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VOLUME 3
ISSUE 12

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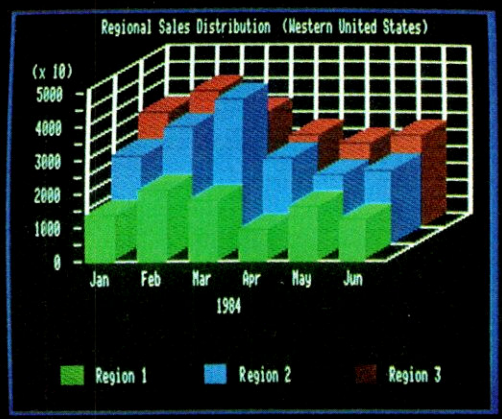

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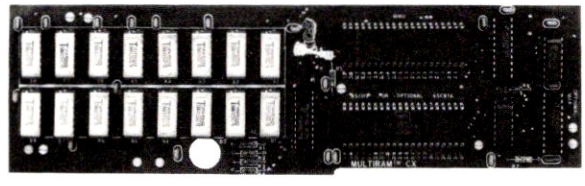

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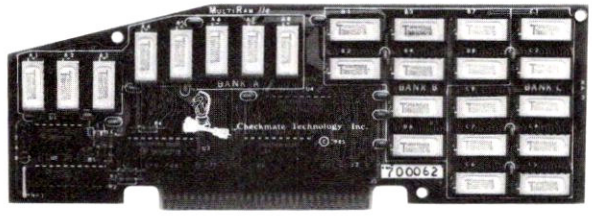

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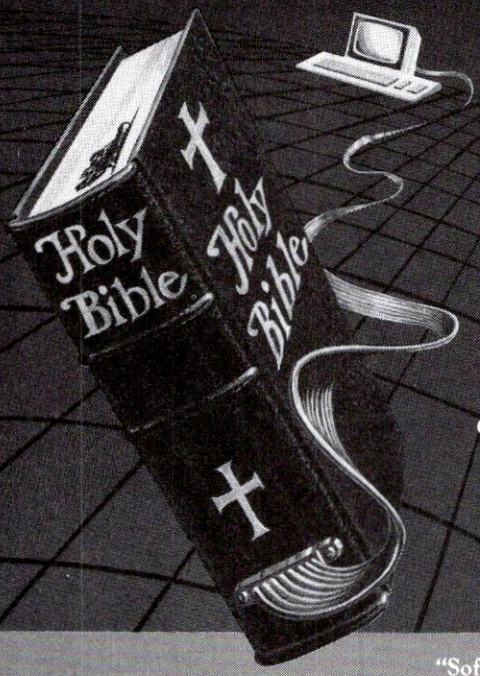

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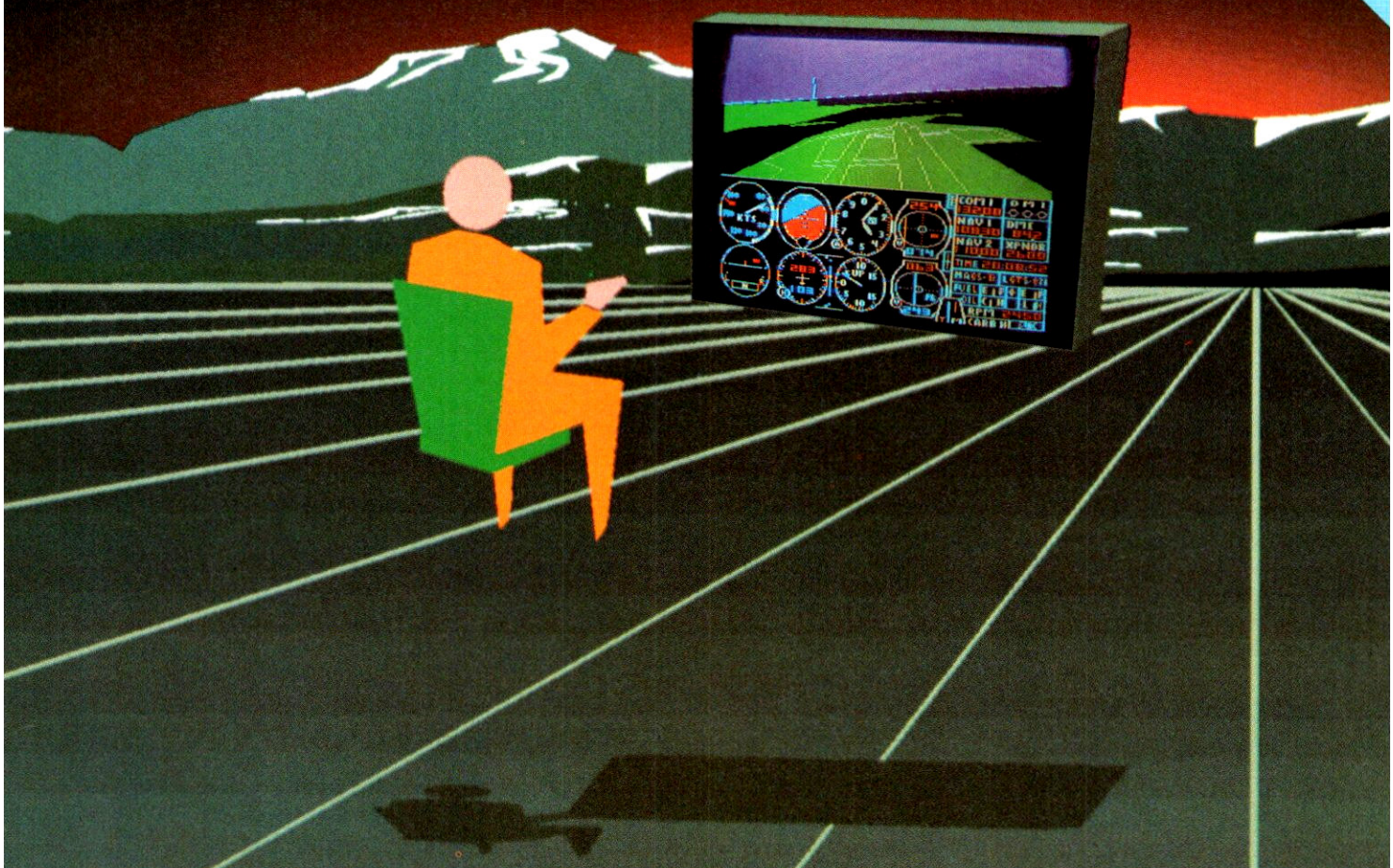

