative software company, uses a unique and sophisticated in-house graphics development system. In fact, Pentapus, the company's first game project, was written on a 6502 assembler with intricate codes. In addition, most of the game's graphics were edited right on the screen, thus producing clear images and state-of-the-art arcade sound. Even without the excitement of the game itself, Pentapus is worth its price for graphics and sound alone.

Nell Fields



HANDY DANDY

Handy Dandy
Gentry Software
9411 Winnetka Avenue
Chatsworth, CA 91311
(213) 701-9228
List Price: $19.95
Requires: 48K; Apple II, II Plus, or IIe; joystick optional

CIRCLE 502 ON READER SERVICE CARD

Deep in the bowels of an aging condominium, utter chaos erupts in the boiler room—water pipes burst, steam pipes leak, rabid rats run wild, debris falls, and floors crumble. Amid this pandemonium, the building maintenance man, Mr. Fixit, arrives on the scene. Instead of this handyman hero living up to his name and trying to repair everything, however, he flees in terror, propelling his beer-barrel body through the different levels of the boiler room.

Handy Dandy puts you in the cowardly boots of the portly Mr. Fixit. As a retreating repairer, you maneuver across four sequential screens of deadly obstacles, each more hazardous than the last. You have but a limited time to escape from each screen. Although the building is literally falling to pieces, you do not have to fix anything. Your main objective is to survive. If you can spare the time, grabbing a toolbox or anvil nets bonus points, but your overriding concern is to get off the screen and out of the boiler room.

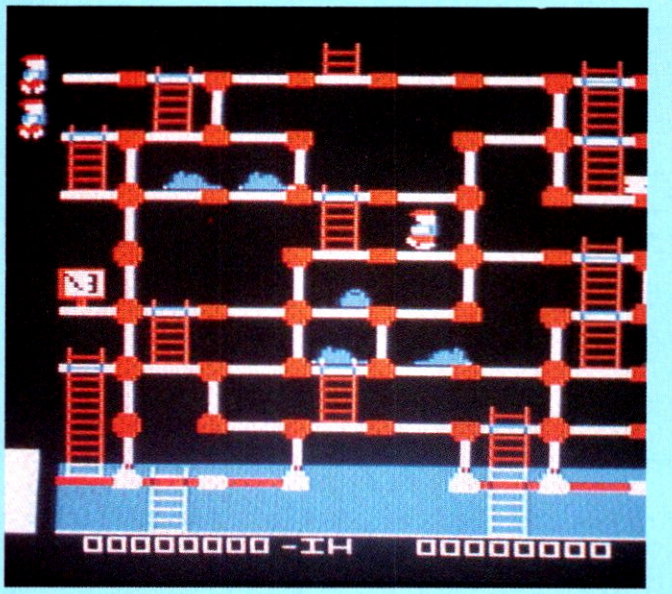
Mr. Fixit travels left, right, up, and down and can jump. On the first screen, he moves quickly, but on the second screen, he seems to slow to about half speed. On the third and fourth screens, Mr. Fixit's speed is somewhere in between. The joystick and keyboard controls are responsive in all directions.

The first screen, called the water-pipes maze, starts you at the bottom of the building. A jumble of pipes criss-crosses above your head, and the screen fills rapidly with water. Mr. Fixit must climb ladders and maneuver across the pipes to exit from the top of the screen. Oddly enough, although you can tiptoe across the pipes horizontally, you cannot climb or slide down the pipes in truly heroic fashion. Your main obstacle, aside from blundering off the end of a pipe, is a pack of lackadaisical rats strolling across the water pipes. Although the maze contains more rats than the New York City sewer system, the rats are not vicious and prefer to follow their preassigned paths rather than Mr. Fixit. Make no mistake, Mr. Fixit sweats off a few pounds

Water pipes burst, steam pipes leak, rabid rats run wild, debris falls, and floors crumble.

while maneuvering around the rats, but patience, rather than freewheeling instinct, propels the plump plumber from the bottom of the maze to the top.

The number of obstacles barring your way out of the boiler room increases on the second screen. You must run underneath four slow-moving pile drivers, climb a ladder, and sprint over the tops of the pile drivers. You must then duck underneath a predictable bouncing ball, scamper around scalding steam from leaky pipes, and exit from the screen. Although the second screen provides more challenge than the first, it remains fairly easy to pass through. The random blasts



of steam from the leaky pipes imperil Mr. Fixit occasionally, but he and the hazards move slowly, giving you plenty of time to react.

Handy Dandy's third screen supplies a challenging and exciting obstacle course. The ceiling is collapsing, constantly showering you with concrete, bricks, and other multicolored debris. After scrambling up a ladder, you must run across part of a floor containing trapdoors that open and close. After grabbing an elevator and climbing a couple of ladders, you must cross three more trapdoors before leaving the screen. The combination of falling debris and the disappearing floor is tricky. You need judicious planning and split-second timing to guide Mr. Fixit between bricks and over the trapdoors. Of course, the higher you climb, the less time you have to avoid falling blocks. The third screen requires the instinctive reaction that hovers between skill and luck.

The fourth screen features a difficult trampoline and trap-door obstacle that requires precise timing on your part. You must jump Mr. Fixit onto a trampoline so that he bounces up through an open trapdoor above his head and then lands on the trapdoor when it closes. Meanwhile, blue balls fall from the ceiling. This trampoline trick requires a lot of eye/hand coordination. Three of my Mr. Fixits hit their heads on the trapdoor—they jumped, bounced, the trapdoor closed, and they knocked themselves senseless. The fourth and last Mr. Fixit tried something different. He jumped and bounced while the trapdoor was closed. The trapdoor opened, he bounced some more, the trapdoor closed, and then he hit his head.

The screen sequence does not go 1, 2, 3, and 4.

They jumped, bounced, the trapdoor closed, and they kicked themselves senseless.

It appears in the order 1, 2, 1, 3, 2, 1, and 4. Individual screens become more hazardous the second and third time you cross them.

The graphics are simple and mediocre. The potbellied Mr. Fixit sports brown pants, a brown cap, and a

blue shirt as he waddles across the screens. All the obstacles and background look pretty much as they should, except for one monumental display of graphic ineptness—the rats in the water-pipes maze. At least, the illustration on the box portrays these little blue mounds as rats. At first, Mr. Fixit appears to be surrounded by a horde of little blue blobs from a B-grade monster-movie. Upon closer inspection, though, they look like blue armadillos with hunchbacks.

Handy Dandy's sound is as unspectacular as its graphics. You hear a beep when you pick up the bonus toolbox and anvil, some happy notes when you reach the top of the screen, and a couple of mournful bloops when you fail to negotiate a hazard.

The game instructions are sparse and do not provide hints on avoiding obstacles. They contain an error concerning the Jump function. The joystick-control section indicates that pressing the fire button causes Mr. Fixit to jump. The keyboard-control section makes no mention of a Jump function.

You can pause the game during play. High scores are not saved on disk.

Unfortunately, Handy Dandy fails to fire up enthusiasm. Its weaknesses stem partly from the game concept, the graphics, and the game design. Mr. Fixit, who is supposed to be a handyman, does not do anything constructive. Instead of repairing the pipes and floors, he merely runs for his life. He can't even fix the graphics.

The game does not contain the graphic embellishments needed to make the screens more entertaining and aesthetically pleasing. Some things, such as the rats, almost defy description. Handy Dandy's barebones approach results in a relatively static display on a somewhat empty screen.

I had a problem with defective disks, but Gentry Software was helpful in remedying the situation. Steam is supposed to billow from three places along a pipe. In my review copy and in a second copy I received, the steam spewed from only one break, effectively forming an impenetrable barrier that prevents you from leaving the screen. Gentry Software replaced the review copies and apologized for the inconvenience. The company said the problems have been fixed, and customers holding defective copies can contact Gentry Software and arrange for a replacement.

Handy Dandy is occasionally challenging and fun, but inelegant graphics, limited sound effects, and two mild screens crop up to ruin a potentially exciting game. Handy Dandy needs to be repaired, but do not count on Mr. Fixit.

Russ Lockwood

PENSATE

Penguin Software
830 4th Avenue
Geneva, IL 60134
(312) 232-1984
List Price: $19.95
Requires: Apple II, 48K

CIRCLE 503 ON READER SERVICE CARD

With the advent of computers, board games have made the transition from horizontal to vertical with ease. Both modes have their advantages, but computerized board games, such as John Besnard's Pensate, add another dimension to squares, circles, and chips.

The object of this game is to move a marker up seven rows to the top of the computer board without landing on or being landed upon by the opposition's marker.

Initially, four markers are placed on the 64-square board. You choose a marker and make the first move: one square vertically or horizontally, then in the other direction.

Throughout the game, the opponent's markers—ten varieties with different movements—move in a pattern that you must figure out. These markers also can jump other markers, and if they land on a player's piece, the game is over.

Board games have made the transition from horizontal to vertical with ease.

Pensate offers three different levels of challenge, each with nine steps, and the option to make more than one move at a time. Thus, Pensate requires you to think ahead and try to outguess the computer's moves.

Like checkers, Pensate can be played against a human opponent. You then must avoid the computer's and your opponent's markers. Unfortunately, as players soon discover, moves cannot be deleted once entered.

Two features make Pensate an extraordinary game. First, the computer's pieces can "wrap around" the screen when making their moves. A player's piece cannot. In other words, if you enter a move that would take the piece off the edge of the screen, it will count as a move, but the piece will stay in the same place.

Like checkers, Pensate can be played against a human opponent.

Second, Pensate offers a retrace mode, the ability to land on a square that has been taken by a player's piece. If retrace is not used, squares that cannot be landed upon are marked on the screen.

Pensate graphics are Zen-like—very simple yet sophisticated. They serve their purpose adequately without overindulgence. Well-thought-out art does not require superfluous ornamentation. There's no need to subtract from Pensate's clean and concise form.

But that's author Besnard's style—clean and concise. A master game player, Besnard is the developer of Bezman, a popular first for the Hughes Aircraft manager. Other Besnard creations followed, but none were up to Bezman par—that is, until Pensate.

Nell Fields

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CIRCLE 295 ON READER SERVICE CARD

▸ SOFTWARE REVIEW/BY STEVE ROSENTHAL

THINK TANK

Does this organizational program live up to its billing?

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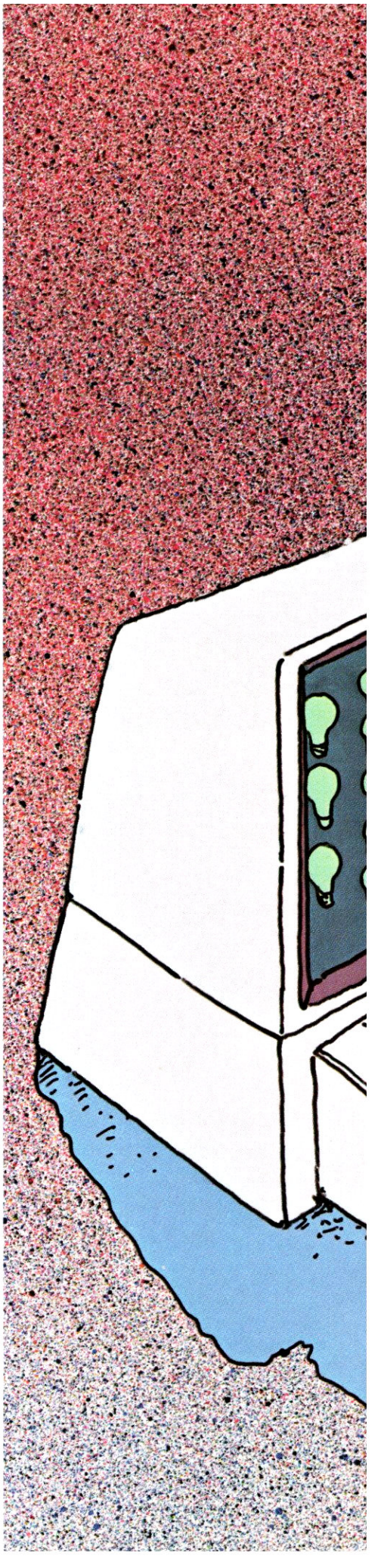
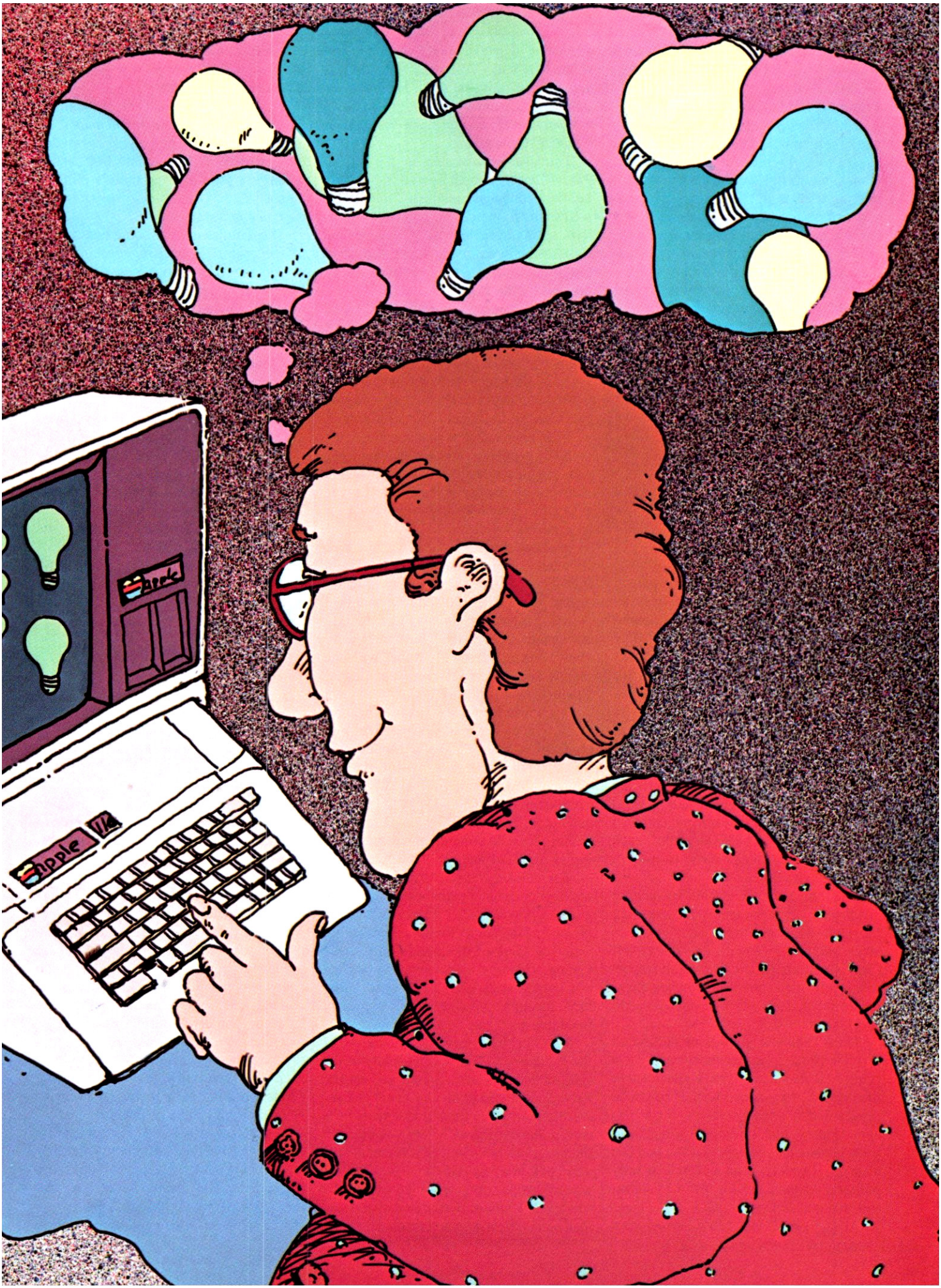
If you think writing would be easier if you could get help with organizing your material, the ThinkTank program, from Living Videotext, may be just what you are looking for. This program combines an editor designed expressly for working with outlines and a simple text editor. You can use the outline facilities to develop and arrange your ideas and then fill in the narration with the text editor.

