

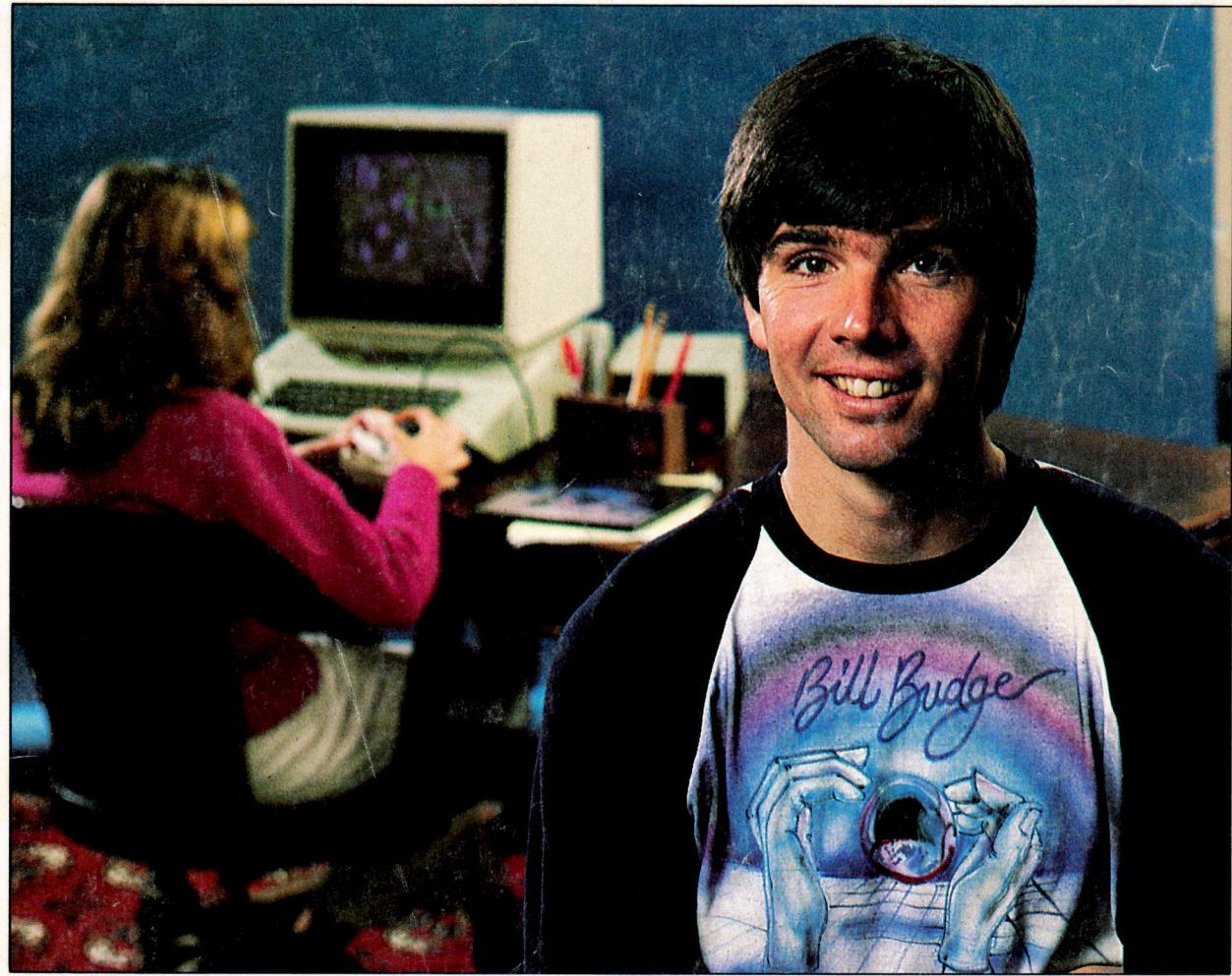
May 1984 USA \$2.95

in Cider®

Green's Apple* Magazine

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Bill Budge: Pinball's All-Time High Scorer



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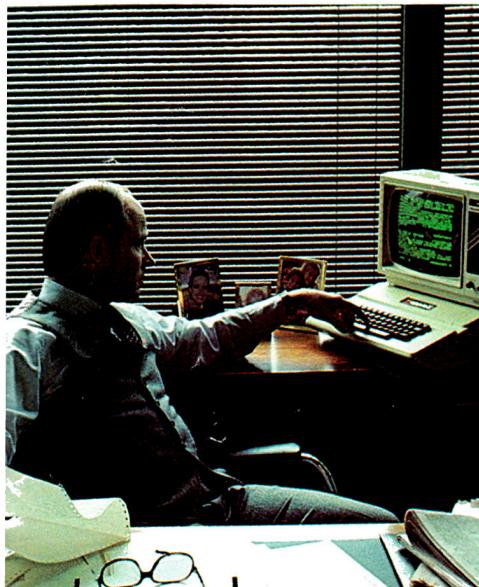
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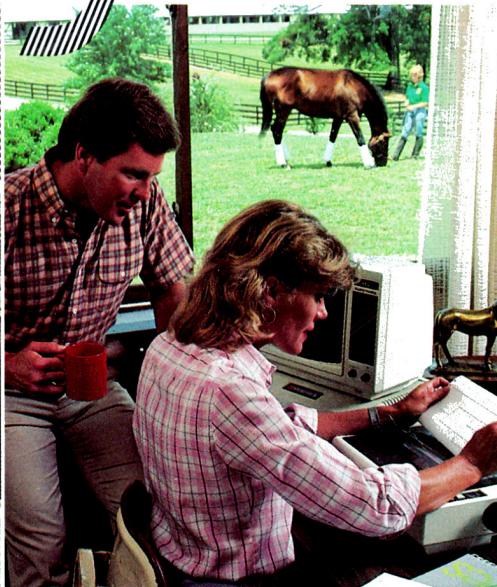


Hayes Your Apple's telephone.

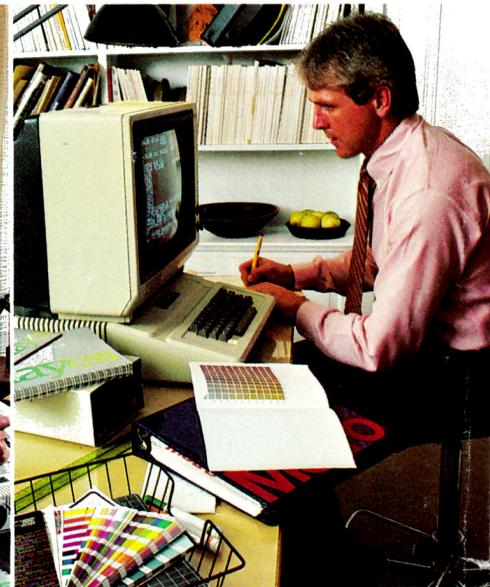
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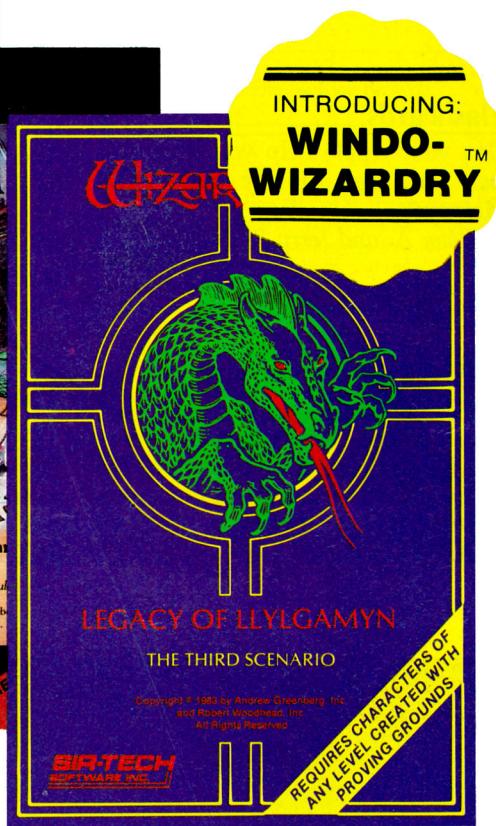
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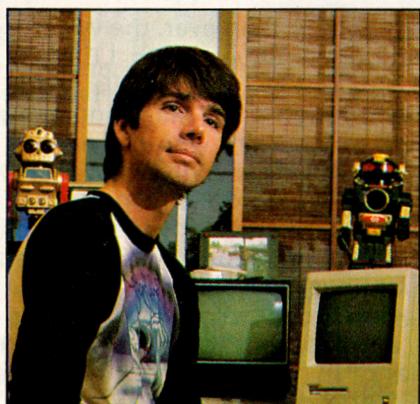
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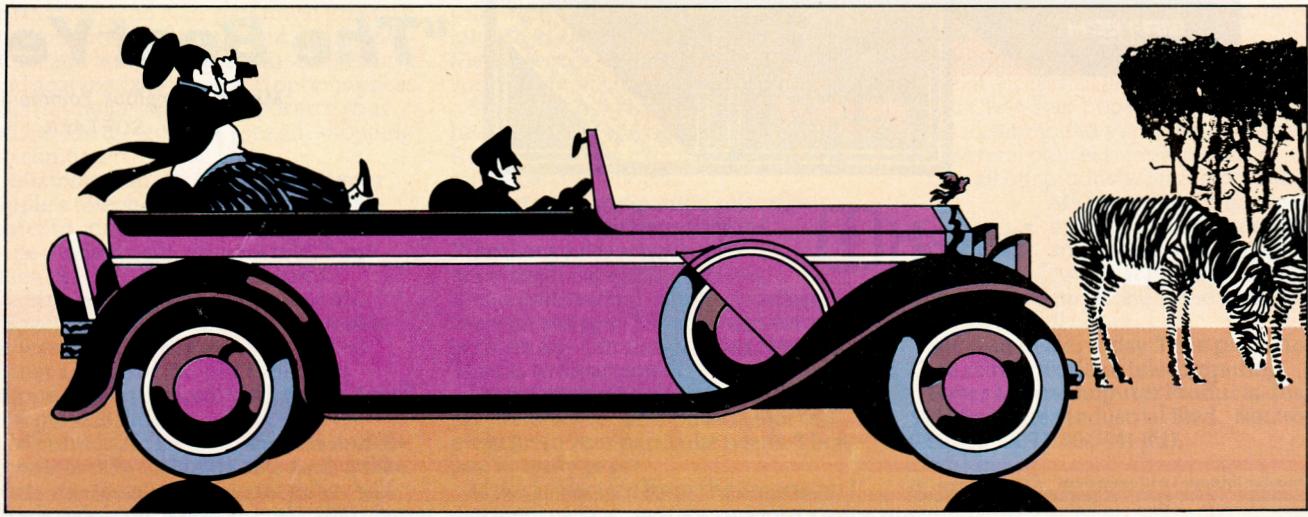


Flashcards, p. 38

Bill Budge: Pinball's All-Time High Scorer, p. 30



Hunting the Elusive ACSII, p. 42



ARTICLES

Bill Budge: Pinball's All-Time High Scorer 30

Our intrepid reporter tracks down Apple computing's matinee idol. Sorry, no autographed centerfold included.

by Sam Whitmore

Electronic Arts 35

Bill Budge is only part of this innovative company. We talk to the genius who organizes geniuses.

by Sam Whitmore

Flashcards 38

Can your Apple help you learn foreign languages quickly and easily? Mais oui!

by Peter A. and Jerry P. Lachenbruch

Hunting the Elusive ASCII 42

Forget about word processing—how does the computer keep track of all the letters and other individual characters you keep typing in?

by Arsen Darnay

Titles Slides Without Peer 50

You needn't worry about boring your guests with home slide shows if you include some pictures you took with your Apple.

by Dr. Kenneth A. Deitcher

Stack Attack 54

You've seen science fiction characters play three-dimensional chess on TV. Now you can play three-dimensional tick-tack-toe on your computer.

by Subu Magge

The World's Cheapest Word Processor 64

If you ever thought, "Hey, someone should invent a cheap Pascal word processor," well, someone just did! And it's yours, free.

by James R. Florini

inCider's inSidious inSolubles 82

The Savings Accrual

by Arthur H. Ude

The Compleat Text File Primer, Part 3 84

Our series continues with an examination of data's journey between the disk and the memory.

by Lee Swoboda

DEPARTMENTS

Hot Cider
by Wayne Green

Fermentations

Letters

III's Company

The New Apple III—
How Much of a Plus?

Fudge It!

Hundreds of Scenes Per Disk!

Interaction—A Child's World

Baby's First Computer Program

The Applesoft Adviser

The Sort Index

Bent on Business

Talking to Yourself

The Apple Clinic

Third-World Computing; Sticky Keys;
The Vacuum Secret

Hints 'n' Techniques

Out, Damned Cursor!; Paddle Reading

Calendar

Book Reviews

Write Your Own Apple Games; Pascal
Programs for Games and Graphics; The
Naked Computer

Hardware Reviews

AmDisk-I Micro-floppy Disk Drive;
KoalaPad; Inforunner Riteman Printer;
Apple Color Plotter

Software Reviews

Cut & Paste; I.Q. Baseball; Cubit;
OPVAL; Portfolio; Circascript

Cider Vinegar

New Publications

New Software

New Products

Fudge It!, p. 16

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116

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Remarks from the Publisher . . . Wayne Green

Chain selling—no, nothing to do with bondage or K-Mart. What I have in mind would take advantage of the main Apple strength—one which no other computer system has, but which has not been really developed by Apple. I'm thinking along the line of the chain letter.

When I was a youngster, some brilliant chap somewhere in the U.S. started chain letters. I watched with awe as my father and grandfather received hundreds of envelopes, each with a dollar bill in it. And please remember that a dollar bill in the early '30's would buy about what we get with a \$20 bill today.

What Apple has is a body of over one million Apple II/Ile owners who are not just the owners of a certain brand of computer—no, it's an emotional thing—in some ways more like a religion. This is why there are so many avid Apple user groups. This is one of the big reasons why Apple sales have done so well.

inCider was started just over a year ago and in that short period there are over a half million Apple owners reading it every month. Just think what could happen to Apple sales if every *inCider* reader decided to make it his or her responsibility to convince one more person to buy an Apple! That could increase Apple ownership by about 50 percent in short order.

Accepting that perhaps only a third of the *inCider* readers will see this editorial, we still have a powerful group for chaining. If every Apple owner reading this were to make a goal, every two months, of convincing one friend or a business to buy one Apple computer, that alone would sell about 1.2 million Apples in the next year.

If each of these new owners were to be infused also with the Apple spirit and set about doing the same,

in one year we would have 13 million more Apples out there, a lot of frazzled Apple executives trying to keep up with the orders and thousands of blissful stockholders... for that would run to about two billion in sales just for Apple IIs.

Now how difficult would it be for you to round up a new customer for an Apple every couple of months? Our research shows that 85 percent of you have substantial influence with your business on computer purchases. Well, use your influence! Further, the research is quite clear that virtually no one buys a computer today without asking friends who already have them for advice on their choice. Yep, you have a lot of friends and business compatriots who are right now trying to decide between Apple and IBM. If you keep quiet both of us will lose, so keep asking around and get to these people before they invest a lot of time and money in something else. Point out how great your system is—all the things you are doing with it and how you'll be able to help them get started.

Later you can encourage your friends to, in turn, get their friends to go the Apple II route. If each of the six people you sell on Apple does the same every two months, you'll have a chain resulting in 63 new Apples being sold.

Of course, I am basing the whole idea on your being enthused, but not terribly energetic. If you could get that into a one-month ramp instead of two, we'd end up with 4,095 more Apple II owners in one year. So, if only one third of the Apple II users joined the chain, we would see some two billion Apple IIs sold in the next year—bringing the sales for Apple to about \$3 trillion. Hey, maybe I'd better buy a few more shares of Apple stock, eh? ■

PRO-MODEM 1200



M. Hett Circle 268 on Reader Service card.

It's about time.

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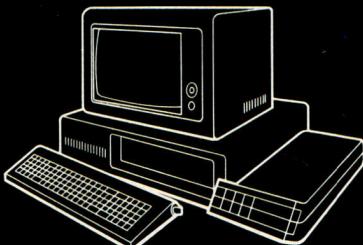
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PROMETHEUS

Fermentations

by Swain Pratt

Your Child and Your Apple— Think Again!

To judge by countless media reports, the microcomputer is fast becoming the latest educational bandwagon. Many teachers and parents are eagerly jumping aboard (to the joy of industry marketing people), and where they jump, children must perforce follow.

This was, perhaps, inevitable. Concerned and responsible educators naturally must consider seriously a new machine with such apparent potential as an educational tool. Many parents, anxiously concerned about their offspring's future, fall in line. After all, the arguments are persuasive.

The computer will help children learn facts (and won't discourage by criticism); it will help them think logically (adventure games?); it will give them confidence (success *will* come as they learn which keys to press); it will give them—the bottom line—the knowledge and skills to compete in tomorrow's computer-oriented business world.

Proponents proclaim that elementary schools—as well as high schools—should have computer programs for all. It's never too late to start, is it? And, so saying, why not for preschoolers? And even for babies? Early familiarity is bound to make children computer-friendly. So, ever-increasing in strength flows a flood of feeling that the computer is a wonderful tool to help kids learn while having fun, and the sooner the better.

I beg to differ, like the little boy in the fairy tale who cried, "But he hasn't anything on!" when the naked emperor paraded by in his fine, but imaginary, new clothes.

I don't at all question the sincerity of *most* of those who are convinced that computers are good for children.

I am just as strongly convinced, however, that computer use in any significant and continuing degree tends to be damaging to young children. By young I mean up at least until puberty, and I think the harm done is probably in inverse proportion to age.

I fully realize I'm uttering what amounts to heresy in a computer magazine, so I must have reasons. I do. I feel strongly that our technological environment and the kind of thinking that has created it are robbing our children of their childhood. Everything encourages them to grow up too fast, their education, for example, forcing them prematurely into an exercise of logical thought that may develop a sort of precocious cleverness, but ultimately results, I'm convinced, in modes of thought that are narrow, sterile, inflexible—the quality of thinking that is guiding world events today. (Are you impressed with the results?)

A child, like a new plant shoot, is a tender and sensitive being, open and vulnerable to the influences of everything in his environment. The preschool child is especially so. The impressions of the world he experiences work deeply into him, affecting his behavior and even his organic development.

Along with everything else, machines make their impressions, imprint their natures into the child in a very subtle way, and the computer is one of the machines I would most prefer that my child experience as little as possible. It is a fine tool for adults to use for many appropriate purposes (and certainly high school students should have computer courses), but in its very nature the computer embodies the principle of the conditioned response.

Here we have to be extremely

wary. Much in the world today, some of it even consciously directed, works to condition a human being to behave automatically in response to certain stimuli. These forces work to rob him of his independence, his power of individual judgment, eventually of his freedom.

The computer is one more machine that, unless it's used with consciousness and care, contributes further to a kind of automatic, programmed thinking. An adult at least has a conscious ego that, aware, can resist this influence, but the young child has no such defense.

You may not buy my argument at all, but suppose I'm right? TV was once the wonder machine. It was going to revolutionize education, some said, and it certainly became the nation's baby-sitter. Years of experience have now revealed the harm it does to children. We don't as yet have years of experience with the computer, but suppose it is equally, or perhaps more, inimical to the child's healthy development?

Isn't it at least your responsibility not to blindly welcome this machine into your child's life, but to give the matter some very careful thought? Even if the bandwagon is great fun, should you be on it? You can always step off, and if most people think you're crazy, well, that isn't the end of the world. ■

Our good friend and colleague on Run magazine, Swain Pratt, penned this guest editorial. An educator for nearly three decades, Swain is an expert on child development. He is the first to acknowledge that his strong views on computers and kids are not universally embraced. In fact, for a cogent counterpoint to Swain's opinion, turn to page 28 and "Baby's First Computer Program," by Brian Murphy. Let us know how you stand on this volatile topic.

—eds.

System Saver® didn't become the Apple's number one selling* peripheral by being just a fan.

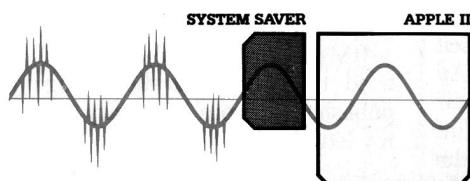
What made over 100,000 Apple® owners fall in love with System Saver? The answer is simple. It's the most versatile, most convenient, most useful peripheral ever made for the Apple.

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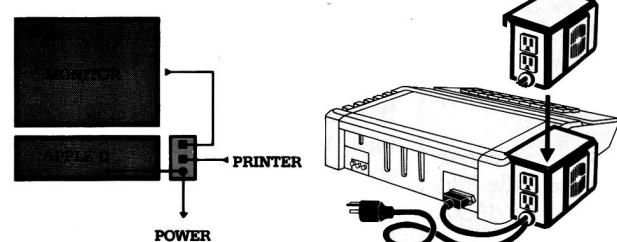
Power line noise can often be interpreted as data. This confuses your computer and produces system errors. Power surges and spikes can cause severe damage to your Apple's delicate circuitry and lead to costly servicing.

System Saver clips surges and spikes at a 130 Volts RMS/175 Volts dc level. A PI type filter attenuates common and transverse mode noise by a minimum of 30 dB from 600 kHz to 20 mHz with a maximum attenuation of 50 dB. You end up with an Apple that's more accurate, more efficient and more reliable.



System Saver makes your Apple more convenient to use.

No more reaching around to the back of your Apple to turn it on. No more fumbling for outlets and cords to plug in your monitor and printer. System Saver organizes all your power needs.

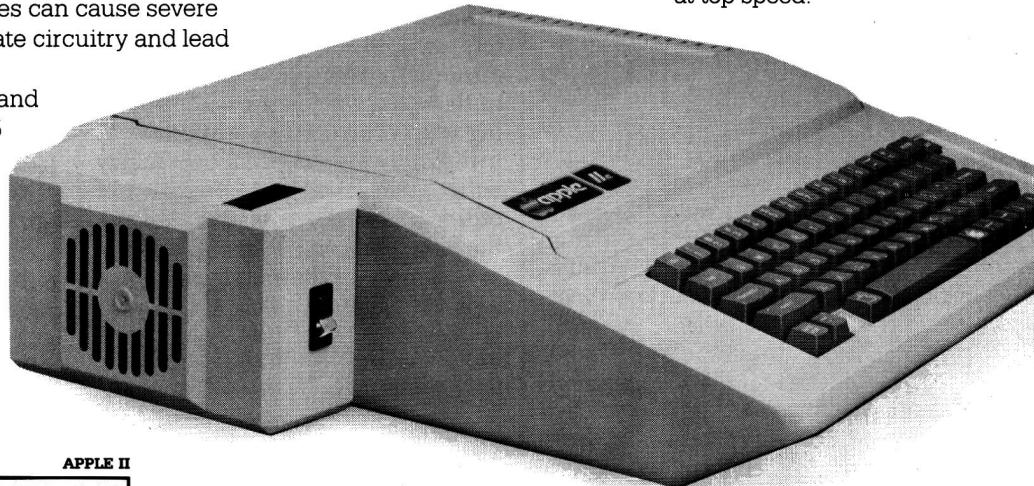
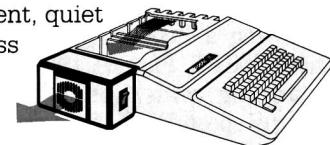


It functions as a multi-outlet power strip with two switched outlets. Plus System Saver offers the ultimate convenience; a front mounted power switch for fingertip control of your entire system.

System Saver lets your Apple keep its cool.

Today's advanced peripheral cards generate heat. In addition, the cards block any natural air flow through the Apple IIe creating high temperature conditions that shorten the life of the Apple and peripheral cards.

System Saver's efficient, quiet fan draws fresh air across the mother board, over the power supply and out the side ventilation slots. It leaves your Apple cool, calm and running at top speed.



So if you want to keep damaging heat, line noise and power surges out of your system for good, pick up the only peripheral that's in use every second your computer is in use. The System Saver. You'll soon come to think of it as the piece Apple forgot.

Compatible with Apple stand



\$89.95 at Apple dealers everywhere.

 **KENSINGTON
MICROWARE**

251 Park Avenue South, New York, NY 10010
(212) 475-5200 Telex: 467383 KML NY

Circle 86 on Reader Service card.

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

System Saver is UL Listed. System Saver's surge suppression circuitry conforms to IEEE specification 507 1980, Category A. Available in 220/240 Volts, 50/60 Hz.

System Saver is a registered trademark of Kensington Microware Ltd. © 1983 Kensington Microware Ltd. System Saver is patent pending.

Letters

Blame the FAA

I was shocked to read your editorial in the January *inCider*. As I read it, I began to get angry at the injustice you were doing to Eastern Airlines. Getting mad at an airline for obeying a Federal Aviation regulation (HCFR Part 91.19) is much like arguing with a state trooper about the speed limit. Paragraph 65 of 91.19 does indeed put the burden of proof on the individual airline. If the FAA has, in fact, run careful tests and determined that no problem exists, why haven't they modified or deleted 91.19? It's a little ridiculous to expect every airline, from United to the smallest commuter, to purchase and test the ever-increasing electronic equipment available to the public.

Virtually no changes to the regulations can be done without coordinating with the Carriers' Principal Maintenance Inspector in Miami. He, in turn, would contact his superiors in Washington to see if tests had been certified. Then he would work with Eastern's engineering department to plan a schedule. Members of this department would then have to fly numerous trips with this equipment on each type of aircraft Eastern flies and submit test results which would be approved. After that, the FAA would have to approve the wording change to the Carriers' Operating Specifications and the crews would be notified. If you've had any dealings with the government, you must realize these tests have been going on since the first time a flight attendant asked someone to turn a computer off—probably over a year.

Your real foe never was Eastern Airlines. Only the FAA has been holding all of us back. I've worked as an FAA inspector and as an airline pilot; I know of few times when the airline could afford to be as slow and as cumbersome as the federal rule-making process.

In any case, Eastern has done its homework. We have always been a business airline. Our Executive Trav-

eler and Frequent Flyer programs cater to people like you and we wish to continue to do everything in our power to make Eastern a successful enterprise.

Jim Furlong
765 Wickerberry Knoll
Roswell, GA 30075

Sexy Controversy

In the March 1984 issue, John R. Pleacher took umbrage at an advertisement in the December 1983 issue for alleged sexual implications. Please note that many of us manage to thoroughly enjoy sex and computing without guilt. The advertisement in question contained absolutely nothing offensive. These managers of others' morals should have their own floppies examined.

James Haskin
4812 Rosewood Ave.
Los Angeles, CA 90004

I agree with John R. Pleacher's letter (March 1984) expressing feelings against ads with sexual connotations. Using women as sex objects to sell merchandise has no justification. Ad writers for magazines can sell their products in ways other than that shown on page 19, March 1984—the very issue in which Pleacher's protest appeared. Wayne, start listening!

John Giese
808 E. Huron
Milford, MI 48042

I agree with Mr. Pleacher's desire that computing magazines be free of ads involving the erotic. If the ads were in bar code, no one would have to look at their contents unless they wanted to.

Raymond J. Schuerger
Box 460D Steubenville Pike
Pittsburgh, PA 15205

Earle in Africa

Thank you for "The Apple Clinic." It is excellent. Now the first thing I turn to when I receive *inCider* is

"The Apple Clinic" (and not because Lexington is my home town).

P. R. Christensen
Kenya Institute of Education
Nairobi, Kenya

Mail Order Complaints

inCider has received numerous letters regarding Starfire Games, a division of Omni Soft Corp., 9960 Owens Mouth Ave., Suite 32, Chatsworth, CA 91311. These complaints center on Omni Soft's apparent disinclination to ship ordered products or refund checks. We have attempted to contact Omni Soft on behalf of our readers, but to date our efforts have been unsuccessful. We're still trying.

If you're having problems with one of *inCider's* advertisers, by all means, write to us right away. Address your complaint to Rita Rivard, *inCider*, Route 101 and Elm St., Peterborough, NH 03458. We'll do our level best to straighten the matter out.

—the editors

Wiz Fix

It's probably my fault, but I noticed two errors in the listing you published in your February issue in my letter about Wizfix.

Line 571—[missing after PEEK in the first line

Line 589—[missing after PEEK
Sorry!

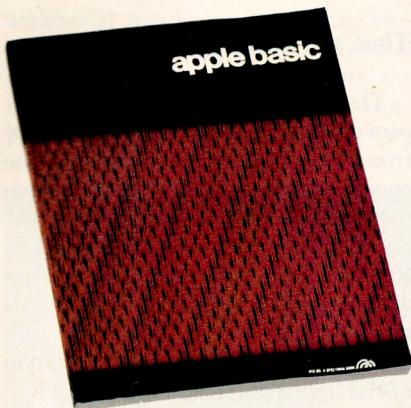
Alan Popow
#1107-9810-105 St.
Edmonton, Alberta T5K 1A6

inSpirations

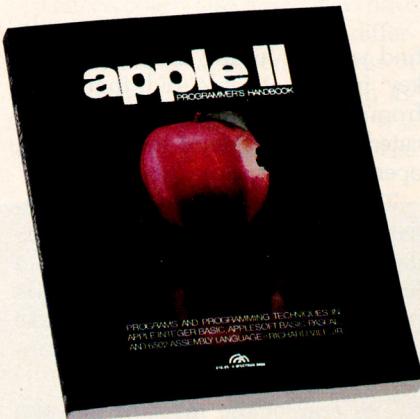
I'd like to cast my vote for getting software through your magazine. Bar code readers are an intriguing idea. What if *inCider* starts a dial-up computer and allows current programs to be down-loaded? I would be willing to pay for this, or you could make it available to your subscribers.

Robert T. Russell
69 Dogwood Cres.
Scarborough, Ontario M1P 3N5

Prentice-Hall speaks a language other publishers have forgotten. English.



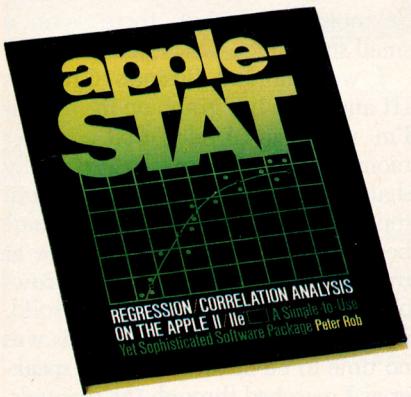
APPLE BASIC by Richard Haskell. A step-by-step, illustrated intro that shows how to write programs for financial management, graphics, games, math problems, and more. \$12.95



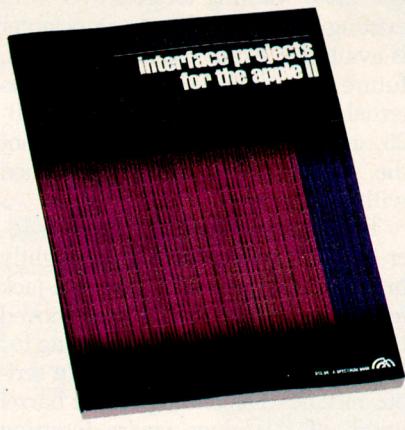
APPLE II PROGRAMMER'S HANDBOOK by Richard Vile, Jr. Teaches four most common Apple programming languages: Integer BASIC, Applesoft BASIC, Apple (UCSD), Pascal, and 6502 Assembly Language. Plenty of applications. For intermediate programmers. \$16.95



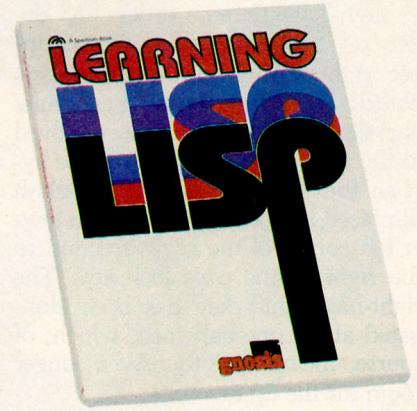
APPLE II-6502 ASSEMBLY LANGUAGE TUTOR by Richard Haskell. A specially designed book/disk tutorial that makes it easy to learn assembly language programming and interfacing techniques. \$34.95



APPLESTAT: Regression/Correlation Programs for the Apple II/IIe by Peter Rob. Easy-to-use, yet sophisticated statistical management system in book/disk package. Includes convenient HELP feature. \$49.95



INTERFACE PROJECTS FOR THE APPLE II by Richard C. Hallgren. Hardware-oriented projects that are easy to build, and enable users to discover Apple II's vast capabilities. \$12.95



LEARNING LISP by Gnosis. An intro to the much talked-about language of artificial intelligence. Packed with examples and exercises. Disk available. \$14.95

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Prentice-Hall, General Publishing Division, Englewood Cliffs, N.J. 07632

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by Bill O'Brien

The New Apple III— How Much of a Plus?

Believe it or not, something new besides the Macintosh and the Lisa 2 walked out of Apple recently. It was the relatively unheralded Apple III Plus. The differences between it and the original Apple III are not enough to make you go out and make a trade, but for anyone who hasn't yet bought a III and is considering it, a discussion of the differences should be worthwhile.

Facelift

The first hint that the Plus is different is the keyboard, a lighter grey than the original. And the keyboard is not only painted differently—the keys have also been arranged in a slightly different order. A delete key has been added to the upper right corner of the main keyboard, replacing the vertical rule/backslash key, which has been moved to the next row. The tilde/reverse hyphen that the vertical rule/backslash displaced has been moved to the lower left corner of the keyboard, just to the right of the caps lock key. The right-hand shift key has been elongated about one-half inch, which, of course, means that there's no longer room for the up arrow.

The up-arrow has been reassigned as the bottom-most key on the right side of the keyboard, aligning all of the arrow keys in one row. This puts an extra key in that row with no room to accommodate it. So the space bar has been shortened. Not by much, but if you usually depress the bar with your right thumb, you might

find yourself hitting the closed apple key instead. Where did that come from? The apple keys have been relocated to either side of the space bar, open to the left, closed to the right.

The numeric keypad, unfortunately, remains unchanged. The addition of +, -, *, and / keys would have made it a real calculator style pad. What they have done is make the Apple III keyboard more compatible with the Apple IIe.

The rear of the machine has also undergone some renovation. Gone is the familiar blue connector for the external disk drives. In its place is a full-fledged RS-232-type connector. For those wanting to cross over with existing Apple III drives, an adapter is available. Future drives will be coming with external RS-232 (or more properly, DB-25, since it's the physical type and not the signal levels we're concerned with) connectors.

To accommodate the slightly wider RS-232 connector and a slightly broader power switch, the mini-jack for the audio output has been moved to just above the RCA female plug for black and white video. This is a serious mistake. Depending on the barrel width of the plugs you're inserting there, they can now interfere with each other—bend against each other, in fact. Under the circumstances, I would give them a six-month life span of plugging and unplugging. To extend their life, you might want to leave them alone once they're plugged in.

Time and Tithe

There are no obvious internal improvements in the III Plus apparent from the outside, but removing the cover reveals an unmistakable battery holder. It accommodates the back-up batteries for the clock. Yes, this reincarnation of the Apple III has a functional real-time clock. Although I haven't delved deeply into the matter, the type and positioning of the holder indicate that it could also be available as a kit.

On the right side of the machine, just below the metal casting, is an on/off switch. At first I thought it might be a toggle for the speaker. I made sure it was on, because I love that little noisemaker—but there was a small surprise.

I was running Business Graphics III and put a bar graph on the screen. I'm using an Amdek 300A amber monitor and the images are really sharp, though a little compact from top to bottom. When the bar chart began to fill, I had to look twice at the screen. There were no little rows of space in the fill area. It was solid, and so were the characters. This was no time to be disturbed by the speaker as I searched through the manuals, so I toggled the switch off. There were the rows of blank space! I was definitely onto something, and the

Address your correspondence to Bill O'Brien at his new address, PO Box 1010A, Fort Lee, NJ 07024.

manual confirmed it.

To wit, the side switch on the Apple III Plus is a video control. Normally the matrix that contains the screen image is 560-by-192. There is another image of the screen in computer memory, displaced by one-half line. With the switch on, both images are displayed by a technique known as interlacing. Together they fill the normal 5-by-8 character making it 5-by-16.

This apparently works in black and white graphics mode also, but the manual includes a warning that under some graphics conditions the additional memory used by the secondary screen image may be needed to generate the graphics. Using the interlace switch at those times may produce garbled screens. Also, keep

in mind that the interlace feature works best on monitors that have some screen persistence. This is not true of most black and white monitors.

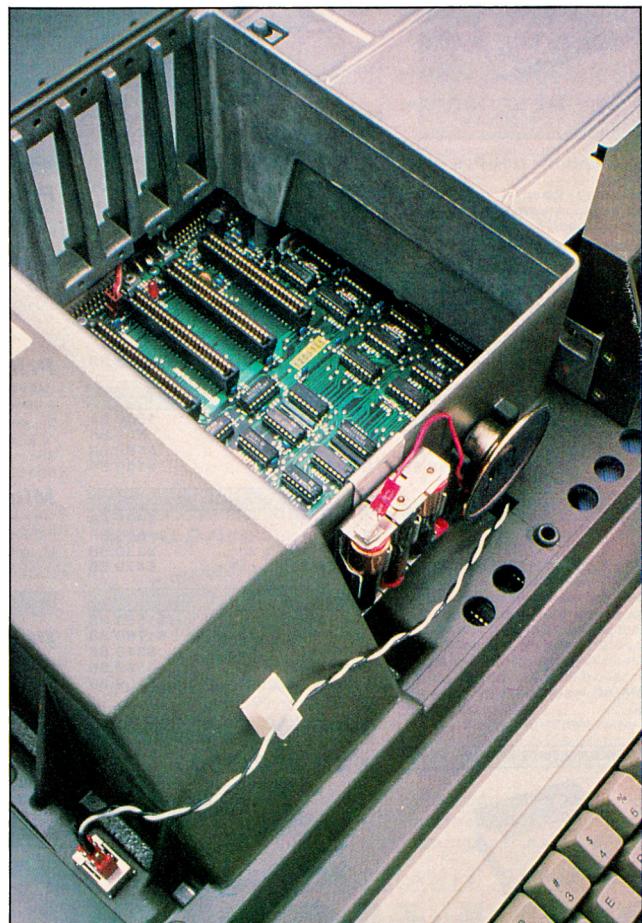
Little Things

On my original Apple III, there was some sensitivity to weight placed over the internal disk drive. If the 300A monitor sat squarely in the middle of the machine, the drive wouldn't boot. Apparently, mine wasn't an isolated case. With the Apple III Plus, this little inconvenience seems to have been removed.

The keyboard also appears to have a bit more tension to it. This difference may not be apparent to those of you with later Apple IIIIs, for an interim machine I once tried also was better than my original III (serial

number in the low 20000s).

Your oft-used friend, SOS utilities, has been changed a little, too—in particular, the SCP. Now when you modify a driver file, you cannot change the device type and device subtype fields. That may not seem disastrous—after all, how many times have you changed the device type? That, of course, would depend on how many programs you've used that automatically check the device type to determine which drivers you have on line are controlling printers. Any such program, like III Easy Pieces, would recognize Apple's UPIC driver but not Interactive Structures' PKASO driver, because their device types are different. My suggestion would be to get an Apple III copy of SOS Utilities, just in case.



Photos courtesy of Apple Computer Inc.

Clockwise from upper left: the Apple III Plus with ProFile hard disk drive; inside the III Plus—note the batteries for the real-time clock; the keyboard upgraded for compatibility with the IIe.

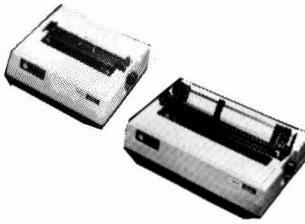
Microline Family

The Okidata **Microline** family offers Apple II users a wide range of features for almost any application. All **Microline** printers are made with the same rugged materials and care. No matter which printer you select, you've chosen one of the best printers made.

The **Microline 92** (160 cps) is ideal for word processing. It features 10, 12 & 17 cpi, a correspondence font, double-width, emphasis/boldface, sub/super scripts, underlining, pin-friction feed (tractor is optional on the **92**) & dot-addressable graphics (120 x 144 dpi). The **93** is the 136 column version. Parallel interfaces are standard; the RS-232C interface is optional.

The **Microline 84** (132 col) is the Step 2 version, featuring 200 cps at 10, 12, & 17 cpi (w/ double-width), all w/ a correspondence mode & dot addressable graphics. Parallel or RS-232C interfaces available.

The **Microline 82A** (120 cps) is a data cruncher. Features 10 & 16 cpi (5/8 double-width). Dot-addressable graphics are optional. The **83A** is the 136 column version. **Microline Series** **SCALL**

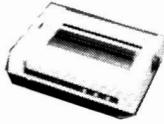


Dot Matrix

ANADEX	
9500B	\$1119.88
9501B	\$1119.88
9620B	\$1209.88
9625B	\$1309.88
WP-6000	\$2359.88
WP-6000 Tractor	\$139.88

C. ITOH

Prowriter 1 & 2 Prowriter SP



C. Itoh's **Prowriter** (120 cps) features 10, 12, & 16 cpi proportional/ correspondence quality font, double strike, double-width, sub/super scripts, dot graphics (160 x 144 dpi) & friction/ tractor feed.

The **Prowriter SP** (HotDot) has faster print speed (180 cps), true sub/superscripts and italics. A new printer with nice features.

Prowriter	\$379.88
Prowriter 2	\$609.88
Prowriter SP	\$519.88
w/RS-232C	\$539.88

EPSON	
RX/FX Series SCALL

DS/DATAPRODUCTS	
P-480	\$439.88
Prism 132	\$1489.88
w/4-color	\$1699.88

INFORUNNER	
Riteman	\$339.88

MEMOTECH	
The DMX-80 (80 cps) features 10, 12 & 16 cpi, italics, double-width, half-width, enhanced/bold print, dot graphics (120 x 144 dpi), friction/ tractor feed. Quiet printing & a sharp design make it ideal for home or office. The DMX-80 is serviced by Panasonic. DMX-80 \$339.88	

MANNESMANN TALLY	
MT-160 L	\$629.88

MT-160 L	\$629.88
MT-180 L	\$879.88
MT-Spirit	\$329.88

QUADRAM	
QuadJet SCALL

STAR MICRONICS

Gemini 10X	\$299.88
Gemini 15X	\$429.88
Delta 10	\$499.88
Delta 15	\$589.88
Radix 10	\$629.88
Radix 15	\$739.88

Letter Quality

C. ITOH

A10 Starwriter F10 Starwriter F10 Printmaster



The **F10 Starwriter** (40 cps) features 10 & 12 cpi, sub/super scripts, underlining, 6 & 8 lpi, Qume code & Diablo supplies. The **Printmaster** has the same specs, but it prints faster (55 cps). The **A10 Starwriter** has the same specs, but at 20 cps. Both the **Tractor Feed & the Sheet Feeder** fit all three models.

A-10 Starwriter \$599.88

F-10 Starwriter \$1119.88

F-10 Printmaster \$1469.88

Tractor Feed \$219.88

Single Bin Sheet Feeder (A10/F10) \$599.88

STAR MICRONICS	
PowerType	
The PowerType (17 cps, 110 columns) has 10, 12, 15 cpi & proportional type, sub/superscripting, backspace/underlining & Diablo 620/630 code compatibility.	
PowerType	\$359.88

Accessories

Printer Stands

Heavy-gauge steel with a baked enamel finish (beige), & a paper slot in the center for bottom feeding. Fits 80 or 132 column printers (specify).	\$509.88
80 Column Stand	\$39.88
132 Column Stand	\$49.88

Microfazer

Printer buffers from 8K to 512K, in parallel in/parallel out configurations. Microfazer **SCALL**

INTERACTIVE STRUCTURES

Pkaso U

Full text & graphic screen dumps (low & hi-res), 90 degree rotation, 16 gray shades, & more, that's **Pkaso**. Their new card, the **Pkaso U** is a culmination: they let you install the EEPROM from a disk with their accumulated (& extensive) knowledge of printer features. Special install menus let you customize the install. An excellent improvement. **Pkaso-U** \$139.88

ORANGE MICRO

Grappler + \$139.88
Buffered Grappler + \$189.88

TBL PRODUCTS

Parallel Printer Card, includes cable \$79.88

THE MAILMAN COMETH

Those of you using Apple IIIs in business might want to consider an in-house mail system. They're quite common in large firms where executives are often either out of the office or too busy to collect or leave messages during business hours.

Look through your copy of *Can Someone Please Tell Me What the Apple III Can Do?*. There, on page 58, you'll find Info-net from Sun Data in Logan, Utah. To use it, you'll need a 256K system, a Hayes Smart-Modem, and a large secondary storage device—anything from a Micro-Sci A143 .5-megabyte floppy disk, through a 5-megabyte Profile, up to an Xcomp 20-megabyte unit, depending on the size of your organization and the number of messages involved.

Info-net is not simply a message center, either. It's a complete bulletin board system with password protection and levels of access, and the capability to file mail for future reference rather than hold onto it and clutter your mailbox. Now all those portables and lap computers make sense—for using your Apple III and Info-net to tie everyone together into a cohesive information network.

Sun Data's companion program, EASYTERM III, offers the same features as Access III, with an off-line mode as well. Unfortunately, it falls just short of great since there are no editing features in the off-line mode for creating data without being tied to a mainframe's editor.

KORRECT MY SPELLING

Apple has been busy on software, too. I've just gotten my hands on a copy of Apple Speller III and it's nothing to sneeze at. It will work with *any* text file, not just one created by Apple Writer III, although it works *best* with Apple Writer III, version 2.0. While it can run in a 128K machine, its ability to correct misspelled words is very limited unless you have 256K.

Based on the *Random House Dictionary, Concise Edition*, Apple Speller III will ferret out misspelled or unknown words, then it will sim-

ply show them to you, it will guess at the words you meant, or it will search through the dictionary list for other words that come close in spelling and display them for your consideration. If it's more convenient, you can mark the words and change them later with whatever word processor you are using.

Apple Speller III's help with correct spelling is a great advantage. Most similar programs assume a misspelling occurs as a typographical error, not through ignorance; they offer no help with the true spelling. This lack of assistance has always vexed me.

A VIDEO JACK OF THE RIGHT COLOR

It seems that some of you folk are having trouble getting good color resolution on your color video monitor. The problem, in many cases, is trying to get a color signal from the black-and-white video jack on the rear panel. The signal at that point is described, in the Apple III owner's manual, as black-and-white composite video with color information generating a linear grey scale. Getting color from such a signal is highly unlikely.

To fix the problem, procure a 75-ohm coaxial cable (type RG-59 will do), a 15-pin D connector with a suitable hood assembly, and a male RCA plug. Solder the center conductor of the coax cable to the tip of the RCA plug, and the shield braiding to its outer ring. On the other side, the center conductor should be soldered to pin 12 of the D connector, and the shield to pin 13. Once that's completed, and you're sure you've done it right, insert the RCA plug into the monitor and the D connector into the color video port on the back of the Apple III. You should get fine color now. In emulation mode, you may notice a flickering column of dots along the left side of the screen. This is, unfortunately, normal.

So we bring May to a merry close. Next month, a surprise or two, but for now, live long and program.

Ciao bene, Apple America! ■

Monitors

NEC

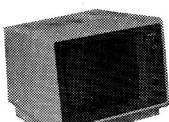
JB-1205M



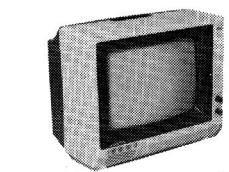
NEC's JB-1205M (amber) has an 18MHz bandwidth on 80 column by 24 line (12" diagonal screen). The JB-1201 is the green screen version.

JB-1205M (amber).....	\$169.88
JB-1201M (green).....	\$169.88

AMDEK



300 (12" green).....	\$149.88
300A (12" amber).....	\$159.88



Color I+ (Com).....\$329.88

ROLAND DG

MB-121G (12" green).....	\$159.88
MB-121A (12" amber).....	\$159.88

Modems

US ROBOTICS

Password

A direct connect originate/answer modem. 300/1200 baud, auto dial/answer, auto mode/speed select, full/half duplex (local echo), DTR override, RS-232C pins 2 & 3 reversible & audio line monitor. Includes RS-232C cable, power supply & modular cable. RS-232C interface for Apple II optional.

Password.....	\$369.88
---------------	----------

MPI

RS-232C Card.....\$89.88

D.C. HAYES

Micromodem IIe

The Micromodem IIe is an originate/answer, auto dial/answer, full/half duplex internal modem for the Apple/Franklin systems. It includes a communications package (Smartcom II), modem board, cables & complete documentation. A superior product.

Micromodem IIe.....	\$259.88
---------------------	----------

Smartmodems

300 baud.....	\$239.88
300/1200 baud.....	\$559.88

NOVATION

AppleCat II

The AppleCat II is a 300 baud originate/answer, auto dial/answer, full/half duplex internal modem for the Apple/Franklin systems. A 1200 baud version is also available.

300 baud.....	\$269.88
1200 baud.....	\$589.88



Peripherals

MICROSOFT

Softcard System

Includes Z80 Softcard for CP/M, Videoterm for 80 column display, a 16K RAMcard, software & Thom Hogan's book on CP/M.

Premium Package.....	\$559.88
----------------------	----------

If you've already got 64K RAM (Franklin or IIe), get the Z80/Softcard Combo. Same spec's, but **without** 16K RAMcard.

Z80/Videx Combo.....	\$519.88
----------------------	----------

Z80 Softcard.....	\$279.88
16K RAMcard.....	\$89.88

TITAN

Accelerator II

The Accelerator II's high-speed 6502 processor & 64K memory makes an Apple II run 3 1/2 times faster. Comes with pre-boot.

Accelerator II.....	\$499.88
---------------------	----------

Neptune

An 80-column boards for the Apple IIe w/64, 128 or 192K RAM added. Takes the IIe short-slot.

32K Neptune Board.....	\$199.88
64K Neptune Board.....	\$319.88
128K Neptune Board.....	\$409.88

RAMboards

32K Memory Board.....	\$169.88
64K Memory Board.....	\$279.88
128K Memory Board.....	\$399.88

VIDEOT

VideoTerm

The VideoTerm produces an 80-column display. Soft switch lets you toggle between 40 or 80 columns. Upper/lower case, CP/M & Pascal compatible.

VideoTerm w/switch.....	\$239.88
VideoTerm w/o switch.....	\$209.88

UltraTerm

UltraTerm takes VideoTerm one step further; it produces 160 columns, as well as 80 columns, with upper/lower case.

.....\$289.88

Enhancer II

The Enhancer II allows programmability of keys, macro definitions for keys, upper/lower case & more. It's better than having a new keyboard.

.....\$109.88

PSIO

A parallel & RS-232 interface board for the II/II+/IIe/Franklin. "Phantom Slot" & Hires dump highlight its many features.

.....\$179.88

RANA SYSTEMS

Elite-1

The Elite-1's are single-sided, with 163K storage, 84ms access time & 13 or 16 sectoring. The Controller Card can run four drives—Apples, Rana's or whatever—in any combination.

The Elite-2's are double-sided drives. Elite-3's are 80 track drives.

Elite-1.....	\$259.88
Elite-2.....	\$489.88
Elite-3.....	\$639.88
Controller.....	\$99.88

ADVANCED MICRO PRODUCTS

Micro Drive



An Apple-compatible floppy disk drive that features a Panasonic direct-drive mechanism. There are 16 sectors per track (48 tpi), with a

total capacity of 140K bytes (half-tracking capability too).

AMT MicroDrive \$219.88

ADVANCED LOGIC SYSTEMS

Smarterm II

An 80-column card with inverse & highlight video, shiftkey, etc. 7x9 char, 80col x 24 lines w/ 25th addressable line.

.....\$149.88

CP/M PLUS

The CP/M Plus card sets a new standard for Apple CP/M. 6MHz Z-80B processor, w/64K, CP/M Plus 3.0 operating system, CBASIC language & GSX-80 software for programming CP/M Plus graphics.

.....\$329.88

ALS Z-Card (Z-80 card w/CP/M 2.2 & utilities) \$149.88

ALS RS-232C Interface \$119.88

TBL PRODUCTS

Cooling Fan

We are introducing a new product line for the Apple I system, marketed exclusively by **THE BOTTOM LINE**. We begin our effort with a **Cooling Fan**.

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Fudge It!

by Don Fudge

Hundreds of Scenes Per Disk!

If you do a lot of computer art composed of colored or uncolored line drawings, or if you write adventure games, then you need utilities for displaying lots of different scenes. Educational programs coming out these days with dozens of pictures that graphically enhance the learning process are examples of applications of such utilities. This is where state-of-the art has taken us.

There are several things you need for recreating scenes from data quickly and efficiently, especially if you have from 100 to 248 scenes stored on one side of a disk.

Faster DOS

One requirement is some sort of fast disk operating system, such as Pronto-DOS, Diversi-DOS, Fast-DOS, TDE, or Pro-DOS, to speed up file loading from disk. Contact me for more information on this, if you don't know how to deal with it.

Good Art

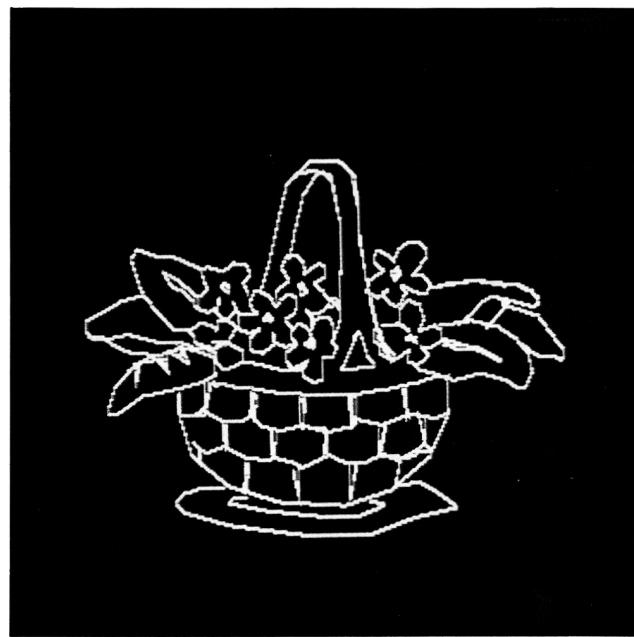
To make your creations marketable, should you so desire, a good artist is also necessary. If you're really good at designing graphics yourself, keep in mind that there are a lot

of career opportunities opening up in this field.

Compression

The most significant need is for good drawing and screen-compressing, or data-saving, utilities. You must either draw scenes as pictures and then compress them to as few bytes as possible, or save the scenes as line data and perhaps color-fill data as well.

The advantages of compressed binary pictures are that they're easy to handle and take little in the way of memory space for decompressing



A white-on-black line drawing created with HPDRAW.



The same drawing, color-filled.

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Circle 402 on Reader Service card.

Listing 1. HPDRAW.

```

0  GOSUB 2500
1  ONERR GOTO 63990
2  GOTO 600
3  PE = PEEK ( - 16336 ) + PEEK ( - 16336 ): RETURN
4  PK = PEEK ( - 16384 ): IF PK > 127 THEN POKE - 16368,0: GOSUB 2100: GOTO
6
5  RETURN
6  ROT= 64: SCALE= 1:P0 = INT ( PDL ( 0 ) * 1.095 ):P1 = INT ( PDL ( 1 ) * .7
5 ): XDRAW 1 AT P0,P1: FOR QW = 1 TO 50: NEXT : XDRAW 1 AT P0,P1
7  PK = PEEK ( - 16384 ): IF PK > 127 THEN POKE - 16368,0: GOSUB 1900: RETURN
8  GOTO 6
9  IF WI = 1 THEN V = V + 1: POKE V, PEEK ( 225 )
10 RETURN
30 HOME : VTAB 2: PRINT "DO YOU WANT TO DRAW 256-WIDE HPLOT SHAPES O
R 280-WIDE HPLOT SHAPES WHICH REQUIRE 16-BIT (2 BYTE) X COORDINATE
& TAKE UP MORE SPACE?": PRINT
31 PRINT "(A) 256": PRINT : PRINT "(B) 280": PRINT : PRINT "(A/B)";: GET
AS: PRINT AS: IF LEN ( AS ) = 0 THEN 30
32 IF ASC ( AS ) < > 65 AND ASC ( AS ) < > 66 THEN 30
33 IF ASC ( AS ) = 66 THEN WI = 1
40 CALL 62450
47 POKE - 16303,0: POKE - 16298,0: HOME : VTAB 1: PRINT "USE THE PADDLE
S TO MOVE THE DOT UNTIL YOU'RE AT YOUR STARTING POINT. HIT THE BUT
TON ON PADDLE #0. NOW MOVE THE DOT UNTIL A LINE DRAWN BETWEEN THIS
DOT & THE 1ST DOT WOULD BE THE LINE
48 PRINT "YOU DESIRE. HIT BUTTON #0 AGAIN. KEEP UPTHIS PROCESS UNTIL DONE
. AFTER THE LAST LINE HAS BEEN DRAWN, HIT NOT ONLY PADDLEBUTTON #0 BU
T BUTTON #1 AS WELL.": GOSUB 63000
49 GOSUB 188: POKE - 16304,0: POKE - 16297,0
50 HOME : P1 = .75 * PDL ( 1 ): IF P1 > 159 THEN VTAB 23: PRINT "MOVE PDL
#1 COUNTERCLOCKWISE!": GOSUB 62000: GOTO 50
51 ROT= 64: HCOLOR= H: SCALE= 1:FL = 0:V = 3329:VV = 0:V1 = 3329
55 P0 = INT ( PDL ( 0 ) + (.095 * PDL ( 0 ) * WI ):P1 = .75 * PDL ( 1 ): XDRAW
1 AT P0,P1:X% = P0:Y% = P1
60 REM
61 PK = PEEK ( - 16384 ): IF PK > 127 THEN POKE - 16368,0: IF PK = 160 THEN
V = V - ( 2 + WI ): HCOLOR= 0: GOSUB 950: HPLOT Z0,Z1 TO Z2,Z3: HCOLOR=
H: GOSUB 62000:X% = Z0:Y% = Z1:Z0 = Z2:Z1 = Z3: GOTO 970
62 IF PK = 193 THEN PK = 0: CALL 62450: GOTO 50
63 IF PK = 198 THEN PK = 0:FS = NOT FS
64 IF FS = 1 THEN POKE - 16302,0
65 HOME : VTAB 21: PRINT "X: " INT ( P0 ) " Y: " INT ( P1 ) " LINES: " VV
66 IF FS = 0 THEN POKE - 16301,0
67 PRINT "PRESENT BYTE ADDRESS: " V
68 PRINT "SCENE'S BYTE LENGTH: " V - 3328
70 P1 = .75 * PDL ( 1 ): FOR QW = 1 TO 10: NEXT : P0 = INT ( PDL ( 0 ) + (.09
5 * PDL ( 0 ) * WI ): XDRAW 1 AT X%,Y%: XDRAW 1 AT P0,P1:X% = P0:Y% =
P1
75 VTAB 1
80 B0 = PEEK ( - 16287 ): IF B0 > 127 THEN PRINT CHR$ ( 7 ):V = V + 1: POKE
V, PEEK ( 224 ): GOSUB 9:V = V + 1: POKE V, PEEK ( 226 ): IF FL = 0 THEN
FL = 1:B0 = 0:Z1 = P1:Z0 = P0: XDRAW 1 AT P0,P1: GOTO 85
82 IF B0 > 127 THEN HPLOT X%,Y% TO Z0,Z1:B0 = 0:Z3 = Z1:Z2 = Z0:Z1 = Y%:
Z0 = X%: IF ER = 1 THEN ER = 0: GOSUB 960
85 B1 = PEEK ( - 16286 ): IF B1 > 127 AND FL = 1 THEN HCOLOR= H: GOTO 110
90 GOTO 60
110 PRINT "":GG = INT ((V - V1) / (2 + WI )): POKE V1,GG
120 HOME : TEXT : VTAB 2: INVERSE : PRINT "CHOOSE TO:": NORMAL : PRINT : PRINT
"(1) DRAW ANOTHER LINE IN THIS SCENE": PRINT "(2) QUIT PRESENT SCENE",
"START A NEW ONE": PRINT "(3) QUIT AND SAVE SCENE": PRINT "(4) QUIT"
130 PRINT : PRINT "(1-4)";: GET AS:AZ = VAL ( AS ): IF LEN ( AS ) = 0 THEN
130
135 PRINT CHR$ ( 13 ): CALL 1002
140 IF AZ > 4 OR AZ < 1 THEN 130
150 ON AZ GOTO 160,165,170,175
160 VV = VV + 1:V1 = V + 1:V = V + 1
161 P1 = .75 * PDL ( 1 ):FL = 0
162 POKE - 16304,0: POKE - 16297,0: GOTO 55
165 CALL 62450: GOTO 30
170 POKE 3328,VV + 1: GOTO 204
175 GOTO 600
188 PRINT : PRINT "TO ERASE LINE, HIT SPACE BAR.": PRINT "TO ERASE SHAPE,
HIT A.": PRINT "TO TOGGLE MIXED/FULL SCREEN, HIT F": PRINT "KEEP # O
F LINES IN SCENE UNDER 256": GOSUB 63010
190 RETURN
204 HOME : VTAB 1
300 DS = CHR$ ( 4 )
301 VTAB 21
302 INPUT "FILE NAME: ";NS: IF LEN ( NS ) = 0 THEN 302
303 INPUT "DID YOU GET IT RIGHT? (Y/N)";Z$: IF LEN ( Z$ ) = 0 THEN 302
304 IF ASC ( Z$ ) < > 89 THEN 302
307 TEXT : VTAB 1: HOME
308 LL = ( V + 1 ) - 3328
309 GOSUB 20000
310 PRINT DS;"BSAVE";NS;,"A3328,L";LL
311 VTAB 21: PRINT NS
312 PRINT "A3328 L"LL" LINES: "VV + 1: PRINT "(HIT ANY KEY)";: GOSUB
63010
314 GOSUB 21000
400 GOTO 600
402 HOME : VTAB 1: INPUT "FILE NAME: ";STNS: IF LEN ( STNS ) = 0 THEN 600
403 PRINT : PRINT "DID YOU GET IT RIGHT? (Y/N)";: GET QWS: IF LEN ( QWS )
= 0 THEN 402
404 PRINT QWS: PRINT CHR$ ( 13 ): CALL 1002: IF ASC ( QWS ) < > 89 THEN 40
2
405 GOSUB 20000:DS = CHR$ ( 4 ): PRINT DS;"BLOAD";STNS: PRINT "ADDRESS: " PEEK
( 43634 ) + PEEK ( 43635 ) * 256:LG = PEEK ( 43616 ) + PEEK ( 43617 ) * 25
6: PRINT "LENGTH: " LG

```

Listing continued.

routines. However, the actual compressed data often occupies from 12 to 25 disk sectors—not very “compressed” for many purposes! (There may be a few of you who don’t yet know that a normal BSAVED picture is 33 sectors long and is saved with BSAVE pic, A\$2000, L\$1FF8 for page one graphics and BSAVE pic, A\$4000, L\$1FF8 for page two.)