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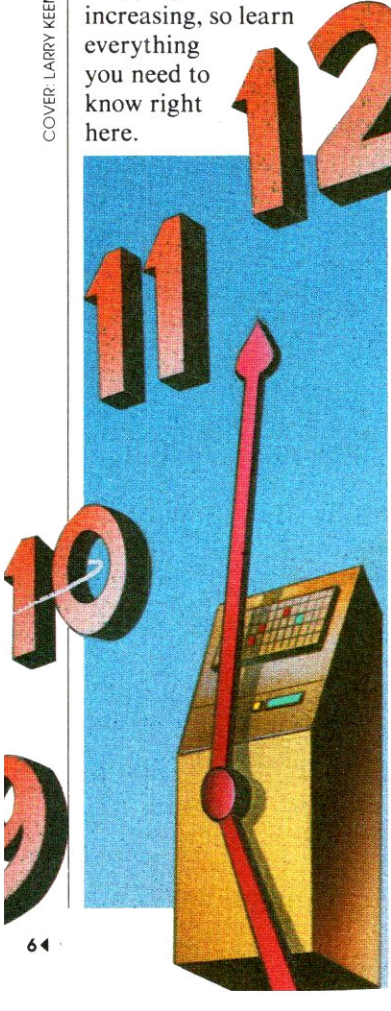

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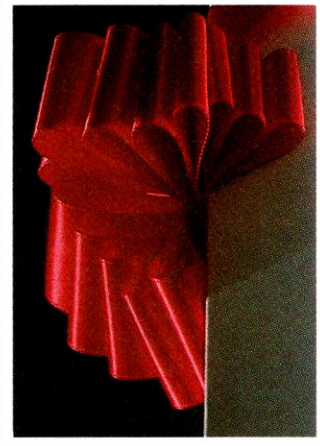

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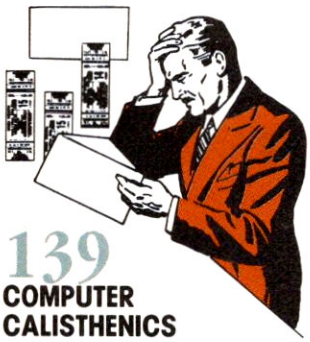

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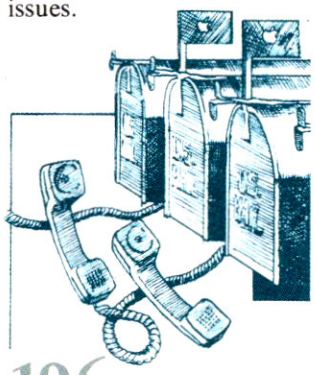

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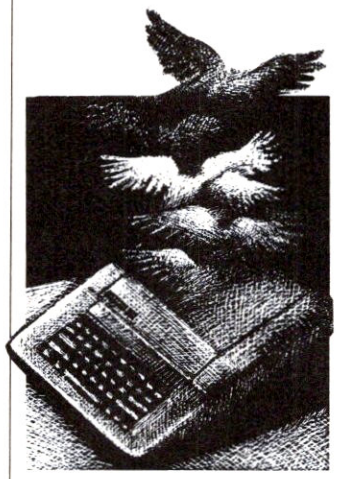

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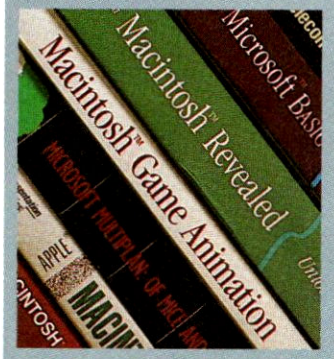

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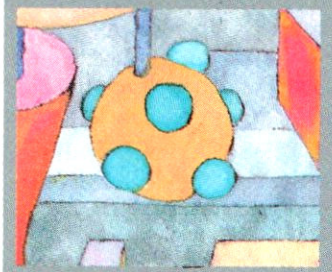