The program does not, unfortunately, contain any AI (artificial intelligence) features, so it can't help you with the content of your writing. What it does do is make it easier for you to list, organize, and rearrange your ideas in order to turn them into a coherent document.

According to the manual, you can also use ThinkTank as a card file, text database, or appointments calendar, among several dozen other uses. The




Apple

manual gives no instructions for any uses other than for outlining and creating documents, though.

Think Outline

ThinkTank's main purpose is to help you organize your thoughts by means of an outline. As the introduction to the manual points out, outlines are useful for looking at ideas and presenting both general concepts and small details. They allow you to look at the main headings, at any particular topic and its subheadings, or even the smallest item listed.

Making an outline, however, is often an exercise that requires you to retype or

ThinkTank first shows an outline in overview form.

erase extensively. Because each part of an outline depends on both its own structure and its relation to all the other parts, making even a small change can involve you in a great deal of rearrangement. Although this is easier for you to do on a word processor than on a typewriter, it is even easier with ThinkTank.

The overall structure of a ThinkTank data file is a normal, upside-down tree-structured outline. The outline has an overall title (which ThinkTank calls the "summit"), under which are several major topics. Each major topic can also be the root of a tree of lesser topics, each of which in turn can give rise to its own branching structure.

You build up an outline by adding headings and then specifying whether the next will be further right (subsidiary), the same (equal), or further left (back to another topic at a more important level). You can also move headings, delete them, copy parts of outlines, and add text commentaries.

ThinkTank can store your outline on disk or print it out as hard copy on a printer. It can also write a special text file on disk, so you can further edit your results with a word processor. Since you can suppress the outline headings and print just the text commentaries, you can also use ThinkTank as a complete text-preparation program for ordinary narrative reports, letters, or files.

At any point, you can examine your outline in whatever level of detail you wish. You can "collapse" your project and look at only the main headings, or you can "expand" a part or the whole to as many levels as you have entered.

General Operation

ThinkTank is written in the UCSD Pascal System, so its operation is partly determined by the nature of the Pascal p-System. Some of the program's steps will seem more logical if you've had some experience using other p-System programs, but, if you haven't, you simply follow the directions.

At most stages in ThinkTank, the program presents you with a menu of choices, one of which is highlighted. A status line at the bottom of the screen gives additional details about the highlighted choice, in case you don't remember what all the menu choices signify.

You can select any choice on the menu by typing the key for its command, you can move the highlight to another choice with the arrow keys, or you can select the currently highlighted choice by entering a Return.

Many of the menu choices lead you to submenus. For example, if you choose Edit from the main menu, the program offers you a choice of editing outlines, editing paragraphs, or canceling the Edit command. In fact, the ThinkTank commands form their own outline, with the menus and submenus corresponding to headings and subheadings.

Once you know how to use the program, you can give a complete string of choices in response to a higher-level menu, and ThinkTank will carry the choices down through the submenus. For example, you could type EH for edit headlines, instead of typing E for edit, waiting for a new menu, and then choosing H for headline.

The combination of extensive menus and fast command paths makes this program relatively easy to learn without being cumbersome to use. You might find that some of the menu choices that Living Videotext considers obvious are not immediately clear, but, after a few runs through, you shouldn't find any insoluble puzzles.

You may have trouble with the use of the Escape key. ThinkTank refers to the Escape key as its "universal escape valve," and you generally use it to cancel the current command or exit from a menu. Depending on where you use it in the program, however, this key may take you back just one command level, back several levels, or back all the way to the top level. I would prefer to use one key to always take me back a single level and a different one to return me directly to the top level.

Running ThinkTank

To start using ThinkTank, you put the program disk in drive 1 and either the demonstration disk or a blank, formatted disk in drive 2. You obtain best results when you put only one outline on each data disk, but you can put several on a disk if you so choose.

The ThinkTank disk contains a copy of the required operating-system code, so you can boot the program disk directly. The program writes on the program disk during normal operations, so it's doubly important to back up the disks before anything goes wrong.

ThinkTank starts by asking you for the date, and only after that does it sign on with a screen showing program name, serial number, and the copyright message. If you have your outline (data) disk in drive 2, ThinkTank automatically reads it into memory.

If you start with a blank disk, ThinkTank supplies the word *summit* as a temporary title. Otherwise, you then see your outline title and the first level of subheadings underneath. ThinkTank doesn't show you all the details under each subheading until you ask, with an Expand command. The idea is for you to consider the larger picture without getting dragged down by the details.

The overall structure of a ThinkTank data file is a normal, upside-down tree-structured outline.

To enter your outline, you first use the arrow keys to position a "bar cursor" (which highlights one line at a time) wherever you want to add material. You then choose the New command from the top level. From the New menu, you can choose to put your headline above the current line, below it, or below and indented one level, further in or out.

Unless you tell ThinkTank to stay in the New menu, it returns to the top level each time you add a line. By choosing Mode from the New menu, you stay in New until you type an Escape.

After you've read each menu several times, you become sufficiently familiar with ThinkTank to start taking more direct paths. At the top level, you can type NMD (for New, Mode, Down), and you're all set to enter a new heading

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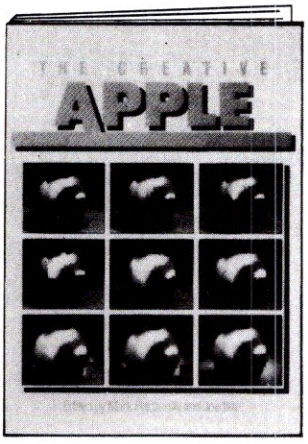

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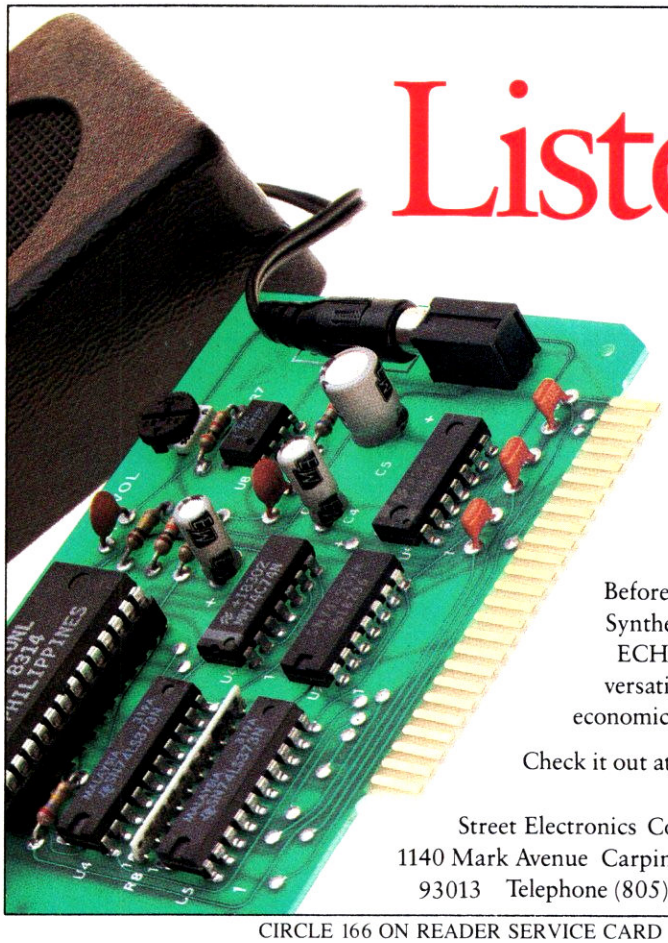

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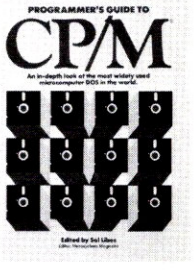

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directly below your current bar-cursor position.

If the first version of your outline is not exactly what you want, you can also edit or rearrange material. Using the Edit and Outline options, you can use the arrow keys to move to any headline on the screen and change its text. You can also scroll up or down, but the cursor won't stop at headings that are not displayed because they are at a level that you have "collapsed" and not yet "expanded" back.

Using the Move command, you can take a heading and move it up or down, as well as further to the left or right. When you move a heading, the program moves, along with it, all the subheadings and text stored underneath it. You can also copy a section of your outline, either to duplicate it or as a temporary measure in case you find you don't like your new arrangement.

Text Entry

Along with each heading, you can enter up to 2048 characters of text. ThinkTank calls this a "paragraph" but notes that this only means a chunk of text, and you can have as many indentations or blank lines within your text as you choose.

You can add text using either the New and Paragraph options or the Edit and Paragraph options (the manual recommends the edit route). The editor is a basic screen-oriented editor, which shows text in the way it will appear on the screen. ThinkTank includes automatic word wrap so you can keep typing and

A NEW PROGRAM THAT CAN HELP YOU ORGANIZE YOUR IDEAS AND PLAN AHEAD

I've got a new program that helps me plan and organize the articles and manuals I write. Doug and Denise Green have a new word processor. Bernie DeKoven has a new brainstorming tool. Roger Rines has a new project management program. And Steve Wozniak has a new program that helps him organize music festivals.

A Personal History

I first saw ThinkTank at the National Computer Convention in June of 1982. Dave Winer, author of the program and president of Living Videotext, was showing off a preliminary version. "Far out!" I said. "Here's the tool I've been looking for."

After spending three years developing the program, Dave needed a ThinkTank manual. I was hired to work with the ThinkTank people, and I began to use ThinkTank.

Because of my involvement with ThinkTank, I cannot evaluate it objectively. Instead, let me tell you how it works and how several Apple owners are using it.

What's a ThinkTank?

The traditional tool for working with ideas is an outline. ThinkTank helps you create an outline of your ideas on the screen. Unlike a paper outline, however, a ThinkTank outline is easy to work with because it is free-form, flexible, and easy to control. Unlike a word processor, ThinkTank understands outlines. Therefore, it understands the relationships between your ideas—how one idea is indented under (subordinate to) another. When you move, copy, or delete a headline, you're actually working with all the information under the headline as well—which makes it easy to rearrange and reorganize your ideas.

Brainstorming with Big Bird

The "idea processor" tag for ThinkTank was suggested by Bernie DeKoven of Palo Alto, California. DeKoven is senior consultant to Children's Television Workshop, which produces "Sesame Street" and other innovative children's programming. CTW is now entering the educational-computer-game market.

When I asked DeKoven how he uses ThinkTank, he answered, "Almost exclusively. There's no other program I know of that's so flexible and suited to my way of thinking."

When DeKoven designs a game, he outlines every aspect with ThinkTank. But he wasn't always such an eager outliner.

"Ever since I was in fourth grade," Dekoven recalled, "my teachers told me how valuable it was to outline my work. But I always hated it. I'm a divergent thinker, not a top-down one. After all, how can you tell what the first point will be until you know what the fiftieth will be?

"ThinkTank made outlining available to me. When I design a game, I make a random list of every aspect I can think of. I constantly move back and forth between brainstorming and detailing. With ThinkTank I can suppress the need to organize until it's all there. At that point the ideas practically organize themselves. ThinkTank is to the creative thinker what VisiCalc is to the financial planner."

DeKoven also uses ThinkTank for word processing. "It's not an ideal word processor," he admitted; "it's not designed as one. But I use it anyway because it lets me go right from outline to text." DeKoven would like to see ThinkTank handle graphics as well as text.

Beyond the Word Processor

Doug and Denise Green, who reviewed ThinkTank for *InfoWorld* (Vol. 5 (30): 41-43; July 25, 1983), use it for writing. Denise is a microcomputer consultant, and Doug is director of computer services for the Binghamton, New York, school district. Denise told me they use ThinkTank to write reviews and plan workshops. "If a review is somewhat complicated, ThinkTank lets us start with an outline. Word processors aren't very good for outlining."

In their review, the Greens wrote:

> ThinkTank does not pretend to be a word processor. In fact, it is more than a word processor . . . you can begin writing in outline form and switch to paragraph form whenever you choose. It is truly an idea processor, as well as being one of the best word processors that we have used on a micro.

"It really made our IIe sing," Denise added. The Greens gave ThinkTank excellent ratings in all four review categories—the highest evaluation.

Who's on First, Devo's on Second

Steve Wozniak, cofounder of Apple Computer and now its principal engineer, was an early ThinkTank user. He told me that it was very helpful in organizing the day-to-day operation of the US festival, his music and technology fair.

Wozniak arranged his outline into two main headings—Rock and Country and Western. He divided each main category into the days of the festival, each day into the groups that would be performing. Under each group he listed information such as price and availability.

ThinkTank is one of those general programs that can be useful to almost anyone. "It merits huge success," Wozniak said.

Wozniak would like ThinkTank to run on a portable computer so he can take notes while away from his desk. Ironically, he would also like it to be more compatible with the Apple hardware options offered by independent manufacturers.

The Electronic Problem Manager

Roger Rines, worldwide service manager of Spectra-Physics' industrial laser

the program will start a new line when you get to the edge of the screen.

Other text-editing commands include Insert and Type Over modes, Find, Exchange (replace), Page, Select (mark block), and Delete. In the Apple II version, you can also use the back-slash (\) and the caret (^) to indicate Shift and Shift Lock.

ThinkTank also has Search and Xchange commands that restrict their operation to the current heading and all its subsidiary headings, plus their text paragraphs. If you move to the Summit level before invoking these commands, you must search through the entire document, but you can easily limit your search to a certain number of levels or to a heading and its subsidiary material.

Porting

You can either print the output from your ThinkTank sessions directly on a printer or send it to a file for further editing. ThinkTank refers to these procedures as "porting."

To print your ThinkTank document, you select Port from the main menu and then select Printer as the Port option. You would usually want to print out your files with the Formatted option, so you choose that option next. ThinkTank then asks you whether you want to review the current format settings.

If you go through the settings, your first choice includes single-, double-, or triple-spacing. You can then set left and right margins, and page length, and specify whether you want ThinkTank to indent subheadings further or to start all

division in San Jose, California, uses ThinkTank for project management. Rines calls ThinkTank his "problem manager."

His outline is organized around the projects he's responsible for; under each project he lists the problems he's identified. When he decides what should be done and by whom, he copies the problem down to an "action" section for monitoring.

"Organizing is important in any sort of problem analysis. ThinkTank makes it easy to put a problem in perspective, to break it down into its smallest parts. It's very malleable," Rines said.

Rines uses ThinkTank to maintain a list of things to do and to prepare letters, presentations, and agendas. "It's an excellent tool for communicating," he added.

Attorney at the Computer

Stuart Forsyth, director of California's State Bar Court in San Francisco, also uses ThinkTank for agenda planning. "Its flexibility is the key. Before a meeting, I use ThinkTank to keep a checklist of potential items for discussion. As I prepare the agenda, I can move things around, then print it. It's very, very helpful for the work I do," he explained.

Forsyth has collected a large amount of written information on personal computers. He used ThinkTank to set up his filing system and now keeps a running index in an outline. Forsyth has also prepared reports with ThinkTank, starting with free-flowing ideas, then shaping them into an outline. "I found I didn't need much text. The headlines conveyed almost all the information. The outline made an excellent presentation tool," he reported.

Forsyth tried to work with outlines on a word processor, but found them hard to reorganize and unsuited for brainstorming. "ThinkTank is most useful where something needs to be organized. It has the flexibility to do exactly what you need to get done." Forsyth would like to see the program speeded up by translating parts of it into assembly language, however.

