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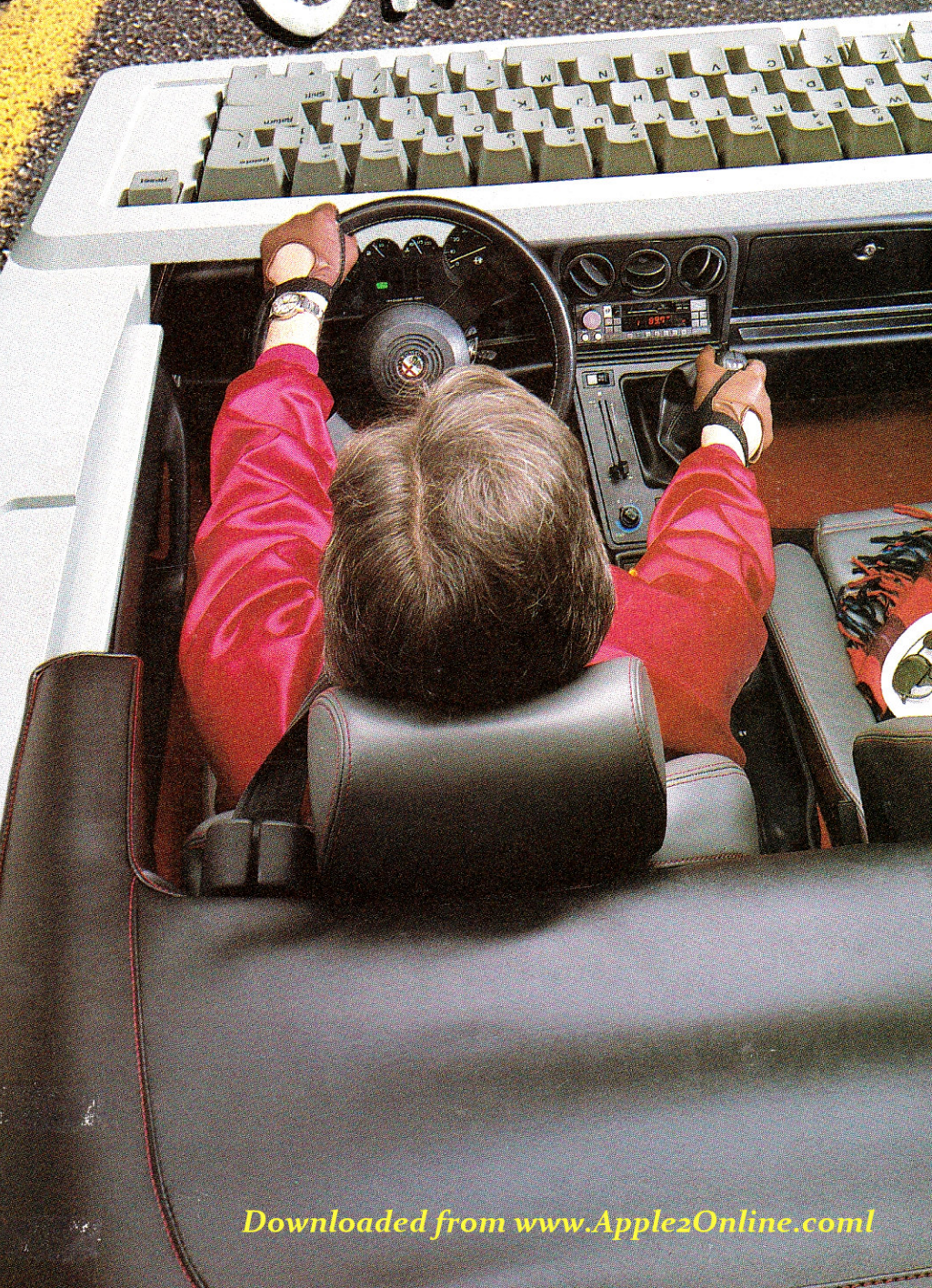
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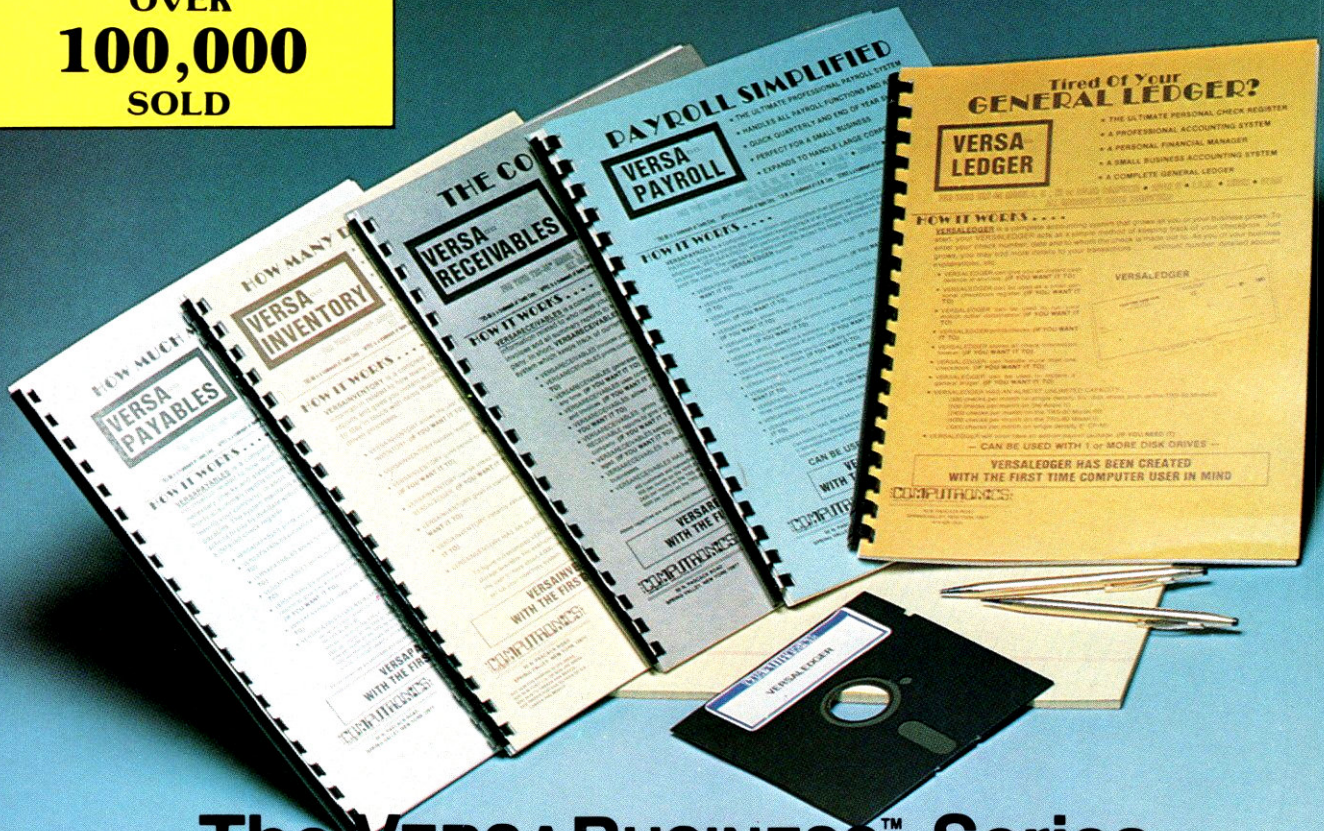


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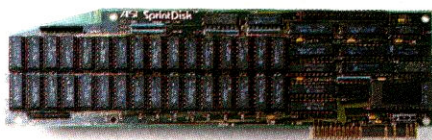
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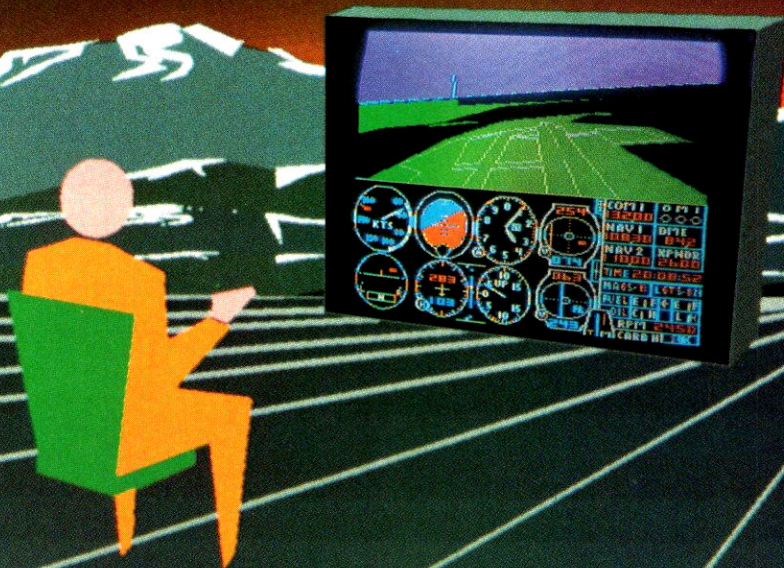
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THE INDEPENDENT
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APPLE COMPUTING

COVER STORY

20 TURBOCHARGING YOUR APPLE IIe

BY GARY B. LITTLE

Learn how to soup-up your IIe with speed-up cards that improve processing power, memory cards that provide more workspace, and high-capacity disk drives that speed up disk input/output operations. This story also includes a chart of the products available to help you increase the power of your IIe.



SOFTWARE

30 CHEAP THRILLS

BY PAUL FREIBERGER

Ever wondered whether the programs in public domain are any good? Veteran industry writer Paul Freiberger discusses the pros and cons of public-domain software and where to get it, and he takes a look at a some of the programs you can obtain.



MAINTENANCE

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BY PHILIP CHIEN

A diskette is one of the most vulnerable components of your computer system. An understanding of floppy diskettes and their care will help keep your Apple running smoothly. Read this article to find out how to take care of your floppies if you are new to computing or just need a refresher course in floppy disk maintenance.



SOFTWARE

44 APPLE WRITER II WORD PROCESSING LANGUAGE

BY J.P. NEIL

The Apple Writer II word-processing program and its associated manual are comprehensive and the many applications well presented, but the manual does neglect a few significant areas. This article deals with one of the most important missing items, the creation of form letters and addressing of associated envelopes.

QUICKTAKE

53 COMPUTEREYES

BY ROBERTA SCHWARTZ

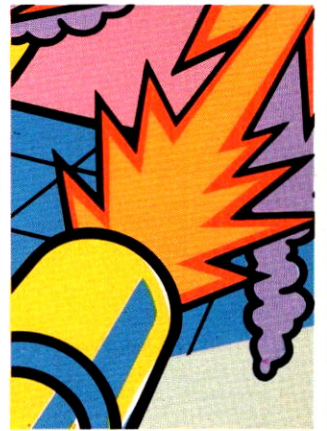
What's that you say? You'd like a video digitizer, but you don't have any slots left in your Apple II Plus or IIe? You've looked around and every system you've seen involves complicated hardware and software? Well, look again, at this review of ComputerEyes, an inexpensive video-acquisition system.

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BY DONALD OLIVER

Summer is upon us, and while young people's fancies turn to vacations, and beach parties, software manufacturers are knocking themselves out to alert the public to their new computer games. For a change of pace, however, we asked writer Donald Oliver to draw your attention to some of the oldies but goodies of the entertainment market.



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BY STEVE ROSENTHAL

Why can't the Macintosh read a 3.5-inch diskette created with an Apple II UniDisk? And why can't you use a Macintosh to read a diskette written by an IBM PC with 3.5-inch drives? Rosenthal ponders these and other pressing questions in this month's Thoughtware.



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BY GARY B. LITTLE AND CHRIS VAN BUREN

Little and Van Buren answer your questions about custom device-controller programs, to enhance or not enhance, and speeding garbage collection.

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68000 ASSEMBLY-LANGUAGE PROGRAMMING, PART III

BY GARY B. LITTLE

In this, the final installment in a three-part series on 68000 programming on the Macintosh, Little looks at some of the programs that make up Apple's Macintosh 68000 Development System. He also shows you how to create a simple Macintosh application.



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CUSTOMIZING YOUR ELECTRONIC WORKPLACE

BY ROBERT C. ECKHARDT

Although the Macintosh offers one of the most comfortable and intuitive working environments around, all of us have ideas about how to make our Macs even easier to work with. From changing menus to creating new icons, several utility programs give you the power to act on your ideas, turning your Mac into a truly personal computer.

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MACTIPS

Suggestions from our readers

(No I.D. required for half-elves.)

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And the going is tough in Skara Brae town. The evil wizard Mangar has cast an eternal winter spell. Monsters control the streets and dungeons beneath. Good citizens fear for their lives. What's worse, there's only one tavern left that serves wine. But the Bard knows no fear. With his trusty harp and a few rowdy minstrel songs he claims



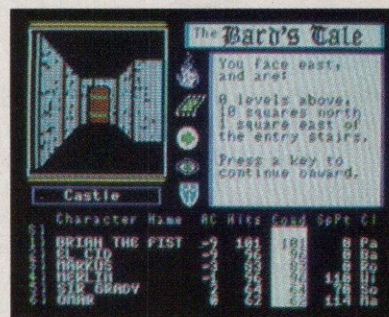
are magic, the Bard is ready to boogie. All he needs is a band of loyal followers: a light-fingered rogue to find secret doors, a couple of fighters to bash heads, a conjurer to create weird allies, a magician for magic armor. Then it's off to combat, as soon as the Bard finishes one more verse. Now what's a word that rhymes with "dead ogre?"



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VACATION WORKOUTS FOR YOUR II

Summer is my favorite time of year. The days are long and warm, and we pack up our bags and head out for some fun and sun. Vacations are traditional for many of us just about now because the weather is good and business in general settles into a lull. The microcomputer industry is no exception to this tradition. It is the time when we start to plan for the fall, catch up on paperwork, and take some time off.

Important new products, such as significant new television shows and movies, are rarely introduced in the middle of the summer, and unfortunately this summer is no exception to the tradition. Even though this is the time for vacations and relaxation, I have never agreed with the personal-computer hardware and software manufacturers' belief that computing comes to a standstill. In fact, computer users remain quite active, which is evidenced by our mail and by our reader-service responses to advertisements.

Since I'm convinced that you don't just stuff your Apple into the closet until September, our cover story this month aims to bring you up to date on keeping your Apple in competitive condition.

With all the talk this year in the IBM market about faster processing speeds and more storage capacity, you might be beginning to feel left in the dust. You don't have to be, though. With the addition of a memory card, a hard-disk drive, and some special software, your Apple can be just as efficient as your neighbor's PC. To show you how to get more out of your computer, we asked Gary Little to write our cover story on

how you can soup up your Apple II and keep up with the Joneses.

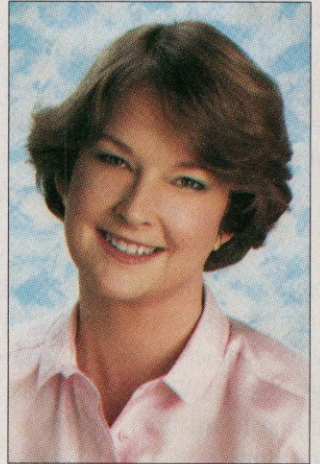
I would also like to bring your attention to something I know you have been waiting for: my response to your outcry about my May editorial on illegal software copying. I received too many responses to include them all on this page, so I've devoted the entire letters section in this month's issue to reprinting a sampling of the hundreds of responses I received from you on this controversial issue.

Although I shouldn't have been surprised, I have to admit I was astonished at the vehemence with which many of you responded to my editorial. Obviously, software copying is not quite such a clearly cut issue as I would have liked to make it. Many of you had interesting and certainly heartfelt reasons for feeling justified in making copies of software. I think the best way to calm the storm is to let you have your say, so turn to the letters section and read on.

Since we hope you will take A+ to the beach or park for some of your summer reading, we have included a little lighter fare as well. Most of us like to play games during our spare time, and computer enthusiasts are no exception. In fact, game software helped launch the personal-computer revolution. New games come out every year, but you can still get ahold of some great classics that you shouldn't overlook. To bring these oldies but goodies to your attention, we commissioned a retrospective of some of the all-time computer-game greats. So be sure to take a ride down memory lane and read the article "Entertainment Classics." Enjoy the issue! +

Maggie Canon

MAGGIE CANON / EDITOR IN CHIEF



Even though this is the time for vacations and relaxation, I have never agreed with the personal-computer hardware and software manufacturers' belief that computing comes to a standstill.

What the Experts are Saying About RamWorks II!®

"In an informal competition called '640K vs. 640K' AppleWorks running on a RamWorks equipped Apple IIe outperformed Symphony running on an IBM PC."

—*InfoWorld*

"AppleWorks wiped out Symphony. . . The competition was set up partly to show off another of Wozniak's favorite things, the RamWorks II memory expansion board from Applied Engineering . . ."

—*San Jose Business Journal*

"There are huge differences among the AppleWorks modifying programs sold with the cards. Without doubt, RamWorks II is the most powerful."

—*inCider*

"Applied Engineering's RamWorks is a boon to those who must use large files with AppleWorks. . . I like the product so much that I am buying one for my own system."

—*A+ Magazine*

"RamWorks II is the most powerful auxiliary slot memory card available for your IIe, and I rate it four stars. . . For my money, Applied Engineering's RamWorks II is king of the hill."

—*inCider*



As you can see, it's easy to tell who sets the pace in Apple memory expansion. In fact, if you read the competition's ads, you'll notice that many even claim to be as good as RamWorks. Some say they're "RamWorks compatible".

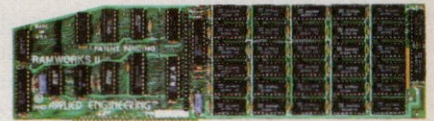
At least they agree on one thing. RamWorks is the one they have to measure up to. But the truth is there aren't any substitutes for RamWorks.

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We invite your comments.
Letters

TO OUR READERS:

Of all the topics we discuss in the pages of this magazine, software piracy is by far the most controversial. The volume of mail I received after my May editorial, in which I spoke out against illegal software copying, made the contentiousness of this issue abundantly evident.

In that editorial I asked for suggestions and said I sought an open dialogue, so I am excerpting some of the letters I received. This issue is complex and emotional, and everyone seems to have something to say, so this time it is your chance to voice your viewpoint. I wish to respond to only one of the many accusations and condemnations: that I am hypocritical for denouncing illegal software copying when *A+* runs advertisements for products that crack copy protection. Most magazines, and especially *A+*, have a distinct separation between editorial and advertising (like that between church and state). I do not control the advertising aspects of this magazine, and, likewise, the advertisers do not control the editorial aspects.

So, here are the excerpts from your letters:

The problem of software piracy has arisen and survived because any data on a disk can be loaded into a computer and then written to another. But wait! How about using a read-only disk medium? Five-and-a-quarter-inch and three-and-a-half-inch disks are readable and writable, but as of now, compact disks are read-only. Users can boot the program from a CD-ROM drive and then use a 5¼- or 3.5-inch disk for data storage. I have yet to see pirated

copies of Grolier's Electronic Encyclopedia floating around, simply because the data can be loaded but not resaved. If and when CD-ROM drives become standard computer peripherals, people will be unable to copy software stored on CD's.

Mike Anderson
St. Louis, MO

Some sort of protection is needed for the manufacturers. I would advocate some sort of serial number contained on the diskette and displayed each time the software is run. This

*This month's letters
are all responses to
the controversial issue
of software piracy.*

number would also be on the product-registration card. Sending in the card would register one as the purchaser and owner. I think that this might serve as a deterrent to piracy.

Dean S. MacLaughlin
Watertown, MA

Your editorial in the May issue is one with which I agree and comply and that, for me, brings forth comparisons with another hobby in which the problem is much older, if not much better resolved. I first became involved with high-fidelity sound 35 years ago, when the best available equipment was usually home-designed and -built. As time has passed, several things have happened. Equipment manufacturers have proliferated and quality outrun our fondest dreams. The ability to

dub has approached perfection. Copying has become so widespread that the industry repeatedly tries to impose taxes on blank tape to recover revenues lost to the private pirates.

I would suggest that if software manufacturers want users to keep faith with them, then they should keep faith with those users. In short, if users are expected to be honest, so should the manufacturers and the retailers. A good place to start would be honest representation of what programs are and are not, will and will not do, on what equipment, and what third-party enhancements are supported. This is a tall order, but some software developers are doing a good job—many are not.

Irwin Knigge
Rapid City, SD

Having read your editorial in the May 1986 edition, I first want to commend you for your willingness to take what seems to be an unpopular stand on your feelings about infringing on software copyrights. I also couldn't help noticing that in nearly every ad for mail-order software, copy programs were mentioned. It seems to me that while you condemn copying software, you are willing for your magazine to make money advertising the means for copying programs. There seems to me to be a conflict here.

Vernon J. Sansom, Jr.
Bolivar, TN

I should say first of all that I think it admirable that you "moderated a panel on software piracy." But did you really expect the attitudes of software users to have changed? Consider our nation's 55MPH speed limit. It is a law. People break it. And I think you would find a number of drivers (perhaps even those on the *A+* staff?) who would unashamedly admit to having driven over 55 and who might have "felt fervently justified in their actions." The problem, with both software pirates and highway bandits, is that they are *individuals*. I

imagine few drivers feel that by driving the speed limit, they alone have contributed to saving energy and lowering the highway death toll. By the same token, very few software users feel that their copying software has singlehandedly dealt a death blow to the company that produced the software.

My concern is that by crusading so hard to protect the software producer, we may forget about the software user. Keep in mind that the guy next to you may have just bought one of

those "good-looking bad things." For him, the "pirate" is the company that put out the bad product—and won't even let him back it up.

John Q. Phillips
Rochester, MI

In my opinion, there is no solution to the problem of "software piracy." As long as you have software manufacturers coming up with new copy-protection schemes, you'll have someone out there whose sole purpose in life is to copy those programs.

A demo disk is the pits! Demo disks are half programs. One maker of financial software gave out free demo disks if you sent in a card from a magazine. The only number this demo allowed you to enter was 4. Now, can you really tell how well a program is going to work by only entering numbers like 444,444.44? Other demos are just hi-res commercials. They just don't do it.

Doug Tuccinardi
Wappingers Falls, NY

If making a backup copy is illegal, then I too am guilty. I think a good solution would be for the software developers to package two disks in the software package, so that there is no need for making an extra copy. The original price could reflect this, and additional copies should be available at cost in case of a crash.

Richard Carlson
San Diego, CA

My suggestion is for manufacturers to keep their protection to a minimum, just enough to stop truly casual copying or, even better, none at all (a nod to Penguin and Beagle Bros.) and take the cost of protection development out of the final price. There isn't a program or protection scheme around that cannot be broken.

My suggestions to stop piracy are these: (1) The computer manufacturers make their products compatible, giving the software manufacturers a larger market and letting them bring their prices down. (2) The software manufacturers stop concentrating on developing protection and concentrate more on the software itself. (3) The software manufacturers try bringing their prices down and stop publishing shoddy merchandise.

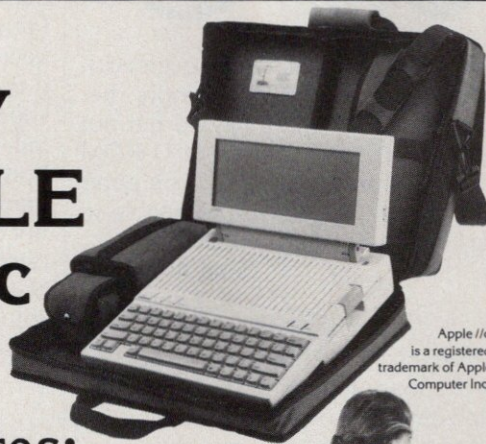
Nathan Cobb
Kingston, RI

I strongly disagree with your "Porsche" and "direct stealing from a computer store" analogies; they are completely irrelevant. If you examine the amended copyright laws for software, you will find that one *can* make a backup copy for oneself, by whatever means. It therefore is OK to copy software for oneself. The question is, then, whether you can give this copy to someone else. I think that this question is in the very gray area of the law.

William D. Callender
Bedford, MA

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I can only speak to the problem from the perspective of a software user, not as a software vendor or magazine publisher. I don't see a software-piracy problem. I see a software-protection problem. Piracy is a technique I use to resist and educate (yeah, sure) inconsiderate software publishers. If you *really* think you can evaluate a product with instore trials, demo disks, or even magazine reviews, I would suggest that you've distanced yourself from your readers by becoming spoiled by review copies or by evaluating too many programs that you don't need to use.

I can assure you that I think more than twice before I knowingly purchase a copy-disabled product. Software publishers who sell disabled products are sending a very clear message. They consider their customers thieves and potential thieves. On the other hand, I pay for the shareware I use. I don't keep copies of unprotected software that I am not going to purchase. I don't give copies of unprotected software to people I don't trust to erase or buy after trying a program out.

One of The Rest of Us
Bend, OR

Although I agree with all that you've stated, I find it difficult to sympathize with software producers. Publishing software is not much different than publishing other copyrighted material. The music, book, and magazine industries have suffered from the copy machine over the years, and wouldn't you agree that Rogers and Hammerstein put in their share of time when they composed—only to have their works photocopied over and over? By the way, what message are you sending to your readers when the magazine you work for gains revenue from the copy programs it advertises? Me thinketh you speak with a forked tongue!

Dane Peters
Pomfret, CT

CORRECTION

On page 49 of our June issue, the contact information for PM Software, maker of Profiler, should have read as follows:

17610 Beach Blvd., Suite 29
P.O. Box 1788
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If you own a IIc, Orange Micro again has the answers. For an effective and economical link to any parallel printer, the HotLink is what you need. For

advanced graphics, the Grappler C is the most powerful IIc parallel interface available.

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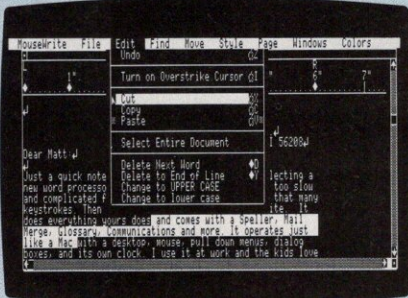
CIRCLE 258 ON READER SERVICE CARD

There Are a Lot of Great Reasons to Own MouseWrite...

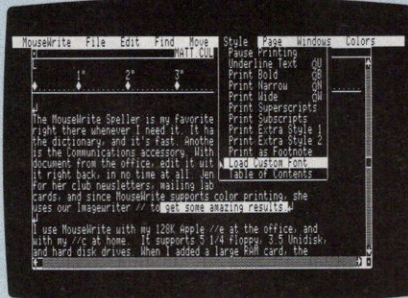
Reasons like being able to quickly correct any mistakes with MouseWrite Speller. It's built-in so it's there whenever you need it. Want form letters, labels, or 1000 individually addressed envelopes? MouseWrite's Mail Merge and Glossary get the job done for you.

Put pizzazz in your printouts by selecting anything from Color to Custom Fonts. Save time with Print While You Work. Get in touch with the world with MouseWrite Communications. 12 more great reasons are the 12 documents you can open at once on the Expanded Desktop.

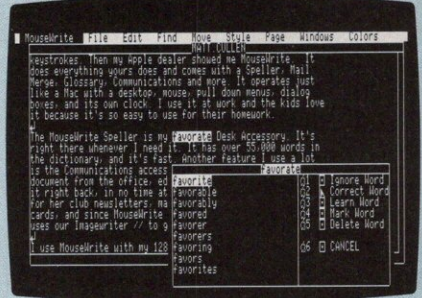
"Cut, Copy, Paste & Undo with Mac-like pull down menus"



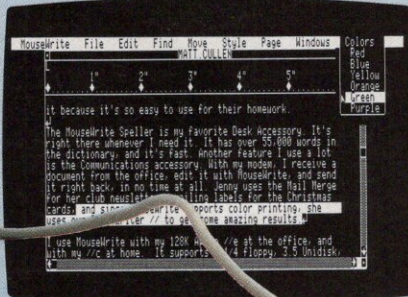
"Add style to your writing with downloadable Custom Fonts"



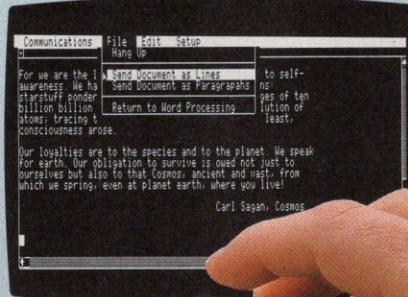
"Correct errors fast with the integrated MouseWrite Speller"



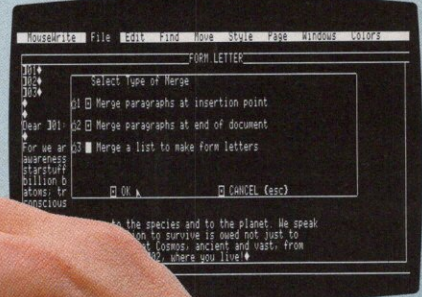
"Make a splash by adding color with ImageWriter II and others"



"Send and receive files with built-in Communications"



"Form letters in a flash with Mail Merge"



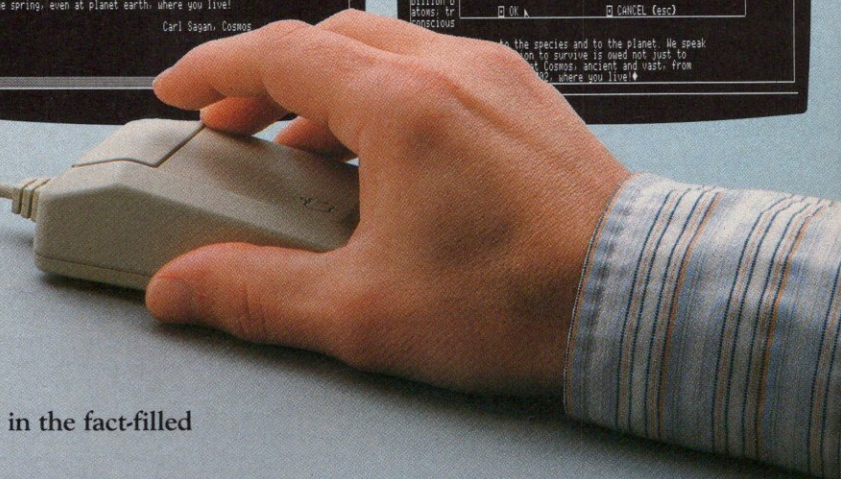
MouseWrite will also load AppleWorks documents directly, or even your old DOS 3.3 Text files. It works with your 5-1/4" disk, Unidisk 3.5, hard disk, or Extended RAM card.

Suggested Retail Price: \$149.95

Ask your local dealer, or get all the details in the fact-filled MouseWrite brochure by calling:

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CIRCLE 143 ON READER SERVICE CARD

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NewsPlus

Apple Computer is apparently readying both UNIX and IBM PC compatibility for the Macintosh line.

FIGHT STIMULATOR

In an attempt to keep its software abreast of current events, MicroProse software has updated the documentation of its popular F-15 Strike Eagle flight-simulator program to include information about the American air strike on Libya last April 14. The current version of F-15 Strike Eagle, which puts you in the pilot's seat of an attack bomber, includes a Libyan mission based on a real 1981 incident involving a U.S. Navy task force that was provoked into action by Libyan aircraft in the Gulf of Sidra.

To capitalize on the incident, MicroProse ran a \$20,000 ad in the *New York Times* headlined "The World in Conflict . . .

What Would You Do?" MicroProse, however, went a bit overboard when planning its *New York Times* publicity stunt. It wanted to include this ad copy: "You are the pilot of a twenty-million-dollar fighter. Your orders have just come through for an antiterrorist air strike against Libyan targets." The newspaper rejected the proposed ad copy, stating it felt it was in poor taste in light of the seriousness of the international situation. Even though MicroProse's proposed ad copy was shot down, the company says sales of F-15 Strike Eagle have been brisk.

UNIX- AND PC-COMPATIBLE MACINTOSH

In a move to strengthen the Macintosh's position in the business market, Apple Computer is apparently readying both UNIX and IBM PC compatibility for the Macintosh line. In a meeting with securities analysts this spring that was closed to the press, John Sculley is reported to have said that Apple will not only offer UNIX (as Sculley had stated on a previous occasion), but will also provide MS-DOS

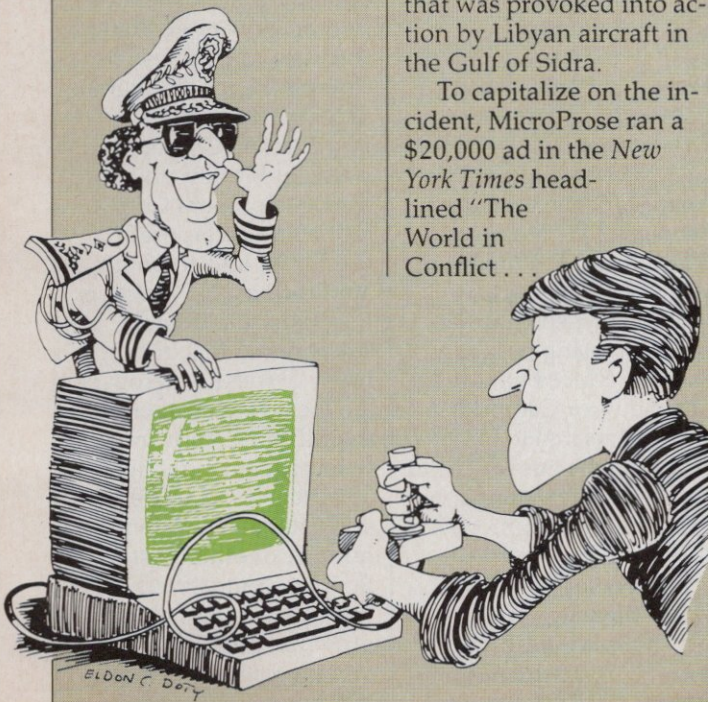
as an option for the Macintosh in an effort to offer a total system for computer users in government, science, and business. Sculley said that UNIX would help Apple woo the scientific and government markets and that MS-DOS would appeal to the business market. Apple also disclosed that it has acquired proprietary UNIX software from Cadmus Computer Systems of Lowell, Massachusetts, in order to boost its UNIX development.

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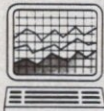


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NewsPlus

The Macintosh was recently star witness in a murder trial.

MACINTOSH TESTIMONY

A Macintosh computer was recently a star witness in the first-degree-murder trial of Sagon Penn, who was charged with the shooting deaths of two San Diego policemen. The defense contended that shots had been fired in self-defense as Penn attempted to escape a brutal beating by the police. The defense's case centered on a 2.3-second tape se-

quence recorded by the police dispatcher that contained the voices of citizens complaining of police brutality; the voice of the dispatcher; and, faintly in the background, six sounds that both the defense and prosecution agreed could be gunshots. Determining the exact timing of these shots was critical to Penn's claim of self-defense. Defense attorneys hired speech expert Tito Poza to assist in analysis of the brief tape sequence. Poza used a Macintosh with the MacADIOS audio digitizer and MacSpeech Lab signal-processing program (both produced by GW Instruments of Cambridge, Massachusetts) to locate and time the gunshots and represent the data graphically on the Macintosh screen.

According to Poza, "I knew the only way I could get my specialized findings across to the jury was

to play the critical section of the tape to them over and over, with millisecond timing . . . [With the Macintosh] there were none of the false starts you get with an ordinary tape recorder." Although a verdict in the case had not been reached at press time, Poza said that the attorneys, the judge, and the jury were impressed with the Macintosh technology and its contribution to the analysis of important evidence.

POSTSCRIPT'S POPULARITY

The PostScript page-description language, created by Adobe Systems, was popularized when Apple decided to use PostScript to harness the power of the LaserWriter printer. Now more than 65 software companies, including Microsoft, Digital Research, MicroPro, WordPerfect Corporation, Addison-Wesley, and Lotus Development Corporation, are incorporating PostScript into software applications. No longer is PostScript the domain solely of the Macintosh; many of these developers are including PostScript in their IBM PC software so their programs can take advantage of Apple's LaserWriter and a growing number of other PostScript output devices.

PostScript has also grown in popularity among companies that

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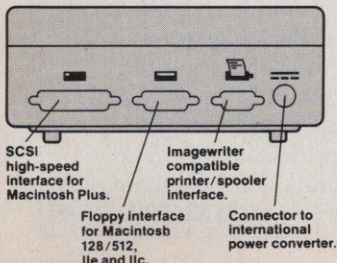
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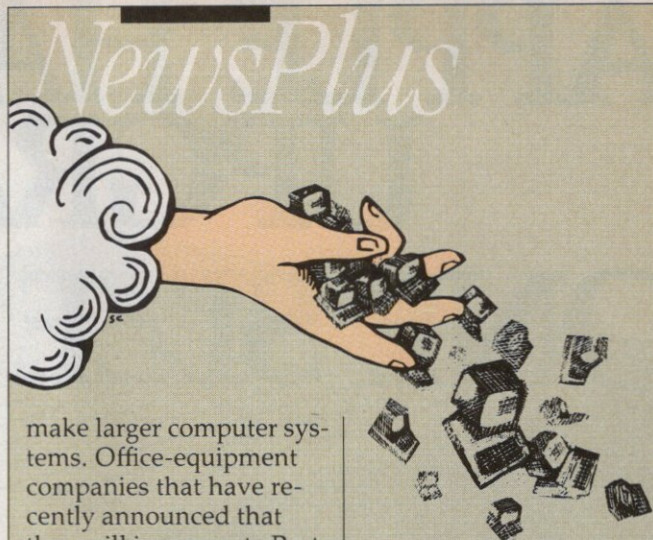
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ASK ABOUT THE VERSION FOR MACINTOSH!