So, compressing from 33 sectors to 12 to 25 is okay for some purposes, but very inadequate for others. If two-to-five sector colored or uncolored scenes are what you need, then put your fast DOS in place, get your scene utilities out and start truckin’!

Back-Issue Goodies

But what if you have no scene utilities? Then you can use the ones in this column, combined with those in my August, 1983 column. In August I presented PALETTE, a scene color-filling program, PATRN-MAKER, a color palette maker, and FILL4, a machine language color-fill algorithm that fills any color you want into white line drawings on black backgrounds. (Contact me if you’d like information on how to get black-lined, white-background color-fill utilities.) If you don’t have the August, 1983 *inCider*, refer to page 6 in this issue for instructions on how to get one.

The Programs

To supplement August’s column, you need these programs: HPDRAW, FILLTABLE, A2, A3, CTABLE MAKER, SCENE RE-CREATE, A5, a HELLO program, MENU, and some changes in the PALETTE program from August. You’ll find them all in this column.

HPDRAW (Listing 1) creates either 256- or 280-pixel-wide line drawings and saves them as binary data files of two or three sectors. The advantage of 256-wide drawings is that they take up one third less memory and operate a bit faster, but at the expense of 9 percent of your

Write to Don Fudge at Avant-Garde Creations, PO Box 30160, Eugene, OR 97403.

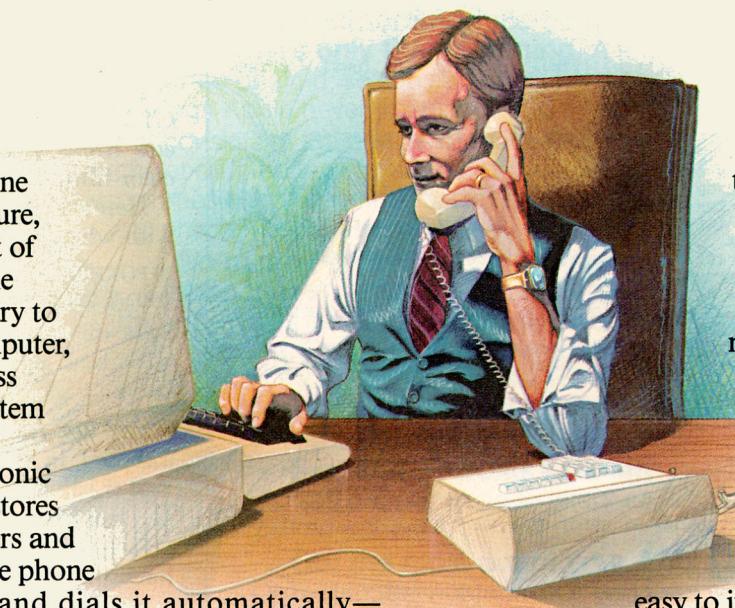
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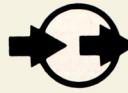


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Listing continued.

```

406 WI = 1
408 GOSUB 21000
410 PRINT : PRINT "# OF LINES IN SCENE: " PEEK (3328)
415 POKE 250,0: POKE 251,13
420 PRINT : PRINT "SCENE WIDTH:": PRINT : PRINT "(A) 256": PRINT "(B) 280
"; PRINT : PRINT "(A/B)": ";: GET A$: IF LEN (A$) = 0 THEN 420
421 PRINT A$: PRINT CHR$ (13): CALL 1002
425 IF ASC (A$) < > 65 AND ASC (A$) < > 66 THEN 420
430 IF ASC (A$) = 65 THEN PRINT DS"LOADA2":WI = 0: GOTO 480
440 PRINT DS"LOADA3"
480 HGR : POKE - 16302,0
490 HCOLOR= BC: HPLOT 0,0: CALL 62454: HCOLOR= H
500 CALL 848
510 BS = 1:VS = 0
525 GET A$: PRINT CHR$ (13): CALL 1002: HOME : TEXT
530 VTAB 21: INPUT "DO YOU WANT ANOTHER FILE? (Y/N)":;QWS: IF LEN (QWS) =
0 THEN 530
540 IF ASC (QWS) < > 89 THEN HOME : GOTO 550
545 GOTO 402
550 REM
600 POKE - 16303,0: POKE - 16298,0: HOME : VTAB 1: INVERSE : HTAB 18: PRINT
"MENU:": NORMAL
601 SG = 0:FL = 0:Q = 0:D$ = CHR$ (4)
602 SCALE= S: HCOLOR= H: ROT= R
603 PRINT "(HIT ESC TO QUIT OR 'M' FOR MENU)": PRINT
605 PRINT "(0)ABORT SCREEN---START OVER": PRINT
620 PRINT "(1)CHOOSE A LINE COLOR": PRINT
636 PRINT "(2)CHOOSE A BACKGROUND COLOR (USE BLACK FOR DRAWING)": PRINT
640 PRINT "(3)LOAD IN A SCENE": PRINT
650 PRINT "(4)DRAW SCENE & SAVE IT": PRINT
660 PRINT "(5)VIEW SCREEN": PRINT
670 PRINT "(6)EDIT A SAVED LINE DRAWING": PRINT
690 FLASH : PRINT "(CHOOSE 0-6)": ";: NORMAL : GET A$: PRINT CHR$ (13)
691 IF ASC (A$) = 77 THEN PRINT CHR$ (4)"RUNMENU"
692 IF ASC (A$) = 27 THEN TEXT : HOME : END
700 IF LEN (A$) = 0 THEN 690
710 IF VAL (A$) < 0 OR VAL (A$) > 6 THEN 690
719 IF A$ = "0" THEN 912
720 ON VAL (A$) GOTO 900,916,402,30,920,1000
721 GOTO 600
900 HOME : VTAB 1: INPUT "LINE COLOR? (0-7)":;H: IF H > 7 OR H < 0 THEN 9
00
902 GOTO 600
912 INPUT "SURE YOU WANT TO ABORT SCREEN? (Y/N)":;QWS: IF LEN (QWS) = 0 THEN
912
913 IF ASC (QWS) < > 89 THEN 600
914 HGR : GOTO 600
916 INPUT "SURE YOU WANT TO DO A BACKGROUND COLOR? THIS WILL ERASE ANY SH
APE! (Y/N)":;QWS: IF LEN (QWS) = 0 THEN 916
917 IF ASC (QWS) < > 89 THEN 600
918 HOME : VTAB 1: INPUT "BACKGROUND COLOR (THIS ERASES SHAPES!) (1-7)":;
BC: IF BC > 7 OR BC < 0 THEN 918
919 POKE - 16304,0: POKE - 16297,0: HCOLOR= BC: HPLOT 0,0: CALL 62454: VTAB
21: GOSUB 63000: GOTO 600
920 POKE - 16304,0: POKE - 16297,0: VTAB 21: GOSUB 63000: GOTO 600
950 E0 = Z0:EL = Z1:ER = 1: RETURN
960 HCOLOR= 0: FOR Q = EL - 1 * (EL - 1 > = 0) TO EL + 1 * (EL + 1 < 192
): FOR W = E0 - 1 * (E0 - 1 > = 0) TO E0 + 1 * (E0 + 1 < 192): HPLOT
W,Q: NEXT : NEXT : HCOLOR= H: RETURN
970 HCOLOR= 0: HPLOT Z0,Z1 TO Z2,Z3: HCOLOR= H: GOTO 60
1000 POKE - 16304,0: POKE - 16297,0:LI = PEEK (3328):AD = 3329: FOR L =
1 TO LI
1020 SEGS = PEEK (AD) - 1: FOR S = 1 TO SEGS
1025 HCOLOR= 0
1030 HL = PEEK (AD + 1):HH = PEEK (AD + 2):V = PEEK (AD + 3): IF WI = 0
THEN V = HH:HH = 0
1035 LO = PEEK (AD + 3 + WI):HI = PEEK (AD + 4 + WI):VE = PEEK (AD + 4 +
WI + WI): IF WI = 0 THEN HI = 0
1040 HPLOT HL + HH * 256,V TO LO + HI * 256,VE: GOSUB 3: FOR QW = 1 TO PDL
(0) * 8: NEXT : GOSUB 4: HCOLOR= 3: HPLOT HL + HH * 256,V TO LO + HI *
256,VE
1045 AD = AD + 2 + WI
1050 NEXT : AD = AD + 3 + WI: NEXT : GOTO 1000
1900 IF PK > 203 THEN HI = INT (P0 / 256) * WI:LO = P0 - (256 * HI):VE =
P1: POKE AD + (4 - (WI = 0)),LO: POKE AD + (5 - (WI = 0)),HI: POKE AD
+ (6 - (2 * (WI = 0))),VE: HCOLOR= 3: RETURN
1910 HH = INT (P0 / 256) * WI:HL = P0 - (256 * HH):V = P1: POKE AD + 1,HL
: POKE AD + 2,HH: POKE AD + (3 - (WI = 0)),V: HCOLOR= 3: RETURN
2000 POKE 250,0: POKE 251,13: PRINT CHR$ (4)"LOADA3": HGR : HCOLOR= 3: POKE
- 16302,0: IF WI = 0 THEN PRINT CHR$ (4)"LOADA2"
2005 CALL 848: GET A$: PRINT CHR$ (13): CALL 1002
2010 TEXT : HOME : INPUT "DO YOU WANT TO SAVE IT THIS NEW WAY? (Y/N):";
AN$: IF LEN (AN$) = 0 THEN 2010
2020 IF ASC (AN$) < > 89 THEN CALL 54915: GOTO 600
2050 TEXT : HOME : INPUT "FILE NAME: ";FS: IF LEN (FS) = 0 THEN 2050
2055 GOSUB 20000
2060 PRINT CHR$ (4)"BSAVE"FS",A3328,L"LG: CALL 54915: GOSUB 21000: GOTO
600
2100 IF PK = 155 THEN CALL 54915: GOTO 2000
2110 RETURN
2500 POKE 2296,1: POKE 2297,0: POKE 2298,4: POKE 2299,0: POKE 2300,4: POKE
2301,0
2505 POKE 232,248: POKE 233,8
2510 HCOLOR= 3:H = 3: POKE - 16301,0
2515 HGR
2520 RETURN
20000 TEXT : HOME : FLASH : PRINT "SWITCH TO DATA DISK.": NORMAL : GOSUB
63000: RETURN
21000 FLASH : PRINT "SWITCH TO PROGRAM DISK.": NORMAL : GOSUB 63000: RETURN

```

Listing continued.

screen width. (X coordinates need only 8-bit numbers, as opposed to the 16-bit numbers required of 280-wide drawings.)

FILLTABLE (Listing 2) runs the machine language line-drawing algorithm (A2 or A3) and then uses color-fill data (to be saved during use of the PALETTE program) to color-fill the line drawing just recreated. A2 (Listing 3) recreates 256-wide line drawings, and A3 (Listing 4) recreates 280-wide line drawings.

With CTABLE MAKER (Listing 5) you choose 32 4-by-2 (pixel format is 4 bytes wide and 2 lines high) colors for filling scenes. Each disk of scenes has its own CTABLE (color table)—these scenes can choose from only the 32 colors in that disk's "crayon box."

SCENE RECREATE (Listing 6) reconstructs your data files into scenes.

Finally, A5 (Listing 7) uses the CTABLE's data to make a color palette from which you choose when color-filling.

Here's a good HELLO program with which to initialize your disk:

```

20 POKE104,96:POKE24576,0
:PRINT CHR$ (4)"RUN MENU"

```

Save this as HELLO if the disk is initialized, or do INIT HELLO if it's blank.

You also need a MENU program, included in this month's listings as well (Listing 8). I made it really simple; feel free to make it a bit fancier.

Here are the BSAVE parameters for the listings needing them:

FILLTABLE, A7936, L210

A2, A848, L87

A3, A848, L104

A5, A37888, L256

Remember CALL-151 to access the monitor for typing. Don't enter over six lines of hex code at once, and use space between codes. Do 800.8B7 types of monitor memory dumps to check your work and perhaps 800L (for example) disassembly listings to double-check.

Make sure (even if you don't use my HELLO program) that POKE 104,96:POKE24576,0 is in effect before you run MENU or the other pro-

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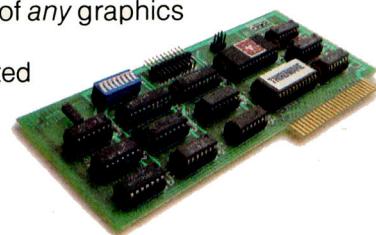
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Fudge It!

Listing continued.

```

62000 FOR QW = 1 TO 15:PL = PEEK ( - 16336): NEXT : RETURN
63000 PRINT " (HIT ANY KEY TO CONT
INUE):
63010 PK = PEEK ( - 16384): IF PK > 127 THEN POKE - 16368,0: RETURN
63020 GOTO 63010
63990 PRINT CHR$ (7): POKE 216,0: ONERR GOTO 63990
63991 PP = PEEK (222): IF PP = 254 THEN RESUME
63994 POKE - 16303,0: POKE - 16298,0
63995 PRINT "YOUR ERROR IS CODE #:PP: GOSUB 63000: CALL 54915: GOTO 600

```

grams. Using my HELLO will ensure this.

Also be sure that PALETTE and FILL4 (A\$9000,L\$400) are loaded onto

```

1F00- 20 E2 F3 A9 0D 85 FB A9
1F08- 00 85 FA 8D 52 C0 A9 7F
1F10- 85 E4 A5 F0 F0 0E A2 00
1F18- 8A A8 20 57 F4 20 F6 F3
1F20- A9 00 85 E4 20 50 03 A5
1F28- FA 85 7B A5 FB 85 7C E6
1F30- 7B D0 02 E6 7C A0 00 B1
1F38- 7B 85 7D A9 01 85 7E A9
1F40- 00 A8 85 DB E6 7B D0 02
1F48- E6 7C B1 7B 85 DA A5 E7
1F50- F0 0C E6 7B D0 02 E6 7C
1F58- B1 7B F0 02 E6 DB E6 7B
1F60- D0 02 E6 7C B1 7B 85 F9
1F68- E6 7B D0 02 E6 7C B1 7B
1F70- A8 B9 00 0C 85 06 C8 B9
1F78- 00 0C 85 07 C8 B9 00 0C
1F80- 85 08 C8 B9 00 0C 85 09
1F88- C8 B9 00 0C 85 DC C8 B9
1F90- 00 0C 85 DD C8 B9 00 0C
1F98- 85 DE C8 B9 00 0C 85 DF
1FA0- C8 A5 F0 F0 06 A9 7F 85
1FA8- E4 D0 04 A9 00 85 E4 A6
1FB0- DA A4 DB A5 F9 20 11 F4
1FB8- A5 E5 B5 FF 85 EF A5 30
1FC0- 85 ED 20 00 90 A5 7E C5
1FC8- 7D B0 05 E6 7E 4C 3F 1F
1FD0- 60 00 00

```

Listing 2. FILLTABLE.

```

0350- A2 00 A1 FA 85 EB E6 FA
0358- D0 02 E6 FB A2 00 A1 FA
0360- 85 06 E6 FA D0 02 E6 FB
0368- A1 FA 85 08 A0 00 E6 FA
0370- D0 02 E6 FB A1 FA A6 08
0378- 20 57 F4 C6 06 20 8C 03
0380- 20 3A F5 C6 06 D0 F6 C6
0388- EB D0 CB 60 A2 00 E6 FA
0390- D0 02 E6 FB A1 FA 85 09
0398- E6 FA D0 02 E6 FB A1 FA
03A0- A8 A2 00 A5 09 60 00 00

```

Listing 3. A2.

```

0350- A2 00 A1 FA 85 EB E6 FA
0358- D0 02 E6 FB A2 00 A1 FA
0360- 85 06 E6 FA D0 02 E6 FB
0368- A1 FA 85 08 E6 FA D0 02
0370- E6 FB A1 FA A8 E6 FA D0
0378- 02 E6 FB A1 FA A6 08 20
0380- 57 F4 C6 06 20 93 03 20
0388- 3A F5 C6 06 D0 F6 C6 EB
0390- D0 C4 60 A2 00 E6 FA D0
0398- 02 E6 FB A1 FA 85 09 E6
03A0- FA D0 02 E6 FB A1 FA 85
03A8- 08 E6 FA D0 02 E6 FB A1
03B0- FA A8 A6 08 A5 09 60 00

```

Listing 4. A3.

this disk and saved (and make the specified changes in PALETTE), and that the PATRN binary picture (A\$2000,L\$2000), which is BLOADed at \$4000 in PALETTE, is also saved onto the disk. These are all from August's column. Incidentally, the PATRN picture results from running the PATRNMAKER file from August.

Scene Creation— Black and White

To create a black-and-white line drawing, choose HPDRAW from the MENU, then (4) DRAW SCENE & SAVE IT in HPDRAW. Normally specify (B) 280 for screen width, when prompted, then read the instructions. Hit F to toggle (switch back and forth) between full- and mixed-screen graphics. I strongly recommend the following rules of operation:

```

0 CLEAR : HOME : TEXT : VTAB 9: HIMEM: 36864
1 ONERR GOTO 63990
2 D$ = CHR$ (4): GOSUB 300
3 K = 3072
5 GOSUB 1900
10 POKE 230,64
89 HOME : TEXT
90 PRINT : INVERSE : VTAB 1: PRINT "COLOR TABLE FILLER WILL PUT 32 DIFFER
ENTCOLORS INTO $C00-$CFF (3072TO327). WHEN32 ARE LOADED, IT WILL BE
SAVED AS CTABLE,ASC00,LS100. TO RESTART HIT ESC.": NORMAL
91 PRINT : PRINT "TO SELECT A COLOR, HIT PDL #0 BUTTON. CHOSEN COLORS W
ILL BE MARKED.": PRINT : PRINT "HIT ANY KEY.": GET AA$: PRINT CHR$ (
13): CALL 1002
92 POKE - 16304,0: POKE - 16297,0: POKE - 16299,0
99 POKE - 16302,0
200 P0 = 1.09 * PDL (0):P1 = .75 * PDL (1): IF P0 + 18 < 280 THEN XDRAW
1 AT P0,P1: XDRAW 1 AT P0 + 18,P1: FOR QW = 1 TO 100: NEXT : XDRAW 1 AT
P0 + 18,P1: XDRAW 1 AT P0,P1: = PEEK ( - 16336)
201 IF P0 + 18 > 279 THEN GOSUB 62000: GOTO 200
204 PK = PEEK ( - 16384): IF PK > 127 THEN POKE - 16368,0: IF PK = 155 THEN
CLEAR :K = 3072:D$ = CHR$ (4): GOTO 89
210 PP = PEEK ( - 16287): IF PP > 127 THEN P = PEEK (229): IF P / 2 < >
INT (P / 2) AND P > 0 THEN P = P - 1
215 IF PP < 128 THEN 200
220 A = PEEK (P + PEEK (38) + PEEK (39) * 256):B = PEEK (P + 1 + PEEK
(38) + PEEK (39) * 256)
225 C = PEEK (P + 2 + PEEK (38) + PEEK (39) * 256):D = PEEK (P + 3 + PEEK
(38) + PEEK (39) * 256)
230 XDRAW 1 AT P0,P1 + 1: XDRAW 1 AT P0,P1 + 1:E = PEEK (P + PEEK (38) +
PEEK (39) * 256):F = PEEK (P + 1 + PEEK (38) + PEEK (39) * 256)
231 POKE K,A: POKE K + 1,B: POKE K + 2,C: POKE K + 3,D
232 G = PEEK (P + 2 + PEEK (38) + PEEK (39) * 256):H = PEEK (P + 3 + PEEK
(38) + PEEK (39) * 256)
235 POKE K + 4,E: POKE K + 5,F: POKE K + 6,G: POKE K + 7,H
266 HCOLOR= 0: DRAW 1 AT P0,P1: DRAW 1 AT P0 + 4,P1: DRAW 1 AT P0 + 2,P1:
DRAW 1 AT P0 + 2,P1 + 2: DRAW 1 AT P0 + 2,P1 - 2
268 HCOLOR= 3: DRAW 1 AT P0 + 7,P1: DRAW 1 AT P0 + 11,P1: DRAW 1 AT P0 +
9,P1: DRAW 1 AT P0 + 9,P1 + 2: DRAW 1 AT P0 + 9,P1 - 2
270 K = K + 8
271 GOSUB 60000
272 IF K > 3327 THEN GOSUB 20000: PRINT D$"BSAVECTABLE,ASC00,LS100": HOME
: TEXT : FLASH : PRINT "CTABLE SAVED!": NORMAL : GOSUB 21000: PRINT D
$"RUNMENU"
280 CALL 54915:ZA = FRE (0): GOTO 200
300 PRINT CHR$ (4)"BLOADPATRN,AS4000": RETURN
1900 POKE 232,192: POKE 233,3: POKE 960,1: POKE 961,0: POKE 962,4: POKE 9
63,0: POKE 964,60: POKE 965,54: POKE 966,0: ROT= 0: SCALE= 1: RETURN
20000 TEXT : HOME : FLASH : PRINT "SWITCH TO DATA DISK.": NORMAL : GOSUB
63000: RETURN
21000 PRINT : FLASH : PRINT "SWITCH TO PROGRAM DISK.": NORMAL : GOSUB 630
00: RETURN
60000 FOR QW = 1 TO 10:PM = PEEK ( - 16336): NEXT : RETURN
62090 GOSUB 60000: RETURN
63000 PRINT : PRINT "(HIT ANY KEY TO CONTINUE)": PRINT
63030 PK = PEEK ( - 16384): IF PK > 127 THEN POKE - 16368,0: RETURN
63050 GOTO 63030
63990 POKE 216,0:KP = PEEK (222)
63991 ONERR GOTO 63990
63995 IF KP = 254 THEN RESUME
63997 PRINT ";;";;;
63998 CALL 54915
63999 GOTO 89

```

Listing 5. CTABLE MAKER.

Apple's® new ProDOS™ is pro Thunderclock™

When Apple designed their new ProDOS operating system for the Apple II family, they included an important new function—the ability to automatically read a clock/calendar card. Nice touch.

It means that every time you create a new file or modify an existing one, the time and date are automatically recorded and stored in the CATALOG.

Now you can instantly know the exact time your files were last updated.

Apple could have chosen any clock for ProDOS to recognize, but they chose only one.

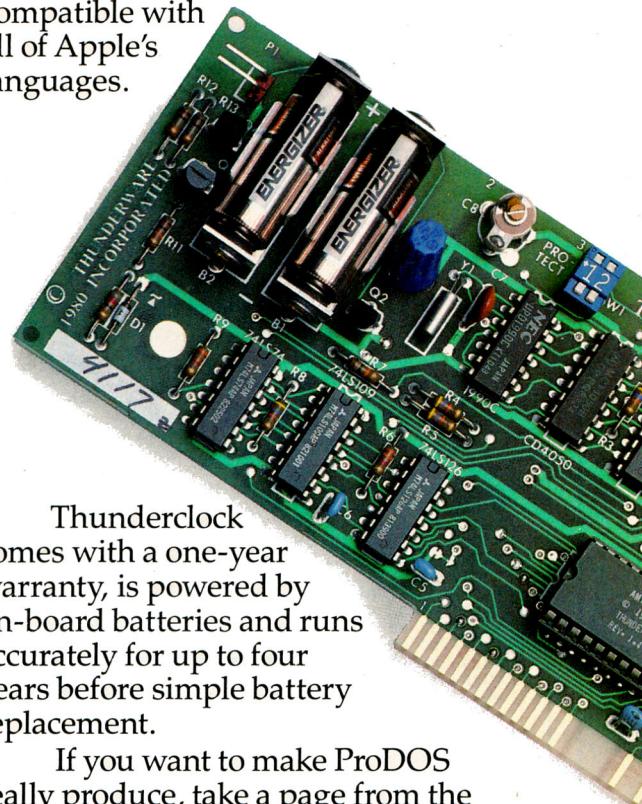
Thunderclock. It's the only clock mentioned in the ProDOS manuals.

That's a nice stroke for us, but it's even better for you.

Because, in addition to organizing your disk files, Thunderclock will add a new dimension to all the new ProDOS-based software. For instance, with business or communications

software you can access a data base or send electronic mail automatically, when the rates are lowest. Even when you're not around. And that's just a start. The better you can use your Apple, the better you can use a Thunderclock.

Thunderclock gives you access to the year, month, date, day-of-week, hour, minute and second. It lets you time intervals down to milliseconds and is compatible with all of Apple's languages.



Thunderclock comes with a one-year warranty, is powered by on-board batteries and runs accurately for up to four years before simple battery replacement.

If you want to make ProDOS really produce, take a page from the manual—get yourself a Thunderclock—the official ProDOS clock.

See your dealer or contact us.

Circle 129 on Reader Service card.

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™ ProDOS is a trademark of Apple Computer, Inc.

Fudge It!

```

0 CLEAR : HOME : TEXT : VTAB 9: HIMEM: 36864
1 ONERR GOTO 63990
2 DS = CHR$ (4)
89 HOME : POKE - 16303,0: POKE - 16298,0: HCOLOR= CL: SCALE= S: ROT= R:
SZ = 0:VI = 0:S7 = 0
90 WH = 0: POKE 240,0
100 PRINT DS$ "BLOADFILL4": PRINT DS$ "BLOADFILLTABLE"
125 GOSUB 43000: GOSUB 20000
150 PRINT DS$ "BLOADCTABLE"
205 PRINT : INPUT "COMBINATION HPLOT SCENE & COLOR-FILL FILE'S NAME: "
;AS: IF LEN (AS) = 0 THEN 205
210 PRINT DS$ "BLOAD" A$
215 GOSUB 21000
220 CALL 7936
490 GET AA$: PRINT CHR$ (13): CALL 1002
500 HOME : TEXT : INPUT "WANT ANOTHER SCENE? (Y/N): ";AA$: IF LEN (AA$) =
0 THEN 500
505 WH = 0
510 IF ASC (AA$) = 89 THEN CALL 54915: PK = FRE (0): GOTO 90
520 PRINT CHR$ (4) "RUNMENU"
20000 TEXT : FLASH : HOME : PRINT "SWITCH TO DATA DISK.": NORMAL : GOSUB
63000: RETURN
21000 FLASH : PRINT "SWITCH TO PROGRAM DISK.": NORMAL : GOSUB 63000: RETURN
43000 PRINT : INPUT "CHOOSE WIDE (280) OR NARROW (256) SCREEN FILLI
NG (W/N): ";AS: IF LEN (AS) = 0 THEN 43000
43010 WI = 0: POKE 231,0: IF ASC (AS) = 87 THEN POKE 231,1:WI = 1: PRINT
DS$ "BLOADA3": RETURN
43020 PRINT DS$ "BLOADA2": RETURN
63000 NORMAL : PRINT : PRINT "(HIT ANY KEY TO CONTINUE)": PRINT
63010 PP = PEEK (- 16384): IF PP > 127 THEN POKE - 16368,0: RETURN
63020 GOTO 63010
63990 POKE 216,0: PK = PEEK (222)
63991 ONERR GOTO 63990
63995 IF KP = 254 THEN RESUME
63997 PRINT "", "", ""
63998 CALL 54915
63999 GOTO 89

```

Listing 6. SCENE RECREATE.

```

9400- A9 D8 85 FE A2 00 86 E4
9408- A9 FC 85 FC 18 A5 FE 69
9410- 28 85 FE C9 79 90 01 60
9418- E6 FC E6 FC E6 FC E6 FC
9420- A5 FC C9 1D B0 E2 BD 00
9428- 0C 85 E3 E8 BD 00 0C 85
9430- F0 E8 BD 00 0C 85 D7 E8
9438- BD 00 0C 85 1D E8 BD 00
9440- 0C 85 1E E8 BD 00 0C 85
9448- 1F E8 BD 00 0C 85 CE E8
9450- BD 00 0C 85 CF E8 86 FA
9458- A5 FE 85 FD A2 FF A0 00
9460- A5 FD 20 57 F4 A9 00 85
9468- FB 18 65 FC A8 20 C2 94
9470- 91 26 E6 FB A5 FB C9 04
9478- 90 EF A2 FF A0 00 E6 FD
9480- A5 FD 20 57 F4 C6 FD A9
9488- 00 85 FB 18 65 FC A8 E6
9490- FB E6 FE E6 FB E6 FB 20
9498- C2 94 C6 FB C6 FB C6 FB
94A0- C6 FB 91 26 E6 FB A5 FB
94A8- C9 04 90 DF A6 FA E6 FD
94B0- E6 FD A9 26 18 65 FE 85
94B8- EB A5 FD C5 EB 90 9D 4C
94C0- 18 94 A5 FB D0 03 A5 E3
94C8- 60 C9 01 D0 03 A5 F0 60
94D0- C9 02 D0 03 A5 D7 60 C9
94D8- 03 D0 03 A5 1D 60 C9 04
94E0- D0 03 A5 1E 60 C9 05 D0
94E8- 03 A5 1F 60 C9 06 D0 03
94F0- A5 CE 60 A5 CF 60 00 00
94F8- 50 50 D8 E0 50 E8 F0 F8

```

Listing 7. A5.

1) Always begin (after choosing option 4 to draw) by drawing a frame around the screen, for looks and to prevent later wraparound of color-fills. Then hit button #1 to exit, and choose option 1, DRAW ANOTHER LINE IN THIS SCENE.

2) A "line" has a unique definition here. It is the totality of all the segments you draw, up to 255, without "taking your pencil off the paper." A triangle, rectangle, circle or irregular shape may all be one line. Once you hit button #1, your last line is finished and you can save it, quit or draw another line.

3) Every time you draw a line, draw at least two *points* (defined, as you'll see in the instructions, by hitting button #0) before hitting button #1 to quit that line. If you goof, *start over*, because your one-point line will screw up the entire picture's data file. *All lines must have at least*

2 points!

4) Never use button #1 to end a line; use button #0 *first*.

Color Table Creation

To use CTABLE MAKER, simply follow the instructions. (PATRN will be needed, so make sure it's on your disk.) Hit button #0 to choose colors, and the paddles for moving the cursor around. Your CTABLE will automatically BSAVE at the end, once 32 choices have been made. Be sure to include black, white, green, violet, orange, blue, brown, dark green and light green. They seem to be needed in most scenes.

PALETTE Use

PALETTE, as I mentioned, was already discussed in August's *i-Cider*. However, the PALETTE CHANGES listing in this column (Listing 9) gives your old PALETTE program new features. With it, PALETTE not only creates good color-filled 33-sector pictures, it also creates wide or narrow data-file pictures that will store in a few sectors. It even enables you to edit bad color-fills! Here are some of the rules for using this utility:

- 1) Don't fill on top of an area already filled.
- 2) Use quick button hits.
- 3) Don't fill on top of lines.
- 4) Keep in mind that the filling will begin just beneath the cursor (towards the bottom of the screen).
- 5) Use E to edit a bad fill, but don't do it unless there are at least two fills completed already.
- 6) Use framed drawings, or at least start filling at the right side of the screen and move leftwards.
- 7) Try to avoid creating line drawings with sharp angles to fill, although correct "paintbrush" use can fill those places and allow you to save at least a picture, if not data files. Paintbrush instructions are in the program.

Here's how to create a data-file picture (after you've made the changes in the August PALETTE program):

- 1) Draw a line drawing with

```

10 DS = CHR$ (4)
100 HOME : PRINT "(1) PALETTE": PRINT : PRINT "(2) HPDRAW": PRINT : PRINT
"(3) CTABLE MAKER": PRINT : PRINT "(4) SCENE RECREATE": PRINT
115 PRINT "1-4": "
120 GET AS$: PRINT CHR$ (13)
200 ON VAL (AS$) GOTO 210,220,230,240
206 GOTO 10
210 PRINT DS$ "RUNPALETTE"
220 PRINT DS$ "RUNHPDRAW"
230 PRINT DS$ "RUNCTABLE MAKER"
240 PRINT DS$ "RUNSCENE RECREATE"

```

Listing 8. MENU.

Something no modem has ever said before.



If you're looking for a premium modem without a premium price, here's a word of advice: Apple.

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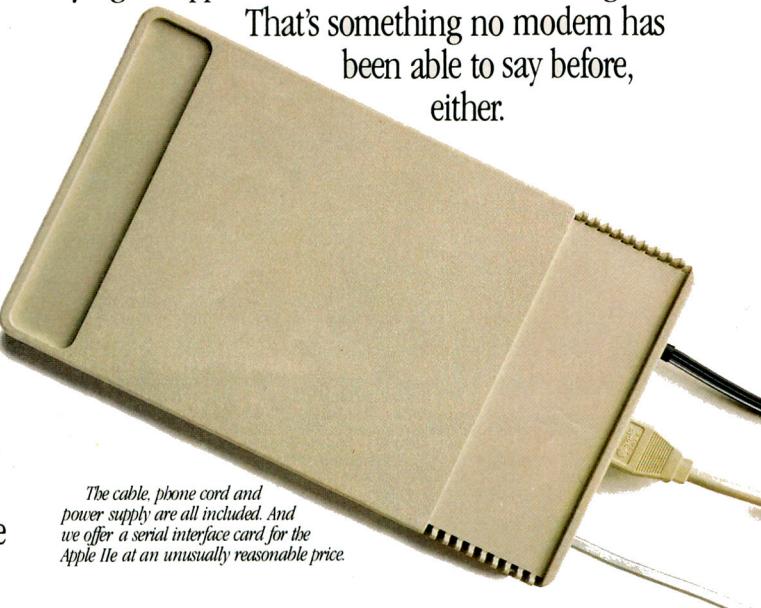
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You can send electronic mail. Play games. Bank at home. Make friends. Influence people. Find the lowest air fares for business trips. Or do almost anything else you like.

And since the computer age happens to coincide with the plastic age, you can charge your Apple Modem with an Apple Credit Card.

Which, along with the low price, makes buying an Apple Modem as much fun as using one.

That's something no modem has been able to say before, either.



The cable, phone cord and power supply are all included. And we offer a serial interface card for the Apple IIe at an unusually reasonable price.

Soon there'll be just two kinds of people. Those who use computers. And those who use Apples.



Fudge It!

```

2 K=3072:WI = 1
4 PP = PEEK (-16384): IF PP > 127 THEN POKE -16368,0: IF PP
  <> 160 THEN HGR: POKE -16302,0: GOTO 50
5 IF PP > 127 THEN 50
7 IF SZ = 1 THEN 24
8 Z8 = 0: IF Z9 = 0 THEN Z9 = 1: HGR2: GOSUB 300: GOTO 10
10 GOSUB 190: X = 139: GOTO 89
15 RETURN
24 Z9 = 0: VV = 3072: HCOLOR= 0: IF Z8 = 0 THEN Z8 = 1: HGR2:
  PRINT DS$"BLOADA5": CALL 37888: PRINT DS$"BLOADFILLTABLE" 25
  POKE -16299,0: POKE -16304,0: POKE -16297,0: GOSUB 190: X=
  139: GOTO 900
50 CL = 3: S= 1: R= 64: X= 139: Y= 79: D$= CHR$(4): HOME: BB
  = 0: XS$="D": GOTO 89
89 HOME: POKE -16303,0: POKE -16298,0: HCOLOR= CL: SCALE= S:
  ROT= R: V1= 0
92 PRINT "(12)CREATE COLOR-FILL TABLE": PRINT "(13)GO TO SCAN
  AND SAVE SHAPE": PRINT "(14)SAVE 34 SECTOR SCREEN
  PICTURE": PRINT "(15)ERASE SCREEN": PRINT "(16)SEE
  COLOR BYTE #S": PRINT "(17)MYSTERY COLOR"
98 ON ZZ GOTO 100,110,1100,1200,1300,1600,1700,1800,400,7,900
,8000,9000,10000,11000,12000,13000
100 HOME: PRINT "(1) PALETTE": PRINT: PRINT "(2) HPDRAW":
  PRINT: PRINT "(3) CTABLE MAKER": PRINT: PRINT "(4)
  SCENE RECREATE": PRINT
111 IF ZZ = 0 THEN FLASH: PRINT "NOW SWITCH BACK TO THE
  PROGRAM DISK!": NORMAL: GOSUB 63000
113 IF ZZ= 0 THEN PRINT DS$"RUNMENU"
115 PRINT "1-4: "
120 GET AS: PRINT CHR$(13)
190 POKE 232,192: POKE 233,3: POKE 960,1: POKE 961,0: POKE
  962,4: POKE 963,0: POKE 964,60: POKE 965,54: POKE 966,0:
  ROT= 0: SCALE= 1: IF VV = 1 THEN VV = 0: RETURN
200 P0= 1.09 * PDL(0): P1= .75 * PDL(1): IF P0+ 18 < 280 THEN
  XDRAW 1 AT P0,P1: XDRAW 1 AT P0+ 18,P1: FOR QW= 1 TO 100:
  NEXT: XDRAW 1 AT P0 + 18,P1: XDRAW 1 AT P0,P1: O= PEEK (-
  16336)
206 GOTO 10
210 PRINT DS$"RUNPALETTE"
218 CN= (INT(P0/28) + (INT (P1/40) * 8)) * 8
220 PRINT DS$"RUNHPDRAW"
230 PRINT DS$"RUNCTABLE MAKER"
240 PRINT DS$"RUNSCENE RECREATE"
565 PRINT: FLASH: PRINT "SWITCH TO YOUR PROGRAM DISK.": "
  NORMAL: GOSUB 63000
903 POKE 6,A: POKE 7,B: POKE 8,C: POKE 9,D: POKE 220,E: POKE
  221,F: POKE 222,G: POKE 223,H
910 P0= PDL(0) + INT((.09 * PDL(0)) * WI): P1= INT(.75 * PDL
  (1)): GOSUB 1500: XDRAW 1 AT P0,P1: FOR QW= 1 TO 100:
  NEXT: XDRAW 1 AT P0,P1: IF VV = 0 THEN Z= PEEK (-16336)
916 P9= PEEK (-16384): IF P9 > 127 THEN POKE -16368,0: IF P9 <
  155 AND P9 <> 195 AND P9 <> 197 THEN GOSUB 1500
918 P0= PEEK (-16286): IF PP > 127 AND SZ= 0 THEN HOME: GOTO 89
919 IF PP > 127 AND SZ= 1 THEN 7
920 PP= PEEK (-16287): POKE 240,0
922 IF PP>127 AND SZ= 0 THEN 950
924 IF P9 = 197 THEN V= V-(3+WI): V1= V1-1: POKE AD,V1: P9=0:
  POKE 231,WI: CALL 7936: SCALE= 1: ROT=0: GOTO 900
925 IF P9= 155 THEN 985
950 ROT=0: SCALE= 1: XDRAW 1 AT P0,P1: POKE 237,PEEK(48):
  XDRAW 1 AT P0,P1: CALL 36864
955 IF SZ= 0 THEN 980
956 IF WI = 1 THEN POKE V,P0 - 256 * (P0>255): V= V + 1: POKE
  V,(P0>255): GOTO 958
957 POKE V,P0
958 V= V+1: POKE V,P1: V= V+1: POKE V,CN: V= V+1
960 V1= V1 + 1: IF V1 > 254 THEN 985
985 POKE AD,V1: SZ= 0
990 HOME: TEXT: INVERSE: PRINT "HIT CTRL-C IF YOU SO NOT WANT
  TO SAVE": NORMAL: INPUT "NAME OF COMBINATION HPLOT/COLOR-
  FILL FILE: "; AS: IF LEN (AS)= 0 THEN 990
995 GOSUB 20000
999 PRINT DS$"BSAVE"AS",A"AR,L"(V+1) - AR: PRINT AS: PRINT
  "A"AR: PRINT "L"(V+1)-AR: GOSUB 63000: GOTO 565
8000 HOME: INPUT "NAME OF HPLOT SCENE FILE: "; AS: IF LEN (AS)
  = 0 THEN 8000
8005 POKE 250,0: POKE 251,13
8008 GOSUB 20000
8010 PRINT DS$"BLOAD"AS: V= PEEK(43634)+ PEEK(43635) * 256: AR
  = V: V= PEEK (43616) + PEEK (43617) * 256: AD = V: V=
  V+1: SZ=1: PRINT DS$"BLOAD CTABLE"
8015 INVERSE: PRINT: PRINT "SWITCH TO PROGRAM DISK.": NORMAL:
  GOSUB 63000: GOSUB 43000: CALL 848: GOTO 89
20000 PRINT: INVERSE: PRINT "SWITCH TO YOUR SCENE DISK.": "
  NORMAL: GOSUB 63000: RETURN
43000 HOME: TEXT: INPUT "CHOOSE WIDE (280) OR NARROW (256)
  SCREEN FILLING (W/N) "; AS: IF LEN(AS) = 0 THEN 43000
43010 WI = 0: IF ASC (AS) = 87 THEN WI = 1: PRINT DS$"BLOADA3"
  : RETURN
43020 PRINT DS$"BLOADA2": RETURN

```

Listing 9. PALETTE CHANGES.

HPDRAW, and remember if it is narrow or wide.

2) Go to the menu, and then to PALETTE, hitting return to erase the screen during entry. (And, if you make more than one data file in a row, use option 15 to erase the

screen between pictures.)

3) Use option 12 to begin creating a color-filled data file.

4) Specify narrow or wide when asked—it must be correct. (This refers to the line drawing you'll be

loading at this point; it was saved as NARROW or WIDE.)

5) Select option 10, CHOOSE A PALETTE COLOR. (Make sure you've used CTABLE MAKER to create a color table, or it won't work.)

6) Move the double cursor around and select a color with button #0.

7) Read the instructions.

8) You'll now be color-filling your line drawing with the use of the paddles. Use paddle button #0 to fill and paddle button #1 to choose a new color, C to see your coordinates and color-byte colors, and E to edit (if you've made at least two fills).

9) Hit escape to exit and control-C to restart if you don't want to save the scene.

10) Erase the screen between scene-fills, unless you want to save a bizarre 33-sector picture of a surreal variety.

Use of SCENE RECREATE

This utility enables you to recreate your scenes quickly and efficiently. It's possible to use the guts of this program, in a one-line condensed form, as a GOSUB in your own Applesoft programs, so you can load and display scenes conveniently. Make sure 240 is POKED with 0, and 231 is POKED with 1 for wide- or 0 for narrow-screen line drawings.

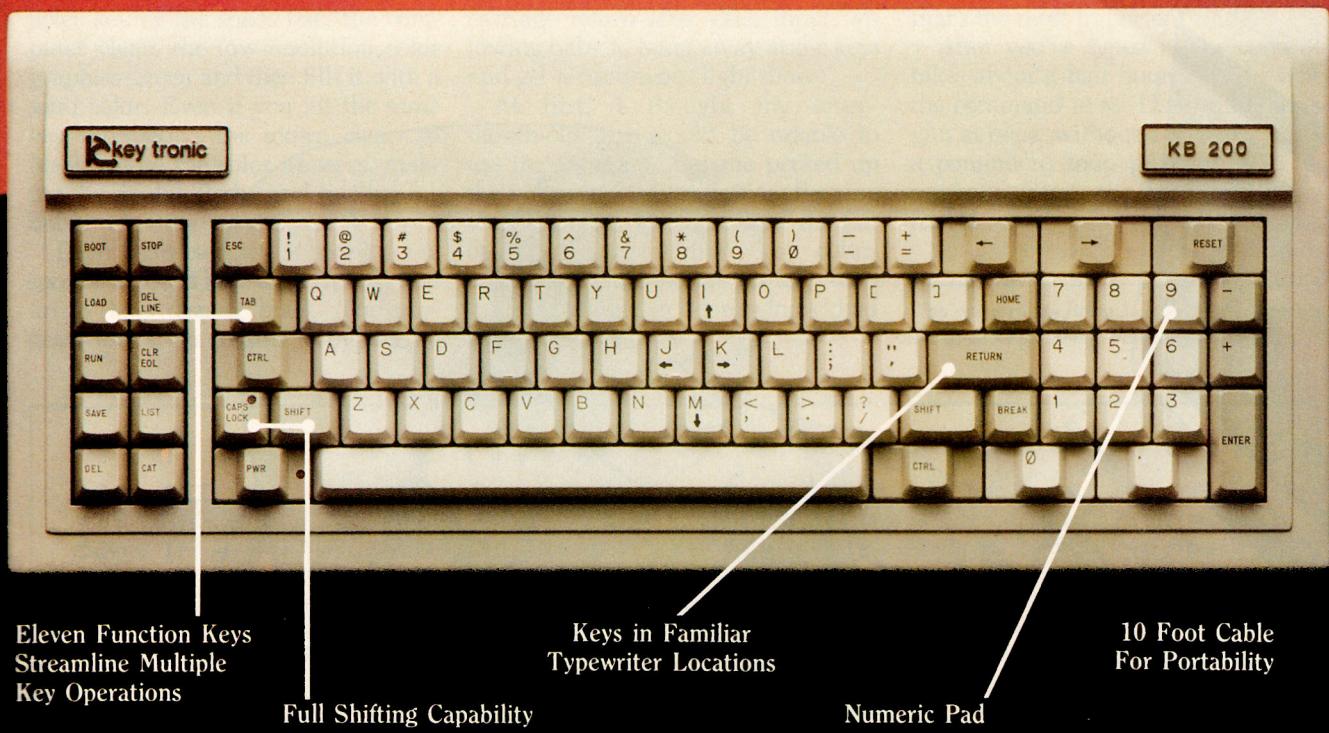
Uncolored Scenes

To use the enclosed utilities to create line drawing scenes that are not colored, you need only BLOAD your line drawing data files at \$D00, BLOAD A2 (narrow) or A3 (wide), and type CALL 848 to get your line drawing on the screen. Make sure HGR and HCOLOR = 3 are in place.

The HPDRAW utility lets you not only create line drawings, but also reload data files and display the drawings (narrow or wide)—and you can even edit them! The editor will be a surprise for you. It takes a while to learn how to use it effectively—it's rather strange. But it is effective if used right. Let's see if you can figure out what to do with it. Life needs *some* challenge. One hint: Use option 3 first.

See you next time! ■

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by Brian J. Murphy

Baby's First Computer Program



The other day, while holding my seven-month-old daughter Elizabeth on my knee and trying to test-play a game for an *inCider* review, the motion of my fingers across my Apple keyboard caught Elizabeth's attention. She promptly joined in the fun, banging her little hand down on the keys.

Like a good Daddy I didn't get angry with her, but shifted my position

so she couldn't play with the keyboard while I was using it. But the incident opened up a whole new line of thought.

Piaget, the Swiss child psychologist, said that children are born with a healthy curiosity that parents and schools tend to squelch. At first, all children want to probe, poke, taste, pound, tear and generally explore their environment, a trait which Pia-

get believed we should encourage.

Don't Touch the Computer!

Consider now computer phobia, a fear of computers. Parents, fearful of damage to their systems, teach their children not to touch their precious machine. The fear of punishment and disapproval for touching the system may well carry over to school, making it more difficult for teachers

to use computers effectively and jeopardizing your child's progress.

Clearly, it is better for children to use computers early on, under controlled conditions. Since the earlier you start the better, here's a simple program, Baby's First Computer Program, I wrote and then tested with the assistance of my little girl.

How It Works

Every time the baby strikes a character key or the space bar, the computer clears the low-resolution color graphics screen and then fills it with a solid color. Even if you hit the same key repeatedly, the screen clears to black before the color appears, making the display flashy and exciting for baby.

Each character key is coded for a specific color. The escape, return and arrow keys display black. The program uses a get routine to bypass the



carriage return after each input, allowing baby to bang away at the keys and get a continuous light show.

At first, I thought my seven-month-old girl would be unable to use the program, but she perked up the instant she saw the colors flashing on the screen. First she used the flat of her hand to make the colors change, but in time she actually used her index finger to depress individual keys.

Benefits

This program, for children seven months to three years old, demonstrates that the computer is all right to play with when an adult is supervising. It also helps to teach cause and effect relationships. You can teach the alphabet and numbers by pointing out which colors you get when you depress specific keys. But, best of all, the program provides entertainment for you and your baby, and that's the most important thing.

After you've typed in the code (it takes about a half hour), simply type the command RUN. The program begins at once, without a title page. It is a continuous loop program and requires a reset to interrupt. Have fun! ■

You can write to Brian Murphy and his daughter at 133 Post Road, Fairfield, CT 06430.

```
498 GET A$  
499 GR  
500 IF A$ = "A" THEN COLOR= 1  
501 IF A$ = "S" THEN COLOR= 2  
502 IF A$ = "D" THEN COLOR= 3  
503 IF A$ = "G" THEN COLOR= 5  
504 IF A$ = "F" THEN COLOR= 4  
505 IF A$ = "H" THEN COLOR= 6  
506 IF A$ = "J" THEN COLOR= 7  
507 IF A$ = "K" THEN COLOR= 8  
508 IF A$ = "L" THEN COLOR= 9  
509 IF A$ = ";" THEN COLOR= 10  
510 IF A$ = "X" THEN COLOR= 12  
511 IF A$ = "Z" THEN COLOR= 11  
512 IF A$ = "C" THEN COLOR= 13  
513 IF A$ = "V" THEN COLOR= 14  
514 IF A$ = "B" THEN COLOR= 15  
516 IF A$ = "N" THEN COLOR= 1  
517 IF A$ = "M" THEN COLOR= 2  
518 IF A$ = "M" THEN COLOR= 3  
519 IF A$ = "," THEN COLOR= 4  
520 IF A$ = "." THEN COLOR= 5  
521 IF A$ = "/" THEN COLOR= 6  
522 IF A$ = "Q" THEN COLOR= 7  
523 IF A$ = "W" THEN COLOR= 7  
524 IF A$ = "E" THEN COLOR= 8  
525 IF A$ = "R" THEN COLOR= 9
```

```
526 IF A$ = "T" THEN COLOR= 10  
527 IF A$ = "Y" THEN COLOR= 11  
528 IF A$ = "U" THEN COLOR= 12  
529 IF A$ = "I" THEN COLOR= 13  
530 IF A$ = "O" THEN COLOR= 14  
532 IF A$ = "P" THEN COLOR= 15  
533 IF A$ = "1" THEN COLOR= 1  
534 IF A$ = "2" THEN COLOR= 2  
535 IF A$ = "3" THEN COLOR= 3  
536 IF A$ = "4" THEN COLOR= 4  
537 IF A$ = "5" THEN COLOR= 5  
538 IF A$ = "6" THEN COLOR= 6  
539 IF A$ = "7" THEN COLOR= 7  
540 IF A$ = "8" THEN COLOR= 8  
541 IF A$ = "9" THEN COLOR= 9  
542 IF A$ = "0" THEN COLOR= 10  
543 IF A$ = ":" THEN COLOR= 11  
544 IF A$ = "--" THEN COLOR= 12  
545 IF A$ = " " THEN COLOR= 1  
1002 ZZ = 1  
1006 HLIN 0,36 AT ZZ  
1008 ZZ = ZZ + 1  
1010 IF ZZ = < 40 THEN GOTO 10  
06  
1011 PRINT "  
1012 GOTO 498
```

Program listing

BILL BUDGE:

Pinball's All-Time High Scorer



by Sam Whitmore

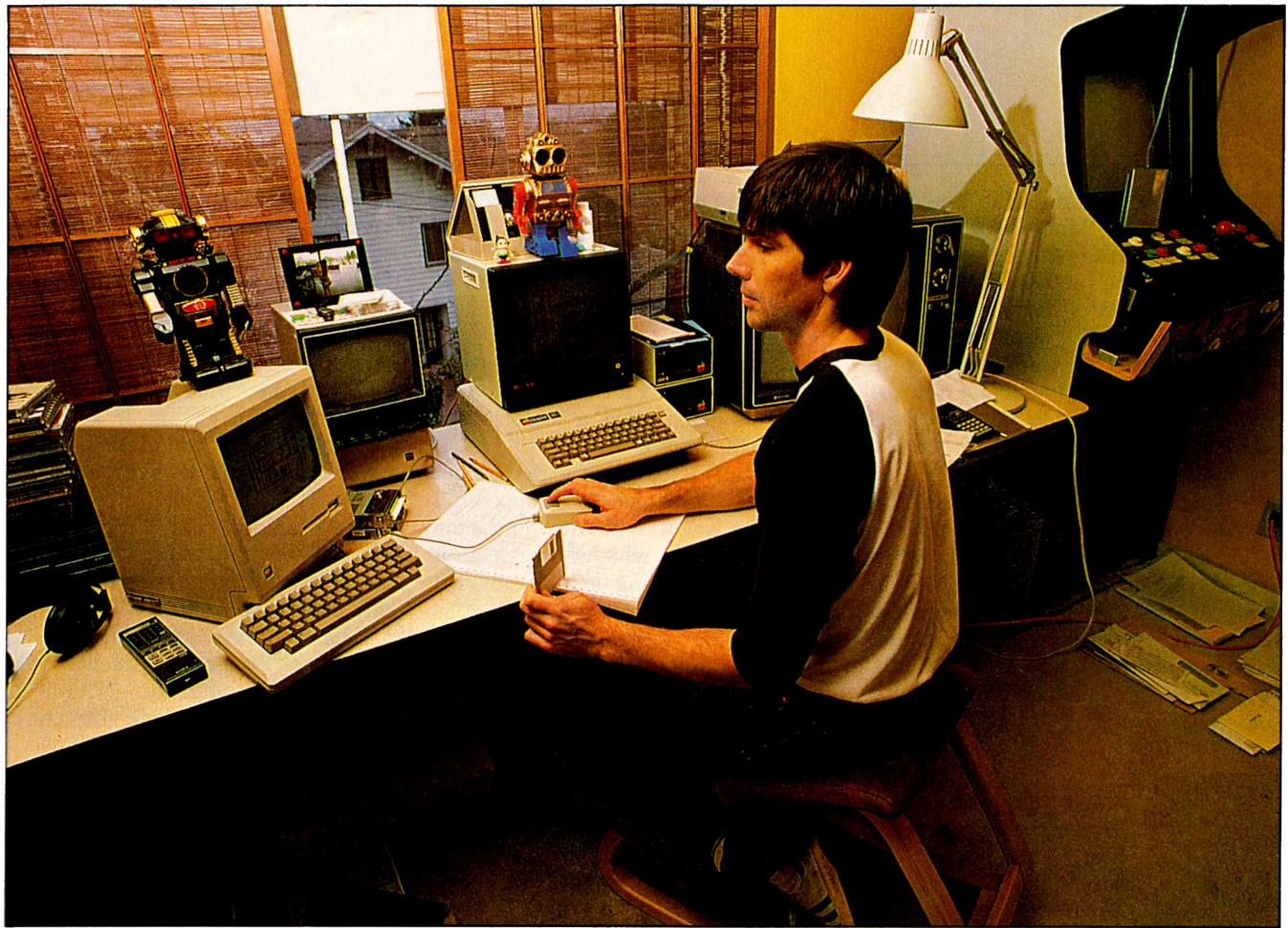
Bill Budge wants to be famous. To many he already is. When Apple Computer's Steve Wozniak described Budge's "Pinball Construction Set" as the best program ever written for an 8-bit computer, most micro-computer industry observers couldn't help but notice this photogenic, 30-year-old manchild.

"I don't want to just be famous," Budge says from his \$200,000 home in Piedmont, California. "I want to write programs that will make me famous. I don't want to be recognized on the street, or be famous just for being famous. I just want to be respected for

**"I want to write
programs that will
make me famous."**

**"I just want to be
respected for
my craft."**

**"Apple wants me
to do MousePaint
for the III . . ."**



my craft."

Budge's reputation rests thus far on two top-selling pinball programs. Shortly after leaving his job on Apple's Lisa project in 1981 Budge wrote "Raster Blaster," at that time a state-of-the-art adaption of pinball to the personal computer.

In 1982 Budge signed up with Electronic Arts (see related story) and created "Pinball Construction Set." This near-legendary program allows players to construct their own pinball game using endless combinations of bumpers, balls and flippers, and to define the game's physical properties like ac-

tion (how fast the ball bounces around) and gravity (how fast gravity pulls the ball down).

Budge's colleagues marveled at his ability to cram large amounts of computer instructions into an astonishingly small amount of memory. They were thunderstruck by the very idea of a "construction set" and the possibilities it presented.

"The main reason everyone respects Bill Budge is because he's not arrogant or a braggart," says Electronic Arts president Trip Hawkins, himself a former Apple employee and a friend of Budge's. "Bill doesn't let it all go to his

head, and he easily could."

Budge likes to stay busy. He writes a monthly column for a computer magazine and periodically visits large national retailers—as his Electronic Arts retainer specifies—to promote Electronic Arts games.

Last winter Apple Computer "borrowed" Budge, contracting him to adapt Macintosh's "MacPaint" graphics program to the Apple IIe and another Apple machine he declined to

Write to Sam Whitmore at 1 Clinton Ave., Danvers, MA 01923.

"I'd rather concentrate on the Macintosh."

"It's really a set of software development tools."

"I admit they won't have the payoff of a video game . . ."

specify (a new portable?). The new program, called "MousePaint," will be available later this year.

"Bill Atkinson [author of MacPaint] already did most of the work for me," Budge says. "Getting it on the IIe was more fun than anything else. Apple wants me to do MousePaint for the [Apple] III, which they say is shipping 2500 units a month. If that's the case, it probably would be worth it."

"To tell you the truth," he says, "I'd rather concentrate on the Macintosh."

Budge says he had a Mac months before its official release, and that it was love at first sight. "The Macintosh gives every program a consistent user interface, so that if you learn one program, you're familiar with all the others."

"The best part is that, as a programmer, I no longer have to write the software that makes up that user interface. It's all in ROM. So twenty percent of the programmer's work is eliminated right off the bat."

Budge will use the Mac to develop his next big project for Electronic Arts, which he describes as a "construction set construction set."

"It's really a set of software development tools," he explains. "I suppose I'll be sitting down with the marketing people to decide whether to release it as a product, or hang on to it and use it to develop even more products."