Banking on ThinkTank

Fred Winograd, vice-president of Chase Manhattan Bank in New York, uses ThinkTank primarily as a personal organizer. He has outlines to keep track of telephone numbers, schedules, and things to do. "When I come back from a meeting, I store notes under its entry on the schedule outline. And my to-do list has a separate section for priority items," he said.

As a resource on personal computing for Chase, Winograd maintains an outline for referrals and purchases. He's also used ThinkTank to outline a slide presentation for a project plan.

Report Card

Susan Peterson's work typifies the educational applications of ThinkTank. She is senior researcher for the Bay Area Research Group (BARG) in Palo Alto, California, investigating school-based planning with a grant from Carnegie Corporation.

As the project concludes, Peterson and BARG president Jane David have been using ThinkTank to organize their final report. "We've used ThinkTank to try out several tentative arrangements. It helps us bounce ideas off each other. It's much easier to read a 15-page outline than a 100-page report," Peterson said.

Peterson also used ThinkTank to organize her lecture notes from a course she took on anatomy and physiology. She found that entering and organizing her written notes into ThinkTank outlines became part of studying. "It comprised 60 or 70 percent of my studying," she estimated.

She would like ThinkTank to run on a notebook-sized computer so she could outline her notes in class. She'd also like to be able to enter diagrams. Peterson predicted that the outlines will be especially valuable when she takes the state physical therapy exams in a few years.

"Once you find one way of making ThinkTank work, you begin to see other ways," Peterson added. She and David have a special interest in jigsaw puzzles and are writing a book about them. Naturally, they're using ThinkTank to do the outline.

The ThinkTank Mystique

Although everyone I talked to had a wish-list of enhancements or improvements, these users are enthusiastic about ThinkTank. Most use it regularly, some addictively—each for his or her own purposes. It's fascinating to introduce people to ThinkTank, and watch them get excited, use it, then customize it for their own applications. Which brings us back to the original problem: What exactly is ThinkTank, anyway?

When I first saw ThinkTank, I described it as a cross between a word processor and a database manager. But that was only half true. There are functions in those programs (such as arithmetic calculations) that ThinkTank doesn't attempt. Other functions it performs differently, sometimes better.

In fact, ThinkTank is something more than all of its applications. It becomes what you want it to become. There's something in it that fits in with your thought processes, that helps you organize, clarify, solidify, and amplify ideas and information. This may sound a little mystical; there may be good psychological explanations. But in the end, perhaps the word "mystique" *is* the best way to describe ThinkTank.

John Unger Zussman

John Unger Zussman is president of Logical Arts, a software documentation and design firm located in Menlo Park, California.

headings at the left margin.

The headline-depth setting gives you control over how many levels of headings the program prints. If you choose O, ThinkTank suppresses the headings and prints text only. If you choose a large enough number, the program lists all your headings and details. You have a similar choice for paragraphs, so you can

You can expand any part of the outline to show further details.

print none of them, all of them, or only the more important sections.

ThinkTank can number your sections if you request it to do so. Numbering is segmented decimal—the first subsidiary section under section 1 is numbered section 1.1, its first subsidiary is 1.1.1, and so on. It can also generate a table of contents of up to 100 headings, along with their relevant page numbers. Because the printing process is a single pass, the program prints the contents page at the end, but you can easily move it to the front of the stack.

If you select headers, ThinkTank takes the name of the outline or section you're porting and prints it on the top of each page, along with the date and page number. If you pick footers, the text consists of the most recent heading, subsidiary to the current title.

ThinkTank's final three choices are Printer Control options. You can pick pause at each page or continuous form, number of copies, and any printer-initialization strings (for example, to set top of form or change fonts).

As you can see, the program's formatting ability is sufficiently extensive for most ordinary reports and presentations. You can produce a reasonably attractive page, but you don't have precise control over options such as page breaks or double columns.

You can also port your outline to a file. The three formats you can use are structured (which mimics the way ThinkTank stores files internally and is thus the format from which the program can read back in fastest), plain (when you want to do the formatting with another program), and formatted (a disk image of the file the printer would produce). The result in all cases is a Pascal p-System text file, so you can't read or edit it directly with most Apple text editors. Living Videotext does, however, include a set of utilities for going from Apple disks to Pascal disks and back, if you don't want to use a Pascal-based editor.

ThinkTank uses a character-translation table to make the connection between command character and command. With a few exceptions, you can change any of the characters you use to invoke ThinkTank commands. I prefer to use the Delete key to erase a character I have just typed, rather than the one under the cursor as in the ThinkTank

With a few exceptions, you can change any of the characters you use to invoke ThinkTank commands.

standard arrangement, and it took me less than a minute to change this command to the way I prefer.

If you use the II/II Plus version of ThinkTank and have an 80-column card, you'll have to turn it off and make do with a 40-character line. The IIe and III

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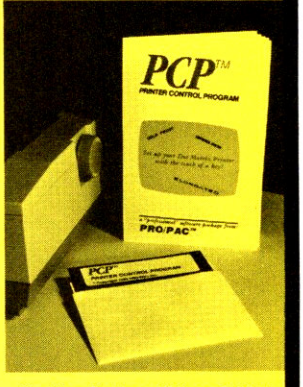

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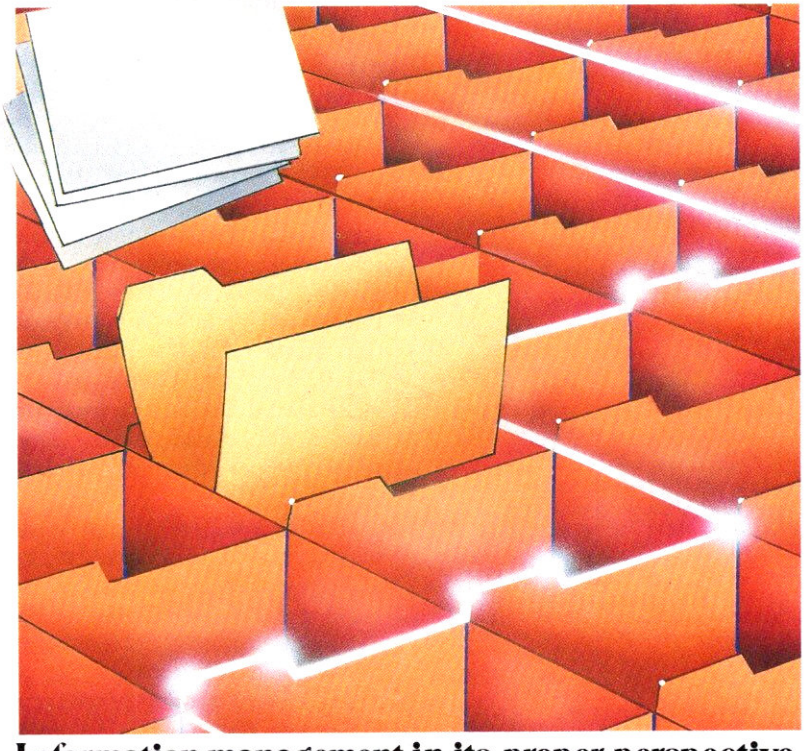

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CIRCLE 284 ON READER SERVICE CARD

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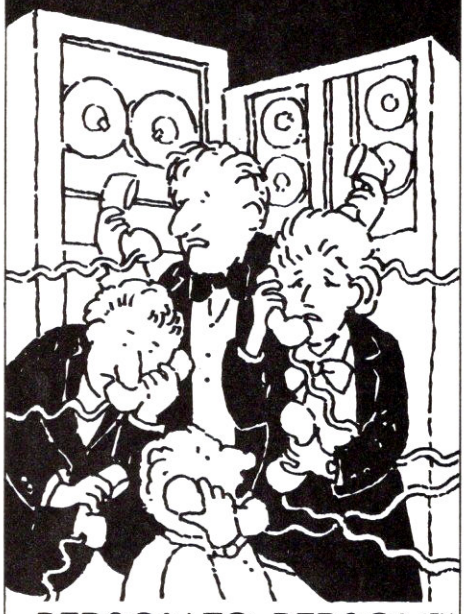

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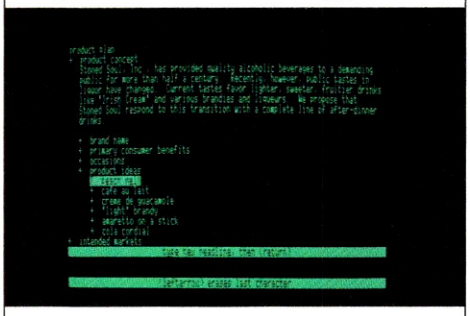
versions support the full 80-character screen width. Otherwise, all the Apple versions of the program work the same way, with the exception of slight differences in the keys used for each command.

ThinkTank's most glaring omission is any easy method for you to make backups of an outline during an editing session. There is no specific backup command, and the discussion in the manual only describes how to back up your disks between sessions. The only time that a file is closed (and therefore safely stored away on disk) is when you go to the Special (disk operations) menu or exit from the program.



ThinkTank allows you to show even further detail at any level of the outline.

To use the disk operations from the Special menu, you have to remove your data disk and put in the ThinkTank sample data disk. To copy your disk, you must switch disks several more times.

If you exit from ThinkTank, you are left in a cut-down version of the p-System and are given no instructions on how to reinvoke the program. If you read through the hard-disk sections of the manual and are familiar with Pascal, you can puzzle out the method (Xecute Tank), but there should be a better, clearer way. Backups are essential, and they should be made as easy as possible for you to perform, not as difficult.

Manual

ThinkTank comes with a detailed manual, including introductory, tutorial, and reference sections. Most of the manual is produced with what looks like a daisy-wheel printer, but the tutorial section contains numerous screen photos. It's all clearly readable, even though the layout and design are occasionally confusing.

The writing style in the manual is pleasant, but it does not make up for a curious lack of organization—it presents some topics in very fragmentary fashion. You may find it hard to see how material is allocated between the Introduction, Brief Tour, Tutorial, and Notes and Suggestions.

The manual was apparently conceived in two separate parts—introduction and reference—but no dividers or even large headlines differentiate them. This produces the rather remarkable arrangement of a book that has appendices in the middle, but a list of figures and tables that spans both parts. Again, you can work around this, but you shouldn't have to. This may be just a problem of being too close too long, but Living Videotext ought to consider getting a good outside editor to take a look.

ThinkTank is, as promised, easy to learn and use. It generally does what the manual says it will (although it clearly is not "The First Idea Processor" and doesn't have a single command that can tell an idea from an indent).

If ThinkTank didn't produce p-System files (or if I had a Pascal editor that I liked), I'd probably use the program a lot more. It's definitely a good tool for brainstorming, organizing, and revising an outline.

When writing an article or report, I've found it best to start off with ThinkTank and then go on to a full-featured word processor when I have the organization of my material clarified. Often the effort to convert from the p-System is too much trouble, so I just reenter the text or work on a parallel version.

ThinkTank's most glaring omission is any easy method for you to make backups of an outline during an editing session.

As does any program of this complexity, ThinkTank has a few idiosyncrasies that I'd like to see changed but none that gives me any real problems. Overall, it's a good product.

If you think some good outlines might help organize your writing, your business, or your life, I'd definitely advise you to give ThinkTank a try. ✚

ThinkTank is available in versions for the Apple II/II Plus (Videx), Apple IIe, and Apple III. It requires two floppy disk drives (or hard disk with Pascal operating system) and 64K (II, IIe) or 96K (III) RAM. The suggested retail price is $150. Contact Living Videotext, Inc., 450 San Antonio Road, #56, Palo Alto, CA 94306; telephone (415) 857-0511.

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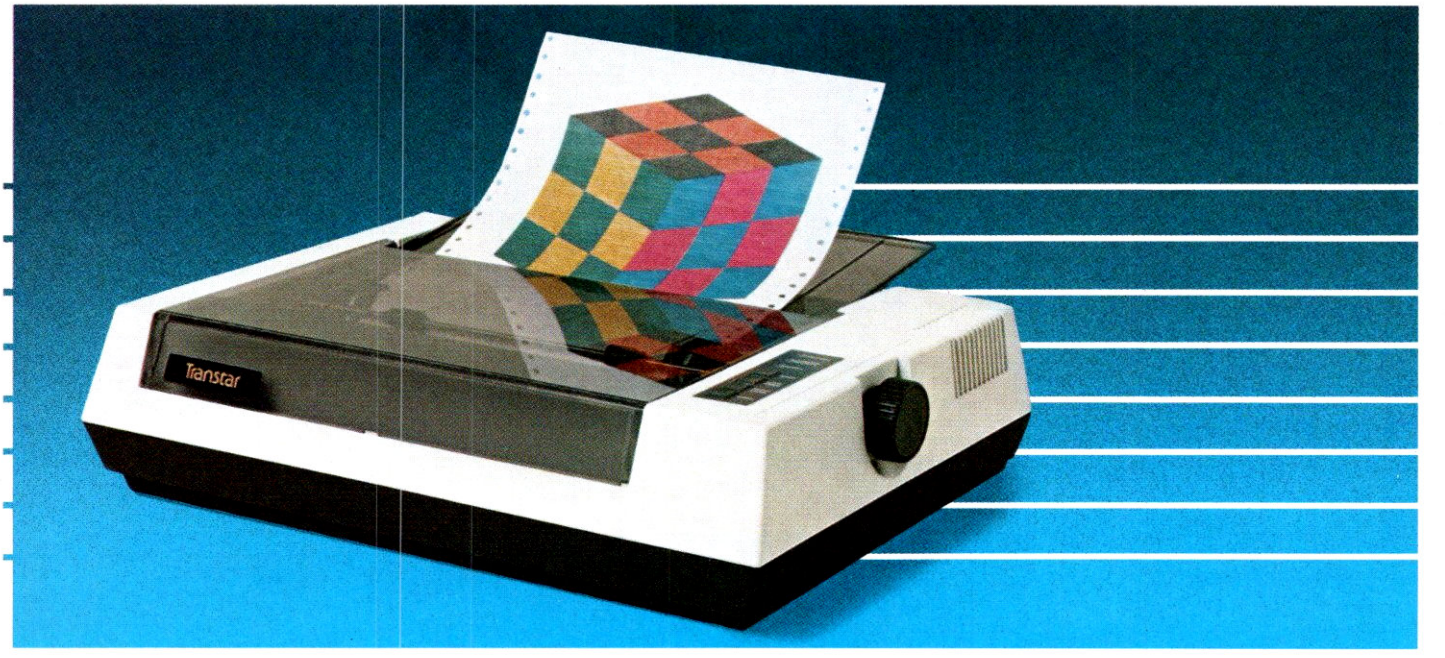