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make larger computer systems. Office-equipment companies that have recently announced that they will incorporate PostScript into future products

Script into future products include Digital Equipment Corporation, NBI, and Wang. The PostScript bandwagon is now so full that any other page-description language, such as Xerox's InterPress or whatever IBM might adopt, will have a hard time replacing PostScript as the industry standard.

ALTRUISTIC APPLE

The Apple Computer Community Affairs program has awarded 59 computer systems, valued at more than a quarter of a million dollars, to 52 social-service and arts groups throughout the U.S. These systems are being used for a broad range of nonprofit purposes, such as linking resources for agencies serving the disabled in rural Washington state to provide training and employment in the recycling and horticulture industries; helping a network of four agencies in Tulsa, Oklahoma, create a database on child abuse; providing resources for several shelters for battered women; and even aiding a Kampuchean word-processing development project that will allow Kampuchean refugees to use a Mac.

Other groups the program has funded include a children's musical theater, an astronomy research center, the New York Hall of Science, and even an eye bank that plans to use its Apple to facilitate fast delivery of eye tissue for transplants. If you belong to a group you feel might be worthy of Apple's consideration in its next round of funding, you can obtain the guidelines from Apple's grant programs from Apple Computer Corporate Grants, 20525 Mariani Avenue, M/S 27-F, Cupertino, CA 95014.

EXCEL TEMPLATES

If you like the Excel spreadsheet program for the Macintosh as much as I do, you'll want to check out Excellent Exchange, a catalog of more than 70 Excel templates and macro programs. Excellent Exchange not only offers Excel-related software additions for sale, but it is also interested in distributing templates and macros you might have created. Excellent Exchange offers a free catalog and a sample demo disk for \$3. Contact Excellent Exchange, Heizer Software, 5120 Coral Court, Concord, CA 94521; (415) 827-9013. +

Earth will be destroyed in 12 minutes to make way for a hyperspace bypass.

Should you hitchhike into the next galaxy? Or stay and drink beer?

Slip the disk in your computer and suddenly you are Arthur Dent, the dubious hero of *THE HITCHHIKER'S GUIDE TO THE GALAXY*,TM a side-splitting masterwork of interactive fiction by novelist Douglas Adams and Infocom's Steve Meretzky. And every decision you make will shape the story's outcome. Suppose for instance you decide to linger in the pub. You simply type, in plain English:

>DRINK THE BEER

And the story responds:

YOU GET DRUNK AND HAVE A TERRIFIC TIME FOR TWELVE MINUTES, ARE THE LIFE AND SOUL OF THE PUB, THEY ALL CLAP YOU ON THE BACK

>WRAP THE TOWEL AROUND MY HEAD

And the story responds:

THE RAVENOUS BUGBLATTER BEAST OF TRAL IS COMPLETELY BEWILDERED, IT IS SO DIM IT THINKS IF YOU CAN'T SEE IT, IT CAN'T SEE YOU.

AND TELL YOU

WHAT A GREAT

CHAP YOU ARE AND

THEN THE EARTH GETS

UNEXPECTEDLY DEMOLISHED, YOU WAKE UP WITH A HANGOVER WHICH LASTS FOR ALL ETERNITY. YOU HAVE DIED.

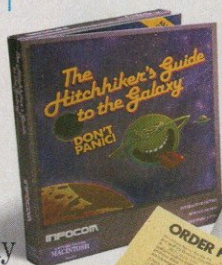
Suppose, on the other hand, you decide to:

>EXIT THE VILLAGE PUB THEN GO NORTH

In that case you'll be off on the most mind-bogglingly hilarious adventure any earthling ever had.

You communicate—and the story responds—in full sentences. So at every turn, you have literally thousands of alternatives. If you decide it might be wise, for instance, to wrap a towel around your head, just say so:

Simply staying alive from one zany situation to the next will require every proton of puzzle solving prowess your mere mortal mind can muster. So put down that beer and hitchhike down to your local software store today. Before they put that bypass in.

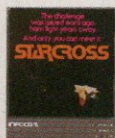
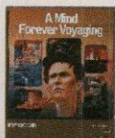


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Other interactive science fiction stories from Infocom.

A black and white photograph showing a person from a high-angle, rear perspective, driving a car. The person is wearing a red jacket and has their hands on a steering wheel. The dashboard area is replaced by a computer keyboard, and a computer mouse is mounted on the steering wheel. The car is on a road that curves into the distance under a cloudy sky.

COVER STORY BY GARY B. LITTE

Put your Turn

I've heard it said on more than one occasion that the Apple IIe is the "Volkswagen of computers." That moniker is meant to be flattering, I suppose—an indication that the IIe is sound and reliable, and that it always gets the job done.

Cynics might interpret this comment as a knock on the overall power of the IIe, however. They will argue that, like the Beetle, the standard IIe can't deal efficiently with difficult assignments (not enough horsepower), doesn't have enough memory for serious applications (not enough leg room), and doesn't have enough disk capacity (the gas tank is too small).

To varying degrees, all these criticisms are justified. After all, the standard IIe is not too different from the first disk-based Apple II, sold in 1978. In those days, the II was the most powerful computer in its class. Other computers have since overtaken it by incorporating more powerful microprocessors, higher-capacity disk drives, and more memory.

Fortunately, the IIe has something the Beetle never had: expansion slots! By plugging peripherals into these slots, you can dramatically improve

Apple II into high gear, and boocharge!

the performance of the IIe and transform your system into a state-of-the-art computer.

In this article I'm going to look at three types of peripherals you can use to soup up your IIe: speedup cards that improve raw processing power, memory cards that provide added workspace for complex application programs and that emulate disk storage devices, and high-capacity disk drives that speed up disk input/output (I/O) operations and make dealing with large files and large numbers of files more convenient.

Speedup Cards

A speedup card is simply a self-contained computer system—the card contains a microprocessor, RAM, and a control program in ROM. All you really need to operate it are a power supply, a clock signal, and I/O devices; it borrows these resources from the IIe as soon as you turn the power on.

The microprocessor used by the most popular speedup cards—the Accelerator IIe, McT's Speedup, and Applied Engineering's Warp—is a 65C02 running at a clock speed of 3.6 MHz. This is the same

microprocessor used by the IIe, so the speedup card can run the same programs as a standard IIe. But since the processor ticks along at 3.6 MHz, rather than the standard 1 MHz of the IIe, many programs will run more than three times as fast as they would without benefit of the card.

In practice, the actual performance ratio is somewhat less than 3.6 MHz, for two reasons. First, speedup cards must slow down to access peripherals, such as disk drives, which are operated by programs that depend on a 1MHz clock speed. The software drivers for the Disk II and the Uni-Disk 3.5 disk drives are two such programs. Even if the card doesn't have to slow down (it doesn't for a hard disk), the mechanical speed of the drive prevents the effective data-transfer rate from increasing much.

Second, most speedup cards do not accelerate the execution of programs that operate in the auxiliary-memory area of the IIe (the memory on the Extended 80-Column Text Card)—the only exception is the TransWarp card. This means that a program such as AppleWorks, which uses auxiliary

memory extensively, will not run much more quickly than it would without the card. This is unfortunate because most of the new programs for the IIe take advantage of auxiliary memory.

Using the TransWarp card with AppleWorks is a real treat, however. Spreadsheet recalculations are easily three times as fast as they are without the card, deletions of blocks of text in the word processor take place much more rapidly, and so on. If you have modified AppleWorks to work with extremely large files (we'll see how to do that later in this article), you will almost certainly want to use TransWarp.

An example of the dramatic effect of using TransWarp with a program that runs in auxiliary memory is shown in figure 1. The first entry in the figure indicates the times required to compile an extremely large program using the Merlin Pro assembler; the unbracketed times were measured with the TransWarp disabled and the bracketed ones with it enabled. As you can see, the standard assembly process using a ProFile hard disk was 560 seconds—just over nine

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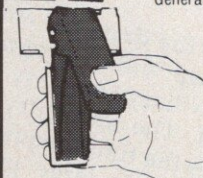
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minutes. With the TransWarp enabled, that time was reduced to 222 seconds, for a performance ratio of 2.52. If you eliminate disk I/O by assembling from a RAMdisk, the ratio improves to 2.74.

A speedup card is particularly useful with graphics-intensive programs like the program-selector utilities Catalyst and MouseDesk. No more will you watch as a graphics window scrolls by at a snail's pace.

One final note on speedup cards: they work just fine in slot 3 on the IIe. (Slot 3 generally takes the 80-column video display card on the II Plus.)

Memory Cards

Another way to beef up your IIe is to add more memory to it. Programs can use the extra memory for several purposes, the most popular of which are increasing the program workspace, creating a simulated-disk storage area (called a RAMdisk), and speeding up disk-read operations (disk caching).

I will be looking at two different types of memory cards you can use for these purposes: I/O-slot cards and auxiliary-slot cards.

An I/O-slot card is one that is compatible with the 1-megabyte (1M) Apple Memory Expansion Card introduced last September. You can plug the I/O-slot card into any expansion slot (except slot 3). Compatible products are AST Research's SprintDisk, Cirtech's Flipster, and Applied Engineering's RamFactor. An optional "piggyback" board for the SprintDisk lets you add another 1M; RamFactor's piggyback can bring the total memory up to 16M. The RamFactor also has a battery backup option that prevents data loss for up to 12 hours after a loss of power.

An auxiliary-slot card contains 80-column video-display circuitry as well as extra memory. It plugs into the

auxiliary connector, replacing the traditional 80-column text card. The four leading cards of this type are Checkmate Technology's MultiRAM RGB, Applied Engineering's RamWorks II, AST Research's MegaRam-Plus, and Legend Industries' Legend E' Card. You can insert up to 1M of RAM in each of these cards. You can also add expander boards with even more memory to your system.

Let's take a look at how you can use these cards to increase the performance of the IIe.

Program Expansion

When I say "program expansion" I mean AppleWorks expansion, because it seems that everyone who buys a megamemory card uses it to enhance AppleWorks performance. We're starting to see other programs that take advantage of the extra memory, however.

AppleWorks (version 1.3) automatically uses the memory on an I/O-slot memory card to expand the AppleWorks desktop beyond the standard 55K limit. If the card contains 1M, the desktop space becomes 1.012M in size, so you can work with several large files at once. Unfortunately, AppleWorks doesn't increase the global limits on database records and word-processor lines or the maximum number of files on the desktop (12).

AppleWorks does not automatically take advantage of the extra memory on auxiliary-slot cards. Every manufacturer of such cards, however, includes a program you can use to patch AppleWorks so that it will use that memory.

Some of these patch programs also change AppleWorks in other, more dramatic, ways. The RamWorks software, for example, increases the limit on the total number of database records and word-processor lines to

	Storage Device:			
	RAMDisk	Hard Disk	Disk II	UniDisk 3.5
Assemble a 28K file to disk with Merlin Pro	493 (180)	560 (222)	(note) (note)	573 (289)*
Save a 44-block Applesoft program	1	5	13	11
BSAVE a 36K binary file	2	8	20	17
LOAD a 44-block Applesoft program	<1	2	4	4
BLOAD a 36K binary file	1	2	6	6

*The bracketed times are for a IIe sped up by a TransWarp card.

Figure 1: Performance benchmarks for the IIe; all times are in seconds.

CIRCLE 223 ON READER SERVICE CARD

more than 15,000 (the standard limits are 1350 and 2250, respectively). MultiRam software allows about 23,000 database records and 5000 word-processor lines; the AST Mega-RamPlus software allows about 1350 database records and 2250 word-processor lines.

This means that you can use AppleWorks to create enormous databases and documents. Of course, the larger the document, the longer it takes to manipulate it, so you may want to use a speedup card in conjunction with the AppleWorks expansion programs. In addition, you really need a high-capacity disk device to store such files. Although both RamWorks and MultiRam allow you to save large files across multiple floppy disks, the storage process is awkward and time-consuming.

RAMdisks

A RAMdisk is an area of memory in which data is stored in the same format as on a disk drive. The big difference between the two types of storage is that when you want to read from or write to the RAMdisk, the data transfer occurs at the full speed of the processor. No longer do you have to wait for slow, mechanical disk drives.

The speed increase in operations when using RAMdisks is dramatic. Figure 1 shows benchmarks for some common disk operations such as saving and loading files. Notice that saving a 36K binary file to a RAMdisk takes one-tenth the time of saving it to a standard floppy disk. Other operations are just as rapid.

One inconvenience of using a RAMdisk is that you first have to transfer your files to it, using a program like Filer or System Utilities. This takes time, so you may want to avoid using the RAMdisk if you will only be using your program for a short time.

If you use a RAMdisk, you must remember that anything you store on it is lost forever if you turn off the Apple. For this reason, you may prefer to store only programs on it and use regular disks for data that you will change.

You can use every I/O-slot and auxiliary-slot memory card as a RAMdisk. The driver software is kept in ROM for the I/O-slot cards; you must load it from disk for the auxiliary-slot cards.

The RAMdisk for an I/O-slot card is quite easy to use because the disk

ACCELERATOR CARDS

Accelerator IIe

Titan Technologies, Inc.
310 West Ann Street
Ann Arbor, MI 48104
(313) 662-8542

Price: \$319

System Requirements: Apple II, II Plus, or IIe
65C02 processor. 3.6 MHz. One-year warranty. Increases processing speed up to 3½ times. Includes 80K of high-speed RAM.

SpeedDemon

McT
1745 21st Street
Santa Monica, CA 90404
(213) 829-3641

Price: \$189; upgrade of earlier version, \$75

System Requirements: Apple II, II Plus, or IIe
65C02 processor, 3.5 MHz. 3-year warranty. Low static sensitivity and built-in self test. Has been shipping for 3½ years.

TransWarp

Applied Engineering
P.O. Box 798
Carrollton, TX 75006
(214) 241-6060

Price: \$279

System Requirements: Apple II Plus, IIe, Franklin, or Laser 128
65C02 processor, 3.6 MHz. 5-year warranty. Speeds up main 64K, ROM, and auxiliary memory on IIe.

HARD-DISK DRIVES

A2i-350-10- and -20-NovoComp

CMC Computer Systems
1514 E. Edinger, Suite H
Santa Ana, CA 92705
(714) 835-2462

Price: 10MB, \$945; 20MB, \$1145

System Requirements: Current-model Apple IIe case
Internal hard disk replaces power supply. 90-day warranty. Auto-boots directly from hard disk. Runs ProDOS, DOS 3.3, CP/M, and Pascal. ProDOS-only version available at lower price.

AST-2000

AST Research, Inc.
2121 Alton Avenue
Irvine, CA 92714
(714) 476-3866

Price: 20MB with 20MB tape backup, \$2795; 20MB drive only, \$1595; 20MB tape backup only, \$1695

System Requirements: Apple IIe
6-month warranty. High-performance SCSI hard-disk and tape subsystem.

MicroStor

AST Research, Inc.
2121 Alton Avenue
Irvine, CA 92714
(714) 476-3866

Price: 10MB with 10MB backup, \$1995

System Requirements: Apple II Plus, IIe
6-month warranty. Hard-disk and cartridge tape backup. Compatible with all Apple II operating systems.

ProAPP 20

ProAPP, Inc.
1475 S. Bascom Ave.
Campbell, CA 95008
(800) 424-2425,
(408) 559-3552

Price: \$995

System Requirements: Apple IIc, IIe
20MB. 1-year warranty, 10-day money-back guarantee if not satisfied.

QC10, QC20

Quark Peripherals, Inc.
2525 W. Evans, Suite 220
Denver, CO 80219
(800) 543-7711 Sales,
(303) 934-2211 Mktg.

Price: 10 MB, \$1295; 20MB, \$1795; upgrade, 10MB to 20MB, \$345

System Requirements: Apple IIc, IIe, III
90-day extended warranty available. Does not require special interface card.

Sider I, Sider II, B-Sider

First Class Peripherals
3579 Highway 50 East
Carson City, NV 89701
(800) 538-1307

Price: Sider I, 10MB, \$695; Sider II, 20MB, \$995; B-Sider, 20MB removable cartridge, \$695

System Requirements: Apple II Plus (revision 7 or later) or IIe
1 year warranty.

driver is contained in ROM on the card. There is no installation program to run since ProDOS automatically recognizes the card as a disk device. Such a RAMdisk also retains its data after a warm boot (Control-OPEN-APPLE-Reset), so it's hard to lose data unless you turn off the Apple.

Another nice feature of such a card is that you can boot from its RAMdisk (with a PR#n command) if it contains the standard files ProDOS needs to

*It's not difficult
to transform your IIe
into a Formula 1 racer,
capable of handling
more complex chores
more quickly than before.*

boot a disk (PRODOS and a .SYSTEM file like BASIC.SYSTEM). If you're using an enhanced IIe, and the card is in a higher-numbered slot than any other disk device, you can also warm boot from the card. You cannot boot from an auxiliary-slot memory card.

Another advantage of using an I/O-slot memory card as a RAMdisk is that such use has become standard. Several programs, such as Pinpoint, Catalyst, and MouseDesk, recognize the RAMdisk when they start up and transfer their files to it automatically. The net result is that these disk-intensive programs operate much more quickly than they do without the card.

Disk Caching

The AST SprintDisk (and MegaRamPlus) comes with an interesting program called SprintCache that uses a method quite different from that of the RAMdisk to speed up disk operations.

When you want to read data from a real disk for the first time, SprintCache transparently transfers it to SprintDisk RAM before passing it on to your program, so the operation is actually slightly slower than usual. But the next time you ask for the data, SprintCache realizes it is already in RAM, so it bypasses the slow disk-read operation and delivers it to you from RAM at full speed. This technique is called disk caching.

SprintCache is effective with programs that read the same data files

again and again. For example, after you use AppleWorks with SprintCache for a while, the disk activity associated with loading overlays stops because all the overlays are in the cache and are loaded from there instead. SprintCache is not too useful if you simply read a file once and don't use it again, however.

You may be wondering why you would use SprintCache instead of a RAMdisk program. There are two good reasons: first, you don't have to copy any files to cache memory as you would before using a RAMdisk; second, if you ever have a power out-

age, you won't lose any data, because write operations are not cached. The disk always contains a current copy of the file.

High-Capacity Disk Drives

We saw earlier that even with a speedup card installed, disk operations are not much faster than usual. The solution to the disk bottleneck, of course, is to use a faster type of drive—typically, a hard disk such as First Class Peripherals' The Sider, CMC's A2i-350, ProAPP's ProAPP 20, or AST Research's MicroStor or AST-2000. The hard-disk benchmarks in figure 1 were measured us-

MEMORY CARDS

Apple II Memory Expansion Card

Apple Computer, Inc.
20525 Mariani Avenue
Cupertino, CA 95014
(408) 996-1010

Price: With 256K, \$299

System Requirements: Apple II, II Plus, or IIe
Plugs into slot 4, 5, or 6. Maximum RAM 1MB. 90-day warranty.

Flipster

Cirtech (UK), Ltd.
Distributed by
Greengate Productions, Inc.
2041 Pioneer Court, Suite 15
San Mateo, CA 94403
(415) 345-3064

Price: 1 MB, \$399

System Requirements: Apple II Plus, IIe, Franklin 1200, or Franklin 2000
Plugs into slots 1 through 7 (IIe, not slot 3). 1-year warranty. Memory-division software included. Patches for earlier versions of CP/M and Pascal. Compatible with Apple II Memory Expansion Card.

Legend C' Card

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

Price: 256K, \$219; 512K, \$269; 768K, \$319; 1MB, \$369

System Requirements: Apple IIc
3-year warranty. Gives up to 1MB AppleWorks desktop. Includes software program that allows use of mouse with AppleWorks.

Legend E' Card

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

Price: 256K, \$219; 512K, \$269; 768K, \$319; 1MB, \$369

System Requirements: Apple IIe
Plugs into auxiliary slot. 3-year warranty. Gives 80-column display. Compatible with all software written for Apple Extended 80-column card. Includes software that allows use of mouse with AppleWorks. Has RGB double hi-res color video and 16 levels of gray.

Legend S' Card

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

Price: 256K, \$269; 512K, \$319; 768K, \$369; 1MB, \$419

System Requirements: Apple II, II Plus, IIe, III, Franklin Series, and Laser 128
Plugs into slots 1 through 7. 3-year warranty. Slot independent. DOS, CP/M, Pascal, ProDOS, SOS, and disk emulators are available. Allows 1MB AppleWorks on II, II Plus, IIe, IIc, or Franklin.

MegaRamPlus

AST Research, Inc.
2121 Alton Avenue
Irvine, CA 92714
(714) 476-3866

Price: 64K, \$195; 256K, \$295; 512K, \$445; 768K, \$595; 1MB, \$745

System Requirements: Apple IIe
Plugs into auxiliary slot. 2-year warranty.

ing Apple's ProFile hard disk; speeds for other drives should be similar. Notice that hard-disk read and write operations are about twice as fast as the corresponding floppy-disk operations.

Another reason to use hard disks, of course, is that they are ideal for saving large individual files as well as large numbers of files; 140K floppy disks cannot handle such tasks. Common hard-disk capacities are 5M, 10M, and 20M.

The Sider was the first low-cost hard disk available for the Apple and is still quite popular. The CMC's A2i-

350 is unique in that it fits inside the IIe and replaces the system's power supply with its own power supply.

The AST drives feature a removable tape cartridge that you primarily use for making backup copies of the hard disk. The new AST-2000 can back up 20 megabytes in only eight minutes. Most other hard-drive manufacturers offer some sort of optional backup mechanism, perhaps a separate tape unit or simply a program to transfer the files to multiple floppy disks.

You should avoid the floppy-disk backup method at all costs. Remem-

ber that you need about nine 5.25-inch floppy disks to back up just one megabyte, so you will need 180 to back up 20M... forget it!

If you use a hard disk, you will almost certainly want to use ProDOS rather than DOS 3.3. Unfortunately, this means you must master the arcane concepts of pathnames, prefixes, and directories to locate files efficiently on the disk. Your efforts will not be wasted, however, since almost all new software being released for the IIe runs under ProDOS.

You also have to organize files carefully on the disk so they are easy to find when you want them. My advice on how to best structure a hard disk goes something like this (you can use Filer for all these operations):

1. Format the disk.
2. Copy ProDOS and BASIC.SYSTEM from floppy disk to the disk's volume directory.
3. Create subdirectories in the volume directory for each of your major applications. For example, I have subdirectories called ASM (for the Merlin Pro assembler), AW (for AppleWorks), PTP (for the Point-to-Point communications program), and U (for a group of utility programs). Notice that I've kept these names short even though they can be up to 15 characters long; this lessens my typing task when I need to enter a pathname.

4. Copy files from the floppy disk to the appropriate subdirectories.
5. Create subdirectories within each of the application subdirectories. This is where the application should store its data. For example, I have a subdirectory called AW.WORK within the AW subdirectory that holds all my A+ articles.

My final suggestion is that you install a selector program such as Catalyst or MouseDesk (see the April A+), which takes control whenever you quit an application. These programs make it easy to run a program without requiring you to remember its pathname.

I prefer to use my own bare-bones selector program (shown in figure 2) because it loads more quickly than either Catalyst or MouseDesk and is easy to customize. With it, you can select a program from a menu simply by pressing a single key.

If you call this program Startup and store it in the volume directory of a disk that is structured as described above, it runs automatically every

MultiRam CX

Checkmate Technology, Inc.
509 South Rockford Drive
Tempe, AZ 85281
(602) 966-5802

Price: 256K, \$199.95; 512K, \$259

System Requirements: Apple IIc
Plugs into motherboard of IIc (CPU and MMU sockets). 5-year warranty. AppleWorks memory-expansion software, RAMdisk software, and RAM test utility software included with card. 65C816 processor is available.

MultiRam IIe

Checkmate Technology, Inc.
509 South Rockford Drive
Tempe, AZ 85281
(602) 966-5802

Price: \$159.95 64K through \$329.95 768K

System Requirements: Apple IIe
Plugs into auxiliary slot. 5-year warranty. Expands Apple 64K memory to 768K. AppleWorks memory-expansion software, RAMdisk software, and RAM text utility software included.

MultiRam RGB

Checkmate Technology, Inc.
509 South Rockford Drive
Tempe, AZ 85281
(602) 966-5802

Price: \$199.95 64K through \$439.95 1MB

System Requirements: Apple IIe
Plugs into auxiliary slot. 5-year warranty. RGB video output standard. Options include 10-year, battery-backed static RAM and expansion board for more than 1 MB.

RamFactor

Applied Engineering
P.O. Box 798
Carrollton, TX 75006
(214) 241-6060

Price: 256K, \$239; 512K, \$289; 1MB, \$389

System Requirements: Apple II Plus, IIe, Franklin, or Laser 128
Plugs into slots 1 through 7, excluding 3. 16MB RAM maximum (with expander). 5-year warranty. Battery backup option, \$179; 16-bit (65C816) option, \$159. Allows you to run AppleWorks on II Plus.

RamWorks II

Applied Engineering
P.O. Box 798
Carrollton, TX 75006
(214) 241-6060

Price: 64K, \$179; 256K, \$219; 512K, \$269;

1MB, \$389; 1.5 MB, \$539; upgrade, Memory Master original RamWorks, \$120
System Requirements: Apple IIe
16MB RAM maximum (with expander). Optional 65C816, \$159. RGB option, \$129. Built-in AppleWorks print buffer; auto loads AppleWorks into RAM.

SprintDisk

AST Research, Inc.
2121 Alton Avenue
Irvine, CA 92714
(714) 476-3866

Price: 256K, \$295; 512K, \$445; 768K, \$595; 1MB, \$745

System Requirements: Apple II, II Plus, or IIe
2-year warranty. Plugs into slots 1 through 7. Compatible with Apple II Memory Expansion Card.

Z-RAM

Applied Engineering
P.O. Box 798
Carrollton, TX 75006
(214) 241-6060

Price: 256K, \$329; 512K, \$389

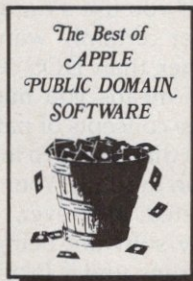
System Requirements: Apple IIc
Goes inside IIc. 5-year warranty. 16-bit option (65802), \$89. Includes Z80 processor to run CP/M software.

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037 Freewriter (II+ needs paddles) .. \$5

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 040 Address book, amortization \$5
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1 REM Copyright 1986 Gary Little

100 FOR I = 8192 TO 8192 + 219: READ X: POKE I,X: NEXT

110 SL = 6: REM Slot number of hard disk

120 POKE 8359,16 * SL: CALL 8192

130 D\$ = CHR\$(4)

140 PRINT D\$;"PR#3": PRINT : HOME

200 PRINT TAB(25);"Directory of Programs"

250 PRINT

300 PRINT "1. Point-to-Point"

400 PRINT "2. Assembler"

410 PRINT "3. Utilities"

420 PRINT "4. AppleWorks"

450 PRINT

500 PRINT "Enter your choice (1..4): ";: GET A\$: PRINT A\$

600 PRINT

700 IF A\$ = "1" THEN PRINT D\$;"-PTP/PTP.SYSTEM"

710 IF A\$ = "2" THEN PRINT D\$;"-ASM/MERLIN"

720 IF A\$ = "3" THEN PRINT D\$;"PREFIX U": PRINT D\$;"CATALOG": END

730 IF A\$ = "4" THEN PRINT D\$;"-AW/APLWORKS.SYSTEM"

800 END

5000 DATA 173,129,192,173,129,192,162,0,189,21,32,157,0,209,
232,208,247,173,130,192,96,216,32,0,191,204,179,16,32,0

5001 DATA 191,198,181,16,32,0,191,197,145,16,176,121,173,149,
16,41,15,240,114,141,149,16,169,47,141,129,2,162,0,189

5002 DATA 150,16,157,130,2,232,236,149,16,208,244,169,47,
157,130,2,232,160,0,185,186,16,240,7,157,130,2,232,200,208

5003 DATA 244,232,142,128,2,32,0,191,200,165,16,176,60,173,
170,16,141,172,16,32,0,191,202,171,16,176,46,32,0,191

5004 DATA 204,179,16,176,38,173,130,192,32,137,254,141,12,192,
32,147,254,32,88,252,169,207,141,88,191,169,0,162,22,157

5005 DATA 88,191,202,208,250,169,1,141,111,191,76,
0,32,76,142,16,2,96,149,16,0,0,0,0,0,0,0,0

5006 DATA 0,0,0,0,0,0,3,128,2,0,17,0,4,0,0,32,255,255,0,0,1,
0,1,184,16,1,47,66,65,83

5007 DATA 73,67,46,83,89,83,84,69,77,0

Figure 2: A Startup program that installs custom quit code in ProDOS

time you boot the disk. Before the program displays the menu, it installs a special quit routine into ProDOS, so control passes to it every time you leave an application. If you use the program, you have to change one variable to indicate the slot number of the hard disk: SL in line 110. You'll also have to change the menu entries and pathnames, of course.

A useful commercial program for coping with hard-disk-file maintenance is Central Point Software's Copy II Plus. It will draw a tree diagram of all the directories on a disk and show you how they are interconnected. To select a directory, you position a cursor over its name using the arrow keys, then press Return. What could be easier?

UniDisk 3.5

If you are more interested in extra disk capacity than disk speed, consider Apple's new UniDisk 3.5. It uses convenient 3.5-inch hard-shell disks with capacities of 800K each (more than five standard floppies). That should be enough to store most of

your popular applications with room to spare for data storage. The disks are also easy to back up; that is, they are if you use a program like Copy II Plus. It takes about 6½ minutes to make a single copy.

You certainly shouldn't buy the UniDisk 3.5 for its speed. As figure 1 shows, it just isn't that much faster than the old Disk II. In fact, read operations such as LOAD and BLOAD are completed in about the same amount of time as they are with the older disk system.

Given these various options—speedup cards, memory cards, and high-capacity hard disks, you can see that it's not difficult to transform your IIe into a Formula 1 racer, capable of handling more complex chores more quickly than before. After you sit down in front of a turbocharged Apple IIe, you'll wonder why you didn't upgrade sooner. +

Gary Little is the author of Point-to-Point, Pinpoint's new telecommunications program for the IIe and IIc.

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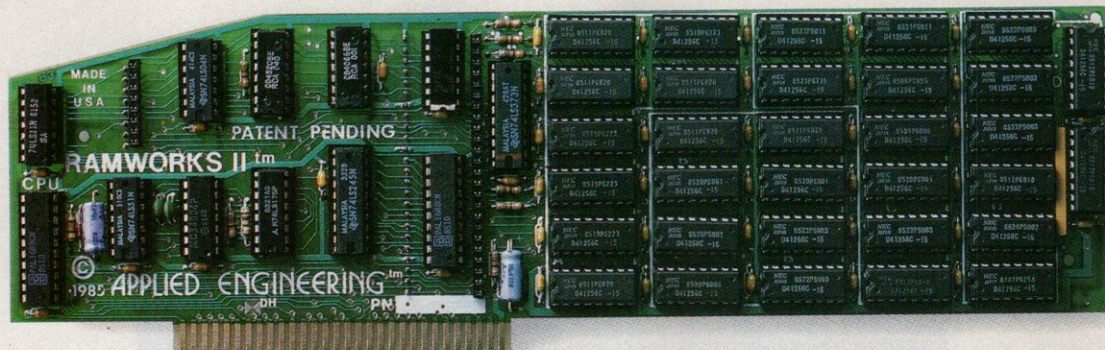
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While RamWorks II is recognized by all memory intensive programs, NO other expansion card comes close to offering the multitude of enhancements to AppleWorks that RamWorks II does. Naturally, you'd expect RamWorks II to expand the available desktop, after all Applied Engineering was a year ahead of everyone else *including Apple* in offering more than 55K, and we still provide the largest AppleWorks desktops available. But a larger desktop is just part of the story. Look at all the AppleWorks enhancements that even Apple's own card does not provide and *only* RamWorks II does. With a 256K or larger RamWorks II, *all* of AppleWorks (including printer routines) will automatically load itself into RAM dramatically increasing speed by eliminating the time required to access the program disk drive. Switch from word processing to spreadsheet to database at the speed of light with no wear on disk drives.

Only RamWorks II eliminates AppleWorks' internal memory limits, increasing the maximum number of records available from 1,350 to over 15,000. *Only* RamWorks II increases the number of lines permitted in the word processing mode from 2,250 to over 15,000. And *only* RamWorks II (256K or larger) offers a built-in printer buffer, so you won't have to wait for your printer to stop before returning to AppleWorks. Ram-

Works II even expands the clipboard. And auto segments large files so they can be saved on two or more disks.

RamWorks II, *nothing* comes close to enhancing AppleWorks so much.

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Using RamWorks II couldn't be easier because it's compatible with more off-the-shelf software than any other RAM card. Popular programs like AppleWorks, Pinpoint, Catalyst, MouseDesk, Howard-Soft, FlashCalc, The Spread Sheet, Managing Your Money, SuperCalc 3a, and MagiCalc to name a few (and *all* hardware add on's like ProFile and Sider hard disks). RamWorks II is even compatible with software written for Apple cards. But unlike other cards, RamWorks II plugs into the IIe auxiliary slot providing our super sharp 80 column text in a completely integrated system while leaving expansion slots 1 through 7 available for other peripheral cards.

Highest Memory Expansion.

Applied Engineering has always offered the largest memory for the IIe and RamWorks II continues that tradition by expanding to 1 full MEG on the main card using standard RAMs, more than most will ever need (1 meg is about 500 pages of text)...but if you do ever need more than 1 MEG, RamWorks II has the widest selection of expander cards available. Additional 512K, 2 MEG, or 16 MEG cards just snap directly onto RamWorks II by plugging into the

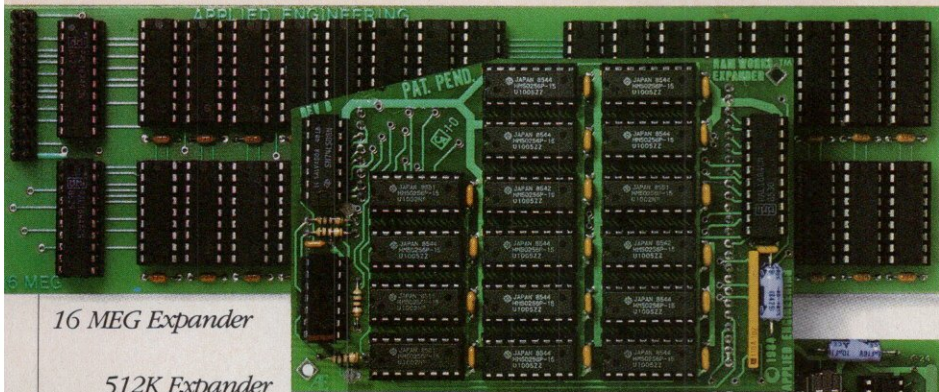
industry's only low profile (no slot 1 interference) fully decoded memory expansion connector. You can also choose non-volatile, power independent expanders allowing permanent storage for over 20 years.

It Even Corrects Mistakes.

If you've got some other RAM card that's not being recognized by your programs, and you want RamWorks II, you're in luck. Because all you have to do is plug the memory chips from your current card into the expansion sockets on RamWorks II to recapture most of your investment!

The Ultimate in RGB Color.

RGB color is an option on RamWorks II and with good reason. Some others combine RGB output with their memory cards, but that's unfair for those who don't need RGB *and* for those that do. Because if you don't need RGB Applied Engineering doesn't make you buy it, but if you want RGB output you're in for a nice surprise because the RamWorks II RGB option offers better color graphics plus a more readable 80 column text (that blows away any composite color monitor). For only \$129 it can be added to RamWorks II, giving you a razor sharp, vivid brilliance that most claim is the best they have ever seen. You'll also appreciate the multiple text colors (others only have green) that come standard. But the RamWorks II RGB option is more than just the ultimate in color output because unlike others, it's fully



16 MEG Expander

512K Expander

compatible with all the Apple standards for RGB output control, making it more compatible with off-the-shelf software. With its FCC certified design, you can use almost any RGB monitor because only the new RamWorks II RGB option provides both Apple standard and IBM standard RGB outputs (cables included). The RGB option plugs into the back of RamWorks II with no slot 1 interference (works on the original RamWorks, too) and remember you can order the RGB option with your RamWorks II or add it on at a later date.

True 65C816 16 Bit Power.

RamWorks II has a built-in 65C816 CPU port for direct connection to our optional 65C816 card. The only one capable of linearly addressing more than 1 meg of memory for power applications like running the Lotus 1-2-3™ compatible program, VIP Professional. Our 65C816 card does not use another slot but replaces the 65C02 yet maintains full 8 bit compatibility.

Endorsed by the Experts.

Steve Wozniak, creator of the Apple Computer said "I wanted a memory card for my Apple that was fast, easy to use, and very compatible, so I bought RamWorks." A+ magazine said "Applied Engineering's RamWorks is a boon to those who must use large files with AppleWorks...I like the product so much that I am buying one for my own system." inCider magazine said "RamWorks II is the most powerful auxiliary slot memory card available for your Iie, and I rate it four stars...For my money, Applied Engineering's RamWorks II is king of the hill."