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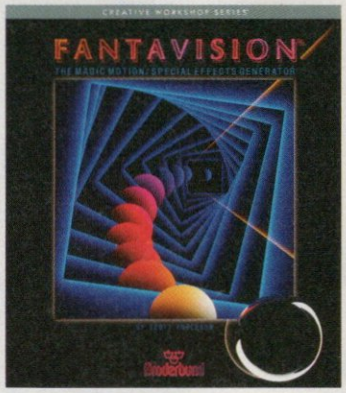

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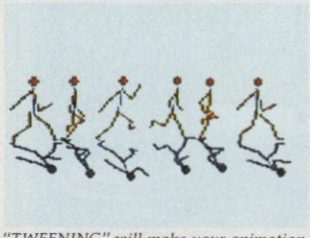

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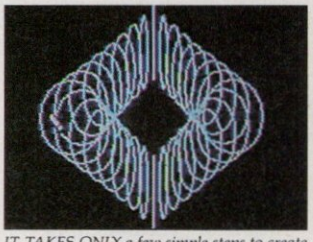
FANTAVISION IS A REVOLUTIONARY SOFTWARE BREAKTHROUGH that, for the *first* time, brings to home computers the special powers known to computer animators as "tweening" and "transforming."

You don't need any artistic ability or computer programming skills. Anything you draw in one frame can be fluidly "transformed" into something else in the next frame. For example, draw a plane in the air in your first frame, and a plane on the runway in your second frame. With Fantavision, your computer can instantly generate—in real time—up to 64 "in-between" frames so that your plane appears to come in smoothly for a realistic, three-point landing.

WHEN YOU SEE THE MAGIC of Fantavision, you won't believe it. When you play with it, you won't be able to stop.

YOU CAN even add Text with Fantavision, and with a single stroke make it "Lean," "Flip," "Squash," "Zoom," or parade around the screen, just like you've seen on television.



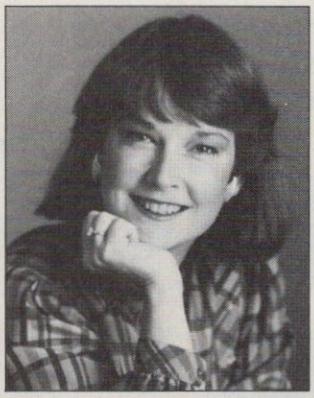
IT TAKES ONLY a few simple steps to create intriguing three-dimensional effects.

LOAD HI-RES SCREENS from other programs to make spectacular Backdrops. Then, add your own animation and Text.

Brøderbund®

FANTAVISION is available for Apple personal computers. Look for it at your favorite Brøderbund Software dealer. For more information about Brøderbund products, please write us at 17 Paul Drive, San Rafael, California 94903-2101. Apple is a registered trademark of Apple Computer, Inc. © 1985 Brøderbund Software, Inc.

CIRCLE 251 ON READER SERVICE CARD



Message from Maggie

Expandability is undoubtedly the primary reason for the ongoing phenomenal success of a computer product created eight years ago.

KEEPING YOUR APPLE II UP TO DATE

As many of you know, the ability to expand your Apple II with boards (also called cards) is what makes this computer so great. From day 1, the Apple II computer has never stopped growing and changing, allowing you to customize the system to your needs and keep up with technological advances. Expandability, also referred to as open architecture, is undoubtedly the primary reason for the ongoing phenomenal success of a computer product created eight years ago.

Expandability is so important, in fact, that it is a topic of debate inside Apple, as well as in the rest of the personal-computer industry. Apple made a deliberate choice several years ago to go against the tide with nonexpandable systems such as the IIc and the Macintosh. In the last six months, however, that decision has not only come under intense scrutiny, but officials at Apple have also admitted publicly that closed architecture is a mistake and a thing of the past at Apple. Third-party developers are even getting Apple's permission to develop add-ons for the IIc and the Mac that require opening the case.

Although the advantages of beefing up your Apple II are limitless, the prospect of picking the right expansion board can be daunting. To help you sort through the hundreds of boards available today, we are providing a four-part cover story that describes what the cards do and we have compiled an exhaustive set of charts detailing the differences among the many boards you can choose from.

Speaking of expandability, when you pull your December issue from your mailbox or buy one at the newsstand, we will have celebrated our second anniversary. I am pleased to say that this issue is one of our biggest ever. And since it's the holidays, I can get sentimental and say how much we appreciate your support in making *A+* the number 1 Apple magazine.

You see before you a picture of the editorial and art staff, who labor to bring this publication to you every month. The dozens of other crucial members of our team who are not in the picture include our publisher, the advertising sales staff, the production people at our headquarters in New York; the people at the outside services we use, and, of course, our free-lance authors.

From all of us to all of you, we wish you the very happiest of holidays and a prosperous new year. +

Maggie Canon

MAGGIE CANON/**EDITOR**

The A+ editorial and art staff: Back row, top, left to right: Fabian Cooperman, Peter Tucker, Ae Kyung Kuark. Back row, bottom: Mary Bohannon, Chip Carman, Carol Person. Middle. Leslie Steere, Eva Langfeldt, Marjorie Gue Brandon. Front: Fred Davis, Maggie Canon.

ANTHONY ABUZEIDE

Let's compare Apples™ to Apples™.

An Apple IIc

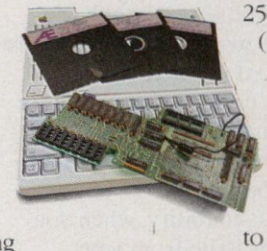
An Apple IIc with Z-RAM

The Apple IIc on the right works exactly the same as the Apple IIc on the left. Almost. The Apple on the right has a powerful memory expansion coprocessing card called Z-RAM. From Applied Engineering. Which means the Apple on the right can completely load AppleWorks into RAM—and then run it up to thirty times faster than the Apple on the left.