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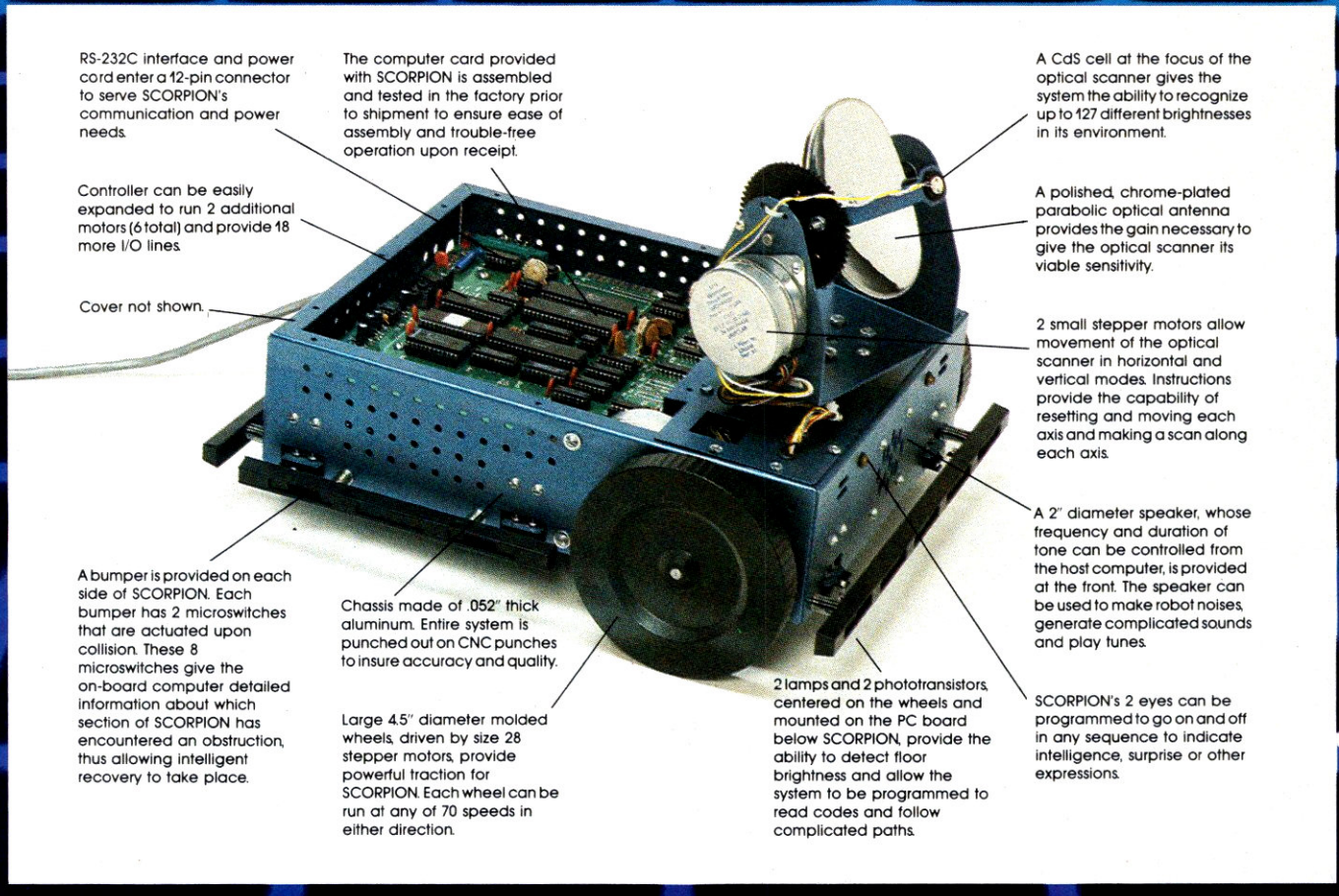

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TUTORIAL/BY ROBERT COWART

HOW TO dBASE II

PART V

In a tutorial series on dBase II, a popular program for database management

So far in the *A+* series of dBASE II tutorials, we have covered techniques for creating databases, storing information in them, and keeping that information updated. In addition, we have explored almost all of the dBASE II commands for data retrieval, including the use of sorted and indexed databases, as well as the advantages of using the Report command for easy report generation.

This installment of "How to dBASE II" will cover some considerations governing the judicious use of Index and Sort. We will also examine the commands for large-scale modifications of and interactions between data files.

Tutorial Conventions

These tutorials include quite a few examples. Sometimes you are asked to type in a command, and then dBASE II responds. Just to differentiate between what you do and what dBASE II responds with, we show the words you type in lowercase letters. You can type uppercase letters if you want to—it's just clearer this way. Some examples specifically ask you to type uppercase letters, but only with series of words between quotes. The dBASE II responses are usually in uppercase letters. All screen interactions appear in a different typeface than the text's, so you can distinguish them. To make these sections more readable, I imply carriage returns rather than include them.

Sorting vs. Indexing

As you learned in our last session, using indexed databases is usually the fastest way to get to the information you are interested in. A typical Find command can locate the desired record in about two seconds, even on a floppy-disk system. Hard-disk-based systems are usually even faster. In addition, indexes take up much less room on a disk than does a sorted file. For instance, here are the sizes of a typical set of files based on a dBASE II file of 245 records:

Size of PHONEBK database:	40K bytes
Size of LAST:NAME index:	8K bytes
Total	48K bytes

Size of PHONEBK database:	40K bytes
Size of sorted database	40K bytes
Total	80K bytes

Spaced saved by indexing: 32K bytes

If most of what you are doing is finding records randomly, then indexing is the way to go. On the other hand, if you intend to access your records frequently in a sequential manner, you will find that a sorted database is faster in the long run. Why? Because you will have fewer disk "hits" or reads if your records are arranged on the disk in the order in which you want to retrieve them.

For example, say you wanted to print out a lot of mailing labels from a name-and-address list. If your database contained more than about 100 records, you would be better off sorting to a new file and printing from that. Here are some statistics based on a typical file (in minutes and seconds):

245-Record PHONEBK Database

	Indexing	Sorting	Difference
Hard Disk	0:44	2:47	2:03
5¼" Floppy	0:45	4:05	3:20

This chart shows clearly that indexing is considerably faster than sorting, regardless of the type of system you are using. Generally speaking, sorting is three to five times slower than indexing. But when it comes time to list or print, the trend reverses:

Listing the Database

	Indexed	Sorted	Difference
Hard Disk	3:03	1:08	0:55
5¼" Floppy	2:53	1:14	1:39

Printing the Database (1200 Baud)

	Indexed	Sorted	Difference
Hard Disk	9:00	7:00	2:00
5¼" Floppy	8:50	7:07	1:43

These two charts demonstrate that printing a sorted file is faster than printing an indexed file. You have to decide whether an application warrants the time it would take you to sort the database before printing—take into account how often you plan to print it. In the case of the database above, you lose about two minutes by sorting, but you gain it back when you print. The net gain is about zero. But remember—you save two minutes *each time* you print. If you needed to print the list even a few times, the time saving might make sorting the file worthwhile, even though you lose some disk space to store the sorted file. Don't forget that you will have to re-sort the database if you add any records to it; if you don't, the newly added records will be out of order. Here are the questions to ask yourself when considering whether to index or sort.

1. Will I be updating the file often?
   Yes → Index (and open the index when appending)
   No → Sort
2. Am I short on disk space?
   Yes → Index
   No → Sort
3. Do I normally need to access the file sequentially or randomly?
   Sequentially → Sort
   Randomly → Index

Now, add up your answers to see which approach is appropriate. In regard to question number 2, don't forget that you can sort to another disk drive if you need to (as in SORT ON LAST:NAME TO B:LAST).

If you are really having trouble deciding, consider this: Say you have an indexed file that you print occasionally. If you sort it once in a while into the order in which you will print it and then use the new sorted file for further updates, printing

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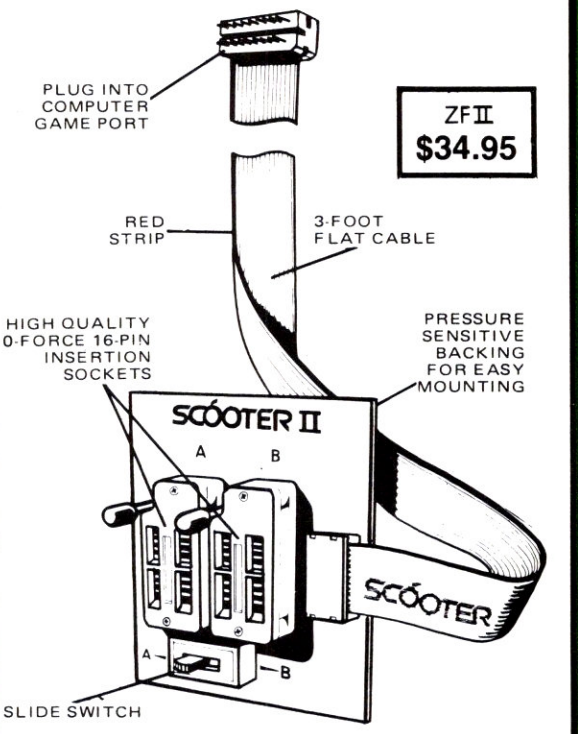

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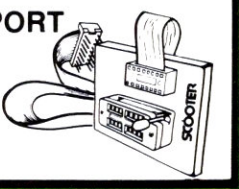

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your indexed file will be faster than it normally would be (excluding the time it takes to sort and then reindex the new sorted file) because the records in your new file are arranged on the disk in the desired order.

If you absolutely must do regular sorting on databases, there is still hope, although you'll have to pay. Several ancillary programs are available to make up for some of the deficiencies of dBASE II. One of these, called dBPlus, includes a greatly improved sort routine that works up to 15 times faster than dBASE's, as well as sorting on all the fields instead of just one.

Displaying Filenames

Ever wish you could see what files were on your disk without having to type the following?

```
. QUIT
*** END RUN dBASE II ***
A>DIR
```

Well, you can, using the Display command in a special way. You can examine all or parts of your CP/M directory (using "wild cards") or display just the dBASE II data files (see figure 1).

Incidentally, if you want to see files that have no extension (e.g., LETTER.), you must type in the spaces where the extension would be, after the period. Even though you can't see them on the screen, dBASE knows they are there. If you do not stipulate a CP/M file extension, dBASE assumes you mean .DBF.

Deleting Old Files

Just as with Display Files, you don't have to quit dBASE in order to delete a file in your CP/M directory. You can use the Delete command to obliterate complete files, as well as just records within a file (as covered in a previous issue of *A+*). To kill a file, you must append the word *FILE* to the Delete command. Again, dBASE assumes a DBF extension, unless you tell it otherwise.

```
. use camplist
. delete file camplist
FILE IS CURRENTLY OPEN

. use
. delete file camplist
FILE HAS BEEN DELETED

. delete file mailing.fmt
FILE DOES NOT EXIST
```

(assuming you don't have this file)

Take great care when deleting files. This command works the same way as the CP/M ERA command. Once you've erased a program, you are out of luck, unless you have an "unerase" program such as POWER.COM or UNERA.COM, or a backup copy on another disk. UNERA.COM is a public-domain program that every CP/M user should have. You can get it from the CP/M User's Group in New York City. Better yet, get a copy of POWER!, which contains 55 utilities for keeping your CP/M files in good order, from a company called Computing! in San Francisco.

Notice also that dBASE II will not delete a file that is in use. The reason is that part of the file is in your computer's RAM, and dBASE hasn't yet placed an end-of-file marker on the file, nor has it updated the CP/M disk directory with the

```
. display files
DATABASE  FILES  # RCDS   LAST UPDATE
ACCPAY    DBF    00020    00/00/00
ACCREC    DBF    00027    00/00/00
AREACODE  DBF    00148    00/00/00
BBS       DBF    00002    00/00/00
KEYFILE   DBF    00206    00/00/00
MIND      DBF    00245    00/00/00
TEMP      DBF    00244    00/00/00
REST1     DBF    00102    00/00/00
CAMPLIST  DBF    00005    00/00/00
PEOPLE    DBF    00244    00/00/00
INVNTORY  DBF    00010    00/00/00

DATABASE  FILES  # RCDS   LAST UPDATE
PEOPLE    DBF    00244    00/00/00

. disp files like ???ple.*

PEOPLE    .NDX   PEOPLE   .NEW  PEOPLE   .CMD  PEOPLE   .DBF

.disp files like *.ndx

ACCNDX    .NDX   ACCRBILL.NDX  ACCRWHO .NDX  ACCTNDX  .NDX
ACODE     .NDX   FIRST   .NDX  LAST    .NDX  PEOPLE   .NDX
COMP      .NDX

. disp files like *.cmd on e:

None
```

Figure 1: Using the Display command

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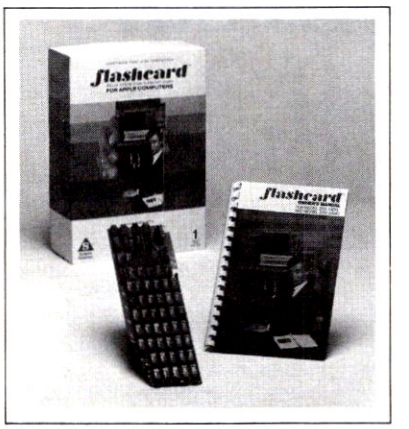

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CIRCLE 399 ON READER SERVICE CARD

Action	Notes
`. rename minerals to vegetabl`	
`. rename letter to temp` `FILE DOES NOT EXIST`	← *dBASE looking for letter.dbf, when file is really named letter.*

`. rename letter. to temp`
`FILE ALREADY EXISTS`
`. rename letter. to temp1`
	← *dBASE won't write over existing file called temp. This is OK, since temp1 does not already exist.*

`. use camplist`
`. rename camplist to camp`
`FILE IS CURRENTLY OPEN`
	← *dBASE won't rename a file in use.*

Figure 2: Using the Rename command

information necessary for deleting files.

Want to Rename a File?

Suppose you want to give a file a new name. Just use the Rename command. Make sure you are not using the file whose name you are going to change. See figure 2 for a few examples.

Making a Copy of a File

The Copy command provides a flexible means for modification of databases. In its simplest form, this command merely copies files as the CP/M program PIP.COM does. In this form, Copy is simply a convenience that eliminates the need to leave dBASE before you make copies of files. For the following examples, you will need to create or locate a copy of the following database (from last issue's experiments):

```
STRUCTURE FOR FILE:   A:CAMPLIST.DBF
NUMBER OF RECORDS:    00000
DATE OF LAST UPDATE:  00/00/00
PRIMARY USE DATABASE
FLD    NAME   TYPE WIDTH DEC
001   Item     C    010
002   Weight   N    002
003   Cost     N    005  002
004   Owner    C    010
```

Now, using Append, enter the following data:

```
Record  Item       Weight  Cost   Owner
-------------------------------------
00001   BACKPACK     10    65.00  KARL
00002   STOVE        25    85.00  KARL
00003   TENT         12    62.33  LISA B.
00004   FOOD         30    45.27  GROUP
00005   RAINGEAR      7    12.95  VALERIE
```

Here is the standard syntax for the Copy command. Try it:

```
. use camplist
. copy to temp
5 RECORDS COPIED
. use temp
. list
00001   BACKPACK  10      65.00  KARL
00002   STOVE     25      85.00  KARL
00003   TENT      12      62.33  LISA B.
00004   FOOD      30      45.27  GROUP
00005   RAINGEAR   7      12.95  VALERIE
```

You now have a copy of the Camplist file called TEMP.DBF. Everything, including the structure of the file, was copied into TEMP. What if you wanted to copy only a few of the fields in the original database? Try these commands to see:

```
. use camplist
. copy to temp4 field item,weight,owner
00005 RECORDS COPIED
. use temp4
. disp structure

STRUCTURE FOR FILE:   A:TEMP4 .DBF
NUMBER OF RECORDS:    00005
DATE OF LAST UPDATE:  00/00/00
PRIMARY USE DATABASE
FLD     NAME    TYPE WIDTH  DEC
001   Item       C    010
002   Weight     N    002
003   Owner      C    010
** TOTAL **          00023

. list

00001     BACKPACK    10        KARL
00002     STOVE       25        KARL
00003     TENT        12        LISA B.
00004     FOOD        30        GROUP
00005     RAINGEAR     7        VALERIE
```