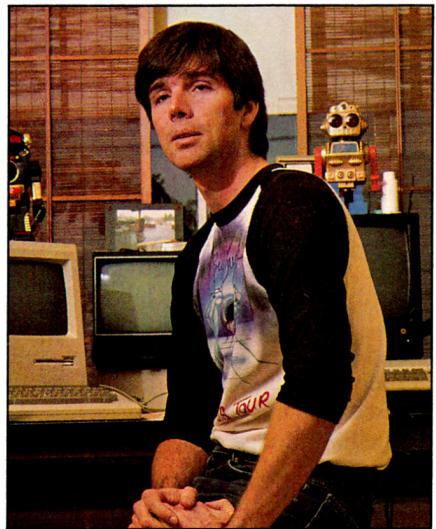
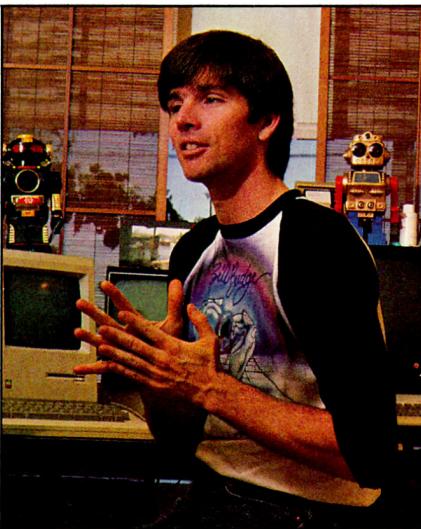
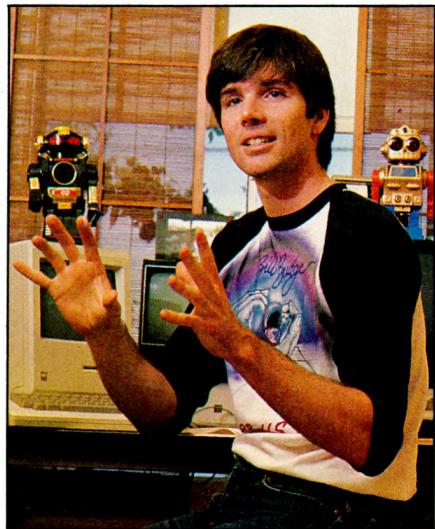
When the project is completed, Budge explains, users will have at hand the technology to develop their own kinds of construction sets. For

less-inventive users, Budge says he's working on ready-made model rocketry, dance, football play, office furniture, model train and roller coaster construction sets.

"The problem is, you can't make a program too difficult for the average person to use," Budge says. "Playing with a construction set is a lot like playing with a programming language—some will be better at it than others."

"All I can say is that if [the construction sets] are impossible for people to use, they won't come out. If I can simplify them enough, they will."

What will these construction sets actually do? "People can just play with them," Budge responds. "They'll be animation kits. I admit they won't



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have the payoff of a video game, but visually, they'll be much more exciting."

In the future, he says, programs will incorporate "real world" knowledge. "For example, the Pinball Construction kit doesn't really do anything—it just simulates a world where you can build things with bumpers and parts, but it doesn't ever try to tell you to do this or that," he says.

"Programs gradually will become more and more interactive, until some day people will wake up and say, 'Hey, these computers are pretty smart.'"

They may be smart, but they won't be as smart as people. "Getting a computer to understand what you say is one thing," he says, "and getting it to understand what you mean is

another."

Relates Budge: "Not too long ago two Carnegie-Mellon scientists wrote a program to enable a computer to analyze newspaper articles. To test it out they read it a story about the Pope's trip to a village ravaged by an earthquake. Well, after assessing the story, the computer concluded that the Pope was injured by the earthquake, or had somehow caused it. So at this point, there's little danger of science creating dangerous new intelligences more powerful than our own. We're protected from that by the difficulty of doing it."

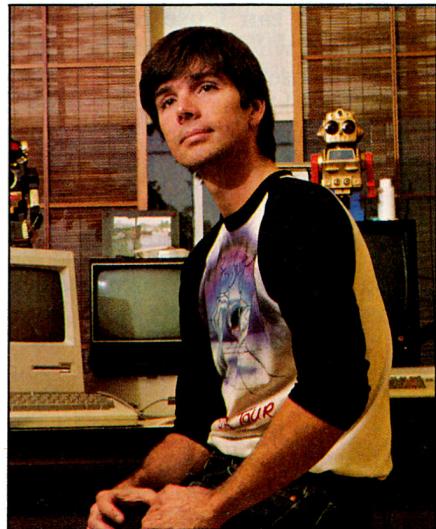
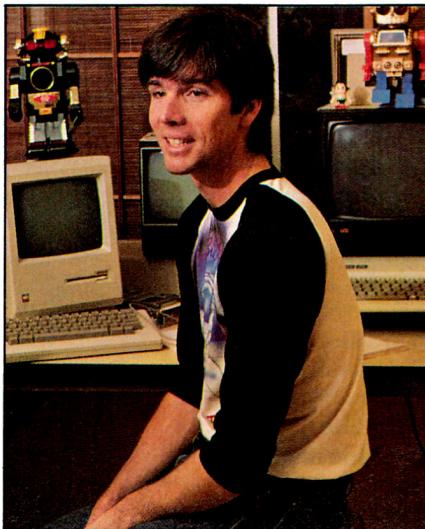
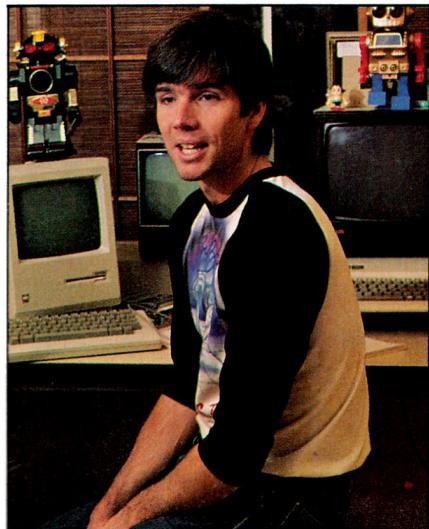
Budge, then, doesn't worry about the high-tech boogeyman—or much else, for that matter. He enjoys *Leave It to Beaver*, punk clothing and sci-

ence fiction. His business is monkey business.

"I hang out with the Macintosh people," he explains. "For fun we walk into an Apple dealership and ask the salesman all kinds of questions about the Mac. And I'll say, 'Hey, I hear the IBM PC is way better than this,' and then we watch 'em to see how they handle it."

"Or other times I get talking to pirates, and the pirates will say, 'Yeah, I have all of Budge's programs.' And I ask them how they did it, and they go on and on about how they did it—right to my face! Then I let them know who they're talking to, and you should see their faces. It's great fun."

Bill Budge is synonymous with fun. Long may he program. ■



"Then I let them know who they're talking to, and you should see their faces."

"Programs gradually will become more and more interactive..."

"The Pinball Construction kit . . . simulates a world . . ."

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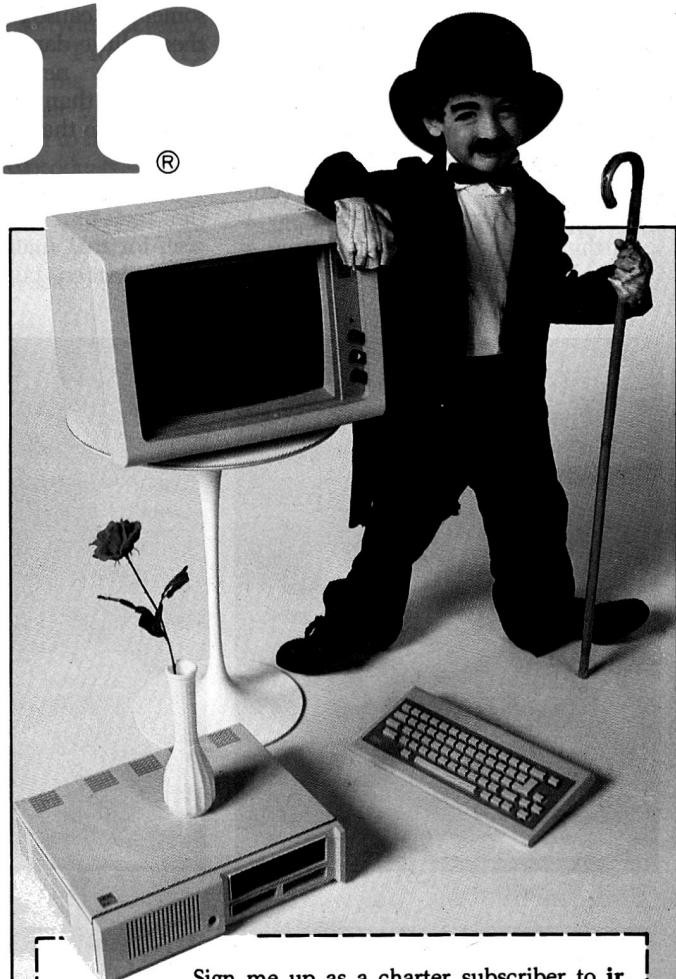
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Electronic Arts

Trip Hawkins has a successful game plan for his company. He has put the newest marketing together with the best programmers.

by Sam Whitmore

Americans spent \$2 billion on microcomputer software in 1983, research says, and they'll spend close to \$3 billion in 1984. That's a lot of cabbage—almost as much as the record and tape industry takes in. Therefore, software companies that can build an identity, create interesting, useful programs and market them intelligently are going to do very well. Electronic Arts can be one of those companies.

"Electronic Arts believes in cherishing creative talent and good ideas," says president Trip Hawkins. "We're totally committed to independent thinkers who have an obsession to create works of art."

Now there's a word that's been beaten to death—art. "We really do believe that what people like Bill Budge (see related story) do is an art form," asserts Hawkins. "We've tried to attract independent software artists who fit the mold. I'm talking about somebody who needs creative freedom so strongly that they don't want to be an employee of a company. It doesn't make any sense for a guy with Bill Budge's talent to stop for a moment and think about manufacturing, packaging, distribution, manuals, marketing and those things. The whole idea of Electronic Arts was to set up a company that can get done all the things necessary for our artists to get their products to the world."

This is not mere rhetoric. In only two years Hawkins has established for Electronic Arts a distinctively packaged product line, an equally distinctive marketing strategy and a reputation as a source of state-of-the-art programs. The ten Electronic Arts programs available for the Apple II line come packaged in laminated 10-inch record jackets replete with liner notes about the program, the artist and a bit about Electronic Arts itself. Their conventional design allows the software

packages to be displayed in record bins, which attract many millions of discretionary dollars annually. In computer stores, the programs are stocked in a slick chrome-and-plexiglass display case that Hawkins calls "the gallery." To combat pilferage, the jackets don't contain the floppy disk, but the buyer can peruse the liner notes to judge whether the program is interesting.

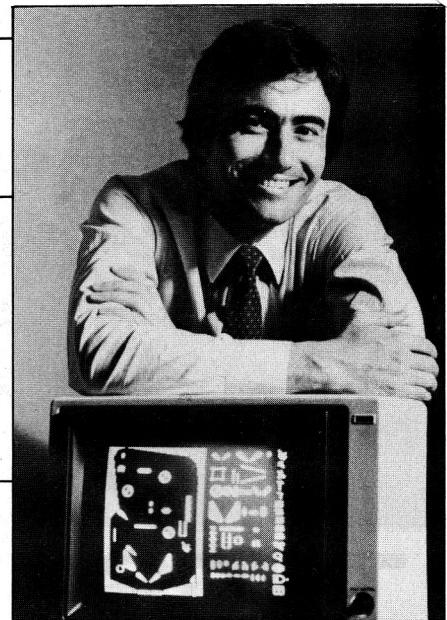
"Our intention was to encourage people to buy our products without requiring a demonstration," Hawkins says. "We wanted to give a feeling for the product through the packaging."

Electronic Arts brings the same innovative spirit to its marketing. Software companies usually use distributors to market their wares. Distributors buy products in bulk from manufacturers, mark up the price and in turn resell the products to retail stores. Manufacturers choose this method because they can get cash for their products quickly and can delegate to the distributor the responsibility of keeping retailers' shelves stocked.

Daring to be Different

Electronic Arts sells its software directly to retailers, skipping the middleman. Hawkins says this personal touch often transforms retailers into Electronic Arts sales reps. "It's too expensive to advertise enough so that people will buy your software," he says. "You can't go on television and say, 'Run out and buy Pinball Construction Set,' because most people don't have a computer in the first place. So we try to show the retailers that we adhere to good business practices, that we have consistently good products and that we support those products with lots of merchandising."

In 1978, as an Apple employee, Hawkins watched his company painfully dissolve its relationships with six



Electronic Arts president Trip Hawkins with Pinball Construction Set.

national distributors in order to inaugurate its own 200-store dealer network. The move gravely wounded the distributors, who were raking in millions. Three of the distributors sued Apple, and in the course of litigation neglected to pay Apple for the computers they already had bought.

"It's more expensive and more trouble, but if you believe that you're going to be a big company, it's better to go direct from the start," Hawkins says. "Distributors are concerned most with turning over their inventory. By law they're not required to observe your suggested list price, and they tend to 'cherry pick,' which means they'll take only the top sellers of your product line. Things like that prevent us from fully defining what Electronic Arts has to offer."

Hawkins says Electronic Arts takes an equally dim view of electronic distribution firms like PC Telemart of North Andover, Massachusetts and Xante Corp. of Tulsa, Oklahoma, the two early leaders in this fast-growing industry. To become part of an electronic distribution network, retailers install computer terminals in their stores. Customers use these terminals to order software from a central mainframe computer, which processes the order and transmits the desired software back to a floppy disk inside the retailer's terminal. Dot-matrix documentation and generic packaging are provided at the point of sale.

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"We want no part of electronic distribution," Trip Hawkins says. "I can't foresee retailers forking out \$15,000 to buy the machine and even more to keep it running, and I certainly can't see customers accepting the idea. I believe that people like the idea of going to a store, taking a product off the shelf and buying it. Using electronic distribution for software is like going into a record store, inserting a blank cassette into a machine and waiting for the machine to record the album for you. Who wants to do that?"

Star Programs

The real question should be: Is Electronic Arts software worth seeking out? In a word, it depends. The company does market unusual and enjoyable computer games. (Read about "Pinball Construction Set" in the accompanying article.) "Dr. J and Larry Bird Go One-on-One," written by Eric Hammond, is an unsurpassed computer simulation that equips an offensive player and a defensive player (or the Apple itself) with the programmed abilities of those two basketball superstars.

"Will Harvey's Music Construction Set" allows the user to arrange notes, sharps, flats, rests and other musical symbols onto a staff and have the Apple play that melody. Compositions can be saved to disk or immediately can be rearranged and played back. Music Construction Set can be fun for both musicians—who can use it to write their compositions—and for plain old music appreciators.

One of these days Electronic Arts will market a program conceived by pop artist Gahan Wilson. The technology to implement Wilson's bizarre ideas still hasn't arrived, Hawkins reports, but Wilson remains optimistic, and the best minds in San Mateo are working on the project.

Otherwise, Electronic Arts displays no more character than most of its rivals. It does boast critically well-received arcade games like Archon and M.U.L.E., but its children's educational programs and "home management" packages are mundane at best. Indeed, the better part of Electronic Arts' character rests in its image as star-making machinery for its programmers.

"I think we're being misrepresented," Hawkins says. "When you go back and look at things I've said or look at any of our advertisements, we don't use the word 'star' when we refer to our programmers. We use the word 'artist.'"

Words aren't the issue; what Electronic Arts really stands to gain is the ability to "presell" its programs. Just as a book publisher counts on revenue from a

famous author's forthcoming novel, software publishers one day will bank on a famous programmer's forthcoming program. Electronic Arts wants to create for gifted programmers the reputations they deserve, and then take those reputations and make a few bucks on them. That's no crime. That's life in the big city, which Electronic Arts happens to make a little bit more enjoyable. ■

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Parlez-vous français? Well, our son Jerry hoped to, so he signed up for his first French course this year, and needed an easy way to practice the vocabulary. So we created Flashcards to make the practice fun and also to keep score.

The program we created has three parts. FLASHCARDS presents word pairs in random order, keeps score and gives a second practice try after a miss. After a correct response, it beeps and offers a word of encouragement (the *hurray* words). LIST MAKER enables you to enter a list of word pairs, check them and save them. LIST EDITOR allows you to review a word list and make modifications. You can create a series of standard lists and save them as LST1, LST2, ... LST100, for example, then refer to them by number to save time in reading them in.

FLASHCARDS asks whether you want one of the up-to-100 standard lists or a list you have entered. After you specify the list, the computer reads

the text file and presents the words in random order. When you respond, the program beeps twice for a correct answer and displays a *hurray* word. An error brings one beep, the correct answer, and a chance to type the correct word to reinforce the correction. After each word pair, the score (number correct out of number presented) is displayed. After the entire set of words, you will see the final score and percent correct.

LIST MAKER is straightforward: You type the English word in the first column, press return, and type the French word in the second column. A "blank stripper" routine removes trailing blanks after an entered word. Excess blanks in the middle of a word (for example, *la maison* instead of *la maison*) are not stripped, so be careful. After you have entered the list, the program steps through it asking for confirmation that each pair is correct. If so, enter Y; otherwise, enter any other letter to be prompted for the cor-

rection.

The neatest way we have found to distinguish between the familiar and formal *you* (*tu* vs. *vous*) or masculine and feminine *they* (*ils* vs. *elles*) is to add (f.) for *familiar* or *feminine* to the English word. Accents are not possible with the standard American character set on the Apple, so you may need conventions for them as well. We place the acute accent (|), grave accent ('), cedilla (\$) and circumflex (^) immediately after the letter being accented.

As mentioned, standard lists can be saved as LST1, LST2, and so on, and then called up simply by asking for the appropriate number in FLASHCARDS. If you have special lists, you can give them their own names, and enter a 0, return, "filename" to read them into the computer.

Although the program will accept

Flashcards

Studying French? Learn the vocabulary
by flipping these CRT flashcards.

by Peter A. Lachenbruch and
Jerry P. Lachenbruch

lists of up to 50 word pairs, 20 or 30 is a practical maximum. We have set up special practice lists that are 30 word pairs long, for studying conjugations of some verbs, but a list of unrelated words that long would be tough for beginners.

One problem with flashcard practice is that no two languages have a one-to-one relationship between words. For example, the French word *à* can have many meanings depending on the context (to, by, and so on). The program, meanwhile, requires a single meaning for each word. It would be possible to allow for multiple acceptable answers, but this would increase the complexity of the program considerably.

LIST EDITOR is a subset of LIST MAKER that enables you to read in a file and make modifications without re-entering the entire list. With this subprogram, you verify the correctness of each word pair, changing the words you find incorrect. ■

Program listing, FLASHCARDS, including List Maker and List Editor.

```
1 REM
FRENCH FLASHCARDS PROGRAM
2 REM
BY PETER A. LACHENBRUCH. COPYRIGHT JUNE1983
5 DIM CN$(10),EF$(2,50),A(50):D$ = CHR$(4):G$ = CHR$(7): REM
SET UP HURRAY ARRAY (CN), VOCABULARY (EF), PERMUTATION ON LIST (A)
10 HOME : VTAB 6: PRINT "YOU MAY CHOOSE: " : PRINT TAB(5); "1. PRACTICE FLASHCARDS": PRINT TAB(5); "2. MAKE A LIST OF YOUR OWN": PRINT TAB(5); "3. EDIT AN OLD LIST": PRINT TAB(5); "4. QUIT"
20 VTAB 15: CALL - 958: INPUT "YOUR CHOICE: "; CH: IF INT(CH) < 1 OR CH < 1 OR CH > 4 THEN VTAB 21: PRINT G$; "ENTER AN INTEGER BETWEEN 1 AND 4": GOSUB 5000: GOTO 20
30 ON CH GOSUB 1000, 2000, 3000, 4000
40 GOTO 10
1000 REM
```

FLASHCARD DRILL SUBPROGRAM

Listing continued.

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Listing continued.

```
1020 DATA "BRAVO!", "HURRAY!", "GREAT!!", "WOW !! !", "NEAT NEAT NEAT", "SWELL !", "TERRIFIC !", "CHIS MO !", "ATTA WAY BABE !", "SUPER MAN!": REM
```

HURRAY WORDS

```
1030 FOR I = 1 TO 10: READ CN$(I): NEXT
1040 HOME : VTAB 6: PRINT "WHICH LIST DO YOU WANT?": PRINT
: PRINT TAB( 10); "0. MY OWN LIST": PRINT TAB( 1
0); "1. - 100. A STANDARD LIST": REM
```

CHOOSE LISTS

```
1050 FI$ = "":FL$ = ""
1060 VTAB 10: PRINT : INPUT "YOUR CHOICE: ";N: IF N <
0 OR N > 100 OR N < > INT (N) THEN PRINT G$;"E
NTER A NUMBER BETWEEN 0 AND 100": GOSUB 5000: VTAB
10: CALL - 958: GOTO 1060
1070 PRINT : IF N = 0 THEN INPUT "ENTER NAME OF YOUR
LIST": FI$: PRINT D$;"OPEN";FI$: PRINT D$;"READ
";FI$: INPUT NP: FOR I = 1 TO 2: FOR J = 1 TO NP:
INPUT EF$(I,J): NEXT : NEXT : PRINT D$;"CLOSE";F
I$: GOTO 1090: REM
```

READ OWN LIST

```
1080 FL$ = "LST" + STR$ (N): PRINT D$;"OPEN";FL$: PRINT
D$;"READ ";FL$: INPUT NP: FOR I = 1 TO 2: FOR J =
1 TO NP: INPUT EF$(I,J): NEXT : NEXT : PRINT D$;"C
LOSE";FL$: REM
```

READ A STANDARD LIST

```
1090 SC = 0: HOME : VTAB 6: PRINT "DO YOU WANT TO TRAN
SLATE": PRINT TAB( 10); "1. ENGLISH TO FRENCH": PRINT
TAB( 10); "2. FRENCH TO ENGLISH": PRINT
1100 INPUT "YOUR CHOICE": "IC: IF IC < > INT (IC) OR
IC < 1 OR IC > 2 THEN PRINT G$;"ENTER 1 OR 2": GOSUB
5000: GOTO 1090: REM
```

CHOOSE DIRECTION OF TRANSLATION

```
1110 M = NP:IT = 3 - IC: GOSUB 1210: FOR I = 1 TO NP: HOME
: VTAB 6: PRINT "NUMBER CORRECT= ";SC; SPC( 5); "O
UT OF ";I - 1:JJ = A(I):TR = 0: REM
```

RUNNING SCORE

```
1120 VTAB 8: CALL - 958: PRINT "WORD: ";EF$(IC, JJ): PRINT
: INPUT "TRANSLATION: ";TR$: GOSUB 1190: IF TR$ =
EF$(IT, JJ) THEN GOSUB 1180:SC = SC + 1 - TR: GOTO
1140: REM
```

PRESENT WORD AND GET ANSWER

```
1130 PRINT : PRINT G$;"SORRY, THE ANSWER IS ";EF$(IT,
JJ): GOSUB 5000: IF TR = 0 THEN TR = 1: GOTO 1120
: REM
```

ERROR, NOW PRACTICE THE WORD

```
1140 NEXT
1150 PRINT : PRINT "FINAL SCORE ";SC; " OUT OF ";NP: PRINT
: PRINT INT ((SC / NP) * 1000 + .5) / 10;" PER C
ENT": PRINT : PRINT "FILE NAME ";FI$ + FL$
1160 INPUT "DO YOU WANT TO CONTINUE (Y/N)? ";Y$: IF LEFT$(Y$, 1) =
"Y" THEN 1040
1170 RETURN
1180 J = INT ( RND (1) * 10) + 1: VTAB 15: PRINT TAB(
10);CN$(J);G$;G$: FOR IL = 1 TO 1000: NEXT : RETURN
: REM
```

RANDOM HURRAY WORD

```
1190 IF RIGHTS (TR$, 1) = " " THEN TR$ = MID$ (TR$, 1
, LEN (TR$) - 1): GOTO 1190: REM
```

REMOVE ANY BLANKS FROM RIGHT OF WORD

```
1200 RETURN
1210 FOR I = 1 TO M:A(I) = I: NEXT :M1 = M:M2 = M1 -
M + 1
```

```
1220 FOR J = M1 TO M2 STEP - 1:AB = INT ( RND (1) *
J) + 1:TM = A(J):A(J) = A(AB):A(AB) = TM: NEXT : RETURN : REM
```

GET A RANDOM PERMUTATION OF WORDS

```
2000 REM
```

Listing continued.

Listing continued.

```
LIST MAKER SEGMENT

2010 HOME : VTAB 6: PRINT "THIS PROGRAM MAKES LISTS O
F PAIRS ": PRINT : PRINT "OF WORDS. THE NUMBER O
F PAIRS MUST ": PRINT : PRINT "LESS THAN OR EQUAL
TO 50"
2015 VTAB 12: CALL - 958: INPUT "HOW MANY PAIRS? ";N
P: IF NP > 50 THEN VTAB 21: PRINT GS;"THE NUMBER
OF PAIRS IS TOO LARGE": GOSUB 5000: GOTO 2015
2020 HOME : VTAB 5: PRINT "ENGLISH"; TAB( 20); "FRENCH
": PRINT
2030 POKE 34,6: POKE 35,21: REM

SET TOP AND BOTTOM OF SCREEN

2040 FOR I = 1 TO NP: VY = PEEK (37) + 1: IF VY > 20 THEN
VTAB 7: VY = 7: HTAB 1: CALL - 958
2050 PRINT I; ". ";: INPUT EF$(1,I): VTAB VY: HTAB 20:
INPUT EF$(2,I): NEXT
2060 POKE 34,5: HOME : VTAB 3: VTAB 6
2070 FOR I = 1 TO NP: PRINT I; ". ";EF$(1,I); TAB( 20)
;EF$(2,I): PRINT : REM

PRINT WORD PAIRS

2080 INPUT "IF CORRECT ENTER Y: ";YS: IF LEFT$(YS,1
) = "Y" THEN 2100
2090 INPUT "ENGLISH: ";EF$(1,I): INPUT "FRENCH: ";EF$
(2,I): GOTO 2080: REM

MAKE CHANGES

2100 NEXT
2110 INPUT "ENTER LIST NAME: ";FI$: PRINT DS; "OPEN"; F
I$: PRINT DS; "DELETE"; FI$
2120 PRINT DS; "OPEN ";FI$: PRINT DS; "WRITE"; FI$: PRINT
NP: FOR I = 1 TO 2: FOR J = 1 TO NP: PRINT EF$(I,
J): NEXT : NEXT : PRINT DS; "CLOSE ";FI$: POKE 34,
0: POKE 35,24: REM

WRITES # WORDS AND WORD LIST

2130 INPUT "DO YOU WANT TO MAKE ANOTHER LIST? ";YS: IF
LEFT$(YS,1) = "Y" THEN 2010
2140 RETURN
3000 REM

LIST EDITOR - ALLOWS YOU TO CHANGE AN EXISTING LIST
WITHOUT COMPLETELY RE-ENTERING IT

3020 HOME : VTAB 6: PRINT "THIS PROGRAM ALLOWS YOU TO
EDIT AN": PRINT : PRINT "EXISTING FLASHCARD FILE
"
3030 PRINT : INPUT "ENTER THE FILE NAME: ";FI$
3040 PRINT DS; "OPEN ";FI$: PRINT DS; "READ"; FI$: INPUT
NP: FOR I = 1 TO 2: FOR J = 1 TO NP: INPUT EF$(I,
J): NEXT : NEXT : PRINT DS; "CLOSE ";FI$
3050 PRINT "ENGLISH"; TAB( 20); "FRENCH"
3060 FOR J = 1 TO NP
3070 PRINT EF$(1,J); TAB( 20); EF$(2,J): INPUT "TYPE Y
IF OK: ";YS: IF LEFT$(YS,1) < > "Y" THEN GOSUB
3130: GOTO 3070
3080 WS = EF$(1,J): GOSUB 3140: EF$(1,J) = WS: WS = EF$(
2,J): GOSUB 3140: EF$(2,J) = WS: NEXT : REM

STRIP BLANKS OFF RIGHT

3090 INPUT "SAME FILE NAME (Y/N)? ";YS: IF LEFT$(YS
,1) < > "Y" THEN INPUT "ENTER NEW FILE NAME: ";
FI$
3100 PRINT DS; "OPEN"; FI$: PRINT DS; "DELETE"; FI$: PRINT
DS; "OPEN"; FI$: PRINT DS; "WRITE"; FI$: PRINT NP: FOR
I = 1 TO 2: FOR J = 1 TO NP: PRINT EF$(I,J): NEXT
: NEXT : PRINT DS; "CLOSE ";FI$
3110 INPUT "MORE EDITING (Y/N)? ";YS: IF LEFT$(YS,1
) = "Y" THEN 3020
3120 RETURN
3130 INPUT "ENGLISH: ";EF$(1,J): INPUT " FRENCH: ";E
F$(2,J): RETURN
3140 IF RIGHTS$(WS,1) = " " THEN WS = MID$(WS,1, LEN
(WS) - 1): GOTO 3140
3160 RETURN : REM

LINES 3140 TO 3160 ARE THE BLANK STRIPPER

4000 HOME : VTAB 6: PRINT "THANKS FOR TRYING THIS PRO
GRAM, ": PRINT : PRINT "KEEP PRACTICING AND IT WI
LL GET EASIER": END
5000 VTAB 24: PRINT "PRESS <<SPACE>> TO CONTINUE": GET
AS: VTAB 20: HTAB 1: CALL - 958: RETURN
```

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Hunting the Elusive ASCII

Join us on an adventure into the deepest recesses of screen coding! Are you intrepid enough to discover the true nature of ASCII?

by Arsen Darnay

Some of us are cursed with the need to know how things work. From time to time we snag on some detail and can't rest until we've tracked the answer to its lair. I've just come back from such a safari. Been hunting ASCII. And here's my trip report.

ASCII in General

What's so elusive about ASCII? Most people know that the abbreviation stands for American Standard Code for Information Interchange. Computers handle only numbers; letters must be turned into numbers to be recognized. ASCII is the convention for assigning numerical values to typographical symbols. The whole business is rather straightforward—or so it

seems. I became intrigued when I noticed that two different ASCII codes produce the same result.

Take the letter 'A,' for instance. The commands `PRINT CHR$(65)` and `PRINT CHR$(193)` will both produce an A on screen. But if you compare them to one another, they behave like different letters. Type `CHR$(65) = CHR$(193)` and press return. Apple will return a zero. It thinks that the statement is *false*. Your eyes show you the same letter A. I wondered what was going on, and that was my point of departure.

So let's take a closer look at ASCII. The standard code assigns the values from 0-127 to 128 control characters and typographical symbols (see Fig. 1). If you place one of these values into

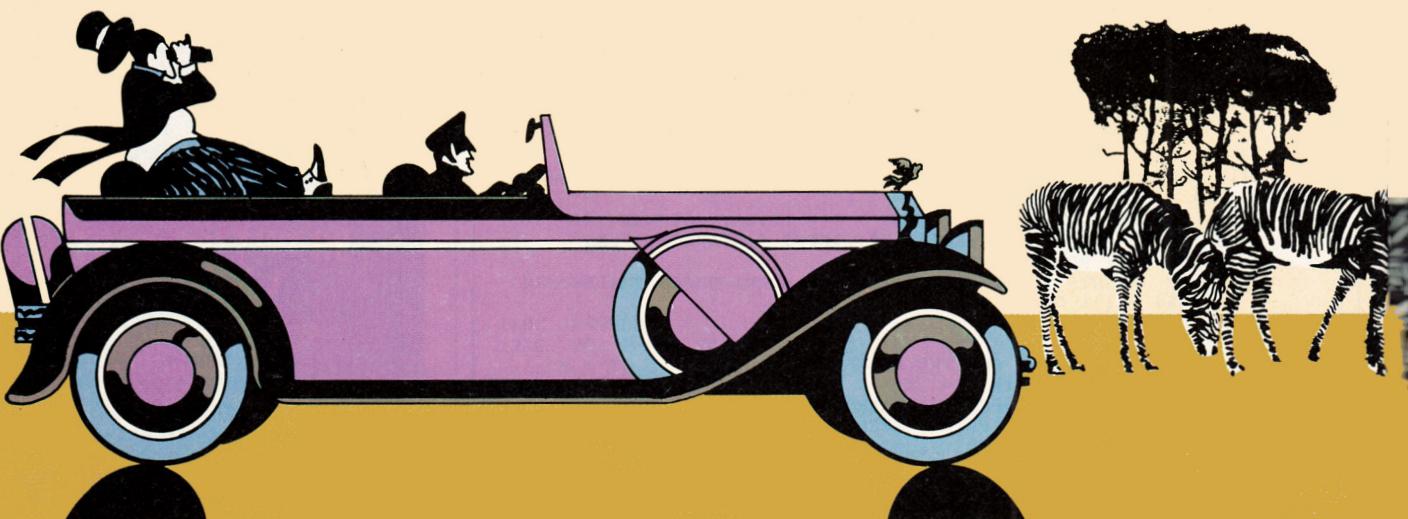
the `CHR$(X)` command in Basic you will see the corresponding symbol on-screen. Yet Apple also permits you to use a higher set of numbers—from 128 to 255. Thus, ASCII 7 and 135 will both produce the bell. Both return control-G, in other words. The difference between them must be on the level of bits and bytes.

If you look at the number 127, you will discover that it's the highest value that the first seven bits of a byte can produce:

Bit Number	8	7	6	5	4	3	2	1
Bit Value	0	64	+ 32	+ 16	+ 8	+ 4	+ 2	+ 1

Add up the values shown, and you

Write to Arsen J. Darnay at 23 W. St. Albans Road, Hopkins, MN 55343.



have 127 or, in binary notation, 01111111. The conventional ASCII notation, in other words, uses only the first seven bits of a byte; it leaves the eighth or highest bit free.

Now let's compare the two kinds of A that Apple recognizes. At the level of a byte, the situation looks like this:

ASCII 65	01000001
ASCII 193	11000001

The two values are identical in all ways but one. In the ASCII 193 version, *the high bit is set*. The high bit is worth 128 (64×2), and $65 + 128 = 193$.

As you noodle around with these two representations of A inside the Apple, you'll discover that Basic holds letters in lower ASCII (0-127), whereas the Apple itself, for purposes of display, converts the values to higher ASCII (128-255). Enter the following program:

```

100 HOME
120 FOR I = 0 TO 127
130 PRINT CHR$(I);
140 NEXT

```

What you will get when you run this program will depend on your Apple or how it is equipped. 'Out of the crate' Apple II's and II Pluses will not produce the lowercase letters nor certain other symbols on-screen. The IIe will. In place of the lowercase letters, the II and II Plus will start over again with the space, !, ", and # sequence. The control characters won't show up, although you'll hear control-G (ASCII 7) beeping.

If you modify line 120 in this exam-

Figure 1. Standard ASCII character codes.

STANDARD ASCII CHARACTER CODES

Decimal	Hex	Key	Tradit.	Name (1)	Function
0	\$00	CTRL-@	NULL		
1	\$01	CTRL-A	SOH		
2	\$02	CTRL-B	STX		
3	\$03	CTRL-C	ETX		Stop Running Program
4	\$04	CTRL-D	ET		DOS Flag
5	\$05	CTRL-E	ENQ		
6	\$06	CTRL-F	ACK		
7	\$07	CTRL-G	BEL		Bell
8	\$08	CTRL-H	BS		Backspace, Left Arrow
9	\$09	CTRL-I	HT		Tab
10	\$0A	CTRL-J	LF		Linefeed, Down Arrow (IIe)
11	\$0B	CTRL-K	VT		Up Arrow (IIe)
12	\$0C	CTRL-L	FF		Form Feed
13	\$0D	CTRL-M	CR		RETURN
14	\$0E	CTRL-N	SO		
15	\$0F	CTRL-O	SI		
16	\$10	CTRL-P	DLE		
17	\$11	CTRL-Q	DC1		
18	\$12	CTRL-R	DC2		
19	\$13	CTRL-S	DC3		Stop listing program
20	\$14	CTRL-T	DC4		
21	\$15	CTRL-U	NAK		Right Arrow
22	\$16	CTRL-V	SYN		
23	\$17	CTRL-W	ETB		
24	\$18	CTRL-X	CAN		Cancel Line
25	\$19	CTRL-Y	EM		
26	\$1A	CTRL-Z	SUB		
27	\$1B	ESC	ESC		
28	\$1C	None	FS		
29	\$1D	None	GS		
30	\$1E	None	RS		
31	\$1F	None	US		
32	\$20	SPACE			
33	\$21	!			
34	\$22	"			
35	\$23	#			
36	\$24	\$			
37	\$25	%			
38	\$26	&			
39	\$27	/			
40	\$28	<			

(1) As used in Telecommunications.

Figure continued.



Figure continued.

Decimal	Hexadecimal	Key	Decimal	Hexadecimal	Key
41	\$29)	85	\$55	U
42	\$2A	*	86	\$56	V
43	\$2B	+	87	\$57	W
44	\$2C	,	88	\$58	X
45	\$2D	-	89	\$59	Y
46	\$2E	.	90	\$5A	Z
47	\$2F	/	91	\$5B	[
48	\$30	0	92	\$5C	\
49	\$31	1	93	\$5D]
50	\$32	2	94	\$5E	^
51	\$33	3	95	\$5F	-
52	\$34	4	96	\$60	space(2)
53	\$35	5	97	\$61	a
54	\$36	6	98	\$62	b
55	\$37	7	99	\$63	c
56	\$38	8	100	\$64	d
57	\$39	9	101	\$65	e
58	\$3A	:	102	\$66	f
59	\$3B	;	103	\$67	g
60	\$3C	<	104	\$68	h
61	\$3D	=	105	\$69	i
62	\$3E	>	106	\$6A	j
63	\$3F	?	107	\$6B	k
64	\$40	ä	108	\$6C	l
65	\$41	Ä	109	\$6D	m
66	\$42	ß	110	\$6E	n
67	\$43	C	111	\$6F	o
68	\$44	D	112	\$70	p
69	\$45	E	113	\$71	q
70	\$46	F	114	\$72	r
71	\$47	G	115	\$73	s
72	\$48	H	116	\$74	t
73	\$49	I	117	\$75	u
74	\$4A	J	118	\$76	v
75	\$4B	K	119	\$77	w

Figure continued.

ple to read FOR I = 128 TO 255, you'll get the same result. The Apple treats the ASCII values, plus 128, the same way as it treats the ASCII values themselves.

Modify these programs so that they will print to your printer, and you will notice that this time even the Apple II and II Plus are producing lowercase letters. These models of the Apple don't have lowercase *fonts*, but your printer does. And with that we'll have to go a little deeper into the jungle.

Fonts

Why Apple uses 'higher' ASCII for its internal purposes is linked to its modes of forming letters for presentation on the screen.

The image on the screen is generated directly by hardware. The Apple sends a stream of bits to the video output; the bits are displayed on the screen. Those set to 0 are blank; those

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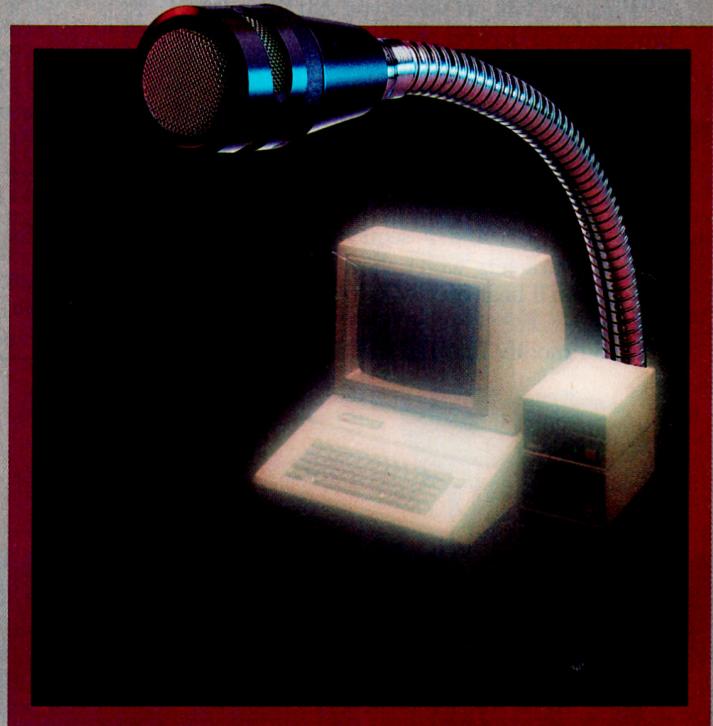
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Figure continued.

76	\$4C	L	120	\$78	x
77	\$4D	M	121	\$79	y
78	\$4E	N	122	\$7A	z
79	\$4F	O	123	\$7B	~
80	\$50	P	124	\$7C	!
81	\$51	Q	125	\$7D)
82	\$52	R	126	\$7E	~
83	\$53	S	127	\$7F	Delete
84	\$54	T			

(2) On the IIe, this produces a left-leaning single quote (').

set to 1 show up as tiny dots. A blank screen means that all bits sent to the screen are zero. The signal is sent to the screen of 280 dots across and 192 lines of dots from top to bottom. That 280×192 matrix is probably familiar to you from high-resolution graphics.

How does Apple know *what* bits to send to the screen? It looks in specific areas of memory such as the text page, which consists of 1,024 locations (from 1024 to 2047—that coincidence of page length and starting address is just that, coincidence). Of these locations, only 960 are used for display. The number comes from 40 columns times 24 lines. For every on-screen spot, memory holds one byte. It's by reading this byte that Apple knows what to display.

Each position on the screen is made up of 56 dots: 280 divided by 40 yields 7, 192 divided by 24 yields 8, and 7 times 8 is 56. Thus, each character on

screen (and the spaces that separate it from other characters) must be shown by 56 separate bits. However, one byte holds only eight bits! How can *one* byte in the Text Page memory produce 56 bits on screen? Here is where character fonts come into play.

Fonts in the Apple are groupings of bytes in read-only memory. One group of eight bytes makes up a letter. The best way to illustrate this is with a picture of the letter A encoded in bytes.

Do you see the shape of the A? The character 'block' consists of eight lines and seven columns. The letter itself is within a 5×7 matrix, leaving room on both sides and the top so that the letters won't 'fuse' into each other.

0000000	byte value:	0
0001000		8
0010100		20
0100010		34
0100010		34
0111110		62
0100010		34
0100010		34

Since each pattern requires eight bytes and seven bits per byte, Apple must find eight bytes stored somewhere in memory to display a letter. If the lowercase 'a' is not stored somewhere, it cannot be produced. On the II and II Plus (unless modified), the following pattern is not in memory and hence won't show on-screen:

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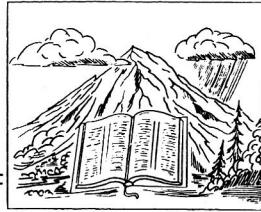
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— SOFTWARE REVIEW
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0000000
0000000
0000000
0011000
0000100
0011100
0100100
0011010

On the Apple IIe the pattern is in memory and hence shows. (Trace over this pattern with a pen, and the shape will emerge.) Here is how a character appears on-screen:

- (1) Apple scans through the text page memory;
- (2) it interprets the one-byte values it finds there;
- (3) it fetches eight bytes from ROM for every screen position;
- (4) it sends them to the video output in a stream of bits;
- (5) characters appear on-screen; and
- (6) the process starts all over again.

This happens many times each second; each time, 280×192 or 53,760 bits rush to the screen, each bit either on or off. The Apple's character gener-

ator, in effect, performs much like a plotting program. It places bright or dark dots on-screen based on codes stored in the text area of memory.

Let's say that the letter A is typed as the first character on top of the screen. The first location of the text memory will hold the one-byte value of 193 (\$C1 in hexadecimal). Why the value is 193 rather than 65 will emerge by-and-by. Suffice it to say here that that code, 193, will generate signals held in *eight* bytes of a character font. Those values will be 0, 8, 20, 34, 34, 62, 34, and 34. Those signals will produce a block of dots, some off, some on, forming a 7×8 matrix at the extreme upper left hand of the screen. One byte of text page memory triggers the automatic display of *eight* bytes of display.

Text Versus Graphics

If text is printed to a screen that is

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```

100 REM HI RES A'S
102 :
104 REM DEMONSTRATES HOW TO
106 REM MAKE A SMALL LETTER
108 REM ON THE HIGH RES
110 REM SCREEN.
112 :
200 HGR
210 P = 8192
220 FOR K = 1 TO 2
240 FOR I = 0 TO 7168 STEP 1024
250 READ N
260 POKE P + I, N
270 NEXT I
280 P = P + 1
290 NEXT K
300 RESTORE
310 IF P < 8192 + 40 THEN 220
320 END
330 :
340 DATA 0,0,0,12,16,28,18,44
350 DATA 0,8,20,34,34,62,34,34
360 :
370 REM 8192 IS START OF
380 REM THE HI-RES SCREEN.
390 REM EACH LINE OF DOTS
400 REM FORMING A LETTER
410 REM IS 8192 + 1024
420 REM MEMORY LOCATIONS
430 REM APART.
440 REM
450 REM IN LINE 280, 8192
460 REM IS INCREMENTED SO
470 REM THAT THE NEXT
480 REM CHARACTER CAN BE
490 REM PRINTED. THIS IS
500 REM DONE 40 TIMES FOR
510 REM ONE LINE OF
520 REM LETTERS.
530 REM
540 REM DATA IN LINE 340
550 REM MAKE THE SMALL
560 REM A. LINE 350 FORMS
570 REM THE CAPITAL A.
580 REM THE LETTERS MUST BE
590 REM 'BACKWARDS' TO COME
600 REM OUT RIGHT!!

```

Program listing. HI RES A's.

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organized exactly like the high-resolution graphics output, why can't we write on the hi-res page or, conversely, plot on the text page? The high resolution page is 'bit mapped,' whereas the text page is not. In the hi-res mode, eight times more memory locations must be programmed to create a screenful of display than in the text mode. In text, you put one value into memory (the ASCII code number—by hitting a key or otherwise) and eight bytes come back automatically. In hi-res, the same result will require putting eight values into memory first. You can write letters on the hi-res page if you care to code them in, eight dots-lines per letter.

In hi-res, one byte of memory controls seven dots on the screen. (The eighth bit is not shown; it's used to code for color.) One dot-line across the screen is 280 dots wide; $280 \div 7 = 40$; 40 bytes are required for one very narrow part of the screen. We have 192 dot-lines to plot. So 40×192 or 7,680 bytes are needed to paint a graphics

screen. That compares with 960 bytes for a screen of words. (The block of memory dedicated to a graphics page is actually 8,192 bytes long, but not all bytes are used for on-screen display.)

The program HI RES A's—see Program listing—will print a line of alternating lowercase and capital A's on your hi-res screen and might give you the impetus for some hunting of your own.

Screen ASCII

Now that we understand the territory a little better, let's plod into the deepest part—screen ASCII.

The Apple can generate normal, inverted, and flashing characters. To produce these symbols, the computer has to have a code in the appropriate location of the text page memory. Each location is only one byte. How, then, will the Apple know whether you want normal, inverse, or flashing display? That one byte, after all, must hold this information.

Apple's designers have solved this problem by producing three special variants on the ASCII code. They use 256 values to encode *three* character codes, as follows:

- 0–63 are used for inverted characters. Bits 7 and 8 are always off (set to zero).
- 64–127 are used for flashing display. Bit 7 is always on, bit 8 is still off.
- 128–255 are for normal display. Bit 8 is always on.

The maximum value that six bits can produce is 63. This limits the number of characters that can be coded to 64–0 plus the other 63. Sixty-four 'spots' are just sufficient to produce the uppercase alphabet, the numerals, and the main typographical symbols.

The *inverse* screen code begins with the ampersand—it has the value of 0; A is 1, B is 2, and so on up to the question mark at 63. The *flashing* screen code begins at 64 with the ampersand; A is 65, B is 66, etc. The series goes to 127 (the question mark).

Notice what has happened. The conventional ASCII sequence (0–127) has been split in half. Where the control characters used to be, we now have inverted letters. The numerals and typographical marks are still

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Screen Code Number	Apple II, II+	Primary Set	Apple IIe
			Alternate Set
0-31	Uppercase Inverse	Uppercase Inverse	Uppercase Inverse
32-63	Special Inverse	Special Inverse	Special Inverse
64-95	Uppercase Flash	Uppercase Flash	Uppercase Inverse
96-127	Special Flash	Special Flash	Lowercase Inverse
128-159	Control Charact.	Uppercase Normal	Uppercase Normal
160-191	Special Normal	Special Normal	Special Normal
192-223	Uppercase Normal	Uppercase Normal	Uppercase Normal
224-255	Special Normal	Lowercase Normal	Lowercase Normal

Notes:

No lowercase at all unless specially equipped.	No lowercase Inverse or Flashing modes.	No Flash in any mode. Gives Inverse lowercase.
--	---	--

'Special' means typographical marks, math operators, and the numerals.

Figure 2. Screen codes for Apple II, II Plus, and IIe.

Command	Screen Memory	On Screen
PRINT CHR\$(65)	\$C1 (193)	A
PRINT CHR\$(193)	\$C1 (193)	A
INVERSE: PRINT CHR\$(65)	\$01 (1)	Inverted A
INVERSE: PRINT CHR\$(193)	\$01 (1)	Inverted A
FLASH: PRINT CHR\$(65)	\$41 (65)	Flashing A
FLASH: PRINT CHR\$(193)	\$41 (65)	Flashing A
NORMAL: PRINT "A"	\$C1 (193)	A

Figure 3. Relationships between screen code and ASCII code.

where they are in the standard code, but inverted. Where the uppercase letters should be, we now have flashing capitals; and in place of the lowercase letters we have flashing numerals and typographical symbols (see Figure 2). By sacrificing the control characters (which you don't need to see anyway) and the lowercase letters, we get *two* sets of symbols, inverted and flashing, out of seven bits.

The third screen code is for normal display. Here the eighth bit is always on; the range extends from 128 to 255. The control characters (128-159) generally don't appear; the visible sequence begins with the space, !, ", # series; the ampersand is 192, A is 193, B is 194, and so on. A normal A is always coded as 193 for display purposes—even if you give it to the machine as 65, as in PRINT CHR\$(65).

Keep in mind that this is *screen* code. You can't type PRINT CHR\$(1) and expect to get an inverse A (I thought I could and learned otherwise). But if you say INVERSE: PRINT CHR\$(65), the screen memory will hold a 1. Figure 3 shows the relationship.

The eight-bit limit on screen coding is the reason why no Apple displays flashing lowercase letters. The byte has no room to flag that condition.

Inverse and Flash

How are inverse and flash created? Refer back to the diagram in the text of the A made of zeroes and ones, and imagine that letter 'inverted.' Ones replace zeroes, and zeroes ones. That's inverse. To 'print' an inverse character, the Apple doesn't need a special font. It just 'flips' the image when it encounters the INVERSE command.

The flashing display is merely the very rapid shifting between the normal and the inverse mode, made possible because the screen is continually 'refreshed.' The character generator is always sending signals to the video, and when the FLASH code is in a memory location, inverse and normal transmissions alternate.

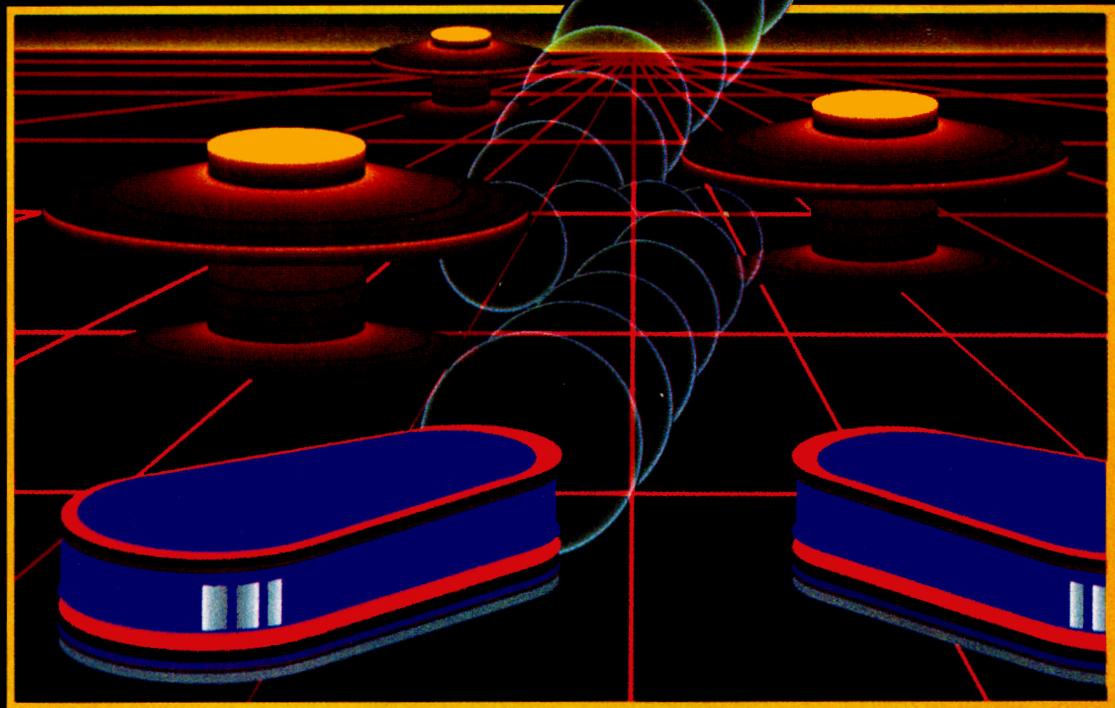
Know more about ASCII than you ever wanted to know? I'm sorry. For some of us, hunting is such a passion that we can't rest until the trophy is tamely hanging above the fireplace. ■

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by Kenneth A. Deitcher, M.D.

To make my slide programs more professional and interesting, I use an Apple II Plus and a Gibson light pen to generate slide titles. My system has 64K of memory, two disk drives, and a standard 18-inch color television set.

The Gibson LP II allows you to draw a black and white image directly on the color monitor screen. In the edit mode, you can correct irregularities of the freehand drawing, deleting or adding black or white pixels and saving the completed drawing. The final image is saved to the disk by touching the pen to the appropriate spot on the screen and typing the name given to your drawing.



The images can be drawn symmetrically in the vertical or the horizontal axis or both to create a frame in which to insert text for a title. A touch of the pen fills the design in the frame with color. Over 100 color patterns are included on the disk and you can design your own patterns with a program called Penpainter. The only require-

ment for a good design is to make sure all lines are complete. If any gaps exist, the color will run into other areas.

You can add or change color patterns any number of times, then your completed picture can be saved and photographed. I keep all my initial uncolored drawings on a separate disk in case I want to make a different color design in the future. Once a drawing is colored in, no further manipulation can be carried out with the light pen.

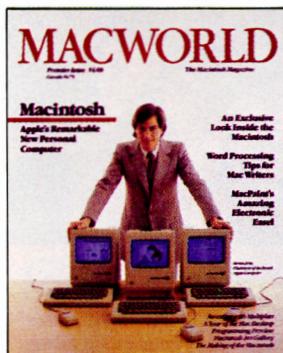
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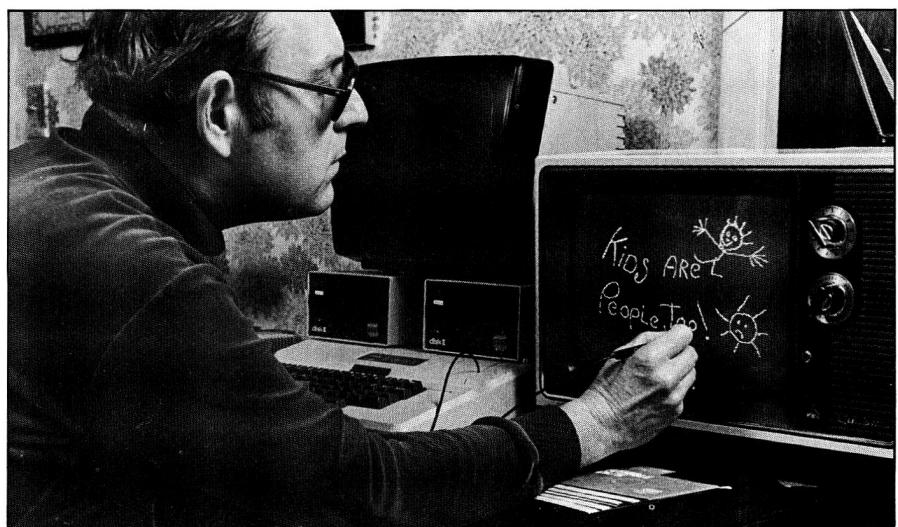
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modify and add various sized text and font styles, in colors, to the title slide. I use Rainbow Writer by Personal Software, Alpha Plot, and Apple Mechanic with Typefaces, all by Beagle Brothers. Rainbow Writer lets you enter text anywhere on your slide in eight sizes and colors. Alpha Plot draws lines, circles and rectangles within your frame, and shifts and merges several images. Apple Mechanic and Typefaces add over 30 different font styles.

The average time to make a slide is 15 minutes. The slide titles, when complete, are saved to disk. At this point, I photograph my creation on 35mm color slide film. The camera I use is a Canon A1 with a 70-210mm macro-zoom lens set on macro mode. The camera is placed on a tripod approximately two feet from the color monitor. I use daylight color slide film (I prefer Fujichrome with an ASA of 100). I set my lens aperture at f22 and set my camera on programmed aperture-preferred mode. This allows the camera to select the appropriate speed



The author using the Gibson light pen.

for the f-stop. In this case, the speed is usually around 1/15 to 1/30 second, and at this speed I get no scanning lines. The exposure is made in a completely darkened room to avoid reflections. The best photographs are obtained from slides with a black back-

ground, and, to get deeper color saturation, I underexpose the film slightly. Using a 36-frame roll of color slide film with some bracketing, the cost of a slide is approximately 50 to 75 cents, including processing and mounting. ■



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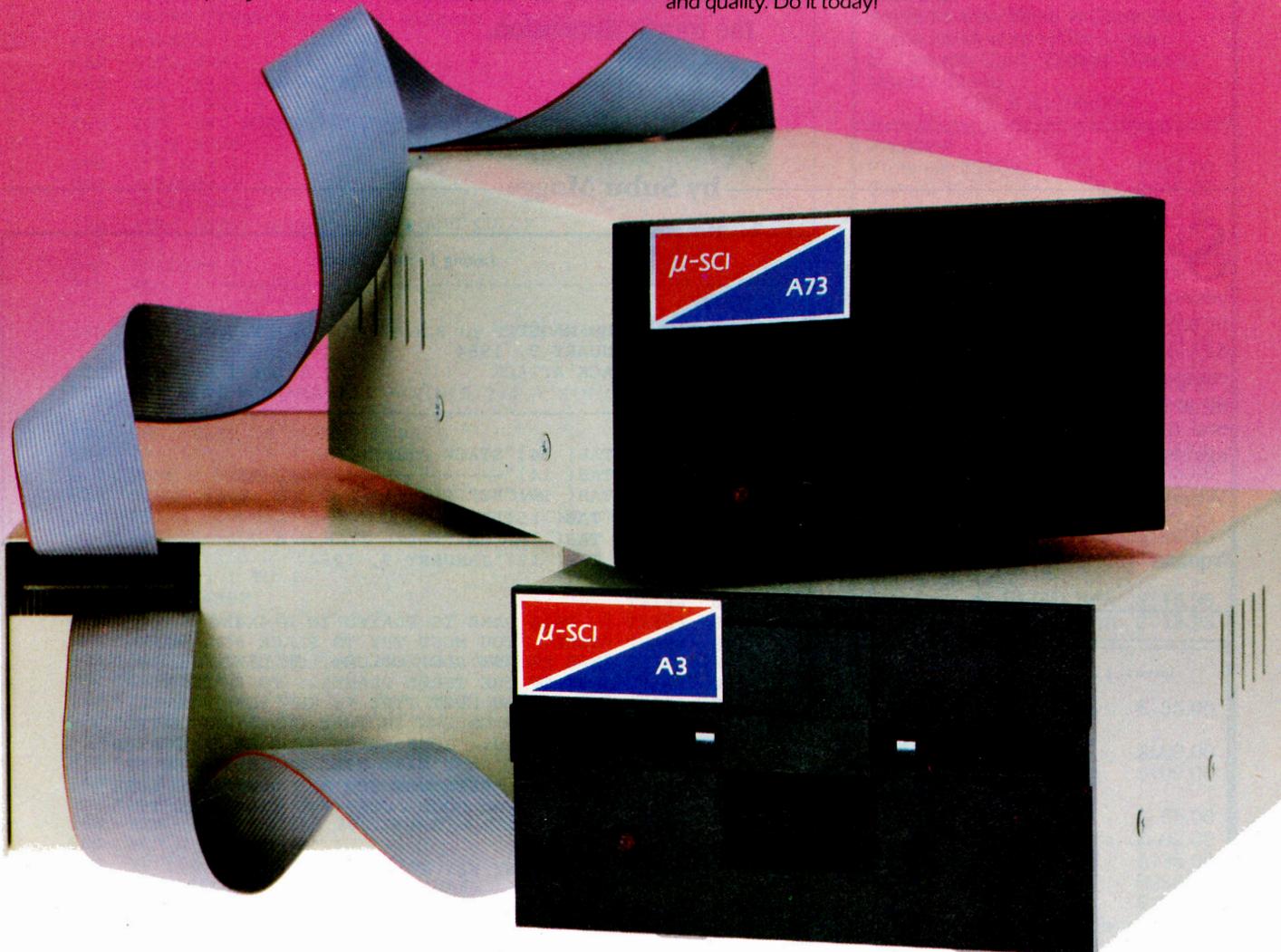
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Stack Attack

From scratch paper to fogged-up glass to your computer screen, the enduring popularity of tick-tack-toe enters the fourth dimension.

by Subu Magge

Stack Attack (Listing 1) is a hi-res strategy game pitting you against your computer to place four markers in any row, column, or diagonal of a 4-by-4-by-4 cube. White X's indicate computer moves and your moves show up as red O's. You'll have to think several moves ahead if you want to win against the computer's strategy.

Winning Combinations

The "game board" has 64 numbered "squares" (Figure 1), stored in the array

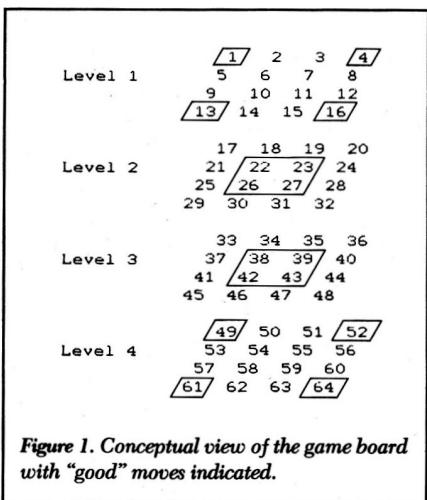


Figure 1. Conceptual view of the game board with "good" moves indicated.

X(64). If you occupy a square, the corresponding square number in this array has a value of 1. The quantity of -.3 indicates a computer square. There are 76 possible combinations for winning moves. The computer stores the combinations in M(76,4); the first

Any questions can be directed to Subu Magge at 9875 Fox Hollow Lane, Cincinnati, OH 45243.

Listing 1. Stack Attack.