Z-RAM also acts as a solid-state disk drive. Which means the Apple on the right will load and store programs up to 30 times faster. And, our included RAM disk is compatible with Applesoft, PRO-DOS, DOS 3.3, PASCAL and CP/M.

Turbo Charged AppleWorks.

Even a 256K Z-RAM can completely load AppleWorks into RAM. With Z-RAM, the moment your fingers touch the keyboard AppleWorks responds. A 256K Z-RAM lets your IIc run AppleWorks up to 30 times faster, increases available desktop to 235K and maximum number of records from 1,350 to over 16,000, doubles the number of lines allowed in the word processor, provides a print spooler, and auto-segments large files so they can be saved on two or more disks. A 512K Z-RAM boosts AppleWorks desktop to an incredible 425K.



Take a closer look.

There's more. Z-RAM has a built-in high speed Z-80B microprocessor that allows you to run CP/M programs. Which means you now have access to the single largest body of software in existence, including popular packages like WordStar, dBase II, Turbo PASCAL and Microsoft BASIC. A 16 bit option is also available.

And still more. Z-RAM is compatible with all IIc software and hardware, installs easily in just ten minutes with a screwdriver (slightly longer without), is available with 256K or 512K of additional memory (a 256K Z-RAM can be upgraded to 512K at any time). Z-RAM is easily handled by the IIc power supply with our patent pending power saving design.

The only thing better than that would be a recommendation from Steve Wozniak.

"I recommend Applied Engineering products wholeheartedly." (Of course, Steve's IIc has a Z-RAM installed.)

Steve Wozniak, the creator of Apple Computer

For fast response.

Z-RAM comes complete with simple instructions, RAM disk software, Z-80 operating system, CP/M manual. And a five year "hassle free" warranty. Make a good Apple great. With 256K Z-RAM "384K total" ($359); with 512K "640K total" ($419); 16 bit option may be added later ($89).

If you want to run CP/M software, but don't need more memory, we suggest our Z-80c card. The Z-80c has no memory expansion ports and is priced at only $159.

Call 214-241-6060 TO ORDER TODAY. 9 a.m. to 11 p.m. Seven days, or send check or money order to Applied Engineering. MasterCard, Visa and C.O.D. welcome. Texas residents add 5⅛% sales tax. Add $10.00 outside U.S.A.

Applied Engineering
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Letters

GETTING ZEROS STRAIGHT

Dear *A+*,

I would like to make a minor clarification of Ping Sun Chun's letter in the September issue of *A+* (page 11).

When using AppleWorks, Version 1.2, with the Grappler+ and some other intelligent interface cards, you have to change the interface-card control code from its default value of Control-I 80N to Control-I 0N. Recently we have received several calls from *A+* readers who think that the code contained the letter O and not the number 0 (zero). This perception is not correct. Make sure that when you install that code, you use Control-I 0 (zero) N, and not the letter O. This precaution will allow your AppleWorks files to print correctly without giving you an 80N in the upper left corner of your paper, or word wrap in the text.

The earlier versions of AppleWorks do not have an interface-card selection in their Change Printer Specifications menu and must be reconfigured to work properly with the Grappler+. You can find the version number of AppleWorks by booting the Start Up disk. On the screen that asks you to put in the Program disk and press Return, it also shows the version number. Versions that end with the letter *G* have already been reconfigured.

Gordon Castle
Technical Support
Orange Micro, Inc.
Anaheim, CA

IBM IMAGES IN APPLE ADS

Dear *A+*,

I'll admit that I'm a little snobbish about Apple computers. It is the only brand of computer that I have in my home, and it is the only brand used by the company where I work. I choose to read *A+* magazine because it's as dedicated to the Apple as I am.

Therefore, I'm a little confused and upset that at least three major advertisers in the September issue used IBM computers to advertise products purportedly for the Apple. After years of hearing rhetoric claiming that IBM is better than Apple, I'm more than a little offended by advertisers who continue to promote such propaganda in their ads. Whether the ads are for Sony color monitors, Rolodex software, or Cabbage travel cases, if the advertisers refuse to use Apples in their ads, I refuse to use their products in my Apple. (To be fair, there were several other advertisers who promoted their products with non-Apple computers, but given the historical controversy between IBM and Apple, it is the IBM ads that trouble me most.) I, for one, plan to boycott advertisers who have so little respect for the Apple.

Pat Marnett
Tempe, AZ

INFOCOM KUDOS

Dear *A+*,

I just read your article "A Robot Sidekick" in the "That's Entertainment" section (*A+*, September 1985, pages 108–110), and I agree completely with your review of Planetfall by Infocom (although you made it seem a bit harder than it actually is). I think the people at Infocom deserve a round of applause for their work in making this game (it is really one of their best).

You get a great sense of pride and a feeling of fulfillment when you complete a game. The hint booklet gives players a way of getting the information they want, instead of making them go through a lot of keyboard pounding, hastily turning off of the computer, stomping, and slamming doors.

I think if the world had a lot more of Infocom, computer gaming would be a better place to be.

Raymond Cirincione
Morganville, NJ

SOME OMISSIONS

Dear *A+*,

I still feel that you are the best Apple-computer magazine that exists, but I wish to point out some deficiencies in your August issue.