Sometimes, for use with other database systems and/or text editors, you may have to copy a data file into another format. For example, suppose you wanted to use a mailing-list database with the MailMerge program from MicroPro International in San Rafael, California, to generate form letters. Or perhaps you want to send one of your databases over the telephone lines (via modem) to be used on a mainframe computer. MailMerge requires fields to be separated by commas, and

other database programs may require a different character as the "delimiter," the field separator. You may want to copy your database to a simple text file for inclusion in a letter or report. dBASE can accomplish these tasks if you use the SDF and Delimited clauses after the Copy command. Here are some examples. To create a simple text file which includes the data, but not the structure, type

```
. use camplist
. copy to temp2 sdf
00005 RECORDS COPIED
. quit
*** END RUN dBASE II ***

A>type temp2.txt

BACKPACK 1065.00KARL
STOVE    2585.00KARL
TENT     1262.33LISA B.
FOOD     3045.27GROUP
RAINGEAR  712.95VALERIE
```

Notice that the fields all seem to run into one another. Maybe the Delimited clause will help. Get back into dBASE and type

```
. use camplist
. copy to temp3 delimited
00005 RECORDS COPIED
. quit

*** END RUN dBASE II ***

A>type temp3.txt

'BACKPACK',10,65.00,'KARL'
'STOVE',25,85.00,'KARL'
'TENT',12,62.33,'LISA B.'
'FOOD',30,45.27,'GROUP'
'RAINGEAR', 7,12.95,'VALERIE'
```

What happened? Just using delimited alone results in all fields being separated by commas and "character" fields being separated by the default delimiter, single quotes. You can specify the delimiter if you need to:

```
. use camplist
. copy to temp3 delimited with /
00005 RECORDS COPIED
. quit

*** END RUN dBASE II ***

A>type temp3.txt

/BACKPACK/,10,65.00,/KARL/
/STOVE/,25,85.00,/KARL/
/TENT/,12,62.33,/LISA B./
/FOOD/,30,45.27,/GROUP/
/RAINGEAR/, 7,12.95,/VALERIE/
```

Notice that the commas still appear between fields and that the new delimiter appears only around character strings. If what you really want is to strip out all the extra blanks, get rid of the quotation marks, and separate your fields with commas,

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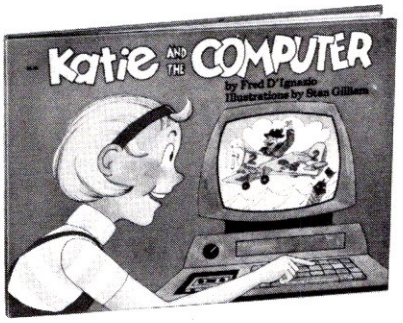

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CIRCLE 169 ON READER SERVICE CARD

you can do it this way:

```
. use camplist
. copy to temp3 delimited with ,
00005 RECORDS COPIED
. quit

*** END RUN dBASE II ***

A>type temp3.txt

BACKPACK,10,65.00,KARL
STOVE,25,85.00,KARL
TENT,12,62.33,LISA B.
FOOD,30,45.27,GROUP
RAINGEAR,7,12.95,VALERIE
```

You have another interesting option when you're copying. You normally use it only with automatic dBASE "programs," but it is worth mentioning. This feature permits the copying of your database structure into separate records of another database. Look what happens to the Camplist database when you carry out this process:

```
. use camplist
. copy to temp structure extended
00004 RECORDS COPIED

. use temp
. disp structure

STRUCTURE FOR FILE:   A:TEMP .DBF
NUMBER OF RECORDS:    00004
DATE OF LAST UPDATE:  00/00/00
PRIMARY USE DATABASE
FLD     NAME       TYPE  WIDTH   DEC
001   FIELD:NAME   C     010
002   FIELD:TYPE   C     001
003   FIELD:LEN    N     003
004   FIELD:DEC    N     003
** TOTAL **          00018

  list

00001       Item          C       10       0
00002       Weight        N        2       0
00003       Cost          N        5       2
00004       Owner         C       10       0
```

Don't worry if you feel puzzled, because this example is more than a little confusing. The bottom line is this: None of the *data* from CAMPLIST was copied. Only the *structure* was. Each field in CAMPLIST became one record in TEMP. Since each field in CAMPLIST has four qualities attributed to it (length, decimal places, and so on), each record in TEMP needs four fields. You can see the names of these fields just after the Display Structure command above. You can also examine the structure of CAMPLIST now by opening and listing the file TEMP.

Once you have copied a structure to a new file, you can use the Modify Structure command to alter the structure.

Copying Only the Structure

Finally, what if you only wanted to make a "carbon" copy of the structure that you could use as a normal database? Say you wanted to have two Camplist databases—one for each of the backpacking trips you're planning this year. You could go through the Create process all over again, or you could copy the whole file and then use Delete All followed by Pack. (This approach could be time-consuming for large files). Of all your options, Copy Structure is the simplest and quickest:

Copying just the structure is especially useful because it eliminates the need to go through the Create process unless you are designing an entirely new structure.

```
. use camplist
. copy structure to camp2
```

Copying just the structure is especially useful because it eliminates the need to go through the Create process unless you are designing an entirely new structure. Additionally, once you have copied a structure to a new file, you can use the Modify Structure command to alter the structure. This method is the key to changing the structure of a database that already has lots of valuable information in it. Normally if you try to modify the structure, dBASE says, "MODIFY ERASES ALL DATA RECORDS. PROCESS Y/N?" For those of you who missed the first issue, here are the basic steps to avoid catastrophe. First, make sure to answer NO when you see that question! Then (using CAMPLIST as an example) type

```
. use camplist
. copy structure to temp
. use temp
. modify structure
  (make your changes)
. append from camplist
  (read data from old file into new one)
. list
  (check to see if it looks OK)
. delete file camplist
  (get rid of old file)
. rename temp to camplist
  (rename your new file to old name)
```

Next Time

The next issue will cover more complicated techniques for file manipulation, including experimentation with joining two databases together and with the Update command, which helps keep your databases current. So, until your next issue arrives or appears on the newsstand, try to take the time to experiment on your own and, of course, always keep a backup disk of your files in a safe place. ✚

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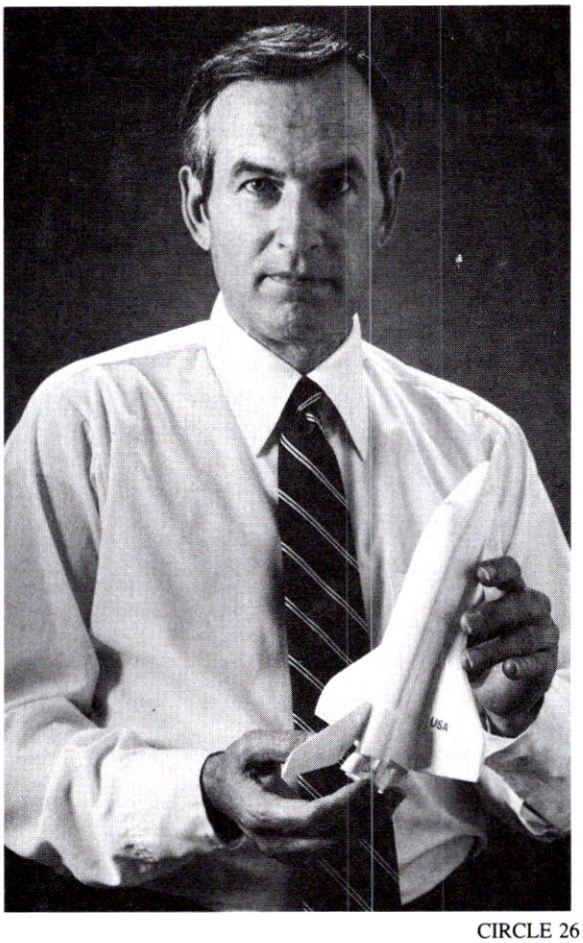

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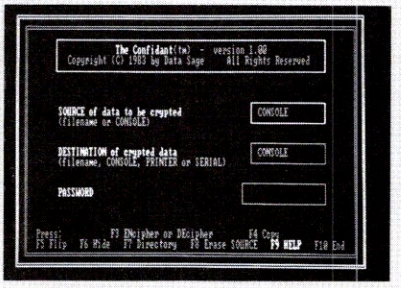

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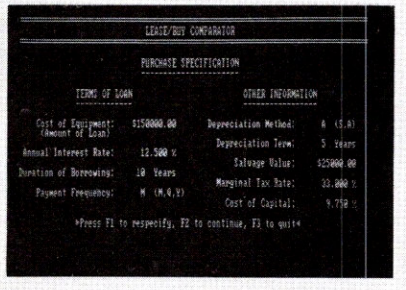

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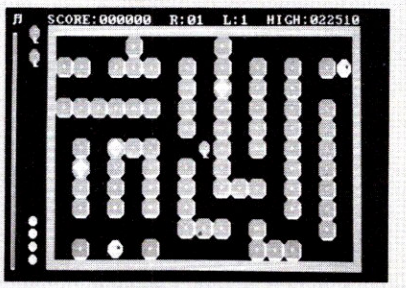

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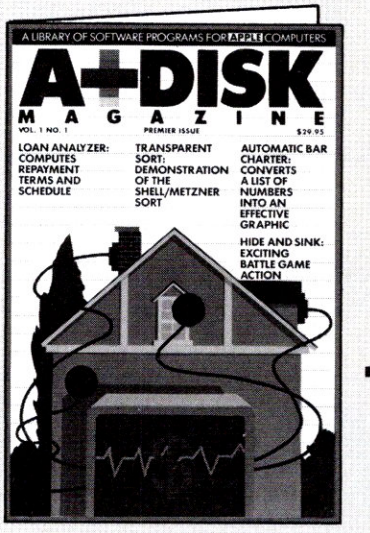

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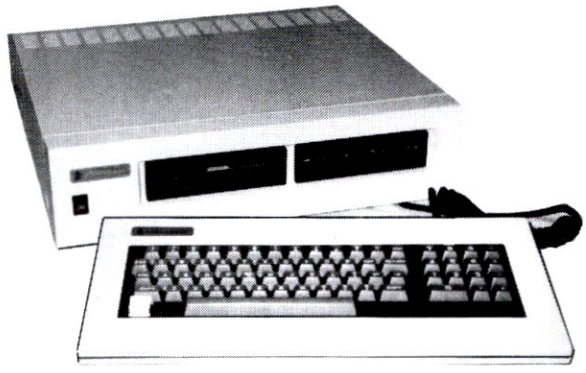

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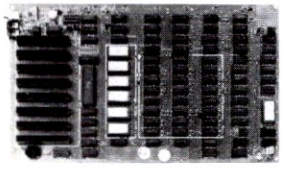

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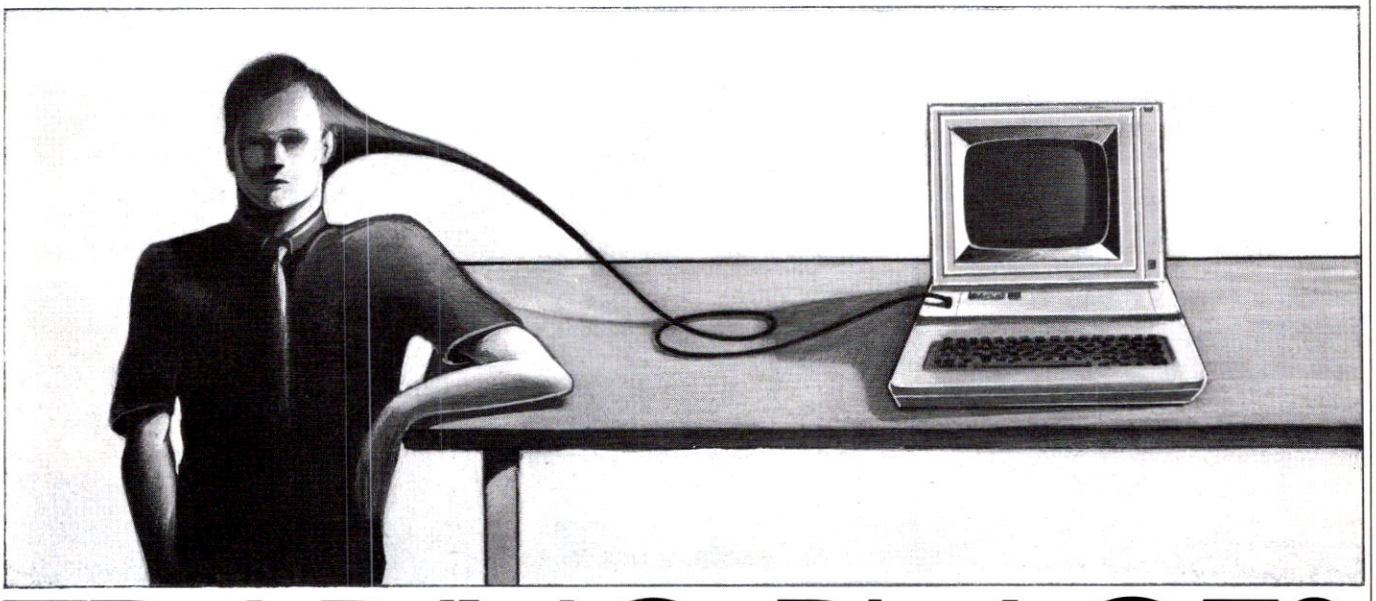
ELECTRONIC BRAINSTORMING
BY JOHN ZUSSMAN

'Artificial intuition' may make computers more like people.



TRADING PLACES

I first met Obi-Wan Kenobi (no, not the one from *Star Wars;* this is Obi-Wan Kenobi, my personal computer) in June of 1982. Since then we've developed a close personal relationship. Oh sure, we fight occasionally; Obi-Wan, though wise, can be stubborn, patronizing, and downright mysterious at times. Still, I figure that in the last year and a half, I've spent more time—awake and sober, at least—with Obi-Wan than I have with any human. Just ask my wife.

One of the pleasures of a relationship like this is that you begin to see each other—and yourself—in sharper perspective. I've found a lot to admire in the way Obi-Wan's mind works. Here are a few of the things my personal computer can do that I wish I could:

• **Memory.** I envy my computer's ability to remember, verbatim, whatever's stored in its memory or on disk. I'd love to have *Hamlet, Alice in Wonderland,* or the *Kama Sutra* at my disposal, ready to recite a few lines as the need arose—not to mention my appointment calendar and telephone directory. But even more I envy my computer's ability to forget. When a file is erased from a disk—deliberately or not—it's *gone.* My mind, on the other hand, is full of irrelevant trivia. I'm constantly flashing on commercial jingles, camp songs, and unpleasant incidents from adolescence that I'd just as soon forget—for good.

I envy my computer's ability to remember, verbatim, whatever's stored in its memory.

• **Patience.** Just as I began this paragraph, I was interrupted by a lengthy telephone call. After completing it I took a breakfast break and then attended an hour-long meeting. In all, I left my computer for over two hours, yet it didn't protest, complain, get angry, or walk away. It just sat there, its cursor blinking brightly, waiting patiently until I returned. Don't try *that* with your boss, spouse, or best friend.

• **Multiplexing.** I'm writing this column with a word-processing program that runs under the QNX operating system,

SCRG

SWITCH-A-SLOT

The **SWITCH-A-SLOT** is an expansion chassis, which allows the user to plug in up to four peripheral cards at one time. One of these cards is selected for use, and only that card draws power.

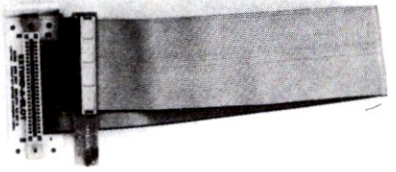
This product is especially useful where the software requires the printer to be in a particular slot, and the user wishes to choose between two or more printers.

- Allows up to four peripheral cards to be plugged into one peripheral slot.
- User selects desired card by front panel rotary switch.
- Only selected card draws power.
- Plugs into any peripheral slot.
- Saves wear and tear on delicate connectors.
- 18" cable connects Switch-a-slot to computer.
- Accommodates cards up to 10¼" long.
- All connectors gold plated.

$179.50

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. These products may be incompatible with some alternate processor cards.