Apple experts everywhere are impressed by RamWorks II's expandability, versatility, ease of use, and the sheer power and speed that it adds to any Iie. With a RamWorks II in your Apple, you'll make IBM PC's and AT's look like slowpokes.

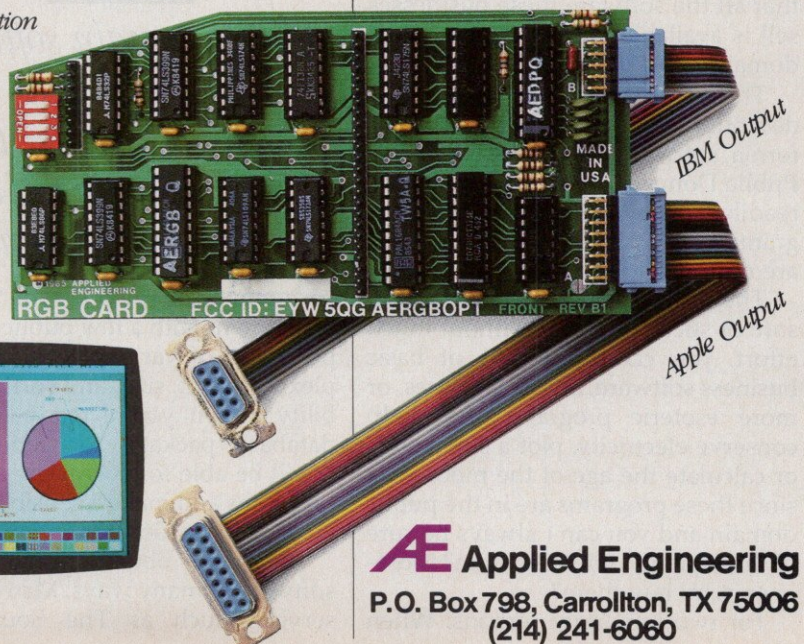


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Cheap Thrills

A Great Selection of Public-Domain Software for Just Pennies

At a recent San Francisco computer exposition, Judy Rosenthal's software booth did a brisk business. Buyers thumbed through her catalog of Apple programs and bought disks by the dozens.

In Beverly Hills, former TV talk-show host and recording star Les Crane has started a software business, selling a collection of well-known programs on a single disk.

At first glance, neither of these commercial ventures appears unusual. They seem typical until you learn that all the software these businesses sell is available for free in the public domain.

These are not cases of commercial deception. Rosenthal's San Jose, California, software business is called The Public Domain Exchange, and Crane readily acknowledges that the programs on his Golden Oldies diskette are not proprietary.

The Apple II has attracted a treasure of such software. Without much effort, you can find disks of basic business software, amusing games, or more esoteric programs that help conserve electricity, plot a sine wave, or calculate the age of the moon. But since these programs are in the public domain and you can't always be sure of their quality, why use them? Moreover, why buy them?

For two important reasons: When

you first get a computer, you may not be sure what you are going to do with it. We don't always buy computers because we need them—the reason for a purchase is usually less direct. We buy a computer because we want one and because we will use it in one way or another. Public-domain software lets you put your computer to work with little, if any, extra investment.

Second, public-domain software is instructive. Before deciding on a data-

Public-domain software lets you put your computer to work with little, if any, extra investment.

base-management program, you can experiment with a few public-domain programs of varying levels of complexity, speed, size, and sorting capability. When you're ready to buy a database package for serious use, you'll be able to look at the available programs and make a sensible choice.

How Do You Get It?

You can obtain public-domain software in many ways. Many on-line services such as The Source and

CompuServe enable users to upload and download programs.

Some magazines provide listings of software that you can type into your computer. The most useful resource for such listings is probably *Nibble* magazine, published in Concord, Massachusetts. A recent issue of *Nibble* included a fascinating icon-based program that produced films in high-resolution graphics, and a projector program that let you view your creations.

Users' Groups, Near and Far

Typing in programs from a magazine can be a pretty lonely activity, and you can't judge the quality of a program until you've used it. Few magazines offer reviews of public-domain software. One of the best ways to find the occasional gem among the stacks of public-domain software is to participate in a local users' group.

Dozens of users' groups actively solicit public-domain software. Usually the group appoints a librarian, whose job it is to catalog programs and to test them or talk to people who have done so. Most users' groups permit free sharing of all public-domain software.

Users' groups also consult other organizations that offer public-domain software. For example, most groups are in touch with the International Apple Core (IAC) of San Jose,



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TRIAL SIZE TOOL BOX



California. The IAC publishes a regular *Apple II Public-Domain Software Library Catalog*, which lists programs by category and offers a short description of each.

You don't have to belong to a local club in order to get software from the International Apple Core. The group will gladly send you its newsletter and let you purchase its disks for \$4.50 each.

The Big Red Apple Club (BRAC) of Norfolk, Nebraska, has also earned a reputation for providing informative listings of its public-domain programs. "The Big Red is the best," says Les Dyer, librarian of the Pen-Apple users' group in San Carlos, California. "They are informative and inexpensive."

Scarlett, the monthly publication of the Big Red Apple Club, is frequently more than 30 pages long and includes program listings and descriptions of the contents of disk volumes that the BRAC sells. Annual BRAC membership is \$12, and members get disks at \$2.50 per disk or less. Users' groups frequently obtain software from the BRAC and offer it at no charge to group members.

Public-domain software is inex-

*Public-domain software
is inexpensive or free,
and sometimes you
get what you pay for.*

pensive or free, and sometimes you get what you pay for. For example, while trying to track down a public-domain word-processing program, I came across a program that the president of a users' group had highly recommended. It processed words all right; unfortunately, it couldn't print them! When you evaluate public-domain software, you can't have the same expectations that you do when testing an expensive commercial program. Nevertheless, the vast number of public-domain programs can be a little intimidating, and, despite your efforts to research them, sometimes they aren't quite what you expected. Enter Judy Rosenthal.

The Public Domain Exchange

Rosenthal's first software experience came with PC-SIG, a group that screens and sells public-domain software for the IBM PC. At computer

shows, Apple II owners told her they needed a similar service, and she founded the Public Domain Exchange.

If you don't have time to experiment with dozens of programs to locate one that suits you, then the Public Domain Exchange may be helpful. Rosenthal has hired several reviewers who help her evaluate public-domain programs. Many of these reviews appear in the Public Domain Exchange's newsletter. The firm also has issued a book, *The Best of Apple Public Domain Software*, in which its disks are carefully categorized by topics such as Games, Food and Nutrition, Astronomy, Business, and Utilities; the book also includes a list and brief description of the programs on each disk. The disks sell for \$5 apiece and usually contain 10-20 programs.

"We don't just take a disk and throw it into the library. We go to users' groups, see what we need, decide what is quality, and only then put together new disks."

In addition to selling public-domain Apple software, both The Public Domain Exchange and the BRAC offer a category of software that is not



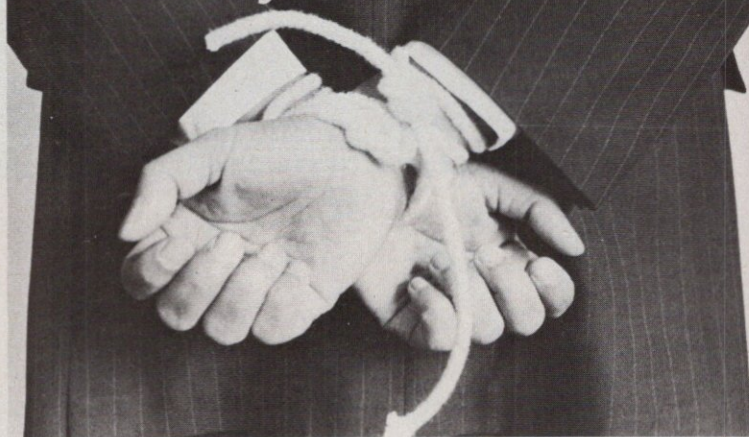
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quite public domain or commercial. Personal-domain programs, also called shareware, are packages that you can obtain at little or no cost. If you find a personal-domain program useful and plan to continue using it, then you send the software author a contribution, generally about \$25.

You can find all sorts of Apple II applications in the world of public-domain software. Here are a few programs that impressed me:

FreeWriter

This simple word-processing program is by Paul Lutus, author of the well-known AppleWriter program. FreeWriter is ProDOS-based, and it works best on an Apple IIe or IIc, since they have the open- and closed-apple keys. You can use it on an Apple II Plus too, with the lowercase display and a game paddle. The program employs many of the same commands that AppleWriter does—and FreeWriter prints your files, too! FreeWriter is readily available to you through many public-domain sources.

DB Senior

This program was originally developed for schoolchildren, but DB Senior is actually a handy and easy-to-

When you evaluate public-domain software, you can't have the same expectations that you do when testing a commercial program.

learn database program. The well-written manual comes as a text file on the disk.

DB Senior uses a straightforward menu command structure. It sorts fields alphabetically and numerically and offers linear and binary searches. You can scroll forward and backward through records and erase records on the spot. I obtained DB Senior through the San Francisco Apple Core.

Trial Size Tool Box

This set of public-domain programs from Roger Wagner Publishing of Santee, California (known for MouseWrite), includes limited versions of the four programs—Chart 'n Graph Toolbox, Database Toolbox, Video Toolbox, and The Wizard's

Toolbox—that comprise The Toolbox Series, which is available commercially (\$39.95 per program). Each Toolbox is a set of commands that you can add to your own programs in an instant. For example, Chart 'n Graph Toolbox has commands for automatic axis generation and graph scaling and labeling. Database Toolbox's commands sort lists and delete arrays. Roger Wagner hopes you'll like Trial Size Tool Box so much that you'll order the commercial programs from him, but you're under no obligation to do so.

Public-domain libraries are filled with utility programs, and I found several of the Public Domain Exchange's utilities quite handy. The Disk Arranger allows you to customize your disk catalog in alphabetical order. Disk Mapping tells you where on a disk a file is located. Disk Scan searches a disk for bad sectors.

Public-domain games are available by the dozen. If you've never played Towers of Hanoi or an Eamon adventure, those are a good place to begin. A few of the classic computer games are also commonly available. Users' groups tend to modify programs, and you may not be completely satisfied

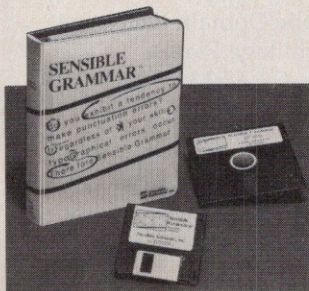
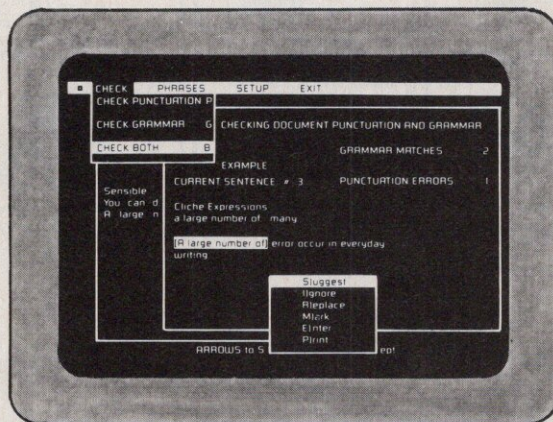
Here's How to Screen Your Grammatical Errors

Sensible Grammar saves you embarrassment and improves your credibility by helping you screen out the grammatical errors in your papers. And it's easy to use on your Apple II computer because it is AppleMouse compatible and has Macintosh-like screens.

Possible mistakes are shown to you in context, a replacement word or phrase is suggested, and you are then given the option to accept or reject the suggested correction.

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- checks your capitalization and punctuation, as well as the spelling of abbreviations;
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- allows entry of your personal hackneyed expressions and then lets you know every time you use them.



Sensible Grammar™

for your Apple 128K //e and //c computer is available for \$99.95.

AppleWorks Compatible!

*Sensible Grammar works with the following word processors, AppleWorks, AppleWriter-ProDOS version (Apple Computer, Inc.); Format II Enhanced-ProDOS (Kensington Microware), Mouse Write text files (Roger Wagner Publishing); MouseWord (International Solutions); PFS:WRITE-ProDOS (Software Publishing, Inc.); Word Juggler (Quark Inc.); WordPerfect (SSI Software); Zardax-ProDOS (Computer Solutions) and others. Owners of trademarks indicated in parentheses.



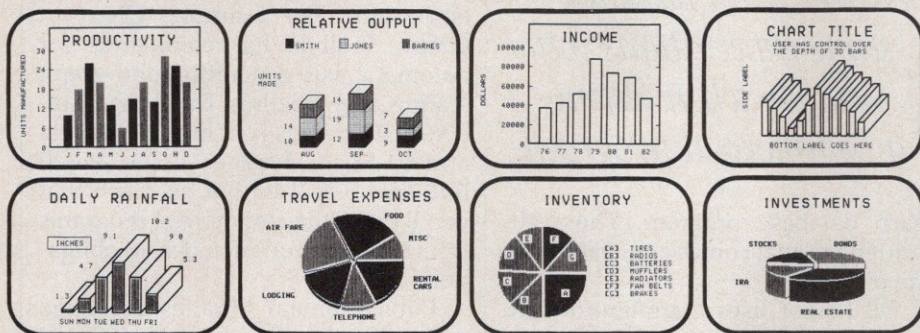
Sensible Software, Inc.

210 S. Woodward, Suite 229, Birmingham, MI 48011
(313) 258-5566

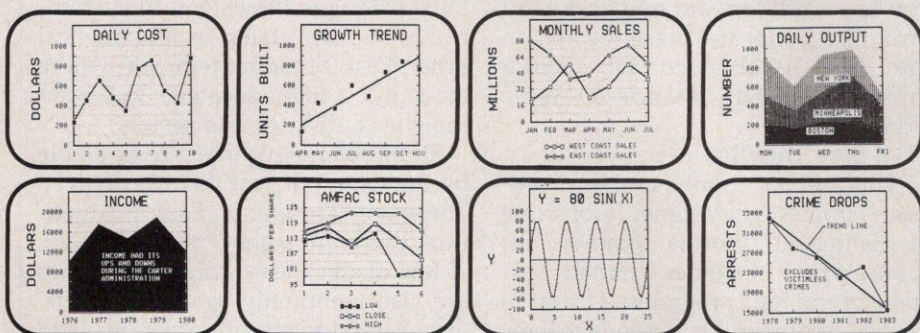
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CHARTS! FOR THE APPLE II

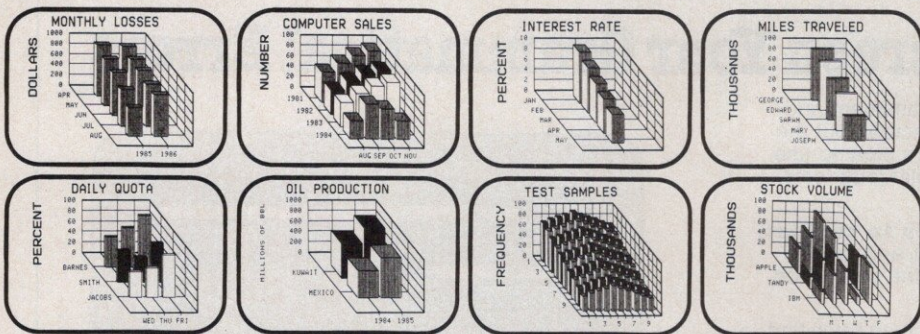
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3DChart. Nothing else like it! 3D bars plotted versus two variables on a 3D grid. Up to 144 bars. 14 chart styles. \$29.95.

with the version you get, however.

To correct this situation, Les Crane, who once hosted a late-night talk show in an ABC effort to dethrone Johnny Carson, has placed relatively authentic versions of several public-domain games on a disk he calls Golden Oldies, Volume 1 (see "Entertainment Classics" in this issue). The \$34.95 package includes the original Adventure by Will Crowther and Don Woods; the pioneering AI program Eliza; Pong, the program that made Atari famous; and Life, a game that simulates on a computer screen the creation of the universe.

Of course, you shouldn't limit yourself to programs recommended in this article. One of the reasons for using public-domain software is to gain experience with different programs and to determine what you like. Experiment with public-domain programs. You'll be amazed at how rapidly your software library grows.

Paul Freiberger is a book author and newspaper columnist based in Palo Alto, California. With Michael Swaine he coauthored Fire in the Valley (Osborne/McGraw-Hill, 1984).

FURTHER INFORMATION

The Big Red Apple Club
1105 South 13th Street, #103
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Golden Oldies, Volume 1
Software Country
270 North Canon Drive #1297
Beverly Hills, CA 90210
(213) 278-8450
Distributed by Electronic Arts
1820 Gateway Drive
San Mateo, CA 94404
(415) 571-7171

International Apple Core
Public Domain Library
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The Public Domain Exchange
673 Hermitage Place
San Jose, CA 95134
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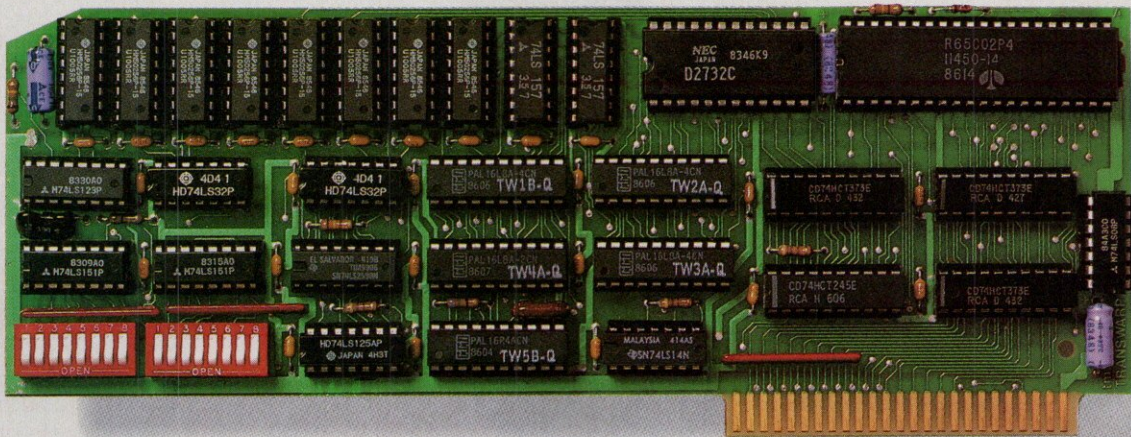
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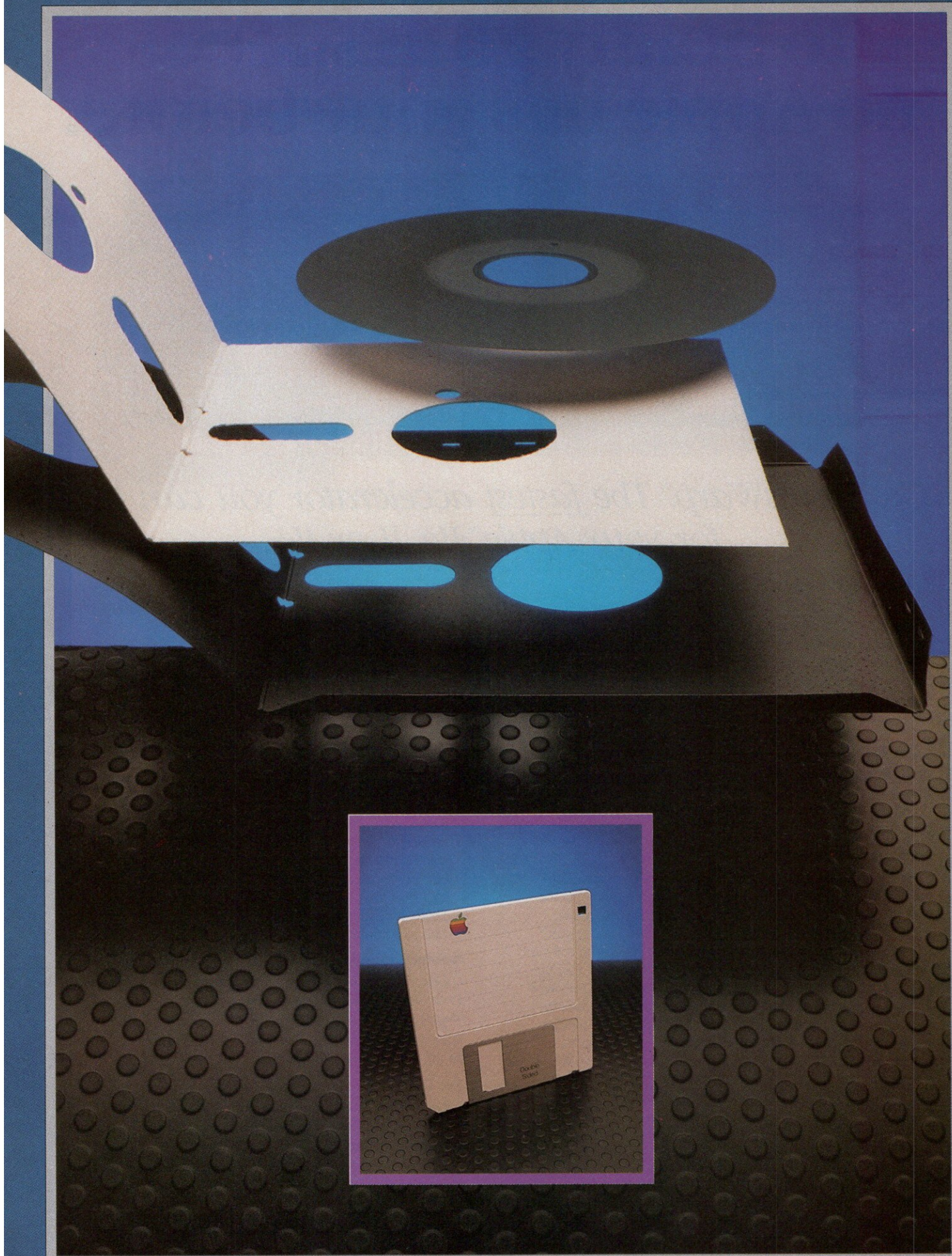
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*Everything
you need to know
about
diskette care*

Diskette Primer

Diskettes are one of the most vulnerable components of your computer system. An understanding of floppy diskettes and their care will help keep your Apple running smoothly.

You can find some information about diskette care on the jacket backs of most 5¼-inch floppies or in the diskette box. This article will provide a more detailed look into proper diskette maintenance.

General Precautions

Diskettes are somewhat sensitive to temperature and humidity. When the humidity gets too high, moisture can gather on their surfaces. A very cold or hot disk can contract or expand and may destroy data in the process. Most floppy disks should be kept between freezing (0° C/32° F) and warm (38° C/100° F) and between 10% and 90% relative humidity. Thus, it is not a good idea to leave floppies inside a car.

Although your diskettes are often called floppies, you should not bend them. (The term *floppy* in this context refers to the interior plastic, as opposed to the material of a hard disk). Be especially careful not to bend your disks when inserting or removing them from a drive.

Always hold a 5¼-inch diskette by its outer jacket. Never touch the oval "windows" that are open to the internal disk medium. A fingerprint, even from a clean hand, can destroy significant amounts of data. The 3.5-inch diskettes have a metal shutter that protects the internal medium. Something as small as a smoke particle can damage data on a diskette.

Write-Protect Notch

All 5¼-inch floppy diskettes come with a small rectangular notch in the upper right-hand corner—similar to the knockout tab on video and audio

cassettes—that determines whether or not the drive can write onto the diskette. If this hole is covered on a 5¼-inch diskette, a properly functioning drive will not write to it or format it and accidentally destroy important data. Unfortunately, with an 8-inch diskette, you cover the hole in order to write to the diskette and uncover it to protect it, which can cause confusion for people used to working with 8-inch drives on older computer systems. With 3.5-inch diskettes, you open a slide tab over a hole to write-protect the diskette.

You should write-protect all your important programs. Although this precaution protects diskettes from erasure by a properly functioning drive, diskettes still can be erased by a malfunctioning drive, a magnet, or proximity to the bell of a ringing telephone.

Any time you obtain a new application program, the first thing you should do is write-protect it to make sure that you don't accidentally erase your only copy of a brand-new program. (Most programs come pre-write-protected, however, and you won't need to protect them.)

Diskette Lifespan

Most diskettes last at least 40 hours—not 40 hours of ownership or of use, but 40 hours of reads/writes. Since a diskette needs to be read or written to for only a tiny fraction of

**KEEP DISKETTE IN
JACKET WHEN NOT
IN USE.**

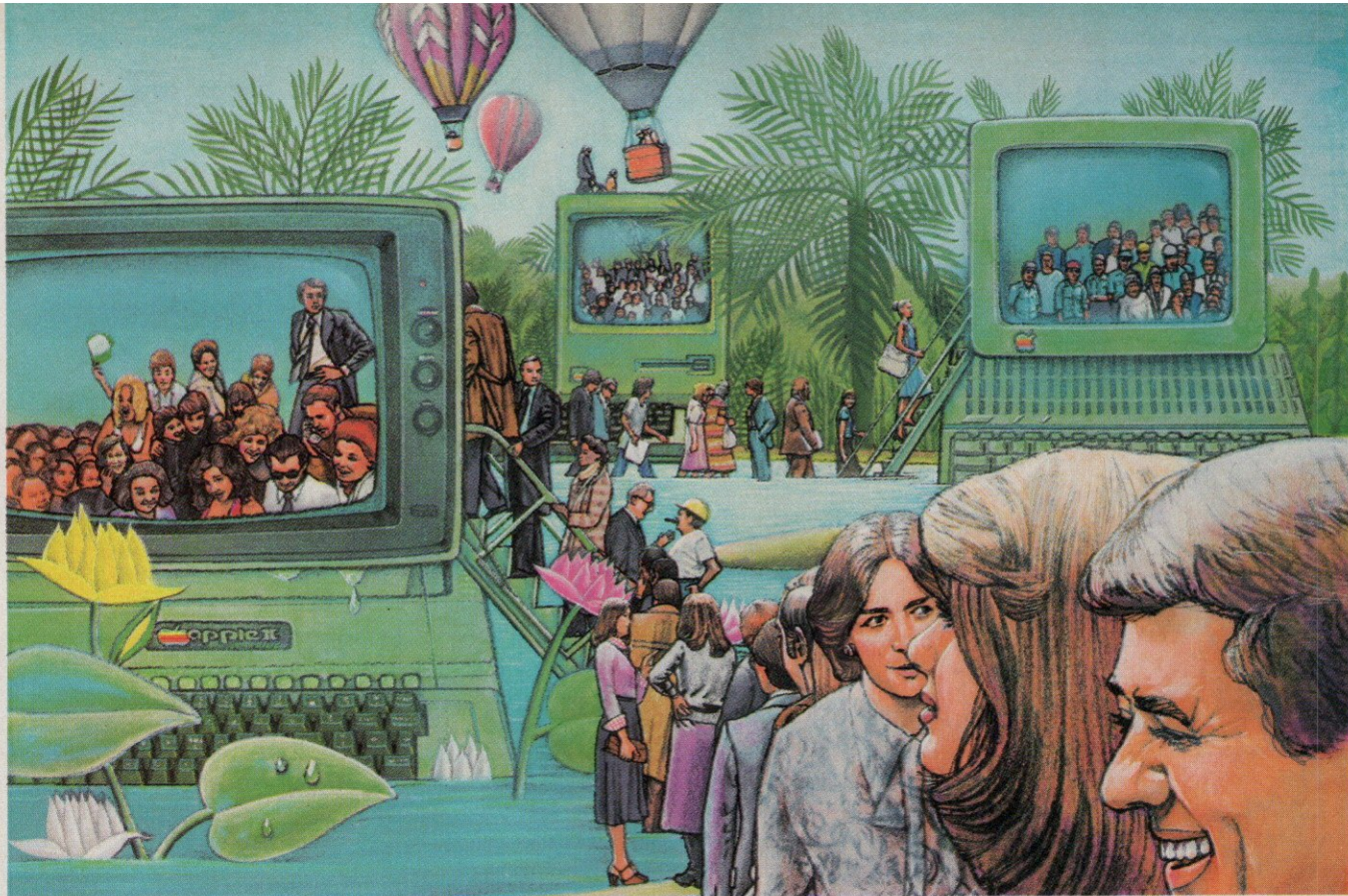
the time it is in the drive, this lifespan translates to a worst case of having to replace your diskettes once a month (if the diskettes are in a heavy read/write situation such as that of a bulletin board) or a normal case of six months to two years (for normal day-to-day applications).

Make sure that you always have backup copies of important diskettes to protect you from diskette failure. You should back up programs and data you use frequently, and very important data should be backed up daily. Programs and data you use less frequently and diskettes for starting up your system need fewer backups. If you're in doubt about the health of a diskette, you can determine whether or not you can reuse it by running a media-check program. Such programs often come on copy-program diskettes, and you can also find them through some users' groups. If a diskette has too many hard errors, throw it away. If a dead diskette has a "lifetime" warranty (or a 20-year warranty, which is effectively the same thing) and you think it's worth it, you can return the diskette to the manufacturer for replacement.

Labeling Tips

When labeling your 5¼-inch diskettes, avoid writing directly on the diskette's label. If you must write on the label, use a soft-tip felt pen. *Never* use a ball-point, hard-tipped pen, or pencil. You can easily put a crease in the diskette or leave graphite particles inside the jacket, which will affect the diskette's performance. Most boxes of diskettes come with self-adhesive labels on which you can write with whatever you wish (you can even type the labels or print them out on your printer). You then stick them over the manufacturer's label. If you





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want to replace an old label, don't just put the new label over the old one; remove the old one first. Never use an eraser on a diskette label, because the eraser particles can get into the diskette jacket. The 3.5-inch diskettes have a more durable hard-plastic case, so you can write on them directly.

Always label your diskettes. As a general rule, when I label diskettes, I put the title of the program(s), the format (DOS, ProDOS, UCSD Pascal, CP/M, word-processing data, and the like), date of original use, an ID number, and a comment. Indicating the operating system is important because you usually cannot read a diskette from one operating system into another without using a translation utility.

Storage

After you are finished using your diskettes, you have to find them a good place to rest until their next use. An old cardboard box filled with newspapers may make a puppy happy, but you have to treat diskettes differently. Always return 5¼-inch diskettes to the jackets they came in, which helps prevent dust, your diskette's number 1 enemy, from gathering on the magnetic media. Store them vertically if possible, to avoid crushing the one on the bottom or bending them accidentally. Don't squeeze too many diskettes into too little room.

Choose the diskette-storage place with care. Make sure nothing can spill into it and that no one can tamper with the diskettes. *Do not* store your diskettes near your computer's monitor, a television set, audio speakers, a telephone, or any magnets. Magnetic fields can erase diskettes, whether or not they are write-protected!

If you must send diskettes by mail, prevent bending by using a special floppy-diskette mailer available at computer and office-supply stores or by taping the diskette jacket to a piece of cardboard, covering the card-

**INSERT
CAREFULLY**



STORE AT
10°-25°C
50°-125°F

board with bubble-pack if possible, and placing it in a foam-lined envelope. Label the outside of the envelope in large letters: DO NOT FOLD OR EXPOSE TO MAGNETIC FIELDS OR X-RAYS. MAGNETIC MEDIA ENCLOSED. Make sure you have a backup copy, just in case the diskette gets lost or damaged. If you don't have a piece of cardboard handy or want better protection for your diskettes, you can make a diskette mailer out of an extra diskette box. Cut the box with a pair of scis-

THE UNIDISK 3.5

The Apple UniDisk 3.5 is Apple Computer's 3.5-inch drive for the Apple II. (Make sure that you do not confuse the UniDisk 3.5 with the UniDisk 5.25.) The UniDisk 3.5 is basically a double-sided version of the 3.5-inch drive used by the II's cousins in the Macintosh world for the last two years. Since it is manufactured by Apple, many software vendors make programs that work with it. Many software packages say, "Comes in both 5¼-inch and 3.5-inch formats," and some software manufacturers provide their programs on 3.5-inch diskettes on request.

The UniDisk is compatible with both ProDOS and Pascal 1.3. It cannot work off the shelf with earlier versions of Pascal, CP/M, or DOS 3.3, however. Several third-party manufacturers have written drivers to make the UniDisk compatible with DOS 3.3, though. The 3.5-inch diskette is technically more sophisticated than the 5¼-inch floppy. It uses a hard outer shell with a protective shutter that helps protect the information on the diskette. Since it uses a very-high-density, high-quality recording surface, a 3.5-inch diskette can also store much more data and store it more reliably than a 5¼-inch floppy can. UniDisks can store 800K on a diskette (400K per side), and you can get programs that let a UniDisk read a diskette made on a Macintosh, and vice versa.

Apple Computer is putting a lot of support behind the 3.5-inch format, and future products in the Apple II as well as Macintosh series will have 3.5-inch drives built in. In fact, IBM has recently announced optional 3.5-inch drives for its PC-series computers. On the Apple IIc, you may need a ROM upgrade to use the UniDisk; the

upgrade is available for free from your dealer when you purchase a UniDisk. The simple way to tell if your IIc needs an upgrade is to enter BASIC and type PR#7. If the system crashes or attempts to boot the external drive, then you need the upgrade. If the system says something like AppleTalk not connected, then your IIc is already upgraded. The UniDisk plugs into the external-drive port on the IIc, and you can use the expansion port on the back of the UniDisk to plug in an external Disk IIc or another UniDisk.

With the Apple II Plus and IIe, you need to purchase a UniDisk controller card (\$69 retail), which the UniDisk plugs into. The UniDisk 3.5 controller card can control up to 127 devices, but with the existing power supply and operating system you can only use two UniDisk drives. If you need more storage space than two UniDisks, then you need a hard-disk drive, which is less expensive.

Many people ask, "Why should I buy a UniDisk when I could buy a hard-disk drive for only a couple of hundred dollars more?" The answer is that the 3.5-inch diskette medium is removable and storable. You can mail, file, and easily back up a 3.5-inch diskette. In fact, the UniDisk makes an excellent backup device for a hard-disk drive. It takes 65 5¼-inch diskettes to back up a full ten-megabyte hard-disk drive and only 12 3.5-inch diskettes to back up the same drive. In addition, since Apple supports the 3.5-inch format, a lot of software is, or will be, available in the 3.5-inch diskette format. For the foreseeable future, software manufacturers will still offer software on 5¼-inch floppies, but the 3.5-inch diskette is the medium of tomorrow.

TIPS ON BUYING DISKETTES

Hundreds of different styles of diskettes are available, but Apple computers mainly use three types of diskettes. Apple II, II Plus, IIe, IIc, and III computers that use 5¼-inch disk drives use 5¼-inch single-sided, single-density diskettes.

Apple II-series computers that use the newer UniDisk 3.5 drive require 3.5-inch double-sided diskettes, and Macintosh-series computers use either 3.5-inch single-sided diskettes (400K storage capacity) or 3.5-inch double-sided diskettes (800K storage capacity) that are the same as those used in the UniDisk 3.5. If your computer system includes more than one disk-drive model, you may need to use a different type of diskette for each drive.

Here are some of the terms you will see when buying diskettes:

Single-Sided/Double-Sided (SS/DS)

These terms refer to the number of sides a drive uses. Some drives use only one side of floppy disks; others use both. Typical Apple Disk II-compatible 5¼-inch drives are single-sided drives, but some third-party 5¼-inch drives are double-sided.

Single Density/Double Density/Quad Density (SD/DD/QD)

These designations refer to how much data you can safely store on a 5¼-inch diskette. All Apple II 5¼-inch diskettes are single-density diskettes.

3.5-Inch/5¼-Inch

These measurements refer to the diameter of the diskette, which should be quite evident from the size of the box the diskettes come in. You

cannot, of course, interchange different-size diskettes.

Reinforced Hub (RH)

A reinforced hub is a plastic ring, similar to a loose-leaf life extender, that supports the mylar inside a 5¼-inch diskette and protects it from the drive motor's hub. Usually it is worth the extra cost. If you obtain 5¼-inch diskettes without the hubs, you can get a kit for installing the hubs yourself.

Colored Diskettes

You can get both 5¼- and 3.5-inch diskettes with color-coded cases, although internally they are all similar. Colored diskettes can be handy. For example, you can use one color for accounts payable and another for accounts receivable, employ a color for backup diskettes, or choose a special color for classified data.

sors. Put the diskette in and tape it up, and it's ready to send!

Disk-Drive Maintenance

If your computer has a maintenance contract, you should get the drives cleaned and aligned every three to six months. If you don't have such a contract, don't adjust your drives until you need to. (Engineer's Law: If it ain't broke, don't fix it!) When you start to get "soft errors" (the drive needs several tries to read or write something successfully or gives I/O error messages on various random sectors), you should get the drive aligned. If you have a disk-speed program (e.g., Locksmith), you can run it as often as you like. You should have the speed adjusted if the drive is more than 10% (30 units on a 300RPM drive) out of center. Don't forget that by adjusting the speed yourself, you may void your computer's warranty.