```

10 REM SUBU MAGGE
20 REM JANUARY 9, 1984
30 REM STACK ATTACK
40 REM
50 REM -----
60 HOME
70 PRINT TAB( 14 )"STACK ATTACK"
80 PRINT TAB( 14 )"-----"
90 PRINT TAB( 19 )"BY"
100 PRINT TAB( 15 )"SUBU MAGGE"
110 PRINT TAB( 19 )"ON"
120 PRINT TAB( 12 )"JANUARY 9, 1984"
130 PRINT
140 PRINT
150 PRINT " THIS GAME IS PLAYED IN A 4X4X4 "
160 PRINT "CUBE. YOU MUST TRY TO PLACE FOUR MARK-"
170 PRINT "ERS IN ANY ROW, COLUMN, OR DIAGONAL IN "
180 PRINT "ANY OF THE THREE PLANES. TO ENTER YOUR"
190 PRINT "MOVE, YOU MUST TYPE IN THE BOARD LEVEL,"
200 PRINT "ROW, AND COLUMN IN THAT ORDER SEPARATED"
210 PRINT "BY COMMAS. YOUR MOVES WILL BE INDICATED"
220 PRINT "BY AN 'O' AND MINE WILL BE INDICATED BY"
230 PRINT "AN 'X'. ALTHOUGH YOU ARE DOOMED TO LOSE";
240 PRINT "I WISH YOU GOOD LUCK--YOU WILL NEED IT!"
250 PRINT
260 PRINT
270 PRINT "PRESS ANY KEY TO CONTINUE ";
280 GET COS
290 LET DOS$ = CHR$ ( 4 )
300 LET Z = 0
310 TEXT
320 HOME
330 PRINT "DO YOU WISH TO GO FIRST ";
340 GET ANS: PRINT ANS
350 IF ANS = "Y" OR ANS = "N" THEN 430
360 INVERSE
370 GOSUB 4560
380 PRINT "INCORRECT ANSWER--TYPE 'Y' OR 'N'"
390 NORMAL
400 PRINT
410 GOTO 330
420 REM EXECUTE SUBROUTINE TO READY BOARD AND DIMENSIO
N VARIABLS
430 GOSUB 2570
440 REM RESET INDICATOR THAT TELLS IF PLAYING REPEATED
LY
450 LET Z = 1
460 IF LEFT$ ( ANS,1 ) < > "N" THEN 490
470 LET D = 2

```

Listing continued.

Listing continued.

```

480 GOTO 230
490 PRINT "ENTER MOVE (LEV,ROW,COL)--> ";
500 INPUT A,B,C
510 IF (A = 1 OR A = 2 OR A = 3 OR A = 4) AND (B = 1 OR
B = 2 OR B = 3 OR B = 4) AND (C = 1 OR C = 2 OR C =
3 OR C = 4) THEN 580
520 INVERSE
530 GOSUB 4560
540 PRINT "MOVE IS INCORRECT--PLEASE RETYPE"
550 NORMAL
560 GOTO 490
570 REM REDEFINE MOVE AS SQUARE NUMBER (1-64)
580 LET SQ = 16 * A + 4 * B + C - 20
590 REM TEST IF SQUARE IS OCCUPIED
600 IF X(SQ) = 0 THEN 670
610 INVERSE
620 GOSUB 4560
630 PRINT "THAT SQUARE IS ALREADY FILLED--TRY AGAIN";
640 NORMAL
650 GOTO 490
660 REM MARK SQUARE AS FILLED
670 LET X(SQ) = 1
680 REM SET SHAPE NUMBER/COLOR AND GOTO SUBROUTINE TO
PLOT MOVE
690 LET D = 1
700 HCOLOR= 5
710 GOSUB 4420
720 REM RESET SHAPE NUMBER AND COLOR
730 LET D = 2
740 HCOLOR= 3
750 REM ----

760 REM LOOP TO ADD UP TOTALS OF EACH WINNING COMBINAT
ION
770 FOR G = 1 TO 76
780 LET L(G) = X(M(G,1)) + X(M(G,2)) + X(M(G,3)) + X(M(
G,4))
790 REM TEST IF PLAYER WINS
800 IF L(G) < > 4 THEN 930
810 HOME : VTAB 21
820 GOSUB 4560: GOSUB 4560: SPEED= 100
830 PRINT "CONGRATULATIONS!!--YOU'VE DONE THE           IMPO
SSIBLE--YOU WIN WITH THESE MOVES:
840 SPEED= 255
850 FOR J = 1 TO 4
860 GOSUB 4500
870 PRINT A;";B;";C;";;
880 NEXT J
890 PRINT "WANT TO PLAY ANOTHER GAME ";
900 INPUT PA$
910 IF LEFT$(PA$,1) = "Y" THEN 310
920 HOME : VTAB 21: PRINT "THANKS FOR THE GOOD GAME!!!!"
: END
930 NEXT G
940 REM ----

950 REM LOOP TO SEE IF COMPUTER HAS WINNING MOVE
960 FOR G = 1 TO 76
970 IF L(G) > - .8 THEN 1190
980 REM LOOP TO FIND OPEN SQUARE
990 FOR J = 1 TO 4
1000 IF X(M(G,J)) < > 0 THEN 1180
1010 GOSUB 4500
1020 REM DRAW MOVE
1030 GOSUB 4420
1040 HOME : VTAB 21
1050 GOSUB 4560: GOSUB 4560: SPEED= 100
1060 PRINT "TOUGH LUCK!!! I MOVE TO ";
1070 PRINT A;";B;";C; AND WIN AS FOLLOWS:
1080 REM LOOP TO PRINT WINNING MOVES
1090 FOR J = 1 TO 4
1100 GOSUB 4500
1110 PRINT A;";B;";C;";;
1120 NEXT J
1130 SPEED= 255
1140 PRINT "WANT TO PLAY ANOTHER GAME ";
1150 INPUT PA$
1160 IF LEFT$(PA$,1) = "Y" THEN 310
1170 HOME : VTAB 21: PRINT "THANKS FOR THE GOOD GAME!!!!"
: END

```

Listing continued.

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CO\$	Pause
M(76,4)	Table listing combinations to check—a winning combination is stored as a sequence of square numbers.
Y(16)	Array of square numbers telling best possible moves
X(64)	Array that tells if square is filled
L(76)	Array that indicates what is in a combination
PB(76)	Array to tell if a player block deserves remark
AN\$	Tells who moves first
DOS\$	CHR\$(4)—To access disk
I	Index of loops that set initial array values
A	Level part of move
B	Row part of move
C	Column part of move
SQ	Square number (1-64) of move
D	Shape number to be drawn (1 for player, 2 for computer)
G	Index of loop that "adds" up the values for a combination
PA\$	Tells if player wants to play again
J	Index of loop that prints winning moves
K	Index of loop to see if computer can win
U	Index of loop to see if computer should block
T	Index of loops that find empty square of a combination
W	Index of loop to move to combination with 2 in it
Q	Index of loop to find best possible move
H	Index of loop that sees if there is a draw
Z	Indicator to see whether game is being played for first time
AA	Index of loop that flashes moves
P%	Pointer to a comment
NO	Index of loop for bell
BB	Index of loop to see if player has blocked

Table. Variables.

Listing continued.

```

1180  NEXT J
1190  NEXT G
1200  REM -----
1210  REM TEST IF PLAYER HAS BLOCKED A WINNING MOVE
1220  FOR X = 1 TO 76
1230  IF L(X) < > ( - .3 + - .3 + - .3 + 1) THEN 1360

1240  REM TEST IF BLOCK MADE IN A PREVIOUS MOVE
1250  IF PB(X) = 1 THEN 1360
1260  LET PB(X) = 1
1270  LET P% = RND (1) * 5 + 1
1280  HOME : VTAB 21
1290  GOSUB 4560
1300  ON P% GOTO 1310,1320,1330,1340,1350
1310  PRINT "YOU CLEVER FOX!!! I'LL GET YOU YET!!!": GOTO
1390
1320  PRINT "PRETTY SHARP---BUT I'LL GET YOU SOON!!!": GOTO
1390
1330  PRINT "THINK YOU'RE CLEVER HUH? YOU JUST WAIT!": GOTO
1390
1340  PRINT "AT LEAST YOU'RE KEEPING THE GAME CLOSE!": GOTO
1390
1350  PRINT "YOU'RE JUST DELAYING THE INEVITABLE!!!": GOTO
1390
1360  NEXT X
1370  REM -----
1380  REM LOOP TO SEE IF COMPUTER NEEDS TO BLOCK
1390  FOR G = 1 TO 76
1400  IF L(G) < > 3 THEN 1630
1410  REM LOOP TO FIND OPEN SQUARE
1420  FOR J = 1 TO 4
1430  IF X(M(G,J)) = 0 THEN 1460
1440  NEXT J
1450  REM SET SUBROUTINE VARIABLES AND EXECUTE TO FIND
      A,B,C
1460  GOSUB 4500
1470  HOME : VTAB 21
1480  GOSUB 4560

```

Listing continued.

dimension is the combination number and the second determines the square number in the sequence.

In each winning square combination, the computer adds the numbers in the X array for each square in the combinations stored in M(76,4). The computer stores this number in the array L(76); the dimensions correspond to the combination number in M(76,4). The L array indicates how many squares are occupied by whom in each of the 76 winning combinations. Thus, if the fourth combination, M(4), had two of your markers and one of the computer's, L(4) would equal 1.7 (-.3 + 1 + 1). Consult the table for a further

"You'll have to think several moves ahead if you want to win against the computer's strategy."

listing of the variables and their functions.

The computer moves by checking several priorities in a specific order indicated by the values in the L array. The process begins with a test of whether you have won by checking if any value in the L array is 4. If not, the computer searches for a winning move, indicated by a value of -.9 in the L array. If not, it then checks to see if you have three in a combination, signified by a 3 for any L array value, a condition that demands an immediate block. If this proves false, the computer tries to find a combination containing only two of its markers, indicated by an L array value of -.6, in order to place a third.

If it finds none, the computer for two combinations, each with two of your markers, sharing a copied square. By filling the square, the computer preve

Listing continued.

```

1490 LET P% = 5 * RND (1) + 1
1500 ON P% GOTO 1510,1520,1530,1540,1550
1510 PRINT "THINK YOU'RE CLEVER DON'T YOU?": GOTO 1560
1520 PRINT "YOU'VE GOT TO DO BETTER THAN THAT!!": GOTO
1560
1530 PRINT "YOU'VE GOT TO BE REAL FAST TO BEAT ME!!": GOTO
1560
1540 PRINT "TRYING TO OUT-FOX ME, HUH!!!": GOTO 1560
1550 PRINT "WHILE THE SUN SHINES YOU CAN'T BEAT ME!"
1560 PRINT "I MOVE TO BLOCK YOU AT ";A;";";B;";";C
1570 REM DRAW MOVE
1580 GOSUB 4420
1590 REM STORE MOVE
1600 LET X(M(G,J)) = - .3
1610 REM RESTART PROCESS
1620 GOTO 490
1630 NEXT G
1640 REM -----
1650 REM LOOP TO SEE IF 2 IN ROW FOR COMPUTER
1660 FOR G = 1 TO 76
1670 IF L(G) < > - .6 THEN 1820
1680 REM LOOP TO FIND AN OPEN SQUARE
1690 FOR J = 1 TO 3
1700 IF X(M(G,J)) < > Ø THEN 1810
1710 REM SET SUBROUTINE VARIABLES AND FIND A,B,C
1720 GOSUB 4500
1730 REM DRAW SHAPE
1740 GOSUB 4420
1750 HOME : VTAB 21
1760 PRINT "I SHALL MOVE TO ";A;";";B;";";C
1770 REM STORE MOVE
1780 LET X(M(G,J)) = - .3
1790 REM RESTART PROCESS
1800 GOTO 490
1810 NEXT J
1820 NEXT G
1830 REM -----
1840 REM SEE IF PLAYER HAS 2 MARKERS IN 2 COMB WITH CO
MMON SQUARE
1850 LET E = Ø
1860 FOR X = 1 TO 76
1870 IF L(X) < > 2 THEN 1900
1880 LET E = E + 1
1890 LET K(E) = X
1900 NEXT X
1910 IF E < 2 THEN 2170
1920 REM LOOPS TO COMPARE THE COMBINATIONS TO EACH OTH
ER
1930 FOR N = 1 TO E - 1
1940 FOR O = N + 1 TO E
1950 REM LOOPS TO FIND COMMON SQUARE
1960 FOR J = 1 TO 4
1970 FOR G = 1 TO 4
1980 IF M(K(N),J) = M(K(O),G) THEN 2030
1990 NEXT G
2000 NEXT J
2010 GOTO 2130
2020 REM IF SQUARE NOT OPEN KEEP CHECKING
2030 IF X(M(K(N),J)) < > Ø THEN 2130
2040 REM SET SUBROUTINE VARIABLES AND FING A,B,C
2050 LET G = K(N)
2060 GOSUB 4500
2070 HOME : VTAB 21
2080 PRINT "HA HA...I KNOW WHAT YOU'RE UP TO!!": PRINT
"I MOVE TO ";A;";";B;";";C
2090 REM DRAW MOVE
2100 GOSUB 4420
2110 LET X(M(K(N),J)) = - .3
2120 GOTO 490
2130 NEXT O
2140 NEXT N
2150 REM -----
2160 REM LOOP TO SEE IF THERE IS A DRAW
2170 FOR H = 1 TO 64
2180 IF X(H) = Ø THEN 2330
2190 NEXT H
2200 REM ALL SQUARES ARE FULL WITHOUT A WINNER

```

Listing continued.

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Listing continued.

```
2210 HOME : VTAB 21
2220 GOSUB 4560: GOSUB 4560
2230 PRINT "THIS IS INCREDIBLE--YOU HAVE FORCED A "
2240 PRINT "DRAW. DO YOU HAVE THE NERVE TO TRY TO "
2250 PRINT "BEAT ME ";
2260 INPUT PA$
2270 REM TEST IF USER WANTS ANOTHER GAME
2280 IF LEFT$(PA$,1) = "Y" THEN 310
2290 PRINT "THANKS ANYWAY FOR THE GOOD GAME"
2300 HOME : VTAB 21: PRINT "THANKS FOR THE GOOD GAME!!!"
": END
2310 REM -----
2320 REM LOOP TO PICK BEST POSSIBLE MOVE
2330 FOR Q = 1 TO 16
2340 REM TEST IF SQUARE IS EMPTY
2350 IF X(Y(Q)) = 0 THEN 2400
2360 NEXT Q
2370 REM USE ANY OPEN SQUARE
2380 LET Y(Q) = H
2390 REM FIND A,B,C
2400 LET A = INT ((Y(Q) - 1) / 16) + 1
2410 LET B = INT (((Y(Q) - 16 * (A - 1)) - 1) / 4) + 1
2420 LET C = Y(Q) - (A - 1) * 16 - (B - 1) * 4
2430 REM DRAW SHAPE
2440 GOSUB 4420
2450 HOME : VTAB 21
2460 PRINT "I SHALL MOVE TO ";A;";";B;";";C
2470 REM STORE MOVE
2480 LET X(Y(Q)) = - .3
2490 REM RESTART PROCESS
2500 GOTO 490
2510 END
2520 REM
2530 REM -----
2540 REM THE FOLLOWING ARE SUBROUTINES USED IN THE PRO
GRAM
2550 REM -----
2560 REM SUBROUTINE TO READY GAME
2570 HGR
2580 TEXT
2590 HOME
2600 VTAB (12)
2610 PRINT "ONE MOMENT PLEASE TILL I SET UP THE GAME"
2620 REM TEST IF PLAYING FOR REPEATED TIME (DONT WANT
TO REDIM)
2630 IF Z > 0 THEN 3010
2640 REM ELSE--PLAYED FOR 1ST TIME--DIMENSION VARIABLE
S
2650 DIM Y(17)
2660 DIM M(76,4)
2670 DIM X(64)
2680 DIM L(76)
2690 DIM K(76)
2700 DIM PB(76)
2710 REM
2720 LET DOS$ = CHR$(4)
2730 REM LOOP TO READ DATA FOR BEST POSSIBLE MOVES
2740 FOR X = 1 TO 16
2750 READ Y(X)
2760 NEXT X
2770 REM LOOP TO READ DATA FOR WINNING COMBINATIONS TO
CHECK
2780 FOR X = 1 TO 76
2790 READ M(X,1),M(X,2),M(X,3),M(X,4)
2800 NEXT X
2810 REM BEST POSSIBLE MOVES
2820 DATA 1,49,52,4,13,61,64,16,22,39,23,38,26,42,27,4
3
2830 REM HORIZONTAL ON EACH LEVEL
2840 DATA 1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18
,19,20,21,22,23,24,25,26,27,28,29,30,31,32,33,34,35
,36,37,38,39,40,41,42,43,44,45,46,47,48,49,50,51,52
,53,54,55,56,57,58,59,60,61,62,63,64
2850 REM VERTICAL ON EACH LEVEL
```

Listing continued.

from acquiring three markers in two combinations, which would have enabled you to wrap up the game on the next move. If this situation does not exist, the computer checks if all the

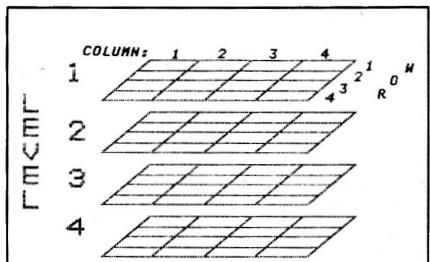


Figure 2. The game board.

squares are occupied and there is a draw.

If all else fails, the computer picks from a list of 16 "good" moves. These squares are the ones in the maximum number of combinations. The four middle squares of both the central levels and the four edge squares of the outer levels are each members of seven different combinations, thus earning them the distinction of being "good" moves (Figure 1). Make your move and the process begins again.

Program Line Explanation

60-480 give the directions and determine who goes first. They also execute a subroutine to draw the board (Figure 2) and ready the variables.

490-740 accept a player move and go to the appropriate subroutines to draw it, while storing the move with a 1 in the appropriate X array location.

760-930 add up the value of each square, stored in X(64), in the 76 possible winning combinations stored in M(76,4), and store these sums in L(76). Also, these lines check if the player has made a winning move indicated by an L array value of 4.

950-1190 check to see if any L array value is -.9, which would indicate an imminent winning move for the computer.

1210-1360 check if the player has blocked a three-in-a-row situation for the computer, indicated by .1 for an L array value. If this is true, an appropriate message is printed.

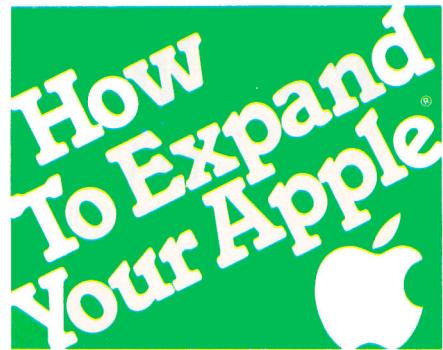
1380-1630 check to see if the computer

Listing continued.

```

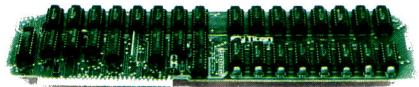
2860 DATA 1,5,9,13,2,6,10,14,3,7,11,15,4,8,12,16,17,21
,25,39,18,22,26,30,19,23,27,31,20,24,28,32,33,37,41
,45,34,38,42,46,35,39,43,47,36,40,44,48,49,53,57,61
,50,54,58,62,51,55,59,63,52,56,60,64
2870 REM VERTICAL THROUGH LEVELS
2880 DATA 1,17,33,49,2,18,34,50,3,19,35,51,4,20,36,52,
5,21,37,53,6,22,38,54,7,23,39,55,8,24,40,56,9,25,41
,57,10,26,42,58,11,27,43,59,12,28,44,60,13,29,45,61
,14,30,46,62,15,31,47,63,16,32,48,64
2890 REM DIAGONALS ON EACH LEVEL
2900 DATA 1,6,11,16,13,10,7,4,17,22,27,32,29,26,23,20
,33,38,43,48,45,42,39,36,49,54,59,64,61,58,55,52
2910 REM DIAGONALS THROUGH LEVELS
2920 DATA 1,21,41,61,13,25,37,49,2,22,42,62,14,26,38,5
0,3,23,43,63,15,27,39,51,4,24,44,64,16,28,40,52,1,1
8,35,52,4,19,34,49,5,22,39,56,8,23,38,53,9,26,43,60
,12,27,42,57,13,30,47,64,16,31,46,61
2930 REM DIAGONALS OF 'CUBE'
2940 DATA 1,22,43,64,16,27,38,49,13,26,39,52,4,23,42,6
1
2950 REM LOAD SHAPE TABLE AND SET POINTER (METHOD BY J
EFFREY A. MILLS)
2960 PRINT DOS$;"BLOAD SHAPES,A";( PEEK (176) * 256 + PEEK
(175) + 1)
2970 POKE 232,( PEEK (175) + 1): POKE 233,( PEEK (176))
2980 ROT= 0
2990 SCALE= 1
3000 REM INITIALIZE VARIABLES
3010 FOR X = 1 TO 64
3020 LET X(X) = 0
3030 NEXT X
3040 FOR X = 1 TO 76
3050 LET L(X) = 0
3060 NEXT X
3070 REM ----- PLOT BOARD -----
3080 REM PLOT 4 LEVELS
3090 HCOLOR= 3
3100 FOR X = 0 TO 3
3110 HPLLOT 80,8 + 39 * X TO 210,8 + 39 * X TO 180,38 +
39 * X TO 50,38 + 39 * X TO 80,8 + 39 * X
3120 REM HORIZONTAL/VERTICAL LINES
3130 FOR Y = 1 TO 3
3140 HPLLOT 80 + 32.5 * Y,8 + 39 * X TO 50 + 32.5 * Y,38
+ 39 * X
3150 HPLLOT 51 + 7.5 * Y,(39 - 7.56 * Y) + 39 * X TO 179
+ 7.5 * Y,(39 - 7.56 * Y) + 39 * X
3160 NEXT Y,X
3170 REM -----
3180 REM "LEVEL"
3190 REM "L"
3200 FOR X = 34 TO 106 STEP 72
3210 FOR Y = 1 TO 2
3220 HPLLOT Y,X TO Y,X + 13
3230 HPLLOT 1,X + Y + 11 TO 10,X + Y + 11
3240 NEXT Y,X
3250 REM "E"
3260 FOR X = 52 TO 88 STEP 36
3270 FOR Y = 1 TO 2
3280 HPLLOT Y,X TO Y,X + 13
3290 NEXT Y
3300 FOR Y = X TO X + 13 STEP 6
3310 FOR Z = 0 TO 1
3320 HPLLOT 1,Y + Z TO 10,Y + Z
3330 NEXT Z,Y,X
3340 REM "V"
3350 FOR X = 1 TO 9 STEP 8
3360 HPLLOT X,70 TO X,75
3370 HPLLOT X + 1,70 TO X + 1,75
3380 NEXT X
3390 HPLLOT 2,76 TO 6,83 TO 9,76
3400 HPLLOT 1,76 TO 6,83 TO 10,76

```

Listing continued.

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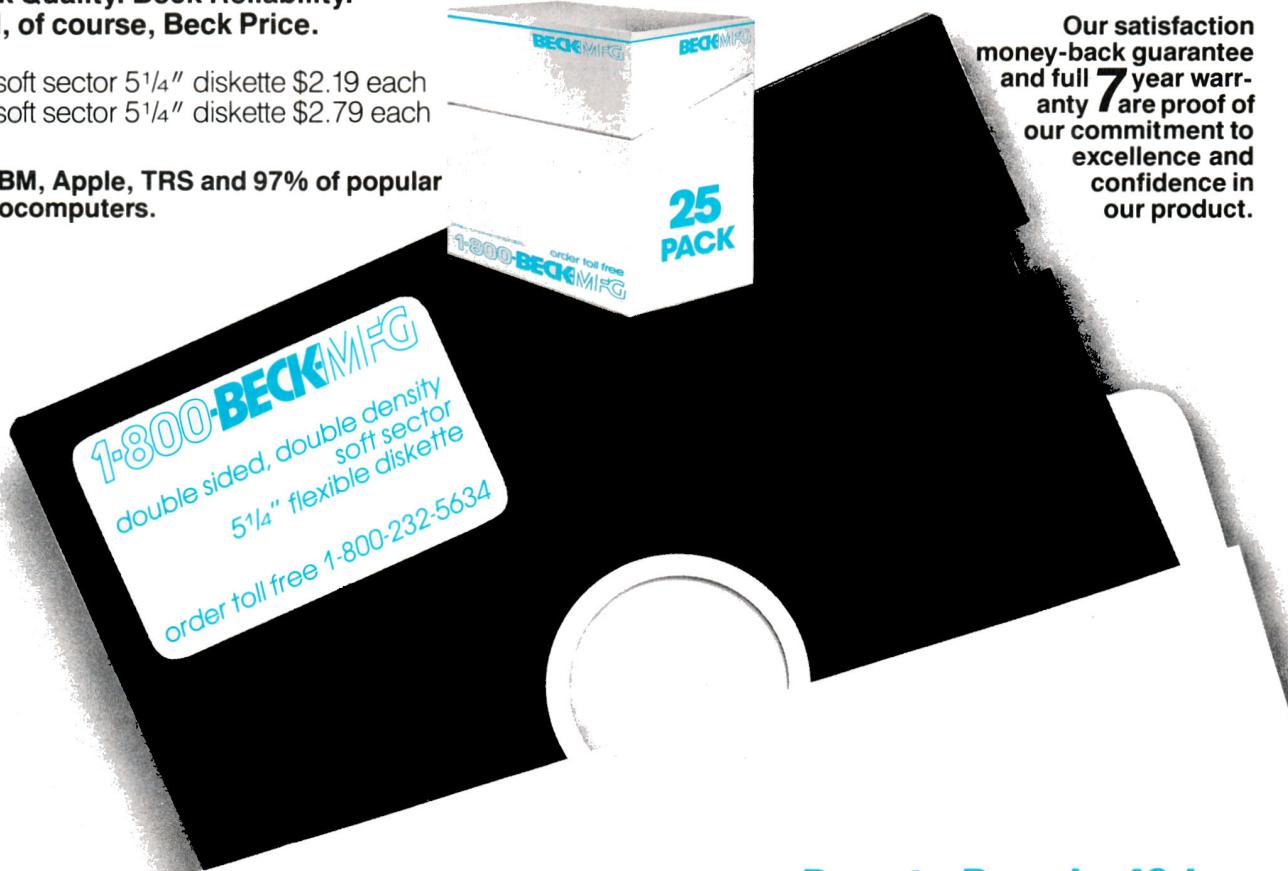
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Listing continued

```
10 REM LOADER MAKER
20 REM SUBU MAGGE
30 REM JANUARY 9, 1984
40 REM ADOPTED FROM JEFFREY A. MILLS
50 REM -----
60 LET D$ = CHR$(4)
70 PRINT D$;"OPEN LOADER"
80 PRINT D$;"DELETE LOADER"
90 PRINT D$;"OPEN LOADER"
100 PRINT D$;"WRITE LOADER"
110 PRINT "FP"
120 PRINT "POKE 103,1"
130 PRINT "POKE 104,64"
140 PRINT "POKE 16384,0"
150 PRINT "LOAD STACK ATTACK"
160 PRINT "POKE 105,0"
170 PRINT "POKE 106,0"
180 PRINT "POKE 107,0"
190 PRINT "POKE 108,8"
200 PRINT "POKE 109,0"
210 PRINT "POKE 110,8"
220 PRINT "POKE 111,0"
230 PRINT "POKE 112,32"
240 PRINT "POKE 115,0"
250 PRINT "POKE 116,32"
260 PRINT "RUN"
270 PRINT D$;"CLOSE LOADER"
280 END
```

Listing 2. Loader Maker.

needs to block. This would occur if the player alone had three markers in a combination, indicated by an L array value of 3. In such a situation, a remark would be printed.

1650-1820 check to see if the computer alone has two markers in a combination and can place a third. A value of -.6 in the L array indicates this situation. 1840-2140 see if the player has developed two combinations, each with two of only his markers, sharing a common square. The computer would move to that open square and prevent the player from being able to place three markers in two different combinations, as such a situation would lead to a player win on the next move.

2160-2300 check if there are any open squares. If none are found, the game ends in a draw.

2320-2510 select the best possible moves if all the other tests do not yield a good move. These moves are picked from the Y(17) array in a specific order so that the occupied squares are in as many common combinations as possible.

2570-4390 are a subroutine to ready the variables and plot the board (Figure 2). Lines 2810-2940 provide the square numbers that are either good moves or winning combination components.

4410-4470 are a subroutine to draw

```
3410 REM -----
3420 REM NUMBERS
3430 REM "1"
3440 HPLOT 30,12: HPLOT 30,13: HPLOT 31,12: HPLOT 31,13
3450 FOR X = 30 TO 35
3460 HPLOT X,23: HPLOT X,24
3470 NEXT X
3480 FOR X = 11 TO 24
3490 HPLOT 32,X: HPLOT 33,X
3500 NEXT X
3510 REM "2"
3520 FOR X = 56 TO 58
3530 HPLOT 30,X: HPLOT 31,X
3540 NEXT X
3550 HPLOT 31,55: HPLOT 32,56: HPLOT 38,56: HPLOT 37,56
: HPLOT 38,57: HPLOT 39,57: HPLOT 38,55
3560 FOR X = 32 TO 37
3570 HPLOT X,54: HPLOT X,55
3580 NEXT X
3590 HPLOT 30,66 TO 39,57: HPLOT 30,67 TO 39,67: HPLOT
31,66 TO 39,58: HPLOT 30,68 TO 39,68
3600 REM "3"
3610 HPLOT 30,92: HPLOT 30,93: HPLOT 30,100: HPLOT 30,1
01: HPLOT 31,103: HPLOT 32,101: HPLOT 38,93 TO 39,9
3 TO 39,94 TO 38,94: HPLOT 38,102: HPLOT 38,101: HPLOT
37,101: HPLOT 37,100
3620 FOR X = 32 TO 37
3630 HPLOT X,90: HPLOT X,91
3640 NEXT X
3650 FOR X = 91 TO 100 STEP 9
3660 FOR Y = 0 TO 2
3670 HPLOT 31,X + Y
3680 NEXT Y,X
3690 FOR X = 37 TO 39
3700 HPLOT X,92: HPLOT X,95
3710 NEXT X
3720 FOR X = 32 TO 37
3730 HPLOT X,102: HPLOT X,103
3740 NEXT X
3750 FOR X = 98 TO 100
3760 HPLOT 38,X: HPLOT 39,X
3770 NEXT X
3780 FOR X = 33 TO 38
3790 HPLOT X,96: HPLOT X,97
3800 NEXT X
3810 REM "4"
3820 HPLOT 37,126 TO 37,139: HPLOT 36,127 TO 36,139: HPLOT
28,134 TO 36,127: HPLOT 29,135 TO 37,126: HPLOT 29,
134 TO 39,134: HPLOT 29,135 TO 39,135
3830 REM -----
3840 REM "COLUMN"
3850 REM "C"
3860 HPLOT 39,0 TO 41,0: HPLOT 42,1: HPLOT 38,1 TO 38,5
: HPLOT 39,6 TO 41,6: HPLOT 42,5
3870 REM "O"
3880 HPLOT 46,0 TO 48,0: HPLOT 45,1 TO 45,5: HPLOT 46,6
TO 48,6: HPLOT 49,1 TO 49,5
3890 REM "L"
3900 HPLOT 52,0 TO 52,6 TO 55,6
3910 REM "U"
3920 HPLOT 58,0 TO 58,5: HPLOT 59,6 TO 61,6: HPLOT 62,0
TO 62,5
3930 REM "M"
3940 HPLOT 65,6 TO 65,0 TO 67,3 TO 69,0 TO 69,6
3950 REM "N"
3960 HPLOT 72,6 TO 72,0: HPLOT 72,1 TO 76,5: HPLOT 76,6
TO 76,0
3970 REM ":":
3980 HPLOT 79,2: HPLOT 79,4
3990 REM -----
4000 REM NUMBERS
4010 REM "1"
4020 LET X = 0:Y = 0
4030 FOR S = 1 TO 2
4040 HPLOT 96 + X,Y TO 96 + X,6 + Y: HPLOT 95 + X,1 + Y
: HPLOT 94 + X,6 + Y TO 97 + X,6 + Y
4050 LET X = 122:Y = 9
4060 NEXT S
4070 REM "2"
4080 LET X = 0:Y = 0
```

Listing continued.

Listing continued.

```
4090 FOR S = 1 TO 2
4100 HPLOT 125 + X,Y TO 127 + X,Y: HPLOT 124 + X,1 + Y:
    HPLOT 128 + X,1 + Y TO 128 + X,2 + Y: HPLOT 127 +
    X,3 + Y: HPLOT 126 + X,4 + Y: HPLOT 125 + X,4 + Y: HPLOT
    124 + X,5 + Y: HPLOT 123 + X,6 + Y TO 128 + X,6 + Y
4110 LET X = 85:Y = 17
4120 NEXT S
4130 REM "3"
4140 LET X = 0:Y = 0
4150 FOR S = 1 TO 2
4160 HPLOT 156 + X,Y TO 160 + X,Y: HPLOT 160 + X,1 + Y:
    HPLOT 159 + X,2 + Y: HPLOT 158 + X,3 + Y: HPLOT 15
    9 + X,4 + Y: HPLOT 160 + X,5 + Y: HPLOT 159 + X,6 +
    Y TO 157 + X,6 + Y: HPLOT 156 + X,5 + Y
4170 LET X = 44:Y = 26
4180 NEXT S
4190 REM "4"
4200 LET X = 0:Y = 0
4210 FOR S = 1 TO 2
4220 HPLOT 192 + X,Y TO 192 + X,6 + Y: HPLOT 192 + X,Y TO
    189 + X,3 + Y: HPLOT 188 + X,4 + Y TO 193 + X,4 + Y
    : HPLOT 188 + X,3 + Y
4230 LET X = 3:Y = 33
4240 NEXT S
4250 REM -----
4260 REM "ROW"
4270 REM "R"
4280 HPLOT 224,30 TO 227,30: HPLOT 228,31 TO 228,32: HPLOT
    227,33 TO 224,33: HPLOT 224,30 TO 224,36: HPLOT 226
    ,34 TO 228,36
4290 REM "O"
4300 HPLOT 233,20 TO 235,20: HPLOT 236,21 TO 236,25: HPLOT
    235,26 TO 233,26: HPLOT 232,25 TO 232,21
4310 REM "W"
4320 HPLOT 245,11 TO 245,17: HPLOT 244,16: HPLOT 243,15
    : HPLOT 242,16: HPLOT 241,17 TO 241,11
4330 REM ENTER HI-RES WITHOUT ERASING IMAGE
4340 POKE - 16304,0
4350 POKE - 16297,0
4360 POKE - 16301,0
4370 POKE - 16300,0
4380 VTAB 21
4390 RETURN
4400 REM -----
4410 REM SUBROUTINE TO DRAW MOVE
4420 FOR X = 1 TO 7
4430 XDRAW D AT 92 - (B - 1) * 7 + 32 * (C - 1),13 + (A
    - 1) * 39 + (B - 1) * 7
4440 FOR PAUSE = 1 TO 100: NEXT PAUSE
4450 NEXT X
4460 DRAW D AT 92 - (B - 1) * 7 + 32 * (C - 1),13 + (A -
    1) * 39 + (B - 1) * 7
4470 RETURN
4480 REM -----
4490 REM SUBROUTINE TO CHANGE SQUARE NUMBER TO LEV,ROW
    ,COL
4500 LET A = INT ((M(G,J) - 1) / 16) + 1
4510 LET B = INT (((M(G,J) - 16 * (A - 1)) - 1) / 4) +
    1
4520 LET C = M(G,J) - (A - 1) * 16 - (B - 1) * 4
4530 RETURN
4540 REM -----
4550 REM SUBROUTINE FOR BELL
4560 FOR X = 1 TO 5
4570 PRINT CHR$(7)
4580 NEXT X
4590 RETURN
4600 REM -----
4610 END
```

6EDD-	02	00	20					
6EE0-	00	3C	00	56	00	58	00	5A
6EE8-	00	5C	00	5E	00	60	00	62
6EF0-	00	64	00	66	00	68	00	6A
6EF8-	00	05	00	05	00	1B	C1	51
6F00-	1B	C1	28	2D	35	35	3E	3E
6F08-	3F	27	27	2C	2D	2D	26	17
6F10-	3E	27	7F	09	4D	49	C9	00
6F18-	00	2C	25	2D	2C	AD	D2	DB
6F20-	DB	3B	3E	37	3F	07	C1	C1
6F28-	C1	C1	49	35	35	75	2A	
6F30-	2E	35	00	05	00	05	00	05
6F38-	00	05	00	05	00	05	00	05
6F40-	00	05	00	05	00	05	00	05
6F48-	05	00	05	00	05	00	05	00
6F50-	05	00	05	00	05	C1	C9	6B
6F58-	09	C1	C8	4D	FF			

Listing 3. Shape table.

the moves. A shape table is used for the markers. Shape number 1 is the player's O while the computer's X is shape number 2.

4490-4530 are a subroutine to find a square number's level, row, and column. The player uses this second method to enter his moves.

4550-4590 are a subroutine to sound a bell to gain the player's attention to messages.

Problems Encountered

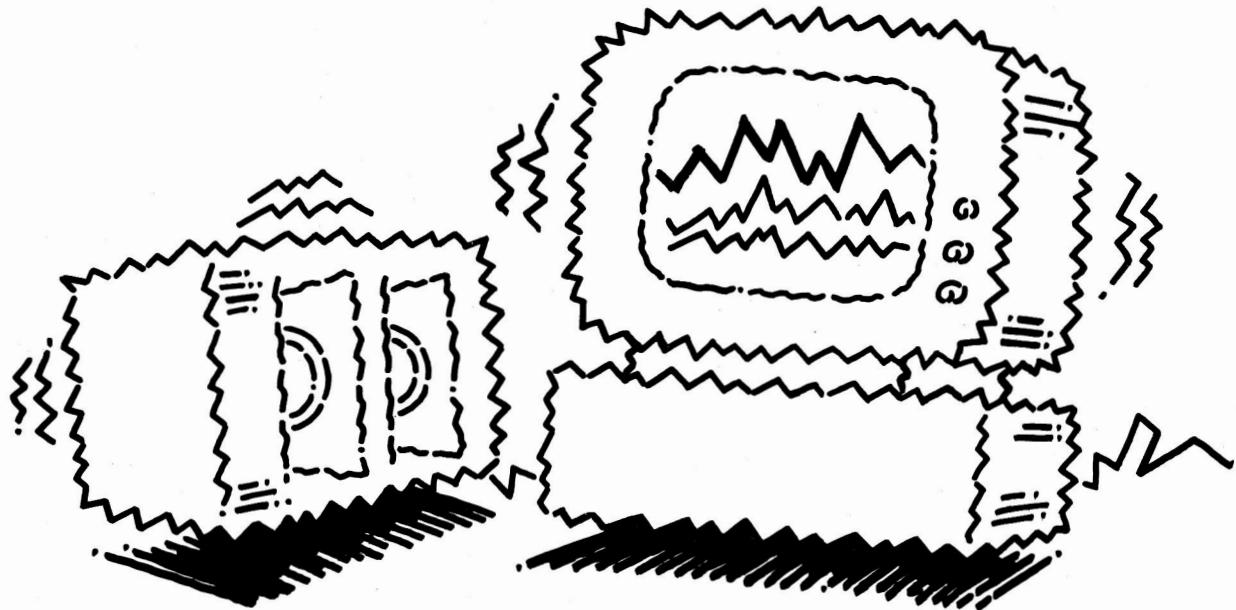
The major difficulty in constructing this program was the incompatibility of long programs with hi-res graphics. As the program grew, it began to occupy the graphics portion of memory and scramble the hi-res board. Avoiding the hassles of monitor fiddling, I originally broke the game down into several small programs that ran sequentially.

Jeffrey A. Mills provided a solution by developing a series of POKEs to load a program above the graphics pages ("Program Loader," *inCider*, September 1983). Adapting his techniques, I wrote Loader Maker (Listing 2), which must be run before all else to create a text file that will run the game properly.

Getting Started

First, run the program Loader Maker (Listing 2) to create a text file to start the game. Next, type in and save the shape table (Listing 3) with BSAVE SHAPES. A28381,L127. Type in and save the main program as "Stack Attack." Finally, EXEC Loader and enjoy the program. ■

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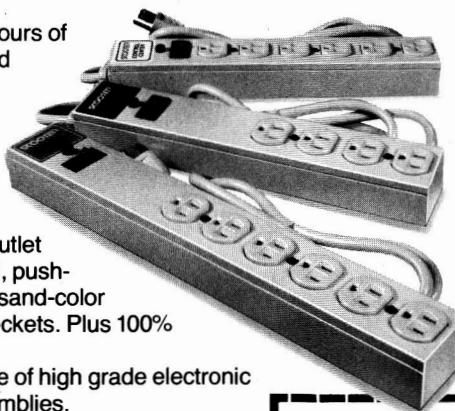
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The World's Cheapest Word Processor

Believe it or not, with the UCSD Pascal system on your Apple you almost have a built-in word processor. All you need to add is a printout formatter—and here it is!

by James R. Florini

There are many word processors on the market, some of them very good indeed. However, if you have the Apple Pascal system, you don't really need to buy a word processing package at all.

If you have used Pascal for programming, you must have noticed the convenient features the Editor provides. It has Insert, Delete, Find, and Replace functions (and Replace can be done once, a specified number of times, and globally), re-margining of paragraphs, methods for moving blocks of text within a file and between files, and ways to reconfigure the editing system using the "Set Environment" commands. Careful reading of pages 72-126 in the *Operating System Reference Manual* will introduce you to what the Editor can do. Indeed, it has most of the features of the editors included in the commercial word processing programs, and it is all part of the Apple Pascal System most of us bought for programming.

What the Editor lacks is any provision for printing out the textfiles. At the most elementary level, you can go to the filer and transfer the file to the printer, but that gives unformatted printouts. What is needed is a program to make the text print the way you want it to—a printout formatter.

I started working on this printout formatter when I recognized the *single great truth* of text formatting—that the computer need not send to the printer each character it reads from a

textfile. This means that you can use various characters as signals to have the printer take some specific action (printing the next character as a superscript, for example). Everything else is just a matter of deciding what features to include, what signals to use for them, and writing the procedures and functions to make it all work.

One advantage to using the UCSD Pascal system for word processing is the possibility of analyzing the textfiles with programs like my REFCITED (*inCider*, March 1983), which pulls all reference citations from the text. The CROSSREF program that is included in the Pascal package (on disk Apple 3:) can check spelling and be used as a rather crude indexer. Another advantage is that you can customize things to fit your own needs using a program like the one presented here. The major disadvantage I see is that the operating system is not really very user-friendly; certainly it doesn't provide as many on-screen prompts as most commercial word processors. But when you finally get familiar with them, those single-letter commands in the UCSD system are really very quick and easy to use.

I have written this program on the assumption that it will be used for serious word processing, so things are arranged for at least two disk drives, 80 columns and a full ASCII character set. Many modifications of the older Apple II's provide these, and the IIe comes with a full ASCII character set, at least 64K of memory, and a stan-

dard typewriter keyboard. (It seems to me that anyone doing word processing with a 40-column Apple II would be wiser to use a commercial program like Screenwriter II, rather than put up with all of the dizzying horizontal scrolling involved in using the Apple Pascal Editor on a 40-column screen).

I have also assumed the use of a Diablo-type printer, although it is essential only for the boldface and superscript functions; these require very short horizontal spacing and negative linefeeds, respectively. Otherwise, everything in this program should work on most printers—if you can find the appropriate control codes in your printer manual.

Entering the Text

Obviously, a printout formatting program is not very useful if you have nothing to be printed. To help you decide if it is worthwhile to go to the trouble of typing and compiling this long program, let's first go through the steps used in entering text with this system.

First, go to the filer and enter N for a new file. Then quit the filer, enter E to get the editor, and press return in response to the request for a file name. Now, assuming you are going to enter things in normal paragraph format, enter S and E to set the environment. In

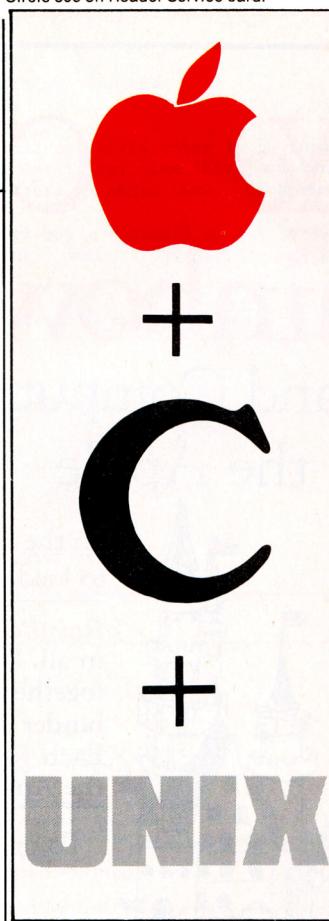
Write to Dr. James R. Florini, c/o Biology Department, Syracuse University, Syracuse, NY 13210.

response to the resulting menu, enter AFFT for auto-indent false and filling true. Also enter C' to make the command character the accent grave (ASCII character #96). The command character's function in the UCSD editor may not be obvious, but it's very handy. If it is the first character in a line, it prevents that line from being incorporated into a paragraph when you use the margin command or insert something just ahead of that line. It is particularly useful for the command lines we'll get to in a moment.

Now press the spacebar to get back to the editor, and then enter I to start inserting text. All you have to do now is just type away as fast as you can—and for me it is a good deal faster on the Apple than on a typewriter, possibly because it is so easy to correct mistakes that I don't worry much about them. Don't bother with carriage returns unless you want to start a new paragraph (two successive returns do this); the text wraps around to the next line without breaking up your words. Clever little Apple!

None of this says anything about the accompanying program or its features, so let's stop typing a moment to look at the kinds of signals we might include in the text. They are all listed in Table 1. Embedded signals occur within a line and affect only the immediately following character (or in the case of underline, start and stop within a line). Command lines make more permanent changes and must appear on a line by themselves. For the latter, to make things easier for people accustomed to other word processors, I have used command lines starting with periods; this is a rather common way of putting commands in text files. To make things as user-friendly as possible, I have tried to use very descriptive commands, and have allowed the option of using either a long, descriptive format or an abbreviated version (handy when you get more accustomed to the system). Of course, the nice thing about an open program of this sort is that you can make up your own commands, change the command letters—do anything that fits your needs.

To show how these things might be used, Figure 1 shows a short paragraph with all the signals showing (I



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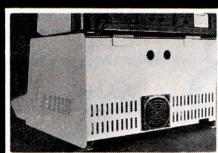


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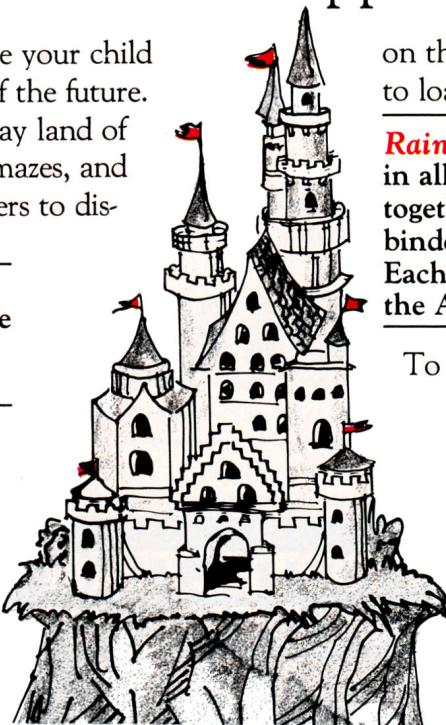
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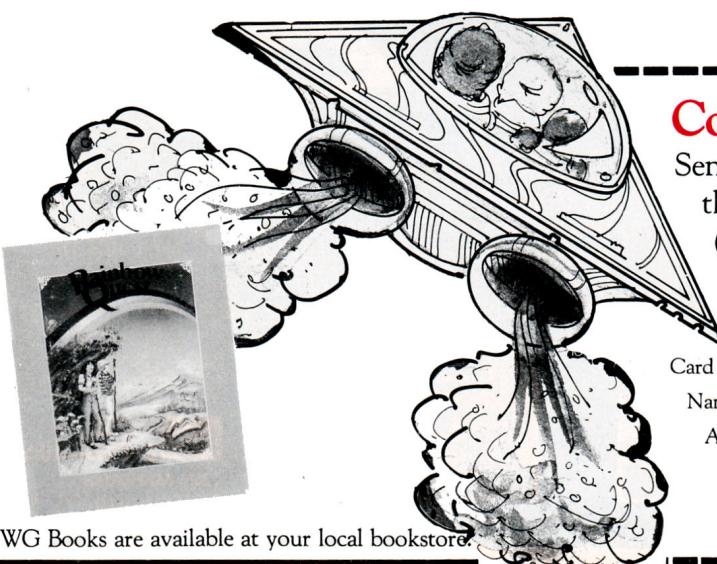
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```
^.Set Spacing at 1
^.Print Boldface
^.Don't Print unless at least 3 lines left on the page
    Example of Text Entry
```

This is an example of the kind of text one would enter to be formatted with the _DIABLOPRT1 program. We get underlining like this, and can also do footnotes^a with superscripted key letters as shown here. Chemists would

^.Start Footnote

^a This is an example of the way you would put a footnote in the text. It can, as you see, occupy more than one line, and it can include any (or all) of the usual imbedded signals.

^.End Footnote

also use subscripts to write something like H₂SO₄. Now I'll change the Environment.

What I did here was to change the left, right, and paragraph settings. Word processors often do that with command lines, but that would require that the program include procedures to format lines. I think it is preferable (insofar as possible) to see how the final printout will look while entering the text.

Back to normal now.

Figure 1. Sample text as it is entered.

Listing 1. DIABLOPRT1.

```
(**$+,V-*)
PROGRAM DIABLOPRT1;
  (BY J. R. FLORINI, Biology Dept., Syracuse University)
  (USES ENTRIES; - if you have this in your SYSTEM LIBRARY)
CONST
  PAGELEN=66; {66 lines/11 inch page at normal spacing}
  SPACE=' '; NULL=''; {Makes program easier to read}
  NORMAL=8; PARTIAL=3; REMAINDER=5; {Diablo vertical space settings}
  MAXFILES=15; MAXFOOT=75; DATE='10/10/83';
  TYPE RIGHTONES=SET OF CHAR; {Omit if USES ENTRIES}
  VAR
    FILEPRINT, PRINTNUM, PAUSE, INSAVED, FINISHED, ALLDONE, UNDERLINE, NEWPAGE,
    INCLUDING, FORMATTING, HALF, PART, UNDERSPACE, PLUSMINUS, PRINTBOLD,
    FOOTPRINT: BOOLEAN;
    CHOICE: CHAR;
    COMMANDSET: SET OF CHAR;
    HEADPLACE, PAGEPLACE, LINES, LINESPACE, MARGINS, PAGE, J, U,
    TOTFILES, WORDS, F_LINES, SLINES: INTEGER;
    SAVESPACE: PACKED ARRAY[0..10] OF INTEGER;
    FIRSTPAGE: PACKED ARRAY [0..MAXFILES] OF INTEGER;
    PRINTPAGE: STRING[4];
    RUNHEAD: STRING[75];
    INFILE, LINE: STRING;
    FILENAME: ARRAY [0..MAXFILES] OF STRING[20];
    FSTRING: ARRAY[1..MAXFOOT] OF STRING;
    INCLFILE, TEXTFILE, DIABLO: TEXT;

  PROCEDURE CLEAR_SCREEN;
  BEGIN
    WRITE (CHR(12)); {Clears screen}
    WRITELN ('MEMORY AVAILABLE IS :35, MEMAVAIL, ' WORDS.', DATE:15);
    WRITELN; WRITELN
  END;

  PROCEDURE CLEAR_LINE(N: INTEGER);
  BEGIN
    GOTOXY(0,N); WRITE (CHR(29));
  END;

  PROCEDURE CLEAR_BOTTOM;
  VAR I: INTEGER;
  BEGIN
    FOR I:=23 DOWNTO 20 DO CLEAR_LINE(I);
  END;

  PROCEDURE ZERO_FOOT;
  VAR I: INTEGER;
  BEGIN
    FOR I:=1 TO MAXFOOT DO FSTRING[I]:=NULL;
    F_LINES:=0; FOOTPRINT:=FALSE;
  END;

  PROCEDURE SHOW_LINE;
  BEGIN
    GOTOXY(32,20); WRITE(WORDS,' Words');
    GOTOXY(45,20); WRITE ('LINE # ',LINES+1);
    GOTOXY(60,20); WRITE (F_LINES,' Footnote lines');
    CLEAR_LINE(22); WRITE(LINE); GOTOXY (80,23);
  END;

  PROCEDURE REMOVE_GRAVE;
  BEGIN
    IF LENGTH(LINE)>0 THEN IF LINE[1]='`' THEN DELETE (LINE,1,1); {Remove `}
  END;

  PROCEDURE INCL_LINE;
```

Listing continued.

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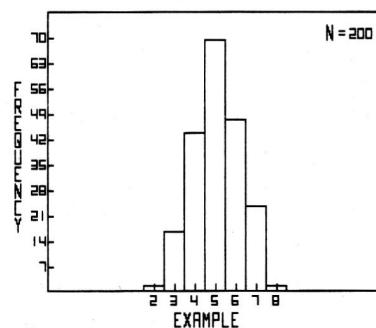
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Example of Text Entry

This is an example of the kind of text one would enter to be formatted with the DIABLOPRT program. We get underlining like this, and can also do footnotes^a with superscripted key letters as shown here. Chemists would also use subscripts to write something like H_2SO_4 . Now I'll change the Environment.

What I did here was to change the left, right, and paragraph settings. Word processors often do that with command lines, but that would require that the program include procedures to format lines. I think it is preferable (insofar as possible) to see how the final printout will look while entering the text. Back to normal now.

^a This is an example of the way you would put a footnote in the text. It can, as you see, occupy more than one line, and it can include any (or all) of the usual imbedded signals.

Figure 2. Sample text output.

added the Print Signals and Don't Print Signals commands to let my printer do this). In essence (except for odd things like footnotes and command lines), the text looks a lot like it will on the final printout—except, of course, that you can see only 24 lines at a time. Figure 2 shows the output from this paragraph.

How It Works

If you haven't seen many Pascal programs, you may not know that they should be read backwards; to find out what is happening, start with the "Main Program," which is required to be at the end; look up the procedures as they are called. To help you read my

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programs, I designate all procedures (and most functions) with two words separated by an underline, and I make the variable names as descriptive as I can.

In this program, we start with some instructions (lots of different people might use it), and then do a bunch of initializing things while the user is reading the instructions. The user gets a chance to enter a running title for the top of each page, or to enter F so the name of each file will be printed there (this is handy when correcting drafts of long documents consisting of a number of files).

The next procedures, STANDARD_FORM and CHOOSE_FILES, may seem a bit strange. They are temporary expedients to keep this program from filling an entire issue of *inCider*. This month's version of the program prints everything single-spaced, with one-inch margins, and the pages numbered at the upper right. It also prints just one file, so TOT_FILES is (temporarily) set at 1, and the filename must be entered exactly. Next month I'll present rather fancy versions of STANDARD_FORM and CHOOSE_FILES that will give lots of formatting options, add the .TEXT suffix, make sure the files are really present, make the computer look in every possible drive for any file specified, and even show you a disk directory if you can't remember the name you gave a file. That's really user-friendly!

Now the program goes on to print the files (all one of them, this month!) in order. First there is some screen business that will look a bit odd now, but will make more sense next month when there is a list of filenames at the top of the screen. Of course, the list of starting page numbers hasn't been entered yet, but it is easier to put these things in the program now than to make a lot of little changes when we include the file entry parts next month. The important thing here is the call to READ_FILE; that's where the action really starts.

READ_FILE reads through the file, one line at a time, by calling NEXT_LINE, which uses SHOW_LINE to flash each line as it is read (and to show how many words and lines have been printed). PROCESS_LINE is then in-

Listing continued.

```
BEGIN
  READLN (INCLFILE,LINE); REMOVE_GRAVE;
END;

PROCEDURE NEXT_LINE;
BEGIN
  READLN (TEXTFILE,LINE); SHOW_LINE; REMOVE_GRAVE;
END;

PROCEDURE PAPER_INSERT; {Single sheet feed}
BEGIN
  CLEAR_BOTTOM; IF FINISHED THEN WRITELN ('Insert paper to START file',
  FILENAME[J], ' on page ',page,'.') ELSE IF PAGE > 1 THEN
  BEGIN
    WRITELN ('Insert paper and align top edge for page ',PAGE,' of file ',
    FILENAME [J],'.');
    WRITELN ('PRESS <RETURN> TO CONTINUE PRINTING.:35'); WRITE (CHR(7));
    READLN;
  END;
END;

PROCEDURE CHECK_STORED; {Leave space at top for graph}
VAR I, AVAILABLE: INTEGER;
BEGIN
  AVAILABLE:=PAGELEN - 2 * MARGINS;
  REPEAT {Might be more than one waiting}
    IF (SAVE_SPACES[1]<>0) AND (SAVESPACE[1] <= AVAILABLE) THEN
    BEGIN
      FOR I:=1 TO SAVESPACE[1] DO WRITELN(DIABLO);
      LINES:=LINES+SAVESPACE[1];
      FOR I:=1 TO 9 DO SAVESPACE[I]:=SAVESPACE[I+1];
    END;
    UNTIL (SAVE_SPACES[1]=0) OR (LINES+SAVESPACE[1] > AVAILABLE);
END; {CHECK-STORED}

PROCEDURE PROCESS_LINE; FORWARD;

PROCEDURE PRINT_INCLFILE;
BEGIN
  INCLUDING:=TRUE; GOTOXY(0,21); WRITE('PRINTING ',INFILE);
  RESET(INCLFILE,INFILE); WHILE NOT EOF(INCLFILE) DO
  BEGIN
    INCL_LINE; SHOW_LINE; PROCESS_LINE;
  END;
  CLOSE(INCLFILE); INSAVED:=FALSE; INCLUDING:=FALSE;
  GOTOXY(0,21); WRITE(CHR(29));
END;
```

Listing continued.

voked to check if either of the signals to turn on formatting is present. If it is (or if formatting has not been turned off), the huge PRINT_LINE set of procedures is called to do all the formatting that can be done; otherwise PRINT_UNCHANGED just prints the line as it was read from the file. This non-format option may seem odd, but it can be quite useful for printing out programs and for similar situations in which you don't want superscripts, subscripts, etc. This gives slightly greater speed, of course, but in most cases it is the printer rather than the Pascal program that limits output speed.