EXTEND-A-SLOT



The **EXTEND-A-SLOT** brings a slot outside your APPLE™, allowing an easy change of cards. The 18" flex cable is long enough to allow placement of the card in a convenient location. The high quality connectors are gold plated for reliability.

The perfect accessory for:

Owners of large numbers of I/O expansion cards—keep your frequently used cards installed. Use the EXTEND-A-SLOT for the others.

Technicians—easy access to test points on accessory cards under actual operating conditions.

Experimenters—make easy changes to cards while card is installed.

EASY TO USE—just plug it in as you would any expansion card, then plug your card in. When you want to change cards, do it easily outside the computer, without the wear and tear on the computer expansion slot.

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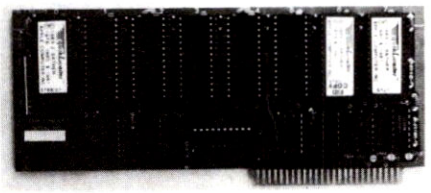
NEW PRODUCT

quikLoader



Designed by Jim Sather

SPEED

The quikLoader is the *fastest* way to load programs, ***BAR NONE!*** Applesoft, Integer, or machine language programs can be loaded in fractions of a second. More importantly, DOS is instantly loaded every time the computer is turned on. Integer is even loaded in the language card. This process takes less than a second, saving valuable time. The quikLoader operating system can keep track of over 250 programs stored in **PROM**s (Programmable Read Only Memory). The user simply transfers any of these programs to PROM using the instructions packed with the unit, and any PROM programmer, or we will provide this service.

CONVENIENCE

How many times have you started to work with a frequently used program, only to find that you have misplaced the disk, or worse, had the disk damaged, or the dreaded "I/O ERROR" message flash on the screen. With the quikLoader, these nightmares can be a thing of the past. Frequently used programs are available *instantly* when you need them, without having to look for the disk, or hoping that the lengthy disk loading procedure goes smoothly. If you do need to use standard disks, the quikLoader even speeds up that process. For example, to catalog a disk, just press ctrl-C Reset. To run the "HELLO" program, press crtl-H Reset.Other "one-key" commands include entering the monitor, booting the disk, calling up the mini-assembler, etc. The major difference between the quikLoader and the other ROM cards is the complete operating system (in PROM). This enables you to get the quikLoader catalog on the screen (by pressing ctrl-Q Reset), allowing you to see what programs are available. Loading or running of the desired program requires one keypress. Program parameters, such as starting address and length of machine language programs can be seen on the catalog screen, if desired.

VERSATILE

The quikLoader will accept any of the popular PROMS available on the market, 2716, 2732, 2764, 27128 and 27256. These types may be freely intermixed on the card. Long programs can take up more than one PROM, or several short programs may be stored on one PROM. The quikLoader operating system even handles multiple cards, so you can easily double or triple the amount of PROM memory available. The ultimate memory capacity of one card is 256K, so many frequently used programs and utilities can be stored. We even start your library of programs with the most popular utilities on the card, FID and COPYA. Now, if you have to copy a disk, you don't have to search for the master disk. You can start copying within 3 seconds after turning on the computer.

INCREASED DISK CAPACITY

Since DOS is loaded from the quikLoader every time the computer is turned on, it is not necessary to take up valuable disk space with DOS. This will give you more than 10% additional space for programs and data on your disks.

SYSTEM REQUIREMENTS

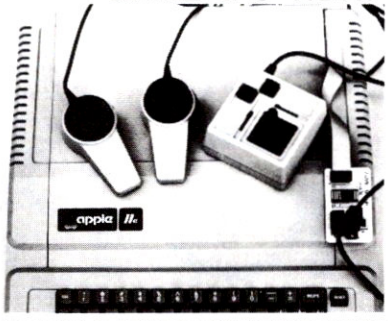
The quikLoader plugs into any slot of the APPLE] [+ or //e. If used in a] [+, a slightly modified 16K memory card is required in slot 0. A disk drive is required to save data.

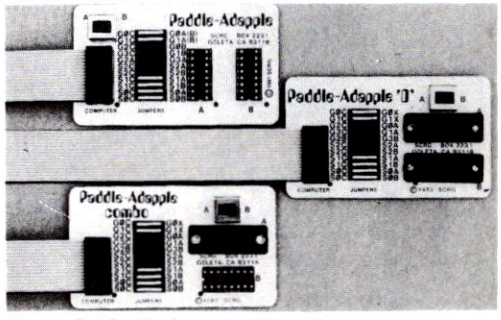
DOS, INTEGER BASIC, FID, and COPYA are copyrighted programs of APPLE COMPUTER, INC. licensed to Southern California Research Group to distribute for use only in combination with quikLoader.

$179.50

Paddle-Adapple

GAME I/O ADAPTOR and EXTENDER





- Works with all Apple compatible joysticks, paddles and other I/O devices.
- Select one of two devices or . . .
- Use 4 paddles simultaneously.
- Unique "Jumpers" socket allows you to configure to meet your needs.
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The **Paddle-Adapple** has two 16 pin sockets

The **Paddle-Adapple "D"** works with the subminiature D connectors.

The **Paddle-Adapple Combo** has one 16 pin socket and one subminiature D connector.

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This hardware product gives the user complete control over all I/O functions in the range $C000 through $C0FF. For example, you may switch between text and graphics; hi-res and low-res; turn disk drive on and off, etc.

D MAnual 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 immediately. 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.

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CIRCLE 246 ON READER SERVICE CARD

much like Unix on Apple's Lisa. Unix and QNX are multitasking systems, which means they let the computer do more than one thing at a time. In this case, while the word processor is operating, a spelling-checker program is running in the *background*. As I use the word processor, misspelled words are automatically highlighted on the screen. I can correct them, add them to the dictionary, or leave them for later. The spelling checker causes no noticeable delays in the word processor. Given the inclination (and sufficient memory), I could simultaneously print a draft of this column and transmit it over a telephone line to *A+*—even while continuing to edit it. If I were a programmer, I could compile my latest version of *Space Carnage* at the same time. With appropriate software, even single-tasking computers can do some of this. Now, as someone who can barely walk and chew gum at the same time, I respect this ability to multiplex. I'd love to spend the afternoon writing, while simultaneously preparing a seven-course dinner, watching *All My Children,* and soaking up some sun at the beach. Alas, I'm pretty much confined to one task at a time. I realize, of course, that my computer doesn't really do two things at once. It just switches its attention from one matter to the other so quickly that you don't notice the transition. I don't care; I'd settle for that.

But don't get the impression that computer envy is a one-way street. I can do a few things, almost without thinking about them, that baffle Obi-Wan entirely:

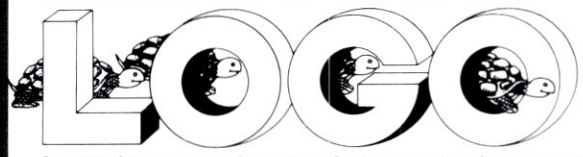
As someone who can barely walk and chew gum at the same time, I respect this ability to multiplex.

• **Language skills.** My computer can "speak" many languages, none of which, unfortunately, I spontaneously understand. Would it be too much to ask it to speak English—or French, Urdu, Swahili, or even all of the above? Why must I master a set of obscure, cryptic, primitive dialects—one for each program—to tell it what to do? Why does it persist in speaking unintelligibly to me? If you had a friend who used such phrases as *BDOS Error on A: R/O,* would you seek out his company often?

• **Error tolerance.** OK, so I learn my computer's language—you'd think it would be satisfied. Fat chance. I have to spell everything right, use words in the right order, get every punctuation mark in the right place. If I tried to enter CATALOG but typed CATALOD instead, you could figure out what I meant, right? So why can't a computer? Instead, it replies SYNTAX ERROR and makes me type it over. It's like being in third grade again, getting marked off for spelling and grammar. Why can't it do what I mean and not what I say?

• **Learning from experience.** I've learned a lot about my computer in the last year and a half, but why hasn't it learned anything about me? For example, CATALOG is only one method I use to list the files on a disk; others (depending on the operating system) include DIR, LS, and FILES. Occasionally I get confused and type the wrong one. Why hasn't my computer learned that they all mean the same thing? For that matter, why hasn't it learned anything about the economy or current events? How does it feel about the greenhouse effect or the nuclear freeze? Why hasn't it learned anything about personal computing from the countless articles,

LEARN TO SPEAK



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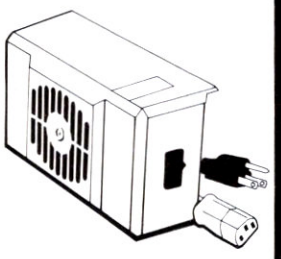

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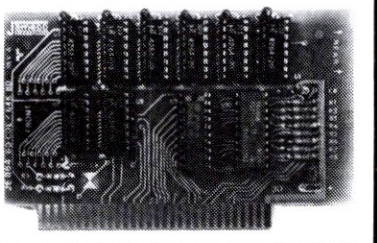

Now you can double the memory capacity and get an 80-column display format for your APPLE *IIe** computer at an affordable price. Just plug the JE864 card into your APPLE* and expand your display to 80 characters per line. Perfect for word processing. The JE864 also features 64K bytes of additional memory to allow programming not possible with standard APPLE *IIe** computers. Complete documentation included.

Board: High density board design squeezes 64K bytes of RAM onto a 2½" x 4½" board • Fully tested to assure proper operation.

Uses: Word processing – displays 1000 more characters per screen • Extra memory allows running of extremely large programs • Ultra High Resolution Graphics capability.

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CIRCLE 276 ON READER SERVICE CARD

reviews, and manuals I've written in the last year and a half?

What all this boils down to is that, although humans and computers both act intelligently, they are intelligent in different ways. For example, as Rising Star's Chris Rutkowski has pointed out, humans are good at recognizing patterns, such as a person's face or voice—such an ability to recognize is virtually impossible for existing computer technology.

Computers, however, are best at manipulating symbols, such as multiplying 2 to the millionth power or translating ASCII codes into characters.

In other words, the human mind is *associative;* computers, in contrast, are *algorithmic*. Until we become more alike, we will have trouble understanding each other. Since humans probably won't be able to become more algorithmic, we can only hope that we can make computers more associative. So the question becomes: *Are there algorithms for associative thought?* Artificial-intelligence researchers have been wrestling with exactly this issue for years. No one can predict the ultimate outcome of their labors, but a few fruits are already appearing, even on personal computers.

The Savvy language is extensible—a major advantage—but it's also wordy and cumbersome.

A good example is Savvy for the Apple II, developed by Excalibur Technologies of Albuquerque, New Mexico. Released late in 1982, Savvy is one of those combination products that's hard to describe precisely. It includes a Z80 coprocessor card, a pattern-recognition device, an operating system, an extensible programming language, a database manager, and an application network. Excalibur president Jim Dowe calls the whole package "artificial intuition."

Most relevant here is the pattern recognizer. To display a directory of files, you use the command LIST THE FOLDERS. If you mistype, entering LITS or some other word Savvy doesn't know, the pattern recognizer goes to work, comparing what you typed to what it knows. In a few seconds it concludes you meant LIST and displays your folder names. It will also remember LITS for future reference.

Suppose you type CATALOG. Since Savvy isn't familiar with this word and the pattern recognizer can't figure it out either, it asks you to try again. Now you type ASSOCIATE CATALOG WITH LIST. The Associate command tells Savvy to put a new word—CATALOG, meaning LIST—into its vocabulary. The next time you type CATALOG—or CATALOD, or even GOLATAC—Savvy will know what you mean.

Savvy's pattern recognizer and associative memory are the keys to giving it a human sort of intelligence. It will often do what you mean, not what you say. You can deliberately teach it your own language, and it will gradually learn your quirks and habits.

If Savvy hasn't really caught on among Apple users, some of the reasons are technical. For example, pattern recognition is sporadic and often slow. If you define a command called ALPHA, Savvy can recognize APHLA, but not APHA, ALPA, ALPHE, or ALFA. Even when it works it can take up to ten seconds.

Other reasons for Savvy's disappointing showing involve market positioning. Its makers seem unsure about whether Savvy is for programmers or users. If it's meant for programmers, the verdict is mixed. The Savvy language is extensible—a major advantage—but it's also wordy and cumbersome, and program-development tools are scarce.

If Savvy is meant for users, its success (like that of any operating system) is dependent on developing a broad base of application software. Savvy isn't easily compatible with other Apple software, though, and the application programs that come with it are uneven and inadequately tested. (In fact, Excalibur thinks of them as templates, to be modified by users to suit their own preferences.)

In the end, Savvy's fate may depend on whether Excalibur can get independent software vendors to climb on the Savvy bandwagon. So far, only a handful of accounting, farm, and business-management programs is available.

Whether Savvy succeeds or not, it represents a significant force in personal-computer technology. This product suggests what we can do to make computers more human. Other software developers, searching for a competitive edge, are bound to expand on Excalibur's advances and learn from its mistakes. "Artificial intuition" is a force that can't be ignored for long. ✚

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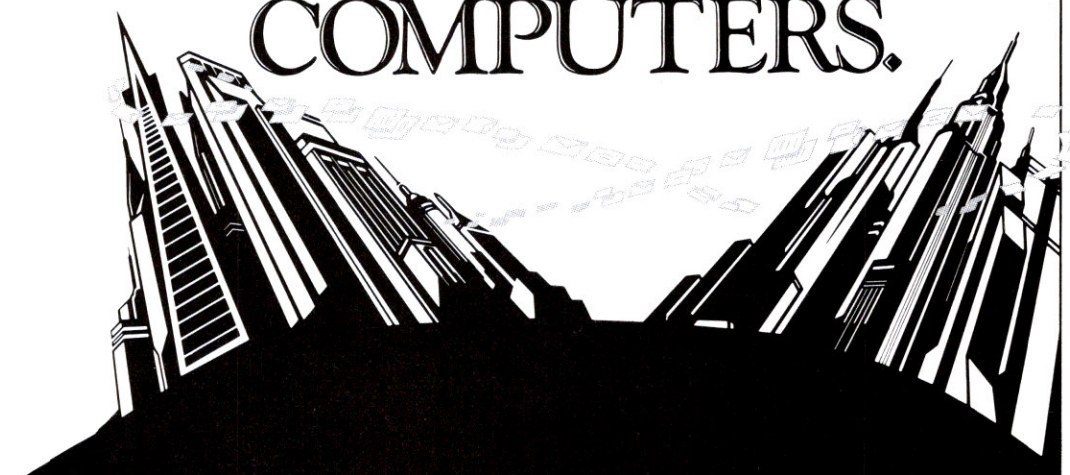

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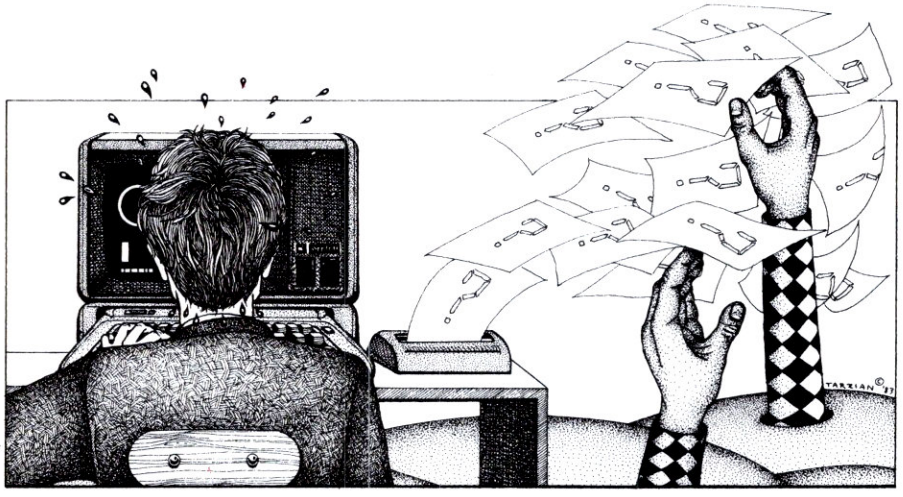
RESCUE SQUAD/BY LINDSAY McGRATH

What to do about balky printer interfaces, memory tests, system boots, and interrupt signals



Apple II Parallel-Printer Interface in Apple III

Q: I bought an Apple III to use as the business computer for my small interior-design firm and connected it to a printer using an Apple II parallel-printer interface. Overall, the system works well, but often the Apple III has trouble passing my commands to the printer. Any suggestions?