Your article on dot-matrix printers leaves out the Spectrum LX-90 by Epson. This printer is recommended for the Apple IIc by Epson in its advertisement on pages 6–7.

I would also like to mention that your report on IIe enhancements has a mistake in the MouseText character-set program on page 48. The program line that prints the corresponding ASCII characters has been deleted.

Michael Little
Clintwood, VA

Thank you for your comments. You are right about the program line that was dropped in the MouseText character-set program. The program's last line should have read

```
700 PRINT "ABCDEFGHIJKLMNOPQR
    STUVWXYZ[\] ^ _";
```

NEW ISN'T BETTER FOR ALL

Dear *A+*,

AppleWorks 1.1 was upgraded to 1.2 primarily to correct printing problems involving extra spaces, word wrapping, etc. Where these problems exist, the change is probably necessary. I, too, had my dealer upgrade me to the 1.2 version, assuming new would be better, even though printing was not a problem for me.

I use AppleWorks spreadsheets extensively and found open-apple-" useful for rapidly deleting a cell. In 1.2 this feature is missing, and although open-apple-B will do the job, it is relatively cumbersome. Needless to say, 1.1 is back in the drive.

Robert J. Netro
North Canton, OH

▸ TIMEBASE UPDATE

Dear *A+*,

I appreciate the review of our TimeBase software published in your November issue (pages 164–167). I must point out, however, that since the review was printed, we have released an updated version, TimeBase 1.6.

TimeBase 1.6 is considerably more sophisticated than Version 1.01, the version Sharon Aker reviewed. It takes into account all of the suggestions and criticisms heaved upon us by users, dealers, and distributors alike. The result is truly a one-of-a-kind program that can handle the vast majority of office-management tasks.

New features include multiuser capabilities, viewing of unlimited multiple schedules in a single screen, locating the next commonly available time that any group of individuals is free for a meeting, customized time reporting for single or multiple schedules, voice-synthesized reminders and alarms, multiple database capabilities, mailing labels, user-defined indexes, independent things-to-do list for each schedule, tracking of expense accounts and credit cards, compatibility with Apple's LaserWriter, and many others. We have even included a copy of Switcher and supporting documentation.

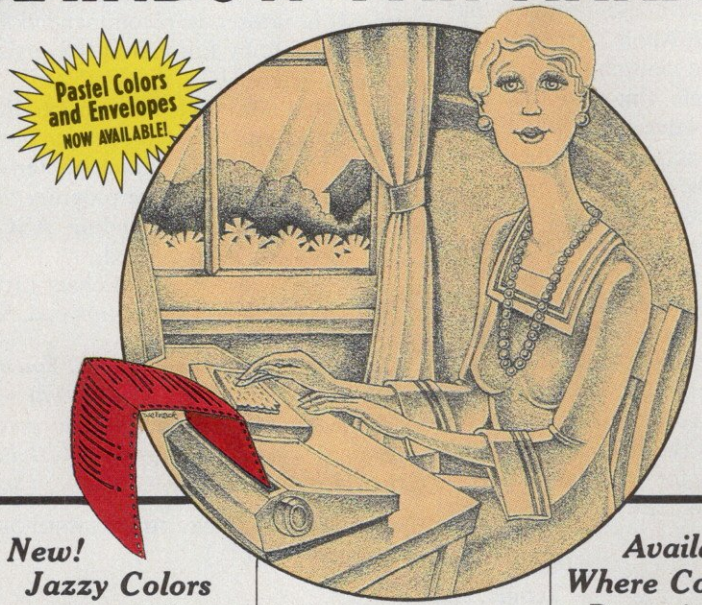
These features, combined with Switcher and with existing TimeBase functions, allow you to solve virtually any business need with considerably less effort than was required previously. The fact that TimeBase works hand in hand with your other business software makes it the only total office-management system for the Macintosh.

Registered owners of Version 1.01 will be receiving a notice in the mail allowing them to upgrade to Version 1.6 for $10.

Salvatore F. Patalano
Vice President, Marketing
SoftDesign
Miami, FL

★EXTRA! EXTRA!★

RAINBOW PAK™ ARRIVES!



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CIRCLE 309 ON READER SERVICE CARD

▸ NEWSROOM TIP

Dear *A+*,

I've found a way to avoid the primary pitfall—disk swapping—that John Eckhouse finds with The Newsroom (*A+*, September 1985, pages 43–51).

The documentation does suggest that "banners," "panels," and "photos" all be saved on separate disks, but it is not required. I have found it convenient to save all the photos, banners, panels, and layouts for two pages (or more—I haven't yet filled a disk) on the same disk. This method eliminates all disk swaps, except when you need to access the publisher's Clip Art disk or need to print on a single-disk system.

A more frustrating "feature" of the program is the fact that custom artwork you've created for either banners or photos is not transferable between the two elements. This restriction can be quite inconvenient when you've spent a great deal of time creating a unique graphic for one issue and wish to use this same graphic as part of another element for a new issue.

Although the program is not perfect, it is an amazing value at its suggested list price of $49.95.