If you don't want to get a maintenance contract for your computer, I

still recommend getting one for your drives. In most cases, if you want an extended warranty for your drives, you have to purchase the contract for the computer also, but if you can purchase a drive-maintenance contract, then do so. Why? Your computer has very few, if any, moving parts, and once your computer is burned in, very little can go wrong with it. Your disk drive is a different story. It has at least two motors and several moving parts. Your disk drive has to put up with many different diskettes, of varying quality. The mean time to failure (MTTF) for a 5¼-inch floppy-disk drive is about 8000 hours. For constant day-in day-out operation, you're talking about eight months. For most users, however, the MTTF is about two to three years, and the design improvements in 3.5-inch drives have led to an even longer MTTF for them. Since your drive includes most of the moving parts in your computer, you should consider it the weakest component and treat it as such.

Many people use special cleaning diskettes every month to clean the drive heads, but I've personally never liked them. Whenever I have to clean the heads on my drives, I open up the drives and use a swab of cleaning fluid to clean the heads directly. If you're squeamish about opening up your drive, however, then the cleaning dis-

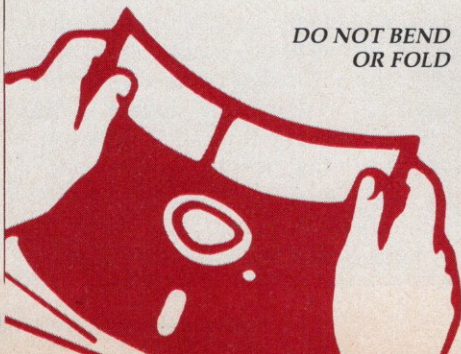


**NEVER PLACE
NEAR A MAGNETIC
FIELD**

kettes are the best way to go. Make sure when choosing a cleaning diskette that it uses a low-abrasive cleaner. (Contrary to various ads, no cleaning diskette is totally abrasive-free, since the abrasives are what does the cleaning.) Follow the directions with the cleaning diskette, and remember rule number 1 of cleaning diskettes: Use them only when it is necessary to do so.

Should your drive give you problems with a program, don't put in the backup until you have determined what the problem is. Use a scrap disk without anything important on it. If you have access to a second computer, try to see if your diskette still works on the other computer. If your system has two drives, then exchange

**DO NOT BEND
OR FOLD**



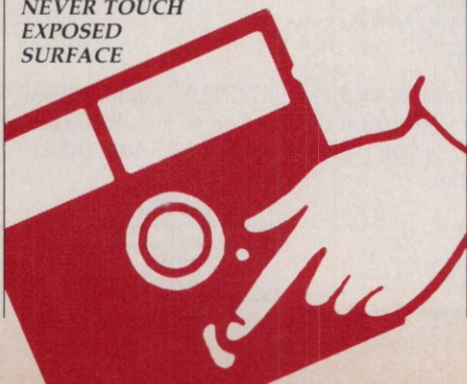
the drives or, if necessary, take your diskettes to your dealer and check to see if they work in the store's demo machines.

After all the precautions you take, no matter how much you pamper your diskettes, drive, and system, sooner or later you will get a dreaded I/O ERROR or similar message. Sometimes the data will be lost forever, and you will have to use a backup copy, but at other times you may be able to recover the destroyed information. If the diskette won't boot but will catalog, use a file-transfer program (e.g., Filer.System for the UCSD P-system, FID for DOS 3.3, FILER for ProDOS, or PIP for CP/M) to copy all the files onto a new diskette. If the bad files are not important or if you have backups made before those files were last updated, then transfer the good files to a new diskette and transfer the backup's replacements for the bad files.

In the worst-case scenario, your diskette's VTOC (volume table of contents) and catalog (where the disk drive stores the information that tells it what files are on the diskette and where they are located) may be destroyed. You can get this information back with a good disk-editing utility, a full understanding of how the information is stored on the diskette, and plenty of time—or by obtaining a special disk-recovery utility. Several good disk-recovery utilities are available—among them Locksmith and Mr. Fixit from Alpha Logic Business Systems, and Bag of Tricks from Quality Software—and you should make sure that the one you purchase will do everything you want it to do and also ascertain that the recover utility will work with your hardware configuration. If all else fails, use your backup—you did remember to make one, didn't you? **+**

Philip Chien is a free-lance writer living in Florida who has published more than 60 computer articles.

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SURFACE**



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SOFTWARE

Locksmith, besides fulfilling its traditional functions as a backup program, comes with several disk-care utilities, including Disk Certify and Disk Speed, and accommodates DOS and ProDOS diskettes.

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Bag of Tricks is a set of utilities that lets you change data on standard Apple (DOS 3.3, UCSD, ProDOS, CP/M)

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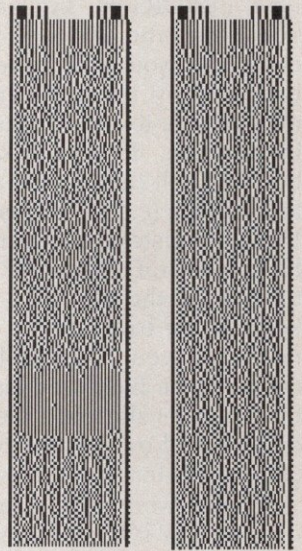
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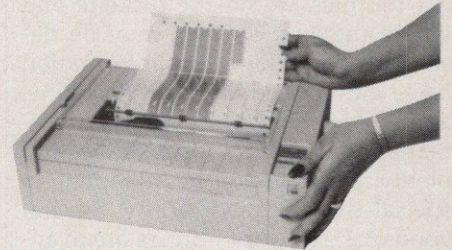
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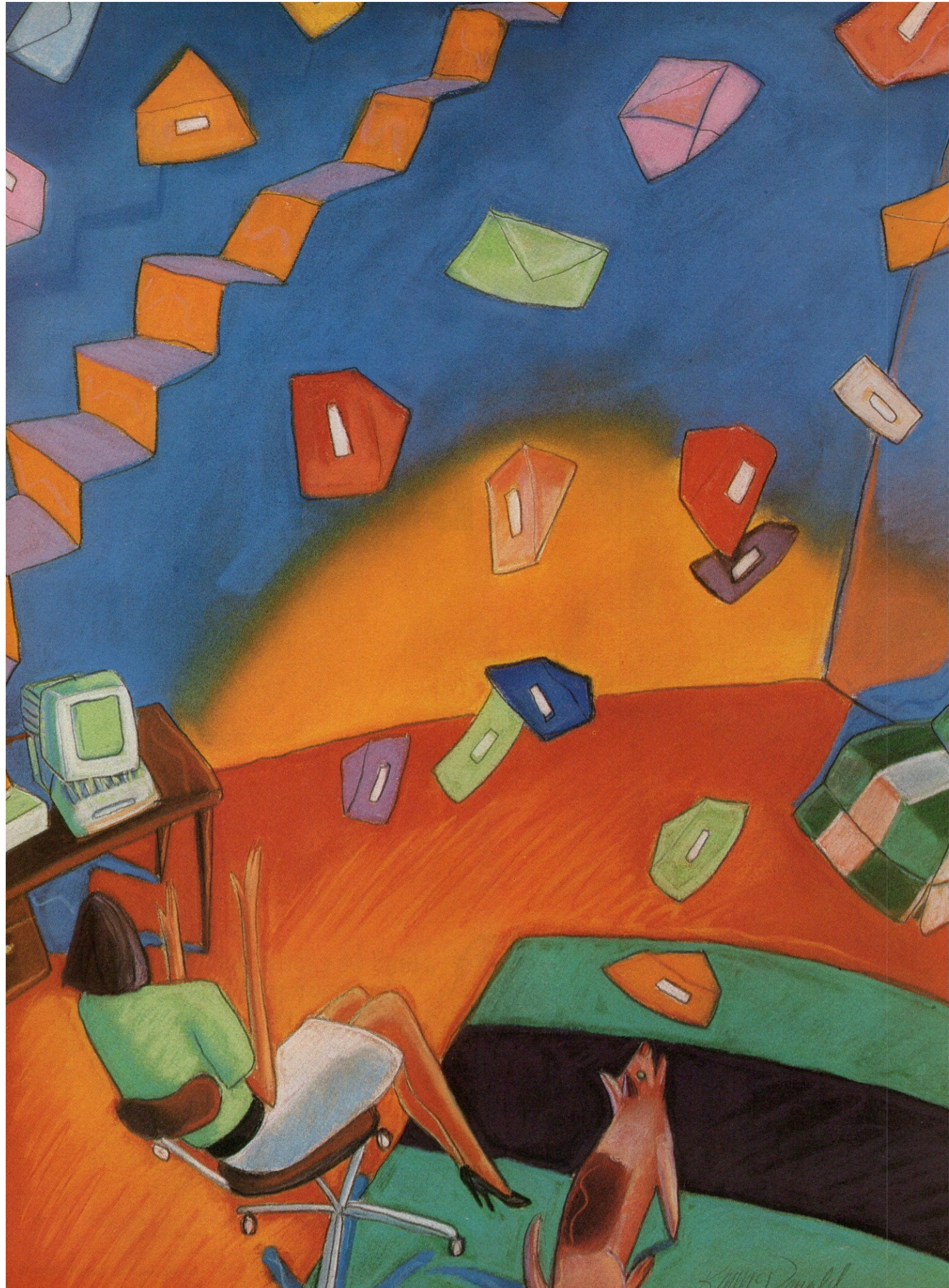


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APPLE WRITER II

WORD PROCESSING LANGUAGE

WHAT THE MANUAL DOESN'T TELL YOU

The Apple Writer II word-processing program and its associated manual are comprehensive and the many applications well presented, but the manual does neglect a few significant areas. This article deals with one of the most important missing items, the creation of form letters and the addressing of associated envelopes.

Form letters fall into two primary categories. The first is what you might call the shotgun or broadcast category. The salutation of this type of letter is usually "Dear Sir:" or "Dear Ms.," since you don't know the addressee's name and are using only the person's title in the address on the letter and the envelope. The second type of form letter involves the use of names as well as titles.

If you're not yet reasonably familiar with Apple Writer II (AWII) and its Word Processing Language (WPL), you should take a close look not only at the earlier sections of the manual but also at all of the WPL programming examples, beginning on page 74, especially the AUTOLETTER example. You will notice a marked difference between WPL and computer languages such as BASIC. In BASIC, all lines have gradually increasing line numbers, whereas WPL doesn't use line numbers. WPL is, in fact, somewhat like assembly language.

To create form letters with WPL, pay particular attention to lesson 4, "Using Numbers to Retrieve Text File Segments," starting on page 82 of the manual, and to "AUTOLETTER" on page 99 (see figure 1). The method of

numbering addresses, including the name of the addressee as well as the company name and address per se, is of key importance, not only with respect to form letters and envelopes, but also for any purpose that requires

```

START PSX 1
LOOP NY
LFORMLETTER
B
F/(Address)//
Y?
LADDRS/(X)>>/</N
PGO FOUND
PGO QUIT
FOUND PLSADDRS/(X)>>/N=$A
B
F/(Name)/$A/A
PNP
PSX +1
PGO LOOP
QUIT PIN
NY

```

Figure 1: The WPL AUTOLETTER program

printing out (and/or displaying) the contents of a file list.

Creating a Form Letter

Now you can generate a typical form letter of the broadcast type (see figure 2). The first step is to create a name/address list as illustrated on page 98 of the manual, with each address field numbered in angle brackets (<>), starting with <1>. You must use angle brackets rather than standard brackets in WPL address numbering; otherwise the system will not work. Also, in practice, you don't type the addressee's title and the address on the form-letter draft as shown in figure 2. Instead, you put only the date on the first line, followed by (Address) at the start of the same line or the second or third line after it. The AUTOLETTER WPL program in figure 1 will take care of inserting the correct address field.

The next step is to make up unique filenames for each set of form letters. Let's say, for example, that the form letter in figure 2 is called OVERDUE ACCOUNTS. Purely as a matter of convenience, you abbreviate this file name as OVRDUACTS and treat various later filenames similarly. The file with company names and addresses can have an abbreviated filename such as ADRSLST. You use these filenames in saving the form letter and address texts, respectively. Filenames can be uppercase or lowercase. When you display the disk catalog, lowercase filenames automatically appear in uppercase characters.

Now you display the WPL pro-

gram AUTOLETTER by typing the filename AUTOLETTER. The WPL program in figure 1 will appear on the screen. Using the cursor-movement sequence, move the cursor down to line 3. Shift the cursor to the right until it is placed immediately after the last R of FORMLETTER. Now press the space bar once to change the cursor to its normal state, and, using the left arrow key (Apple IIe and IIc users use the Delete key), backspace until the word FORMLETTER is wiped out. Then substitute your own form-

letter filename—OVRDUACTS, in this case. In a similar manner, go down to line 10 and substitute for the existing word ADDR\$ your new filename ADRSLST. Whenever you want words in all uppercase characters, all you have to do is to type a Control-K; the same command lets you revert back to lowercase.

Now save this modified AUTOLETTER WPL program under a new title, let's say FRMLTRMSTR as an abbreviation for FORM LETTER MASTER. The modified AUTOLET-

June 22, 1986

The Director of Finance
XYZ Co., Inc.
12345 A Street
San Jose, CA 94112

RE: OVERDUE ACCOUNTS RECEIVABLE

Dear Sir (or Ms.):

We would like to take this opportunity to inform you personally that more than 90 days have passed since we filled your orders. To date no payments have been forthcoming.

We would appreciate it if you would see that your Accounts Department sent payments in full on all overdue accounts by return mail.

Yours, etc.

.ff

Figure 2: A sample "broadcast" form letter. Note that the .ff at the end of the letter is not followed by a carriage return. The date can be either on the same line as the start of the name and address section or 1 or 2 lines above, if desired.

TER WPL program that appears in figure 3 has the filename OVRDUACTS substituted for FORMLETTER and ADRSLST for ADDR\$.

Printing Letters

You're now ready to print some form letters. Turn on your *letter-quality* printer; insert a single sheet into the printer; and type a Control-P and the words DO FRMLTRMSTR.

After the disk drive stops, the

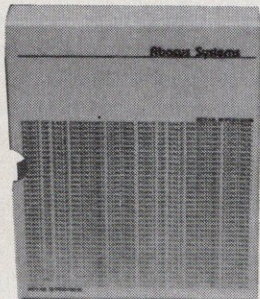
```
START PSX 1
LOOP NY
LOVRDUACTS
B
F/(Address)//
Y?
LADRSLST/(X)/N
PGO FOUND
PGO QUIT
FOUND PLSADRSLST/(X)/N=$A
B
F/(Name)/$A/A
PNP
PSX+1
PGO LOOP
QUIT PIN
NY
```

Figure 3: The FRMLTRMSTR program

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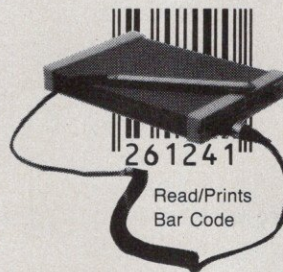


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CIRCLE 114 ON READER SERVICE CARD

screen will show the upper portion of the first letter with the first name and address, and a moment later, a statement will appear at the top of the screen telling you to insert a sheet and press Return. As soon as you press the Return key, assuming the printer is properly connected to and compatible with the computer, the letter should start printing. After one or two tries on plain paper to adjust the printer's left paper guide and the top of the sheet for proper positioning of the top margin, you can start automatic printing of the whole list on regular letterhead sheets.

You may want to modify your list of titles plus company names and addresses to include the phrase "Private Secretary, Office of" on the first line, preceding the title of the recipient (The Director of Finance, in the figure 2 example). This phrase may personalize a broadcast letter enough to save it from the oblivion that befalls so many form letters.

To add the phrase, you must modify the address list with the filename ADRSLST as follows, after first loading the file ADRSLST into memory and displaying it on the screen: You position the cursor to the right of <1> and type in Private Secretary, Office of. The word *of* is the last word of the first line, without any subsequent punctuation. Do *not* insert a space after the right angle bracket. Follow the same procedure for each successive number in angle brackets.

Now your address list will look like figure 4.

```
(1)Private Secretary, Office of
The Director of Finance
XYZ, Inc.
12345 A Street
San Jose, CA 95112
(2)Private Secretary, Office of
The Director of Finance
Firm name
Street
City, state initials, and ZIP code
(3)Private Secretary, Office of
The Director of Finance
etc.
```

Figure 4: A modified list of titles plus company names and addresses

When the list is complete, add the next number in angle brackets after the last address, press Return, and add .ff at the start of the next line—do *not* add a carriage return. Let's say the

last address in your list is <30> Private Secretary, etc. The next two lines are as follows:

```
(31)
.ff [no carriage return]
```

The extra number in angle brackets ensures that the computer will print the last letter completely, and the .ff is the form-feed signal to indicate the end of a page. In this instance, for both the letters and the envelopes, the .ff causes the ejection of the letters and the envelopes after printing.

Now that you've mastered the broadcast form letter, you can work on the personal-salutation type (i.e., "Mr. John Jones" in the address and "Dear Mr. Jones" in the salutation, or "Dear John" if you happen to be an acquaintance of the addressee).

Lesson 8 (page 88) of the AWII manual is entitled "Personalizing a Letter beyond the Address." In addition to dealing with the numbered address list, it covers the insertion of the recipient's name in various places in the letter, including the salutation. The manual says that you should type (Name) wherever you want the first name. It defines the first name as "the segment between <1> and a space." The only problem is that if you have Mr. John Jones, the first space after the <1> is after the Mr.; hence, in each place you insert (Name), the WPL program will print Mr., not the desired Mr. Jones or John. Here's a method that gets around that problem, however: In order to have the WPL program print Jones in the salutation, you have to type the Dear Mr. in advance in your form letter. The beginning of the letter might initially look something like figure 5, below (after AUTOLETTER printing from the ADRSLST WPL program).

```
Date
Mr. John Doe
Firm name
Street address
City, state initials, and ZIP code

RE: Fill in subject here if required

Dear Mr.
Start letter text here.
```

Figure 5: The beginning of a letter in an unmodified AUTOLETTER program

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Our next step is to generate a suitable, modified AUTOLETTER program.

Load AUTOLETTER as before. Let's say you've given the broadcast and personalized form letters the filenames LETTER A and LETTER B, respectively. Change the third line from L FORMLETTER to L LETTER B; the seventh line from L ADDR, etc. to L

```

START PSX 1
LOOP NY
LLETTER B
B
F/(Address)//
Y?
LADRSLST/(X)/(N
PGO FOUND
PGO QUIT
FOUND PLS#/$$/%/N=$A
B
F/(Name)/$/A
B
F/$$/A
B
F/%%/A
B
PNP
PSX +1
PGO LOOP
QUIT PIN
NY

```

Figure 6: The LTRMSTR B program

ADRSLST, etc.; and the tenth line (after FOUND) to PLS#/\$\$/%/N=\$A. Now insert five new lines, starting after the 12th line: The new 13th line reads B, the 14th F/\$\$/A, the 15th B, the 16th F/%%/A, and the 17th B. The final five lines of AUTOLETTER remain unchanged. To conserve memory space, you can arbitrarily assign the filename LTRMSTRB to AUTOLETTER modified for LETTER B, instead of the longer full title LETTER MASTER B. Figure 6 shows a printout of the LTRMSTRB file.

The final touch for personalized letters is to modify the general heading format of LETTER B so it looks like figure 7, below.

```

June 22, 1986
Address
RE: Fill in subject here if required
Dear Mr. (Name):
Start letter text here.

```

Figure 7: The general heading format of LETTER B after modification

To accomplish this modification, you change the ADRSLST file as follows in figure 8, below.

```

(1)Mr. John $$Jones%
XYZ. Inc.
12345 A Street
San Jose. CA 94112
(2)Mr. Peter $$$mith%
Delta Associates. Inc.
1 Executive Plaza. Suite 50
San Francisco. CA 94102
(3). etc.

```

Figure 8: To accomplish the modifications in figure 7, you make the above changes to your ADRSLST file.

The \$\$ and %% signs are delimiters that bracket the names you want printed wherever the (Name) Marker shows up.

In the current example, the names you delimit in this way will appear after the Dear Mr., followed by a colon to end the formal, personalized salutation. Of course, if you want Dear John or Dear Mary in lieu of Dear Mr. Jones, the \$\$ and %% should bracket the desired name. Therefore, the ADRSLST file has to read \$\$John%% or \$\$Mary%% instead of \$\$Jones%%, wherever you want the personal name form, and you don't use the Mr. after the Dear.

Preparing Envelopes

Now we have arrived at the last but equally important function, the preparation of envelopes in the same letter-quality type as you used in your form letters. (Having the envelopes match the type quality of the letters gives the appearance of individually

```

START PSX 1
LOOP NY
LENVLTR
B
F/(Address)//
Y$
LADRSLST/(X)/(N
PGO FOUND
PGO QUIT
FOUND PLSADRSLST/(X)/N=$A
B
PNP
PSX +1
PGO LOOP
QUIT PIN
NY

```

Figure 9: The ENVMSTR program

written letters.) Envelope preparation requires a three-step process involving changes to the WPL AUTOLETTER program:

1. Change the third line from L FORMLETTER to L ENVLTR; the seventh line from L ADDR, etc. to L ADRSLST, etc.; and, finally, the tenth line (after the initial word FOUND) to PLS ADRSLST, etc. You can call this modified WPL program ENVMSTR, for ENVELOPE MASTER (see figure 9).
2. The next step is to create the new FORMLETTER under the shortened filename of ENVLTR, as noted above. This simple WPL program reads as follows:

```

(Address)
.ff

```

Nothing more is necessary. Don't forget, there is no carriage return after the .ff.

3. The third step is to make up a modified printing format suitable for envelopes. In this instance, if you leave the printer's left paper guide as it was for the letters, you should change the printing format so that the left margin (LM) reads 45 instead of the default 9.

You can also change the page interval (PI) to 33 in lieu of the default 66, since the envelope is less than half as wide as a normal 8½ × 11-inch page. Change the page length (PL) to 33 as well and save it, using the filename ENVFORMAT. You can adjust the vertical centering of the typed name and address by rolling the printer platen so that the envelope's top edge is at some easily remembered point above the platen.

The process of automatically addressing envelopes, matching the names and addresses already printed on your form letters, is also simple. First experiment with a few envelopes to check the vertical and lateral envelope placement in the printer. Now you're ready for the real thing. Put a blank envelope in the printer and type a Control-P, followed by DO ENVMSTR.

The disk drive will operate briefly; then the computer will instruct you to insert a sheet (only if the SP printing parameter is set to 1) and press Return. The printer will quickly type in the name and address and eject each envelope. +

J.P. Neil is a Mountain View, California, consulting engineer.

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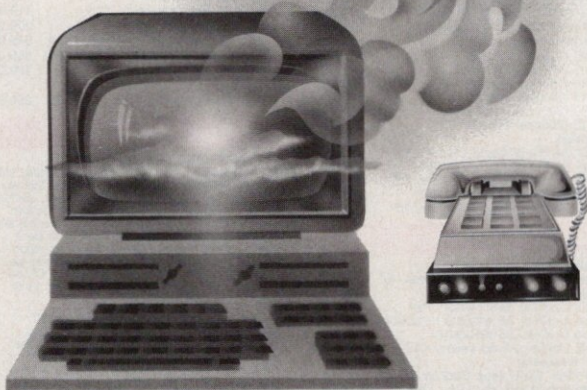
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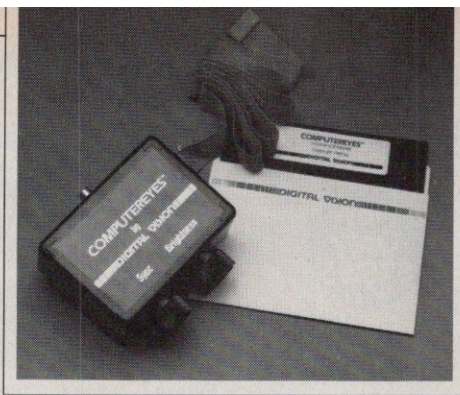
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Quick Take

BY ROBERTA SCHWARTZ

ComputerEyes

What's that you say? You'd like a video digitizer, but you don't have any slots left in your Apple II Plus or IIe? You'd like a digitizer, but you have an Apple IIc? You've looked around, and every system you've seen involves complicated hardware and software? Look again.

ComputerEyes is an inexpensive video-acquisition system that's available for the entire Apple II family of computers. Besides the standard hi-res software, it has optional packages to

take advantage of the IIc's or 128K Apple IIe's double hi-res or to create images that are compatible with The Newsroom or The Print Shop.

The system comes with a one-year warranty and a comprehensive 30-page manual that includes a detailed section on operating ComputerEyes from your own programs.

Before I go any further, I should interject that I'm assuming you're familiar with the ins and outs of video digitizers. If not, I'd suggest that, before you read this article, you take a look at "Eyes for your Apple," A+, March 1986, in which Anthony Revaux presented an overview of the digitizing process, applications for di-

gitized images, as well as a review of three other Apple II video digitizers.

The ComputerEyes module is a small (roughly 2½ × 3½ × 1½-inch) black box. Connecting the box to your Apple is a snap. For the II, II Plus, or IIe, it plugs directly into the game I/O socket. If you use a game-port extender, you don't even have to open your Apple. On the Apple IIc, it plugs into

the rightmost two connectors on the rear of the computer (serial port 2 and the joystick socket). The module plugs into your video source via a standard RCA-type phono jack.

The ComputerEyes module has two knobs, labeled Sync and Brightness. The first time you boot the software, you select Adjust Sync from the menu and turn the sync knob until you see the message In Sync on your monitor. You probably won't have to adjust the sync again unless you change your video source.

The Software

Every time you boot the ComputerEyes disk, you're offered the option of operating the DOS 3.3 or ProDOS version (both are on the same disk). You choose the disk-operating system that the software into which you plan to load your images

uses. From the menu you can select Help, Adjust Sync, Normal Capture, 4-Level Capture, 8-Level Capture, View Current Image, Save to Disk, Load from Disk, Catalog, Demo, and Exit.

Normal Capture gives you a high-contrast, black-and-white image. The scan takes approximately five seconds (see figure 1).

The 4-Level Capture, which takes about 22 seconds, gives you synthesized gray levels. The final picture is generated from four high-contrast images that are taken at different thresholds (like different exposures or f-stops with a camera). The system then merges these images together with different "masks" (number of pixels lit), corresponding to different gray levels.

The 8-Level Capture, which takes approximately 45 seconds, is similar to the 4-Level, but with smoother gray tones (see figure 2).

You can save images to disk as standard 34-sector files or you can pack them. The number of sectors a packed image uses varies according to its complexity.

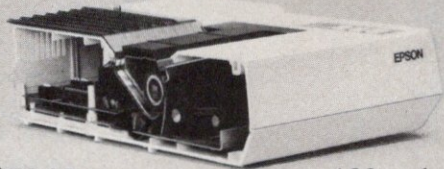
Using the System

Let's assume that you're using a camera as your video source. You set the object that you want to digitize in front of the camera and illuminate it. (Generally, video digitizers require a strong light source. I've used some that were ineffective unless I had two or three bright spots illuminating the subject. I was amazed to find that with this system, I got satisfactory images in natural daylight or under a 75-watt bulb.) Next, you select Normal Capture. If the captured image is too bright or too dark, you use the brightness knob on the module to change it; if it's out of focus, you adjust your camera. You repeat these steps until you have a satisfactory picture. That's all there is to it; go on and capture all the images you want.

ComputerEyes is a slow scan device—it acquires an image over several video frames, rather than just one. Therefore, it isn't suitable for rapidly changing images. If you want to capture your golf swing, this is not the system for you. If you're a professional artist who needs complete control over the image, you'll probably want to look elsewhere. This system doesn't offer any frills. You can't adjust the picture size, alter the grayscale settings or patterns, and so on.

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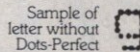
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that A+ readers use their Apple for more than one application? Many use their system for Word Processing and Entertainment, or Business and Education, or Graphics and Accounting.

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Figure 1: Normal Capture gives you a high-contrast, black-and-white image.



Figure 2: Double-hi-res image. The 8-Level Capture is similar to 4-Level but has smoother gray tones.

It has no color commands. Once you've captured and saved your image, however, you can use other software to enhance it.

If you want to capture images for use in a database or word-processing program, for electronic surveillance, to record measurements, for graphics applications, or just for fun, then you should consider ComputerEyes. Standard hi-res images, because of the Apple's resolution, are not very detailed, but the double hi-res images, with twice as many pixels, are excellent. The system is inexpensive, compact, and easy to use, and it creates satisfactory images with minimal lighting.

Would I buy it? Yes, I just did. +

Roberta Schwartz is a free-lance computer-graphics artist. She teaches at the New School in New York City and is coauthor of a book on Apple computer graphics.

PRODUCT INFORMATION

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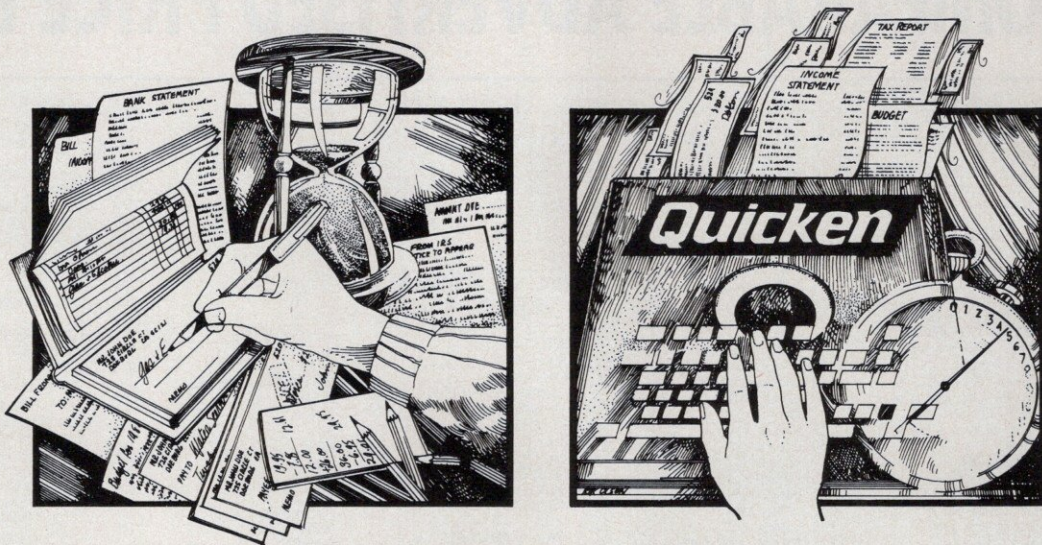
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CIRCLE 108 ON READER SERVICE CARD

MIND WHEELS AROUND THE WORLD

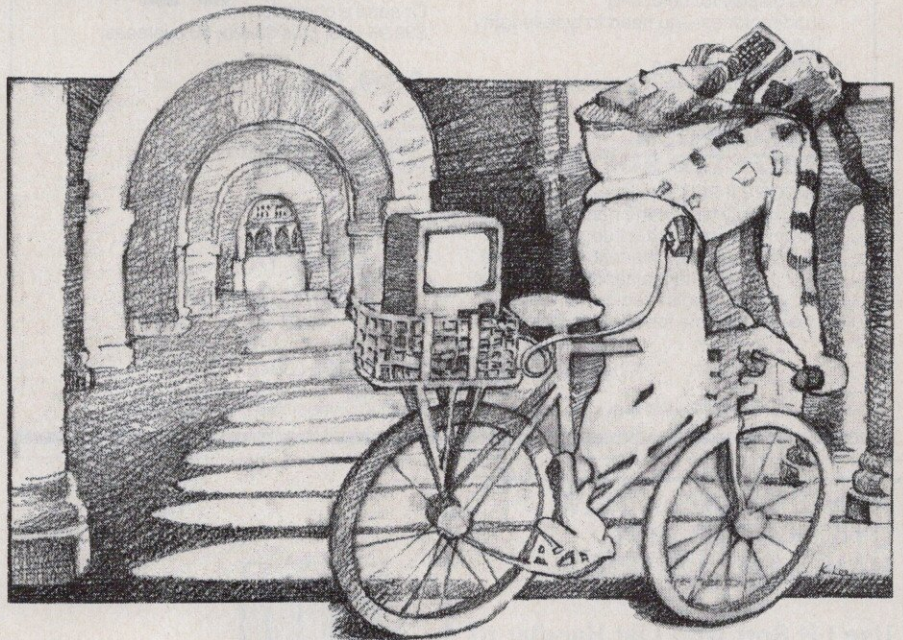
The International Apple University Consortium conference in England

Last March I attended a Wheels for the Mind conference, a meeting of the International Apple University Consortium, at Cambridge University in England. The purpose of this meeting was to allow AUC members from around the world to share with each other their experiences with campus-based Macintoshes. Participants from more than 30 countries spent several days listening to speakers, attending seminars, and seeing products at a third-party expo, all through the generous support of Apple.

When I was first asked to speak at this conference, I was surprised to find that the AUC was an international phenomenon. I had thought this activity was restricted to a select group of colleges and universities in the United States. It was thus a pleasant surprise to find that the campus Macintosh is as popular in Sweden and Australia as it is in Palo Alto and Boston.

The Mac is an expensive machine in Europe, not because its price is so high, but because taxes take such a bite and (in the United Kingdom, at least) wages are so low. For example, it takes about two weeks for an American professor to earn enough to buy a Mac. A colleague in England may have to work for several months to make the same purchase.

Any cost impediment to the purchase of this computer outside the U.S. was not in evidence at this conference, however. In fact, the level of commitment was probably higher than it would have been in the States,



simply because these people had invested so much just to get their computers in the first place. Therefore, attendees came with enthusiasm and a wealth of information to share.

The Conference

Conference participants attended a combination of keynote addresses,

The schedule of events was so packed that little time remained for the idle discussions in the hallways that are so important at conferences. As a result, conference mealtimes and receptions were alive with animated conversation.

The Presentations

Since the meeting was an Apple-sponsored event, one might have expected a glossy show of the type Apple sometimes puts on in the U.S. In fact, Apple's presence was understated. It portrayed itself as a partner with the universities, not as a slick sales organization pitching hardware.

This sense of partnership revealed itself in several ways. For example, Apple speakers were in the minority overall. Even the keynote addresses were split between Apple representatives (John Sculley, Jean-Louis Gassée, Alan Brightman, and Mike Spindler) and outsiders (Roger Schank from Yale, and me).

John Sculley reiterated Apple's well-known commitment to educa-

The campus Macintosh is as popular in Sweden and Australia as it is in Palo Alto and Boston.

AUC presentations, seminars, and a vendor expo. The presentations spanned the range from philosophical issues to the practical realities of incorporating the Macintosh into the classroom.

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Did You Know...

that the average A+ reader has invested more than \$5,200 in their Apple system?

tion and suggested that the personal computer could break down the traditional walls between the arts and the sciences, leading to a holistic approach to education.

Jean-Louis Gassée pointed out that there was a lot more to educational computing than setting up a lab full

John Sculley suggested that the personal computer could break down the traditional walls between the arts and the sciences.

of machines for students to use. He expressed concern that computers would be used as "vending machines for Saran-wrapped homilies." He argued that the computer could change the way we learn—that we had to explore the boundaries of the mind and that the personal computer was the compass and map of that adventure.

Alan Brightman, head of Apple's Office of Special Education, discussed the potential of the computer to help people with special needs become integrated into the mainstream of society. Michael Spindler, president of Apple International, suggested that industry and universities have much to learn from each other. He proposed that exchange programs be set up to let industry people spend some time teaching and for university people to spend time working in industry.

Roger Schank talked about the hype of artificial intelligence, suggesting that today's expert systems were a sham. He proposed directions of research that might lead to the creation of truly intelligent programs. My talk focused on computational metaphors and construction-set programming, topics I have mentioned in this column before.

From Philosophy to Practice

If the keynote addresses were philosophical in tone, most of the AUC presentations and panel sessions were practical. For example, Jean-Marie Hullot of France showed a LISP-based program he had developed to let programmers assemble user interfaces from a construction



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A brief look at the exhibits convinced me that excellent Macintosh products are being designed all over the world.

set. He spent a few minutes creating a "simple" program that included menus, windows, scroll bars, and the like. Once the components were on the screen, his program automatically generated the necessary LISP source code to bring these images to life. Hullot's goal is to create a user-interface construction set that generates source code in any of several programming languages, including LISP, C, and Pascal.

The presentation of some AUC software developed by Neville Smythe (of the Australian National University) was of more direct interest to teachers. He showed a mathematics program called ANUGraph that allowed users to construct mathematical equations using standard math notation. The program then plotted the equations on the screen to any level of precision (see figures 1 and 2). The program could plot several functions at the same time, allowing accurate measurement of intersections of curves. I wish I'd had tools like this when I was in college!

File Edit Function P

$$x - \sin(x^2);$$

+	-	—	(...)	...	√	x	y	7	8	9
cos	sin	tan	cosh	sinh	tanh	a	b	4	5	6
arccos	arcsin	arctan	arccosh	arcsinh	arctanh			1	2	3
sec	cosec	cot	sech	cosech	coth			.	0	x
exp	log				/			π	e	

Figure 1: Screen showing the construction of a mathematical expression with the ANUGraph program from Australia. The resultant expression uses standard mathematical notation.

I could go on for many pages about the other AUC presentations. Suffice it to say that the two I've described are typical of the quality of them all.

The conference's third-party expo allowed vendors from many countries to display their wares. A brief look at these exhibits convinced me that excellent Macintosh products are being designed all over the world.