A: *Many users have found a slight timing problem when they use an Apple II parallel-printer interface in an Apple III. You can remedy this situation by replacing or modifying the interface. If you decide to replace the part, get a universal parallel interface that will work in both the Apple III mode and the Apple II Emulation mode. You can modify the original Apple II interface to work in your Apple III by adding an 0.001-microfarad capacitor between pins 4 and 7 of chip B2, a 74LS74. Talk to your dealer about making any hardware changes.*

Apple III Memory Test and ProFile

Q: I have an Apple III and recently bought a ProFile hard disk. The completed system meets my computing needs quite well, but it has a problem. Once I installed the ProFile, my computer's built-in memory test stopped working. What gives?

A: *The memory test, which begins at $F6E6, will perform poorly as long as the ProFile cable and interface card are connected to your Apple III. What you've probably noticed is that with everything connected, your computer completes the first pass and then starts beeping mysteriously. If you disconnect the ProFile cable but leave the interface card installed, the situation doesn't get much better. With the ProFile interface card only, the machine loops through the test, possibly delivering memory errors, and prints ROM ERROR under the display. The memory test should perform perfectly if you disconnect both the ProFile cable and the interface card. If it doesn't, visit your dealer.*

Every time I enable the interrupt, the program crashes.

Giving Pascal the Boot

Q: I learned to program in BASIC on an Apple II Plus chock full of cards—including a communications card in slot #3—and never had a problem booting up my system. Now that I'm learning Pascal, though, I find that the system won't boot up correctly unless slot #3 is empty. Why?

A: *With Pascal, slot #3 is reserved for an external terminal. When you boot the Pascal system with a card in slot #3, the system recognizes it, assumes there is an external terminal or an 80-column card, and tries to communicate with it instead of with the video and keyboard. To avoid this kind of confusion, keep slot #3 empty, unless you are using something other than Apple 40-column video, when booting your Pascal system. You can simply move the communications card to another open slot. Beware—you may have to reconfigure other software that uses the communications card.*

Apple II Interrupts

Q: I thought I was an "advanced" Apple II programmer, but this one has got me hanging by the thumbs. I am trying to get an assembly-language program that uses an interrupt signal generated by a peripheral card in my Apple to work. This interrupt signal is a clock I use for timing purposes in a simple little program. Every time I enable the interrupt, the program crashes. The interrupt service routine saves the A, X, and Y registers on the stack and restores them to their saved values when it is finished. The program logic looks fine, actually simple, but something is wrong with the way I use the interrupt. Can you help me?

A: *The Apple monitor program gets control of the computer each time it recognizes an interrupt signal. As soon as the monitor recognizes the interrupt, it saves register A in location $0045. The monitor then checks the interrupt condition and determines whether it is a "break" instruction or a true hardware interrupt. For a true hardware interrupt, the monitor passes control to the program whose starting address is stored in locations $03FE and $03FF. When your program gets control and saves the A, X, and Y registers, however, it is not saving the correct value for register A. Register A is changed by the monitor program itself before your program ever gets control. So instead of directly saving register A on the stack, you should first load register A from location $0045 and then save that value on the stack. This procedure should stop the system from crashing.* ✚

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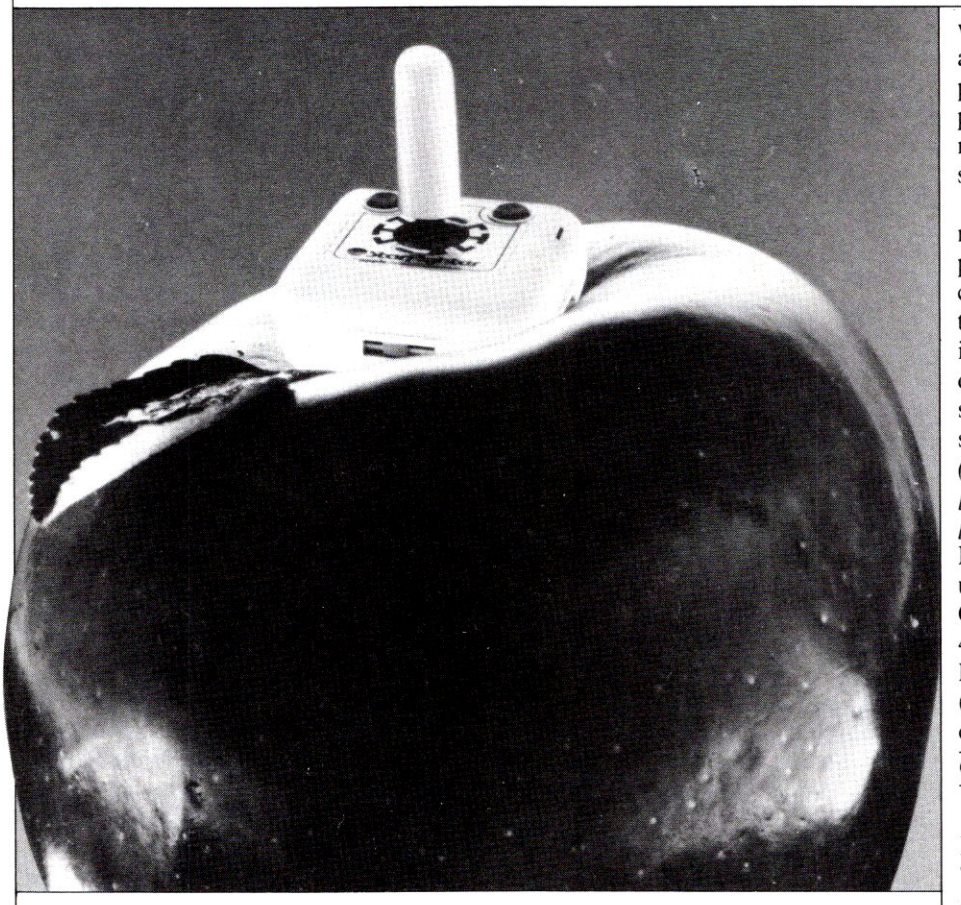

Suncom's Starfighter analog joystick controller

HARDWARE

Starfighter

The Starfighter from Suncom is an analog joystick controller for Apple computers. The new controller uses thick-film resistive printing and field-effect transistor technology, outmoding old potentiometer and mechanical linkage assemblies. Features include dual left/right hand firing buttons; laser-trimmed centering adjustments; high/low-throw sensitivity switch; short- or long-throw adjuster; and a comfortable, round-cornered shape. *(List Price: $49.95)*

Requires: Apple II, II Plus, or IIe ($5.95 adapter cable required for the II and II Plus)

Suncom
650 Anthony Trail, Suite E
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Microfazer

This product from Quadram Corporation serves as a buffer to take over printing tasks without tying up computer time. While Microfazer directs the printer, without using any of the computer's own memory, a personal-computer user can continue computing.

Microfazer, the first print buffer with half a megabyte of memory, turns a "dumb" printer into a "smart" printer with 8K to 512K RAM (depending on the addition of plug-in memory chips or a Microfazer expansion board).

The unit is enclosed in a durable metal case and comes equipped with a pause/copy feature allowing additional copies of the buffered information with the push of a button. The Microfazer is sized to stack with popular modems, disk drives, and other peripherals, and some models can plug in directly inside or at the back of the printer. *(List Price: Parallel-to-parallel model [including cable] $179 [8K], $199 [16K], $225 [32K], $299 [64K])*

Requires: any Apple computer configured with 25-pin parallel port

Quadram Corporation
4355 International Boulevard
Norcross, GA 30039
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or TWX 810-766-4915

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Rhino-Com Language Card

The Rhino-Com language card lets owners of Rhino's XR robot operate it directly with an extended version of Applesoft BASIC. The card, which goes into the Apple's slot 2, contains an RS-232C interface. In addition to running the XR robot, the card can operate any other peripherals that run with an RS-232C, such as a printer.

The card contains six commands that give the user control over most of the XR robot's functions. *(List Price: $300)*

The Microfazer print buffer by Quadram Corporation

Requires: Apple II Plus, IIe, or III with special connector
Rhino Robots, Inc.
P.O. Box 4010
Champaign, IL 61820
(217) 352-8485

CIRCLE 557 ON READER SERVICE CARD

The Rhino-Com language card with its 40-page manual and demonstration diskette

PICO-1

The PICO-1 is a low-cost, dot-matrix printer that works with low-cost home computers. An adapter and cable allow the printer, which runs at 80 characters per second, to be connected directly to Apple, Atari, TI-99/4A, and TRS-80 computers.

The PICO-1 comes in gray or beige. *(List Price: $330)*
Pueblo Instruments, Inc.
P.O. Box 3367
Pueblo, CO 81005
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VideoSlide35

The VideoSlide35, a computer-graphics camera system that enables personal-computer and graphics-workstation users to produce high-quality, color 35mm slides, is now available in a 24 kilohertz line-rate version for the Lisa.

The original VideoSlide35 is compatible with systems requiring between 15 and 19 kHz line rates, such as the Apple II.

Both versions of the VideoSlide35 allow users to obtain 35mm color slides, at a cost of less than 50¢ per slide, from images generated by their personal computers and color terminals. The unit weighs 31 pounds and measures 11 × 9 × 29 inches. *(List Price: $3049, for 24 kHz version; $2799, for 15-19 kHz version)*
Requires: Lisa or Apple II, II Plus, or IIe
LANG Systems
1010 O'Brien Drive
Menlo Park, CA 94025
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CIRCLE 559 ON READER SERVICE CARD

Free Programs

Apple Computer's retail dealers are giving their customers free copies of the Apple Logo Tool Kit and Sample Programs disks.

The Tool Kit disk provides product enhancements to Apple Logo. The Tool Kit programs allow Apple Logo users to save and print pictures on dot-matrix printers, use Step and Trace functions as program debugging tools, access and write machine-language programs, and create musical compositions using Apple Logo.

The Sample Programs disk contains

The VideoSlide35 computer-graphics camera system is now available for the Lisa.

30 programs written by Apple Logo users. The programs include examples of turtle graphics, language programs, games, and simulations. The Sample Programs disk also provides complete documentation of the new Apple Logo features offered on the Tool Kit disk.
Apple Computer
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The Model CR-1810 ComScriber I is a lightweight plotter that produces charts, graphs, and illustrations in several colors on standard paper or transparencies.

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You can control the plotter's movements through a 12-key keyboard. The plotter is 2.9 × 14.3 × 8.8 inches and

weighs 7¼ pounds. *(List Price: $695)*
Requires: Apple II, II Plus, or IIe
Comrex International, Inc.
3701 Skypark Drive
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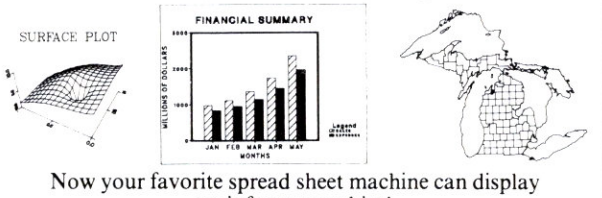

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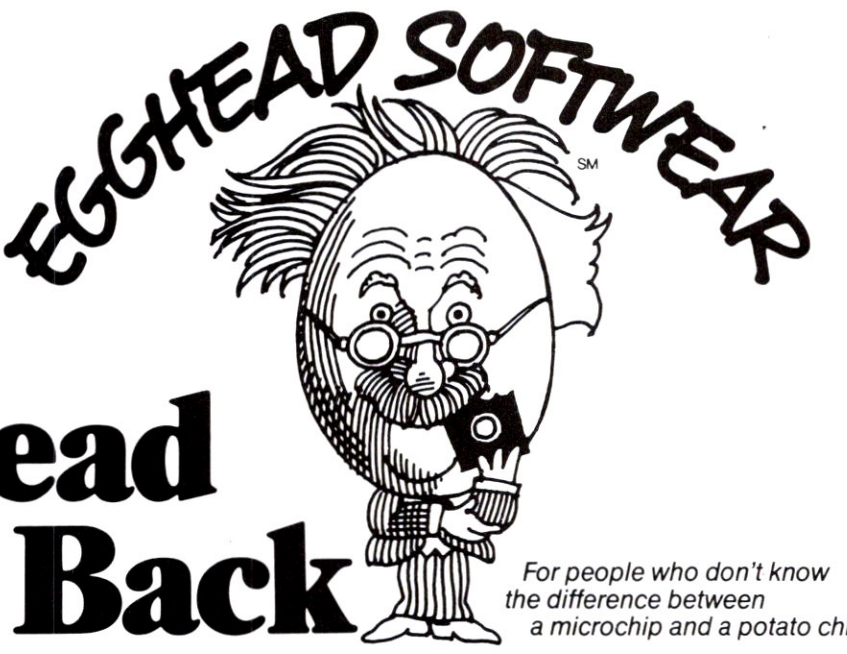

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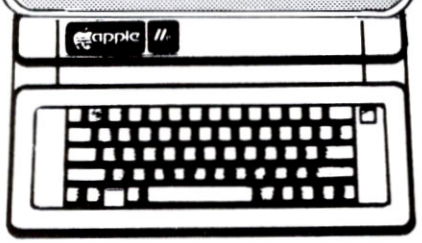

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the knowledge and quick reflexes of players of all ages. This version consists of about 900 multiple-choice questions in each of four categories: sports, trivia, history, and entertainment. It contains three levels of difficulty: novice, expert, and genius.

Graphics enhance the game. One or two people can play. In the two-player version, players race against each other, and the player with the quickest correct answer scores the points. *(Estimated Price: $40 for Oil Barons; $25 for Fax)*

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PRODUCT NEWS

new software products. They include Songwriter (for ages 4 through adult), which teaches you the fundamentals of music while you compose at the keyboard.

PictureWriter lets you create graphics and line drawings on the computer while learning the basics of computer programming (ages 4 through 12).

Phi Beta Filer is a home-list-management software program. It is the first in Scarborough's planned Home Free Series. MasterType offers a video-game approach to basic and advanced typing instruction. *(List Price: $39.95 for Songwriter, PictureWriter, and MasterType; $49.95 for Phi Beta Filer)*

Requires: Apple II, II Plus, IIe, or III

Scarborough Systems, Inc.
25 North Broadway
Tarrytown, NY 10591
(800) 882-8222

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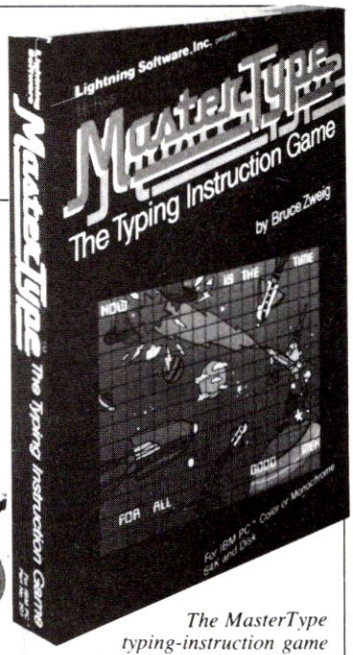
Songwriter teaches music fundamentals.

PictureWriter introduces children to computer graphics.



The MasterType typing-instruction game from Scarborough Systems.