PRINT_LINE is, as you can see, by far the biggest part of this big program. To save time, the first thing it does is to look for (and print) empty lines. (This part includes a half-space feature I use to compress bibliographies without making them less readable.) Then it calls CHECK_SIGNALS to see if any command lines, superscripts, or subscripts are present. If a line starts with a period, READ_COMMAND calls GET_CAPS to condense the command line to its capital letters and then plows through a bunch of nested case statements to make the appropriate response to the command line. This is the place where you can make up more commands to fit your own needs. The possibilities are limited only by your imagination; the current version of this program leaves plenty of memory available for additional features. Some of my commands seem a bit unlikely; I don't know of many cases in which you might start or stop numbering pages in the middle of a manuscript, but it was so easy to do that I couldn't resist adding the commands.

By using .Include File "#5:Table1.text" as a command, you can insert another file within the printout, and have it appear at the top of the next page if there isn't room on the current page; this is the way you might include tables within a report, for instance. If you want it printed at the point it is called, just change the command to .Include File Immediately "#5:table1.text" and the new file will start on the next line. It can include all the features (except another include-

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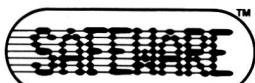
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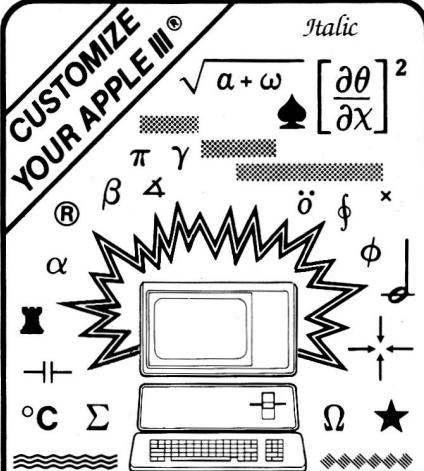
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"EMBEDDED" COMMANDS (i.e., may appear anywhere within the text):

- ^ - next character (one character only) printed as a superscript
- \ - next character (one character only) printed as a subscript
- start underlining (everything except spaces; stops after 160 chars)
- T - stop underlining
- ~ - print a space (to get more than one in a row)
- ' - not printed; use as a "Command" character when setting Environment

COMMAND LINES - MUST be at the left edge of the text, although the period can be preceded by the ` command character. No text that is to be printed can be on the same line. Command lines can be anywhere in the text. All commands except those related to footnotes take effect immediately. Embedded commands (but NOT Command Lines) can appear within footnotes. "n" can be any integer you want, and it can appear anywhere in the line.

Short Form	Longer Equivalent	Effect on Printout
.FP* or .DS	.Format Printout .Don't print Signals	Prints formatted output; this is the usual mode
.DF or .PS	.Don't Format .Print Signals	Prints everything with no formatting; shows all signals
.C or .P	.Change typeface .Page	Stops output until you hit <RET> Starts new page
.DU or .US	.Don't Underline Spaces .Underline Spaces	Obvious Equally obvious
.PM or .NM	.Print plus or Minus .No plus or Minus	Plus signs underlined Plus signs not underlined
.DPn or .SCn	.Don't Print unless n lines .Save n inches for Graph (has same effect)	Avoids isolated headings at bottom Makes n-inch space for insertion of a graph (chart) or table
.SF	.Start a Footnote	Saves all lines until next initial dot for printing as a footnote
.EF	.End Footnote	Obvious - any line starting with a period has the same effect
.NNn or .SSn	.Next Page is number n .Set Spacing at n	Changes page numbers during print Change from single to double, etc.
.HS or .HO	.Half Spacing .Half spacing On	Prints empty lines at half spacing (useful in bibliographies)
.FS* or .DN	.Full Spacing .Don't Number pages	
.PP* or .NP	.Print "Page" .No "Page"	Print "Page" in front of numbers Don't print "Page"
.PB or .PM*	.Print Boldface .Print plus or Minus	Print (only) next line boldface All plus signs underlined Plus signs printed as is
.NM	.No plus or Minus	
.IF"X"	.Include File "X"	X must be exact name of text file

* indicates default settings.

Table 1. Commands recognized by the DIABLOPRT program.

Listing continued.

```

GOTOXY(0,23); WRITE(CHR(29));
END;

PROCEDURE TOP_PAGE;
VAR I: INTEGER;
BEGIN
  IF NEWPAGE OR (FINISHED AND (J=TOTFILES)) THEN EXIT (TOP_PAGE);
  NEWPAGE:=TRUE;
  IF PAUSE THEN PAPER_INSERT;
  IF (MARGINS > 2) THEN
    BEGIN
      WRITELN (DIABLO);
      IF (RUNHEAD>NULL) AND (PAGE>1) THEN
        BEGIN
          IF FILEPRINT AND (PAGEPLACE=38)
            THEN HEADPLACE:=36+ TRUNC(LENGTH(RUNHEAD)/2);
          WRITELN (DIABLO, RUNHEAD:HEADPLACE)
        END ELSE WRITELN (DIABLO);
      IF PRINTNUM AND (PAGE >1)
        THEN WRITELN (DIABLO, PRINTPAGE:PAGEPLACE,' ', PAGE)
        ELSE WRITELN (DIABLO);
    END;
  IF MARGINS>3 THEN FOR I:=1 TO (MARGINS-3) DO WRITELN (DIABLO);
  END ELSE FOR I:=1 TO MARGINS DO WRITELN (DIABLO); LINES:=MARGINS;

```

Listing continued.

file) that the main file uses.

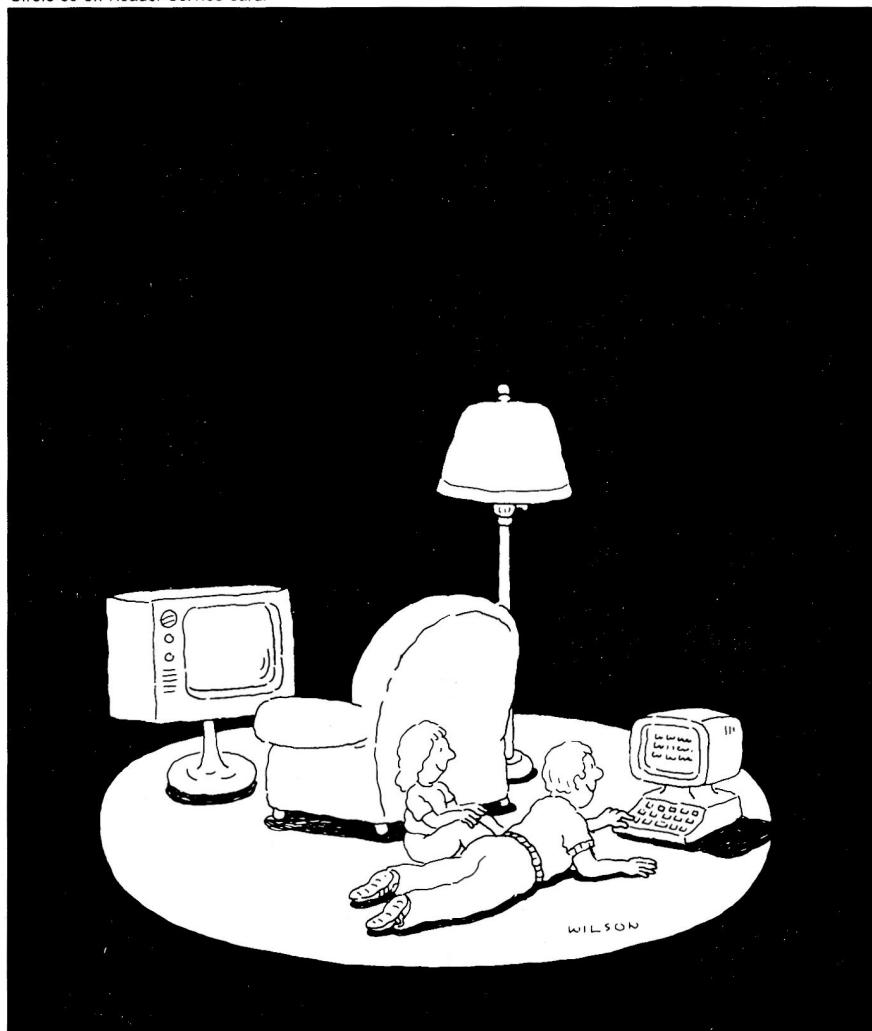
I'm rather fond of the command line system used here; you can make things quite descriptive if you remember which words to capitalize, but you can be starkly brief when you get fully familiar with the system. As shown in Table 1, you can get boldface print by entering (at the left margin) either ".Print Boldface" or ".PB". As the numbers are read separately, it is just as satisfactory to use ".Save 2.75 inches for a Graph" as to write ".SC2.75". There is some redundancy in commands; I had trouble remembering whether the command to leave blank

"Programmers must try to accommodate non-precise commands if computers are to be as useful as they can be for us imprecise humans."

space was "Save for Graph" or "Save for Chart", so I decided to make the two equivalent. Similarly, you might want to turn off formatting in order to print a program (and thus use "Don't Format"), but at other times you could want to print any signals in the textfile (so "Print Signals" would seem more logical). It seems to me that programmers must try to accommodate non-precise commands if computers are to be as useful as they can be for us imprecise humans.

After all the commands are read, the presence of superscripts or subscripts is checked, and all the tildes (the ~ characters) are replaced by spaces; this use of tildes as spaces lets you get more than one space in succession (and avoid two spaces after a period, as when printing Mr. or Mrs. and initials) without having to give up the convenience of automatic filling of paragraphs by the Pascal Editor.

Finally, we go back to PRINT_LINE and actually start printing the formatted text. First, any superscripts are printed in the appropriate places, and then the main part of the line is



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Listing continued.

```
CHECK_STORED; {Any graph spaces waiting?}
IF INSAVED THEN PRINT_INCLFILE;
CLEAR_BOTTOM; WRITE ('FILE ',FILENAME[J],', PAGE ',PAGE);
PAGE:=PAGE+1; FOOTPRINT:=FALSE;
END; {TOP_PAGE}

PROCEDURE PRINT_FOOT;
VAR I, J, STORESPACE: INTEGER;
BEGIN
  FOOTPRINT:=TRUE; NEWPAGE:=FALSE;
  J:=LINES+FLINES+2+MARGINS;
  IF J < PAGELEN THEN FOR I:=1 TO PAGELEN-J DO
  BEGIN {Put footnotes at the BOTTOM of the page}
    WRITELN(DIABLO); LINES:=LINES+1;
  END;
  STORESPACE:=LINESPACE; LINESPACE:=1; {Footnotes ALWAYS Single-Spaced}
  WRITELN(DIABLO,'-----'); {Separator - omit it if you prefer}
  LINES:=LINES+1;
  IF (FSTRING[I]<>NULL) AND (FSTRING[I]<>SPACE) THEN
  BEGIN
    WRITELN(DIABLO); LINES:=LINES+1;
  END;
  I:=0;
  REPEAT
    I:=I+1; LINE:=FSTRING[I]; SHOW_LINE; PROCESS_LINE;
    UNTIL (I=FLINES) OR NOT FOOTPRINT; {Footprint false in TOP_PAGE}
  IF I < FLINES THEN {Not enough room on current page}
    FOR J:=1 TO FLINES-I DO FSTRING[J]:=FSTRING[I+J]; {Leftover footnote lines}
    LINESPACE:=STORESPACE;
  END; {PRINT_FOOT}

PROCEDURE BOTTOM_PAGE;
BEGIN
  IF NEWPAGE THEN EXIT(BOTTOM_PAGE); {Avoid blank pages}
  IF (FLINES<>0) AND NOT FOOTPRINT THEN PRINT_FOOT;
  WRITE(DIABLO,CHR(12));
  TOP_PAGE;
END; {BOTTOM_PAGE}

PROCEDURE TEST_LINES;
VAR TEST: INTEGER;
BEGIN
  IF FLINES<>0 THEN TEST:=FLINES+LINES+1 ELSE TEST:=LINES;
  IF FOOTPRINT THEN TEST:=LINES;
  IF TEST>=(PAGELEN-MARGINS) THEN BOTTOM_PAGE;
END;

PROCEDURE LINE_FEED;
VAR I, TEST: INTEGER;
BEGIN
  LINES:=LINES+1;
  IF FOOTPRINT THEN EXIT (LINE_FEED);
  IF LINESPACE > 1 THEN
  BEGIN
    FOR I:=1 TO LINESPACE-1 DO {One linefeed already in PRINT_LINE}
    BEGIN
      LINES:=LINES+1; WRITELN (DIABLO);
    END;
  END;
  TEST_LINES;
END; {LINE_FEED}

PROCEDURE WRITE_LINE;
CONST DASHES='-----';
BEGIN
  WRITE (DASHES); WRITELN (DASHES);
END;

{ IF NOT USING "ENTRIES" UNIT, THEN ADD (**I #5:ENTRIES*) HERE}
{**I #5:ENTRIES*}
{**I #5:DIABLO2*} Add this next month - contains several goodies

{The following two procedures will be replaced by larger versions next month}
PROCEDURE CHOOSE_FILES;
BEGIN
  CLEAR_SCREEN; WRITE('Enter the EXACT name of the file to be printed: ');
  READLN(FILENAME[1]); TOTFILES:=1;
END;

PROCEDURE STANDARD_FORM;
BEGIN
  FORMATTING:=TRUE; PLUSMINUS:=TRUE; PRINTNUM:=TRUE;
  PAUSE:=FALSE; UNDERSPACE:=FALSE;
  PAGE:=1; MARGINS:=6; LINESPACE:=1; HEADPLACE:=75; PAGEPLACE:=73;
  PRINTPAGE:='Page';
END;

PROCEDURE GENERAL_INSTR;
BEGIN
  CLEAR_SCREEN;
  WRITELN ('This program allows the user to print Pascal text files from');
  WRITELN ('any drive in any desired order. The boot disk must be');
  WRITELN ('present to START the program, but it can be replaced NOW');
  WRITELN ('with a diskette containing text to be printed.); WRITELN;
END; {GENERAL_INSTRUCTIONS}

PROCEDURE MAKE_SPACING (N: INTEGER); {Check your printer manual for these}
BEGIN {This works on a Diablo or Xerox printer}
  WRITE(DIABLO,CHR(27),CHR(30),CHR(N+1));
END;

PROCEDURE GET_CAPS (VAR S:STRING);
VAR I: INTEGER;
BEGIN
```

printed. This is done on a character-by-character basis, and any imbedded signals are filtered out as printing occurs. This analysis also makes it very easy to count the number of words in the manuscript; any space not preceded by another space is considered to represent a word separator. The program starts underlining just after it encounters a “_” signal and stops when a “l” appears. I can tell you from much experience that you will underline a lot of text if you forget the “l”; I made the mistake so many times that I finally put in a 160-character limit to avoid wasting page after page this

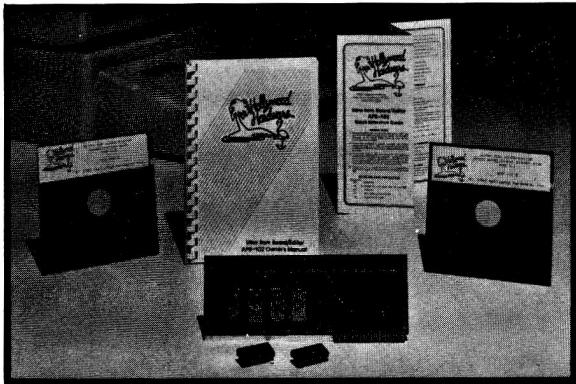
“The whole thing happens almost as fast as most printers can print.”

way. Next, any subscripts are printed; they were removed and stored by CHECK_SIGNALS. Finally, if the line is to be printed boldface, the paper is scrolled up one line, the printhead is moved 1/120 inch to the right, and the whole process is repeated once again. Fortunately, Pascal operates so fast that the whole thing happens almost as fast as most printers can print.

At the end of each line, LINE_FEED is called to add extra linefeeds if double or triple (or greater) spacing is required. It calls TEST_LINES to see if the bottom of the page has been reached; if so it calls BOTTOM_PAGE, which, in turn, calls PRINT_FOOT to print footnotes, if any. One of the hardest things to solve was the infuriating situation that occurs when long footnotes occur in the text where there is not enough space left to print them. This program prints any leftover footnote lines as the first footnote on the next page. (At least my solution is no worse than one \$300+ commercial word processor I have; it suggested that you reprint the entire document, inserting a “page” command just before the line that contains the troublesome footnote.) This was the last feature added to this program, and it may still contain a few bugs lurking in the background. I have tested it every way I can, but (unlike

Listing continued.

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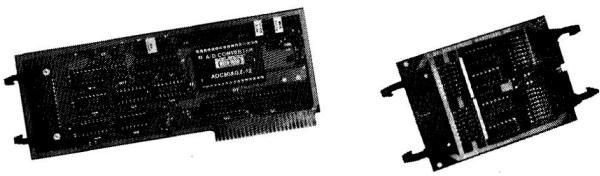
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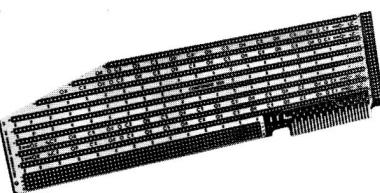
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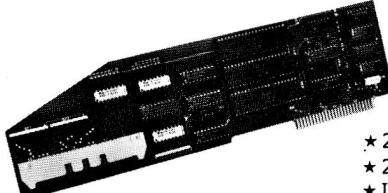
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Listing continued.

```
IF S=NULL THEN EXIT(GET_CAPS);
I:=1;
REPEAT
  IF S[I] IN ['A'..'Z'] THEN I:=I+1 ELSE
  BEGIN
    DELETE (S,I,1); IF I > 1 THEN I:=I-1;
  END;
  UNTIL I>LENGTH(S);
  IF LENGTH(S)=1 THEN S:=CONCAT(S,SPACE);
END;

PROCEDURE PRINT_UNCHANGED; {Faster print with no formatting}
VAR I: INTEGER;
BEGIN
  IF LINE<>NULL THEN IF (LINE[1]<>'.' ) AND (LENGTH(LINE)>1) THEN
    FOR I:=2 TO LENGTH(LINE) DO IF (LINE[I]=SPACE) AND (LINE[I-1]<>SPACE)
      THEN WORDS:=WORDS+1;
  WRITELN(DIABLO,LINE); WORDS:=WORDS+1; {Last one on line}
  LINE_FEED;
END;

PROCEDURE PRINT_LINE;
VAR SUPERSCRIPT,SUBSCRIPT: BOOLEAN;
  SUP,SUB,I,TEMP: INTEGER;
  CH: CHAR;
  SUPERCH,SUBCH: PACKED ARRAY [1..40] OF CHAR;
  UNDERSET: SET OF CHAR;
  SAVELINE: STRING;

PROCEDURE PRINT_SUP; {Requires negative linefeeds}
VAR S, I: INTEGER;
BEGIN
  MAKE_SPACING(PARTIAL);
  WRITE (DIABLO,CHR(27),CHR(10)); {Negative linefeed on Diablo}
  IF NOT (LINE[1] IN COMMANDSET) THEN WRITE (DIABLO, SPACE); S:=0;
  FOR I:=2 TO LENGTH (LINE) DO
  BEGIN
    IF LINE[I-1]='^' THEN
    BEGIN
      S:=S+1; WRITE (DIABLO, SUPERCH[S]);
      END ELSE IF NOT (LINE[I] IN COMMANDSET) THEN WRITE (DIABLO, SPACE);
    END; {Line completed}
    WRITELN (DIABLO); {Back to main line}
    MAKE_SPACING (NORMAL);
  END; {PRINT-SUPERSCRIPTS}

PROCEDURE PRINT_SUBS;
```

Listing continued.

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most other parts of the program) the footnote features have not been in use in my laboratory for two years or so. Scientific writing doesn't use footnotes very much.

The main program ends with a bit of decoration at the bottom of the screen, and the file has been printed, formatted just as you wanted it.

Entering the Program

If all this description makes you think the program is worth the trouble of entering and compiling it, you should note a few things. First of all, this program is *long*; the textfile (not including the ENTRIES portion) occupies 40 blocks, which is the most the Apple Pascal system can handle. (Don't add extra spaces or comments; they won't fit.) So you must turn on the swapping option to get it all entered. This is done by going to the "Command:" level and typing S. You'll see

Listing continued.

```
VAR S, I: INTEGER;
BEGIN
  MAKE_SPACING(PARTIAL); WRITELN (DIABLO); {Positive linefeed}
  S:=0; IF NOT (LINE[1] IN COMMANDSET) THEN WRITE (DIABLO, SPACE);
  I:=1;
  REPEAT
    I:=I+1; IF LINE[I-1] = '\' THEN
    BEGIN
      S:=S+1; WRITE (DIABLO, SUBCH[S]);
      END ELSE IF NOT (LINE[I] IN COMMANDSET) THEN WRITE (DIABLO, SPACE);
      I:=I+1; S:=SUB;
      MAKE_SPACING (REMAINDER); WRITELN (DIABLO); MAKE_SPACING (NORMAL);
    END; {PRINT-SUBS}

  PROCEDURE CHECK_SIGNALS;
  VAR I: INTEGER;

  PROCEDURE READ_COMMAND;
  VAR COMMAND, STORED: STRING;
  I: INTEGER;

  FUNCTION GET_NUM: REAL;
  BEGIN
    IF STORED=NULL THEN EXIT(GET_NUM);
    I:=1;
    REPEAT
      IF STORED[I] IN ['.', '0'.. '9'] THEN I:=I+1 ELSE
      BEGIN
        DELETE (STORED, I, 1); IF I > 1 THEN I:=I-1;
        END;
      UNTIL I>LENGTH(STORED);
      GET_NUM:=(VALUE(STORED));
    END;

  PROCEDURE INCLUDE_FILE;
  VAR IMMEDIATE: BOOLEAN;
  FIRST, SECOND, N: INTEGER;

  PROCEDURE GET_OUT;
  BEGIN
    WRITE(CHR(7)); WRITELN (DIABLO);
    WRITELN (DIABLO, 'CAN''T USE ', INFILE);
    WRITELN (DIABLO); LINES:=LINES+3; EXIT(INCLUDE_FILE);
  END;

  BEGIN
    IF INSAVED THEN PRINT_INCLFILE; {ONLY ONE AT A TIME}
    COMMAND:=CONCAT(COMMAND, SPACE, SPACE);
  
```

Listing continued.

the prompt:

Swapping is off.
Toggle Swapping?

Type Y in response. It will look as if nothing happened, but you can now have 40 blocks in a textfile, rather than the usual limit of 34. This is mentioned on page 7 of the Addendum to the *Apple Pascal Operating System Reference Manual*; I don't think it works in the 1.0 version of Apple Pascal. If you are using that system, you will have to break the Diablo textfile into two parts and treat the second part as an include-file using the (*\$I filename*) compiler directive.

You'll have to do that to get the GET_CHAR, GET_ENTRY, and VALUE utilities, too, if you didn't put my ENTRIES unit in your SYSTEM LIBRARY as described in the January 1983 issue of *inCider*. A somewhat shortened version is pre-

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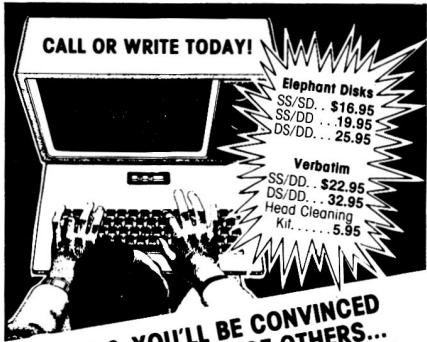
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Listing continued.

```

IMMEDIATE:=COMMAND[3] = 'I';
COMMAND:=STORED; N:=0;
FIRST:=POS(' ',COMMAND); IF FIRST<>0 THEN DELETE(COMMAND,FIRST,1);
SECOND:=POS(' ',COMMAND); IF (FIRST=0) OR (SECOND=0) THEN
BEGIN
  INFILE:=COMMAND; GET_OUT;
END;
INFILE:=COPY(COMMAND,FIRST,SECOND-FIRST);
GOTOXY(0,22); WRITE('Reading ',INFILE);
(*$I*) RESET(INCLFILE,INFILE);(*$I+*)
IF (IORESULT=0) THEN
BEGIN
  IF NOT IMMEDIATE THEN WHILE NOT EOF(INCLFILE) DO
  BEGIN
    INCL_LINE; WRITE('.');
    IF LINE='.' THEN N:=N+1 ELSE IF LINE[1]<>'. ' THEN N:=N+1;
  END;
END ELSE GET_OUT;
CLOSE(INFILE); GOTOXY(0,23); WRITE(N,' Lines included.');
IF ((LINES+N) <= (PAGELEN-MARGINS)) OR IMMEDIATE
  THEN PRINT_INCLFILE ELSE INSAVED:=TRUE;
END; {INCLUDE-FILE}

PROCEDURE READ_FOOT;
VAR S: STRING;
ENDFOOT: BOOLEAN;

PROCEDURE GET_LINE;
BEGIN
  IF INCLUDING THEN INCL_LINE ELSE NEXT_LINE; S:=LINE;
END;

BEGIN
  IF FLINES>MAXFOOT THEN EXIT(READ_FOOT);
  FSTRING[FLINES]:=SPACE; FLINES:=FLINES+1; {Space between footnotes}
  GET_LINE; {Remove Command, get first line of footnote}
  FSTRING[FLINES]:=LINE;
  ENDFOOT:=FALSE;
  REPEAT
    GET_LINE;
    IF S=NULL THEN S:=SPACE; {Avoid value range error next line}
    IF S[1]='.' THEN ENDFOOT:=TRUE ELSE {Other signals not allowed}
    BEGIN {Add another line to the footnote}
      FLINES:=FLINES+1; FSTRING[FLINES]:=S;
    END;
  UNTIL ENDFOOT OR (FLINES=MAXFOOT);
  TEST_LINES; {Starting printing footnote if necessary for it to fit}
END; {READ_FOOT}

PROCEDURE SAVE_FOR_CHART;
VAR SPACES: INTEGER;
BEGIN
  SPACES:=ROUND(6*GET_NUM);
  IF LINES+SPACES <= PAGELEN - MARGINS THEN
  BEGIN {Enough space on the current page}
    FOR I:=1 TO SPACES DO WRITELN (DIABLO);
    LINES:=LINES+SPACES;
  END ELSE
  BEGIN {Not enough space; have to put on next page}
    I:=1;
    WHILE (SAVE_SPACES[I]<>0) AND (I<6) DO I:=I+1;
    SAVE_SPACES[I]:=SPACES;
  END;
END;

PROCEDURE CHECK_LINES;
VAR S: INTEGER;
BEGIN
  S:=ROUND(GET_NUM);
  IF S+LINES >= PAGELEN-MARGINS THEN BOTTOM_PAGE;
END;

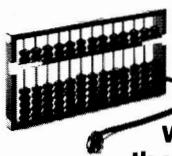
PROCEDURE INTERRUPT_PRINT;
BEGIN
  CLEAR_BOTTOM;
  WRITELN(CHR(7),'Change the daisywheel as desired; press <RETURN>');
  UNITCLEAR(1); READLN;
END;

BEGIN {MAIN READ-COMMAND}
  DELETE(LINE,1,1); {Remove the signal}
  COMMAND:=LINE; STORED:=COMMAND;
  GET_CAPS(COMMAND);
  {You can add your own commands here - customize the program}
  CASE COMMAND[1] OF
    'C': INTERRUPT_PRINT; {C}
    'D': CASE COMMAND[2] OF
      'F': FORMATTING:=FALSE; {DF}
      'N': PRINTNUM:=FALSE; {DN}
      'P': CHECK_LINES; {DPn}
      'S': FORMATTING:=TRUE; {DS}
      'U': UNDERSPACE:=FALSE; {DU}
    END;
    'F': CASE COMMAND[2] OF
      'P': FORMATTING:=TRUE; {FP}
      'S': HALF:=FALSE; {FS}
    END;
  'H': IF COMMAND[2] IN ['S','O'] THEN HALF:=TRUE;
  'I': IF COMMAND[2]='F' THEN INCLUDE_FILE;
  'N': CASE COMMAND[2] OF
    'M': PLUSMINUS:=FALSE; {NM}
    'N': PAGE:=ROUND(GET_NUM)-1; {NNn}
  END;
END;

```

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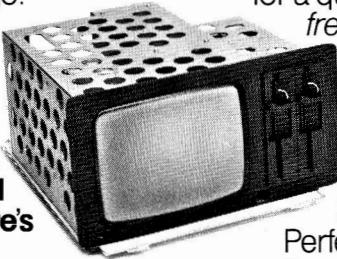
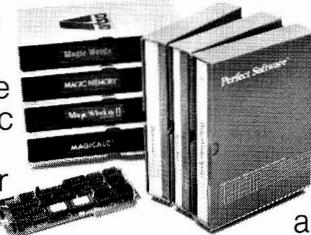
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(ASCII CHR to send for the Specified Function)

FUNCTION	DIABLO 620 (Also Apple LQP)	EPSON MX-80 (with Graftax)	APPLE DOT MATRIX (not tested*)	DAISYWRITER (See note)
Backspace	8	8	8	CHR(8)
Negative Linefeed	27,10	Not Available	27,144	ESC,'R',0,1
Partial Spacing (vertical)	27,30,n+1 (n/48 inch)	27,65,n (n/72 inch)	27,84,n,0 (n/144 inch)	ESC,8,0,n (n/48 inch)
Partial Spacing (horizontal)	27,31,n+1 (n/128 inch)	Not Available	Not Available	Not needed
Boldface	Not available (Alternative to partial horizontal spacing to emphasize characters)	27,69	27,35	ESC,'0'

*These commands were read from the Dot Matrix Printer Reference Card, but could not be tested with the equipment available to me.

Note - for the Daisywriter, these signals are sent as letters and numbers indicated - i.e., a negative linefeed is obtained by
WRITE(DIABLO,CHR(27),'R',0,1); and boldface printing is turned on by
WRITE(DIABLO,CHR(27),'0'); (letter 0, not zero).

Table 2. Printer signals used in DIABLOPRT.

sented here (less error checking, no exponentials, etc., in the VALUE function); it can be used as an include-file for the main DIABLOPRT program, if you don't want to use the LIBRARY unit.

Unless you have a printer *exactly* like mine (a Xerox 1700, which is essentially identical to a Diablo 630; the new Apple Letter Quality Printer responds to the same commands), you will have to do a little research in your printer manual to see what commands to transmit to get the desired printer response. I've put together a list for the few printers for which I could find manuals (see Table 2), but these things can be hard to find. Possibly you could write the manufacturer of your printer if the manual doesn't have the necessary information. Depending upon the quirks of your printer, you might have to make changes in procedures MAKE_SPACING, PRINT_SUP,

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Listing continued.

PRINT__SUBS, and PRINT__LINE (the PRINTBOLD part) to make things work properly on your printer. And if (like the Epsons) your printer can't do negative linefeeds, you'll have to take an entirely different approach to superscripts. There are so many differences among printers that I just couldn't write anything universal for this problem. If your printer can't do variable line spacing, you might be able to employ half-linefeeds for superscripts and subscripts (this is not quite as satisfactory because it gives slight overlap when single spacing). That would require some modification of the PRINT__SUP and PRINT__SUBS procedures.

Good luck in entering and compiling this program. Next month we'll add the format choice and file entry procedures that make DIABLOPRINTER capable of printing a whole book without any attention from you. ■

```
'P': PRINTPAGE:=NULL; (NP)
'S': HALF:=FALSE; (NS)
END;
'P': CASE COMMAND[2] OF
  '': BOTTOM_PAGE; (P)
  'B': PRINTBOLD:=TRUE; (PB)
  'M': PLUSMINUS:=TRUE; (PM)
  'N': PRINTNUM:=TRUE; (PN)
  'P': PRINTPAGE:='Page'; (PP)
  'S': FORMATTING:=FALSE; (PS)
END;
'S': CASE COMMAND[2] OF
  'C', 'G': SAVE_FOR_CHART; (SC or SG)
  'F': READ_FOOT;
  'S': LINESPACE:=TRUNC(GET_NUM); (SSn)
END;
'U': IF COMMAND[2]='S' THEN UNDERSPACE:=TRUE;
END;
END; (READ-COMMAND)

BEGIN (MAIN CHECK-SIGNALS)
IF LINE=NULL THEN LINE:=SPACE; (Avoid value range errors)
IF LINE[1]='.' THEN
BEGIN
  READ_COMMAND; EXIT(PRINT_LINE);
END;
SUPERSCRIPT:=FALSE; SUBSCRIPT:=FALSE; SUP:=0; SUB:=0; (Initializing)
FOR I:=1 TO LENGTH (LINE) DO
BEGIN
  CH:=LINE[I];
  CASE CH OF
    '^': BEGIN
      SUP:=SUP+1; SUPERCH[SUP]:=LINE[I+1];
      LINE[I+1]:=SPACE; SUPERSCRIPT:=TRUE;
    END;
    'V': BEGIN
      SUB:=SUB+1; SUBCH[SUB]:=LINE[I+1];
      LINE[I+1]:=SPACE; SUBSCRIPT:=TRUE;
    END;
    '^': BEGIN
      LINE[I]:=SPACE;
    END;
    ('CASE')
  END; (FOR I...)
END; (CHECK-SIGNALS)

BEGIN (MAIN PRINT-LINE) (This is the main part of the program)
  MAKE_SPACING(NORMAL);
```

Listing continued.

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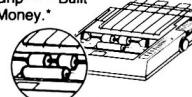
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Listing continued.

```
IF (LINE=NULL) OR (LINE=SPACE) THEN
BEGIN
  IF HALF THEN
  BEGIN
    PART:=NOT PART; IF PART THEN LINES:=LINES-1; {Count half of linefeeds}
    MAKE_SPACING(NORMAL DIV 2); {Half-spacing}
  END;
  WRITELN(DIABLO); MAKE_SPACING(NORMAL); LINE_FEED; EXIT(PRINT_LINE);
END;
CHECK_SIGNALS;
SAVELINE:=LINE; {For Boldface, if needed}
IF SUPERSCRIPTS THEN PRINT_SUP;
FOR I:=1 TO LENGTH (LINE) DO
BEGIN
  CH:=LINE[I];
  IF (CH=SPACE) AND (I>1) THEN
  BEGIN {Multiple spaces counted only as one word separator}
    IF LINE[I-1]>SPACE THEN WORDS:=WORDS+1;
  END;
{The following line avoids double underline, printing underline signal}
IF (UNDERLINE AND (CH='_')) THEN WRITE (DIABLO, '_') ELSE
BEGIN
  IF UNDERSPACE THEN UNDERSET:=COMMANDSET
  ELSE UNDERSET:=COMMANDSET + [SPACE];
  IF CH='-' THEN UNDERLINE:=TRUE;
  IF (CH='+') OR (U>160) THEN
  BEGIN
    U:=0; UNDERLINE:=FALSE;
  END;
  IF NOT (CH IN COMMANDSET) THEN WRITE (DIABLO, CH);
  IF (UNDERLINE AND NOT (CH IN UNDERSET)) {Underline}
  OR ((CH='+') AND PLUSMINUS) THEN {plus or minus}
  BEGIN
    WRITE (DIABLO,CHR (8)); WRITE (DIABLO,'_'); U:=U+1;
  END;
  END; {FOR I...}
  WORDS:=WORDS-SUB;
  IF SUBSCRIPT THEN PRINT_SUBS ELSE WRITELN (DIABLO);
  IF PRINTBOLD THEN
  BEGIN {Prints again, moved over 1/120 inch to the right}
    TEMP:=WORDS;LINE:=SAVELINE; {Restore any superscripts and subscripts}
    WRITE(DIABLO,CHR(27),CHR(10)); {Negative Linefeed}
    LINES:=LINES-1;
    WRITE(DIABLO,CHR(27),CHR(31),CHR(2),SPACE,CHR(27),CHR(31),CHR(11));
    PRINTBOLD:=FALSE; PRINT_LINE; {Only one line printed boldface}
    WORDS:=TEMP {Don't count second time in boldface print}
  END;
  LINE_FEED;
END; {PRINT-LINE}

PROCEDURE PROCESS_LINE;
VAR TEMP: STRING;
BEGIN
  IF LINE<>NULL THEN IF LINE[1]='.' THEN
  BEGIN
    TEMP:=LINE; GET_CAPS(TEMP); IF LENGTH(TEMP)>2 THEN TEMP:=COPY(TEMP,1,2);
    IF (TEMP='FP') OR (TEMP='DS') THEN FORMATTING:=TRUE;
  END;
  IF FORMATTING THEN PRINT_LINE ELSE PRINT_UNCHANGED;
END;

PROCEDURE READ_FILE;
BEGIN
  WHILE NOT EOF(TEXTFILE) DO
  BEGIN
    NEXT_LINE; PROCESS_LINE;
  END;
  FINISHED:=TRUE;
END; {READ_FILE}

PROCEDURE ZERO_THINGS;
VAR I: INTEGER;
BEGIN
  ZERO_FOOT; SLINES:=0; U:=0; LINES:=0; WORDS:=0;
  ALLDONE:=FALSE; HALF:=FALSE; PART:=FALSE; UNDERLINE:=FALSE; PRINTBOLD:=FALSE;
  FINISHED:=FALSE; INSAVED:=FALSE; INCLUDING:=FALSE; NEWPAGE:=FALSE;
  FOR I:=1 TO MAXFILES DO FIRSTPAGE[I]:=1;
  FOR I:=1 TO 10 DO SAVESPACE[I]:=0;
END;

PROCEDURE WRITE_STARS;
CONST STARS='*****';
BEGIN
  WRITE(' ' :6,STARS); WRITE(STARS);
END;

BEGIN {MAIN PROGRAM}
  GENERAL_INSTR;
  ZERO_THINGS;
  COMMANDSET:=[^~, `~, `_, `~, `~, `~, `~];
  WRITELN
  ('What running title is to be printed above the page number on each page?');
  WRITELN ('Press <RETURN> for no running title, "F" to print file names.');
  GET_ENTRY (75,RUNHEAD); FILEPRINT:=(RUNHEAD='F') OR (RUNHEAD='f');
  STANDARD_FORM;
  CHOOSE_FILES;
  WRITELN('PUSH THE "TOF" SWITCH ON THE DIABLO,');
  WRITE ('AND PRESS <RETURN> (on the console) TO START PRINTING.');
  READLN;
  REWRITE (DIABLO,'PRINTER:');
  IF FILEPRINT THEN RUNHEAD:=FILENAME[1]; J:=1; TOP_PAGE; {Top of first page}
  FOR J:=1 TO TOTFILES DO {Only one this month}

```

Listing continued.

Listing continued.

```
BEGIN
  FINISHED:=FALSE;
  (**$1-*)RESET (TEXTFILE, FILENAME [J]); (**$1+*)
  IF IORESULT=0 THEN
  BEGIN
    IF FILEPRINT THEN RUNHEAD:=FILENAME[J];
    GOTOXY (0,J+3); WRITE ('PRINTING==>');
    IF J>1 THEN BEGIN GOTOXY (0,J+2); WRITE (' <DONE> '); END;
    IF (FIRSTPAGE[J] > -1) THEN
    BEGIN
      IF FIRSTPAGE[J]<>0 THEN PAGE:=FIRSTPAGE [J];
      IF LINES<>MARGINS THEN BOTTOM_PAGE;
    END;
    READFILE; CLOSE (TEXTFILE);
  END ELSE WRITELN (DIABLO, FILENAME[J], ' NOT FOUND.');
END;
IF INSAVED THEN PRINT_INCLFILE;
ALLDONE:=TRUE; IF FLINES<>0 THEN PRINT_FOOT; {Print any leftovers}
GOTOXY (0,J+2); WRITE (' <DONE> '); CLEAR_BOTTOM;
WRITELN('TOTAL OF ':0, WORDS, ' WORDS PRINTED.');
WRITE_STARS;WRITELN;
WRITELN (' ':6,
'***** OUTPUT COMPLETED *****');
WRITE_STARS;READLN {Wait to reinsert boot diskette if it was removed}
END.
```

Circle 82 on Reader Service card.



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```
FUNCTION GET_CHAR (PROMPT1, PROMPT2:STRING; ACCEPTABLE: RIGHT_ONES): CHAR;
VAR CH, ENTRY: CHAR;
BEGIN
  REPEAT
    WRITE (PROMPT1);
    IF PROMPT2 <> NULL THEN BEGIN WRITELN; WRITE (PROMPT2); END;
    UNITCLEAR (1);
    READ (ENTRY); WRITELN; IF ENTRY = CHR(27) THEN EXIT (PROGRAM);
    IF ENTRY IN ['a'..'z'] THEN ENTRY:=CHR(ORD(ENTRY)-32); {Capitalize}
    IF NOT (ENTRY IN ACCEPTABLE) THEN
    BEGIN
      WRITELN; WRITELN;
      WRITELN ('',ENTRY,'" is not an acceptable entry.', CHR(7));WRITELN;
      FOR CH:=CHR(33) TO 'Z' DO IF CH IN ACCEPTABLE THEN WRITE ('',CH,'" ');
      IF SPACE IN ACCEPTABLE THEN WRITE (' and <SPACE> ');
      WRITELN (' are appropriate entries at this point.');?>
      WRITELN;
    END;
    UNTIL ENTRY IN ACCEPTABLE;
    GET_CHAR:=ENTRY;
  END; {GET-CHAR}

PROCEDURE GET_ENTRY (LEN: INTEGER; VAR ENTRY: STRING);
VAR I: INTEGER;
  SPACE: CHAR;
BEGIN
  REPEAT
    WRITELN; ; FOR I := 1 TO LEN DO WRITE ('_'); WRITELN ('!');

    WRITE (CHR(31)); READLN (ENTRY); {CHR(31) is "move cursor up"}
    IF ENTRY<>NULL THEN
    BEGIN
      IF LENGTH (ENTRY)=1 AND (ENTRY[1]=CHR(27)) THEN EXIT (PROGRAM);
      IF LENGTH (ENTRY) > LEN THEN
      BEGIN
        WRITELN (CHR(7),ENTRY, ' IS ',LENGTH(ENTRY)-LEN,' TOO LONG!');
        WRITELN ('PRESS <SPACE> AND MAKE A SHORTER ENTRY.');
        READ (SPACE); WRITELN;
      END;
    END;
    UNTIL LENGTH (ENTRY) <= LEN;
  END; {GET-ENTRY}

FUNCTION VALUE (ENTRY: STRING): REAL;
VAR I, COMMA, NUMDIGITS, POINT, POWER, MAGNITUDE: INTEGER;
  STOREENTRY:STRING[10];
  DIGIT: STRING[1]; {NOT the same as a CHAR, no matter what some books say*}
  NUMBER: PACKED ARRAY [1..10] OF INTEGER;
  LESSTHAN1: BOOLEAN;
  DENOM, TEMP: REAL;

BEGIN
  REPEAT
    IF ENTRY = NULL THEN
    BEGIN
      WRITE (CHR(7), 'NO ENTRY WAS MADE! ENTER A NUMBER: ');
      READLN (ENTRY);
    END;
    UNTIL ENTRY<>NULL;
    POINT := POS ('.', ENTRY);
    IF POINT <> 0 THEN DELETE (ENTRY, POINT, 1); {*remove decimal point if there*}
    NUMDIGITS := LENGTH (ENTRY);
    FOR I := 1 TO NUMDIGITS DO
    BEGIN
      DIGIT := COPY (ENTRY, I, 1); NUMBER[I] := POS (DIGIT, '123456789');
    END;
    TEMP := 0; FOR I := 1 TO NUMDIGITS DO
    TEMP := TEMP + NUMBER[I] * PWR0FTEN (NUMDIGITS - I);
    IF POINT <> 0 THEN DENOM := (PWR0FTEN (NUMDIGITS - POINT + 1))
    ELSE DENOM := 1;
    TEMP := TEMP /DENOM; VALUE := TEMP;
  END; {VALUE}
```

Listing 2. ENTRIES.

inCider's inSidious inSolubles

by Art Ude

Welcome to *inCider's inSidious inSolubles*—a series of maddening challenges for you shrewd and observant programmers. Each month we list a short Applesoft Basic program that *seems* to run correctly—but there *is* something wrong. Oh, you won't see anything as obvious as SYNTAX ERR, or any other error for that matter. However, that programmer's sixth sense that you have developed slaving over a hot keyboard will tell you something is amiss. The answer appears elsewhere in the issue. Some solutions are very easy, some considerably harder. Some are "cute," some tricky.

The folks at *inCider* encourage readers to submit their own inSidious inSolubles. While there is no length limit, the shorter the better. All submissions should contain the correct solution and conform to all the specifications below. If your program is especially ingenious, you will receive either a free 12-month subscription to *inCider*, or a 12-month extension of your present subscription. Take a whack at it!

Here are the guidelines and suggestions for solving an inSoluble:

1. The Basic programs are in straightforward Applesoft. Any poked machine language subroutines and calls to that subroutine are correct.
2. You should get some kind of a result from the program; in other words, it shouldn't crash.
3. You should not get an error message of any kind. If you do, check your typing.
4. There will be a short explanation of

what the program is supposed to do. Read this explanation *carefully*. It may contain clues to the problem.

The Savings Accrual

If you contribute a monthly amount to a savings account, it would be nice to know how much will be in that account after a period of years. The short program in the Listing should provide the answer. How are you with algorithms?

Solution on page 140.

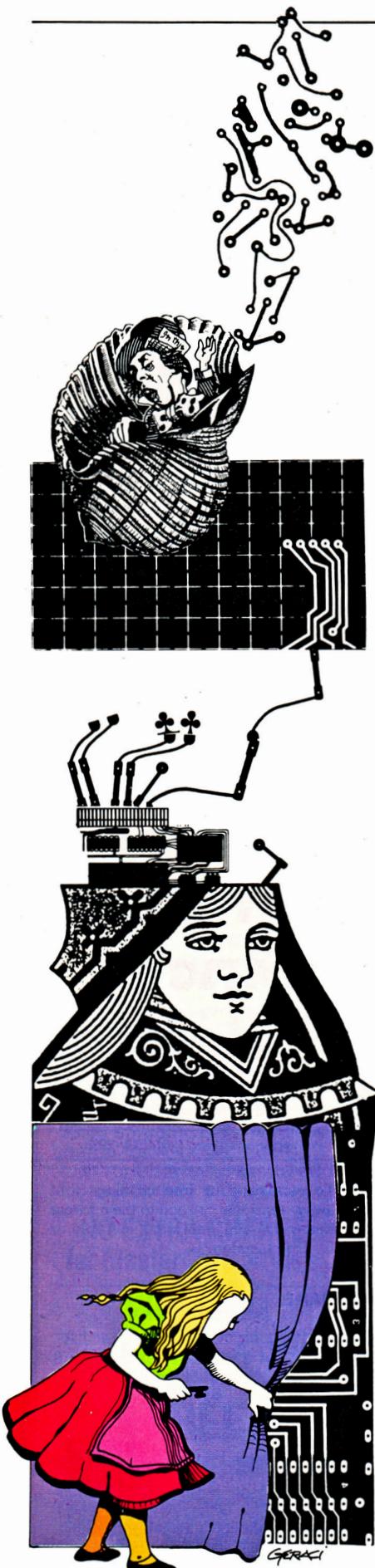
```

10 TEXT : HOME : PRINT TAB(10)
  "## SAVINGS ACCRUAL ##": PRINT
  : PRINT
20 INPUT "RATE OF INTEREST IN PERCENT": RA = RA / 100
30 PRINT : INPUT "DEPOSIT HOW MUCH EACH YEAR?": A
40 PRINT : INPUT "FOR HOW MANY YEARS": YRS
50 REM
YRS = NO. OF YEARS
TA = TOTAL AMOUNT
RA = RATE IN %
A = AMOUNT ADDED EACH YEAR
60 FOR Y = 1 TO YRS
70 TA = TA + A + RA * TA
80 NEXT Y:TA = INT(TA * 100 + .5) / 100
90 PRINT : PRINT "TOTAL AFTER": YRS; " YEARS:": $; TA
100 PRINT : PRINT "YOU COULD WITHDRAW ABOUT": $; INT(TA * RA)
110 PRINT "EVERY YEAR AND NEVER DEplete YOUR": PRINT "ACCOUNT."
: END

```

Program listing. The Savings Accrual.

Submit your own inSidious inSolubles to Art Ude, c/o inCider, Pine St., Peterborough, NH 03458.



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IN54

The Compleat Text File Primer

Part 3—Disk Operating Systems

Explore the subtleties and intricacies of DOS.

by Lee Swoboda

In Parts 1 and 2 of this series I discussed how data was stored on a disk and in the computer's memory. Now let's look at how the data gets from the disk to the memory.

A computer is a central processing unit with a collection of memory and input/output devices (keyboard, video screen, disk drives, printer, and so on). The computer needs some way to interconnect and control the functions of these components. These devices need hardware links, called the bus. The operating system controls and manages the interchange of data. This operating system is a collection of software and firmware (software in ROM) which determines how the components of the computer will operate.

The Apple II and IIe use two operating systems. The first, called the monitor, resides permanently in ROM and controls the Apple's primary functions: keyboard, video, input/output and Applesoft Basic. The second operating system, the Disk Operating System (DOS), resides on the first three tracks of each initialized disk and is loaded into user memory whenever the disk is booted. Why two operating systems? Remember that the Apple was originally designed as an inexpensive personal computer. The original intent was to use a cassette tape recorder as the main data-storage medium. The cassette is certainly an inexpensive storage medium, available in virtually every home. But it does have some significant disadvantages. Cassettes are

slow to load data and they must be operated manually. This makes them virtually useless as an interactive medium for storing programs and data. By interactive, I mean a data storage medium

that interacts with the computer—one that is under complete computer control. With a disk drive, on the other hand, the computer can purr along happily without any human interven-

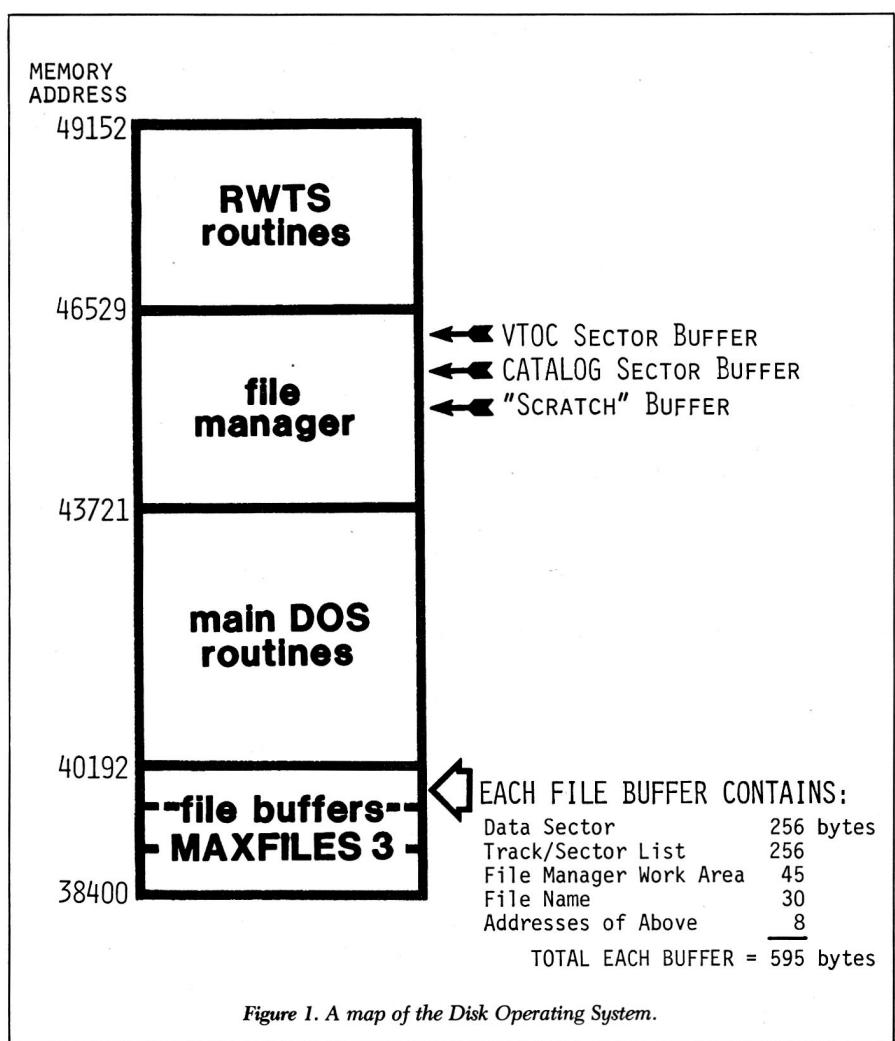


Figure 1. A map of the Disk Operating System.

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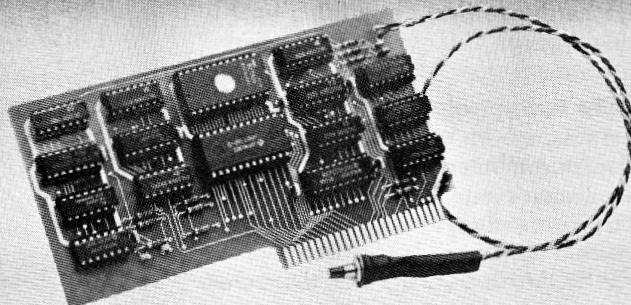
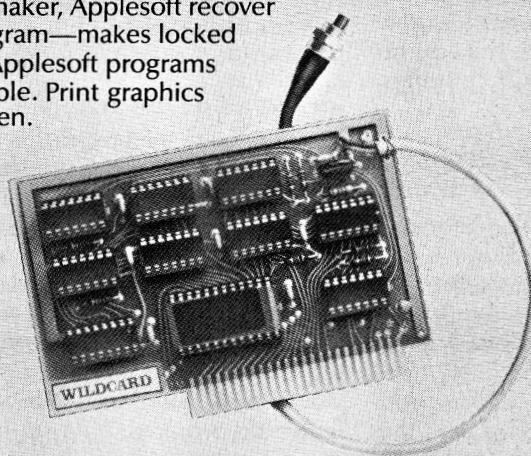
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tion or interference. When consumers demanded that Apple provide a disk drive, Apple provided the hardware (disk drive and controller card), but also provided the software to patch that hardware into the existing operating system. This system is the Disk Operating System, DOS.

The concept of storing part of the operating system on disk is not unique to microcomputers. In fact, mini and mainframe computers usually have the entire operating system on disk. Only a minimal amount of bootstrap software is in ROM, just enough for the computer to load the operating system from disk. This way, it is relatively easy to modify, improve or update software on disk. It is significantly more difficult to update software in ROM, or worse, software permanently burned into a chip. Apple has already updated the DOS three times, the latest update being DOS 3.3. Each update has required only a software change or minor hardware change (two chips in the case of DOS 3.3)—obviously far superior to having to replace an entire controller card or disk drive.

When memory was relatively expensive, Apple built 16K and 32K versions of the Apple II. These relics are now scarce, but when Apple first introduced the disk drive, you could still buy Apples with various "rampowers." As a result, DOS boots (transfers) from disk to memory in three steps. Step 1 loads a small bootstrap program. Step 2 loads the DOS image from disk into the computer as if it had 16K of RAM. Step 3 relocates DOS to the top of available memory. With only one size Apple currently available, the process is now perfunctory, but also indicative of Apple's commitment to minimize obsolescence.

DOS is divided into a number of modules, each with discrete functions. Figure 1 is a rough map of DOS.

Command Parser

Whenever Basic encounters a control-D (ASCII = 4) character, it transfers control of the system to the Disk Operating System. When DOS takes control, it parses the received command by comparing it to a table of allowable commands. If the command is

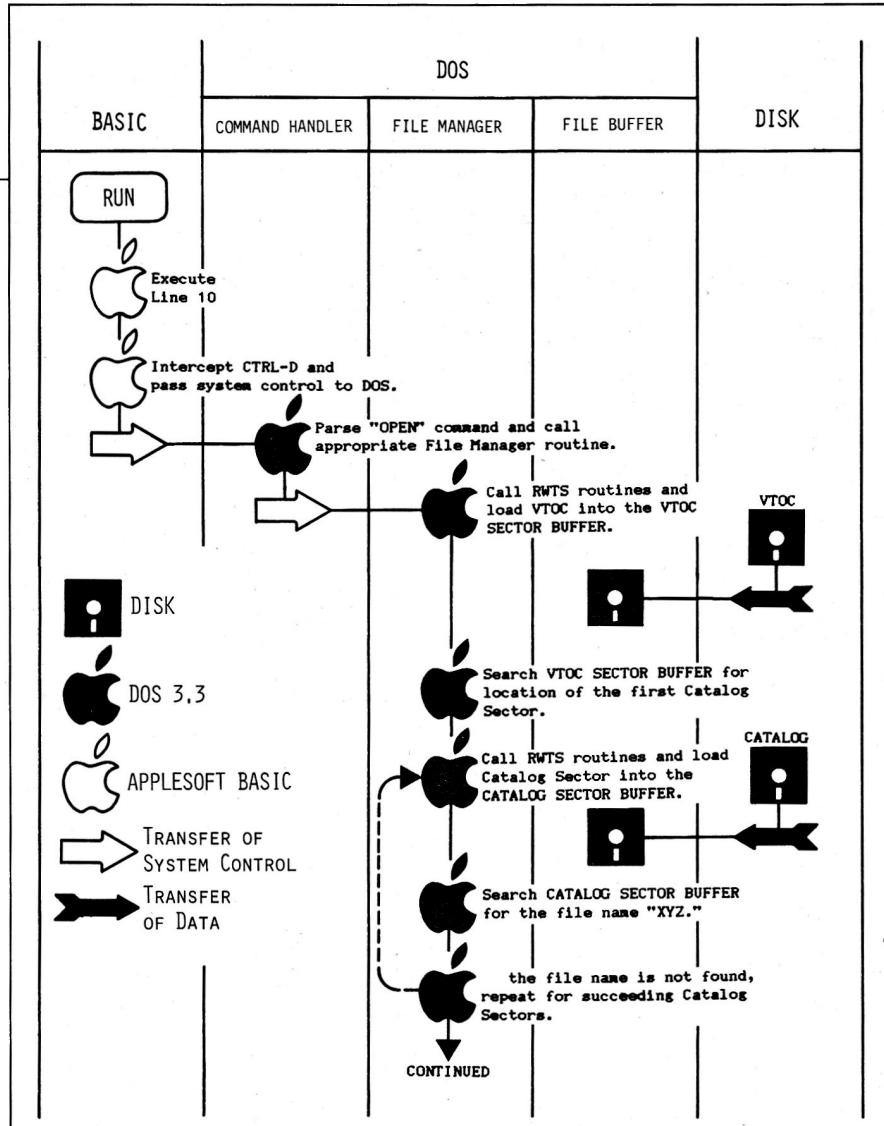


Figure 2a. Text file processing.

illegitimate, DOS will print an error message. If the command is legitimate, DOS will transfer the control to the appropriate subroutine. In the case of text file commands, DOS transfers control to the file manager.

File Manager

The file manager portion of DOS controls the means by which the Apple accesses the disk. The file manager also contains three buffers for temporary storage of data: a VTOC sector buffer, a catalog sector buffer and a 347-byte scratch buffer for storing the encoded raw data from the disk sector until the file manager can decode it. In addition to the routines in the file manager, DOS uses two other routines/buffers: the read/write track/sector routines and the file buffer.

Let's examine a typical text file process.