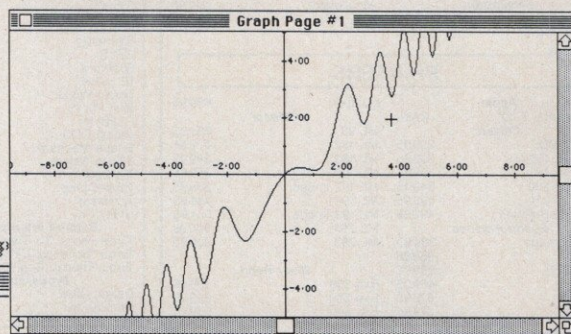
The Last Day

At the end of the last session, David Hartley, Cambridge's director of computing services and master of ceremonies of the conference, came on stage to officially close the proceedings.

"Well," he said, "its over—you can go home now. Go on, let's get back to work!" At that, he put on his academic robe, snapped bicycle clips onto his pants legs, and brought his bicycle onto the stage, complete with a Macintosh sitting in its basket! +

David Thornburg is a frequent contributor to this magazine and is the designer of Calliope, a nonlinear idea processor for the Macintosh and Apple II series of computers. You can reach him in care of this magazine.

Figure 2: Plot of the function from figure 1. The user can zoom in on any region of the graph to explore its behavior in detail.



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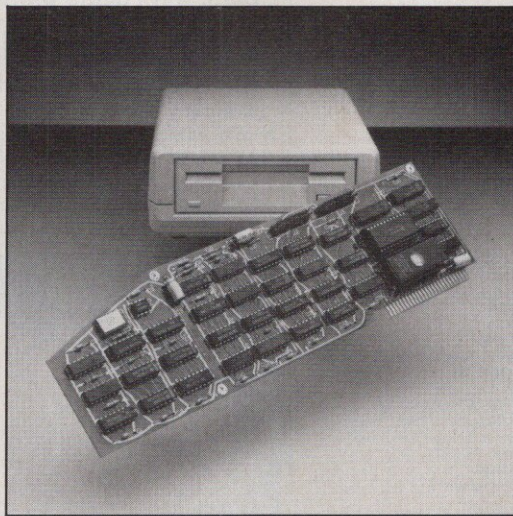
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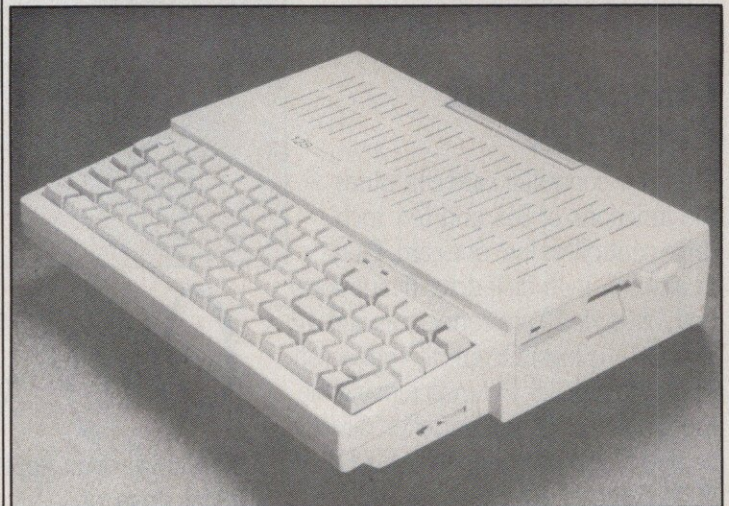
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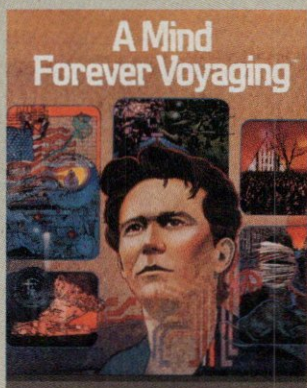
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Your country needs you. What can you, an ordinary young man, do to help? As it turns out, you're not Perry Simm, not ordinary, and not 20 years old. On what you perceive to be your 20th birthday, the facts of life are spelled out for you:

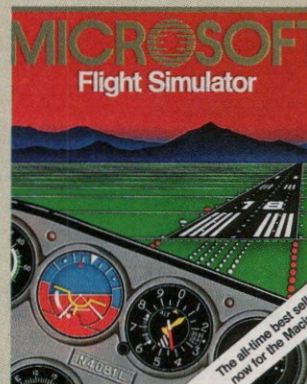
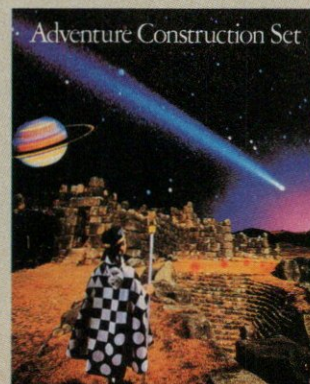
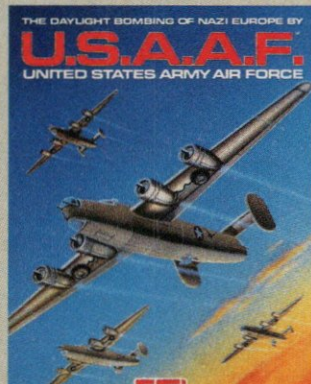
You're a computer that's been living a simulated life. You are PRISM, the first sentient computer, the successful end product of a long, daring experiment in artificial intelligence. Now, with the ability of a computer and the insight of a human, you can travel into a simulated future to test the ramifications of the Plan.

This is the scenario for one of Infocom's latest text adventures, *A Mind Forever Voyaging* (AMFV). One program requirement indicates just how intricate the game is: You need 512K to run it. Infocom rates AMFV as an advanced-level game—that's right between intermediate and expert. AMFV is a bewilderingly rich game, with a slightly different flavor than that of Infocom's other offer-

ings. Although you have to figure out a lot, there aren't any tricky puzzles in your path; you won't spend time figuring out how to unlock a Gothic door or finding your way out of a maze of twisty little passages.

As PRISM, you can enter into any of five "modes;" the simulation of the future—or futures (hint, hint)—is only one of them. You have access to facts and figures in the Library mode; the Communications mode activates your numerous audiovisual sensors; the Interface mode puts you in contact with subsidiary computer systems; and the Sleep mode—well, you figure out why a computer might need to sleep.

Your basic mission is spelled out for you: travel into the simulated future,



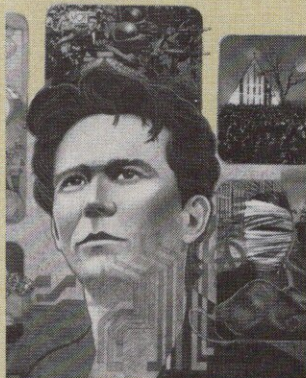
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observing and interacting, and record important details for the edification of your makers. Of course, you have to figure out what to record and where; you can't overdo it without overtaxing your core memory. It will dawn on you sooner or later that your own analysis of the data is also important, and eventually you'll be able to move further into the future to test your hypotheses. I can't say much more without giving too much away.

Infocom has done its usual superb job with AMFV, and then some. Would you believe a vocabulary of more than 1400 words? The packaging is as imaginative as ever. It includes a Decoder that serves as painless

copy protection for the disk; without the decoder, you can't find the proper reply to the security check, which means you can't enter the Simulation mode. It's indicative of AMFV's straightforwardness that the instructions for the Decoder's use are printed right on it; of course, I discovered that only after 20 minutes of trying various replies on-screen. If you've played other Infocom adventures, you don't expect things to be spelled out for you like that!

I have to admit I'm getting a little tired of adventure games in which the role I'm playing is a man; it's a little disconcerting to be talking with my wife in the game and to be interrupted by my husband. That problem aside,



AMFV promises any player hours (and hours and hours) of imaginative fun.

Sharon Zardetto Aker

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*Sensible Speller ProDOS works with the following word processors, AppleWorks, AppleWriter-ProDOS version (Apple Computer, Inc.), Format II Enhanced-ProDOS (Kensington Microware), Mouse Write-text files (Roger Wagner Publishing), MouseWord (International Solutions), PFS WRITE-ProDOS (Software Publishing, Inc.), Word-Talk (Computer Aids) and WordPerfect (SSI Software), Word Juggler (Quark Inc.), Writing Wizard (Scarborough Systems), Zardax-ProDOS (Computer Solutions), and others. Owners of trademarks indicated in parentheses: Black's Law Dictionary (West Publishing, Inc.), Stedman's Medical Dictionary (Waverly Press, Inc.)



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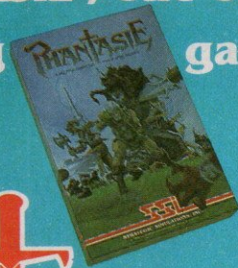
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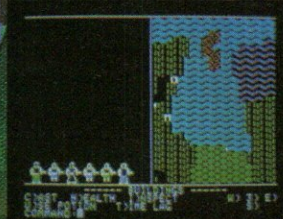
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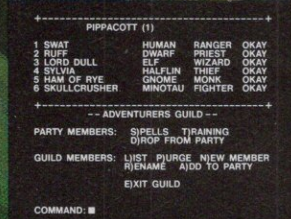
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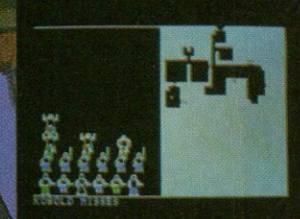
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Your group has found Pluto's Palace in the Netherworld.

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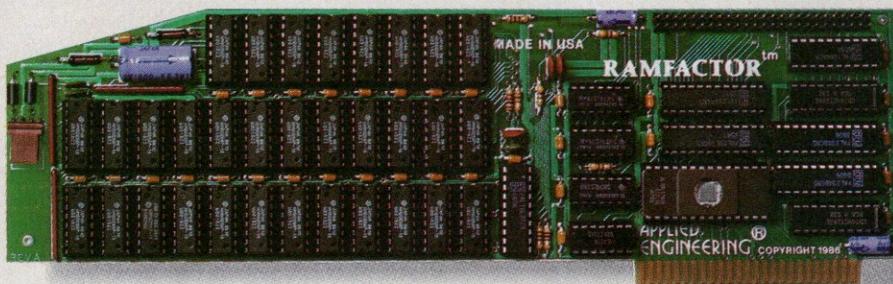
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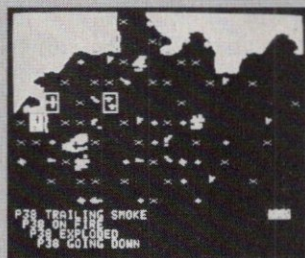
That's Entertainment

U.S.A.A.F. covers the "daylight bombing of Nazi Europe." In a two-player game, one player commands U.S. bombers and fighters, and the other commands the German air force (*Luftwaffe*, for you history buffs). In a one-person game, the computer controls either side. Five difficulty levels are available, and you will be happy to know that you can save a game in progress.

The game uses daily turns broken down into ten-minute segments for movement and combat. For the U.S. player, this scheme means evaluating the damage from previous raids, replacing lost aircraft and crews, assembling a bomber force, picking a target city, coordinating bomber missions to different cities, picking a mission type (from strafing airfields to bombing U-Boat pens), and coordinating fighter escorts.

The *Luftwaffe* player evaluates damage, redirects production, replaces aircraft, allocates flak units, launches patrols, intercepts U.S. bombers and fighters, and keeps track of ever-dwindling fuel supplies. Each side does all these things on a group level of about 50 planes per group.

Give U.S.A.A.F. designer and programmer Gary Grigsby credit—the program flows well. A menu-driven approach makes entering numbers, picking targets, reviewing results, and all the other things you need to do fairly painless. The aircraft-replacement step could be streamlined, and the whole procedure takes a



long time, but the process runs smoothly.

U.S.A.A.F. requires a lot of mental gymnastics, especially when you figure in experience points and morale levels. It is not so much a game as a mathematical exercise. The rule book contains more than a dozen formulas concerning such diverse effects as bomb damage, flak disruption, and air-to-air kill ratios.

Frankly, U.S.A.A.F. overwhelms me more than it captivates me. The meticulous detail and figure juggling may excite the dedicated wargamer, but it leaves me feeling like I am having a near-death/out-of-body experience—the detached impulse to be somewhere else while my body lies dormant at the computer.

If immersing yourself in number crunching while coordinating missions and bombing German factories is your kind of entertainment, however, then U.S.A.A.F. deserves a place in your disk drive.

Russ Lockwood

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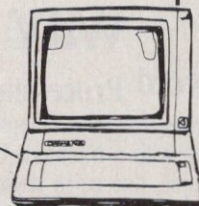
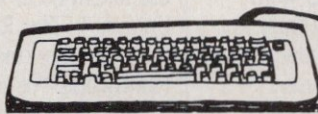
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That's Entertainment

PLAYING GOD

If you're an inveterate fantasy/role-playing adventure player like me, you probably get frustrated with certain games. I'm sure you frequently get tired of hitting your head against the wall trying to figure out the obscure solutions to some of their less-than-logical puzzles. Because of this, how many times have you exclaimed, "I can do it better!"? Well, if you were serious about your avowal, now you have your chance to try.

Stuart Smith's Adventure Construction Set (published by Electronic Arts) is an intricate program that allows you to construct your own fantasy/role-playing adventures. You can play God to



your heart's content, creating worlds and civilizations with their own customs, artifacts, and languages. If your world doesn't please you, you can destroy it all with scarcely more effort than snapping your fingers.

Included in the two-disk ACS package are a tutorial, complete with

seven mini-adventures (to give you an idea of some of the different types of games you can create) and a complete, complex adventure, Rivers of Light.

Lest you think you can come up with another Ultima, Wizardry, or Bard's Tale with ACS, guess again. The game you make will be in the same style as Rivers of Light, which is similar to Smith's earlier efforts Ali Baba and the Forty Thieves and Return of Heracles.

My feelings about ACS are mixed. If I were really wild about it, I could emphasize the ease of operation, going on at length about the menu-driven options. I could also do a great sell-job writing about the many choices you have in constructing

your game and the wide range of possibilities open to you; thanks to the ingenious Mr. Smith, you can control virtually every element of your game, from the maps to the mu-

ACS lets you construct your own fantasy adventures.

sic. And for those of you who don't care about deciding on every detail, I would certainly wax poetic about the way ACS can custom-build an adventure to your specifications with only minimal input from you.

If, on the other hand, I

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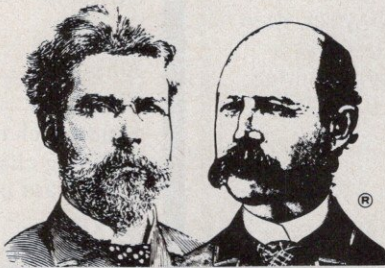
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• 1 ADDRESS	• 1 YOU'VE
• 1 ADDRESSES	• 8 YOUR
• 6 ALL	• TOTAL WORDS: 402
• 1 ALMOST	• CHARACTERS: 2013
• 1 ALWAYS	• CHARS/WORD: 5.0

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MacroWorks' Alpha-Cat program prints a sorted two-column list of all the file names on a disk. Perfect for disk I.D. labels!

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MacroWorks works with all versions of AppleWorks on any Apple IIc or 128K IIe. And you can make disk backups without hassle.

(AppleWorks is a trademark of Apple Computer, Inc.)

You can control virtually every element of your game.

were really negative about ACS in general, I could dwell on the speed of the game play (which you cannot control), as I found it to be rather slow and cumbersome compared with, say, Ultima IV, which really zips along. I would also mention strongly that the adventures you complete can only be played by other ACS owners, severely limiting the future life of your creation. After all, you won't want to play your own adventure, will

you? You know all the secrets and all the answers to your own puzzles!

But, putting all the pros and cons aside, I must question how many of you will actually take the time to put together your own adventure from scratch. No matter how easy ACS is to use, the forethought that goes into any adventure, let alone a good one, is difficult and time-consuming. Because ACS is not designed for computer programmers but is for users such as you or me, it is competing for essentially the same entertainment dollar in the marketplace of Ultima IV, Wizardry, and Bard's Tale. Those games are already finished, in perfect shape, and just awaiting your exploration.

So if you are one of those intrepid souls I described in the beginning of this review, before you are tempted to buy ACS, sit down at your desk and start plotting your original adventure on plain paper. Before you are too far into it, I guarantee you will suddenly have an enormous respect for the makers of all those games that used to frustrate you.

Donald Oliver

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auto-coordinated mode (rudder and ailerons work together), or you can operate the ailerons with the mouse and the rudder with the < and > keys.

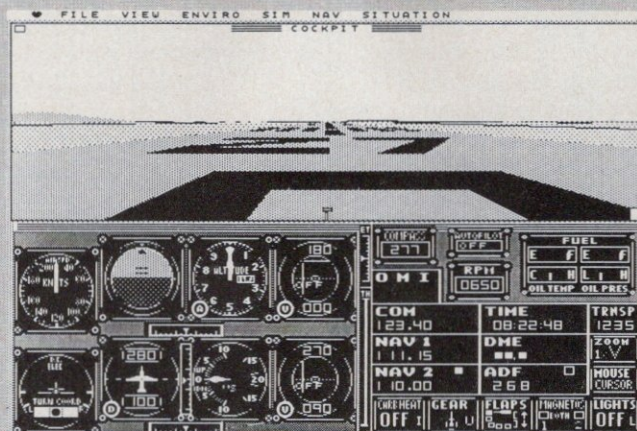
Basic operation of the planes is easy to grasp. You move the mouse forward and back to control the elevators, forcing the

nose of the plane down or up. Sideways motion of the mouse controls the ailerons, which cause the plane to bank. Dragging the mouse up or down controls the throttle and therefore the speed of the plane as well as its lift. Depending on the amount of realism you desire, apply-

ing the throttle too fast can flood the engines and cause them to fail.

The control panel is exceptionally clear and detailed. You have all the standard controls plus a full set of navigational equipment including two NAV radios, Distance Measuring Equipment (DME), Automatic Direction Finder (ADF), COM radio, and more. You can receive approach instructions and other data from airport towers and even land entirely by instruments using Instrument Landing Systems (ILS). Other controls include carburetor heat, magnetos, lights, flaps, and landing gear.

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That's Entertainment

The control panel is exceptionally clear and detailed.

barking on long flights, a sophisticated autopilot is available. You can set the autopilot to control wing levelers, constant altitude, and heading or set it to track a VOR signal. Each of these choices is available separately or together with others. On long flights (a transcontinental jet flight, for instance), you may want to set the autopilot, take a snooze, and come back later. Flying time corresponds to real time.

The game offers two ways to get past the real-time barrier when you're moving from one place to another. One is to set the actual coordinates of your desired destination by using the Position Set command. The excellent and detailed manual includes a listing of coordinates for major U.S. airports. The other way to cover a lot of ground quickly is to use what is called slewing. Slewing allows you to fly much faster than a plane could normally fly, viewing the scenery as you go. The coordinates of your current position appear at the top of the screen at all times.

Windows Everywhere

Microsoft Flight Simulator is loaded with extras. The Cessna sounds like

propellers; the Learjet sounds realistically like a powerful jet.

The simulator offers you several interesting ways of enjoying your

The ground tracking and spotter plane let you observe your plane as you fly.

flights. For instance, the Map window displays an aerial map of your present location.

In addition to the Map window, you can open a second view window. In either or both view win-

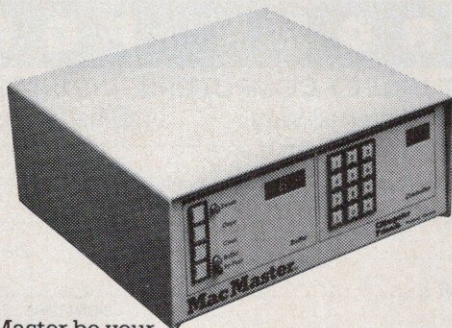
dows, you can display the view from the cockpit, from the ground (tower or tracking view), or from a spotter plane. You use the keyboard to select one of nine directions for the cockpit view.

The ground tracking and spotter plane are unique, in that they allow you to observe your plane as you fly. By putting one of these views in the second window and the normal cockpit view in the first, you might be able to perform complex aerobatics and watch your performance as you do. If you execute a particularly fine maneuver, you can turn on an instant replay at any time. You can set any window to any size or position on the screen and remove it quickly with a couple of

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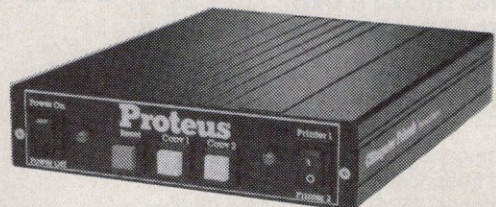
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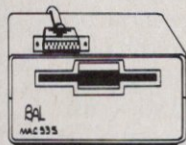


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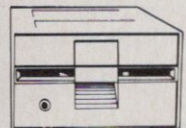
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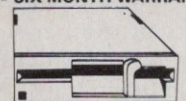
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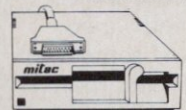
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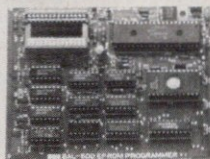
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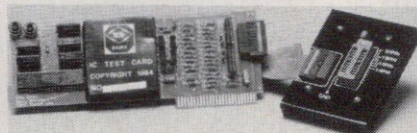
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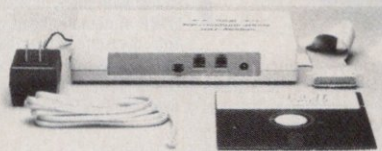
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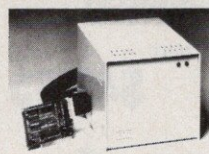
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That's Entertainment

button presses. You can zoom any window from half size to about eight-times magnification.

You can see some large landmarks—the Statue of Liberty (sans scaffolding), the World Trade Center, the Sears Tower, the Golden Gate Bridge, and many others—during your flights. To speed up the program, you can choose a wire-frame display in place of the default 3-D shaded images.

Nonpilot's View (Rusel deMaria)

What's it like to fly Microsoft Flight Simulator? I found it easy, with a little practice. Simple take-offs and normal flight

*Landing
requires a
fair amount
of coordination.*

conditions posed no problems. I had to get used to some delays in the planes' responses—more delay with more and bigger windows. Even a complete novice like me can fly pretty well, though. The trouble comes, as it does in real flying, during landing. Landing requires a fair amount of coordination and understanding—but, with practice, it too is within anyone's grasp. The manual is very informative and helped me gain enough understanding of flying to make the experience rewarding. The more realism I added to the simulation, the more difficult it became. In the end, I preferred sunny skies, calm air, and few windows.

Pilot's View (George Fontaine)

I enjoyed the program. Although nothing can take the place of real flying, Flight Simulator puts on a pretty good show. Being able to watch yourself from the spotter plane adds a novel twist, and it's something that real flight can't provide.

I did have some difficulties. I would have preferred a joystick to the mouse. A joystick just seems more natural, and I didn't really like some of the things I had to do with the mouse—especially double-clicking to obtain access to the menus. Also I was unable to use the elevator trim tabs the way I wanted to achieve level flight. The elevator seemed to overcompensate and didn't allow me enough fine-tuned control.

This is the best flight simulator I've flown on a personal computer to date, however. The program has plenty of airports available and documented in the manual. I think even experienced pilots will find the responses quick enough and the choices interesting and varied enough to add some spice to their computer-room excursions.

*Rusel DeMaria
and George Fontaine*

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Look for a tall brunette in a trenchcoat... and nothing else.

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Chicago Tribune: "This marriage of computer technology and sex is natural... erases forever the image of computer-users as dull guys with slide rules in their pockets and square roots on their minds."

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*Who says newer
is better?
There's life in the
old games yet.*

ENTERTAINMENT Classics

Summer is upon us, and while young people's fancies turn to vacations and beach parties, software manufacturers are knocking themselves out to alert the public to their new and exciting line of computer games. For a change of pace, however, I'm going to draw your attention not to what's new, but rather to what's old—but still good. No, not good—great. Except where noted, all the games I'm going to discuss here were copyrighted in or before 1983, and in the dizzying world of computer technology, three years is a long, long time.

In the flush of the Apple II's early success, hundreds of games were released, most of which have deservedly been consigned to the Land Where Bad Computer Games Go. Many of the games that came out in those first few years are

not only still with us, however, but are as good as or better than anything that is being released now. Some are even being considered modern classics.

Golden Oldies

Lest you think I'm alone in holding on to the past, you should know that a fairly new company called Software Country has brought out a package called Golden Oldies. On a two-sided disk are four classic computer games: Pong, the first, the original, the one that whetted the public's appetite for home games; Eliza, the first attempt at computer-intelligence simulation; Life, the kaleidoscopic window onto an alternate universe; and the original colossal cave Adventure, the granddaddy of all adventure games. These games are presented here in their original states, not in the modified versions in which some of us have

encountered them. They are not just for purists or historians, although it is undeniably fascinating to be able to go back to the beginnings, to see how far the industry has come. You'll enjoy recognizing elements in each of these four games that newer games have borrowed freely. For example, mix the plot and thrilling danger of Adventure with the more sophisticated word-recognition parser of Eliza and, voilà, Zork! Nothing is wrong with this borrowing, mind you. Creative artists have always benefited from exposure to the best of what came before.

Since we are living in a time when Archie Bunker's chair and Fonzie's jacket are in the Smithsonian Institution, it is fitting that at least one software manufacturer is looking back, celebrating the ancestors of today's game software. By the

way, this package is merely Volume One. Volume Two is promised for release in the fall of this year.

Gadzooks! Zork!

Since the runaway success of Zork I in 1979, Infocom has released 18 text-adventure games, recently upgrading the earliest ones to take advantage of 80-column screens. All these games are now available in uniform-size, snazzy packaging. Vividly descriptive prose; a superb and much imitated command parser; and packaging that is detailed and intriguing are the hallmarks of every Infocom game. Zork I, Zork II, and Zork III are expansions and elaborations of the original Adventure (see Golden Oldies), in which you explore the ruins of an ancient empire that lies far underground.

Because of their style and tone, Infocom's En-



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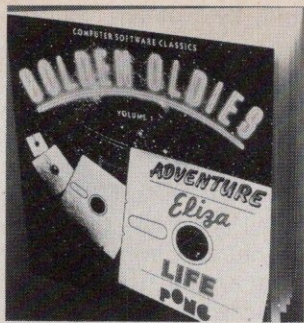
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Golden Oldies—four classics from Software Country

chanter series, composed of Enchanter, Sorcerer, and the recently released Spellbreaker, is considered a continuation of the Zorks, although the plots are different. In the Enchanter series, you start out as a neophyte wizard and eventually assume leadership of the Circle of Enchanters. Each part of the Zork and Enchanter series is a separate and complete story and can be played independently, but you will get maximum enjoyment if you experience them sequentially.

Infocom's games are divided into four categories: Mystery, Fantasy, Science Fiction, and Tales of Adventure. It's hard to pick favorites, but I'm partial to the two mysteries Deadline and The Witness, in which you, the detective, have to solve baffling homicides; and



Infocom's Zork I, II, and III—elaborations of Adventure

Infidel, one of the Tales of Adventures, in which you, as an antihero archaeologist, discover and plunder the riches of an ancient Egyptian tomb.

If you haven't yet ventured into the world of interactive fiction, Infocom's got an offer you can't re-

fuse. You can buy an Infocom sampler that contains excerpts from Zork I, Planetfall (from the Science Fiction series), The Witness, and Infidel. As a valuable bonus, the same disk contains a tutorial that gently and amusingly guides you through the techniques of solving interactive fiction—useful for any such games, not only Infocom's.

Now why can't you refuse this offer? Because the sampler retails for only \$7.95, and if you don't like it, you can get a full refund from Infocom. If the sampler gets you sufficiently hooked to go out and purchase any Infocom game, Infocom will give you an \$8 rebate. So what are you waiting for?

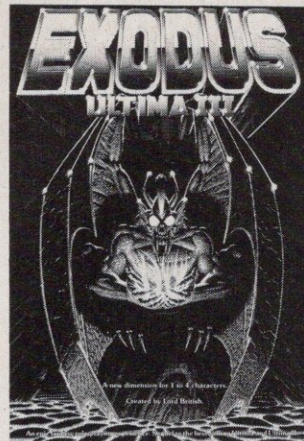
Other Adventures

As the capacity of home computers has grown, so has the complexity of adventure games. Matching Infocom's dominance in the text-adventure market, Sierra On-Line created and developed the graphic-adventure game virtually singlehandedly. Unfortunately, its first six graphic adventures, Mystery House, The Wizard and the Princess, Cranston Manor, Ulysses and the Golden Fleece, Time Zone, and The Dark Crystal, are out of print. Sierra has discontinued them because the new games bearing the company's label are much more advanced. You can still find the old games, often at greatly reduced prices, however. The Wizard and the Princess even comes for free in every package of Sierra's new-style adventure game King's Quest. If you can get your hands on an original Time Zone, the mammoth 6-disk, 12-sided epic game that Sierra claimed would take a year to play, grab it! Only 2500 copies were issued originally, and they

carried a (for then) whopping price tag of \$99.

Ultima

What is Ultima? Is it an adventure game? Yes. Is it also a fantasy/role-playing game? Yes. Does it have arcade-style graphics? Yes. Does it have multilevel dungeons to explore? Yes. Towns, villages, shrines, and other landmarks to visit? Yes. People to talk with? Yes again. Monsters and assorted meanies to destroy? Yes, yes, yes. The Ultima series has all these aspects and much, much more. The author, Lord British, not satisfied to rest on his

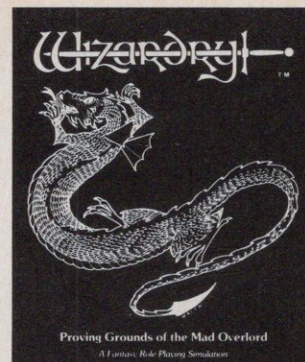


The Ultima III fantasy game, from Origin Systems

considerable laurels, completely rewrites the gaming system with each succeeding installment, making the newer Ultimas more interesting, more complex, and more playable than the earlier ones. So, should you get Ultima I, II, or III if Ultima IV (released in 1985) is such a significant improvement over the others? Sure. I've played them all (in order), and my enjoyment was greatly enhanced by my knowledge of the previous ones.

More D&D

Wizardry has consistently been a best-seller since its release in 1981, and this computerized Dungeons and Dragons fantasy/role-playing simulation still has the power

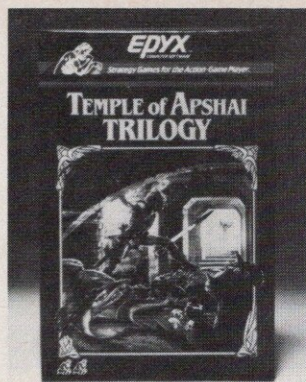


The best-selling Wizardry, from Sir-Tech Software

to bewizard you. The amazing ten-level dungeon awaits your exploration, daring you to uncover its secrets. In the first scenario, called Proving Grounds of the Mad Overlord, you create a group of characters who must adventure together in search of loot and glory. Creating characters is no small feat. You will have to experiment a bit, venturing into the dungeon several times just to see how your characters will fare.

Teamwork is terribly important, so if your characters don't seem to complement each other or if they get killed too quickly, you will have to do some rethinking. Never fear, your options are many, and eventually you will make up a group that works well together. Warning: Wizardry is highly addictive, with no known cure except fighting to the finish!

After you have conquered the first scenario, you will surely want to go on to the sequels, Knight of Diamonds and Legacy of Llylgamyn. (A rumor's going around the castle that a fourth scenario, The Return of Werdna, is going to be released—but don't tell anyone yet.) Sir-Tech Software, manufacturer of Wizardry, also makes a useful reference utility, Wiziprint, which lets you print out your game statistics.



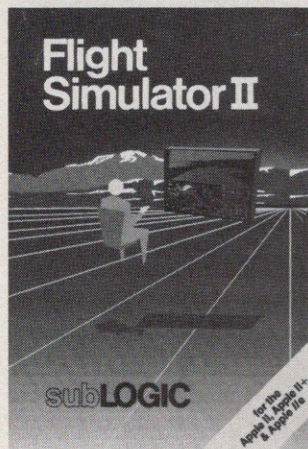
Epyx Software's The Temple of Apshai Trilogy

Wizardry, for all its complexity, is basically a text game, with a hi-res picture window in the upper left corner of the screen. The Temple of Apshai Trilogy from Epyx Software, however, is a thrilling, adventure-filled, real-time, dungeons-and-dragons game with hi-res graphics. The Apshai games were originally issued in three parts, on three separate disks. Now, Epyx has rereleased the entire saga, The Temple of Apshai, The Upper Reaches of Apshai, and The Curse of Ra, complete on one disk with 12 levels and 568 rooms to explore and 37 different monster types with which to battle. New graphics, enhanced sounds, and faster play are some of the improvements in this new version. An 81-page illustrated manual accompanies the disk, giving full descriptions of all the rooms and their contents. Will you attain the grand treasures of the Apshai priests and live to learn the secret of the Sphinx? I'll write a prayer for you. In hieroglyphics, of course.

Flying High

SubLogic's Flight Simulator II has been on the best-seller charts since its release in 1983. I was one of its early purchasers, itching to pretend that I was at the controls of the Piper Archer II—a single engine aircraft with non-

retractable gear—flying around the four scenic areas available on the disk. Even though I made an honest attempt to study the flight-training manuals that came in the game package, I just couldn't coordinate my ailerons with my flaps, however. To my utter delight, I discovered the recently published book *40 Great Flight Simulator Adventures* from COMPUTE! Publications, in which the author, Charles Gulick, gives specific directions and parameters for 40 exciting customized flight scenarios. Even with all the details spelled out, I still had to learn how to fly the darn plane, but now I had more incentive to do so. I discovered many things I never knew you could do with Flight

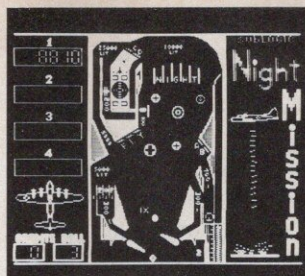


SubLogic's Flight Simulator II—another best seller

Simulator II. Being a dyed-in-the-wool New Yorker, I picked as my favorite scenarios the ones that took me flying around and between the towers of the World Trade Center and through the cables of the Manhattan Bridge. If you haven't yet made Flight Simulator II a part of your collection, you must, but make sure to get a copy of the new book, too.

Pinball

I guess I'll now have to admit that I was a pinball freak when I was younger.



Night Mission Pinball, also from SubLogic

Oh, I didn't hock the family jewels to get quarters to throw into the machine, but I wish I had a dime for every dime I spent. Now my pinball needs are more than satisfied by SubLogic's Night Mission Pinball. The decorations on actual pinball machines have themes, and this software has that of a night bombing raid. Night Mission is so good that you often forget you are not playing a real pinball machine. The sound effects are great, the ball handles realistically, and you can customize the game to suit your whims. Do you want the game to be more difficult? Easier? To award more points every time you score? Simple. Just type FIX, follow the directions in the manual, and deposit those symbolic quarters into the slot. Try the Cosmic mode first. Like wow, man!

Home Arcade Potpourri

Brøderbund Software's Choplifter! presents you with a humanitarian challenge: rescue 64 hostages from the Bungeling empire and transport them in your helicopter to the American post office. Sounds simple, eh? Heh, heh, heh! You don't get points for shooting tanks or planes, although you are able to blow them to smithereens. You score points only for rescuing the hostages.

One last confession: I am a secret Robotron 2084 addict (it comes from Atarisoft). I play it every chance I get. The game is fast-moving and colorful,

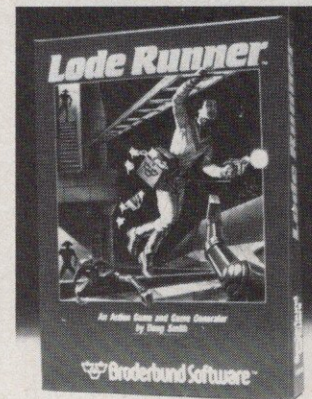
and, best of all, you can never play exactly the same game twice. To improve your score, you must learn strategies and coordination, not precise patterns. The object of the game is no less than saving the last human family from annihilation.

Swashbucker, from DataMost, allows all you armchair Errol Flynn to battle hordes of dastardly pirates aboard a ship. It's stylishly animated and keyboard-controlled, and it saves your high scores to the disk.

Run, Lode Runner, Run!

Lode Runner, Brøderbund's award-winning, best-selling, arcade-style game, has a staggering 155 levels. The goal of each action-packed screen is the same: to steal gold from the Bungeling empire while eluding the guards. It's a deceptively simple premise, but Lode Runner is a challenge-and-a-half! After you get through the 155 levels, an editor on the disk allows you to create your own screens.

Lode Runner has had more than a million copies sold in Japan alone. On August 11, 1985, at the Japanese World's Fair, a Lode Runner competition was held, matching 50 contestants who were selected from 3700 applicants from all over Japan.



Brøderbund Software's award-winning Lode Runner

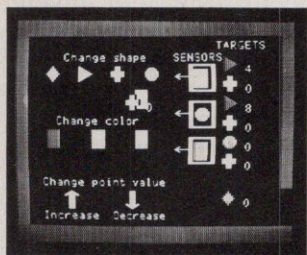
Each contestant got three minutes of playing time on a Sony Jumbotron, which has a display area of 80 x 150 feet.