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Requires: Apple II, II Plus, IIe, or III
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5–12 Wilde Avenue
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(215) 622-5716

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Requires: Apple II or IIe
Continental Software
11223 South Hindry Avenue
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Requires: Apple II, IIe, or II Plus; 16K RAM
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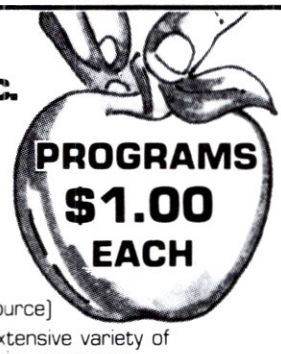

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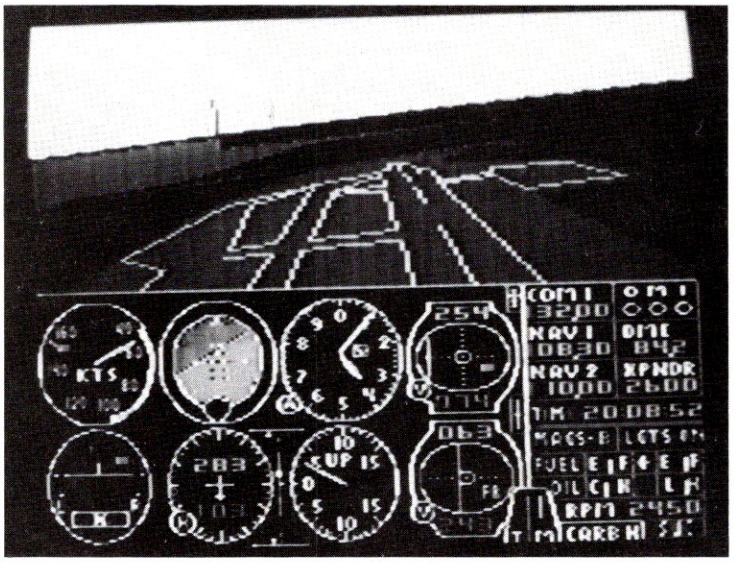

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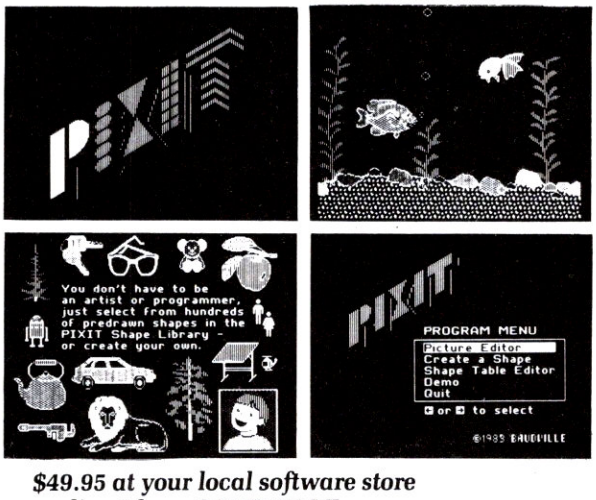

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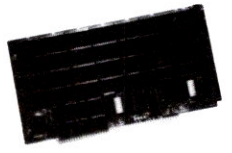

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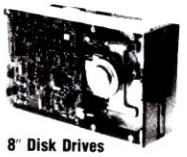

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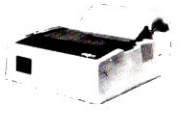

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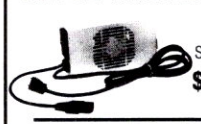

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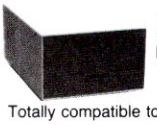

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Megahaus Corporation, publisher of the MegaWriter word-processing program, has developed a compatible spelling checker, called MegaSpell.

MegaSpell spots misspelled words in MegaWriter documents. It comes complete with a 40,000-word dictionary, and users can add 10,000 more words. It displays misspelled words in context and checks corrections against its dictionary. *(List Price: $59.95)*
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Strategic Games
Tigers in the Snow allows you to recreate the Battle of the Bulge and assume command of either the Allied or German forces. It is suitable for novice and intermediate-level game players and comes with a rule book, player-aid card, charts, and a map. *(List Price: $39.95)*
Requires: 64K; Apple II, II Plus, IIe, or III

Carrier Force is a simulation of four major flattop battles fought in the Pacific—the Battle of the Coral Sea, Midway, Eastern Solomons, and Santa Cruz. It comes with two maps and a rule book. *(List Price: $59.95)*
Requires: 48K; Apple II with Applesoft ROM, II Plus, IIe, or III

Battle for Normandy puts you on the northern coast of France for the D-Day invasion and the 24 days that followed. It comes with two player-aid cards with maps and a rule book. *(List Price: $39.95)*
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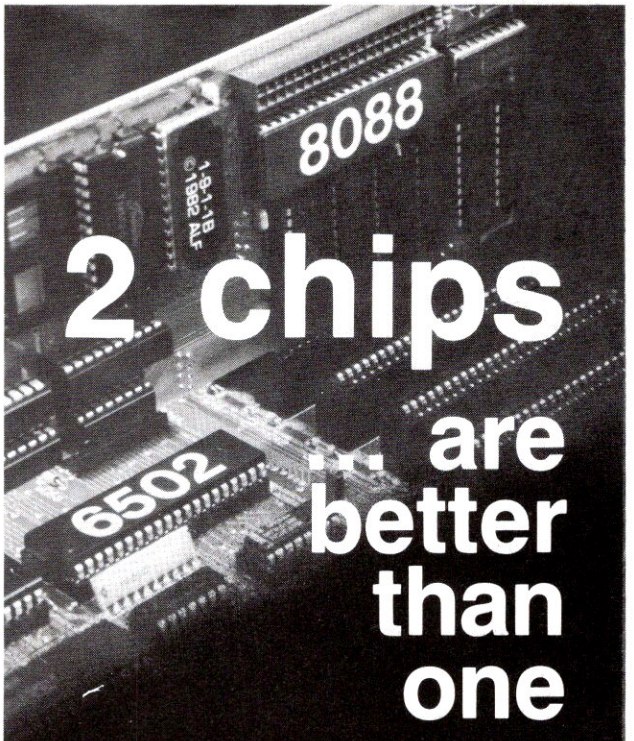

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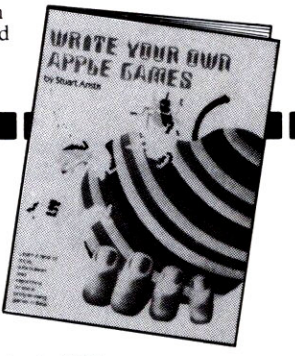

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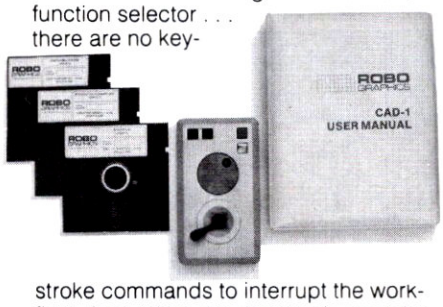

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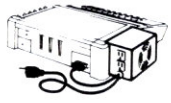

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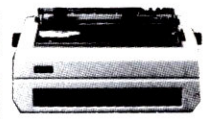

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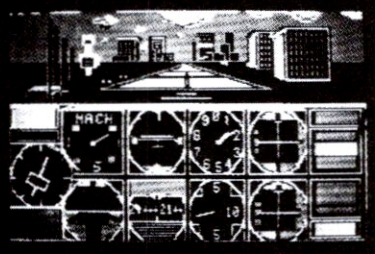

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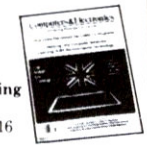

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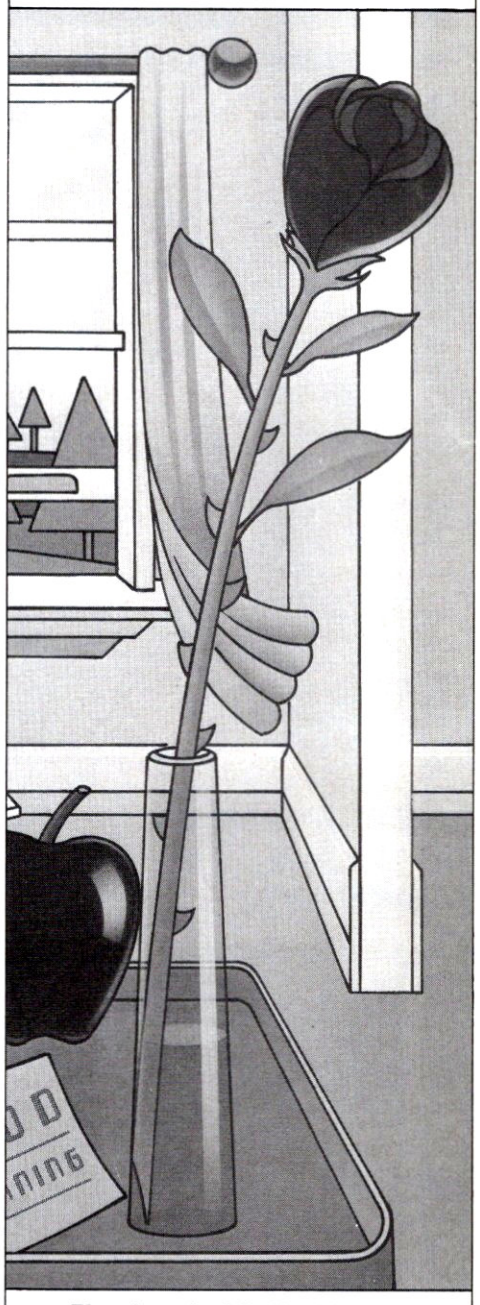

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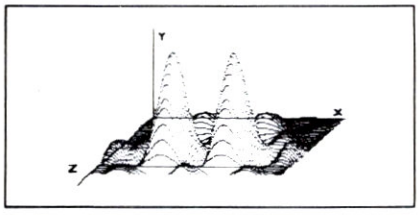

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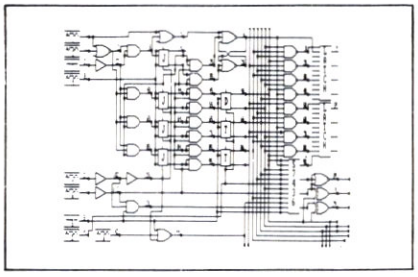
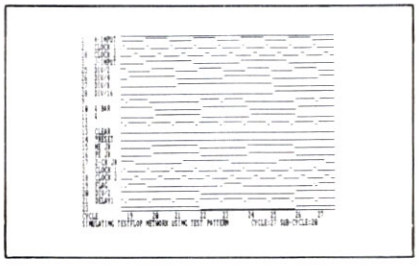


The system provides on-screen editors for NETWORKS/MACROS DATA CHANNELS, CLOCK WAVEFORMS and GATES. GATE attributes include DELAY, TRUTH TABLE, NAME and I/O clocking.



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
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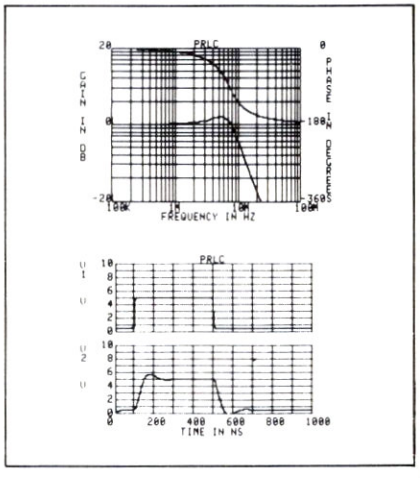

For APPLE II and IBM PC computers. A non-graphics version using an on-screen editor to enter networks and text printer plots to display simulation results is available for CP/M (2.2- 5 1/4" SSSD) systems. Requires 2 disk drives.

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.

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Apple III	C	I
Lisa	D	J
Other (specify)	E	K
None	F	L

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Other (specify)	E	K
None	F	L

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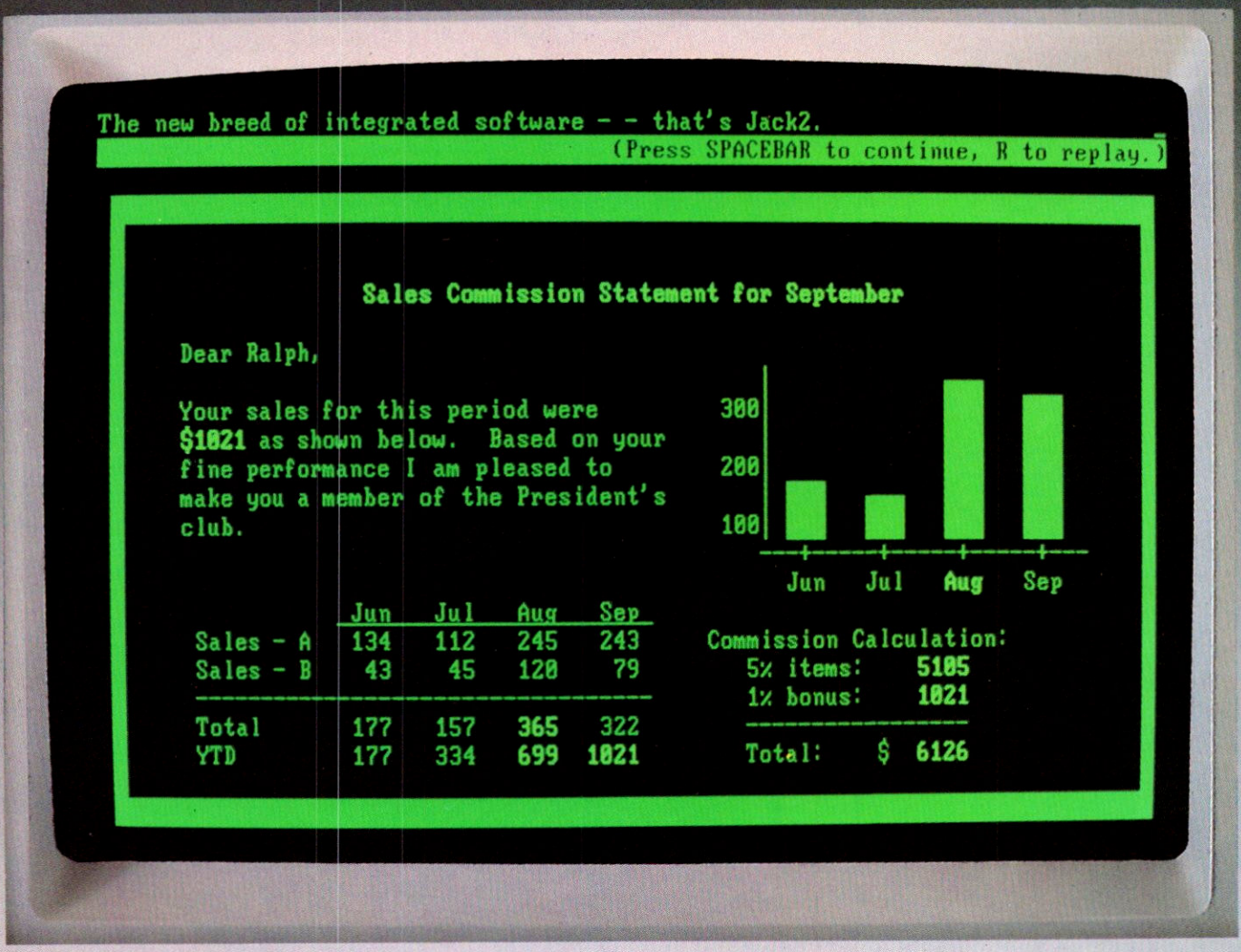

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