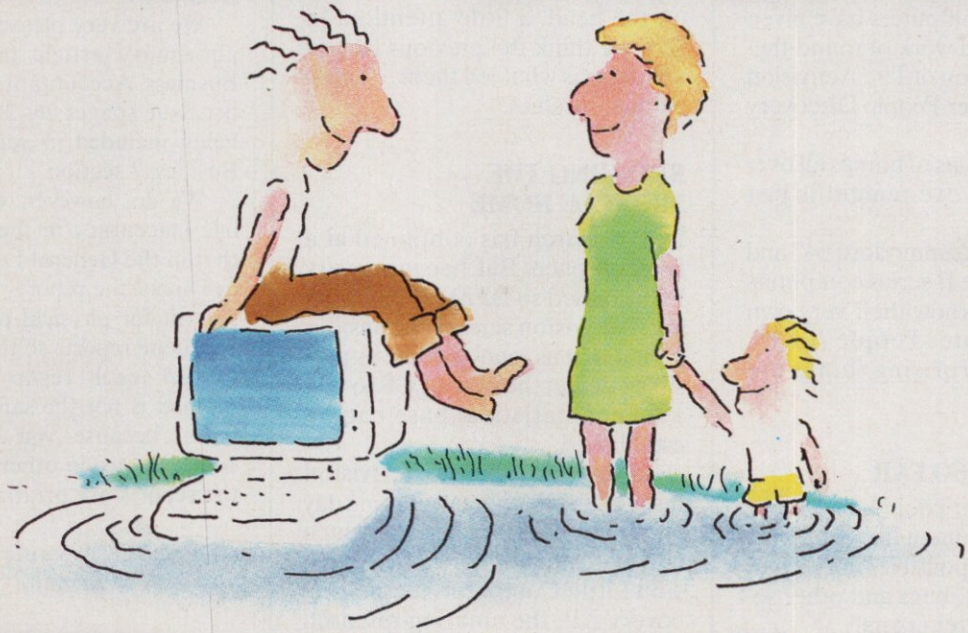
Mel Rainer
Houston, TX

▸ NEWSROOM TIP II

Dear *A+*,

John Eckhouse's review of The Newsroom in the September issue of *A+* was informative about the program's abilities and its limitations. I would like to add to this review the story of an experience I had.

GET YOUR FEET WET...



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Get your feet wet in the information age with the Dow Jones News/Retrieval Membership Kit. At $29.95, you'll enjoy the dip without getting soaked. Available at computer retailers and selected bookstores. For the location nearest you, call:

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"Free time" offer limited to five(5) hours per household. Must be used within 30 days of receipt of password. Nominal service fee still applies.

CIRCLE 277 ON READER SERVICE CARD

"Toss away any preconception that Dow Jones News/Retrieval is a stuffy, one dimensional data base service designed only for an elite corps of stock analysts and Wall Street wizards. Far from it—Dow Jones News/Retrieval also provides entertaining movie reviews, current weather and sports reports, convenient electronic shopping and inexpensive electronic mail. . .Dow Jones News/Retrieval is informative, entertaining and well worth the money."
-Brad Baldwin, *InfoWorld* **Magazine**

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Advertisement

LITTLE PEOPLE INSIDE OUR COMPUTERS:
GETTING TO KNOW THEM.

The dust has settled by now. Things are returning to normal (or what passes for normal) at the sprawling Activision research complex in Mountain View, California. The glamour and excitement of last spring's discovery of little people living inside computers have given way to the hard work of round-the-clock production of The Activision Little Computer People Discovery Kit.™

But, in millions of homes all over America, the excitement is just beginning.

Owners of Commodore 64™ and 128™ and Apple II series computers are getting to know their very own Little Computer People (LCP). And some surprising things are being learned.

THE STORY SO FAR

Little computer people, of course, are the small human-like beings believed to be responsible for glitches, garbled syntax, bugs and other so-called "computer errors."

While the media attention has focused on such mundane research efforts as plasmamemory, artificial intelligence and sixth-generation supercomputers, the real action, science-wise, has been in the LCP field.

"Each LCP we've observed so far is a real individual, but we have noticed certain common traits," comments David Crane, leader of Activision's LCP research team.

"For example, they all seem to enjoy playing music on their pianos (although their musical tastes vary), and they love dancing and aerobic exercise. They like playing card games, too, and will probably try to get you to play with them.

"We haven't been able to decipher their spoken language yet," Crane continues, "but apparently they've been studying our word processing programs, and they've learned to communicate in written English using the typewriters we've placed in the 2½ story electronic dream house, or House-on-a-Disk, that we've created for them."

The LCP also have their emotional side, Crane says. "Like anyone, they need an occasional pat on the head, a little attention. In fact, we think the previous lack of attention is what led them to cause all that mischief."

BRINGING THE MIRACLE HOME

LCP research has continued at a feverish pace. But because every LCP studied so far has been different, Activision scientists consider it vital that as many people as possible contact their own LCP so that a firmer statistical base can be established.

To this end, tireless Activision researchers have been working day and night to perfect and produce adequate quantities of The Activision Little Computer People Discovery Kit, the amazing research apparatus that allows computer owners to meet their own LCP.

The Discovery Kit includes The Little Computer People™ House-on-a-Disk™ Research Software that is guaranteed to lure out at least one LCP; the computer owner's guide to the care of and communication with Little Computer People; deed of ownership for the House-on-a-Disk; and a Special Edition of *Modern Computer People* magazine—all the tools needed for observation, interaction, communication and, perhaps, a meaningful relationship.

Some people are still skeptical. Some people will *always* be skeptical. But science has spoken. There *are* little people living inside computers. The only question is whether you've met the one living in yours yet.