```

10 PRINT D$; "OPEN XYZ"
20 PRINT D$; "READ XYZ"
30 INPUT A$ 
40 PRINT D$; "CLOSE XYZ"

```

Figure 2 shows the process that the Apple DOS goes through to load data from the disk and make it available to a Basic program. Actually, the OPEN command is unnecessary for an existing file, since both the READ and WRITE routines check the file and open it if it is closed. Note in Figure 2 that the file manager does the majority of work. Also note that four separate buffers are required.

Read/Write Track/Sector (RWTS)

The RWTS routines read the "gaps" on the disk and find the appropriate track and sector, then read the data

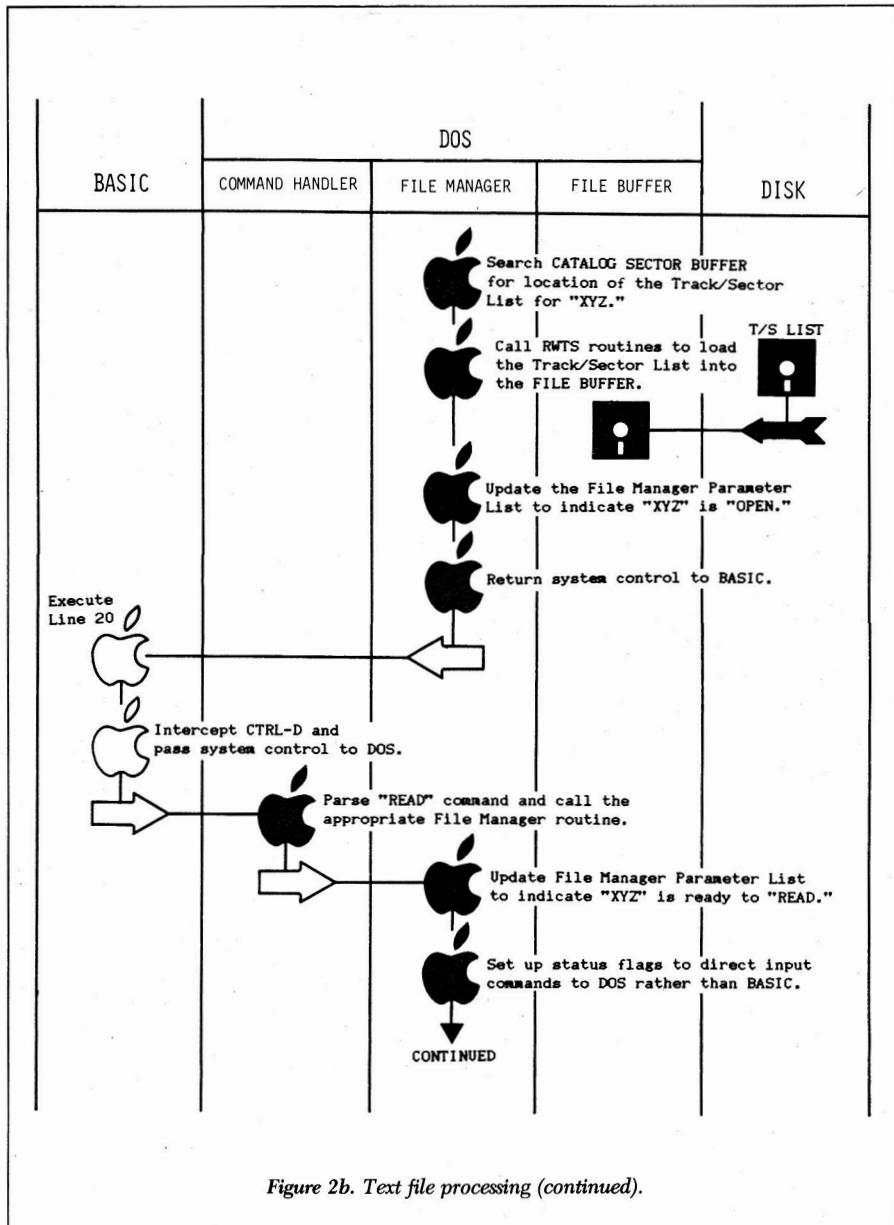


Figure 2b. Text file processing (continued).

within the sector and load the encoded data into a scratch buffer in the computer. The file manager then decodes the encoded data and transfers the results to a file buffer.

File Buffers

This stores data from the disk temporarily until it is transferred to the portion of the computer's memory that is under the program's direct control (the variable table or string storage area). DOS, in its default state, contains three file buffers, each occupying 595 bytes. Those 595 bytes contain the following data for each of three files:

- The last sector of data (256 bytes, decoded) loaded from the disk.
- The track/sector list for the file (256 bytes).
- A file manager work area containing information on the type and status

of the file occupying this buffer.

- The name of the file.
- The addresses of the above data.

Text File Access

Applesoft has three helpful text file commands that do not occur in some other Basics:

- APPEND
- B parameter
- POSITION

I will discuss these in Part 4 next month.

Modifying DOS

"Normal" DOS overhead (MAXFILES 3) is 10752 bytes, from addresses 38400-49152. The overhead can range from 9562 to 18487 bytes for MAXFILES 1 to 16 respectively. Since the string storage area begins immedi-

ately below the DOS file buffers, any increase in MAXFILES after strings have been concatenated will destroy these strings. You must change MAXFILES as one of the first commands in a program.

DOS automatically establishes buffers for three text files. This allows us to have three text files open at one time. Most often, a program will require access to only one file at a time. Applesoft provides a command to allow us to adjust the number of file buffers available. Since each buffer must contain 595 bytes (256 bytes of data plus the other information shown in Figure 1), we can get over 1K free just by eliminating the two file buffers we don't need. To demonstrate this, type in the program listing and run it. The following pairs of values will appear on-screen:

38400 (Top of memory)
36098 (Free space)

38995
36693
39590
37288
38400
36098

```

10 HOME
20 PRINT PEEK(115) + 256 * PEEK(116)
30 PRINT 65535 + FRE(0)
40 PRINT
50 PRINT CHR$(4); "MAXFILES 2"
60 PRINT PEEK(115) + 256 * PEEK(116)
70 PRINT 65535 + FRE(0)
80 PRINT
90 PRINT CHR$(4); "MAXFILES 1"
100 PRINT PEEK(115) + 256 * PEEK(116)
110 PRINT 65535 + FRE(0)
120 PRINT
130 PRINT CHR$(4); "MAXFILES 3"
140 PRINT PEEK(115) + 256 * PEEK(116)
150 PRINT 65535 + FRE(0)

```

Listing. This demonstrates how you can increase memory by eliminating file buffers.

These pairs represent respectively the top of user memory (HIMEM:) and the available free space (from the top of our short program to HIMEM:) for various values of MAXFILES. The top pair is the default value for MAXFILES, which is three. The other pairs show the values for a subsequent reduction of file buffers from three to two to one and back to three. As you can see by comparing the values, every time we reduce MAXFILES by one, removing a file buffer, we move the top of memory up 595 bytes and in-



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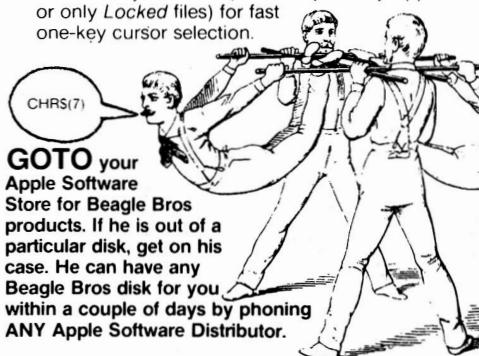
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10 LIST: LIST: LIST: FOR ZZ=PEEK(175)+PEEK(176)*256+36 TO 3072: POKE ZZ,216: NEXT 20 FOR XXX=1 TO 2: POKE-16299,0: POKE -16300,0: XXX=1: NEXT: REM Experiment with different length variable names.

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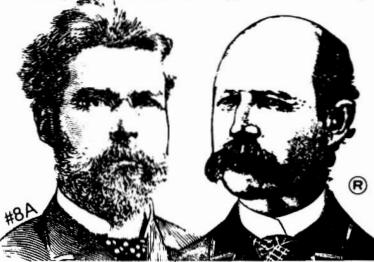
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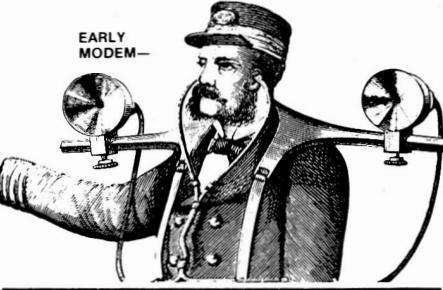
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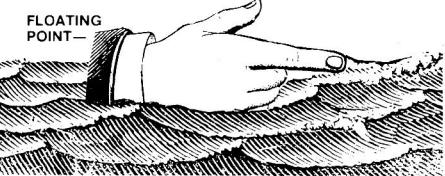
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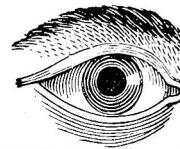
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```
1 FOR S-768 TO 773: READ A:
POKE S,A: NEXT: POKE 232,0:
POKE 233,3: DATA 1,0,4,0,5,0:
2 HGR2: FOR R-0 TO 192: ROT=R:
SCALE=96: XDRAW 1 AT 140,95:
SCALE=30: XDRAW 1 AT 140,95:
S-PEEK(49200): NEXT: RUN
```

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crease the amount of available memory by 595 bytes. Thus, if we will only need one text file open at a time, we can gain an extra 1190 (2×595) bytes of memory by setting MAXFILES to 1.

Moving DOS

If you have a language card (16K RAM card) or an Apple IIe, 16K bytes of read/write memory (RAM) occupy the same address locations as the Applesoft ROM. When you boot the DOS 3.3 system master, Integer Basic loads into this extra memory so that you can switch between the two languages. Because language card addresses are the same as the addresses of the Applesoft ROMs, it is unavailable to the user under normal conditions and is therefore largely unused. Since DOS occupies only a little over 10K bytes in its usual form, it will fit nicely on the language card. This frees an additional 10K of user memory. Since DOS is software, it can easily be modified to occupy those addresses. Several commercial programs can move DOS to the language card. In addition, *Call A.P.P.L.E.* (July/August 1981) published a program that accomplishes this. The advantage to this technique, of course, is that more free space is available to the program so that more strings may be stored and less garbage collection is required.

Faster DOS

Obviously, since DOS is in software, we can also modify the existing software to handle text files more rapidly. We must forego DOS's extra care in handling such files, but this is a small price to pay for significant increases in speed. The two sources of DOS modifications are magazine articles and commercial programs. The "Further Reading" section below lists some magazine articles that provide means of modifying DOS. Look through the advertisements in this magazine for commercial programs. Remember that the program must modify the TEXT handling characteristics of DOS, not just the LOAD and BLOAD characteristics.

Skewing Again

I mentioned disk sector skewing in Part 1 of this series. Skewing is one of

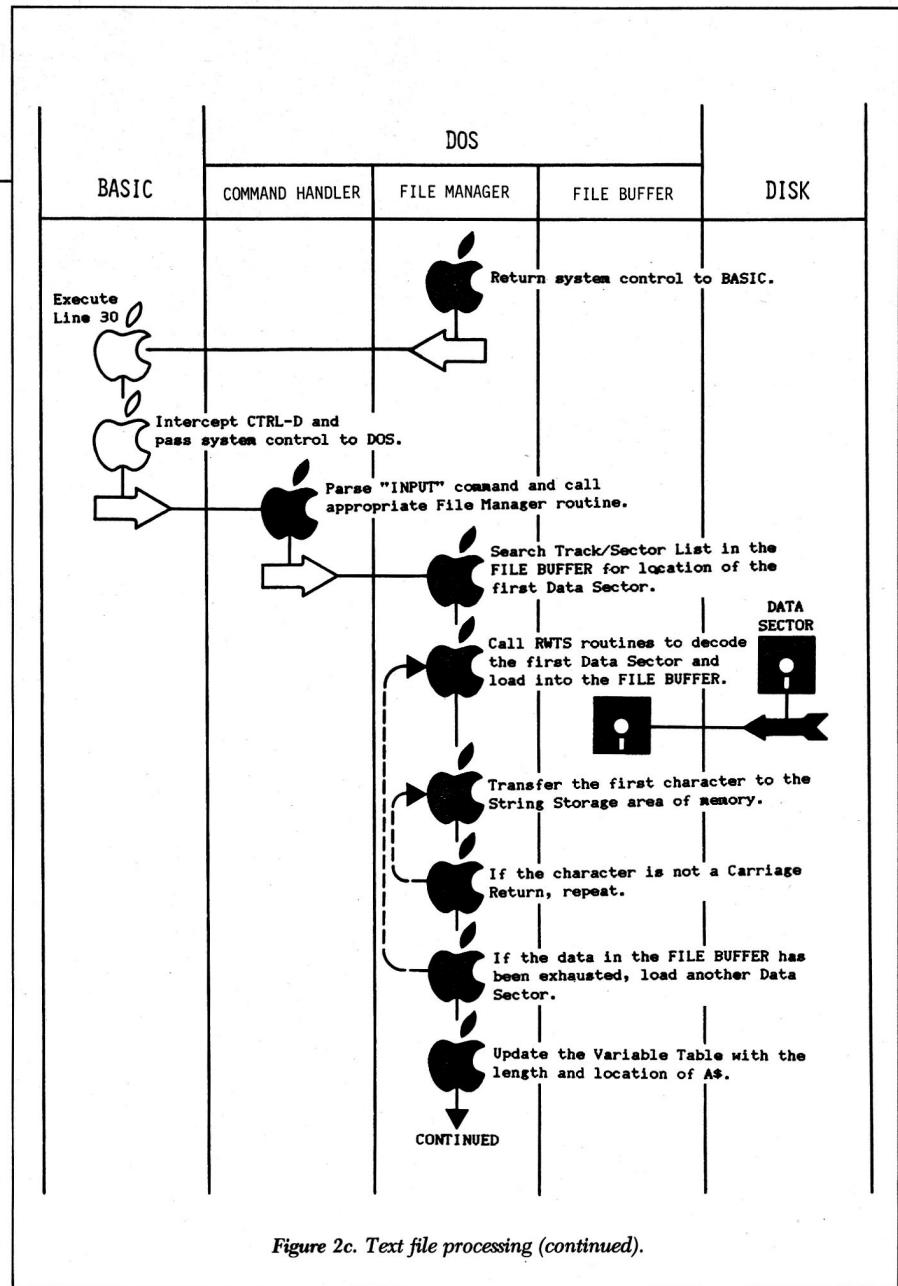


Figure 2c. Text file processing (continued).

the reasons disk operations are so slow.

Imagine the disk as a merry-go-round with 16 horses, each horse representing one disk sector. Number the horses, beginning with 1 and numbering every seventh horse afterwards (the first horse is 1, the eighth is 2, the fifteenth is 3, and so on). Whenever you pass horse number 1, skip it in your counting scheme. When you finish, you will have been around the merry-go-round seven complete times; the horses will be numbered 1, 14, 12, 10, 8, 6, 4, 2, 15, 13, 11, 9, 7, 5, 3, 16. Now stand with a box full of balls looking at horse 1 and start your merry-go-round rotating. Take a ball and throw it at horse number 1. Take another and throw it at horse number 2. Note that six horses passed you while you were picking up the second ball. Just as

skewing the numbers on the horses gave you time to pick up the second ball, skewing sectors gives DOS time to process incoming or outgoing data from one sector before the next sector passes the read/write head. But just to make sure that the computer has plenty of time, DOS waits six sectors before it reads the next sector.

This is the way DOS accesses the disk—read or write one sector, skip six, read or write another sector, skip six. True, the disk spins at 300 rpm, but it still takes seven revolutions (1.4 seconds) to read one track.

If the computer is really waiting for the disk to rotate, why not read sectors in their physical order or, at worst, skip only one sector instead of six? Only one or two revolutions would be required to read a track. Good idea, and

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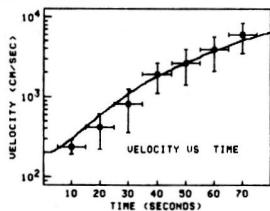
AMPERGRAPH is a powerful, easy-to-use relocatable graphics utility for the Apple II +/e. AMPERGRAPH adds twenty-two Applesoft commands that allow effortless generation of professional-looking plots of scientific or financial data. All of the necessary scaling and screen formatting is accomplished with just a few, simple Applesoft lines.

Unlike most other plotting systems for the Apple II which are stand-alone systems, the AMPERGRAPH utility provides extended BASIC graphics language macros that you can use directly in your own Applesoft programs. The additional commands are &SCALE, &LIMIT, &AXES, &GRID, &FRAME, &LOG X, &LOG Y, &LABEL AXES, &LABEL, &VLABEL, &CENTER LABEL, &CENTER VLABEL, &DRAW, &PENUP, &CROSS, &OPEN SQUARE, &CLOSED SQUARE, &OPEN CIRCLE, &CLOSED CIRCLE, &ERROR BARS, &DUMP (to dump the graph on a Silentsense printer) and &*DUMP (to link with AMERDUMP, see below).

\$45.00

SAMPLE AMPERGRAPH PROGRAM LISTING:

```
10 &SCALE, 0, 80, 80, 13000
15 LX$ = "TIME (SECONDS)":LY$ = "VELOCITY
(CM/SEC)"
20 &LOG Y: &LABEL AXES, 10, 10
25 LABEL$ = "VELOCITY VS. TIME":&LABEL, 30,
200
30 FOR T = 0 TO 80:&DRAW, T, 150 + T12:NEXT T
35 FOR T = 10 TO 70 STEP 10
40 &CLOSED SQUARE, T,
(150 + T12)*(8 + .4*RND(3))
45 &ERROR BARS, 5, T12/2
50 NEXT T:&DUMP
```



AMPERDUMP

AMPERDUMP is a high-resolution graphics dump utility which can be used either in menu-driven mode, or directly from your Applesoft program, with, or without AMPERGRAPH. The following printers will work with AMPERDUMP: Epson MX-80, FX-80, MX-100; Apple DMP, NEC PC-8023A-C, C, ITOH 1550, 8510A/B, 8600. AMPERDUMP offers many features which are not available in other graphics dump routines:

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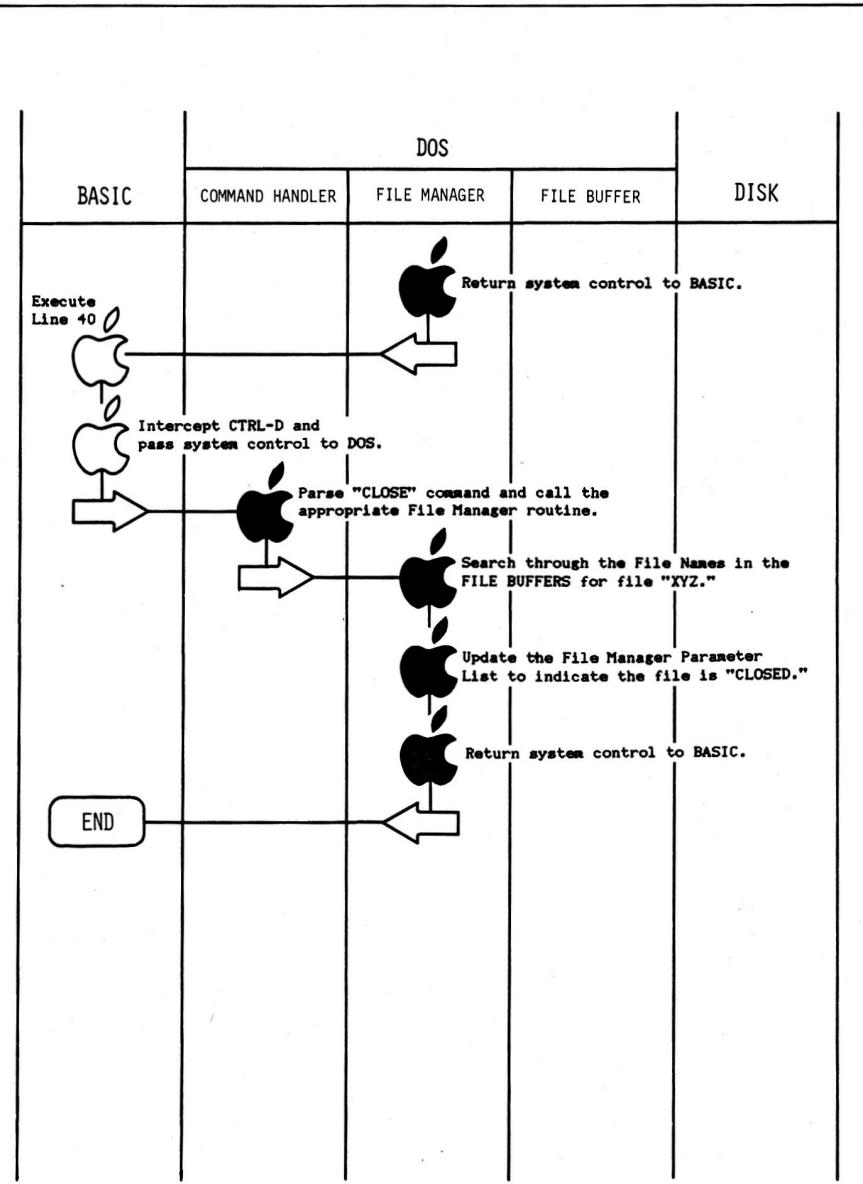


Figure 2d. Text file processing (concluded).

various schemes have been devised to do just that (see "Oiler" in *Nibble*, Volume 3, Number 5). Unfortunately, this scheme just won't work for text files.

Figure 2 shows that text files are handled one byte at a time. Memory space must be allocated for the string, the string must be processed into that memory space and the variable table must be updated—a very slow process. As a result, the extra disk rotation is required to allow time for DOS to process each sector of text—maybe even more if garbage collection is required.

To speed up text file reads and writes, we must be able to bypass the file manager to load text files directly into memory—a highly critical operation. See "Further Reading" for programs that speed text file handling.

Further Reading

- "Text File Fast Loader," *All About DOS*, A.P.P.L.E.
- "Amper Reader," *Nibble*, Volume 2, Number 1.
- "Amper-speed," *Nibble*, Volume 3, Number 3.
- "Saving and Loading Arrays in Applesoft," *Apple Orchard*, Winter 1980.
- "Amper Disk Storage and Recall," *Nibble*, Volume 2, Number 6.

More to Come

Next month, we will look at text files themselves and relate them to the information we have learned so far about the computer. In the meantime, have some random thoughts about the sequence of information we have discussed so far. ■



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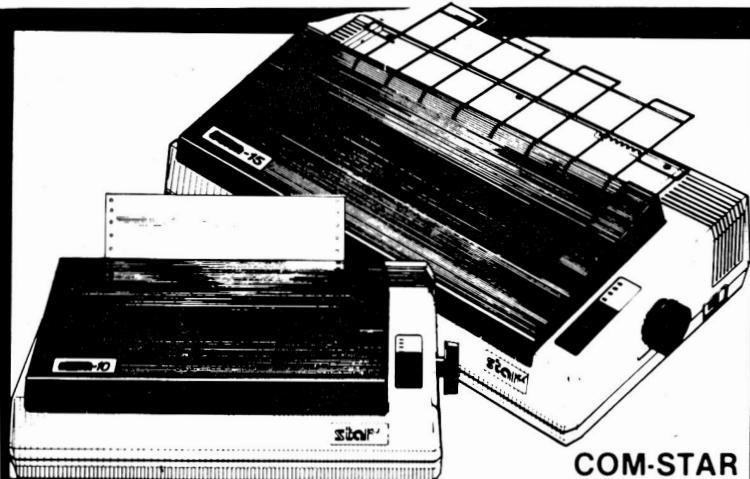
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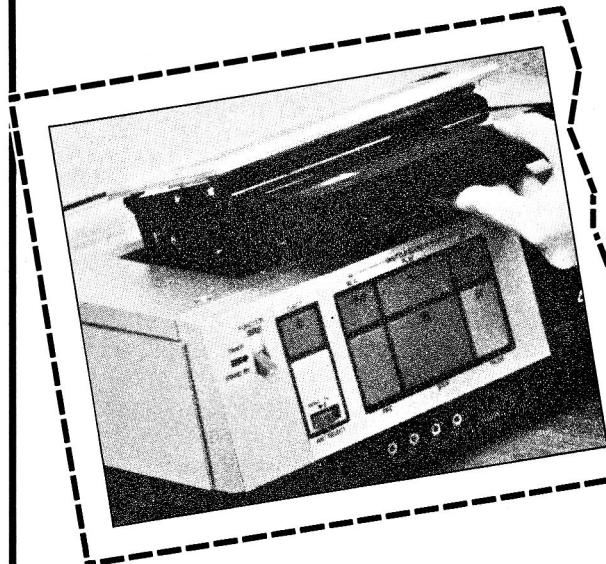
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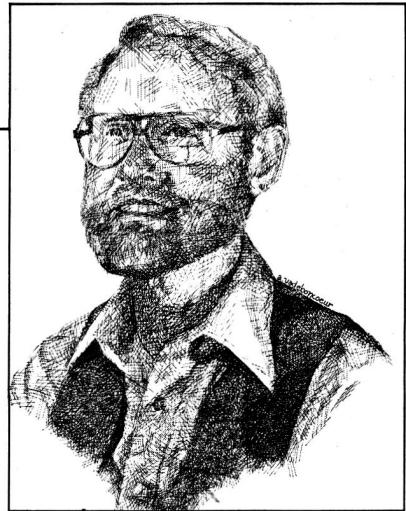
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The Applesoft Adviser

by Dan Bishop



The Sort Index

Several readers have written me over the last few months to request a series of articles on data structures within Basic. Like many other fields of study, data structures can be dealt with in a highly abstract and theoretical form. The subject can also be approached from a practical applications point of view, and you can rest assured that that is how I intend to treat it in my articles.

First, Some Hints

Before starting with this month's topic, the sort index, I would like to provide a solution to a problem that keeps coming up in my mail. I call it "The Case of the Elusive Syntax Error." There are two situations that bring this problem about. The first occurs when there is a syntax error in a user-defined function (a line that begins DEF FN ...), the second when there is a syntax error in a data statement.

In both cases a program will crash with the message SYNTAX ERROR IN LINE ####. The line number given in the error message is not, however, the line containing the syntax error. It is the line that contains the reference to the function or data statement. To find the real location of the syntax error, you need to go back in the program to the DEF FN instruction or the DATA line. For example, type in the following two-line program and attempt to run it:

```
10 DEF FNA(X) = X*(X - 1  
20 PRINT FNA(10)
```

You will receive a SYNTAX ERROR IN 20 message, even though there is

no problem with line 20 at all. The problem is in the line where the FNA function was first defined, line 10.

A similar problem crops up when you are using a system that requires adhering to specific syntax rules for data statements (not in Applesoft Basic). Some systems require that each comma in a list of data elements be followed by a space before the next data element is defined. If you leave the space out, you will get the elusive syntax error. For example:

```
10 DATA 18, 22, 33, 14, 8, 12  
20 FOR I = 1 TO 6  
25 READ A  
30 NEXT I
```

will result in a SYNTAX ERROR IN 25 message. The error, of course, is really in line 10.

If you aren't aware of this feature, you can spend hours pulling your hair out and kicking the dog, trying to determine how a simple line like READ A can have a syntax error!

Why a Sort Index

If you have a list of five or ten names, stored in RAM in an array, and you wish to keep these names in alphabetical order, it is a very simple task to re-order the list whenever you add another name so that the new one appears in its alphabetically correct position. However, most lists are not so simply handled. The lists themselves are usually much longer, involving hundreds or thousands of names. The records that need to be alphabetized are not all in a simple RAM array. They are usually individual records stored on disk. The time and loss of efficiency

that would result with every attempt to re-sort such a large disk file would seriously cut into the computer's usefulness. After all, what does it take to insert a new record into an alphabetically organized filing cabinet?

The solution to this dilemma lies in the sort index. When a file has a sort index, any new record to be added to the file is placed in the most convenient location. If there were a vacancy resulting from a deleted record, then that location would be a logical one for the new record. If the file had no such vacancies, then the new record would be appended to the end of the file. The actual order of appearance of records within the file is of no importance.

What is important is where this new record's location number, or record number (RN), appears in the sort index. The sort index, which is simply a one-dimensional array of integers, is kept in RAM and must be re-sorted every time a record is added or deleted from the file. This index keeps a list of record numbers such that their order within the list corresponds to the alphabetical order of the records themselves. Figure 1 illustrates how the elements in a sort index keep the file organized.

The records in a file can be scanned or searched alphabetically by using the elements within the sort index to specify the sequence in which records are to be accessed. Listing 1 provides a simple program to illus-

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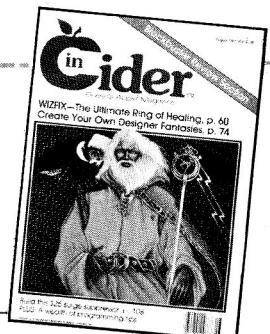
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trate how this concept works. Although this listing and Listing 2 use read/data instructions to set up the records list into an array, the same principles apply to accessing records directly out of disk files. In these examples, the sort index contains the subscript reference to the record array. With disk files, the array elements in the sort index reference actual record numbers in a random access disk file.

With Listing 1, note that, although the data records in the array are listed in random order, when the sort index is used to access these records they are brought out in alphabetical order. The key to using the sort index lies in line 140. Note that if records are accessed by merely using the loop counter—thus A\$(I)—the records are printed in the order of their occurrence in the file (or array). On the other hand, if the subscript used is the value present in the sort index array, N(I), then the records, accessed by A\$(N(I)), are retrieved in alphabetical order. It does take some acclimating to be comfortable using a subscripted variable such as N(I) as a subscript itself!

The Binary Search

Of course, in actual use a sort index must be set up to allow additions, deletions and re-ordering functions to take place. And in order to carry out those functions an efficient search routine must be available that can use the index elements and rapidly search through the file (or array). This search routine has to perform two functions. For the case where it is being used to locate a record already in the file, it must scan through the file to find the desired record. On the other hand, when a new record is to be added to the file, the search routine has to scan through the file to determine where the new record's actual location (record number) is to be placed in the sort index array.

The simplest way to handle such a search is to go through the file se-

```

10 REM LISTING 1 - USING A SORT INDEX
20 DATA "JOHN", "BARRY", "ZAK", "TOM", "MARY", "SUE", "HARRY", "BILL"
30 DATA 2, 8, 7, 1, 5, 6, 4, 3
39 REM READ NAMES INTO A$ ARRAY
40 FOR I=1 TO 8
50 READ A$(I)
60 NEXT I
69 REM READ INDEX INTO N ARRAY
70 FOR I=1 TO 8
80 READ N(I)
90 NEXT I
99 REM DISPLAY ARRAY AND SORTED LIST
100 HOME
110 PRINT "ORIGINAL LIST"; TAB(20); "SORTED LIST"
120 PRINT
130 FOR I=1 TO 8
140 PRINT A$(I); TAB(20); A$(N(I))
150 NEXT I
160 END

```

Listing 1. Simple example of the use of a sort index.

quentially, reading records in order until the correct record has been located. This method may work for small files, or even for files that are located completely in RAM as large data arrays. However, when the

an efficient way to locate a given record within the file. A single record in a file containing over 1000 records can be located with 11 or fewer accesses. The concept is simple. You first divide the file in half and pull out the central record in the ordered file. If the record you are searching for comes before this record (alphabetically) then you needn't waste time looking through the last half of the file. Reset the maximum to this central point, and find the record that lies halfway between the start of the file and the new maximum.

Suppose now that your record comes after the record just selected from the file. This means you can chuck the front fourth of the file, just as you previously discarded the back half of the file. With two comparisons, you have eliminated three fourths of the file. Continuing in this fashion allows you to narrow the field by half each time until the entire file has been scanned.

The binary search subroutine in Listing 2 begins at line 2500. This subroutine assumes that the data being scanned is stored in the A\$(i) array and that this array has a sort index N(i). The item you are searching for is defined as DD\$, and the size of the file is stored in N(0).

Within the routine, MN is the bottom index subscript and MX is the top index subscript for the portion of the file currently being scanned. Of course, at the start MN is set to 1 and MX is set to N(0). Lines 2510-2535 handle the special case where these two values differ by only one. On the other hand, lines 2550-2565 deal with the more common situation.

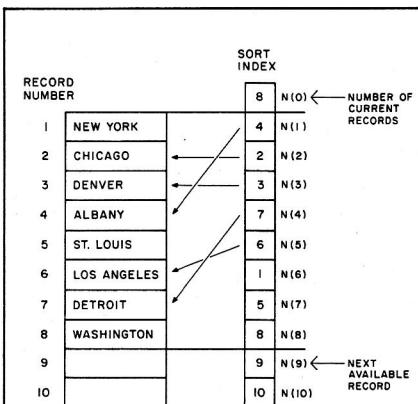


Figure 1. The sort index, N(i), contains the record numbers for the sorted file, with these numbers listed in alphabetical sequence. The elements in the sort index are pointers to individual records in the sorted file.

files are disk files, and only one record at a time can be transferred to RAM for scrutiny, this method becomes painfully slow.

Listing 2 illustrates a superior approach for any type of search through a file that is ordered alphabetically. Of course, in this case the ordering is done through the index rather than the file itself, but the computer doesn't know that.

A binary search through a file is

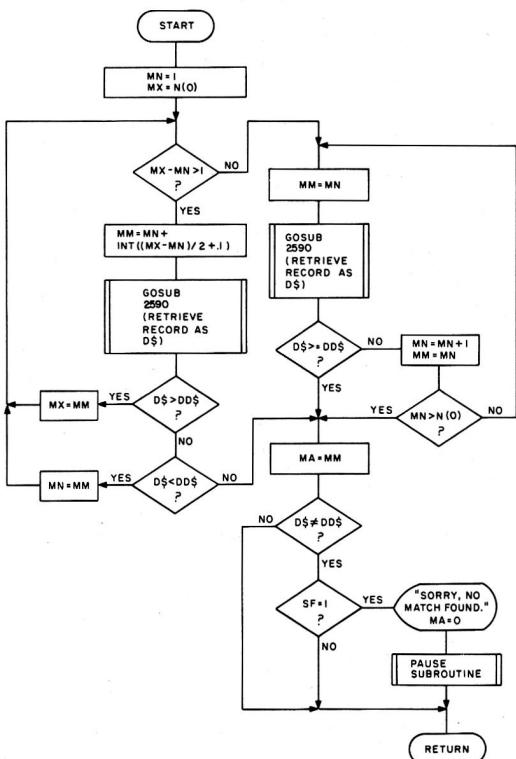


Figure 2. Flow chart for the binary search routine presented in Listing 2. DD\$ is the item being searched for in a file containing N(0) records. If a match is found, the subroutine returns MA, the index subscript for the desired record.

```

5 REM Listing 2 - USING A SORT INDEX WITH A BINARY SEARCH
10 DATA JANE, MARY, SUE, ALICE, QUIN, AVON, BARRY, SALLY, JUNE
20 DATA 9,4,6,7,1,9,2,5,8,3
30 FOR I=1 TO 9
35 READ A$(I)
40 NEXT I
45 FOR I=0 TO 9
50 READ N(I)
55 NEXT I
60 INPUT "ENTER NAME TO BE FOUND (OR <STOP> )...";DD$
65 IF DD$="STOP" THEN END
70 SF=1: GOSUB 2500: SF=0
75 IF MA=0 THEN 60
80 PRINT A$(N(MA));" IS RECORD # ";N(MA)
85 PRINT "AND IS ITEM # ";MA;" IN THE SORTED LIST."
90 PRINT
95 GOTO 60
999 REM PAUSE ROUTINE
1000 FOR I=1 TO 1000:NEXT I:RETURN
2499 REM BINARY SEARCH ROUTINE
2500 MN=1: MX=N(0)
2505 IF (MX-MN)>1 THEN 2550
2510 MM=MM
2515 GOSUB 2590
2520 IF D$>DD$ THEN 2570
2525 MN=MN+1: MM=MM
2530 IF MN>N(0) THEN 2570
2535 GOTO 2510
2550 MM=MM + INT((MX-MN)/2 + .1)
2555 GOSUB 2590
2560 IF D$>DD$ THEN MX=MM: GOTO 2505
2565 IF D$<DD$ THEN MN=MM: GOTO 2505
2570 MA=MM
2575 IF D$=DD$ THEN 2585
2580 IF SF=1 THEN PRINT "Sorry, no match found.": MA=0: GOSUB 1000
2585 RETURN
2590 RN=N(MM)
2595 D$=A$(RN): RETURN

```

Listing 2. The binary search routine, key to the use of the sort index.

The midpoint between MN and MX is determined (line 2550) as MM and record N(MM) is retrieved from the file as D\$.

If D\$ is greater than DD\$, then MX is reset to MM, discarding the top half of the file. If D\$ is less than DD\$, then MN is reset to MM, discarding the lower half of the file. When a match is found, MA is set to the sort index subscript that contains the desired record number. If no match is found after searching the entire file, a message to that effect is displayed.

There is one other function built into Listing 2. When a new record is added, the file must be searched in exactly the same manner. In this case the program is not expecting to find an exact match, but rather to determine the location for this new record. The procedure is the same, except that when the entire file has been searched to find the new record's location the subroutine does not display the NO MATCH FOUND message. Instead, the value of MA is returned to the main program. This value corresponds to the location for inserting the new record's record number into the sort index. A flag value, SF, is set prior to using the binary search subroutine. If SF has a value of 1, then the subroutine expects to find a match in a search; if SF has a value of 0, then the subroutine expects to locate the correct position for a new record. Figure 2 presents the flowchart for this subroutine.

In most applications, the records will not be stored in RAM as an array. The only change that needs to be made to this subroutine to handle disk files is line 2595. The record number is determined in line 2590, and this record number can then be used in a set of disk access instructions to pull out record RN, set D\$ equal to that part of the record being used for the comparison in the search, and then return. Everything else in the subroutine will function the same way.

Setting Up the Index

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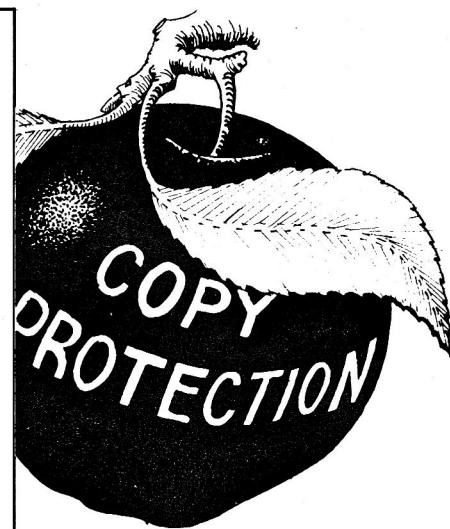
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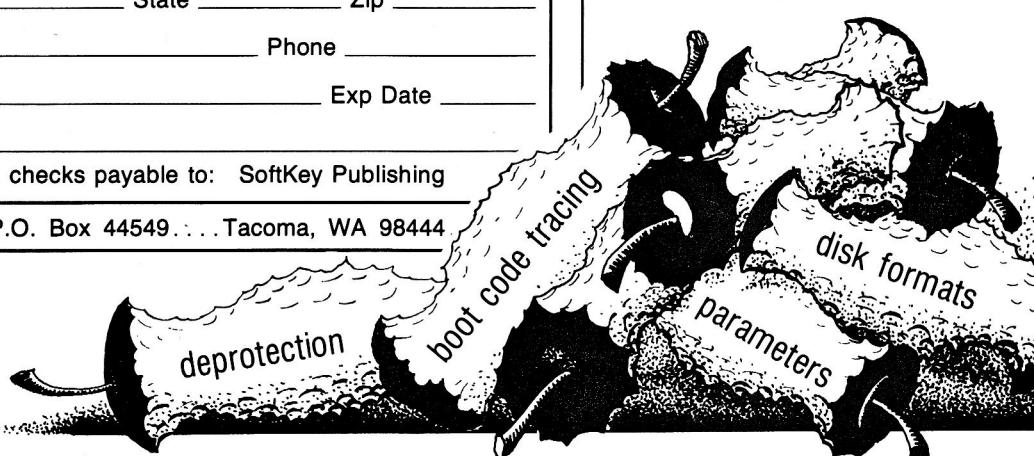
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the sort index was already established for the data set used. In a real application the index needs to start with no records and adjust itself as new records are added or deleted. This problem is not nearly as difficult as it looks. The key feature in performing these functions lies in the binary search routine described above.

When first setting up the sort index, you need to determine the maximum number of records to be kept in the alphabetized sort list. This is necessary in order to properly dimension the sort index, and also to set it up with initial values that will keep the index functional as new records are added and deleted.

The first entry into the index will correspond to the current number of active records included in the index. At the start, that value is 0 and is kept in $N(0)$. All of the remaining elements in the index will contain a value that corresponds to the "next available record." You can then always look to index element $N(0) + 1$ to find a value that tells where the next available record in your file will be. This will correspond to the record number you assign to the next record added to the file.

For example, if you have added ten records to the file, with no records being deleted, then $N(0) = 10$ and elements 1-10 in your index file will contain the numbers 1-10 (but probably not in sequential order, unless you just happened to enter the ten records alphabetically). The next available record will be record 11. This number should be obtained by looking at the value of $N(11)$. As you can tell from this, the first thing to do before using the index file is to assign every element a number that corresponds to the value of its own subscript. The subroutine at 2200 handles this:

```
10 DIM N(100)
2200 FOR I = 0 TO N
2205 N(I) = 1
2210 NEXT I
2215 RETURN
```

Now, whenever you have a new record to add, you need only check the value contained in $N(N(0) + 1)$ to

BEFORE DELETING RECORD 12		AFTER DELETING RECORD 12	
$N(0)$	7	NUMBER CURRENT RECORDS	6
$N(1)$	3		3
$N(2)$	9		9
$N(3)$	8		8
$N(4)$	4		4
$N(5)$	12	RECORD TO BE DELETED	6
$N(6)$	6		5
$N(7)$	5		12
$N(8)$	1	NEXT AVAILABLE RECORD	1
$N(9)$	7		7
$N(10)$	2		2
$N(11)$	11		11
$N(12)$	10		10

Figure 3. Comparison of the sort index before and after record number 12 is deleted. Note that the record number is not discarded. Rather, it is added to the top of the list. The next addition made to this file will use record number 12 for the actual location to store the new record.

find the appropriate next-available slot in the array or file to store the new record.

When you delete a record, you compress the "active part" of the index array and place the removed record's record number at the top of the active list. Thus you keep track of vacancies as they are produced in the file and can simply refer to the top of the active list to find where the next available record vacancy lies.

For example, suppose record 12 (sort index position 5) were removed from the file. Referring to Figure 3,

BEFORE ADDING NEW RECORD		AFTER ADDING NEW RECORD	
$N(0)$	6	NUMBER OF CURRENT RECORDS	7
$N(1)$	3		3
$N(2)$	9	NEW RECORD TO BE INSERTED HERE	12
$N(3)$	8		9
$N(4)$	4		8
$N(5)$	6		4
$N(6)$	5		6
$N(7)$	12	NEXT AVAILABLE RECORD	5
$N(8)$	1		1
$N(9)$	7		7
$N(10)$	2		2
$N(11)$	11		11
$N(12)$	10		10

Figure 4. Comparison of the sort index before and after a new record is added to the file. The binary search routine determined that the new record should be the second item in the alphabetical list.

you will notice that, for this operation, $MA = 5$ and $N(MA) = 12$. The following sequence handles the deletion from the sort index:

```
2000 T = N(MA)
2005 FOR I = MA TO N(0) - 1
2010 N(I) = N(I + 1)
2015 NEXT I
2020 N(N(0)) = T
2025 N(0) = N(0) - 1
2030 RETURN
```

This short routine resets the entire index array from element MA to the top, squeezing out the old record number and replacing it at the top of the active list so it will be the first used when a new record is entered.

Adding New Records

In a sense, adding records to the sort index is just the opposite of deleting them. You need to conduct a binary search (with $SF = 0$) to find a value for MA that corresponds to the location your new record should occupy in the sort index. You also need to get this record's actual record number by checking the next available record from your sort index, element $N(N(0) + 1)$. Place the record in the file or array, and use the following subroutine to merge the new record number into its appropriate position in the index:

```
2100 RN = N(N(0) + 1)
2105 IF N(0) = 0 THEN 2125
2110 FOR I = N(0) TO MA STEP -1
2115 N(I + 1) = N(I)
2120 NEXT I
2125 N(MA) = RN
2130 N(0) = N(0) + 1
2135 RETURN
```

Figure 4 illustrates this expansion of the sort index to accommodate the new record. Of course, the value for MA must be obtained from the binary search routine before this subroutine is called.

Listing 3 illustrates the full use of a sort index on the A(i)$ array. Again let me emphasize that the techniques presented here will work as easily on disk files as on a RAM array by merely changing the references to the A(i)$ array in the program to subroutines handling disk I/O procedures. When using disk files, the sort index must, of course,

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5 REM FULLY IMPLEMENTED SORT INDEX
10 DIM N(100), A$(100)
15 GOSUB 2200
20 HOME
25 PRINT"ENTER SELECTION:"
30 PRINT TAB(7)"A. ADD NEW ITEM."
35 PRINT TAB(7)"D. DELETE AN ITEM."
40 PRINT TAB(7)"S. SEARCH FOR AN ITEM."
45 PRINT TAB(7)"V. VIEW ARRAY AND INDEX."
50 PRINT TAB(7)"E. END THE PROGRAM."
55 PRINT:INPUT"CHOICE...";C$
60 IF C$="A" THEN GOSUB 100
65 IF C$="D" THEN GOSUB 300
70 IF C$="S" THEN GOSUB 600
75 IF C$="V" THEN GOSUB 800
80 IF C$="E" THEN END
85 GOTO 20
99 REM NEW ITEM ENTRY ROUTINE
100 HOME
105 IF N(0)=99 THEN PRINT"ARRAY IS FULL.":GOSUB 1000:RETURN
110 INPUT"ENTER NEW ITEM...";DD$
115 IF N(0)=0 THEN MA=1:GOTO 125
120 SF=0:GOSUB 2500
125 GOSUB 2100
130 A$(RN)=DD$
135 RETURN
299 REM ITEM DELETION ROUTINE
300 HOME
305 INPUT"ENTER ITEM TO DELETE...";DD$
310 SF=1:GOSUB 2500:SF=0
315 IF MA=0 THEN RETURN
320 GOSUB 2000
325 PRINT"ITEM "DD$" HAS BEEN DELETED."
330 GOSUB 1000
335 RETURN
599 REM SEARCH ROUTINE TO FIND SPECIFIED RECORD
600 HOME
605 INPUT"ENTER ITEM FOR SEARCH...";DD$
610 SF=1:GOSUB 2500:SF=0
615 IF MA=0 THEN RETURN
620 PRINT "ITEM "DD$" IS RECORD # "N(MA)
625 PRINT " AND ITEM # "MA" IN THE SORTED LIST."
630 GOSUB 1000
635 RETURN
799 REM ROUTINE TO DISPLAY RECORD ARRAY, SORT ARRAY, & SORTED LIST
800 HOME
805 FOR I=1 TO N(0)
810 PRINT A$(I), N(I), A$(N(I))
815 NEXT I
820 PRINT ,N(N(0)+1) " ----- NEXT AVAILABLE RECORD"
825 FOR I=N(0)+2 TO N(0)+5
830 PRINT A$(I), N(I), A$(N(I))
835 NEXT I
840 INPUT"PRESS RETURN TO CONTINUE...";X$
845 RETURN
999 REM PAUSE ROUTINE
1000 FOR I=1 TO 1000:NEXT I:RETURN
1999 REM DELETE ITEM FROM SORT INDEX
2000 T=N(MA)
2005 FOR I=MA TO N(0)-1
2010 N(I) = N(I+1)
2015 NEXT I
2020 N(N(0)) = T
2025 N(0) = N(0) - 1
2030 RETURN
2099 REM ADD ITEM INTO SORT INDEX
2100 RN = N(N(0)+1)
2105 IF N(0)=0 THEN 2125
2110 FOR I=N(0) TO MA STEP -1
2115 N(I+1)=N(I)
2120 NEXT I
2125 N(MA) = RN
2130 N(0)=N(0)+1
2135 RETURN
2199 REM INITIALIZE SORT INDEX VALUES
2200 FOR I=0 TO 100
2205 N(I)=I
2210 NEXT I
2215 RETURN
2499 REM BINARY SEARCH ROUTINE
2500 MN=1: MX=N(0)
2505 IF (MX-MN)>1 THEN 2550
2510 MM=MN
2515 GOSUB 2590
2520 IF D$>DD$ THEN 2570
2525 MN=MN+1: MM=MM
2530 IF MN>N(0) THEN 2570
2535 GOTO 2510
2550 MM=MN + INT((MX-MN)/2 + .1)
2555 GOSUB 2590
2560 IF D$>DD$ THEN MX=MM: GOTO 2505
2565 IF D$<DD$ THEN MN=MM: GOTO 2505
2570 MA=MM
2575 IF D$=DD$ THEN 2585
2580 IF SF=1 THEN PRINT "Sorry, no match found.": MA=0: GOSUB 1000
2585 RETURN
2590 RN=N(MM)
2595 D$=A$(RN): RETURN

```

Listing 3. Fully implemented sort index, containing routines to add new records, delete old records, and search file for given records.

also be stored on disk. It should be loaded into RAM at the beginning of the program so that it is always available for any functions relating to the disk file.

Be sure that you also save the sort index back onto disk before ending the program. In fact, I have found several situations in which I had to save the updated index onto disk after each revision during the operation of the program. This came up in operating environments where power fluctuations made it impossible to run the system all day without problems. By saving the sort index to disk after each update, I was assured that, should the system go down, all I needed to do was restart the system

"Of course, any given file can have several sort index arrays attached to it, with each index maintaining a sort on a different field within the record."

and all files and sort index arrays would be up-to-date.

Conclusion

Of course, any given file can have several sort index arrays attached to it, with each index maintaining a sort on a different field within the record. Common business applications will have a sort index on client names and a second on account numbers. Large mailing lists may also have a sort index on zip codes, enabling the shipping department to do a pre-sort on bulk mailings.

Whatever your applications, you will probably find yourself at some time needing to keep a sort index on a favorite data file. The techniques described in this article will prove to be helpful in accomplishing that task. ■

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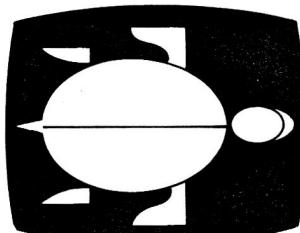


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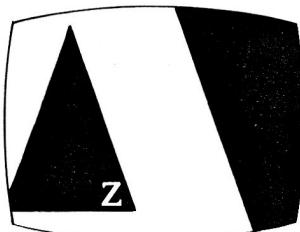
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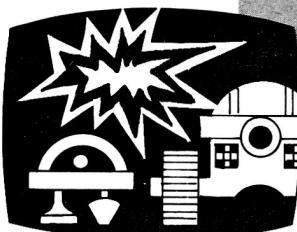
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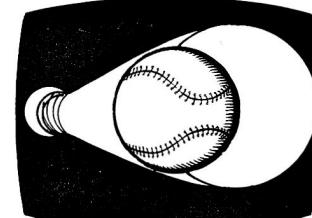
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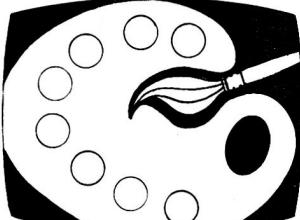
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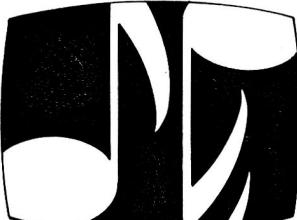
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Bent on Business

by Gregory R. Glau

Talking to Yourself

For some time now there's been a lot of interest in the Lisa approach to computing, called *integrated software*. You enter your information only once, yet you can access and use the same data with software other than the program that created your files. Packages like Lotus 1-2-3 will soon be available for the Macintosh, but what about those of us who have an Apple II, II Plus or IIe?

I recently read a book which said that I already own something close to an integrated system (and you probably do, too), and while it can't do everything, it's near enough to the integrated approach to make it well worth while to learn how to operate it. In many cases it lets me talk to myself by allowing me to transfer information from one program to another.

The process is called the Data Interchange Format (DIF), and it's in the back of your VisiCalc manual (and many others)—you know, the part you skimmed through long ago, when you first read it. The whole idea is to save your information in a manner that allows other programs to read and use the data. In most cases, it's surprisingly automatic and well documented—the software often takes you step-by-step through the process.

Why Bother?

One of the reasons that I never paid too much attention to the DIF file is that I couldn't find any use for it. Why go to the trouble of saving information from VisiCalc work-

sheets in a format other than the standard one that VisiCalc understands? My first experience with the concept came when I bought VisiTrend/Plot, an excellent graphics package. I'd saved and worked with all sorts of things inside VisiCalc that I found helpful to graph, but I didn't like the time it took (and errors I created in the data) to print the VisiCalc worksheets and then manually enter the information into VisiTrend/Plot. The solution, of course, was to save the data in a DIF file, and transfer it to the plotting program.

My purpose here is not to promote VisiCalc but to tell you a bit about and encourage the use of the DIF file as a way to get more mileage from the programs you already have. If you don't use VisiCalc as a spreadsheet, MagiCalc is another spreadsheet with DIF capabilities. Other graphics packages (in addition to VisiPlot) with this ability include PFS: Graph, Apple Business Graphics, VersaPlot, and the Prime Plotter. A database program called Information Master uses a system called Transit to convert VisiCalc files into those Information Master can read. Likewise, Accounting Plus II, an excellent package, uses Data Plus to convert its files into the Data Interchange Format. A terrific version of this system called AccountingPlus Super/e is available for the Apple IIe. DB Master, a powerful database system, has a utility package to let its files "speak DIF." The Executive Secretary, a word processing program that does a lot more

than what you'd expect an executive secretary to do, uses the format. All the "Visi—" series of programs from VisiCorp can use the DIF file, including VisiFile (file management), VisiTrend (a statistical adjunct to VisiPlot) and VisiTerm (which lets you share information with other computers). Statistics with DAISY (as you'd expect from the name, a statistical program) works with DIF files. Other programs are available.

Since the DIF file is essentially a text file, most word processors (and even Basic programs) can access its information. That data may not be in the final form you want it to have, but your word processing system gives you the power to put it into the format you need. If you've created an extensive numerical file with your spreadsheet that you'd like in a report or to put into a quotation for a major project, you don't have to retype all the information. Instead, save that section of your worksheet as a DIF file and load it into your word processing text.

The Book

The definitive book on this subject is *The DIF file*, by Donald H. Beil (Reston Publishing, 11480 Sunset Hills Road, Reston, VA 22090). It includes numerous examples of exactly how to make the file transfer, using a good number of the programs noted above, as well as a Basic program listing for making and sav-

Address correspondence to Gregory R. Glau, PO Box 1627, Prescott, AZ 86302.

ing data into a DIF file, and another listing for reading your information once you save data there.

Applications

Once you consider what you might do if your Apple II *could* use fully integrated software, you'll come up with all sorts of things it'd be helpful for your business to put into effect. While the DIF file doesn't truly integrate programs (there's some disk swapping involved, not every Apple program has the capability, and not every system that can use the DIF file can talk to every other program), it's the next best thing.

You might store, for example, your customer sales and warranty information on disk. Perhaps it would be helpful to examine those records and graph your warranty repair costs for each brand of equipment you sell. A DIF interface between your file handling and graphics package will do this for you.

You may want to pull out specific customer names and addresses from your database program and send a sales letter to certain people. A DIF file that lets your word processor work with the files in your database would make it possible.

Perhaps you've been graphing the raw data for your electricity costs, so you have its information stored in your plotting program files. Would it be useful to transfer this data to a spreadsheet system to calculate percentages and other information, and then send it back to the graphics package to see what the data looks like in another form? The DIF file lets you, and some programs can send information both ways—from the plotting program to the spreadsheet system to manipulate it, and then back to the graphics system to store.

The obvious benefit here is that you get to use all the power of both programs. For example, your graphics system probably doesn't contain all the mathematical functions that your spreadsheet can handle, so it's worth while to send data from the plotting system to manipulate on a

"The obvious benefit here is that you get to use all the power of both programs."

worksheet. Your spreadsheet may not provide the statistical capabilities that your graphics system has, so it's beneficial to let the latter act on your data to compute things like trend lines.

If you keep your customer accounts in an accounting package that can use DIF files, you can create an interface between it and your word processor to write letters to those people whose accounts are past due.

One of the best uses I've found for VisiCalc is to create a worksheet that details the costs involved when I bid a job, not just for my own internal use, but also (on a retail basis) to give to a prospect. Instead of trying to explain why an air conditioning system costs \$3,250, this breakdown does it for me. My prospect can see that the equipment costs \$1,450, freight \$45, ductwork material \$350, insulation \$275, and so on. Like anything else from a sales standpoint, it's helpful when you break things down into smaller quantities (and prices), as then the information is easier for people to relate to. Instead of concentrating on the big price, they look at each individual amount.

If you use this technique, you may have information stored in various VisiCalc worksheets that you'd like to get together and combine into one. A problem with VisiCalc in its standard form is that you must load or save an entire worksheet. The DIF file works in just the opposite manner; you notify the system of the specific section of the worksheet that you wish to save, and the DIF file saves just it. While I don't want to give away all the secrets of Don Beil's book, one of his best ideas is to show how you can save selected parts of your worksheets as DIF files, and then combine them into a design that's in the final form you need. While some other spreadsheets have this capability, the DIF file gives it to that old VisiCalc pro-

gram you may not have been getting the full use out of.

Limitations

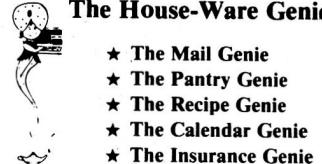
This method of transferring data has limitations, as it's primarily designed for working with numerical information. For example, in *The DIF File*, when author Beil sends text from DB Master to the Executive Secretary, he does so by using designated *numeric* fields. While your word processor will function in upper- and lowercase, most database and spreadsheet programs don't, so if you do transfer text, you'll have to adjust your word processing program for this limitation.

More often than not, you must edit your data either before or after you send it along to another program. Not all information can be moved from one system to another. For example, the formulas you create on a VisiCalc worksheet won't transfer; their resulting data will (which is the important thing, after all).

All this shouldn't discourage you from trying the Data Interchange Format with the programs you now own. Experiment a little with some practice data and see how you do. I think you'll find the concept terrific, the implementation mostly a matter of following directions, and the results more than satisfactory. ■

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I have a comment about the letter in your December column about using an Apple II Plus with 220 volt, 50 hertz current. Your recommendation that this not be done corresponds to what I have read elsewhere, but not to my own experience. There are at least 30 Apple users here in Nairobi with computers rated for 115v, 60hz, and none of us has ever had a problem which could be traced to the current (240v, 50hz in Kenya).

The key seems to be in obtaining a heavy-duty, double wound transformer with adequate capacity for one's entire system. The light, travel models do not work, but the big ones do. Since the Apple uses DC internally, the difference in cycles is not significant, and none of my other equipment (monitors, Epson printer, floppy drives, RAMdisk, various peripheral cards) is bothered. Note, however, that both of my monitors were purchased in the States and are designed to work with a 60 cycle system. As you note, a European model monitor will not work with a 60hz American Apple running off of a transformer.

So my advice to world travellers is to get a good, heavy-duty transformer and take your Apple system along. (In most of the Third World, a back-up power supply and a good power filter are a good idea, too.) You'll be glad you did, and you may be surprised to find other Apple users at the destination.

I have a question about an intermittent problem with one of my Apple Disk II drives. Power may not be a concern here, but, like the reader who recently wrote to you from Lima, service is. It is expensive and

unreliable. Any repairs that I can carry out myself, therefore, are very helpful. Even if I can't fix something myself, it is important to know exactly what is wrong when I get someone else to try.

The problem is that drive 2 occasionally gives me I/O errors. This generally happens after the drive has been used heavily, and is preceded by a clicking noise similar to the one made when the drive calibrates itself to track 0, but somewhat muffled. The series of clicks repeats itself about three times, as if the drive is trying unsuccessfully to find track 0, and then I get an error message. If I leave the drive alone for a day or two, it seems to recover for a while.

I have adjusted the speed of the drive carefully, and also adjusted the 0 track stopper as per your suggestions in last November's column, but neither step solved the problem. I have even switched the analog board from the bad drive to the good one, but the problem stayed in drive 2. I wonder if the problem might have something to do with the disk alignment. Is there any way the disk can be aligned without going to an Apple dealer? If it's not the alignment, can you think of any other possible reason?

P.R. Christensen
Kenya Institute of Education
Nairobi, Kenya

The procedures you followed for narrowing down the reasons for the failure are just what I would recommend. The trouble with the number 2 disk drive does indeed appear to be the head alignment.

There are several adjustments necessary to align the read/write head, the 0 track stopper being the easiest one. The other adjustments are the azimuth and radial positioning. The azimuth adjustment ensures that the head is perpendicular to the disk track. The radial adjustment centers the head over the middle of the track. Both the azimuth and radial positioning require a special disk and an oscilloscope, and the procedures for these adjustments are rather lengthy. I suspect anyone with an oscilloscope and the special disk will have the directions. The rest of us have no need for the directions so I will not include them here.

In addition to the radial and azimuth positioning, two other important adjustments requiring a special disk and an oscilloscope might be considered. The first is the amplitude adjustment, which makes sure the signal is strong enough for the drive to operate reliably. The second is the comparitor offset adjustment which ensures that a 1 stored on the disk is read as a 1 and a 0 as a 0. These two adjustments are made on the analog card. Since you switched analog cards and experienced no improvement, it is highly unlikely that the amplitude or comparitor offset adjustments will solve your problem.

The question now is what to do to correct the problem. Your best bet is

Earle Hancock directs the microcomputing project at Minuteman Regional Vocational School, Lexington, MA. He has served as an advisor to the Massachusetts Association of Vocational Administrators, and belongs to a number of computer organizations. Write to him c/o inCider, Pine St., Peterborough, NH 03458.

to take the drive to an Apple dealer. At the dealership, one of two solutions can be applied. If the dealer has the equipment to do the alignments described above, the procedure should take less than one hour. If your dealer does not have the equipment, he can substitute a new disk mechanical assembly for your defective one. The cost should be under \$130.00—not too bad when you consider that everything except the case, cable and analog card are replaced.

Some of the keys on my Apple IIe keyboard have been sticking lately, as though binding. I hate to send my machine off to a repair center (my dealer says he cannot do anything). Can the key posts be lubricated with WD-40 or a silicone type of spray, perhaps applied with a cotton swab? I don't wish to do any damage or cause shorts in the keyboard.

L. Danielson
Fort Worth, TX

Some early Apple IIe keyboards had a tendency toward sticky keys. My guess is you don't have one of those keyboards since the problem tended to show up soon after the keyboard was put into use. If you carefully remove the keycap with a chip puller or other device and sparingly apply a silicone lubricant on the key post, you may solve the problem.

Stubborn keys can in most cases be replaced. Your Apple dealer should be willing to sell the keyswitches to you for two or three dollars apiece. There are several different styles of key switches. Be sure the ones you buy fit your keyboard and your keycaps.

To replace key switches you will need to remove the case from the Apple by removing the screws around the edge of the bottom. There are nine Phillips-type screws to remove from the IIe, three on each side of the bottom and three along the front just under the lip. Once the screws are removed, turn the computer right side up and gently lift the cover up and off (much easier than on the II Plus). Four screws, two on each side, hold the

keyboard in place. Remove them and carefully pry off the keyboard from the computer.

Identify the problem keyswitch and its connections on both sides of the board. Remove the solder from the connections and remove the screw if present. Replace the keyswitch and solder into place. Reassemble the computer in reverse order from the directions above.

Soldering and de-soldering require practice and a steady hand. Never let the soldering iron be in contact with the circuit board for more than three seconds or you may lift a trace and ruin the board. If you don't have some practice with these skills let someone who has proven soldering skills help you. Regular readers of this column may recognize this warning, but I feel it bears repeating. Of course, you could replace the whole keyboard, depending on how many keys are affected.

I had a problem with my Apple II Plus that I would like to share with you. After a year of no failures the machine suddenly started to act up on a few DOS commands. I could **SAVE** and **LOAD** with no problems, but **BSAVE** and **DELETE** would either cause the disk drive to start talking in a strange tongue or just plain quit with "ERROR" printed out last on the screen. After this happened no commands would come back with monitor error dumps of the register. If the **BSAVE** command used hex numbers the drive would never stop running. All my disks had the same results. There was nothing wrong with the disk drive nor its card and contacts. Both worked well on another machine and other drives had the same fits on mine.

After calming down a few days later, I decided that either a ROM or RAM chip was bad or something physical was going on in the main board to cause a bad or short connection. I was hoping for the latter since the problem showed up after moving the machine from one end of the house to the other. So I opened up the unit and took a close look. I saw noth-

ing unusual. I tried gently pushing each chip into its socket. No result. I put a fresh bag into the jet engine vacuum and put the hose on the discharge end. I figured that if I could not see anything on the board's up side then maybe something was on the other side. I blew air all around inside the unit and fired up the Apple. The problem was gone and has not showed up again.

There was always a cover over the entire system when not being used. I did notice that the metal grounding cloth on the cover keyboard end is not there as I had seen on other Apple II Pluses.

Well, I guess I was very lucky. I have a question about the main board. It seems so flexible being supported only from a few points. Is there a special way of replacing chips so that the board is not stressed?

A. Seidel
Olivette, MD

I almost didn't include this letter in the Apple Clinic. One must be careful not to divulge too many technical secrets in this business. I'd been saving the vacuum cleaner procedure for my retirement. Oh well...

Your concern over the stressing of the mother board while seating and unseating IC's is well founded. The best way to avoid the problem is to remove the board and place it on a surface covered by a $\frac{1}{2}$ -inch foam pad. In many cases removing the board just to replace one IC is not practical. To avoid bending the board I insert an IC part way, then rock it back and forth (along the long axis, not side-to-side) until it's seated. In this manner much less pressure is required to seat the IC correctly.

I have a problem with my Epson printer. It's an MX-80 and it works perfectly except for printing the lowercase letters that end very low, such as the g, y, p and q. The bottom of each of these letters is not printed. This problem didn't show up until I had to replace the ribbon.

Now, both the new and the old ribbon produce the same results. Do you have any suggestions?

A. Notowitz
San Carlos, CA

Dot matrix printers form characters using "wires" positioned one above the other in the print head (Figure 1). Electromagnets drive the wires against the ribbon, which transfers some of its ink to the paper.

To print the capital letter "I" (Figure 2), wires 1 and 7 are fired.

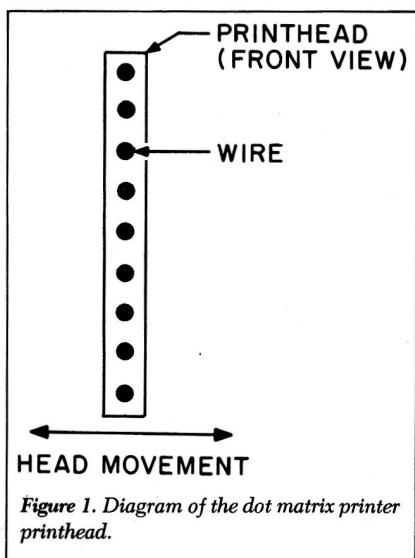


Figure 1. Diagram of the dot matrix printer printhead.

Next the print head shifts to the right one position and wires 1, 2, 3, 4, 5, 6 and 7 all fire at the same time, forming the center of the letter. Once more the print head moves to the right and wires 1 and 7 fire again, finishing the letter. In bi-directional printing the procedure is the same, only the order is reversed when printing on the reverse stroke.

The Epson MX-80 print head has nine wires but forms letters from a matrix seven dots high and five dots wide. The bottom two wires are used for descenders on lowercase letters.

Your sample print-out shows the letter j printing as it should, but the g and y were a little weak at the bottom. The j, g and y all use the bottom two wires to form the descending part of the letter (Figure

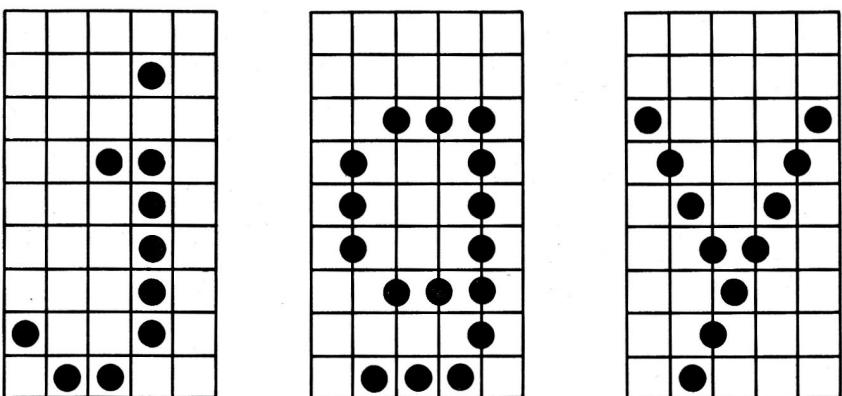


Figure 3. The printhead uses the lower seven wires to print lowercase letters with descenders.

3—note that some letters are compressed horizontally for visual effect). On your sample the letters on the left side of the page are not properly formed. On the right side of the page, however, the letters using the same wires are fully formed. If you are sure that the ribbon cartridge is properly in place and snapped down into the holder (refer to the printer manual for specific instructions), then I can only conclude that the problem resides elsewhere (preferably in another printer, right?).

The most likely cause is an improperly set paper thickness control. The Epson MX-80 can print on multiple copy paper as well as ordinary printer paper. The paper thickness control allows the print head distance from the platen to be changed to accommodate the various papers.

If you're using regular printer paper set the thickness control to the middle position. Initiate the printer self-test by holding the line feed (LF) button down while you turn the power on. Open the top lid and adjust the thickness control while you watch the letters being printed. At one of the seven positions the descenders should be fully formed. If the wires of the print head are too close to the paper the electromagnet will not have enough room to develop the full impact. Conversely, if the print head is too far from the paper the force of the strike will be spent before the wire reaches the ribbon.

The other possibility is that the platen and print head guides are out

of alignment. I doubt if changing a ribbon could cause that. If you suspect an alignment problem, see your Epson dealer.

A final note. A non-standard ribbon could cause some problems. Some of the less expensive ribbon replacements I have seen are poorly made. They often catch the print wires and jam them, causing the electromagnets to burn out. As always—*caveat emptor*.

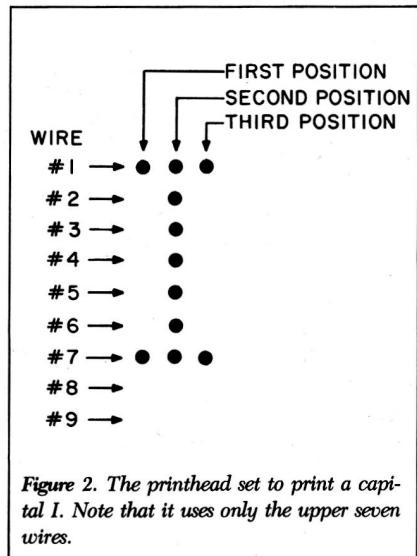


Figure 2. The printhead set to print a capital I. Note that it uses only the upper seven wires.

Your Letters Count!

Your letters are the source of interesting problems. This column depends on those problems for its energy. Keep 'em coming! ■

Out, Damned Cursor!

by Abram M. Plum

I was becoming more and more irritated by the persistent blinking of the cursor while my computer waited for my next response. I solved this problem on the hi-res portions of my program by using the four-line text window at the bottom of the screen. A simple VTAB1 preceding a GET statement was sufficient to hide the cursor behind the graphics screen. Some portions of my program, however, needed to use the full screen for text. Since I didn't want to translate my entire program into high-resolution graphics, I searched for another solution.

I came up with the subroutine in the Listing, which can substitute for a GET statement, but doesn't allow a cursor to appear on-screen. Line 100 continues looping back on itself until you press a key. Line 110 records the selected character and resets the keyboard strobe with a POKE before returning. The value of A\$ can then be used in the same way as the result of a GET statement.

The subroutine starting in line 200 provides a cursorless input. First, I\$ is initialized as a null string in line 200, then built up one character at a time

in line 230. Line 240 allows the user to correct errors by backspacing. This process is concluded in line 220 when the return key is pressed. The final value of I\$ is then available as the response to the INPUT statement. One advantage of this subroutine over the usual input is probably more significant than the elimination of the cursor; a comma can be entered in a string using this subroutine without resulting in an EXTRA IGNORED message.

If you are using G.P.L.E. to edit your program, you must remove the editor from memory before running a

program containing these subroutines.

I also wanted to use some sort of abbreviation or symbol to replace the frequently-repeated PRESS ANY KEY TO CONTINUE. Line 300 does this by printing an inverse > in the lower right corner of the screen. Of course, you must explain the meaning of this symbol early in your program. ■

Address correspondence to Abram M. Plum at the School of Music, Illinois Wesleyan University, Bloomington, IL 61701.