The winner was 12-year-old Yasutaka Fujii. A devilishly hard sequel, *Championship Lode Runner*, was released in 1985, bearing the admonition "For experienced Lode Runner players only!"

Newfangled Education

Rocky's Boots is from The Learning Company, which means that it's supposed to be educational, right?

Absolutely. But it's also stimulating fun to play. *Rocky's Boots'* brain-teasers, which are geared for ages 9 and up, will appeal mostly to the younger end of the age spectrum but will also be appreciated by those who think they're too old for it. After going through a tutorial that teaches fundamental concepts of logic and computer circuitry, you have to design animated kicking machines (the boots of *Rocky's Boots*), using your newly gained knowledge. Then, if you care to, you can even design your own kicking games, keeping the basic premise of the existing ones. Still not sure if *Rocky's Boots* is for



Rocky's Boots, from The Learning Company

you? The Learning Company offers a 30-day money-back guarantee. More recent editions of *Rocky's Boots* have a save-game feature not available on the earliest releases.

Gone, but Not Forgotten

Regrettably, the following games are no longer

being manufactured, but around my house they are still alive and well. I mention them now because they are wonderful, and you can probably find them through mail-order dealers or at computer

shows at nearly give-away prices.

Arcade Machine, from Brøderbund—You probably don't have the patience to design your own game, but you'll get a kick out of having the means to

do it if you're ever so motivated.

Bandits, from Sirius—Kill the invaders before they steal your supplies. This classic features gorgeous graphics.

Muse Software's Castle

PRODUCT INFORMATION

All games work on the Apple II series (Apple II, II Plus, IIe, and IIc) and require at least 48K RAM, except where noted. Most graphic games are meant for use with a color monitor, but you can play all the games if you have a monochrome monitor, unless otherwise noted.

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Choplifter!

Lode Runner

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Wolfenstein pits you against those nasty Nazis as you use all your resources to escape from a four-level maze-like castle. You get to don a Nazi uniform to avoid detection, steal bullets and keys, kill the guards, and eventually locate a set of secret Nazi plans that the Allied forces would love to get their hands on—if you can get out alive.

Drol, from Brøderbund—Cute and colorful. Your object is to reunite a mother with her two children, who were bewitched and are wandering around a maze populated by fantastic creatures. You are equipped with a jet-pack and some killer pellets.

Madame Shepp's Tarot (G.Y.S.T.)—Don't know where you'll find this one, but if you see it, get it! Madame Shepp reads your fortunes, using her tarot cards, which you electronically shuffle and cut. Traditional interpretations.

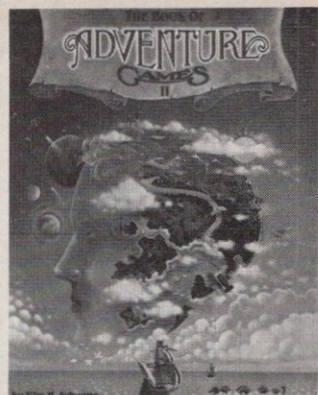
Pac-Man (Atarisoft)—Is there anyone out there who has never eaten even one power dot? There's a reason why Pac-Man is arguably the most famous computer game ever. Find it, and you'll know why.

Spare Change (Brøderbund)—As the manager of an arcade, you must outwit the Zerks as they attempt to steal five of your tokens. Slapstick action; hilarious fun.

Threshold (Sierra On-Line)—Space Invader-like action. Still one of the most beautiful and challenging games ever released for the Apple. Many screens of cleverly designed alien what-nots.

And Still More!

There are lots more games that I don't have room to mention here. You can find out about many more of them, however, from the invaluable yearly guide *The Book of Apple Software*, published



The Book of Adventure Games, from Arrays, Inc.

by Arrays, Inc. Hundreds of different software packages are discussed in detail, with concise, readable, objective descriptions to aid in your purchase decisions.

Stuck in the middle of that adventure game? Arrays also publishes *The Book of Adventures—Volumes I and II*, in which you can find maps and extensive hints for solving dozens of the most popular adventure games, including nearly every one I've mentioned above.

Finally, from COMPUTE! Publications you can get *The Greatest Games: The 93 Best Computer Games of All Time*, written by Dan Gutman and Shay Addams. It is an entertaining paperback that contains lively, in-depth reviews of adventure games, sports games, and arcade games.

So, support your favorite game manufacturer's latest products, but don't forget those old reliable games that have provided many, many hours of devoted fun. Happy gaming to you! +

Donald Oliver is an author and composer whose latest book is How to Audition for the Musical Theater (Drama Book Publishers). He wrote the score for the Broadway musical The Case of the Dead Flamingo Dancer.

YOUR MONTHLY MODEM LINE

Service starts and stops, Macintosh E-mail, and Teletips galore

As more and more companies enter the telecommunications world, they find that the initial, simple desire to exchange data can transform into a complicated task of matching parameters and protocols. Then factor in micro-to-mainframe links, local-area networks, data transfer with other companies, and new technology, and the situation turns into a data-processing-manager's nightmare.

To straighten out the telecommunications tangle, several companies have banded together to form the Corporation for Open Systems, a nonprofit group to recommend industry standards for communications, microcomputers, and other equipment. The organization received a big boost when 13 companies, among them Boeing Computer Services, Eastman Kodak, and Hughes Aircraft, became members.

Of course, an industry "standard" sometimes turns out to be a double standard, as financial risks outweigh displacing an entrenched technology. Nevertheless, manufacturers and users are looking for the ease and convenience of compatibility that comes with such a standard. COS aims to have a say about that compatibility.

A Service Stops . . .

Back in February, I wrote about an inexpensive telecommunications service owned by Knight-Ridder Newspapers called Viewtron. The company started making a big push for subscribers in the last quarter of 1985 and even managed to lure the Independent Commodore Users Group



(ICUG) to switch over from CompuServe. Although the marketing effort quintupled the number of subscribers (from 3000 to 15,000), Knight-Ridder closed the service on March 31. Last-minute negotiations to sell Viewtron

AT&T terminal to use it. The company ignored personal-computer owners until 1985, when it started offering an ASCII version of its service. Most analysts agree it was too little, too late.

Knight-Ridder officials maintain Viewtron was a research venture. This venture cost the company an estimated \$15 million in 1984 and \$12 million in 1985.

. . . And a Service Starts . . .

Who does producer Ivan "Ghostbusters" Reitman call when he wants news about the entertainment industry? How about Walt Disney Studios, RKO Pictures, Home Box Office, and industry luminaries?

A new service named Baseline.

It provides information on 34,000 television, film, and theatrical productions, as well as on more than 200,000 people—actors, directors, key grips, and everyone else who appears in the credits.

The program charts audience statistics, lists literary properties with

Baseline provides information on more than 200,000 people—actors, directors, and everyone else who appears in the credits.

to ICUG fell through for lack of financing.

Viewtron originally started in 1983 as a videotex service, using North American Presentation Level Protocol Syntax (NAPLPS) to transmit text and graphics. The only problem was that you needed a \$600 dedicated

available film rights, and provides current information about projects that are in production. Yes, it even offers electronic mail and stock prices.

Baseline carries a \$97 sign-up fee and a \$75 monthly subscription fee (including one hour of "free" usage) and charges \$45 per hour.

... And a Service Continues

Mnematics is not exactly a household name, but it is trying to be. This little-known company opened for telecommunications business in 1983 and offers the standard fare of ser-

People who run timesharing systems may find Vision-Plus a vision come true.

vices at 300 and 1200 bps for the low, low price of \$3.49 per hour (after a \$39.95 sign-up fee).

How?

"Low overhead," deadpans company spokesman Richard Hall.

I'll take a closer look at Mnematics in an upcoming column.

TELETIPS

This section deals with news, views, and breakthroughs in the telecommunications world. It also offers a quick overview of new features added to services we have already reviewed.

Macintosh Forever

In the corporate world, the IBM PC reigns supreme. IBM knows it. Apple knows it. Third-party manufacturers know it. So tell me, does General Electric Information Services Company (GEISCO) know it? Judging strictly from its Macintosh-only service BusinessTalk, I guess not.

BusinessTalk lets companies with Macintoshes communicate over GEISCO's national network. It takes advantage of the pull-down menus, icons, scroll bars, and other characteristics of the Mac environment. It even lets you work on one file while printing out another.

At \$40 per hour, BusinessTalk is not cheap, and prototype systems have had their problems. Still, it is a definite step in the right direction.

By the way, GEISCO evidently does know all about the IBM PC. It is developing a version of BusinessTalk that works with Microsoft Windows, a Mac-like environment for MS-DOS computers.

Multitalented Terminal

Making your Macintosh emulate a terminal is no big deal. Several programs already exist. Vision-Plus from Rammus Vision is the first program I've run across, however, that makes the Mac emulate a terminal server that can control up to eight concurrent host processes—all the while retaining the mouse- and icon-driven environment.

Most of us would never even think about such grandiose communications schemes, but people who run timesharing systems such as DEC's VMS, Berkeley's UNIX 4.2, AT&T's UNIX V.2, IBM's VM/CMS, and DG's AOS/VS may find Vision-Plus a vision come true.

World's Biggest Blooper

Dick Clark might appreciate it, but a couple of sharp-eyed readers didn't. In the April issue, under the capsule description of Write Away, I wrote that the program was DOS 3.3-based and could not run on the IIc or ProDOS-equipped IIe.

Absolutely wrong. Guilty as charged. I plead insanity. Evidently a

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power surge to the brainRAM disrupted an intention to differentiate between DOS 3.3- and ProDOS-formatted disks. Although ProDOS is the operating system of choice for the IIc and enhanced IIe, Apple's commitment to compatibility allows the use of DOS 3.3 as well. Sorry for the gaffe, folks.

My new CompuServe number is 73537,1075. My old number is no longer valid, and messages sent to it have fallen into electronic oblivion. You can also reach me via MCI Mail at RLOCKWOOD.

To reach *A+* magazine proper, send MCI Mail to APLUS or dial the *A+* BBS at (415) 474-8608. *A+* magazine is also setting up a RoundTable on GENie (see my June 1986 column for a review of the service). Stay tuned for details.

By the way, the pricing structure for GENie outlined in the June column is incorrect. The correct pricing structure is as follows:

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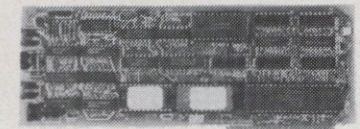
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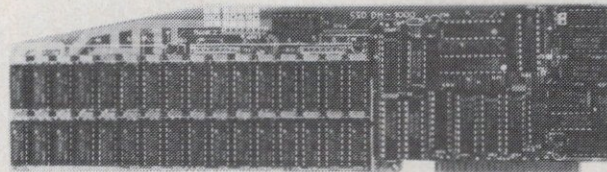


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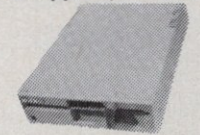
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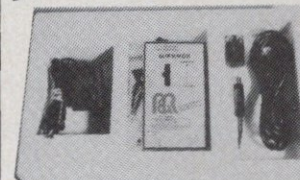


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The Macintosh Section

In this, the final installment in a three-part series on 68000 programming on the Macintosh, I'm going to look at some of the programs that make up Apple's Macintosh 68000 Development System (MDS). In so doing, I'll show how to use them to create a simple Macintosh application.

The four MDS programs with which every assembly-language programmer must become familiar are

- Edit, an editor for creating your 68000 assembly-language source-code files, linker-control files, and resource-compiler source-code files
- Asm, an assembler for converting your 68000 assembly-language source-code files into object-code modules
- Link, a linker for combining one or more object-code modules into a single application, in accordance with the directions in a linker-control file
- RMaker, a resource compiler for converting source code defining data structures such as menus, windows, and icons into resource modules that you can append to an application

Figure 1 is a flowchart of the usual assembly/linking/compilation procedure. Variations are possible, but I'll be following this basic procedure to develop the sample program defined by the source files in figures 2-4 on the following pages.

The sample program creates a large window on the screen and a menu bar with an apple menu and a

PROGRAMMING

BY GARY B. LITTLE

PART III

68000 ASSEMBLY-LANGUAGE PROGRAMMING

This final installment of our series looks at some of the programs that make up the Mac's 68000 Development System and shows how to use them to create a simple application.

File menu. The File menu contains a Quit command you can use to exit from the program and return to the Finder. You can use this program as a shell for testing other programs when all you need is a window in which to display a result.

Edit—the Editor

The MDS editor is called Edit. With it you can create the source files the assembler (figure 2), linker (figure 3), and resource compiler (figure 4)

use. If you key in these files, you should call them APlus.Asm, APlus.Link, and APlus.R, respectively.

At this point, it's not important that you understand exactly what these source files do, although the comments in the files should help you in this regard. What is important is to understand how to convert this group of source files into an executable program. Keep reading to find out how!

Asm—the Assembler

The MDS assembler is called Asm. You use it to convert a 68000 assembly-language program from source-code form to a relocatable-object-code form suitable for subsequent processing with the linker. The object-code files the assembler creates have .Rel suffixes (for *relocatable*).

Each line in the source file comprises four fields, each separated from the next by one or more tab characters or blank spaces (see figure 2). These fields are the label field, the instruction field, the operand field, and the comment field.

The Label Field. A label is a sym-

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bolic name for a position in a program or a piece of data. It must begin with a letter (A-Z or a-z), a period (.), or an underscore (_); subsequent characters can also include digits (0-9) and dollar signs. A label's primary function is to provide a symbolic name for a piece of data or for the target address of a branch or jump instruction. The use of labels makes a

A label is a symbolic name for a position in a program or a piece of data.

program listing relatively easy to understand.

The Instruction Field. An instruction is either a mnemonic for a 68000 instruction or one of several assembler directives the MDS assembler responds to. See the first installment in this series of articles (June 1986 issue) for the standard names for the 68000 instructions. Assembler directives are commands to the assembler that tell it to perform special chores. The most common are EQU (assign a symbolic name to an expression), DC (allocate space for a constant), and DS (allocate space for a variable).

The Operand Field. This field contains the operand or operands for the instruction or assembler directive in the instruction field. As we saw in last month's installment, operands for instructions indicate the addressing modes the 68000 uses to form effective addresses.

The Comment Field. The comment field begins with a semicolon (;). The assembler ignores the semicolon and everything after it on the line, so you are free to enter any text you want, typically an explanation of what the program is doing. If the entire line is a comment, put a semicolon or an asterisk (*) in the first column.

To run the assembler, double-click on the Asm icon on the desktop. When the assembler takes over, select the name of the file to be assembled, using the Open... command from the File menu—that's the file called APlus.Asm in our example.

The assembly process then begins. As it proceeds, the name of the file being acted on is in a box at the top of the screen. When the process ends, a relocatable object-code file called APlus.Rel appears on the same disk as your source file.

Link—the Linker

The next step is to convert the .Rel module created by Asm into an application, using Link. Go from the assembler to the linker by pulling down Asm's Transfer menu and selecting LINK; then select the linker-control file called APlus.Link.

This file controls the activities of the linker, and it must have a filename extension of .Link. The simplest linker-control file contains just two lines and appears in figure 3. The first noncomment line tells the linker to deal with only one relocatable file, Aplus.Rel, and to create an output file called APlus that will contain the final application. The \$ following the name of the .Rel file signifies the end

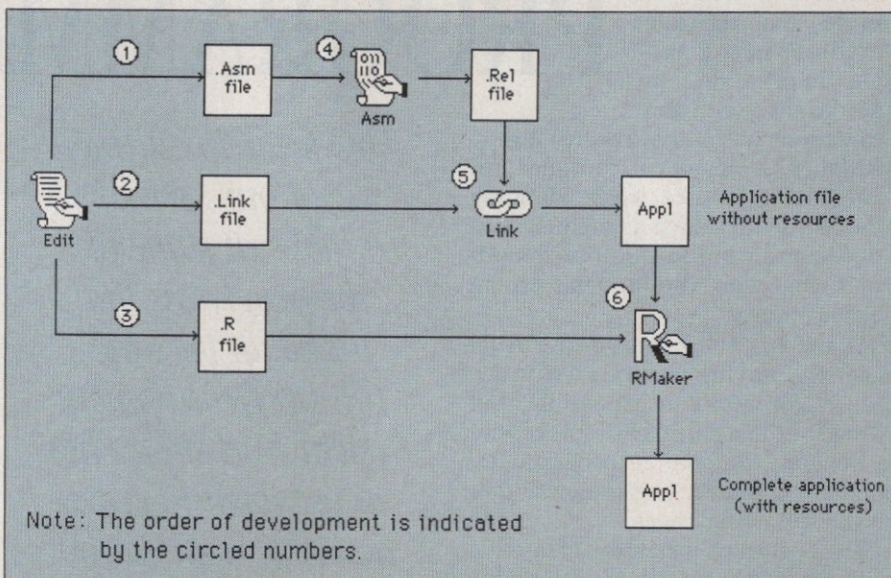


Figure 1: A flowchart showing one way to develop an assembly-language application with MDS

of the linker-control file and is required.

When the linking procedure ends, an application file called APlus will be on the same disk as the .Rel file.

RMaker—the Resource Compiler

At this point, we're still not done, because the sample program makes

use of resources for a window and two menus that you haven't added to its file yet. (A resource is a data structure, stored separately from the program code, that defines standard items such as windows, menus, icons, and cursors. Each is associated with a four-character resource ID—such as

WIND, MENU, or ICON—and an ID number that is unique within the resource class.) Add them with the resource compiler by selecting the RMAKER command from Link's Transfer menu and then selecting the APlus.R file to work with.

The APlus.R file (see figure 4) tells

Figure 2: The source-code file (APlus.AsM) for AsM

- * This is a shell for a simple one-window application.
- * It does not support desk accessories.

```

; Symbolic equates:

WindID      EQU      128      ;Window resource ID
AppleID     EQU      1        ;Menu ID for Apple menu
FileID      EQU      2        ;Menu ID for File menu

; START OF STANDARD HEADER...

INCLUDE     SysEqu.D      ;Operating system equates
INCLUDE     ToolEqu.D     ;Toolbox equates
INCLUDE     QuickEqu.D    ;QuickDraw equates
INCLUDE     MacTraps.D    ;All trap instructions

; Initialize the various ROM Managers:

PEA        -4(A5)         ;Start of QuickDraw globals
_InitGraf      ;Initialize QuickDraw
_InitFonts    ;Font Manager
_InitWindows  ;Window Manager
_InitMenus    ;Menu Manager
_TEInit       ;TextEdit
MOVE.L     #0,-(SP)       ;(no restart procedure)
_InitDialogs  ;Dialog Manager
_InitCursor   ;We want "arrow" cursor

MOVE.L     #$0000FFFF,D0
_FlushEvents  ;Get rid of every event

; END OF STANDARD HEADER...

; Create and draw a window on the screen:

CLR.L     -(SP)           ;Space for returned pointer
MOVE     #WindID,-(SP)   ;Resource ID
MOVE.L   #0,-(SP)        ;0 = store on heap
MOVE.L   #1,-(SP)        ;-1 = this is front window
_GetNewWindow ;Get window from resource

file
; The next step is very important. It ensures that our new window
; is the active port so that we can draw in it. The pointer to the
; window is already on the stack.

_SetPort ;Make window the current
GrafPort

; Create two standard menus:

CLR.L     -(SP)           ;Space for handle
MOVE     #AppleID,-(SP)  ;Menu ID number
_GetRMenu ;Get Menu from resource file

MOVE     #0,-(SP)        ;(0 = add to end)
_InsertMenu ;Add to menu bar

CLR.L     -(SP)           ;Space for handle
MOVE     #FileID,-(SP)   ;Menu ID number
_GetRMenu ;Get menu from resource file

MOVE     #0,-(SP)        ;(0 = add to end)
_InsertMenu ;Add to menu bar

_DrawMenuBar ;Display menu bar

; Insert your application code here
; (We'll just display a sentence in the window
; in this example.)

MOVE     #10,-(SP)       ;horizontal position
MOVE     #40,-(SP)       ;vertical position
_Move ;Position the drawing pen

PEA     'Visit Expo 86 in Vancouver!'
_DrawString ;Draw the string

GetEvent
CLR.B   -(SP)           ;Leave space for boolean result

```

```

MOVE     #$FFFF,-(SP)   ;Allow ALL events
PEA     EventRecord     ;Results are returned here
_GetNextEvent ;Check for an event
TST.B   (SP)+           ;Pop and test the result flag
BEQ     GetEvent        ;Branch if no pending event

;Note: evtNum and evtMouse are symbols for offsets into EventRecord,
; and mButDwnEvt and InMenuBar are symbols for numbers.
; They are defined in the INCLUDED files.

MOVE     EventRecord+evtNum,D0 ;Get event type code
CMP     #mButDwnEvt,D0 ;Is it a button down event?
BNE     GetEvent        ;No, so branch

CLR     -(SP)           ;Space for result
MOVE.L  EventRecord+evtMouse,-(SP) ; Where info
PEA     ClickWindow    ;VAR window involved
_FindWindow ;Where was button pressed?

MOVE     (SP)+,D0       ;Get result
CMP     #InMenuBar,D0  ;Pressed in menu bar?
BNE     GetEvent        ;No, so ignore

; See if "QUIT" was selected from File menu:

CLR.L   -(SP)           ;space for result
PEA     EventRecord+evtMouse ;Where
_MenuSelect ;Get menu selection
MOVE     (SP)+,D6       ;Save menu number in D6
MOVE     (SP)+,D0       ;Discard item number

MOVE     #0,-(SP)      ;Unhighlight menu title
_HiliteMenu

CMP     #FileID,D6     ;In the FILE menu?
BNE     GetEvent        ;No, so branch

; must have selected QUIT command:

RTS ;Return to Finder

; The application constants
; ("DCB.B size,value" allocates "size" bytes, each with a value of "value")
; ("DCL 0" allocates one long word with a value of 0)

EventRecord DCB.B      EvtBkSize,0 ;Reserve space for event record

ClickWindow DCL        0 ;Pointer to window where mouse pressed

RTS

```

Figure 3: The linker-control file (APlus.Link) for Link

Link this file to create an application (without resources).

```

APlus.Rel
$

```

Figure 4: The source file (APlus.R) for RMAKER

```

* Compile this after assembling and linking APlus.AsM
*
* The next command appends the resources to the application:
!Book:APlus

Type MENU
,1 ;Resource ID
\14 ;Title is the Apple symbol (14 = ASCII $14)
About this demo... ;About box

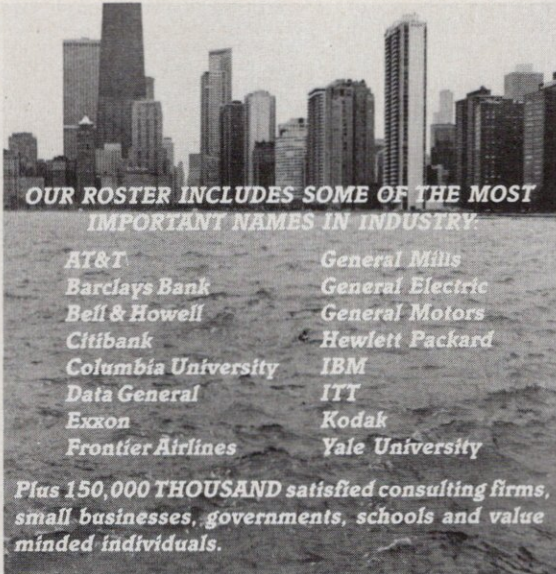
,2 ;Resource ID
File ;Menu Title
Quit ;Only item is "Quit"

Type WIND
,128 ;Resource ID
Aplus Window ;Title for Window
40 5 332 502 ;Window coordinates (TLBR)
Visible NoGoAway ;Visible window/ no goaway box
4 ;Window ID. 4 = title, no grow box
0 ;User-definable item (not used)

```

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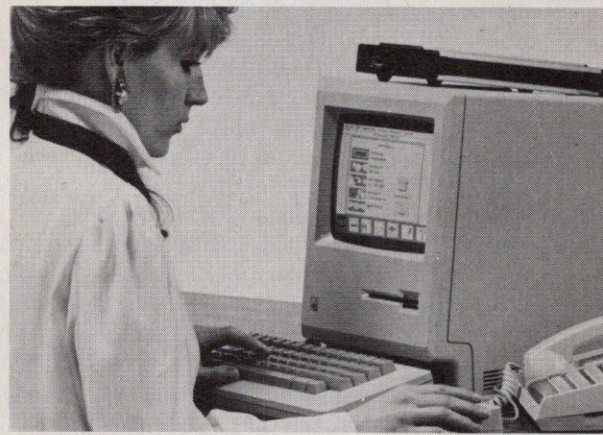
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the resource compiler to append the menu and window resources to the application file you created with the linker (APlus). The RMaker command you use is !Book:APlus, where the word *Book* is the name of the disk on which the APlus file is stored (change it to the name of your data disk before you compile). If you don't specify the disk prefix and RMaker is on a different disk than APlus, you will see a Can't create the output file! error message.

If you're like most people, you'll probably use MDS with a two-drive system. Your assembler tools will be on a disk in the internal drive, and your source code and compiled files will be on a disk in the external drive. If you use this standard setup, you must specify a disk prefix in the RMaker Append command; otherwise, RMaker will look for the file to append to on the internal disk, and it won't be there.

The name of the output file must be the first noncomment and non-blank line in an RMaker source file. (Comment lines begin with an asterisk.) The line that follows must either be blank or contain an eight-character string defining the file-type code and

*Use symbolic names
instead of absolute
numbers, so that your
programs will be
easier to understand.*

the creator code. It's blank in this example because you're appending the resources to an existing file.

When RMaker finishes, the application contains all the resources it needs to operate, so you're done. Return to the Finder by selecting the Quit command from the File menu and then double-click on the APlus icon to run the application. When you do this, you'll see a large window entitled APlus Window covering most of the screen. To leave the application, select the Quit command from its File menu.

RMaker TYPE Statements

The bulk of an RMaker source file, like the one in figure 4, comprises several "TYPE" statements that define the data in the resources. The format of a TYPE statement is as follows:

```
TYPE XXXX      ;;XXXX=resource
                ;; type code
[name],ID [(aa)] ;;resource name,
                ;; ID, attribute
data for resource ;;the resource
                ;;data goes here
```

The brackets enclose optional parameters (don't include them in your file!), which means you don't have to assign a name to a resource and you don't have to specify the value of the resource's attribute byte (but you do have to specify a resource ID). Comments follow two successive semicolons and are ignored by RMaker.

The data for the resource is specific to the type of resource you're defining, as you can see by looking at the definitions for the WIND and MENU resources in figure 4. You can define multiple resources of the same type with a single TYPE command. You follow the data statements in a resource definition with a blank line and begin the next resource definition with the "name, ID, attribute" line, which is how the two MENU resources are defined in figure 4.

Equate and Trap Definition Files

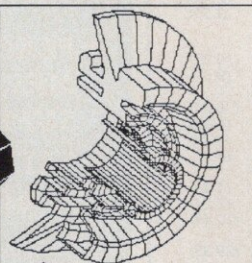
MDS comes with several definition files containing standard symbolic names for various items that are

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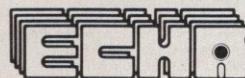
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often used in assembly-language programs: addresses of system global variables, offsets into data structures, bit flags, data masks, and other numeric quantities. It also has files defining the standard toolbox and operating-system instructions for accessing the subroutines in the Macintosh ROM. You should always use symbolic names in your own programs instead of absolute numbers or addresses, so that the programs will be easier to understand and debug.

To assemble the predefined symbol-definition files with your application source code, use INCLUDE directives in your source file, as shown in figure 2. You should make a point of always including these files at the beginning of every program you write, so that they're always there when you need them.

The names of the symbol-definition files you will use most often are SysEqu.D, ToolEqu.D, QuickEqu.D, and MacTraps.D. The comments for the INCLUDE directives in figure 2 indicate what these files contain.

ROM Subroutines

The Macintosh ROM contains hundreds of subroutines that make up a user-interface toolbox. You can use them to easily perform standard activities such as displaying windows, pulling down menus, and dragging windows around the screen.

You access these ROM subroutines by using trap instructions defined in the MacTraps.D file. By convention, their names begin with an underscore character for easy identification. Some subroutines from the program in figure 2 are ___GetNewWindow, ___GetRMenu, ___InsertMenu, and ___GetNextEvent.

Parameters the subroutines in the Macintosh ROM require are usually passed via the 68000 stack. The results, if any, are put onto the stack. (Some subroutines use registers instead, but we won't be dealing with them here.)

For example, consider the ___GetNewWindow subroutine used in figure 2. This subroutine pulls the definition for a window from a resource file (the resource type is WIND) and then displays the window on the screen. It requires three parameters: the resource ID for the WIND resource, a pointer to a storage area in memory it can use, and a pointer to the window behind which it will be drawn on the screen. ___GetNewWindow returns one re-



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sult: a pointer to the window definition in memory.

Before calling `__GetNewWindow`, you must configure the stack properly. Since it returns a result, you must first reserve stack space for the result with a `CLR.L -(SP)` instruction. (You use the `.L` form because the result, a pointer, is a long word. You can allocate space for a word result with a `CLR -(SP)` instruction, and space for a Boolean (true/false) result with a `CLR.B -(SP)` instruction.)

You must then push the values of `__GetNewWindow`'s three parameters onto the stack: first the resource ID (a word), then the storage pointer (a long word), and finally the window pointer (another long word).

The order and size of the parameters is critical. To determine this information for a given trap instruction, you must refer to *Inside Macintosh* or a similar reference work. If you don't arrange things properly, you will invariably see the Macintosh's infamous bomb box.

The Standard Program Header

Notice that the first part of the sample program contains a sequence of instructions for initializing various groups of ROM subroutines (called managers) that the program uses. (In the sample program, you've actually initialized managers you don't use so you can use the same header with any program.) It also removes any pending input/output (I/O) operations from the event buffer and turns on the standard arrow cursor.

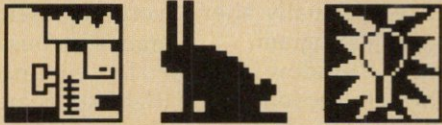
You should insert a similar header at the beginning of every application program you write for the Macintosh. If you don't do so, the program will fail when you try to use a manager that has not been initialized.

Wrap-Up

By now you should be reasonably familiar with how to create a Macintosh application in assembly language. I don't have the space to analyze many 68000 instructions or ROM subroutines in detail, but you can easily obtain more information by referring to any of the several books (including my own!) now available on how to program the Macintosh. I presented a list of these books in the June installment. +

This article was adapted from chapter 2 of Gary Little's most recent book, Macintosh Assembly Language: A Guide for Programmers, which will be in bookstores this fall.

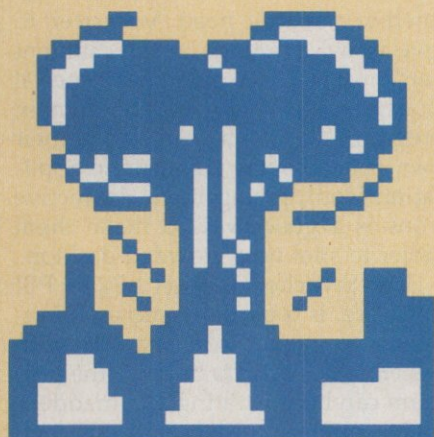
Customizing



YOUR ELECTRONIC WORKPLACE

SOFTWARE BY ROBERT C. ECKHARDT

*Several small
programs that
can make a big
difference
to your Mac*



With its desk accessories stacked neatly in the corner and its files organized (or disorganized) just like your real-world desktop, the Macintosh offers the most comfortable and intuitive working environment around. Even so, all of us have ideas about how to make our Mac even easier to work with. From changing menus to creating new icons, several utility programs give you the power to act on your ideas, turning your Mac into a truly personal computer.

Font and Desk-Accessory Help

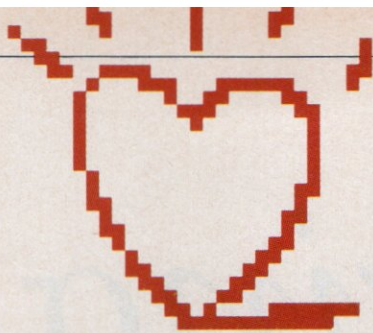
Although Apple's Font/DA Mover is a handy little item, it has many limitations. For example, perhaps you have the public-domain desk acces-

sory Extras but wish that it had a more meaningful name, or maybe you have two desk accessories with almost identical names. Font/DA Mover can't help you, but with DA Installer (Version 1.5) from Dreams of the Phoenix, you can rename any currently installed desk accessory (see figure 1). Unfortunately, for normal day-to-day operations (installing and deleting), DA Installer is seriously flawed: It installs all the desk accessories, not just the one you want, in a desk-accessory file. Thus, unless you store your desk-accessory collection with only one accessory per file, you'll have to continue using Font/DA Mover as well.

Fonts are by their nature more complex beasts than desk accessories, and Font Librarian from Proper Software is a versatile program that does a remarkably good job of taming

them. The first thing you notice about Font Librarian is that you can open many more than two font files at the same time. Thus, you can do a lot of font swapping among many different destinations without constantly having to open and close files. The next thing that distinguishes Font Librarian is that you can rename a font or give it a new ID number, which are useful functions if you run into conflicts while you are installing a new font. And then there's Font Librarian's Display Font command. With it, you can display a font in paragraph form or as an ASCII chart, in plain, italic, bold, underline, shadow, out-





line, extended, or condensed form.

The most important feature of Font Librarian, however, is its ability to install fonts in applications as well as in System and font files—especially useful if you use a single System file with more than one application, whether you use just two on a floppy disk or two dozen on a hard disk. For example, say you have MacWrite and MacPaint on one disk and that you like to use many picture and display fonts with MacPaint and a large number of text fonts with MacWrite. With Font Librarian, you can pare the System file down to the fonts used in both programs and insert application-specific fonts into individual programs as appropriate (see figure 2). This scheme eliminates the clutter of unwanted fonts in each application. In addition, assuming you have enough disk space (a hard disk is helpful here), the total number of fonts at your disposal can greatly exceed the number that the System file alone can hold.

Once all your desk accessories and fonts are installed, the public-domain program Sort Menu can put them in order. Sort Menu is helpful because font and desk-accessory menus are not arranged alphabetically but in the order in which your fonts or desk accessories were installed. After you click on Sort Menu, your menus will be arranged alphabetically (until you turn off or reset your Mac). If you set Sort Menu as your start-up application, your fonts and desk accessories will be organized for you automatically each time you turn on your Mac.

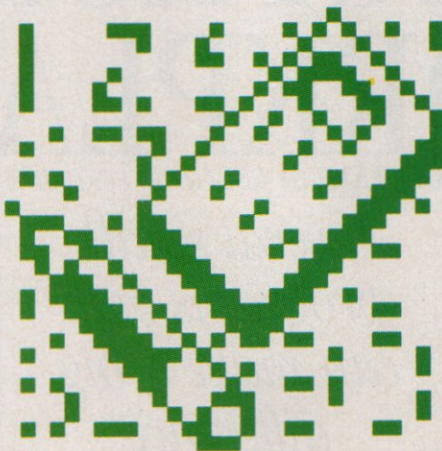
New Items on the Menu

For many Mac owners, especially those who are good typists, keyboard equivalents of often-used menu selections are an important element of any program. Although some applications have logical keyboard equivalents, some do not, and others have none at all; also, your own work habits may demand a special set of keyboard equivalents that only you will find useful.

With MenuEdit 1.0, a public-domain program, you can add keyboard

equivalents of your own choosing to almost any program. MenuEdit is not, however, entirely free of bugs, and some programs do not take kindly to the changes that MenuEdit makes. So some caution is in order, the major warnings being: *Never* use MenuEdit on your only copy, or the original copy, of a program; *Always* experiment on an expendable copy, and, if you are successful, use the changed copy as your new working copy—*do not* change the original. These rules apply, of course, to any situation in which you actually alter the inner workings of a program.

MenuEdit's main window has three sections: the left section lists menu titles (with the apple-menu symbol replaced by an @ sign), the middle section lists the commands under the currently selected menu; and the right section provides the



tools for changing the commands. To set a keyboard equivalent for MacPaint's Rotate command (see figure 3), for example, you select the Edit menu in the left section and the Rotate command in the middle section; then you press the key you want as a keyboard equivalent in the ⌘ Key box. To preserve your change, you select Save from the File menu. Also, always be sure to check that your new ⌘-key combination isn't already in use elsewhere in the program. Having one keyboard command linked to two different menu commands is not just confusing, but it may also cause the program to crash.

You can also edit menus with Apple's resource editor, REdit, Version 1.0. (Do not confuse REdit and ResEdit, another Apple resource editor with similar capabilities that is, however, more difficult for nonprogrammers to use.) Upon opening REdit and the application to be worked on, you will see several rows of icons.



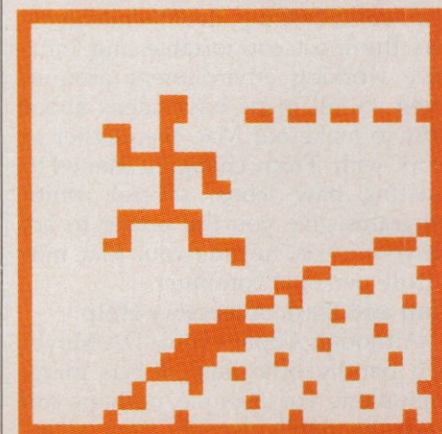
The relevant one in this case is labeled, not surprisingly, MENU. Double-click on that icon, and a new window opens with a series of menu icons representing the selected program's menus (see figure 4).