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The Newsroom's Wire Service, the option to send Newsroom information over a modem, did not support my modem, or any internal modem. I called Springboard Software and explained my problem. I found out that a newer version could be obtained by mailing back the old version and $7.50.

I did so, and, to my surprise, in less than a week I received the new version back in the mail. I hope this information helps any other readers who may be having a similar problem.

Bill Saturno
Washingtonville, NY

▸ CLARIFICATION

Dear *A+*,

We are very pleased with your complimentary article on The Advanced Business Accountant in your September issue (pages 26–28). We appreciate being included in your "Apple Means Business" section.

We do, however, want to point out one inaccuracy in the article. It stated that in the General Ledger System, you can spool the reports so you don't have to wait for physical printing. Actually, we queue reports so that you don't have to pick each report separately. This method is not the same as spooling reports, because you cannot use your computer to do other processing while the reports are printing.

Joan L. Levers
Director, Corporate Communications
Manzanita Software Systems
Roseville, CA

▸ CORRECTIONS

Thomas Moore's BBS

In our September issue on page 110, we listed a bulletin-board service called TKM's Mini BBS. Thomas Moore, the operator of TKM, informs us that the correct name of the service is TKM's ABBS and that the correct phone number is (213) 431-2274.

SoftDesign's TimeBase

On page 164 of our November issue, we incorrectly referred to the company that makes TimeBase as TimeBase Software Design. The correct name is SoftDesign.

▸ FOLLOW-UP

Our November cover story, "Apple's Bevy of New Products," was missing some price information that has now become available. The Macintosh Hard Disk 20 sells for $1499, The Switcher Construction Set is $19.95, and the price of the ImageWriter II Sheet-Feeder is $225.

Advertisement
CIRCLE 174 ON READER SERVICE CARD

2 MILLION AMERICANS ARE ABOUT TO BECOME 'DANGEROUS'

You could be one.

Play **Elite** – it's totally stunning.

Elite is Britain's 1985 Adventure Game of the Year, an interstellar mind-game with incredible 3D Vector-Graphic space flight simulation

Take command of your Cobra MK III combat craft, trade with alien cultures on over 2000 planets in eight galaxies. Pick your destination on the starmap, checking out the computer's 4-way viewscan – and you're ready for your first jump thru hyperspace.

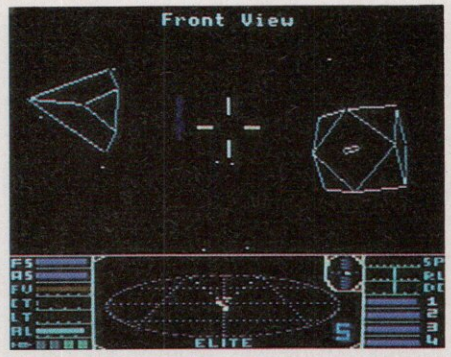
As a rookie you start with 'Harmless' status but with the right stuff and combat skills, you'll win ratings of 'Average' to 'Dangerous' – with your ultimate objective to become one of the **Elite**.

It's big, it's fast and it's here now for the **Apple II**,™ **IIe**™ and **IIc**,™ complete with Manual, Novel, Control Guide, Ship Identification Chart, Keyboard Overlay **and** the opportunity as the US competition winner to get flown to London, England to try for the Elite World Championship.

It's so addictive it's been called "the Game of a Lifetime".

Elite.

Be dangerous.



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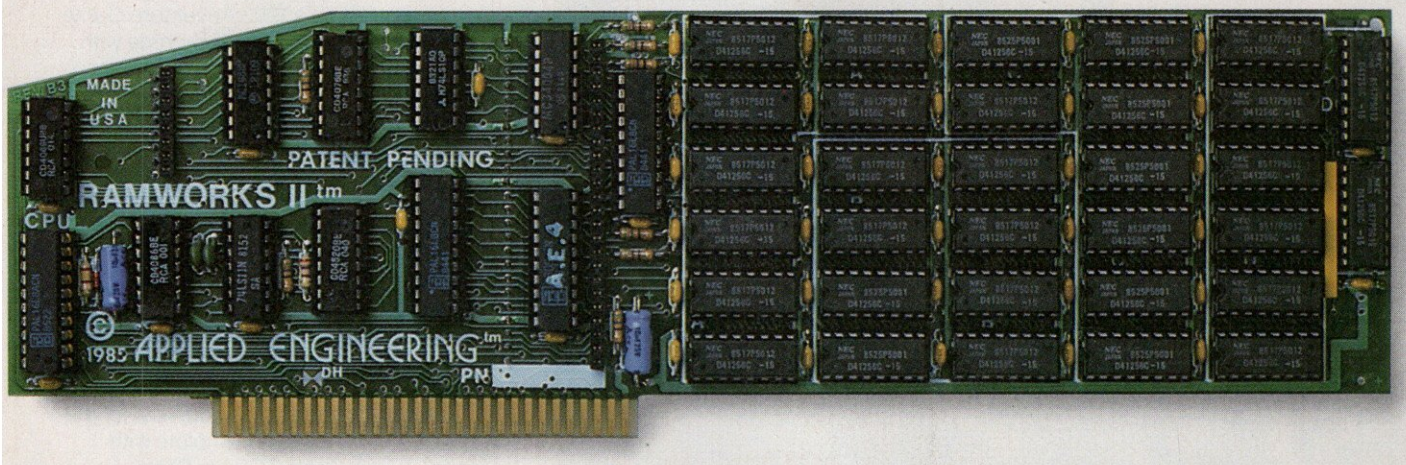
CIRCLE 214 ON READER SERVICE CARD

Meet RamWorks II™

The Recognized Industry Standard For Memory Expansion of the Apple IIe.