```
95 REM * 'GET' SUBROUTINE *
100 I = PEEK ( - 16384): IF I < 128 THEN 100
110 I = I - 128: A$ = CHR$ (I): POKE - 16368,0: RETURN
195 REM * 'INPUT' SUBROUTINE*
200 I$ = ""
210 I = PEEK ( - 16384): IF I < 128 THEN 210
220 I = I - 128: POKE - 16368,0: IF I = 13 THEN PRINT : RETURN
230 A$ = CHR$ (I): PRINT A$;: I$ = I$ + A$
240 IF I = 8 THEN PRINT CHR$ (32);: PRINT A$;: L = LEN (I$) - 2: I$ = LEFT$ (I$, L)
250 GOTO 210
295 REM * 'PRESS ANY KEY TO CONTINUE' SUBROUTINE*
300 POKE 2039,62: GOSUB 100: RETURN
```

Program listing. Cursor removal subroutine.

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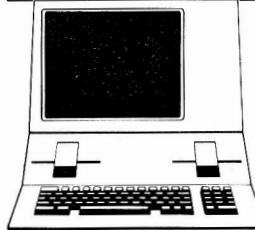
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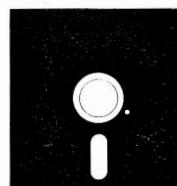
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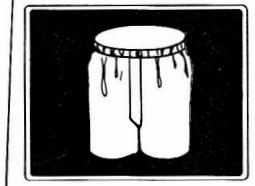
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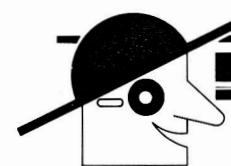
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Paddle Reading

by Steven Lott

Imagine this: You are writing your first program attempting to read the x and y position of the joystick. Your joystick position reading routine yields erratic results. A second joystick shows the same problems. You call the manufacturer; he claims that it is unlikely to be a hardware problem and suggests that the problem is in the software. You are at a loss for a method that will correctly read the joystick. See *inCider* Letters, June and October, to read about people who have had this problem.

The problem is in the timing circuit which reads the paddle values. It needs a short span of time between paddle readings. Without this short span of time, the second paddle value is unreliable.

To banish this bugaboo, insert an

idle loop between reading paddle 0 and paddle 1. This will provide the short span of time needed by the timing circuit. The following sample programs in Applesoft, Pascal, GraFORTH, and Assembler illustrate the solution.

Applesoft:

```
10 X = PDL(0): FOR I = 1 TO 10:  
NEXT I: Y = PDL(1)
```

Pascal:

```
(*This function uses applestuff*)  
FUNCTION stick ( VAR x,y: INTEGER);  
CONST  
  stallmax = 3;  
VAR  
  stall: INTEGER;  
BEGIN  
  x: = paddle (0) ;  
  FOR stall: = 0 TO stallmax DO;  
  y: = paddle (1)  
END (*stick*);
```

GraFORTH:

: stick (-x/y)
0 paddle 32 0 do loop 1 paddle;

Assembler:

```
LDX #0  
JSR $FB1E  
STY pdl0 ; paddle 0  
LDA #$32  
JSR $FCA8 ; stall for a while  
LDX #1  
JSR $FB1E  
STY pdl1 ; paddle 1
```

This problem set me back about two hours of effort. I was made aware of it because GraFORTH is so fast. I had to experiment to find a stall loop that was long enough. Applesoft is slow enough that almost any processing between PDL calls is sufficient. ■

You can write to Steven F. Lott at 416 Harvard Pl., Syracuse, NY 13210.

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Book Reviews

Write Your Own Apple Games

by Stuart Anstis

Creative Computing Press
One Park Ave.
New York, NY 10016
Softcover, \$12.95

Are you a beginning programmer, anxious to learn how to write your own computer games? Or are you an advanced programmer, looking to fine-tune your graphics skills and pick up a few byte-saving algorithms? Or maybe you're a teacher just trying to stay one step ahead of your best programming class?

If you're any of these—or if you just love to play games on your Apple—you'll agree that *Write Your Own Apple Games* by Stuart Anstis is a necessary addition to your computer library.

Written for people of many different skill levels, this book is a complete tutorial on how to write original games in Applesoft Basic. Unlike some of the how-to programmer aids that throw one trick after another at you in machine-gun style, Stuart Anstis clearly explains each technique with examples, helping you understand *why* they work. No blind faith is required here; you are learning methods to use again and again in all your programs.

Chapter one, "Writing Your Own Games," is the main tutorial section of the book. You'll be taught all the tricks, subroutines and algorithms needed to get started. Flowcharting, paddle controls, keeping score, animation, using random numbers, timers and Brownian motion are just a few of the topics you'll find explained.

The remaining six chapters include over fifty game and puzzle program listings with explanations and sample screen outputs. You'll shoot up enemy tanks, challenge the computer to Tic-Tac-Toe, try your hand at Stock Market, program Fireworks and Dandelions, and even make animated movies, as all the action and

graphics techniques you learned in chapter one come alive on your screen.

Although the first chapter does presuppose an understanding of Applesoft Basic (and a familiarity with hi- and lo-resolution graphics commands), even a novice without these prerequisites will find over 100 pages of game listings to provide hours of enjoyment.

Apple game enthusiasts of all kinds will consider this book a real "find."

Ken Silverstein
Salem, NH

Pascal Programs for Games and Graphics

by Tom Swan

Hayden Book Company Inc.
10 Mulholland Drive
Hasbrouck Heights, NJ 07604
Softcover, \$15.95

Many Apple owners have discovered that writing computer games can be as much fun as playing them. This book provides an introduction for the Pascal programmer to the world of game software.

The book is divided into four sections. The first begins with several programs that generate abstract images on the Apple's hi-res screen. These are followed by a variety of games, including a simple shooting gallery, a challenging game similar to Break-out and a multiplayer game called Light Bikes which is reminiscent of the game in the movie *Tron*.

The second section of the book contains four utility programs. The first utility provides the means to create and edit character sets for use on the hi-res screen. The second is a general-purpose drawing program. A third allows easy editing of individual pixels on the hi-res screen. The final utility is a (slow) program for printing the hi-res screen on a letter-quality printer, the NEC 7730.

The book's third section contains descriptions of procedures in the Apple Pascal units Applestuff and Turtlegraphics, and descriptions of extensions to standard Pascal which are part of the Apple Pascal language.

The final section presents a Pascal unit which is used in earlier programs. It contains a set of routines for the text screen, including a very nice procedure for obtaining edited keyboard input.

While the programs in this book are not nearly as sophisticated as commercial offerings, they do provide much valuable information. Important techniques illustrated include using the exclusive-or operation for displaying and erasing shapes, substituting look-up tables for calculations, using random numbers to add interest to games, and collision detection. Other topics include using special character sets for animation, employing a variant record to access memory or soft switches from Pascal, using multiple character sets on the hi-res screen, and procedures for Apple's lo-res graphics.

My only complaint with this work is the inclusion of the procedure descriptions in section three. They are intended for persons who wish to run the programs under some version of Pascal other than Apple's. Anyone who is capable of implementing the procedures described (such as Draw-block) will probably not be interested in the games presented earlier. Leaving out this material would have shortened the book by 20 percent and presumably lowered its cost.

The text and programs are well-written, and the program listings are quite legible. For many, the utilities in sections two and four will be worth the price of the book. A pair of companion disks containing the source code for all of the programs makes it even more attractive. If you want to have fun and learn some new Pascal programming techniques, this book is for you. ■

James Reese
Falls Church, VA

The Naked Computer

Jack B. Rochester and John Gantz
William Morrow and Company Inc.
105 Madison Ave.
New York, NY 10016
Softcover, \$15.95

Take a good long look at a computer. Does it have input, output, a bit of binary? No? Then you are not taking a look at a computer." That profound truth, quoted from a sixth grade teacher's collection of her students' pronouncements, is one of the thousands of reasons you should quickly dash out and make this collection of biggest, oldest, heaviest, lightest, quickest, wittiest, and other superlative computer-related memorabilia your own.

What a pleasure to read and review a book like this! From the first page to the last period you'll be shaking your head at the unbelievable, smiling at the idiosyncratic, laughing at the preposterous, and jumping up from the chair to enlighten your spouse (children, relative, neighbor, or anyone that will listen) on the most recent absurdity that has tickled your funny bone.

In *The Naked Computer* authors Gantz and Rochester have assembled a collection of computer information that spans the years from Joseph Henry and Charles Babbage to IBM and Apple. It's all here—the people who started it, the machines they made and the companies they created, the kluges that couldn't or wouldn't, the robots that tried, the crooks that did, the war machines that, I pray, never do, from Ada's insights to Wozniak's amnesia. Curl up some evening with this enchantment and read till dawn. If ever a book rated a "couldn't put it down" reward, this is it. On the other hand, you can keep it by the easy chair and read a page or two during a TV commercial with just as much pleasure.

The chapters divide up the collection into some semblance of order so if you'd like to concentrate on computer crime, military concoctions,

communications, IBM, the future, robots, history, medicine, banking, or whatever, you can jump in anywhere and splash around to your heart's content. The index will help if you're pursuing a specific subject. Apple and Apple Inc. have 12 listings but I found a few additional ones like the story of programmer Paul Lutus whose 1300-foot extension cord powers his Apple in the Cascade Mountains.

The book is *fun* from cover to cover, so I did not at first suspect that here, in these 300-plus pages, was a history of the computer revolution and the people and events that sparked it. It is a microcosm of the industry, presented as no history book has ever done, with facts and humor intermingled so ingeniously that one never suspects that knowledge and education are being dispensed. An example: The Social Security Administration's five-acre complex in Woodlawn, Maryland is a "veritable factory of computer errors," with 500,000 reels of tape, whose computer programs have overpaid \$600 million to recipients and... oh, read it yourself and learn and laugh through the tears.

Not just a collection of facts, fascinating as they may be, Gantz and Rochester have provided their own commentary that provides for some additional illumination, insight, and humor about that infamous machine, *The Naked Computer*. I hope the authors will update this collection every few years, just to keep us all from taking ourselves too seriously. And, because I just can't resist it, here's one parting quote: "The most entertaining event at the 1979 National Computer Conference was a contest to see who could build a mechanical mouse that could make the best total time running thrice through a maze.... In a fitting tribute to mouse over mind, however, the contest was won by a very dumb but very fast mouse that merely hugged the wall, trying all the corridors, until it got out." ■

Art Ude
Stoddard, NH

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Hardware Reviews

Amdisk-I Micro-floppy Disk Drive

If you've delayed buying that second drive because of the high price of Apple's Disk II, a small solution may be at hand. I say *small* because I am referring to Amdek's 3-inch disk drive—the Amdisk-I Micro-floppy.

The Amdisk-I measures 7½-by-4-by-2 inches. Three Amdisk-I's can fit inside the Disk II. Storage capacity (143K) and performance functions are identical to the Apple product. Other than its inability to use 5½-inch disks, the Amdisk-I can do whatever the Disk II can.

Amdisk-I comes with an attached cable that connects to the Apple drive controller board. Instead of a drive door, the Amdisk-I uses a small slot slightly larger than the disks. When you insert a disk, two metal strips flip back and lock it in place. To remove the disk, press the eject button and the disk pops out.

The disks are 4-by-3½ inches. Enclosed in a hard plastic shell, the recording media is only exposed when you insert the disk into the drive. A thin metal plate covers the areas usually exposed on typical 5½-inch disks. The centering ring is also made of plastic.

Each disk has two sides and can store up to 143K per side. In place of Tyvek disk sleeves, the disks come with form-fitting, clear plastic bags for additional protection. An attached label allows you to record program names on each disk. Similarly, the sticky, write-protect tabs have been eliminated. On the back of each disk are two plastic switches labeled A and B. Flip the A switch and that side becomes write-protected. Flip it back and you may write normally.

The Amdisk-I performs superbly. Although the sound differs from the Disk II, the volume is no greater. The disks are well-engineered and sturdily constructed, representing an advance over the flimsy 5½-inch floppies. The closed drive slot should go a

long way toward protecting the drive mechanism from dust and other contaminants.

The Amdisk-I makes an excellent second drive for those expanding their system's storage capacity. Suggested retail price is \$299 for the drive and \$6.99 per double-sided disk. The Amdisk-I is manufactured by Amdek Corporation, 2201 Lively Blvd., Elk Grove Village, IL 60007. ■

Steven A. Schwartz
Pittsburgh, PA

KoalaPad

How many of you have been dying to have your own graphics tablet, but were stopped cold by the price? Well, have I got a deal for you! Koala Technologies Corporation has introduced a low-cost miniature touch tablet and graphics package. You can finally give vent to those artistic urges without having to take out a second mortgage.

The KoalaPad measures 6-by-8-by-1 inch and has a 4½-inch square active drawing surface. Since it weighs only a pound and comes with a 4-foot cord, you can easily and comfortably hold it in your hand or lap. Connection to the Apple requires approximately 15-30 seconds; the pad simply plugs into the Apple game port. With its two firing buttons, it can even be used as a substitute joystick with most games.

How does it work? The company calls it a "position sensing device." When you touch the device's surface with your finger or a special plastic stylus, the Apple senses the pressure and translates it into screen coordinates in much the same way that it reads joysticks or paddles. KoalaPad accepts custom tablet overlays—thin plastic sheets which pop into the pad's drawing surface. Each overlay has a number of program operations illustrated on it—sort of a touch-and-go menu. One example mentioned in the promotional literature is a pad of 40 programmable function keys.

To use the KoalaPad as a graphics

tablet, Koala includes the Koala Painter program as part of the package. After booting the disk, you see a hi-res menu. To make a selection, touch the corresponding area on the pad and press the firing button to lock in your choice. To draw, use combinations of finger or stylus pressure and button presses. To change selections, return to the menu.

The program offers many options. Your artwork may use either of two color sets. You have eight different "brushes" for different stroke sizes and shapes. For fine detail work, use the "magnify" mode. A "fill" command lets you put color into any completely enclosed area of your picture.

You also get shape-drawing tools. You can draw individual lines, connected lines, rays (a number of lines emanating from a single point), rectangular or square frames (filled or outlined), and circles (filled or outlined), each as a single menu option. If you don't like what you've created, use the "erase" command.

Need help with using one of the options? On-line help is available. Saving and loading pictures is also performed from the menu. The entire program (with the exception of file names) is under the control of the KoalaPad. With practice, even children can use the Koala Painter.

I ran into some real problems with Koala Painter's "frame" command. What you draw, unfortunately, is not always what you get! To make an illustration stand out, I wanted to enclose it in a frame. Every time I followed the procedure to draw a full-screen frame, however, it disappeared from the screen. This led me to believe that I must be performing the touch and button operations incorrectly, further confusing me on the other commands. The problem, apparently, is that the full screen isn't available to you, at least with the "frame" command.

Drawing in "magnify" mode is unnecessarily difficult. When you switch to this mode, the entire picture is replaced by an enlarged portion of the original. The problem is one of guessing *which* portion you are viewing. Also, I'd advise against ap-

lications which require lettering or labeling, unless you have an extraordinary amount of free time on your hands. It may be possible, however, to load the picture and overlay an existing character set from one of the many commercially available programs.

In general, though, both products perform very well. With practice and judicious erasing (re-drawing over errors using the background color), you should be able to use Koala Painter to create detailed pictures, pie charts, or almost any type of hires application you desire. Watch for new application programs. The promotional literature mentions games, education, and finance. The Koala-Pad and Koala Painter are a bargain—an excellent alternative for the budget-minded among you. Retail price for the package is \$125. They are manufactured by Koala Technologies, 4962 El Camino Real, Suite 125, Los Altos, CA 94022. Versions are available for Apple II, II Plus, and IIe. ■

Steven A. Schwartz
Pittsburgh, PA

Characters are formed using a matrix of dots five wide by nine high. (The lowest two dots are used only for descenders on the lowercase letters g, j, p, q, and y.) Current printers use a denser matrix for character quality. Those printed by the Riteman are squarish and noticeably dotty, but crisp and easy to read. The dots are pronounced along horizontal strokes within the standard 10-cpi characters.

For denser characters, the Riteman offers emphasized and double-strike printing modes. These can be used separately or combined, with some sacrifice of printing speed. In the emphasized mode, each character dot is printed twice, because the dots overlap horizontally for a solid, darker look. Diagonal strokes look the most bumpy.

After each line is printed in the double-strike mode, the printhead returns to the starting position and prints the line again. Between passes, the paper advances slightly (1/288th inch). The repetition makes the vertical strokes more solid, and produces darker characters. The horizontal strokes remain fairly dotty.

The most solid characters combine emphasized and double-strike printing modes. They're best used when words need to be emphasized within text, such as for headings and titles.

One additional print-style feature is the ability to print subscript and superscript text. This is not simply the ability to print normal characters a half line below or above the current line. The Riteman prints half-height characters in the lower or upper half of the line to allow you the use of subscripts and superscripts within single-spaced text without printing over part of another line.

Printing speed is rated by the manufacturer at 120 characters per second (cps) in the normal printing mode. There is a pause between printing lines, because there is no extra built in memory to receive characters for the next line while the current line is printed. This reduces the overall printing speed, but offers no particular problem.

The double-strike mode slows

down printout speed by half. Emphasized printing is 25 percent slower than the normal mode.

Other Riteman commands:

- Underline characters.
- Adjust spacing between lines, by increments as small as 1/288th inch.
- Control the paper-out sensor switch.
- Set form length in lines per page or inches per page.
- Set horizontal tab stops.
- Set line spacing between printed pages.
- Allow only one-way rather than bidirectional printing (for maximum precision in aligning columns).
- Activate one of three dot-addressable graphics modes: single-density with 480 dots per line, double-density with 960 dots, or "one-to-one" with 576 dots.

Features *not* available on the Riteman are proportional character spacing, reverse line feeding, and programmable vertical forms control. The Riteman comes equipped with only a one-line memory buffer for storing characters.

The Riteman accepts paper up to 10 inches wide by sheet, in rolls, or fan-folded. (It only prints across an 8-inch line.) Sprockets guide 10-inch perforated-edge paper, but can be moved for rolls or single sheets. The tractor feed is necessary for perforated-edge paper less than 10 inches wide.

Feeding single sheets of paper is bothersome. Pulling the rollers away from the platen releases the platen's grip on the paper. And once the paper is held between rollers and platen, it goes through a slot in the hinged top cover before the cover is closed.

Twelve internal switches set various options. These include default power-on settings for line spacing, character pitch, printing mode, paper perforation skip, and international character set (United States, France, Germany, or United Kingdom). You can also choose to print the zero character with or without a slash.

The Riteman is manufactured by Inforunner, 1621 Stanford St., Santa

Inforunner Riteman Printer

The Inforunner Riteman is a small, light dot-matrix printer and everything about it seems slightly miniaturized. Its low profile appeals to the computer user with limited space or a need to carry the printer. Its low price, too, is an attraction.

The Riteman does not have all the features of the latest matrix printers with higher price tags. It does, however, offer more than plain vanilla printing at the standard 10 characters per inch (cpi). Compressed characters are printed at 16 cpi and expanded characters at 5 cpi. Riteman combines these two variations, printing expanded compressed characters at 8 cpi. It is able to print characters in italic rather than block style for a total of eight different character sizes and shapes.

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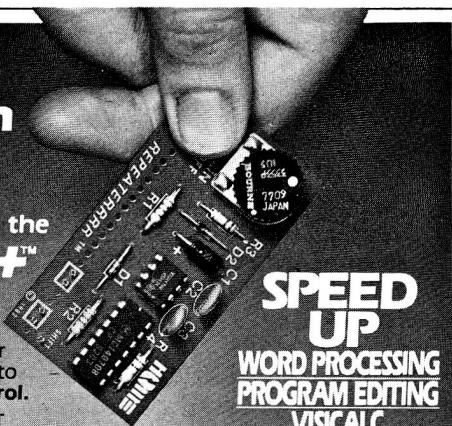
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Monica, CA 90404. It sells for \$399. I'm impressed with the features and performance packaged in this small, inexpensive printer. If you need acceptable, printed output for anything up to informal correspondence, the Riteman is a good choice. ■

**Jon Voskuil
Milford, NH**

Apple Color Plotter

The Apple Color Plotter is a desktop machine that draws pictures under control of any computer that has a serial port. It will draw on sheet paper or transparent film as large as 11-by-17 inches. As your computer sends its commands, the plotter slides the paper back and forth while moving colored pens at right angles to the paper movement. It has built-in commands for drawing lines, circles, arcs, and symbols in any combination of available colors. It also writes text anywhere on the sheet in any size, vertically, horizontally, or at any angle in between. You can change the character aspect ratio for special effects, and you can tilt the lettering from vertical to create italics.

The plotter has commands for coordinate axis drawing when you want to make an X-Y graph. It will generate tick marks automatically to the scale you desire. For drawing data lines there are nine built-in line patterns including dotted and dashed lines. You can generate custom line patterns, too.

Pens and Capper

The pen carrier holds four pens. At present there are eight different colors available in two different widths. Special pens are available to draw on transparent film. The carrier looks like a gun turret with the points going in four directions. The plotter selects the pen by turning the turret. Since the pens are somewhat difficult to remove from the carrier, Apple has supplied a neat pen capper that covers all four pens at the flick of a wrist. The pens dry out quickly, so this is a welcome accessory.

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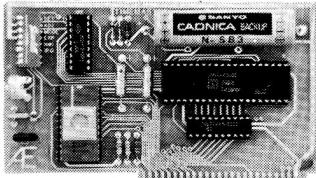
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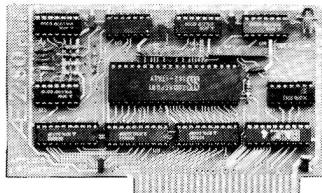
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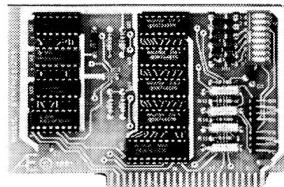
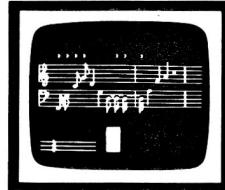
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WIZARD80	MORE	NO	NO	NO	NO	YES	NO	YES
VISION80	MORE	YES	YES	NO	NO	YES	NO	NO
OMNIVISION	MORE	NO	YES	NO	NO	NO	NO	YES
VIEWMAX80	MORE	YES	YES	NO	NO	YES	NO	YES
SMARTER	MORE	YES	YES	NO	NO	NO	YES	NO
VIDEOTERM	MORE	NO	NO	YES	NO	YES	YES	NO

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The control panel on the plotter lets you select the mode of operation and allows you to do some simple drawing. There are lights on the panel to indicate the mode of operation and error conditions.

Paper alignment is done with index marks on the plotter bed. Inserting and aligning the paper takes about two or three seconds. For larger paper there is a detachable wire rack to keep the paper from flopping around. When using the large paper you will need a lot of room on top of your desk.

You won't be able to use preprinted graph paper with this plotter. It is impossible to position the paper precisely enough. But I found I didn't need that kind of paper, anyway.

The only interface available with this plotter is serial RS-232C with hardware handshaking. The cable included with the system is designed

for an Apple Super Serial Card. Having a Prometheus Versacard with a serial port, I had to make a special cable using four wires to make the system work.

Easy Commands

Commands for the Apple Color Plotter are in plain text format—that is, ordinary alphanumeric characters that you can read. It recognizes 25 different two-letter codes to start a command. If required, the command is followed by a list of arguments, separated by commas. A return is normally used to terminate a command. For printed characters, it must be a control-C.

The commands are not too hard to understand. For instance, DA 100,200 means to Draw Absolutely from where the pen is to X = 100 and Y = 200. This draws a line between those two points. MA means to Move

Absolutely without drawing. PS is the Pen Select command. CA draws a circle, while AC draws an arc. PL is Print Lettering.

Among the interesting features of this plotter are the Viewport and Window capabilities. The Viewport command advises the plotter of the absolute working area on the physical sheet of paper. If you want the drawing to fit in a certain portion of the paper, tell the plotter the coordinates of the corners of that area. Then use the Window command to scale the viewport to any dimension you desire. The plotter will draw to the new scale, but not outside the viewport. You can also use the Viewport and Window commands to create text of different sizes and aspect ratios.

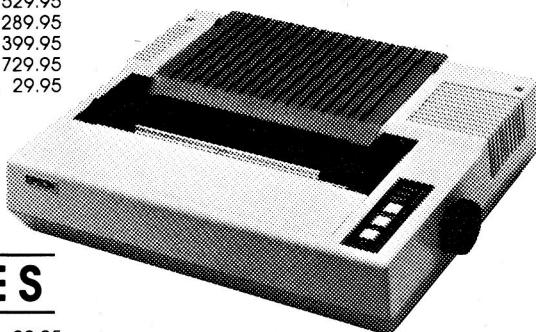
The plotter has an international education; that is, it writes in other languages besides English. Included

Circle 134 on Reader Service card.

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"I found the Apple Color Plotter to be a quiet, well-built machine."

in its standard selection of characters are ten punctuation marks that you can change into special symbols or accented letters. They help you write text in German, French, Swedish, Italian, Spanish, and British English, as well as in American English. There are also 14 special symbols available to use as data points when making a graph.

Basic and Pascal

You can use a word processor to create a file of plotter commands. Since all the commands use ASCII characters, both Apple Writer and the Pascal Editor will work. You then send the file to the plotter, just as if it were a printer.

The instruction manual includes some sample programs in Basic and Pascal for practice in entering commands from the keyboard to control

the plotter. Beyond these samples, you have to write all your own software to plot anything. I have not found any commercial software that uses the Apple Color Plotter. However, I'm sure that won't be the case for long.

The manuals included with the plotter are also good for reference. They don't include a lot of programming examples, but have enough to get you started. They are well-written and contain a good index for finding things quickly. The only complaint I had was the confusing explanation of Viewports and Windows. I used up a good bit of paper learning about those commands.

Also included with the plotter are the eight different colored pens, the pen capper, a pack of 8½-by-11 and a pack of 11-by-17 paper, and a connecting cable for use with the Apple Super Serial Card. The paper is very

high quality and makes the best plots of any paper I tried.

I found the Apple Color Plotter to be a quiet, well-built machine with no operating "glitches." The accessories and documentation are good quality. The ability to plot on 11-by-17 paper or transparencies is unusual for a plotter in this price range. It is easy to interface with any computer with a serial interface that supports hardware handshaking. The major shortcoming is the lack of commercial software to run the machine. But, as I said, I don't think that will be the case for long. The Apple Color Plotter is available from your Apple dealer for \$799. ■

Lee E. Sumner
Dallastown, PA

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IC-12

Software Reviews

Cut & Paste

After the success of its Pinball and Music Construction Sets, Electronic Arts has produced a Text Construction Set—Cut & Paste, a word processor that offers attractive simplicity, surprising power, and a bargain price (\$49.95). It's not the revolution in home software that EA's ads and packaging claim, but it's a strong contender in the sub-\$70 word processing wars.

Once you get past the 1,000 word essay on the package, which follows EA's advertising policy of colossal vanity—the members of its staff have the most brilliant minds in computing, Cut & Paste is the first truly usable word processor—there's the C&P program disk, a document disk, and a passable manual (it relies on or supplements the command summary card, instead of the other way around).

Booting the program disk loads C&P into memory; after that, all work, even copying or formatting new disks, can be done with a document disk in drive 1—a boon for single-drive Apple users. (If you have two drives, you can work with two document disks at once, toggling C&P's read and write functions from one to the other. This convenience makes up for the program's requiring its own, rather than DOS's, disk formatting.)

With a document disk loaded, pressing return calls one of Cut & Paste's two screen displays—a catalog of the disk's files (to start from scratch, you load the file named Blank). The bottom two lines of the screen are devoted to a command menu and accompanying prompts; to load a file, you use the arrow keys to select it from the catalog, press escape to enter the menu, and press return when the cursor's on the Load function.

Besides Load, the catalog menu lets you print, delete, or rename a file, copy or format a disk, switch to drive 2, end a C&P session, or configure the program to your system

(40- or 80-column display, 10 or 12 printer characters per inch, and so on).

C&P's other screen display is, of course, the text file you're working on, which scrolls between an identifying line at top and another command menu at bottom. Again, escape enters the menu and return executes the selected function, whether in the command menu or sub-menus: Save, for instance, brings a choice of saving the file under its current or a new name or aborting the process.

Cut & Paste is named for its primary editing feature. The program



is always in "insert mode," pushing text ahead of the cursor instead of writing over it, and the delete key is a destructive backspace. To delete forward or cut or move large blocks of text, control-A marks the start of a block, defined with the arrow keys in reverse video; the Cut function moves it from the screen into a buffer, and Paste inserts the buffer's contents or most recently cut text at the cursor.

Other menu options let you inspect or empty the buffer, or indent or unindent the left margin five spaces at a time (useful for outlines, though there's no centering, justification, or change in the right margin). There's no print preview feature as in Sierra On-Line's HomeWord, but you can save and select among three printing formats for different sizes of paper or kinds of files.

While Cut & Paste's menus make it easy enough for children or beginners, experienced users will appreciate its ability to take commands from the keyboard as well (to cut text, for example, control-C is a time-saving alternative to escape, three right arrows, and return). They'll also like being able to scroll one screen up or down or to the top or bottom of a file, though there's no quick way to move the cursor horizontally. Also, carriage returns are invisible, and thus easily overlooked or deleted accidentally.

Finally, experts will be slowed by C&P's bevy of prompts or error messages, but to users prone to quit without saving their latest versions ("You Haven't Saved Your Changes"), they're invaluable.

Cut & Paste is a little harder to learn than Bank Street Writer, but considerably easier to use (it avoids BSW's clumsy switching between writing and editing modes, and has a full 80-column display besides). Like other economical word processors, it's simple enough for small jobs or home use; unlike many, it's almost as powerful as a big program for "real" work. I don't like the package, but I like the program.

It's available from Electronic Arts, 2755 Campus Drive, San Mateo, CA 94403. ■

Eric Grevstad
Peterborough, NH

I.Q. Baseball

With all due respect to the rabid Yankee and Red Sox fans in my own family, Chicago Cubs and White Sox fans are the greatest in the world. They always enjoy the game, win or lose. Only Chicagoans, with their great love of the game, could have created a baseball trivia game as much fun as I.Q. Baseball.

I.Q. Baseball really challenges your baseball knowledge; it's no game for the casual, seasonal fan. To win at this game you have to think baseball 365 days a year, which is of

itself a healthy and worthwhile thing to do.

The format of the quiz is a baseball game, depicted in high-resolution color graphics. Besides the sights of the game, there are also the sounds of the ballpark: the roar of the crowd, the stadium organ and one of the best voice simulations I've encountered in a computer game. Other realistic touches include cheering for home team home runs, "rally" and "charge" music when your runners are on base, rain delays (and rainouts!) and, in the true Chicago White Sox tradition, the playing of "Na-na-hey-hey Goodbye!" when a pitcher is yanked from the game.

Before the game begins the player must choose between solitaire (human/computer) and two-player action and between "Minor League" and "Major League" questions. Having accomplished that, there's a brief pause for the National Anthem, the shout of "Play ball!" and at last the game begins.

Once the animated batter steps up to the plate the pitcher hurls the ball and, in the text window below the graphic, a multiple choice question is displayed. In the solitaire mode, with the computer batting, your choice of a correct answer results in an automatic out. In the instance of an incorrect answer, the computer usually awards itself a hit; frequently a double, triple or a home run.

The human player will find, during his at-bats for the home team, that the job of scoring runs is fairly difficult. From time to time during your "ups," the ball you hit with your right answer will be fielded by the third baseman for one out and you will be left with the curiously unconsoling message, "Oh no! You was robbed!" If there are runners on base, it's likely that there will be a double or triple play. I saw more triple plays in this game in one afternoon than in 25 years of watching live baseball. The point is, in order to score runs you have to be very, very consistently correct in answering the "Question Ball."

The questions are not all out of the range of the average fan, to be sure.



Almost anyone can pick the name of the man who hit the most home runs in a 162 game season (Roger Maris, 1961), or the name of the first expansion team to win a World Series (the 1969 N.Y. Mets, God bless 'em). Now try these questions from the "Minor League" list on for size:

- What player-manager led the Indians to the '48 championship?
- Who was the only pitcher to appear in more than 1,000 games?
- Who pitched a 12-inning perfect game but lost in the 13th inning?
- Who was the player Seattle fans nicknamed "The Inspector"?
- What player won the MVP for two years running?

No, the answers are *not* on page 89. As Casey Stengel used to say, you could look 'em up. I strongly suggest that you do so before you play I.Q. Baseball, and most especially before you attack the much more difficult queries from the "Major League" list. Playing with that list you will find the "Visitors" hitting more home runs and your side hitting into more double plays. You have to be super-consistently correct to win the advanced game.

The questions seem to have a mid-western orientation to them, focusing on the exploits and lore of the Cubs, White Sox, Twins, Brewers and Reds. For those with their own regional bias, there are supplementary question disks for each of the 26 major league teams and a special World Series question disk. Now you'll be able to find out just how much you

really know about that favorite team of yours.

I.Q. Baseball is not the slickest game I've seen in terms of graphics. The graphic design and animation are adequate for the job but uninspired. This one consideration aside, the game plays well. I.Q. Baseball is great entertainment and engrossing fun for anyone who really enjoys baseball. Even if you don't aspire to baseball expertise now, a few games with I.Q. Baseball could easily make an expert out of you—or at least give you enough ammunition to prevail in a few taproom controversies.

I.Q. Baseball is manufactured by Davka Corporation, 845 North Michigan Ave., Chicago IL 60611. The game disk costs \$24.95. The individual team disks and the World Series disk each cost \$14.95. The game requires an Apple II with Applesoft and 48K or an Apple IIe.

Brian J. Murphy
Fairfield, CT

Cubit

Cubit is a look-alike for Q-Bert. Originality is not this game's long suit. What is important is that the game provides a lively and light-hearted arcade challenge.

Assuming for a moment that you haven't seen Q-Bert or Cubit before, let me introduce you to the hero of this look-alike. He's only a few pixels high on your high-res color video screen, perfectly round with two stubby legs, a hooked nose, and a marked tendency to cuss a streak, in cartoonese "#\$:&!!," when he's tripped up in his quest to change the color of the pyramid.

Ah, yes—the pyramid. This is probably the only example of winning a game by climbing down the pyramid—and up again, and sideways, and down. The pyramid is made of cubes with three sides showing. Your job, using joystick or keyboard commands, is to maneuver Cubit onto the top face of these blocks, changing their color. When Cubit has changed all the blocks to

the target color, then the game progresses to the next level. The game is divided into four levels of difficulty, with each level divided into four rounds.

The game sounds simple at first, but there are a few surprises in store for our hero Cubit as he bounds up and down the pyramid. One such surprise is the rocks that roll down

the pyramid. In the easier levels, the rocks roll from one cube to the next with stately slowness. You should have no difficulty helping Cubit dodge them. In the higher rounds and levels, the rocks increase in number and move faster. Sometimes as a rock reaches the bottom of the pyramid, it will metamorphose into a snake that vigorously pursues the little

hero all over the pyramid. Escape may be difficult, especially when you're at a level where the squares you haven't landed on yet are invisible.

Among Cubit's worst enemies are the Gremlins. These little guys horn in on Cubit's act by hopping on the cubes Cubit already landed on and change their color again. This makes life hard for Cubit, especially when he's on a level where he has to land on a cube face more than once to change its color. It's a good thing that Cubit can kill off these creatures merely by touching them.

Cubit's best friends are the stars and the disks. The disks are spinning objects that hover just beyond the pyramid. If Cubit jumps onto one, the disk will take him back to the top of the pyramid. The disk provides not only an ideal escape route from a snake, but a possible death trap for the snake, since it may follow Cubit off the structure. Unfortunately for the snake, it can never touch the disk. Instead, the snake will fall to its death.

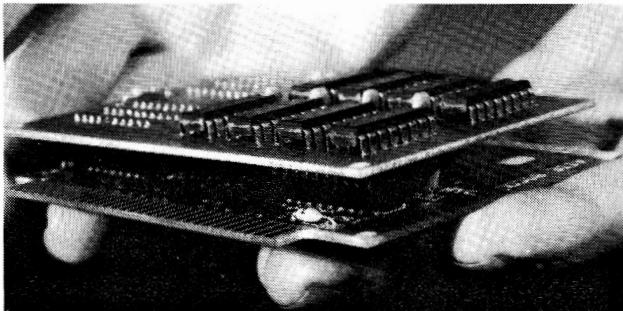
The stars help out when Cubit touches them by temporarily freezing all the rocks, snakes, and Gremlins, giving Cubit the chance to finish re-coloring the pyramid.

Cubit is good fun for youngsters and adults alike. The graphics are good, but not great, and the sound effects are appropriate and adequate. The important thing is play value, and in that respect, Cubit is a winner. This is the way to go if you want to recreate Q-Bert with your Apple.

Cubit can leap into your arms from the corporate pyramid of Micromax, 6868 Nancy Ridge Drive, San Diego, CA 92121. It's designed for use with 48K Apple IIs and with the IIe. Price is \$39.95. ■

Brian J. Murphy
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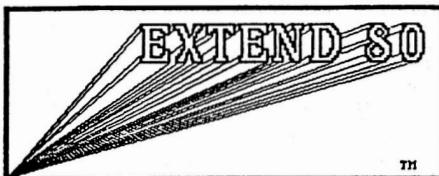


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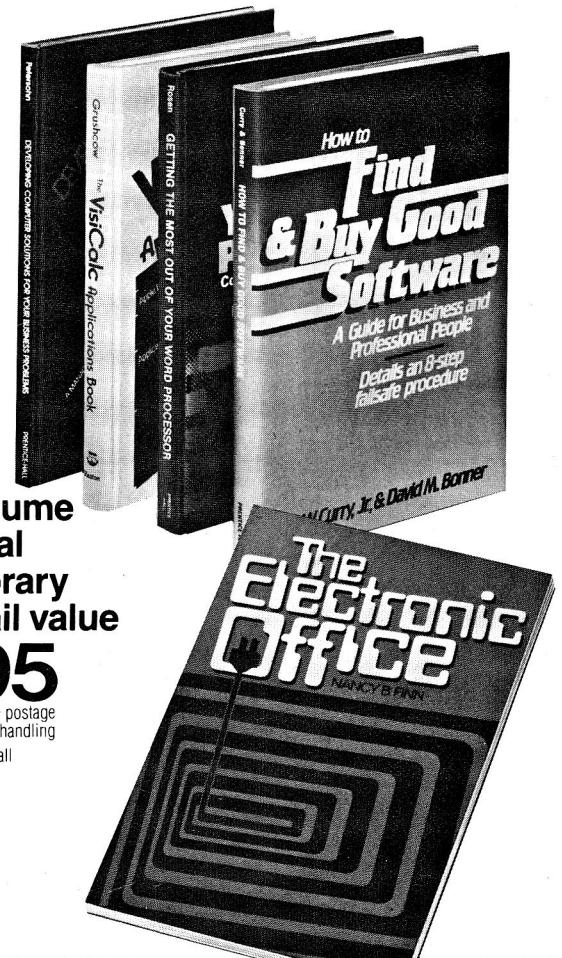
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control large amounts of stock with little capital, lure people to options.

OPVAL is a stock option analysis program by Bob Emmons of Calcshop Inc., West Caldwell, NJ. It analyzes option strategies and indicates when the profit potential is statistically in your favor.

OPVAL is designed to display information just like the pages of a book. The program boots up to a table of contents, showing page titles and abbreviations in logical clusters such as calls, puts, and graphs. To go from one page to another, simply type the two-letter page code in the space provided and press return. Almost the entire program is loaded into memory after booting, so there is little waiting for disks to spin while performing analysis.

Enter basic information into the program before starting your analysis. You must go to the Date and Rate page to enter the current date and prevailing interest rate on short term Treasury Bills. Afterward, the auto calendar displays the option expirations for the next 12 months, and the number of days remaining. You need not count the days to expiration. The date and interest rate are needed for the option valuation model, as you will see.

Next, go to the Stock Data page and load stock information from your data disk, or type in the price, dividend, volatility, and option cycle of an issue not already on file. OPVAL saves stock and option prices, positions, graphs, and other information to disk for future use. You don't have to input this information every time you analyze the same stock, but you must in order to update current prices.

Like other option analysis programs, OPVAL calculates the fair price or theoretical value of an option using the Black-Scholes model, which is a widely-accepted formula within the investment community. The model's key ingredient is a stock's volatility—a percentage of how much a stock went up or down in a fixed period. Current interest rates and dividends are also needed. The Black-Scholes model also determines

what an option should sell for relative to the underlying stock price until the contract expires.

The theoretical prices are then compared with actual option prices to determine if they are over- or under-valued. Chances for profit are best when you purchase under-valued options and sell over-valued options. This is the key to stock option evaluation programs.

The main difference between OPVAL and other stock option analysis programs is the emphasis on *market implied volatility*. This calculates the current market prices of options instead of historical stock prices. It actually uses the Black-Scholes model in reverse. You supply the actual option prices, and the program figures out the volatility. In OPVAL, implied volatility is the market's outlook for the future, which is more important than the past when evaluating option prices. Other option programs use a stock's historical volatility to calculate theoretical prices.

OPVAL relies on implied volatilities in the Black-Scholes model. They are obtained after inputting the market prices of your options. Since the implied volatilities of each option will probably differ, the manual suggests disregarding those far from the norm and using an average of the remaining volatilities. Once a volatility is determined, it can be entered into the stock data page for temporary analysis or saved to disk to update your files.

Once you have theoretical values, the corresponding deltas (hedge ratios) are calculated. Deltas are the amount an option's price changes with each \$1.00 increase in the underlying stock. Options do not move dollar for dollar with the stock until the stock price is above the call's strike price or below the put's strike price. OPVAL will calculate deltas for a single option or a complicated position.

A nice feature of OPVAL is that all options pages resemble the *Wall Street Journal*—horizontal by month, vertical by strike price. Also, the expiration date is shown as well as the month, in inverse video.

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OPVAL analyzes simple calls, puts, or complicated strategies involving any combination of stock and up to 96 options (48 calls, 48 puts) in 18 seconds. Any page of calculations can be shown in either fractions or decimals. Control-F allows you to shift back and forth to your preference.

The page for entering your option positions is also in newspaper format for standardized screen pages. Simply move the cursor to the appropriate strike price and type in the number of contracts that you are long. For contracts that you are short, type a minus sign before the number on separate pages for calls and puts. Stock positions (in 100 shares) can be entered at the bottom of the page. There is no need to name a position such as spread or straddle. Just enter the amount of contracts or stock involved, and OPVAL will analyze it whether the position has a name

or not.

Once a position is entered, you can generate two types of graphs with complete control of both the horizontal and vertical scales. One graph helps you visualize leverage by showing price changes in the underlying stock on an option position. The other graph shows the effect of time on an option position. Options are wasting assets, so if the stock doesn't reach the breakeven point (considering the premium paid for the contract) plus commissions, it becomes worthless. The graphs seem complicated at first, but once you master them they help visualize "what if" scenarios. You can change the "current date" on the Date and Rate page to illustrate "what if" sequences.

Control-P prints any OPVAL screen page. Graphics can be printed without a special interface card because they are programmed in the

text mode instead of hi-res. The program uses asterisks as graph data points, but are a little difficult to interpret because of the distance between them.

OPVAL has two Dow Jones interfaces. One logs on to access stock and option quotes for one or two issues that you might be evaluating. The other interface automatically retrieves stock and option quotes on a list of up to 80 securities in your data base. Prices can also be entered manually.

OPVAL is a good option analysis program that's easy to use for simple or advanced strategies. It is also used with index options, convertibles, and warrants.

A future revision should include a few changes. It would be nice if the program calculated historical volatility. After all, the definition of technical analysis is the study of past trends

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READ**	42.2 sec.	12.4 sec.
WRITE**	44.6 sec.	14.9 sec.
APPEND**	21.3 sec.	2.3 sec.

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to predict future pricing behavior. Also, I find the process of determining implied volatility cumbersome. Weekly closing prices could be entered into the stock data base for updated historical volatilities. The Dow Jones interface could make this an easy task. Both historical and market implied volatility have their application, but the program user should have the choice.

The inclusion of commissions in position analysis would help, because they can add up in multiple option strategies. I'd also like to see a tabular graphs readout and the ticker symbol of the analyzed underlying stock shown on all screen pages. I find myself labeling graphs printed for future reference, especially when dealing with more than one stock.

The program works on an Apple II, IIe (40-column mode) and III (emulation mode). It can work with

OpVal includes newspaper-like tabular displays for forecasted prices (adjusted Black-Scholes), quoted prices, expected profit and other option information: recall of ALL security information: market quotes from Dow Jones™ or keyboard: auto-calendar to Dec., 2060; strategy and position graphs: forecast volatility: electronic book design that makes menu mazes obsolete. For Apple Computers™. Program and manual \$250. Demo disk and manual \$35 (credit on purchase of program). Tax deductible for investors.

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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 TLOAD (791 Strings, 32 chars ea)	8.0 6.2 29.3 24.3 44.2 142.3	NO NO 28.0 16.3 45.9 142.9	NO NO 29.4 24.3 45.1 151.1	NO NO 88.4 83.8 117.1 1231.2
APPLESOFT (100 Sectors)	*SAVE LOAD	7.1 5.0	16.4 4.0	6.4 5.0	33.1 23.5
INTEGER (100 Sectors)	*SAVE LOAD	7.3 4.9	NO NO	6.6 4.9	33.4 23.4
BINARY (100 Sectors)	*BSAVE BLOAD	7.8 5.8	18.4 4.8	7.3 5.8	28.7 24.5
48K PROGRAM SPACE	APPLESOFT (With 3 Bufs avail) INTEGER BINARY	36,352 36,352 36,352	NO NO 34,816	36,352 36,352 36,352	36,352 36,352 36,352
64K PROGRAM SPACE	APPLESOFT (With 5 Bufs avail) INTEGER BINARY	46,592 46,592 46,592	31,232 NO 40,704	45,858 35,162 45,658	35,162 35,162 35,162
NUMBER OF DOS COMMANDS		37	29	31	28
CLOCK FILE DATING	YES	YES	NO	NO	NO
MANUAL FILE DATING	YES	NO	NO	NO	NO
ONE KEYSSTROKE CATALOG	YES	NO	YES	NO	NO
AUTO USE INTEGER CARD ANY SLOT	YES	NO	NO	NO	NO

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one disk drive and 48K of memory. Optional equipment can be a printer, Hayes Micromodem II, Dow Jones password, and second disk drive.

The manual is well written, with instructions and analysis examples. The appendix contains examples of every screen page and a list of estimated volatilities for many widely held stocks for starting a data base. The manual includes a short bibliography of related books about options trading.

The manual and demo disk are available for \$35 (credited toward purchase price). The demo disk is very thorough. It will do all the calculations, graphs, printing, and position analysis of OPVAL. It will even interface with Dow Jones. The only restriction is that the analysis is fixed at a stock price of \$50 1/4, and the Dow interface can only retrieve prices for Texas Instruments stock

and options. OPVAL costs \$250, including two master disks.

People new to options should use a full service broker to guide them through the terminology, strategies, and risks involved. Options exchanges also supply support literature, and brokers are required by law to provide clients with a prospectus from the Options Clearing Corporation.

For more information, contact Calcshop, Inc., Box 1231, West Caldwell, NJ 07007. ■

Richard M. Fuccillo
Groton, MA

According to Calcshop, the enhanced version of OPVAL now includes the ticker symbol for analyzed stock, and the program now can access the Warner Computer Systems Data Base.

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game board (enclosed with the package) at every turn.

Portfolio includes many real world factors that affect investing, but some concepts are handled differently for better play. Also, it lessens the advantage that experienced traders might have over novices.

The 15 companies, whose stock you can buy or sell, each represent a different industry. Portfolio rates the financial health of the 15 companies in one of 10 categories. The categories run from AAA (highest) to D (lowest). The Official Rating scale is a relatively constant, general indicator. The Actual Rating scale is an up-to-the-minute indicator which determines the price of a company's stock, and is affected by various influences on a company.

The factors that change a company's ratings and stock price are internal and external. A factor af-

fecting only one company is internal. External factors affect the whole economy, with various results to each company.

The main screen menu can perform nine activities. The Advance choice calculates the number of squares your token will move on the game board. This is done by "rolling" two six-sided dice. The square your token ends up on will activate a sequence of events, governed by the type of square it is. The manual describes in detail the 10 types. Advancing, along with events it triggers, takes up no days.

From this menu you can also display an information screen (nine more options), purchase/sell stock, analyze commodity transactions, borrow money, make a personal purchase, and end the present month. You can also save or end a game from here.

When playing Portfolio, you are actually playing against a computer opponent, and every six months the values of your corporate holdings are compared to the computer's. Your performance bonus is calculated using the amount that you outperformed the computer, if any. You will find that the performance bonus is the best way to accumulate wealth. Portfolio also offers a handicap option for players of different skill levels.

Portfolio's realism includes taxes. At year's end, your cash balance is compared to the previous year's, and the difference is taxed at 25 percent.

Portfolio allows you to save an unfinished game (including scenario) for future play. Games can be saved on a separate, initialized disk or on the master disk.

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folio disk. The records are arranged by player name. Records include number of games played, awards earned, reputation, and game in progress. Each time a game is started, saved or finished, Portfolio automatically updates the files.

At the end of each game, the "retiring" Investment Manager will receive a letter from corporate headquarters. If the manager's performance has been particularly strong, he gets an award. There are five levels of awards, but the last two are definitely for expert players.

Portfolio is a realistic investment simulation game with virtually unlimited scenarios. This should make the game continually challenging for all players, and allow for improvement. The key to success with Portfolio is to make consistently wise decisions using the available information, which is abundant.

An enhanced version of Portfolio has just been released. It was designed to greatly expand the educational uses of Portfolio through user controlled options. Owners can select the initial economic conditions, enabling teachers to illustrate concepts, and investors to track the marketplace. This version is available at selected dealerships for \$64.95.

The Portfolio package includes a game disk, instruction manual, investment guide, player handbook and a foldout Portfolio board. Portfolio runs on any Apple based system with one disk drive and 48K. The disk is guaranteed for 30 days from the date of purchase. After 30 days, replacement costs \$7.50. It is published by Flexible Software, 134-10 Ivy Drive, Charlottesville, VA 22901. ■

Richard M. Fuccillo
Groton, MA

Circascript

Don't be deceived by fancy packages promising understandable, fast, quality word processing programs. There actually is a word processor, packed with professional features and capable of doing what word processor software packages costing up to four times as much do. It's called Circascript and, at \$39.95, there is a lot to gain for the money.

What's even more amazing, Circascript is a word processing program that actually has clear, understandable documentation. Not only can a person read and understand the instructions, but that same person can be writing and printing text files after only a few hours of work with the manual.

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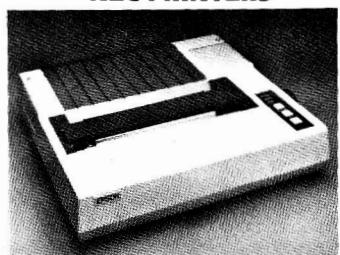
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Software Reviews

"Circascript prints lowercase without a firmware card."

The manual is divided into two parts. The first part is for people who have never used word processing software before and who need to be taken carefully through a step-by-step tutorial. The second part of the manual, according to programmer Tom Park, is for people with prior word processing experience who want to skip the elementary instructions and descriptions and get down to some serious word processing.

Serious word processing is what this program does. Circascript prints lowercase without a firmware card. It will not cast lowercase characters on the screen, but it will print them. Capital letters are indicated on the screen by inverse display.

The program also allows the user to insert printer commands within the body of the text. These commands are used to format the page. For example, !LM10 and !RM70 are

commands which do not appear on final copy but which tell the printer to set the margin at 10 and 70 spaces, respectively.

Similar commands set and justify margins, set tabs, center the text, indent, add extra spaces between lines, and move the printer to the next page. This feature also makes special printer commands.

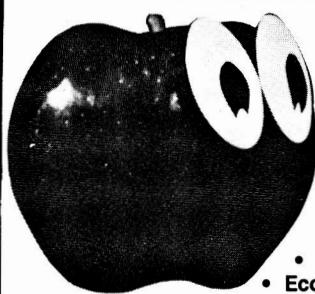
For example, the Okidata Microline 82A printer has four selectable character pitches (pitch means number of characters per inch or cpi). The normal mode is 10 cpi (similar to a pica typewriter). The condensed print pitch is 16.5 cpi; the boldface pitch is 8.3 cpi and the wide print is 5 cpi. The basic commands CHR\$(30), CHR\$(29), CHR\$(29CHR\$(31)), and CHR\$(31) address these four modes in programming the 82A.

Using Circascript with the Microline 82A, the command !TP30 gives normal print, !TP29 gives condensed, !TP 29 gives boldface, and !TP31 brings wide print. (Wide print is the default or automatic mode to which the Microline is addressed by Circascript.)

The manuals of other popular Apple-compatible printers will give similar instructions for setting pitch by taking the number from the CHR\$ command to make the setting.

Circascript features a global word search feature. For example, by pressing control-G for every instance of the word "command" in this article and then writing the word, the program will show every example of the word appearing in the text. This is helpful for spelling corrections. The word search can be a little awkward, however, when the word is a combination of letters such as "on," "an," "it," and "or" that can be found

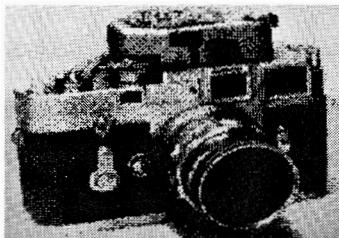
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in longer words. Every example of those letter combinations in the text may appear.

The word search feature is handy, but the global replace feature is more impressive. Control-S can replace any word with any other word.

For example, a student writing about twentieth century presidents may consistently confuse Theodore Roosevelt with Franklin Roosevelt. With the control-S command, the student can replace all the "Franklins" with "Theodoses" and all the "Theodoses" with "Franklins."

Circascript offers a solution to the problem of merging text files. At the end of the text, a control command (control-R) allows the user to type in the name of another file saved to disk. It automatically adds that file to the new text at any chosen point. The two files, under the file name of the new text, may be saved to disk.

For persons writing reports or documents where the organization of subject matter is difficult, this feature provides an easy, rapid way of arranging information. The only limitation is the size of the file. The maximum length is 29,000 bytes, so save to disk often.

Deleting single words, lines, or whole paragraphs is simple. Single control key commands can delete words in chunks or up to 256 characters of a whole paragraph. By using strokes of the left arrow key to eliminate a word or a letter, deletions will be more precise. Pressing the right arrow key restores text deletions. (The arrow key deletes are stored in a 256-character buffer.)

Cursor movement with Circascript is speedy and efficient. Hitting escape twice allows the IJKM keyset to move the cursor up, down, right, or left. Simultaneously, using the re-

peat key speeds that motion dramatically. If faster speed is needed, control key commands will move the cursor a half screen at a time, all the way to the beginning or to the end. Any specific point in the text may be reached quickly even without using global search functions.

Circascript also boasts a conditional paging function for reports or documents separated into sections by subheads. With the proper invisible command, Circascript starts the printing on the next page if there would otherwise have been a subheading at the bottom of the page.

Two other attractive Circascript features are its ability to work on an Apple II without Applesoft and its compatibility with Applewriter files. The documentation includes instructions for using Applewriter 1.0 and 1.5 files with Circascript. This enables two authors with different

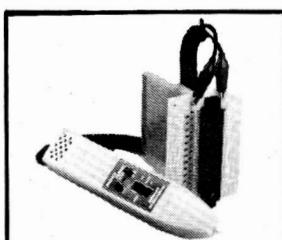
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The remainder of Circascript's features are what you would expect from any high quality word processing software package. Circascript has access to DOS and disk commands can be made from the main program menu and also from the file creating mode. There is automatic page numbering, shift lock (which is really caps lock), and readouts on demand of the amount of free memory left in the computer.

Circascript works with the Apple IIe, also. Special commands and procedures for using Circascript with the IIe are prominently flagged throughout the documentation. The procedure modifications make good use of the computer's lowercase feature and of the added keys on the IIe key-

board.

The features Circascript lacks are on-screen lowercase (when used without a lowercase adapter) and a "test print" function, which would provide a facsimile of the finished product on screen before printing starts. The documentation should be clearer about when one should switch from the program disk to the file disk. A little practice using Circascript and saving and retrieving files will straighten out that problem.

These are minor objections when compared to Circascript's overall quality and power. Circascript represents a lot of software for the money.

Circascript makes an ideal introduction to word processing for a high school or college student, and an even more valuable tool for the production of term papers, essays and reports. Apple II business users will find Cir-

cascript useful for correspondence and reports. For light to moderate business use, Circascript will fill the bill.

Circascript does not come in a fancy package and it doesn't have its own ring binder for the disk and documentation. But what the packaging lacks in flash, the program more than makes up in quality. Anyone interested in seeing what word processing is all about will find that Circascript is a friendly, low-risk introduction. At the same price as many game packages, Circascript represents a bargain worthy of investigation.

Circascript is manufactured by Circadian Software Inc., Box 1208, Melbourne, FL 32902. The program works on any 48K Apple II or II Plus and IIe. A disk drive and DOS 3.3 are also required. ■

Brian J. Murphy
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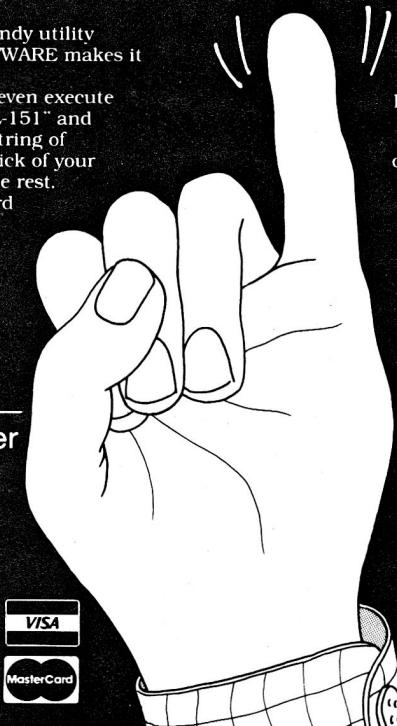
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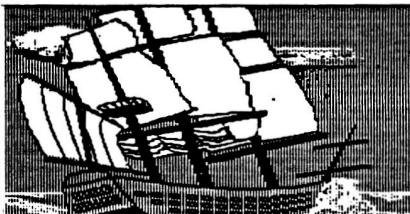
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Cider Vinegar

Presidential Power, March

My Presidential Power simulation published in the March 1984 issue of *inCider* would benefit from the following improvements.

1) SET UP should be modified by inserting these lines:

```
45 GOTO 140  
135 GOTO 170  
165 GOTO 50
```

2) There is a typo in line 20 of RESULTS. CHR4 should read CHR\$.

Several readers have expressed an interest in modifying and extending the simulation. I've encouraged people to forward their enhancements to *inCider* so they may be shared with other readers.

Joel J. Davis
142 Wildwood
Algonquin, IL 60102

inSidious inSolubles Solution, from p. 82

The Savings Accrual Solution

```
70 TA = TA + A + RA * TA + (RA *  
A / 2)
```

The algorithm in line 70 must continue to add the amount contributed each year to the total already in the account (TA + A). In addition, the amount already in the account must earn interest (RA × TA). And—the amount added each year is added *monthly* (did you read the explanation?) and so earns interest for half a year (RA × A/2).

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The signal conditioner's outputs are a high quality 16 pin gold I.C. socket that matches the one on the A/D's so a simple ribbon cable connects the two. The signal conditioner can be powered by your Apple or from an external supply.

FEATURES

- 4.5" square for standard card cage and 4 mounting holes for standard mounting. The signal conditioner does not plug into the Apple, it can be located up to 1/2 mile away from the A/D.
- 22 pin .156 spacing edge card input connector (extra connectors are easily available i.e. Radio Shack).
- Large bread board area.
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The SUPER INPUT/OUTPUT board manual includes many programs for inputs and outputs. A detailed schematic is included.

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Please see our other full page ad in this magazine for information on Applied Engineering's Timemaster Clock Card and other products for the Apple. Our boards are far superior to most of the consumer electronics made today. All I.C.'s are in high quality sockets with mil-spec. components used throughout. P.C. boards are glass-epoxy with gold contacts. Made in America to be the best in the world. All products compatible with Apple II and //e.

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New Publications

edited by Joan Witham

Handbook for Business Managers

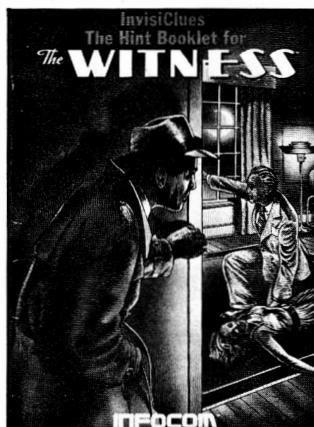
To help business owners and managers with little or no background in computers, Chilton Book Co., Radnor, PA 19089, has published the *Handbook of Computer Applications for the Small or Medium-Sized Business* (\$19.95). It covers everything a manager needs to know about business and computers, including local computer networks and 16-bit micros.

Logo Information and Program Exchange

The Young People's Logo Assoc., PO Box 855067, Richardson, TX 75085, has published the *YPLA Software Exchange Catalog Supplement*, which lists programs that may be obtained by sending either money or a program written in Logo. Another service they provide is The Midnight Turtle, a Logo information exchange in operation from 7PM to 7AM that features electronic mail, up- and downloading of Logo software and five bulletin boards.

Computer News by Tape

Computer News Audio Digest (\$195), a recorded twice-monthly digest of current computer news from key computer journals, can keep executives up-to-date on computer news while driving to work or opening their morning mail. For further information on this digest, contact Computer News Audio Digest, PO Box 10266, Stamford, CT 06904.



Infocom clues.

Critic's Guide to Software

A Critic's Guide to Software for Apple and Apple-Compatible Computers contains information on business software for managers and professionals. It is available for \$12.95 from Chilton Book Company, Radnor, PA 19089.

Educators' Road Map

Educators looking for a road map to the human side of technology can find help in the *1984 Directory of Resources for Technology in Education* (\$12.65, paperback), published by the Technology Learning Center, Far West Laboratory for Educational Research and Development, 1855 Folsom St., San Francisco, CA 94103. The directory provides information about national and state associations, resource organizations, state departments of education, computer camps, periodicals, databases, electronic bulletin boards, hardware companies, summer institutes, conferences, degree programs and funding sources.

Computer Investors Journal

In-depth articles and reviews of investment software and books as well as member software discounts are available in the *AAMI (American Association of Microcomputer Investors Inc.) Journal*. For a sample issue, send \$3.00 to the AAMI, PO Box 1384, Princeton, NJ 08542.

Infocom Game Maps/Hints

Players in need of help in the Infocom series of adventures (Zork, Planetfall, Deadline, etc.) can look to a series of InvisiClues hint books and game maps. They are available for \$7.95 for each game from Infocom, PO Box 855, Garden City, NY 11530.

What Is a Good Program?

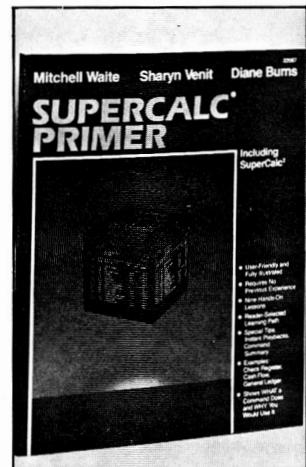
The Book of Apple Software 1984, a comprehensive reference and review guide for Apple II/Ile software, has been updated to include the newest Apple software. Contact The Book Company, 11223 South Hindry Ave., Los Angeles, CA 90045, to obtain the book for \$19.95.

SuperCalc Primer

In 218 pages, *SuperCalc Primer* (\$16.95) teaches novice users how to harness SuperCalc's power in "what-if" problems, making investment predictions and doing financial modeling. For further information, contact Howard W. Sams & Co. Inc., 4300 West 62nd St., Indianapolis, IN 46268.

Bulletin Board Directory

The National CBBS Directory (\$2) contains over 1000 computer bulletin board telephone numbers in numeric sequence, identifying the BBS type, its baud rate, operating hours and other pertinent facts. For further information, contact Thomas Wnorowski, 3352 Chelsea Circle, Ann Arbor, MI 48104.



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Index of Apple Articles

Microindex, a comprehensive index to microcomputer-oriented periodicals, includes title, author, page, length, journal, issue, reader level and rating. The full version is available on a monthly basis to large libraries for \$99 yearly; the abridged version (\$49) is for medium-sized libraries and small businesses; and the journal-specific version (\$5-\$12, yearly issue) is for individual users. Contact Serious Personal Computing, PO Box 7059, South Nashua, NH 03060, for further information.

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New Software

edited by Joan Witham

Disks from Datasoft

New entertainment games from Datasoft Inc. include the following programs for \$29.95: Nibbler, a test of your quickness and judgement in a race against time to devour everything in your path; Bruce Lee, based on the life of the late martial arts expert; Letter Wizard, which adds a new dimension to Datasoft's word processing programs; Genesis, a heated battle for survival with venomous spiders; Ultra Plan, a spreadsheet for planning and forecasting home expenses; and Lost Tomb, a suspense-filled tomb of horrors arcade game.

The Dallas Quest, inspired by the popular TV series, is priced at \$34.95. Heathcliff (\$34.95), based on the beloved animated character, stars in software to teach reading and spelling skills. Contact Datasoft Inc., 19808 Nordhoff Place, Chatsworth, CA 91311, for more information. Reader Service number is 452.

New on the Market

Game programs from a new company, Three Sigma Inc., include Secret of Easter Island (\$30), an adventure where you must find the mysterious idol to save the island from volcanic devastation; Fireware Pinball (\$30), three fast-action pinball games on one disk; Space Spikes (\$20), a shoot-'em-up; and Vegas\$ Video (\$20), simulating a card game in which you bet against the house.

Some of their educational programs are Math Reviewer (\$50), which includes hundreds of lessons



TV stars now star in computer programs.

on exponents, trigonometry, metrics and more; Frog Dissection (\$45), an organ-by-organ tour through a frog with investigations of each of the frog's systems; the Gene Scene (\$45), a human genetics game that teaches basic Mendelian principles and various considerations in genetic counseling; and SAT Review.

All programs may be or-

dered from Three Sigma Inc., PO Box 716, Morrisville, PA 19067, with the addition of \$3 for shipping and handling. Reader Service number is 454.

Financial/Basic Tutorial Programs

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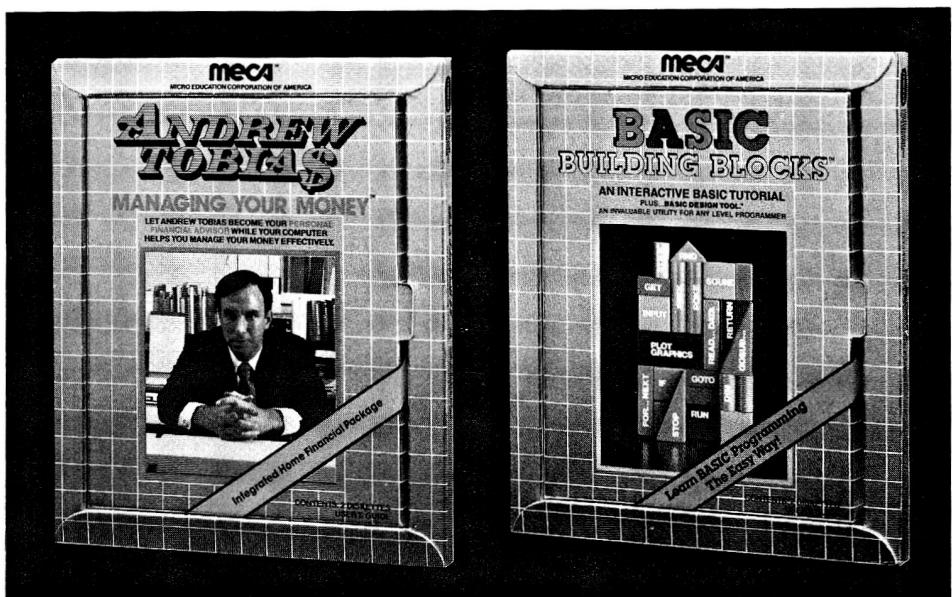
Guide You'll Ever Need and *The Invisible Bankers*. This integrated home financial package retails for \$199.95.

A simple-to-use interactive Basic programming tutorial, Basic Building Blocks allows users to study actual programs as they execute. Debugging programs as well as learning Basic is another key feature. It sells for \$79.99.

For information on both programs, contact Micro Education Corp. of America, 285 Riverside Ave., Westport, CT 06880. Reader Service number is 462.

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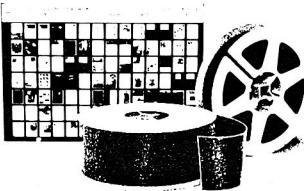
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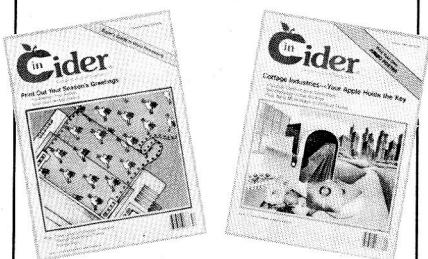
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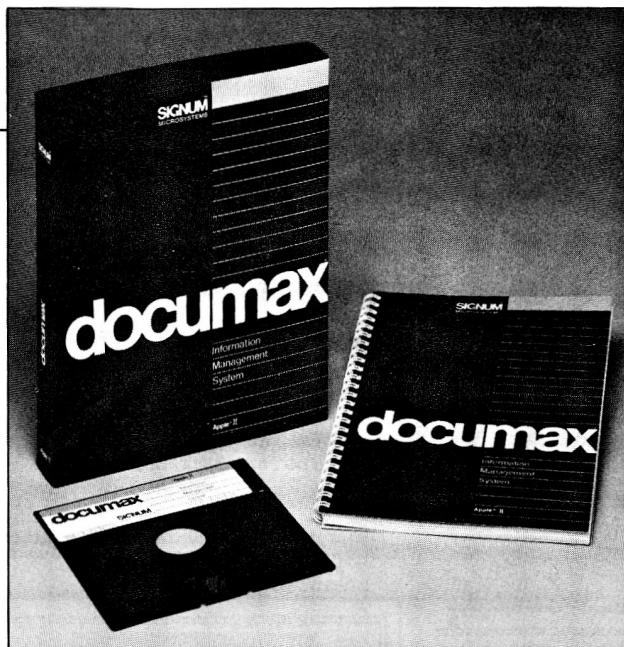
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lection of six menu-driven programs for the home and office. CAT is a catalog program. The Balancing Act balances checkbooks. Calculator is a four-function printing calculator with memory and percent. Loan Analyzer computes loans and mortgage amortizations, total interest paid and payments made, daily percentage rate and amount of each payment. Savings Analyzer computes the future value of savings, IRAs and investments. Wage Analyzer figures wages or income by the hour, weekly, biweekly, semi-annually and annually. Line Writer is a line-at-a-time typewriter.

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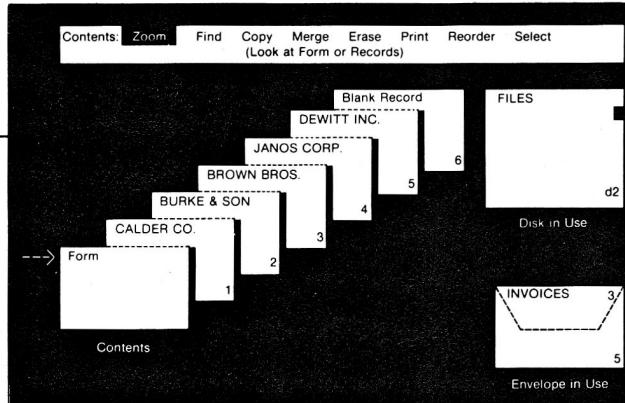
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PO Box 24157, Tempe, AZ 85282, for further information. Reader Service number is 457.

Does Not Do Windows

Originally designed for the IBM PC, the Apple version of Jack2 is a significant improvement over The Incredible Jack. Jack2 is an integrated program that does word processing, spreadsheeting, charting and database management tasks simultaneously, without windows. Icon-driven commands make it easy to use. Priced at \$395, it can be obtained from computer stores or from Business Solutions Inc., 60 Main St., Kings Park, NY 11754.



Jack2 is here for the Apple.

Reader Service number is 455.

Telecommunications Module/Program Selector

Terminus IIe, an integrated telecommunications module for Word Juggler, offers special transmission modes to send and receive any type of file, whether

a Word Juggler document, a Pascal code file or an assembly language program. Suggested retail price is \$89.

Catalyst IIe is a ProDOS program selector for hard disks that switches between copy-protected programs without the need to reboot. Suggested retail price is \$149.

For further information on the above programs, contact Quark Inc., 2525 West Evans, Suite 220, Denver, CO 80219. Reader Service number is 456.

Mysterious Journey

Questron is a journey, filled with mystery, secret tests and tremendous magical powers, to defeat hoards of Stygian creatures and monsters. Your quest is to seek out the diabolical wizard Mantor, purloin the Book of Evil Magic and save the Questron empire. Strategic Simulations, 883 Stierlin Road, Bldg. A-200, Mountain View, CA 94043, offers this fantasy adventure game for \$49.95.

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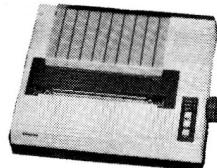
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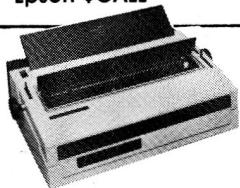


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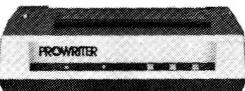
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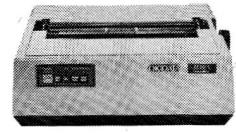
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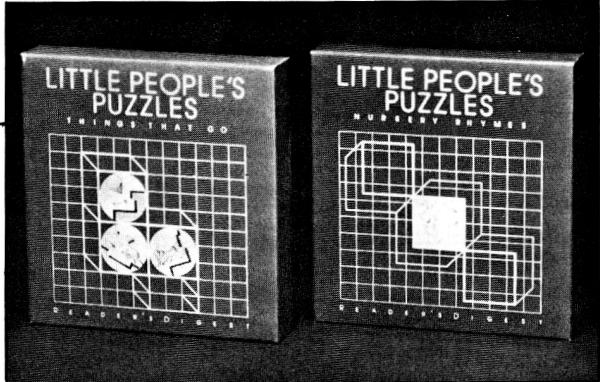
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New Software



The latest educational games from Reader's Digest.

Preschool Learning at Home

Reader's Digest, Pleasantville, NY 10570, has announced new software packages for the home educational market. Alphabet Beasts & Co. (\$34.95) shows pictures of fantasy beasts and a musical rhyme when a letter key is pressed. Numbers are also displayed in both numeric and written form. Little People's Puzzles/Nursery Rhymes (\$39.95) features colorful puzzle pictures from eight different nursery rhymes to be assembled by preschoolers. Reader Service number is 464.

You're on Trial

Jury Trial II, a courtroom strategy game for

\$49, features a cast of characters supported by individual dossiers in the accompanying documentation. Skillful tactics of the competing attorneys win the trial, with the computer as judge.

Contact Navic Software, North Palm Beach, FL 33408, for further information. Reader Service number is 465.

Espionage

The Heist, an espionage arcade game that maneuvers you through 96 different booby-trapped rooms, should be another hit like Miner 2049er from Micro Lab. This program is available for \$40 from computer stores or Micro Lab, 2699 Skokie Valley Road, Highland Park, IL 60035. Reader Service number is 467.

JURY
TRIAL
II

The Courtroom Strategy Game
by NAVIC SOFTWARE

Courtroom strategy game.

Heyden Datasystems New Software

Heyden & Son Inc., a leader in scientific, technical and medical publications, has announced a new division, Heyden Datasystems. Some of their software programs are MUM (\$24.50), a versatile utility program; Microfile (\$75), the personal library ideal for collections of reprints and articles; Superstats (\$215), 26 commonly used statistical routines;

New Software



A complete computer literacy course.

and Autovideogration (\$385), for easy, fast and reproducible chromatography integration. For more information, contact Heyden & Son Inc., 247 South 41st St., Philadelphia, PA 19104. Reader Service number is 466.

New Software for the Power Pad

Open-ended learning and entertainment are offered in Chalk Board's new software to be used in conjunction with the Power-Pad. These additions to Leonardo's Library are Leonardo's Logo (creating shapes, patterns and designs), Boolean Blueprints (advanced Basic programming), Runway (learning navigation and piloting) and Borderlines (simulating international relations). Each package includes the software, as well as a tough plastic overlay imprinted with function buttons and a manual describing a number of learning activities. Prices range from \$29.95 to \$49.95.

For further information, contact Chalk Board Inc., 3772 Pleasantdale Road, Atlanta, GA 30340. Reader Service number is 451.

Electronic Playground

Designed for children three to eight years old,

Electronic Playground (\$24.95) is divided into three parts: Matchbox, a three-part game of matching shapes, upper- and lowercase letters and numbers; Magic Blackboard, a drawing and coloring program where finished pictures can be saved on disk; and Heidi's Program, a flood of colors and sounds.

Making the selection process easier are icons that represent objects or tasks in the programs. For further information, contact Software Entertainment Company, 537 Willamette, Eugene, OR 97401. Reader Service number is 459.

First Encounters

First Encounters teaches computer literacy in the elementary grades. The multi-media kit contains four card games, five keyboard charts, lesson board, worksheets, two program disks, ten mini-programs and teacher's guide for \$98. For more information, contact Educational Activities Inc., PO Box 392, Freeport, NY 11520. Reader Service number is 468.

P-Lisp Now for the Apple

Lisp, a language frequently used in artificial intelligence programs, is now available in a new,

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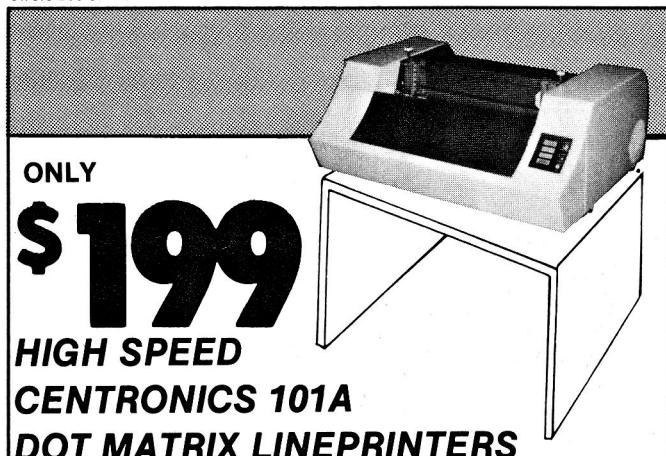
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New Software



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faster version for the Apple. P-Lisp version 3.2 features full floating-point mathematics, hi-res graphics and over 70 built-in functions. The P-Lisp package, at \$99.95, includes the book *Learning Lisp*, as well as the interpreter and manual. Contact GNOSIS Inc.,

4005 Chestnut St., Philadelphia, PA 19104. Reader Service number is 453.

Discovery Learning Programs

New learning programs from The Learning Com-

pany teach reading, number, logic, problem solving and art skills. Reader Rabbit and the Fabulous Word Factory (\$39.95) teach pre-reading and early reading skills to children aged five to seven.

Word Spinner (\$34.95) takes readers on a whirl

through the alphabet to learn the building blocks of reading. In building more than 500 three-letter and 1000 four-letter words, children learn to recognize word patterns and develop critical vocabulary and spelling skills.

Animated dice are used in Number Stumper (\$39.95) to solve basic addition and subtraction equations and develop abstract reasoning and strategic thinking skills.

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Colorasaurus (\$29.95), a

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new type of coloring book for young computer artists, teaches color discrimination, matching and memory skills with colorful dancing dinosaurs in a volcanic world.

For further information, contact The Learning Company, 545 Middlefield Road, Suite 170, Menlo Park, CA 94025. Reader Service number is 458.

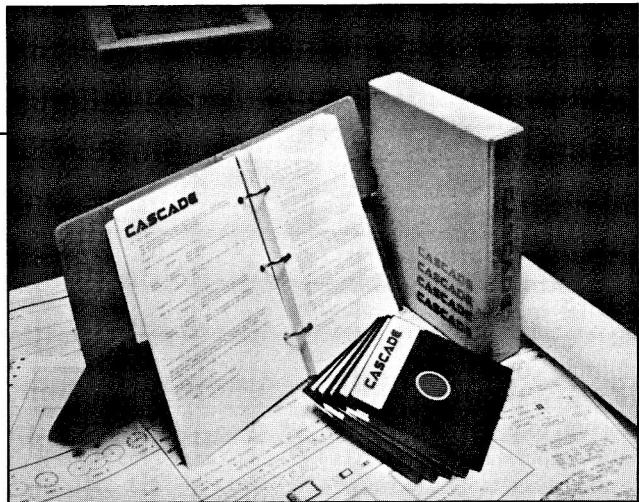
Sorcerer

Sorcerer, the second release in Infocom's Enchanter series of adventures, offers an even greater challenge than previous adventures. A richly-detailed history and geogra-

phy as well as a vocabulary of more than 1000 words make this interactive fiction game a real buy at \$49.95. For more information, contact Infocom Inc., 55 Wheeler St., Cambridge, MA 02138. Reader Service number is 469.

Low-cost CAD

A low-cost (\$895) computer aided design system, Cascade I includes a cursor stabilizer and software for the Apple II Plus and IIe. Cascade I can place as many as 255 different overlays on the system and display each of them independently, which makes it ideally suited for construc-



Low-cost CAD program.

tion drawings for multi-story buildings.

Other features are the ability to group and move objects into a conglomerate, panning and zooming to view objects outside the drawing area. Both aligned, directional and multi-di-

rectional text are incorporated into drawings. The software will power plotters of up to 24-by-36 inches. Contact Cascade Graphics Inc., 1000 South Grand Ave., Santa Ana, CA 92705, for more information. Reader Service number is 463.

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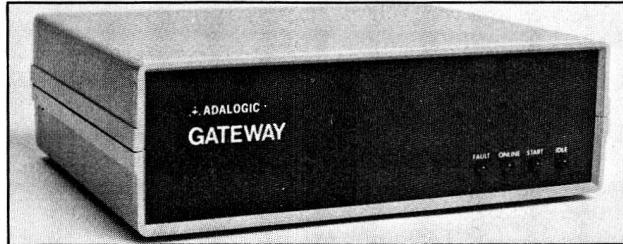
The Model 500 features a Centronics-compatible parallel interface, expandable memory to 256K, multiple copy function up to 255 copies and pause function to temporarily halt data output. The suggested retail price is \$325 from Taxan Corp., 18005 Cortney Ct., City of Industry, CA 91748. Reader Service number is 472.

Elevate Your Printer

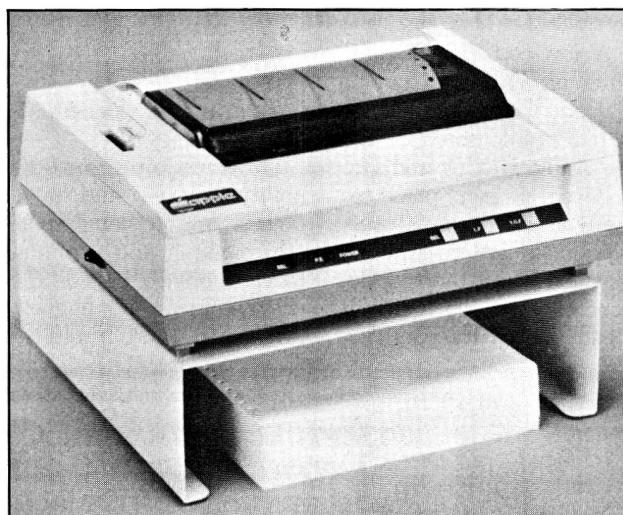
A solid steel enamel-finished stand for elevating mini-printers is available in two models from Bretford Manufacturing Co., 9715 Soreng Ave., Schiller Park, IL 60176. Model WSPS-1 (\$32) elevates a mini-printer with a 9½-inch paper feed and accommodates a continuous flow of paper. The WSPS-2 mini-printer stand (\$43) is for larger mini-printers with a 15-inch capability. A slot accommodates bottom feed printers in both stands. Reader Service number is 486.

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The Jr. Executive computer roll top desk, for the professional and home computer user, has four security locks to prevent tampering and system theft, an automatic power shut-off feature and a removable ventilated rear panel to facilitate system hook-up and heat dissipation. Suggested retail price is \$1175 from Highland Three Inc., PO Box 795003, Dallas, TX 75379. Reader Service number is 487.



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The Australian Vision

Vision-80 Pty. Ltd., an Australian firm, has introduced cards to expand the capabilities of the Apple II and IIe. The Vision-80 board (\$195) plugs into slot 3 and displays 80 columns as well as 128 upper- and lowercase characters and a set of line and block graphics characters.

The Vision-128/256 Memory Expansion Card (\$295) is available as a basic 128K RAM memory expansion card and can be expanded to 256K RAM. The card is fully buffered, allowing lower power consumption and greater reliability.

For further information, contact Cunningham & Walsh Inc., 260 Madison Ave., New York, NY 10016. Reader Service number is 478.

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New Products

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SoundTrap Quiets Noisy Printers

Trace Systems Inc. continues its battle against printer noise by introducing SoundTrap 136, a larger updated acoustical enclosure that quiets 136-

column dot-matrix printers and smaller letter-quality printers. SoundTrap 136 also doubles as a copy stand, reduces paper clutter and efficiently uses desktop space. Suggested retail price is \$229 from Trace Systems Inc., Mountain View, CA 94042. Reader Service number is 473.

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Two boards transform Apple II systems into a signal averager, an autocorrelator and an analyzer of spectrums, histograms, and waveforms. They also provide for multiple sweep displays.

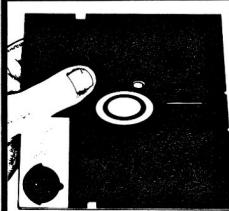
The APL-D2 is an 8-bit, dual channel module that features a 1024 point memory and a maximum sam-



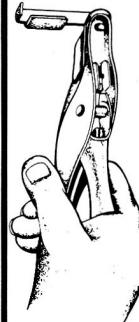
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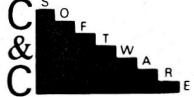
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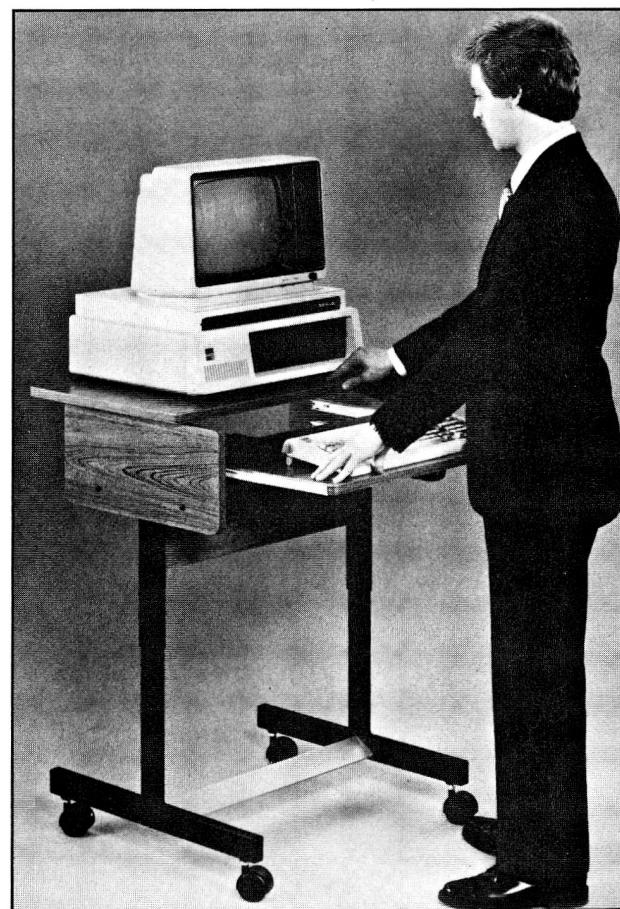
pling rate of 3.5 MHz in the single channel mode.

The APL-HR14 is a 14-bit, single channel module with a 2048 point buffer memory and a maximum sampling rate of 500 KHz. For more information, contact R.C. Electronics, 5386 Hollister Ave., Santa Barbara, CA 93111. Reader Service number is 476.

contact HSP Computer Furniture, PO Box 5545, Birmingham, AL 35207. Reader Service number is 491.

Convenient Outlet

The Micro Saver, an outlet strip, has surge protection and line noise filtering. It also comes with an easily installed bracket to mount it underneath the desk or table where it is conveniently at your fingertips while computing. Other features are a 9-foot sign cord and a lighted recessed power switch. Micro Saver is UL listed and



The Winner is completely mobile and adjustable.

New Products

its circuitry conforms to IEEE standards. Suggested retail price is \$69.95. For more information contact Kensington Microware, 251 Park Ave. South, New York, NY 10010. Reader Service number is 483.

Spin a Computer Web

Useful for networking multiple computers to printers, modems, plotters or any RS-232 devices, SpiderNet is a Z-80 based intelligent switching system. It selects baud rates from 300 to 19.2K to match your transmission rate. It also has a time of day and date clock. SpiderNet is available for \$500 from Artisoft Inc., PO Box 41436, Tucson, AZ 85717. Reader Service number is 485.

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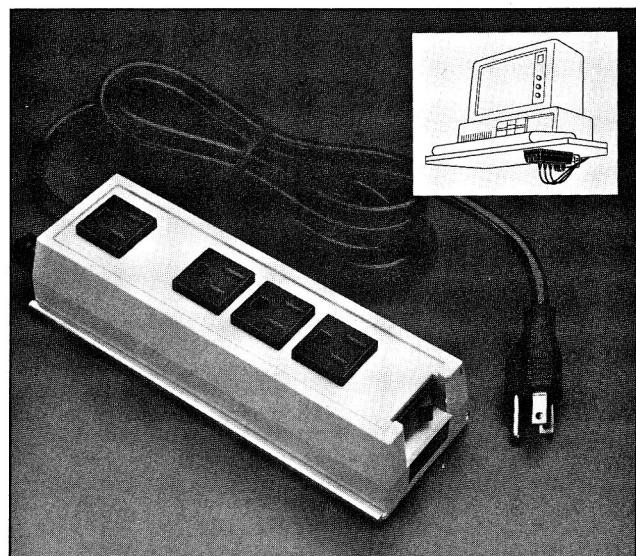
POPCOM Model X100, a personal communications modem, features true voice

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Suggested price is \$475 from microcomputer dealers or Prentice Corp., 266 Caspian Drive PO Box 3544, Sunnyvale, CA 94088. Reader Service number is 474.

68000 Development System

EMS has introduced a hardware/software package that allows the development and debugging of M-68000 programs using existing Apple II computer systems. The hardware consists of a stand-alone



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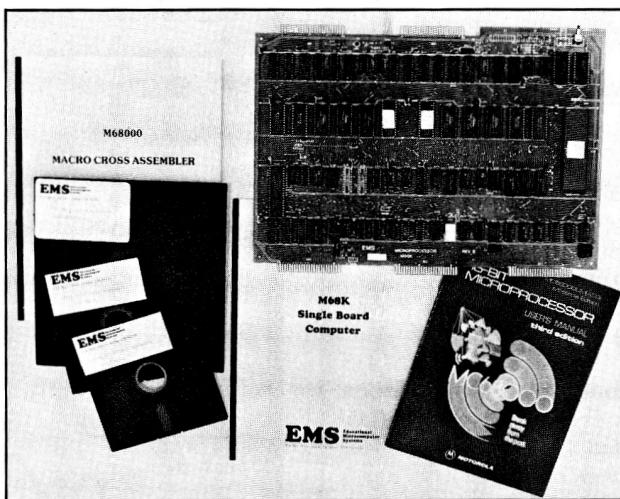
M68K single board computer, equipped with a 6MHz or 10 MHz M68000 CPU, 20K bytes of fast static RAM, 16K bytes of EPROM space, two RS-232 serial ports, a 16-bit parallel port, five 16-bit counter/timers and an expansion bus to allow for memory and I/O expansion.

The software consists of the M68KXAS Macro Cross Assembler which assembles the source files created by Apple II editor or word processor programs using standard M68000 mnemonics. The object file generated by the assembler is formatted to allow downloading to the next M68K SBC. The M68K de-

velopment package price starts at \$795 for a 6MHz version.

For more information, contact Educational Microcomputer Systems, PO

Box 16115, Irvine, CA 92713. Reader Service number is 490.



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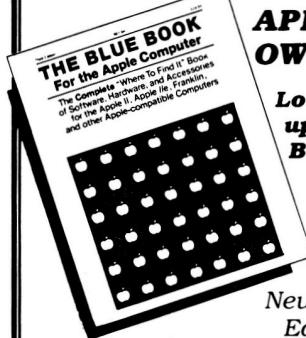
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rate, temperature, and muscle activity, menu-driven software on a floppy disk and selectable feedback options. For further information, contact Thought Technology, 2180 Belgrave Ave., Montreal, P.Q., Canada H4A 2L8. Reader Service number is 488.

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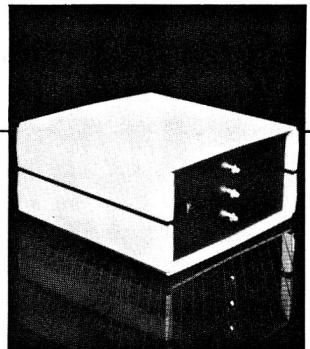
An uninterruptible power supply has been announced by Transwestern Products Corp., 1711 Senter Road, San Jose, CA 95112. Ultraguard is an AC powered, battery back-up power source that gives up to 30 minutes of power, al-

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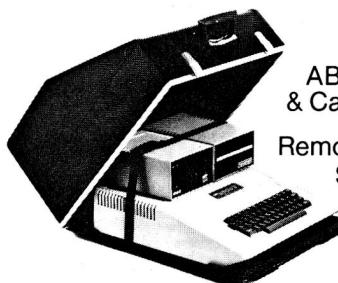
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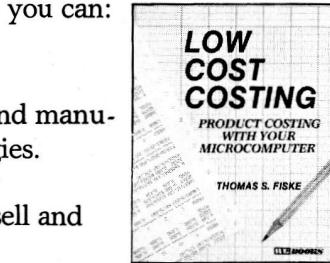
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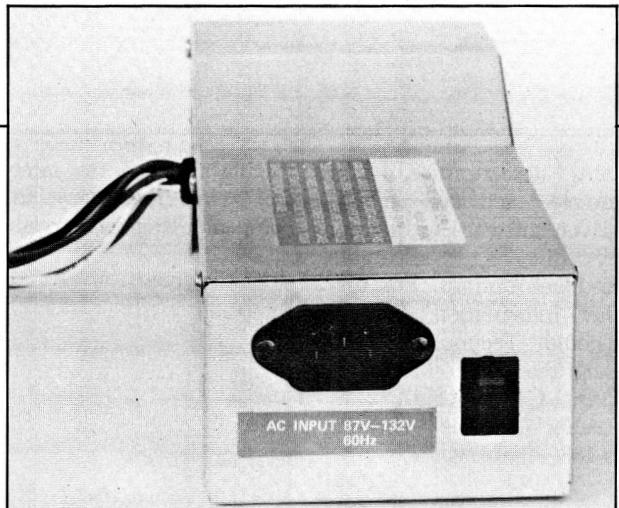
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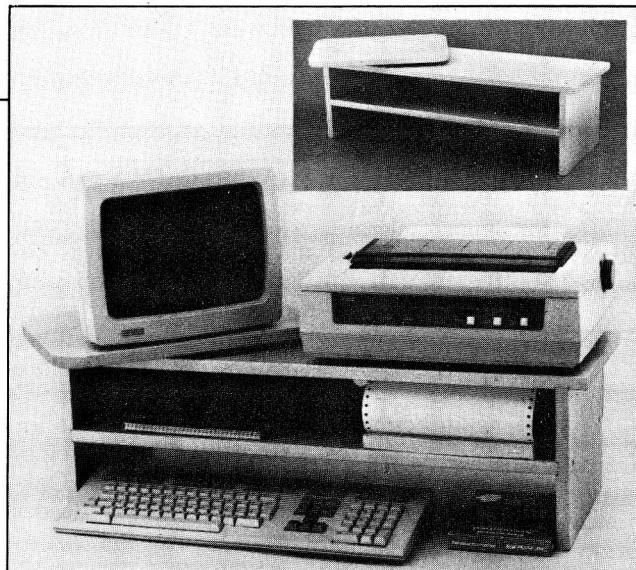
The DataSpec 5-Amp Switching Power Supply with built-in fan allows Apple II owners to add additional cards and peripherals without fear of overloading and overheating. The suggested retail price is \$169.95 from Alliance Research Corp., Northridge, CA 91328. Reader Service number is 482.

Double Time Saver

Duodisk, a new floppy disk drive unit which contains two half-high 140-kilobyte drives side-by-side in a single case, was introduced by Apple Computer. Exactly the width of the Apple II, it can sit conveniently between the computer and monitor. The suggested retail price is \$795 for Duodisk and a



Duodisk contains two half-high drives side-by-side.

New Products*Organize your computer with DeskMate.*

controller card. Contact Apple Computer Inc., 10260 Bandley Drive, Cupertino, CA 95014, for further information. Reader Service number is 470.

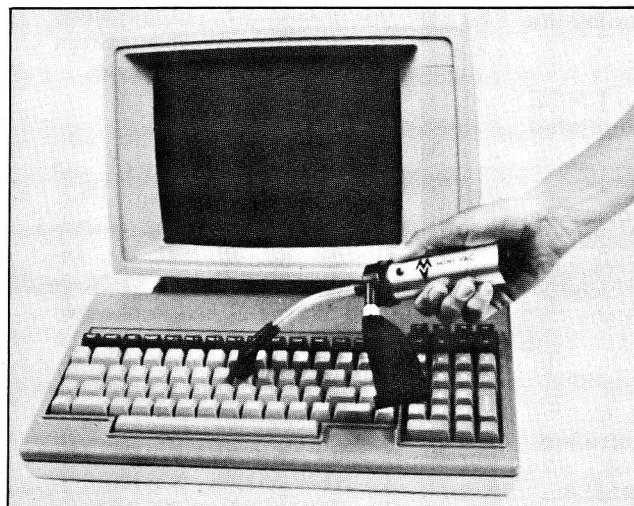
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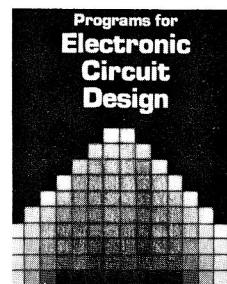
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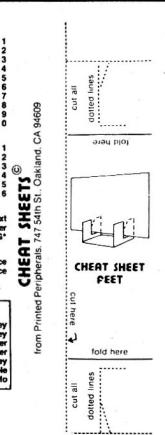
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From current position	^L, d1
TEST from drive 1 user	^LTEST
TEST from drive 2 user	^LTEST, d2
SAVE	SAVE
Append to file named TEST	^TEST/+
Display files on drive 2	^S7, d2
To current position	^S7, d1
TEST to drive 1 user	^TEST
TEST to drive in user	^TEST, d1
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Right one char	K
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Load ~TAB line	^L
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Rename file	R
Lock file	L
Unlock file	U
Delete file	D
Find file	F
GLOSSARY	
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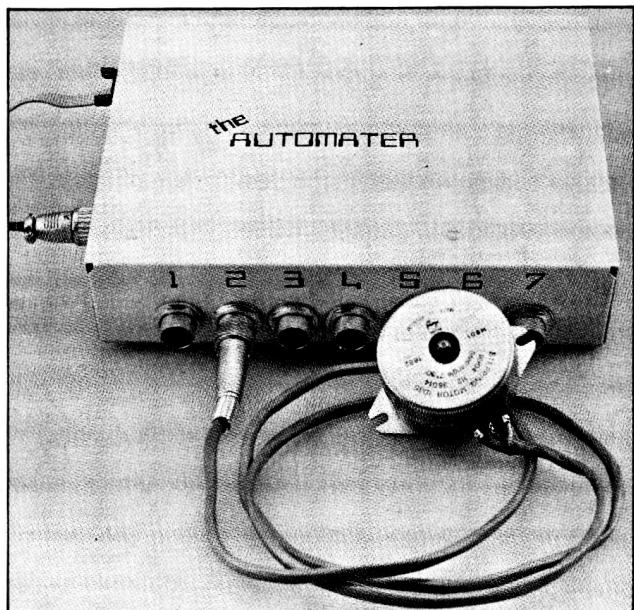
Automater/Armdroid 1 Robotic Arm

The Automater (\$287.28) allows users to design their own applications for automation and computer interfacing to the mechanical world. Programs are available for the Apple II, II Plus and IIe that repeat a

sequence as required. A set of instructions for set-up, interfacing and operation is part of the unit, along with electronics schematics, board layout, basic software listing and description.

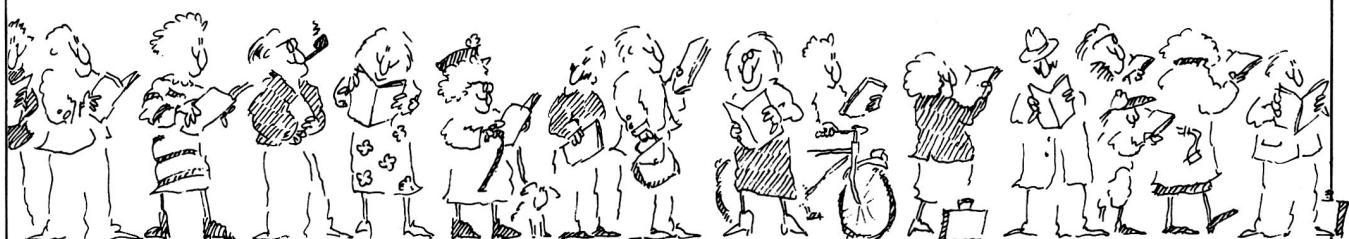
The Armdroid 1 Robotic Arm (\$1295 assembled) can be used as a handling device or a computer peripheral. It uses several joints at once and performs a programmed move sequence under computer control. The robot comes either as a kit or in assembled form.

For further information, contact O&M Computing Inc., Box 2102, Fargo, ND 58107. Reader Service number is 477.



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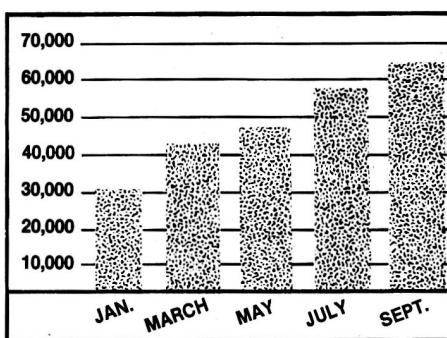


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489 Adalogic	152	229 High Order Micro Electronics	122	16 Quinsept Inc.	139
168 Addmaster Corp.	114	487 Highland Three Inc.	152	519 Quorum	156
460 Alliance Research Corp.	158	484 Holliscraft	159	476 R.C. Electronics	153
* Apple Computer	25	405 Hollywood Hardware	73	* RCM Software	141
470 Apple Computer	158	398 Holmes Enterprises Inc.	138	464 Reader's Digest Software	148
24 Appleware Inc.	138	491 HSP Computer Furniture	154	309 Rising Sun Software	129
509 Apple-Pi Micro	147	304 Human Systems Dynamics	57	475 Rubbermaid	160
* Applied Engineering	123, 141	419 Human Systems Dynamics	67	140 Rule One	145
485 Artisoft Inc.	155	inCider Magazine		Run Magazine	36
179 Beagle Bros. Microsoft	88, 89	Advertising Ad	141, 146	* Safeware	69
* Beck Manufacturing	60	Back Issues	145	526 Select Software Inc.	80
344 Bill Cole Enterprises	79	Dealer Ad	161	* Sensible Software	48
* Bottom Line	14, 15	Foreign Dealer	160	460 Signum Microsystems	146
486 Bretford Manufacturing Inc.	152	Mailing List	146	246 Sinequan	156
* Business Computers		Subscriptions	98	218 Sir-Tech	3
of Peterborough	37	Subscription Problems	145	292 Software Banc Inc.	140
455 Business Solutions Inc.	147	469 Infocom Inc.	151	459 Software Entertainment Co.	149
284 Byte General Inc., The	55	12 Interactive Microware	150	* Software Support	143
6 Bytes & Pieces	131	162 J & M Software	45	376 Software Unlimited	156
335 C & C Software	154	jr Magazine	34	270 Solutions Inc.	151
232 C & S Software	149	62 Kalglo Electronics Co. Inc.	150	103 Southern Center for Res. Inn.	107
233 Calshop	133	86 Kensington Microware	9	67 Stellation Two	114, 145
* Caribbean Computer Sales	128	483 Kensington Microware	154	461 Strategic Simulations Inc.	147
463 Cascade Graphics Inc.	151	511 Key-tronics	27	355 Street Electronics	68
361 Central Point Software	115	450 LJK	144	82 Strictly Software	81
451 Chalk Board Inc.	149	306 Locus Systems	153	156 Sublogic Communications Corp.	49
316 CMA/Charles Mann & Assoc.	148	* MacWorld	51	517 Such-A-Deal	113
427 Computer Learning Center	101	56 Midwest Software	92	525 Swenson Assoc. Inc.	70
254 Computer Outlet	91	396 Manx Software Systems	65	370 Synetix Micro Products	105
* Computer Plus	148	462 MECA	144	472 Taxan Corp.	152
269 Coosol Inc.	136	356 Mega-Byte	114, 145	225 Tellus Systems Inc.	154
163 Core Concepts	147	208 Micro City/Pace	47	458 The Learning Co.	150
457 Core Concepts	146	352 Micro Design	75	481 The Pine Cone	159
348 Craftsbury Software	133	467 Micro Lab	148	32 Thirdware/Precision Software	21
332 David Data	133	245 Micro Management Systems	112	488 Thought Technology	156
452 Datasoft Inc.	144	523 Micro Minds Unlimited	140	454 Three Sigma Inc.	144
144 Davka Corporation	83	204 Micro Works	137	129 Thunderware	23
3 Dennision Carter	Cover IV	134 Micro-Merchant	124	278 Titan Technologies	59
367 Digital Images	145	371 Micro-Sci	53	473 Trace Systems Inc.	153
* Diskette Connection	155	465 Navic Software	148	480 Transwestern Products Corp.	157
108 Diversified Software Research	132	177 Nibble	83	122 Troy Software Designs	40
247 Dorsett Educational Systems	74	380 Nibble Notch	153	15 Troy Software Designs	139
34 Doss Industries	65	387 Nikrom Technical Products	134	402 TSK Electronics	17
30 Dow Jones News Retrieval	71	310 Northeastern Software	117	University Micros	145
215 East Side Software Co.	85	477 O & M Computing Inc.	161	264 Utilico Microware	122
362 Eastcoast Software	111	85 ohm Electronics/Scooter	63	182 Videx Inc.	41
468 Educational Activities Inc.	149	208 Pace/Micro City	47	471 Videx Inc.	152
490 Educational Microcomputer Systems	155	31 Pacific Exchanges	145	478 Vision-80 Pty. Ltd.	152
404 Elek-Tek	46	187 Personal Computer Book Club	130	373 Voice Machine Communications	44
* Fastrack Computer Products	76	141 Pirate Harbor	125	Wayne Green Inc.	
161 Fiberbilt	157	164 Practical Software	157	112 Rainbow Quest	66
139 Flexible Software	45	32 Precision Software/Thirdware	21	110 Low Cost Costing	158
49 Frog House/Prof. Jones	78	474 Prentice Corp.	155	111 Programs Circuit Design	159
453 Gnosis Inc.	150	186 Prentice Hall Inc.	11	Manuscript	140
146 Golem Computers	119	479 Printed Peripherals	160	529 Wesper Micro Systems	19
66 H & E Computronics	Cover III	49 Prof. Jones/Frog House	78	393 Wholesale Technology, Inc.	145
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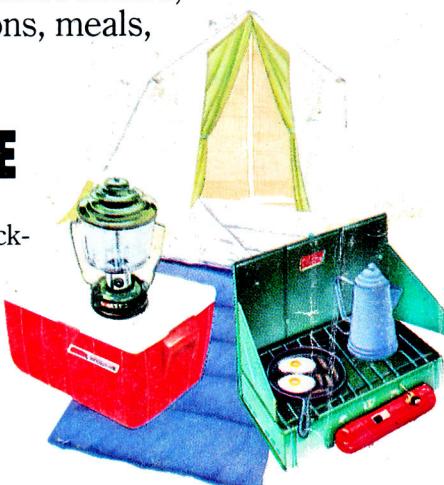
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