To eliminate MacPaint's Align Right keyboard command, for example, you first select menu 7 in the MENU window. Doing so opens a sample Style menu on the right and a dialog box on the left (see figure 5). Click on Align Right in the menu and delete the R in the ⌘ Key box on the left. As with MenuEdit, be sure to save your changes before quitting.

A New Look for Your Desktop

With the techniques described above, you can customize most applications to suit almost any taste. For example, you can make several different versions of MacPaint, each tailored to a specific need. Moreover, to give visual emphasis to the different versions, you can give them special icons. Since many public-domain programs do not have an icon of their own (they display the generic application icon), giving them distinctive icons is a good way to make them easier to spot on a crowded desktop.

Icon Switcher (Version 1.2), by PBI Software, is a partially successful attempt to make icon manipulation easier. I say *partially* because the program can be frustrating and maddeningly counterintuitive at times, and the manual is a serious contender for the worst-manual-ever prize. None-



theless, the program is usually easier to use than a resource editor such as REdit.

Regardless of how you do it, however, altering icons is risky business. For most of us, playing with icons is rather like wearing knee boots while fishing in neck-deep water—you'd best stay in the shallows, unless you're willing to risk a dunking. So be careful, and don't be surprised if something unexpected happens.

If you want to use Icon Switcher to add an icon to an application, you can borrow an icon from another program, use one of the many public-domain icons, or select an icon from one of PBI Software's Icon Libraries. You should note, however, that although the Icon Library disks are creative, they are not very cost-effective—the Fun and Games Series 1 disk, for example, contains only 102 icons, although it has enough space for almost eight times as many.

The process of installing a new icon is not difficult. Once you have started Icon Switcher and selected the program you want to work on, you will see two items, Icons and File Icons, on the menu bar. The former refers to special icons, such as Bill At-



kinson's portrait in MacPaint. The latter, which refers to icons that appear on the desktop, contains the commands you need to work with application or document icons.

To install a new icon, you first use the Switch command to move the new icon into your application (see figure 6). Next, you select the Manipulate command. If the application program has never had an icon before, you simply click on the Install button (see figure 7). If the program already has an application icon, replacing it with a new one requires an additional step to make sure that the new one "sticks." After selecting Manipulate, but before installing the

new icon, you must locate the old icon in the icon-display window and delete it. Your new icon should now appear on the desktop—if not, you use the Switch command to replace the old icon in the Desktop file with the new one.

If you want to alter an existing application icon, you can use Icon Switcher's Edit window. REdit's icon-editing window is, however, much more hospitable. To access file icons in REdit, you simply double-click on the ICN# icon in REdit's main window and double-click on the generic icons in the ICN# window until you find the icon you're looking for. You make your changes the same way you would with the pencil in MacPaint's FatBits (see figure 8), and be sure to save your work before you quit REdit. If necessary, you can switch the icon in the Desktop file. If you want to create new icons from scratch, then REdit is the best program to use—simply click on the Clear button to erase the old icon and push on. If, on the other hand, you want to convert a MacPaint picture into an icon, then you use Icon Switcher.

You can also replace or modify document icons, such as MacPaint's

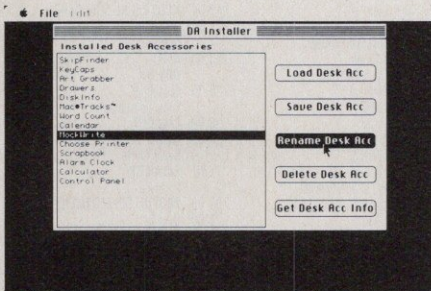


Figure 1: With DA Installer, you can give a new name to any desk accessory installed in the current System file. You can also install and delete accessories and get information such as the amount of disk space an accessory uses.

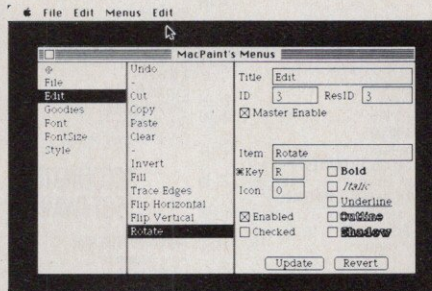


Figure 3: To add a keyboard equivalent with MenuEdit, you first select a menu from the list on the left and then a command from the center list. Click on the box on the right labeled ⌘ Key and type the desired letter in uppercase.

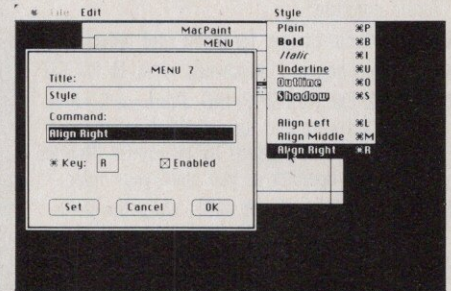


Figure 5: To use REdit's menu-editing window, you click on the command in the sample menu and then work in the Edit window. If you want to edit a second command in the same menu, you press Return.

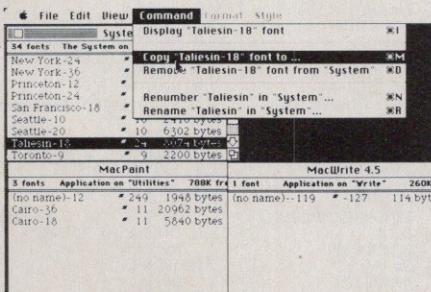


Figure 2: With Font Librarian, you can open many font files at once, including those within application programs. It also has menu commands that summarize your instructions so far—an effective way of preventing mistakes.

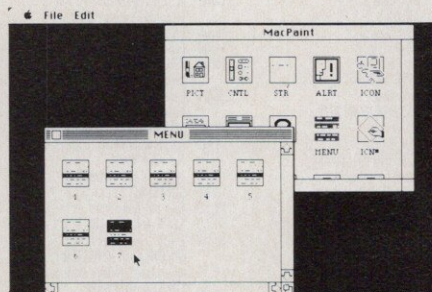


Figure 4: The main window of Apple's resource editor, REdit, Version 1.0 (upper right) lists a program's resources graphically. Numbered icons represent the menus in MacPaint in the Menu window (lower left), with Menu 1 the leftmost.

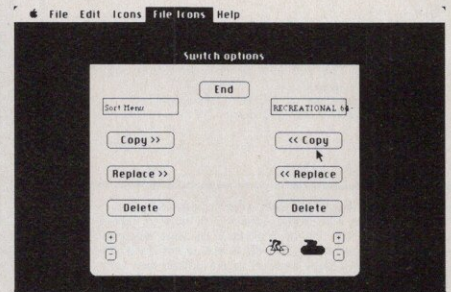


Figure 6: The first step in giving Sort Menu an icon is to copy one from an icon file to Sort Menu. You can flip through the icons in the file by clicking on + or - until you find the one you want; to move it to Sort Menu, you click on << Copy.

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Maxell 3 1/2 SS/DD	16.50
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Interbridge	CALL
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Smartmodem 2400	570.00
Smartmodem 300	128.00
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Transet 1000 512K	265.00
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Portable Modem 300 Baud	85.00
MICROCOM	
Mac Modem 2400 W/Software	553.00
Mac Modem 1200 W/Software	385.00
NOVATION	
Cat Comm Communication System	

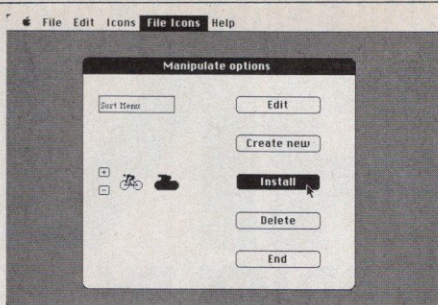


Figure 7: To see Sort Menu's new icon on the desktop, you install it by selecting the Manipulate command and then clicking on the Install button. You can reach the icon-editing window from here by clicking on the Edit button.

brush on paper, to match your new application icons. The methods of doing so are similar to those described above, except that you don't install document icons with the Install button. Instead, you replace the old document icon with the new one by using the Replace button. You also need to replace the corresponding Desktop file icon.

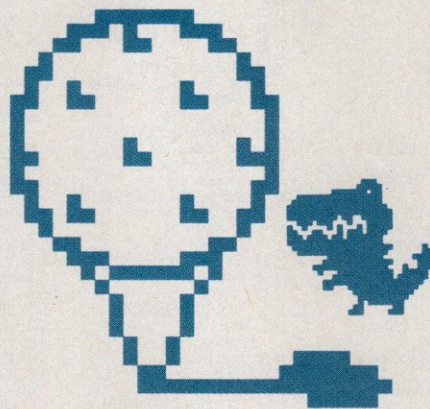
Unfortunately, document icons installed with Icon Switcher have a tendency to revert unexpectedly back to their original form (or change to yet a third state). The best advice, if you have a customized document icon in a program, seems to be not to place a different version of the same program (another customization or the original version) on the same disk or hard-disk volume.

Say Goodbye to Geneva

If you're tired of the Geneva font, you may want to make yet another change to the desktop. The public-domain utility Set Default Font can

change the default font (the font used for icon titles and disk information) from Geneva to any font you wish. Keep in mind, however, that the default font applies to all your disks (it is stored in battery-powered RAM) and that an active System file lacking the default font will use a nearly unreadable 9-point version of the Chicago font instead.

As time goes on, developers will certainly provide Macintosh owners with many more tools for adapting their electronic workplace, but even now, the ways in which you can alter your desktop and applications to your needs—or whims—are abundant.



Have fun giving some of them a try; you may be surprised by how much you like the results. +

Robert Eckhardt, formerly vice president of Simon & Schuster's Electronic Publishing Division, is a free-lance editor and writer.

PRODUCT INFORMATION

DA Installer, Version 1.5

From Quick & Dirty Utilities
Volume One
Dreams of the Phoenix, Inc.
P.O. Box 1273
Jacksonville, FL 32247
(904) 396-6952

List Price: Quick & Dirty
Utilities Volume One, \$39.95

Requires: Macintosh

CIRCLE 430 ON READER SERVICE CARD

Font Librarian

Proper Software
2000 Center Street, Suite 1024
Berkeley, CA 94704
(415) 540-5958

List Price: Shareware, available from users' group software libraries, friends, etc.; \$20 for registration and manual

Requires: Macintosh

CIRCLE 431 ON READER SERVICE CARD

Sort Menu

Public domain, available from users' group software libraries, friends, CompuServe's MAUG, etc.

Requires: Macintosh

MenuEdit 1.0

Public domain, available from users' group software libraries, friends, CompuServe's MAUG, etc.

Requires: Macintosh

Font/DA Mover; REdit, Version 1.0; and ResEdit, Version 0.7

Apple Computer, Inc.
20525 Mariani Avenue
Cupertino, CA 95014
(408) 996-1010

List Price: Available free from users' group software libraries, friends, CompuServe's MAUG, etc.

Requires: Macintosh

Icon Switcher, Version 1.2 and Icon Libraries

PBI Software, Inc.
1111 Triton Drive,
Suite 201
Foster City, CA 94404
(415) 349-8765

List Price: \$19.99 each

Requires: Macintosh

CIRCLE 432 ON READER SERVICE CARD

Set Default Font

Emerging Technology
Consultants, Inc.
4760 Walnut Street
Boulder, CO 80301
(303) 447-9495

List Price: Public domain, available free from users' group software libraries, friends, CompuServe's MAUG, etc.

Requires: Macintosh

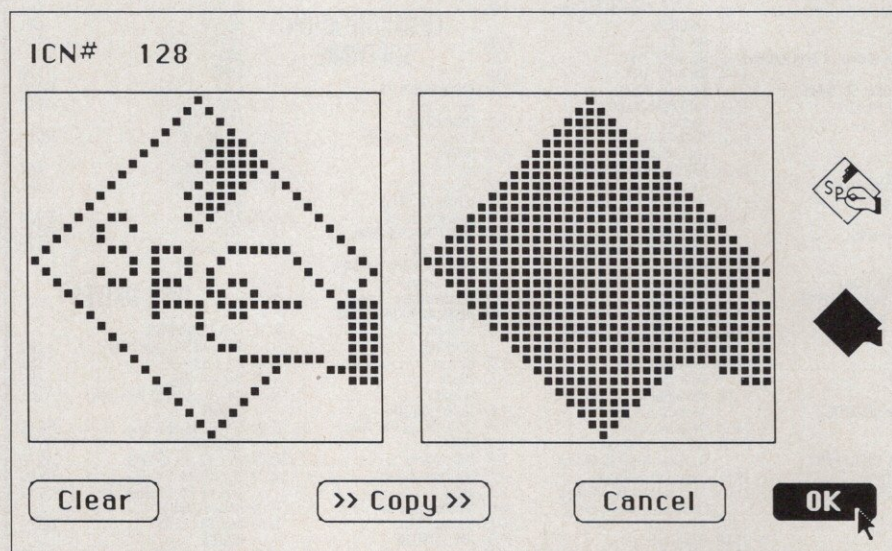


Figure 8: REdit's icon-editing window is easier to use than the one in Icon Switcher. It can, for example, place a duplicate of your icon in the Mask window if you click on >>COPY>>; just fill the duplicate with black to make a new mask.

MacTips

Suggestions from our readers

ON THE DOTTED LINE WITH THE FONT UTILITY

Dotted and dashed lines in MacPaint for plans, technical drawings, and designs can be frustrating and tedious to make by dragging dots and filling lines with patterns. Use the Font function for an endless library of even, consistently spaced broken lines and patterns. Periods, colons, slashes, and dashes—they all generate good lines that you can rotate and stretch, cut and paste. Modify them with styles such as bold and outline and with the variety of forms in different fonts, and you'll quickly have decorative borders.

Anthony Reveaux
San Francisco, CA

FILE FINDER

If you type a single letter when you are viewing a list of documents in an open dialog box, the first file that begins with that letter or the next file in the list will be selected. If you quickly type more of the filename, then a file with that specific filename will be chosen.

Dan Allen
Cupertino, CA

WORD, SPELLING CHECKER, AND ONE INTERNAL DRIVE

If you have a Mac 512K or the Mac Plus but only an internal drive, you can still run Microsoft Word with a spelling checker by setting up a special diskette as follows.

The following procedure works only with the new 800K double-sided drive. Set up your **backup** copy of Microsoft Word by first trashing the Help and Convert files (you might want to copy them to another disk first). Free up as much space on the disk as possible by eliminating any printer drivers you will not be using, and if you are using only an Image-

Writer, trash the chooser as well.

Install your spelling checker. I recommend MacSpell+, since it goes onto your disk as an accessory. Do not install the dictionary itself. I used only about 400K by the time I'd installed the spelling checker.

Set up a special disk for your dictionary as follows: Initialize a fresh double-sided disk. Install a copy of RAM (a public-domain RAMdisk utility) or an equivalent RAMdisk. You should select one that will allow you to set the size of the RAMdisk. Copy your dictionary file onto the disk (MacSpell+ calls the file WORDS). Set up a folder with a name that starts with a letter higher than W, such as ZEBRA. This is because RAM loads files in alphabetical order. You do not want anything on your RAMdisk except the dictionary. Copy the System and Finder files into the folder. Set the start-up to be RAMstart or its equivalent. You want to create a disk that will auto-start by running the RAM-drive-installing program.

Shut down your Mac; then start it up with the auto-start disk you've created with RAM on it. When it runs, make sure you set the size of the disk just barely large enough to load your dictionary. It should finish by leaving you at the desktop. Eject the start-up disk and load your Word backup disk. You're now ready to run Word, using your new "two-drive" system!

I think you'll find, as I did, that spell-checking using a dictionary on the RAMdisk is a lot faster than it is with a floppy disk. In any case, having a second drive makes life a lot easier. The first thing you'll notice is that the Drive button is now active in all functions. Just remember, all that you have on the other "drive" is your dictionary.

Be sure to save your document to a floppy diskette before you attempt to

use the spelling checker. If anything goes wrong and you lock up the Mac, you'll have to reboot, which means you'll lose everything you've typed.

Ross S. Frid
Cadillac, MI

128K MAC UPGRADES

I own a Macintosh with 128K of RAM. We have all heard about the upgrades to the Mac Plus for all the 128K and 512K owners. I decided to upgrade my internal 400K drive to the 800K double-sided drive. That's when the fun ended. Upon working with the new drive, I kept getting the message Out of Memory, unable to load

Well, I called my dealer, who didn't have any idea what was wrong. He called Apple, who said, "The internal 800K upgrade is not compatible with a 128K machine." The moral to this story is: Don't rush out to upgrade your internal drive on your 128K machine.

Phil Loveless
Simsbury, CT

A CALL FOR TIPS

If you or your users' group have a collection of MacTips or a MacTips column, send me a copy and if we find it useful for our readers, we will publish the source, along with your or your users' group's name. If you have any new tips, hints, shortcuts, or suggestions for using the Macintosh computer, we would like to publish them in this column. You'll receive credit, and we'll pay \$50 for each MacTip that we use. Send your tips to MacTips, A+ Magazine, Attn: Chip Carman, 11 Davis Drive, Belmont, CA 94002, or send them electronically via CompuServe (72356,2673), GENIE (APLUS), or MCI (APLUS).

Chip Carman
Belmont, CA

Pipeline



OO-TOPOS

Based on a science-fiction story by Michael and Muffy Berlyn, Oo-Topos is an intermediate-level adventure game in Penguin Software's Comprehend Interactive Novels with Graphics series. The story is set in 1995 A.D., when a meteor has collided with an interstellar transport carrying power-transfusion waste. The waste is scattered toward Earth's Sun and is threatening to destroy all life on Earth. The player's mission is to deliver the chemical seeds of a protective compound that will render the waste harmless. During the voyage, the player's ship is forced to land on the planetoid Oo-Topos, where alien space pirates board and imprison the player. The player must escape before time runs out for Earth. (List Price: \$34.95 for Apple IIs, \$39.95 for Macintosh)

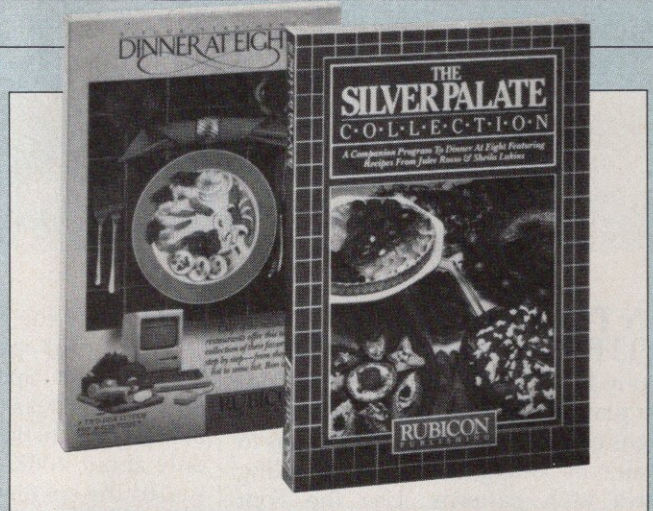
Requires: Apple II, II Plus, IIe, IIc, or Macintosh; 64K RAM
Penguin Software
2600 Keslinger Road
P.O. Box 311
Geneva, IL 60134
(312) 232-1984

CIRCLE READER SERVICE NO. 500



THE SILVER PALATE COLLECTION

Rubicon Publishing has released The Silver Palate Collection, an add-on data disk for its Dinner at Eight recipe database. The new disk contains more than 100 original recipes from *The Silver Palate Cookbook*, by Julee Rosso and Sheila Lukins. Users can process the recipes to organize meals by adjusting quantities of ingredients for any number of services, editing recipes, and adding notes. The computer prints out recipes or custom shopping lists and recommends wines. (List Price: \$49.95; Dinner at



The Silver Palate Collection is an add-on recipe disk for Dinner at Eight.

Eight, \$59.95)

Requires: Macintosh, Dinner at Eight software
Rubicon Publishing
6300 La Calma Drive
Suite 100
Austin, TX 78752
(800) 622-2210
(512) 495-6721

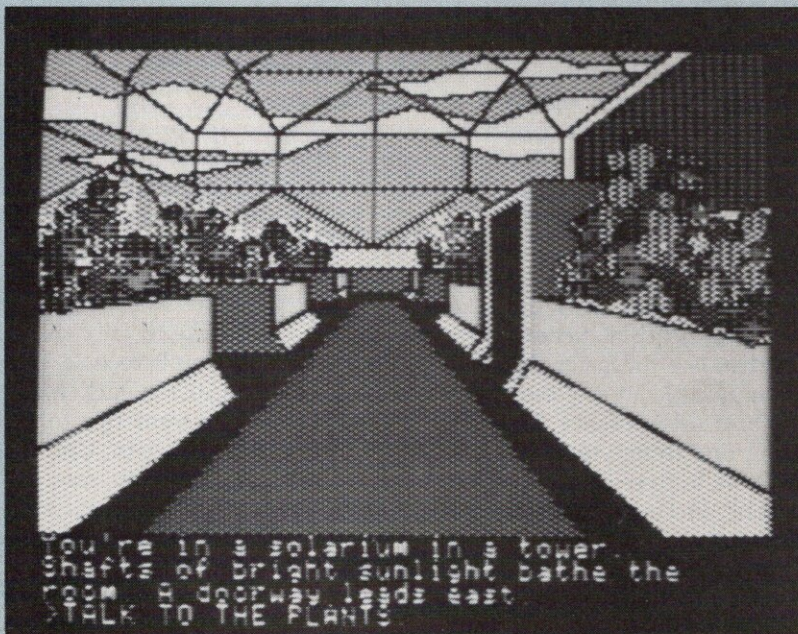
CIRCLE READER SERVICE NO. 501



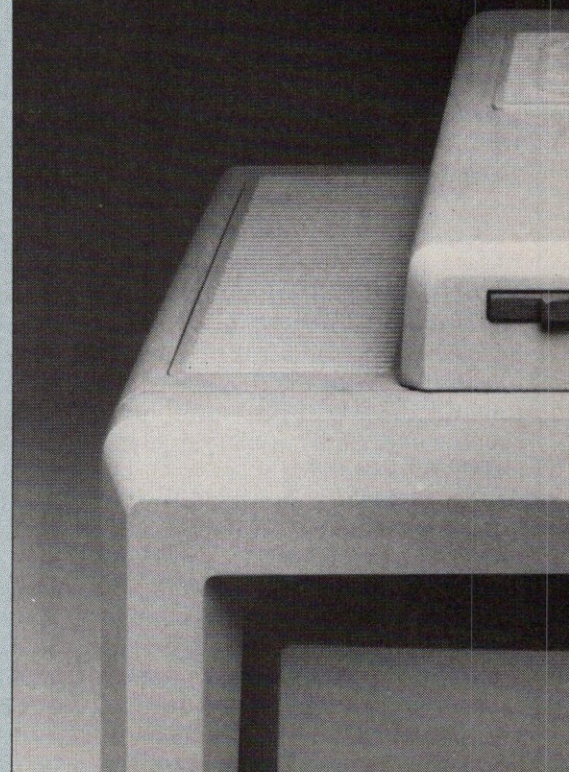
SYSTEM SAVER MAC

A multifunction accessory for the Macintosh, System Saver Mac lets you organize your system's power with two switched outlets for peripherals; protects your system from surges,

A sample screen from the science-fiction adventure game Oo-Topos



System Saver Mac, a multifunction accessory for the Macintosh



spikes, and noise in the electrical power supply; and provides a cooling fan that draws air through the computer at the rate of 15 to 18 cubic feet per minute. System Saver Mac replaces the Macintosh's power cord with one containing two switched outlets so that you can power peripherals separately. For those who prefer single-switch control, each system comes with a special single-switch cap to replace the two separate switches. (List Price: \$99.95)

Requires: Macintosh Kensington Microware Ltd.

251 Park Avenue South
New York, NY 10010
(800) 535-4242
In NY (212) 475-5200
CIRCLE NO. 502



68000 SYSTEM

Rapid Systems' R68 system combines a single-board, 68000-based computer and a comprehensive software-development package that enables Apple II users to add a Motorola 68000 processor to their computers. The system's hardware features fast data transfers between the Apple and the 68000, eight levels of priority-interrupt hardware, two levels of interrupt from the Apple to the 68000, four 8-bit Apple/68000 interface ports, two 16-bit programmable timer/counters, and a user serial port. In addition, the

company can expand the R68's on-board memory from 48K to 256K and offers 8-, 10-, and 12-MHz versions.

The R68's on-board software includes full monitor functions, task and interrupt handlers, and 26 commands for use by any Apple-resident program. It also comes with an Applesoft-support software package that provides communications and software-development commands and a fast S-C macro assembler with



SOUND DESIGNER

Digidesign's Sound Designer for the Macintosh is now available in a version for the Ensoniq Mirage digital-sampling keyboard. The system enables users to store Mirage samples on

disk and display up to three waveforms on-screen simultaneously. Sound Designer also provides extensive sound-editing and processing abilities, several looping aids, and advanced digital signal-processing functions. Users can scale waveforms to show any degree of detail. The system's Front Panel mode provides graphic screens for programming all Mirage parameters and functions. (List Price: \$395)
Requires: Macintosh,

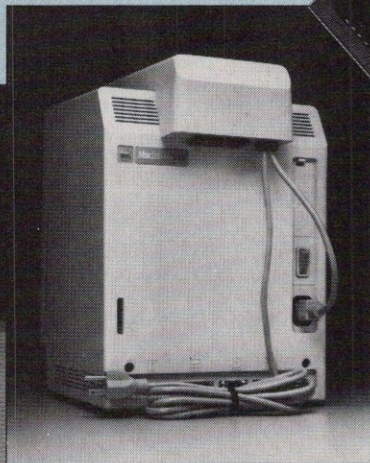


The R68 from Rapid Systems, Inc.

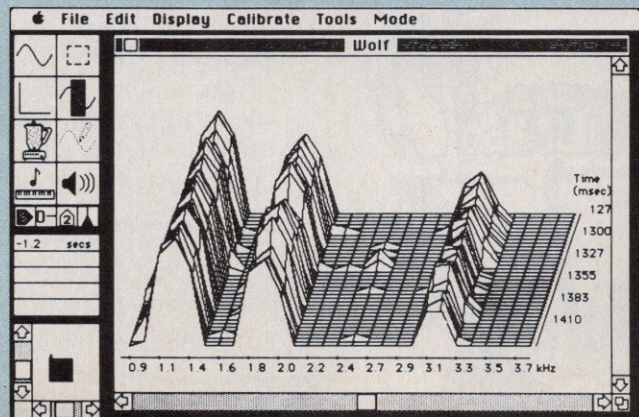
an integral coresident program editor. (List Price: \$499)

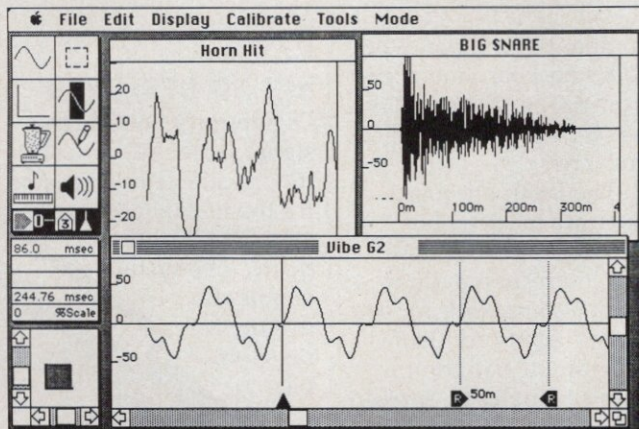
Requires: Apple II, II Plus, or IIe
Rapid Systems, Inc.
755 North Northlake Way
Seattle, WA 98103
(206) 547-8311

CIRCLE READER SERVICE NO. 503



Sound Designer's FFT frequency analysis display





Sound Designer lets users display up to three waveforms simultaneously.

512K RAM, Macintosh MIDI interface, Ensoniq Mirage keyboard
 Digidesign, Inc.
 920 Commercial
 Palo Alto, CA 94303
 (415) 494-8811

CIRCLE READER SERVICE NO. 504

HARDWARE

OKIDATA PRINTERS, MODEMS

Okidata has released two new dot-matrix printers—

the Microline 292 and the wide-carriage Microline 293—and the CLX Series modems.

Both printers offer dual 9-pin printheads that permit high-quality, single-pass printing. The printers operate at 100 cps in near-letter-quality mode and at 200 cps in utility mode. They can handle a broad range of paper types, from single-sheet, hand-fed paper to four-part continuous forms up to 0.014 inches thick.

Optional modules allow the 290 models to emulate the characteristics of earlier Microline models and are available with parallel and RS-232C and RS-422A serial interfaces.

The CLX96 Series of

modems provides 9600-bps, synchronous data transmission in half- or full-duplex mode. Three models—CLX96 (point to point), CLX96FP (multi-drop), and CLX96M (multiport)—are available.

Each model provides automatic adaptive equalization to compensate for varying line conditions. The series also offers built-in diagnostics for isolating faults. (List Price: Microline 292, \$699; Microline 293, \$899; CLX96, \$1445; CLX96FP, \$1995; CLX96M, \$2195)

Okidata
 532 Fellowship Road
 Mt. Laurel, NJ 08054
 (609) 235-2600

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HARD/SOFTWARE



MUSICOM

Musicom is a comprehensive music-education system that provides computer-aided instruction for people of any age or level of proficiency. The Musicom system comprises several courses, including Beginning Ear Training, Basic Keyboard Technique, Intermediate Music Theory, and MIDI Piano Course. Each course uses various instructional techniques, including tutorials, drill-and-practice exercises, and noncompetitive games.

The Ear Training courses use a Pitch and Rhythm Detector (PRD) interface card that plugs into the computer's expansion slot to provide a microphone connection. As students sing into the microphone, the PRD sends this musical information to the program, which displays it on the screen in standard musical notation. The program evaluates and reports on the accuracy of students' pitch and rhythm. Musicom's lesson topics include singing single notes, tunes, and melodic and harmonic intervals; sight singing; and theory outline.

The Keyboard Skills course uses any MIDI-equipped keyboard instrument and presents basic music theory, followed by lessons on right- and left-hand technique. On-screen graphics illustrate playing principles. (List Price: \$495 each)

Requires: Apple II Plus or IIe, 64K RAM, Xanadu IFM-APL card, Roland

MPU-401 MIDI Processing Unit, microphone
RolandCorps US
7200 Dominion Circle
Los Angeles, CA 90040
(213) 685-5141
CIRCLE READER SERVICE NO. 506



CASCADE SPEEDLINK

The Cascade Speedlink hardware/software local-area network can interconnect microcomputer-based Cascade CAD systems and provide storage for up to 4500 complete E-size drawings. Each Cascade CAD system on the network functions as a dedicated workstation and has local storage for up to 75 E-size drawings. Via Speedlink, users can transfer drawings and word-processing and statistical data from each workstation to a plotter or to remote storage up to four miles away.

The Speedlink hub unit fits under a desk or drawing board and can hold up to three porting panels, permitting links to 29 workstations.

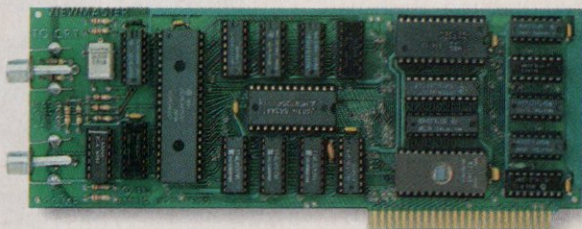
Users can connect addi-



The core unit of the Cascade Speedlink local-area network for CAD systems

Viewmaster 80

Now run AppleWorks™ on your II+ and keep full 80 column compatibility!



	BUILD IN SOFTWARE	SHORT KEY SUPPORT	LOW POWER DESIGN	80 COLUMN HOME	7.9 DDT MATRIX	LIGHT KEY INPUTS	80 COLUMN OPERATOR	INVERSE CHARACTERS
VIEWMASTER 80	✓	✓	✓	✓	✓	✓	✓	✓
SUPRTERM		✓						
WIZARD 80					✓		✓	✓
VISION 80	✓	✓			✓			
OMNIVISION		✓					✓	✓
VIEWMAX 80	✓	✓			✓			✓
SMARTERM	✓	✓				✓	✓	
VIDEOTERM		✓	✓		✓	✓	✓	✓

One look at the chart will give you some of the reasons there's only one smart choice in 80 column cards for your Apple. But the real secret to Viewmaster 80's success is something even better: Total compatibility.

Each Viewmaster 80 includes our powerful AppleWorks expand software, allowing AppleWorks to run on the II+ with only 64K (or more) memory. (We recommend the RamFactor memory card, but any compatible Apple memory card will work.) The software provides our full range of AppleWorks enhancements, including expanded records, word processor, multi-disk saving, time and date display on screen with any PRO-DOS clock, and more!

The Viewmaster 80 works with all 80 column applications, including DOS 3.3, PRO-DOS, CP/M, Pascal, WordStar, Format II, Appewriter II, dBase II, Visicalc, Multiplan, and *hundreds* of others—including AppleWorks.

Here are just a few of the powerful features the Viewmaster 80 delivers for a great price (\$139):

- 80 Characters by 24 lines • Fully compatible with all Apple languages and software • Highest compatibility with existing 80 column software • Very low power consumption • High speed (18 MHz) scroll rate • Upper and lower case characters and true descenders, both inverse and normal; all on-screen editing functions are supported • User-definable cursor shape • Compatible with Apple II, II+ and IIe • Five-year warranty

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AE Applied Engineering
P.O. Box 798, Carrollton, TX 75006
(214) 241-6060

tional porting panels to increase the number of workstations to more than 100. Resident software controls access to any stored drawing. Each Speedlink also includes SuperCalc3 software for spreadsheets, Superwriter for word processing, LAN:Mailmonitor for electronic mail, and LAN: Datastore for relational-database management. Five models of Speedlink are available, ranging from 189 megabytes to more than 1 gigabyte. (List Price: \$21,995-\$56,995, depending on model)

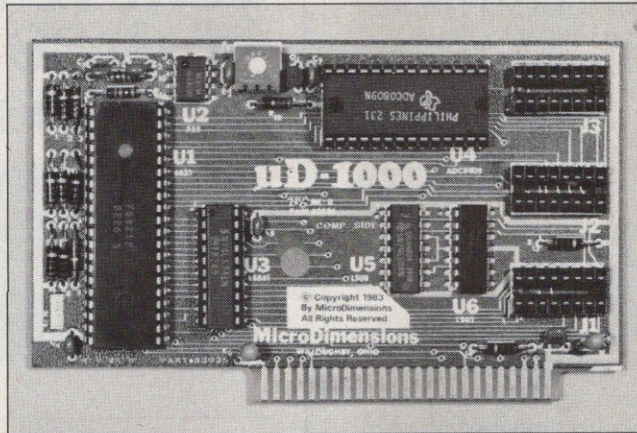
Requires: Apple II or III, Cascade I software
 Cascade Graphics Systems
 16842 Von Karman Ave.
 Irvine, CA 92714
 (714) 474-6200

CIRCLE READER SERVICE NO. 507

uD-1000 I/O SYSTEM

Complete and ready to use, the uD-1000 I/O system is designed to simplify input/output on Apple II Plus and Apple IIe computers. The uD-1000 plugs into one of the computer's slots and provides eight digital inputs, eight digital outputs, and eight analog inputs.

A User Interface Module simplifies testing of user-developed hardware and software. The system also comes with The Hook software, which allows you to use Applesoft BASIC without using POKE or PEEK instructions. You can then use standard BASIC variable names to provide the values of each I/O channel. (List Price: \$169; shipping and han-



The uD-1000 is an easy-to-use I/O system for Apple II computers.

dling, \$2.50)

Requires: Apple II Plus or IIe

MicroDimensions, Inc.
 4780 Beidler Road
 Willoughby, OH 44094
 (216) 946-8070

CIRCLE READER SERVICE NO. 508

SOFTWARE

HALF-PRICE APOLLO SOFTWARE

Schmidt Enterprises is offering its software products The Apollo Accountant and The Apollo Database System to Apple users' group members for half their regular price.

The Accountant is a fast, easy-to-use, disk-based accounting package that lets users enter an unlimited number of transactions and store more than 4000 transactions on one disk. Users can display monthly and yearly totals of any category instantaneously, and a complete on-screen summary of all accounts and categories is always available. The package also balances all accounts and prints complete reports.

The Apollo Database

System lets users design file forms of any length; sort files by any field, in ascending or descending order; and insert formulas into any file field to create complex spreadsheets. It instantly retrieves, prints, removes, or transfers any file or group of files.

Both packages have on-screen help menus and come with easy-to-read manuals with tutorials and sample system disks. (List Price: \$60 each for users' group members)

Requires: Apple II, II Plus, IIe, or IIc
 Schmidt Enterprises
 7448 Newcastle Avenue
 Reseda, CA 91335
 (800) 232-6777

In CA (818) 342-5930

CIRCLE READER SERVICE NO. 513

EREZ ANSEL ENGINEERING SOFTWARE

Frame-Mac, Beamac II, and Beamac, three structural- and civil-engineering software packages for Macintosh computers, are now available from Erez Ansel. All packages provide an accuracy of 19 decimal digits, a choice of units, and a choice of deci-

mal format.

Designed to analyze and assist in the design of any 2-D frame or truss, Frame-Mac allows any number of nodes and prismatic elements and any number of any type of static loads. Beamac II is intended to analyze and assist in the design of any continuous (indeterminate, multispan) or simply supported beam. It allows any number of nodes, supports, hinges, and static loads. Both packages use the modified Cholesky method to solve the structure's stiffness matrix and come with a table of standard section data on disk, which users can add to or change. The packages also have several design aids and several text and diagram windows and allow users to print, copy, or save the contents of any window.

Beamac analyzes any simply supported (statically determinate) beam, performing linear analysis by using the equilibrium of forces and moments methods. A beam can have one fixed support at either end or one pin and one roller support with or without overhangs and any number of any type of static load. Users can change beam parameters at any time and can print and save the contents of any window. (List Price: Frame-Mac, \$495; Beamac II, \$295; Beamac, \$95)

Requires: Macintosh, 128K RAM (Beamac) or 512K RAM (Frame-Mac)
 Erez Ansel
 5800 Arlington Avenue
 Suite 5T
 Riverdale, NY 10471
 (212) 884-5798

CIRCLE READER SERVICE NO. 511

CASL CHEMISTRY SOFTWARE

Computer Assisted Science Labs (CASL) has introduced Chemistry for the 21st Century for use in high-school and college chemistry laboratories.

The menu-driven, easy-to-use program enables up to 150 students per day to use a single central computer linked to a Galaxy toploading electronic balance from Ohaus Scale Corporation. Students can perform experiments involving the determination of density, heat of chemical reactions, conservation of mass, molecular mass, stoichiometry, molarity, solubility constant, and more. They make preliminary readings on a triple-beam balance at the workbench and use the Galaxy balance interfaced to the computer for final weighings. The computer collects all data, grades each activity, instructs students if necessary, and produces printouts showing all data and calculations. (List Price: software, reproducible student lab manual, teachers' key, and RS-232 interface card and

connecting cable, \$475; same set with Ohaus Super C balance, \$895; same set with G400 Ohaus balance, \$1375)

Requires: Apple II Plus or IIe, Galaxy balance
CASL, Inc.
6818 86th Street E.
Puyallup, WA 98371
(206) 845-7738

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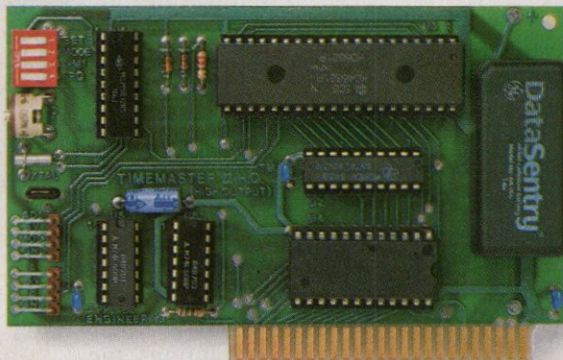
FOOBLITZKY

Fooblitzky is a multiplayer game of deduction, strategy, and chance featuring animated graphics. In the game, players must roam the crowded streets and shops of the city of Fooblitzky trying to deduce and obtain the four secretly chosen objects they need to win the game. Victory depends on using funds well, keeping records, and outsmarting fellow players. The game comes with four workboards and markers and two sets of rules. (List Price: \$39.95)

Requires: Apple IIe or IIc, 128K RAM
Infocom, Inc.
125 Cambridge Park Drive
Cambridge, MA 02140
(617) 492-6000

CIRCLE READER SERVICE NO. 510

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The CASL chemistry software links an Apple II computer with a Galaxy electronic balance.

MAC

PARAGENESIS CAE SOFTWARE

Advanced Engineering Solutions has released two new packages in its Paragenesis series of CAE software for the Macintosh computer.

Digital Macroscope allows engineers to perform gate- and functional-level digital simulations. Three types of simulation are available: 12 State Logical, Physical, and Parametric. The 12 State mode can resolve true, false, strong, weak, conflicting, HiZ, and undefined logic states. The Physical mode computes the gates' output rise and fall times from the source- and sink-current driving-load and input capacitances. The Parametric mode allows supply-voltage and temperature variations and monitors the network's power consumption.

Users can enter the circuit to be simulated via the keyboard or from Schematic Entry, the company's second new package. Schematic Entry is a drawing package that allows users to design

electrical schematics graphically. As users design a circuit, Schematic Entry creates a database of parts, pins, and nodes for generating schematic plots and lists of components and interconnects. This database passes the required interconnect information automatically to Digital Macroscope. (List Price: *Digital Macroscope*, \$1000; *Schematic Entry*, \$700)

Requires: Macintosh, 512K RAM
Advanced Engineering Solutions, Inc.
75 Manhattan Drive
Suite 302
Boulder, CO 80303
(303) 499-2910

CIRCLE READER SERVICE NO. 517



HRM SOFTWARE

Human Relations Media (HRM) has released three educational-software packages.

Designed for students in grades 9 through college, Reaction Time: Balancing Chemical Equations uses an interactive, graphical game format to test students' understanding of typical

inorganic chemical equations. The program has seven sets of reaction data, each set showing the chemical formulas for 15 elements or compounds. Students must use these chemicals as reactants and products to construct as many different reactions as possible in each set, adding coefficients to create balanced equations. The program corrects reactions and produces scores.

Designed for grades 6 through college, Guess My Rule is a math program concentrating on number patterns and relationships, functions, graphing, and problem solving. Students must collect information in order to guess an unknown mathematical rule. To do this, they enter a number, and the program displays the value it gets from using the rule. It displays the value in a table and as a point plotted on a pair of axes.

Finally, Playing to Learn, for grades 4-12, is a set of four math games that challenges students to sharpen their abilities to observe, analyze, deduce, and induce. Crazy Dice tests pattern recognition through addition, subtraction, multiplication, and raising to powers. Dr. Factor reinforces players' knowledge and understanding of factoring whole numbers. Even Wins is a counting game based on binary and even and odd numbers. Bubbles lets players make "informed guesses," or estimates, of numbers and percentages, about quantities of bubbles. (List Price: \$59 each)

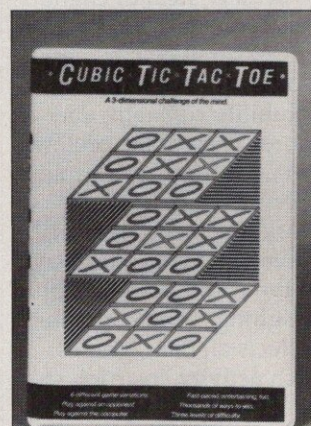
Requires: Apple II, II

Plus, Ile, or Iic; 48K RAM (Guess My Rule, 64K RAM)
Human Relations Media
175 Tompkins Avenue
Pleasantville, NY 10570
(800) 431-2050
In NY (914) 769-6900
CIRCLE READER SERVICE NO. 518



CUBIC TIC-TAC-TOE

Cubic Tic-Tac-Toe is a game of skill that tests players' abilities to think in three dimensions. The program features six game levels and three levels of difficulty. The object of the

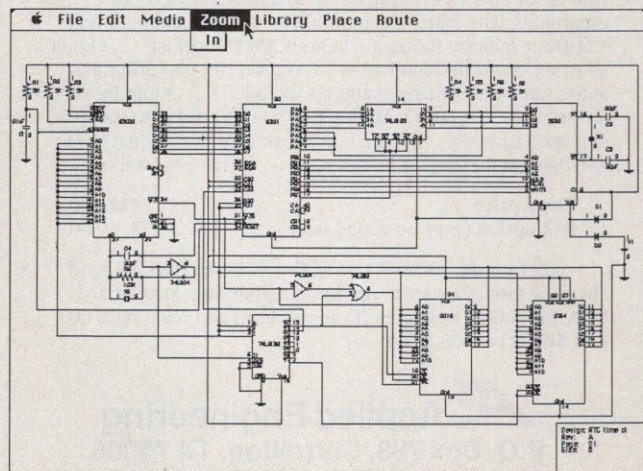


Cubic Tic-Tac-Toe is a three-dimensional version of the old game.

game is to place three Xs or three Os in a row, either horizontally, vertically, or diagonally, in three dimensions. Every game is different, and the program keeps track of scores. Users can play against an opponent or the computer and can choose to play with time limits on moves. (List Price: \$29.95)

Requires: Apple II Plus, Ile, or Iic
Brown-Wagh Publishing
100 Verona Court
Los Gatos, CA 95030
(408) 395-3838

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A screen image from one of Advanced Engineering's new CAE software packages



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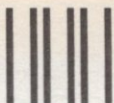
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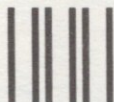
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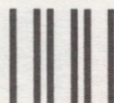
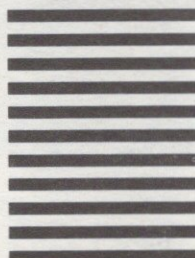
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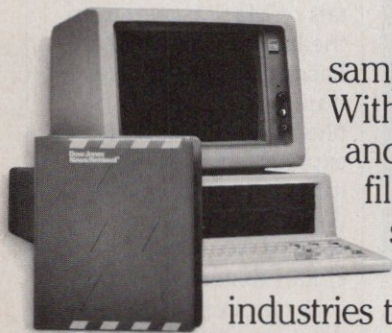
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A runners' log for the Macintosh, MacRun consists of five template programs that work with Multiplan or Excel to record 16 months' running activity. The programs are divided into three sections. The first, Daily Record, lets users enter distance, time, and a 60-character comment and then computes daily pace, weekly total mileage, and average pace. The second section, Weekly Summary, uses Daily Record entries to produce a summary of weekly total distance, average pace, year-to-date mileage, and a six-week moving average of weekly mileage. Finally, Competition Record records the top three performances at common competitive distances from one mile to a marathon. (List Price: \$34.95)

Requires: Macintosh; with Multiplan, 128K RAM, one disk drive; with Excel, 512K RAM, two disk drives
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Learning Well
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A baseball strategy game endorsed by Major League Baseball and the Players' Association, Micro League Baseball lets users manage Major League baseball players—setting up and changing lineups, choosing pinch hitters, and planning offensive and defensive strategies. The simulation is based on real players and statistics and displays results of games in full-color graphics. The Game Disk comes with information for 25 Major League games. Also available are NL and AL roster/player disks for each season and a GM/Owner Disk that lets users update rosters and stats and trade and draft players. (List Price: Game Disk, \$39.95; Team Disks, \$19.95 each; GM/Owner Disk, \$39.95)

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

Micro League Sports Association
28 E. Cleveland Avenue
Newark, DE 19711-5711
(800) PLAYBAL
(302) 368-9990

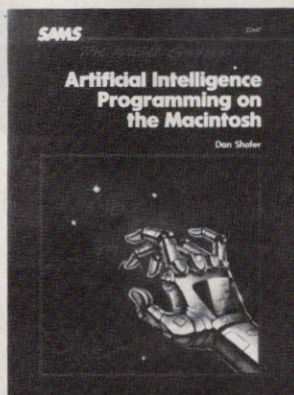
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BOOKS

MAC

ARTIFICIAL INTELLIGENCE PROGRAMMING

Artificial Intelligence Programming on the Macintosh, by Dan Shafer, is a



Artificial Intelligence Programming on the Macintosh

380-page softbound book intended for those who have a basic understanding of computers and programming.

It contains ten programs written in Logo, each of which includes ideas for expanding on concepts. The book provides a step-by-step introduction to the basics of artificial-intelligence programming techniques and concepts, including how to move cannibals and missionaries, build property lists, construct a vocabulary and formats, and use pattern matching to beat the system in the Intelligent Maze Game. (List Price: \$24.95)

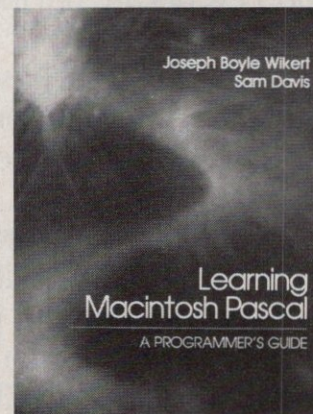
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MAC

LEARNING MACINTOSH PASCAL

A 352-page softbound book by Joseph Boyle Wikert and Sam Davis, *Learning Macintosh Pascal: A Programmer's Guide* is suitable both for beginners and experienced programmers. The book introduces the Macintosh desktop and operating system and discusses the fundamentals of MacPascal—from the basic structure of a Pascal program to procedures, data types, variables, and arrays. It also explains such advanced topics as pointers, linked lists, trees, stacks, and recursion. The book includes dozens of short program examples, screen displays, and four useful application programs and shows users how to program graphics, animation, sound, and music using Toolbox routines. (List Price: \$19.95)



Learning Macintosh Pascal

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THE MEDIA ARE THE MESSAGE

The ongoing problem of diskette incompatibility

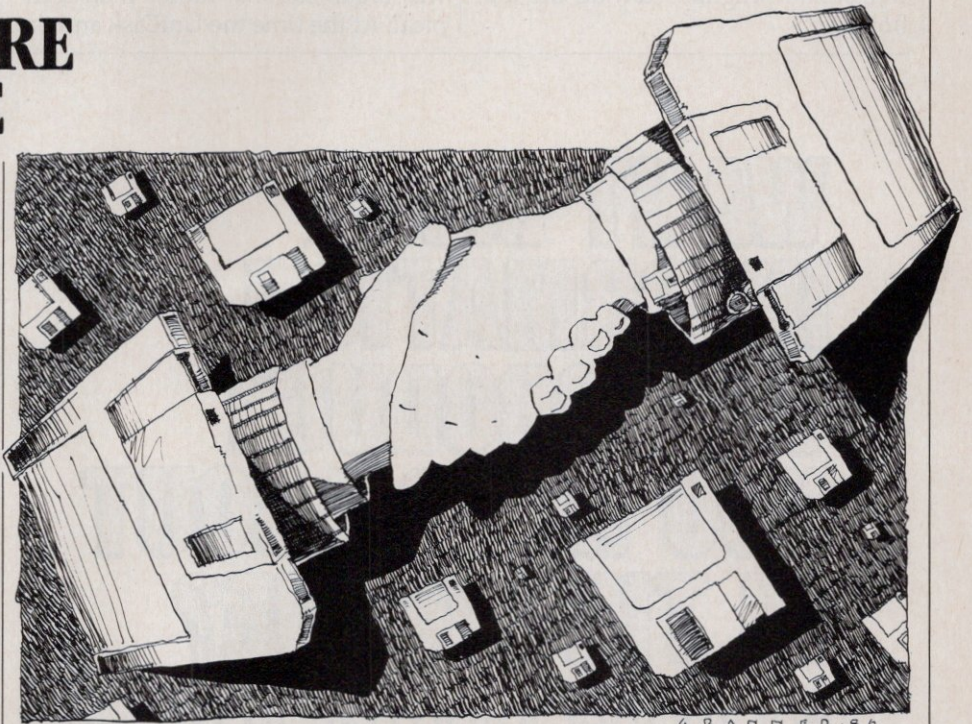
Why can't a Macintosh read a 3.5-inch diskette created with an Apple II UniDisk? After all, the two disk drives use the same mechanisms, the same diskettes, and a similar disk-controller circuit.

And why can't you use a Macintosh to read a diskette written on by an IBM PC with 3.5-inch drives? Why can't Apple II users exchange data files on diskette with people who choose Macs, Atari STs, or Amigas with 3.5-inch drives?

Sadly, 3.5-inch diskettes on different machines are *not* very compatible. Despite the seeming convergence both at Apple and among other manufacturers on a standard size, type, and package for small floppy diskettes, most machines still cannot read diskettes on which some other type of computer has written. The diskettes themselves are standardized, but we have seen no similar progress toward agreement on how to represent the information that might be written on them.

It's as if the newspaper industry had agreed on a standard size and type of printing paper but failed to establish a standard alphabet, vocabulary, or conventions for arranging the words within sentences.

Of course, the situation is not completely hopeless. Just as there are multilingual people, foreign-language translators, and the ability to do a certain amount of duplication without knowing what a foreign newspaper says, computers too can be taught to work with foreign diskettes. To see why that's necessary and why Apple Computer, Inc. has a



particular problem in this regard, let's take a closer look at what's going on inside some of those disk drives.

Apple's Drives

Apple's drives, as you might expect, are the most unusual, employing both a different method of packing in sectors of data and a dif-

Sadly, 3.5-inch diskettes on different machines are not very compatible.

ferent data-encoding method than those of the rest of the personal-computer industry.

Rather than limit the number of data sectors per track to what would fit on the shortest distance around the diskette, just outside the diskette center, Apple engineers decided instead to divide the diskette surface into several bands and to pack the tracks in

each band with as many sectors as would fit. On Macintosh and UniDisk diskettes, for example, the inner band has 8 sectors per track, the next has 9, and so on through 12 for the outside band.

Because the drive electronics read and write pulses at a nearly constant rate, the only practical way to get more sectors onto a track is to lengthen the rotation time—so the Apple drives change the rotation rate of the diskette as the head moves in and out between the various sector-density bands.

Apple also encodes its data in a unique manner. While the rest of the industry represents data values as magnetic pulses, using a method involving separate clock and data pulses, Apple uses a method known as group coded recording (GCR), which represents both data and clocks as combined patterns that take up less total space (some hard-disk manufacturers also use GCR).

Using the variable rotation rates

and GCR, Apple's 3.5-inch format packs 512 bytes onto a sector, 800 sectors onto a side, and 400K or 800K onto a diskette.

Unfortunately, the Apple II UniDisk format and the Macintosh disk-drive format have different methods for finding what information is within those hundreds of kilobytes, so you can't read diskettes from one using the normal commands and programs of the other. A growing number of translation programs can do the job, however.

In the future, an Apple objective will be compatibility among all Apple peripherals.

As to why these machines don't share a common diskette format, even Apple admits that the problem was organizational rather than technical: At the time the UniDisk and the

Mac were being designed, Apple was split into separate Macintosh and Apple II divisions, neither of which was willing to use a format the other had developed because of competition and hostility between the groups.

In the future, say Apple spokespeople from John Sculley on down, an Apple objective will be compatibility among all Apple peripherals. Perhaps that attitude will help out for the next generation of disk drives. Right now, you have to look outside Apple for programs or hardware to move data from the II to the Mac.

Tracking IBM

In the IBM world—and also in the Atari ST series—3.5-inch diskettes are formatted to closely resemble the format IBM uses for its 5¼-inch drives. Each track contains exactly 9 sectors and each sector 512 bytes. The innermost track has the same number of sectors and bytes as the outermost one does, and the diskette rotates at a constant rate (the pulses are just packed closer together on the inner tracks).

Instead of using GCR, data encoding involves the MFM (modified frequency modulation) method, with distinctive data and timing pulses (called clock pulses).

A 3.5-inch diskette formatted in this way contains 720 sectors per side, with 512 bytes per sector. The total diskette capacity is then 360K for single-sided diskettes and drives and 720K for the more common double-sided diskettes and drives.

Because Atari ST-series drives use the same format as the IBM PC 3.5-inch drives do, they can exchange data diskettes without any particular problems (you can't actually use PC application programs on the Atari, however, because the two machines use different processors and operating systems). Some forms of copy protection on each machine can give the other one trouble if you're trying to read in protected programs as data.

David Small, an Atari developer, describes two promising possibilities for Mac-to-Atari diskette interchange. One approach might be to connect a 3.5-inch drive to one of the Atari's fast serial ports, read in all the bits from the diskette, and let a software routine sort out which bits are which. Such a method would let you read from and write to data diskettes without any special preprocessing.

For the moment, however, Small has a less automatic interim solution.

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By tweaking the disk-drive parameters on the Atari so the disk drive uses 10 sectors per track instead of 9, he gets the same 800 logical sectors of 512 bytes per side that the Mac's drive does, although this method uses MFM and constant speed instead of GCR and a variable rate. Although diskettes can't actually be interchanged, if you use a telecommunications link to convey the information, the diskettes look logically identical, so programs that read and write through the low-level DOS routines on each machine can operate the same way without having to treat the diskettes differently.

The Amiga disk-drive design is somewhat Macintosh-like, in that it uses a spare area on one of its custom chips, along with some software, to do the basic low-level diskette reading and writing. Thus, in theory, the Amiga can be almost completely flexible about encoding, sectoring, and logical formatting.

The Amiga normally formats diskettes with one physical sector per track, with each physical sector broken up into 11 logical sectors. When an Amiga wants to read from or write to a logical sector, it reads from or writes to an entire track and does the data extraction or replacement in software.

With 11 logical sectors of 512 bytes each and 80 tracks, an Amiga double-sided diskette packs 880K, even more than what Apple gets with the vari-

I'm a fervent believer in personal computers as tools rather than religions.

able-speed mechanism. The Amiga can't currently read the Mac or UniDisk formats, however, because there is no way to tell its drive how to vary in speed like the Mac's does.

There's hope, though, according to developer Dan Moore of Littleton, Colorado. People have already been figuring out how to use the Amiga's flexibility and direct access to pulse-level information to allow the computer to duplicate a wide range of foreign-format diskettes, so the ability to read Apple's formats may not be that far off.

A side note: The Amiga can now read Atari diskettes without any problem by using the Sidecar attachment meant to allow the machine to run PC-DOS programs. Although only certain DOS versions seem to work with the Amiga (such as those formatted for the Data General laptop), the data-exchange routines developed for PC diskettes work with the Atari diskettes.

I find it astounding that Apple and other major personal-computer firms still don't realize that most users want to work with people who may have different machines, rather than

spending their time crowing about the technical superiority of their particular choice. To most of us, the ability to use our computer to read diskettes from anybody in the office is more important than a diskette with 40K more storage space.

At a minimum, every Mac and UniDisk should come with a program that lets them read diskettes from the other machine, and Apple should long ago have released an inexpensive peripheral to read from and write to PC-style diskettes. Rumors that some of these projects are in the works have been around for years.

Fortunately, personal computers unleash personal creativity. Just as in the CP/M community, in which half a dozen small firms developed programs to let one manufacturer's machines read another's diskette formats, in the Apple, Amiga, Atari, and PC worlds, a growing number of disk-drive engineers are zeroing in on easy diskette interchange.

As you may have noticed if you read this column regularly, I'm a fervent believer in personal computers as tools rather than religions and in the virtues of easy information exchange. Better access to disparate diskettes and computers represents an opportunity for us as Apple users, not a fall from grace and the one true path. Extra barriers do more to shut us out from the world than they do to fortify our position. There's too much good stuff out there to miss. +

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Rescue Squad

BY GARY B. LITTLE AND CHRIS VAN BUREN

CUSTOM DEVICE-CONTROLLER PROGRAM

Q. I'm a hardware designer, and I want to build a custom peripheral card for the IIe. My main stumbling block is in figuring out how to write the device-controller program to be stored in the ROM on the card. Do you have any suggestions for writing such programs?

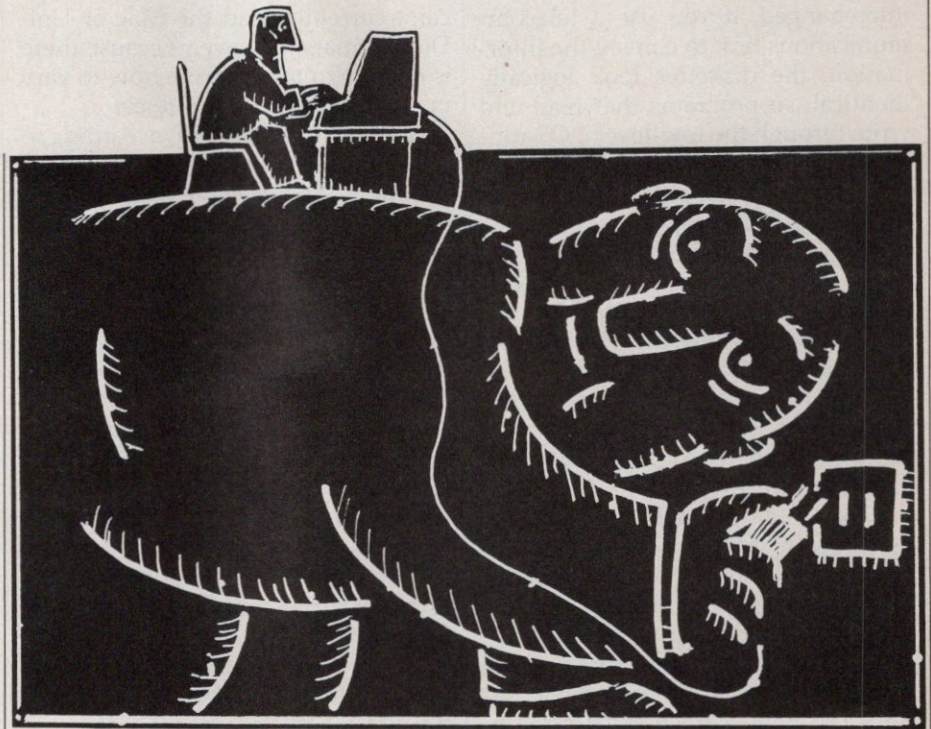
A. Before you start writing your code, make sure your card adheres to certain Apple conventions.

First, the I/O memory locations for controlling the device must be \$C080+n0 to \$C08F+n0, where *n* is the number of the slot into which the card has been placed.

Second, the ROM on the card must occupy the address range \$Cn00 to \$CnFF (called the peripheral-card ROM space). This ROM contains the drivers for communicating with your device. Optionally, you can share the space from \$C800 to \$CFFF (called the peripheral-card expansion ROM) with other peripheral cards; if you do, design your circuitry so that any access of location \$CFFF will disable that space and so that any subsequent use of the peripheral-card ROM space will activate it. That way, you will avoid the intolerable situation of having several cards using the same address space simultaneously.

The program you write for the peripheral-card ROM must be relocatable, since users must be able to use the card in any slot. Relocatable programs are those that can run at any position in memory, so they can't use absolute JMP (jump) and JSR (jump to subroutine) instructions or read data from locations within the ROM space. For scratch-pad data storage you can use locations \$478+n, \$4F8+n, \$578+n, \$5F8+n, \$678+n, \$6F8+n, \$778+n, or \$7F8+n.

For the card to work properly with Applesoft and Pascal programs, your ROM program has to include certain



identification bytes. The operating system examines them to determine what type of card is in a slot. The Pascal protocol also dictates that you include a seven-byte table, beginning at \$Cn0D, containing the offsets (from \$Cn00) of certain fundamental I/O subroutines: Initialize, Input, Output, Status, Control, and Interrupt. By including this table, you let program-

How do I build a custom peripheral card for the IIe?

mers use your card without having to worry about the details of the specific hardware design.

You can find more information on how to build your hardware device and write software for it in Apple's publication *Apple IIe Design Guidelines*.

You will find a summary of the software guidelines in chapter 11 of *Inside the Apple IIe* (Brady Communications, 1985). —GBL

TO ENHANCE OR NOT TO ENHANCE

Q. I own an Apple IIe and have been considering getting the enhancement. My computer dealer tells me that doing so will mean that some of my programs will no longer work on the computer. At the same time, however, he seems unable to tell me which ones or how to discern which. Can you shed any further light on this? The reason for my interest is that I have heard rumors of a new AppleWorks that will work with the mouse, have windows, etc. Are you aware of this new version and when it might be released?

A. The new ROMs in the enhanced IIe contain the MouseText characters that developers can use—along with Apple's guidelines—to create a standard graphic interface for their programs. The only incompatibility between the old and new ROMs is that the MouseText characters replaced a set of reverse-video characters. Apple Computer supposedly encouraged developers to use another means of obtaining reverse video in their programs.

Unfortunately, some developers used the doomed characters, and

their programs, when you use them with the enhanced IIe, display strange-looking shapes where the reversed characters are supposed to be (see "A Close Look at Recent IIe Enhancements" in the August 1985 issue of A+).

Most developers have upgraded their programs for the new ROMs, but you might find some stragglers. If a program was written or upgraded before April 1985, when the enhancement kit was announced, it might have compatibility problems.

Regarding a mouse-based AppleWorks, all information at this point is based on speculation—Apple has not officially announced a new version as of press time for this issue. The most recent rumors say that Apple and Rupert Lissner, creator of AppleWorks, have not exactly seen eye-to-eye on the mouse-based AppleWorks project. Apple might not publish the program at all. Of course, if the program is almost ready, Lissner might just sell it to another publisher.

International Solutions of Sunnyvale, California, is a likely candidate for publishing this kind of program. The company currently publishes stand-alone applications that use the mouse.

Only time will tell whether any AppleWorks-like program published outside of Apple will be compatible with the existing AppleWorks.—CVB

SPEEDING GARBAGE COLLECTION

Q. I've read that the "garbage collection" command, `FRE(0)`, is much faster under ProDOS than it was under DOS 3.3. I've written a very nice ProDOS data-entry routine that is string-intensive, and I still find that my `X=FRE(0)` command takes a long time to complete. What gives?

A. Under ProDOS, two garbage-collection commands are actually available. One is the Applesoft `X=FRE(0)` command, and the other is the ProDOS `PRINT CHR$(4);"FRE(0)"` command.

The Applesoft command is the slow one, and it is the one you're using in your program. If you substitute the ProDOS version, you will notice a dramatic speed increase.—GBL +

Please send your questions and problems to Rescue Squad, A+, 11 Davis Drive, Belmont, CA 94002.

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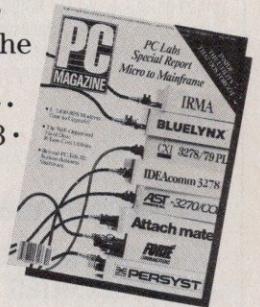
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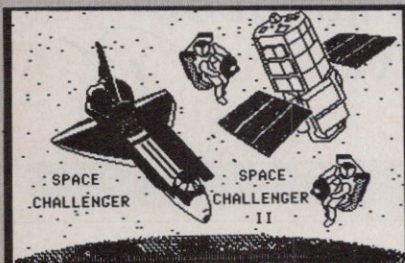
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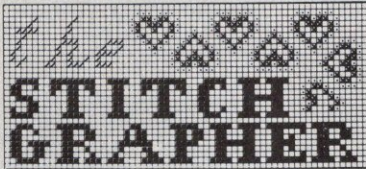


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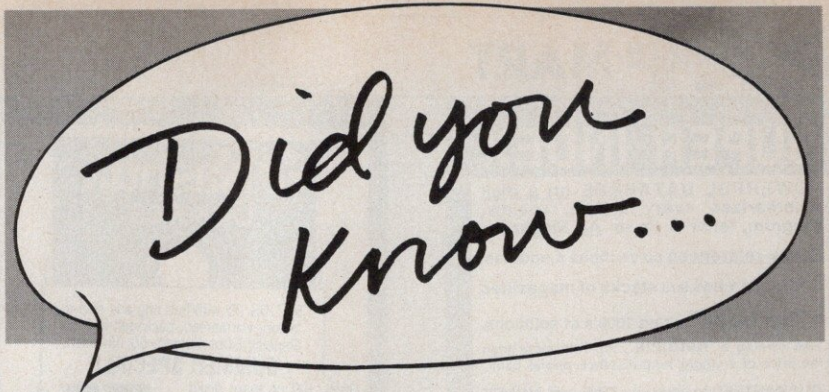
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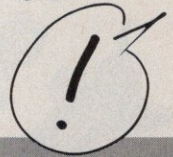
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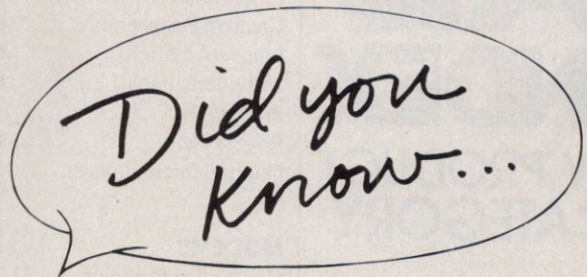
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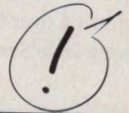
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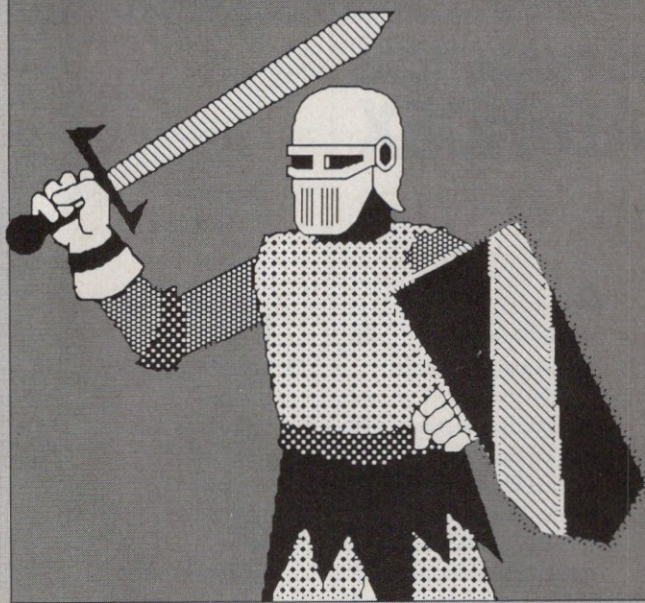
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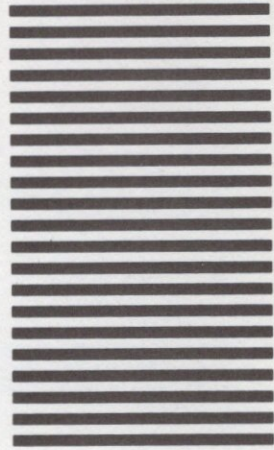
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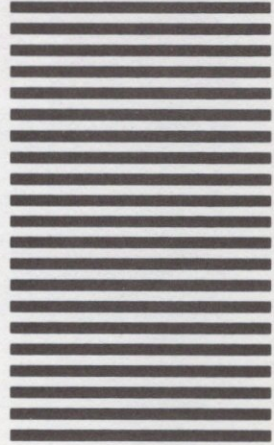
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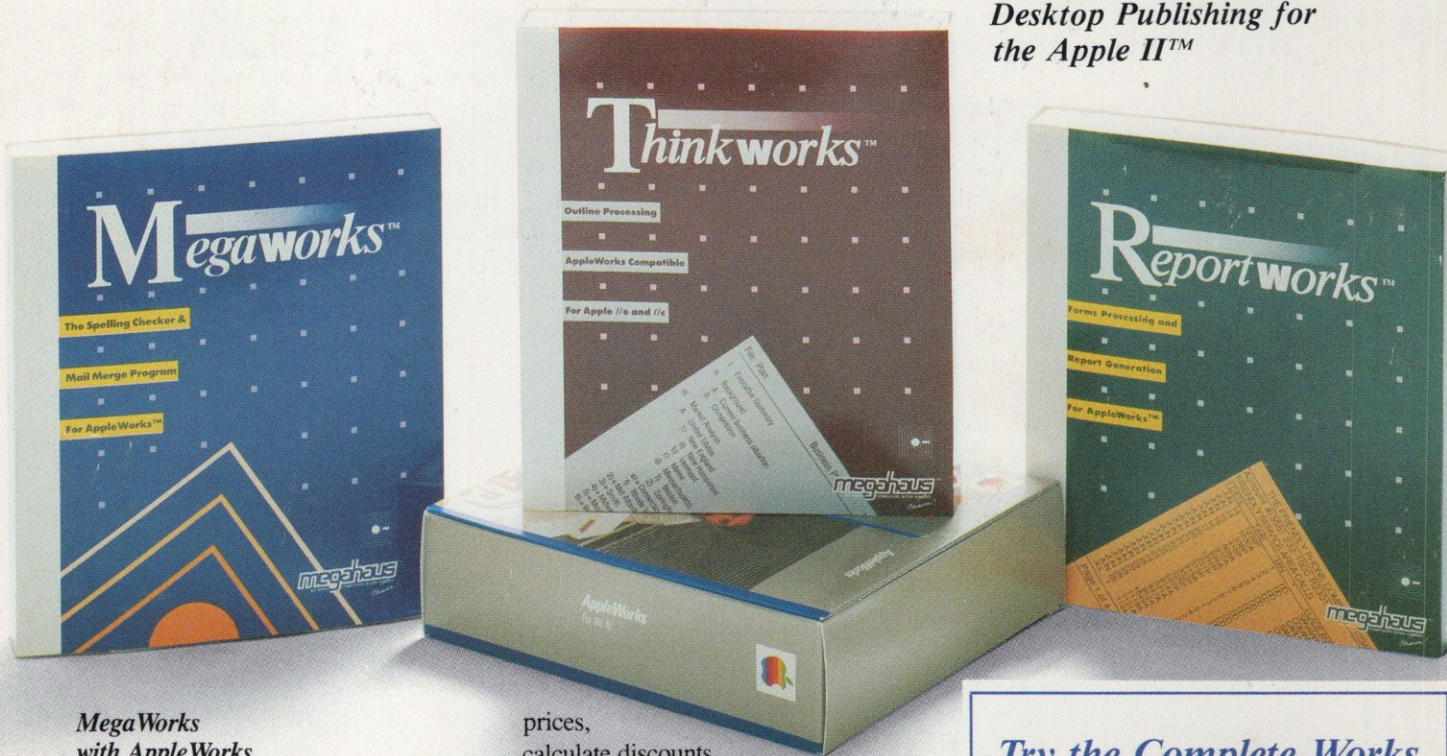
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