RamWorks II. A Generation Ahead. Again.

The best selling expansion card for the Apple IIe just got even better. With RamWorks II, expand your IIe to an incredible 3 megabytes of usable RAM.

Turbo Charged AppleWorks.

RamWorks II plugs into the IIe auxiliary slot and acts just like Apple's extended 80 column card, only better—because if you buy a 256K or larger card, AppleWorks will automatically load itself into RamWorks II. This dramatically increases AppleWorks' speed and power because it effectively eliminates the time required to access disk drive 1. Now, switch from word processing to spreadsheet to database management at the speed of light. AppleWorks responds the moment your fingers touch the keyboard.

But AppleWorks has certain internal limits, independent of available memory. Fear not. Only RamWorks II (and the original RamWorks of course) removes those limits. Only RamWorks II increases the maximum number of records available from 1,350 to over 16,000. Only RamWorks II actually increases the number of lines permitted in the word processing mode. And only RamWorks II features a built-in printer buffer, so you no longer have to wait for your printer to stop before going back to AppleWorks (256K or larger RamWorks II required).

With RamWorks II, you won't have to split your data into 2 or more separate files because you'll have the necessary memory to access ALL your data ALL the time, quickly and conveniently.

RamWorks II	AppleWorks Desktop
128K	101K
256K	188K
512K	378K
1 MEG	758K
1.5 MEG	1136K
3 MEG	2277K

The Most Friendly, Most Expandable Card Available.

RamWorks II is compatible with more off-the-shelf software than any other RAM card. Popular programs like Advanced VisiCalc, Magic Office System, Flashcalc, The Spread Sheet, Diversi-DOS, Supercalc 3A, Magicalc, etc. (and hardware add-ons like Profile and Sider hard disks). Fact is, only RamWorks is 100% compatible with all software written for the Apple 80 column and extended 80 column cards. In addition, RamWorks II can emulate most other RAM cards, so you can use programs written for them without modification. And any size RamWorks II can be user upgraded later to any larger size.

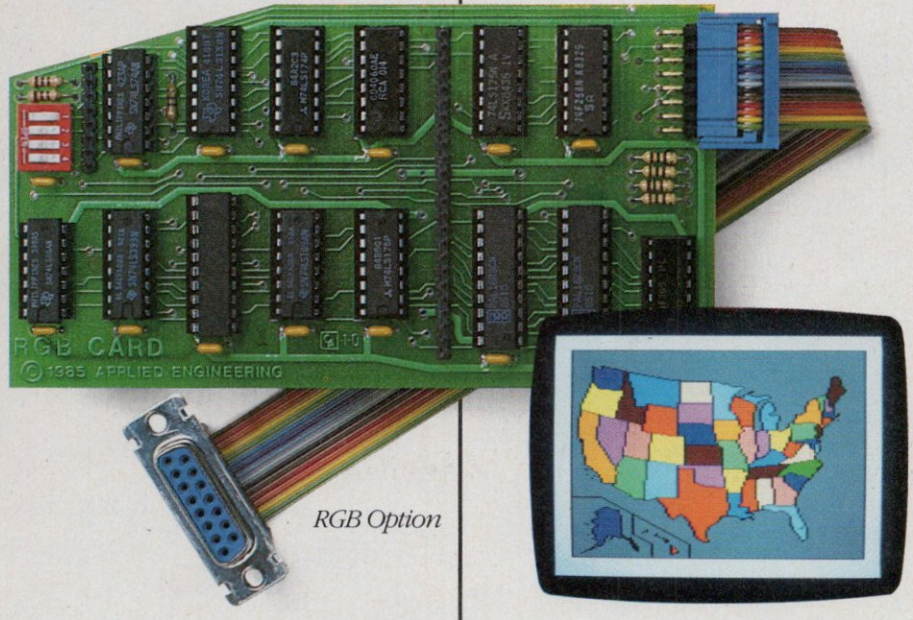
RamWorks II was designed so you could take full advantage of future developments in 16 and 32 bit microprocessors. As your needs grow, so can RamWorks II. A handy coprocessor connector allows the latest and greatest coprocessor cards to access all 3 MEG

of RamWorks II memory. And speaking of more memory, RamWorks II has a memory expansion connector on board so a low profile (no slot 1 interference) memory expansion card can add another 512K or 2 MEG of memory.

Should you ever run low on memory with RamWorks II (unlikely) you can add these expander cards to your RamWorks II at any time. And of course, these expander cards are compatible with original RamWorks too.

It's In Color.

The same slot that's used for memory expansion is also the slot that's used for RGB color display. RamWorks II lets you decide later to add RGB color. For only $129, an RGB option can be added to RamWorks II to give you double high resolution color graphics and 80 column text. All with razor sharp, vivid brilliance that's unsurpassed in the industry. The RGB option does not waste another valuable slot, but rather plugs into the back of RamWorks II with no slot 1 interference (works on the original RamWorks, too) and attaches to any Apple compatible monitor. And remember. You can order the RGB

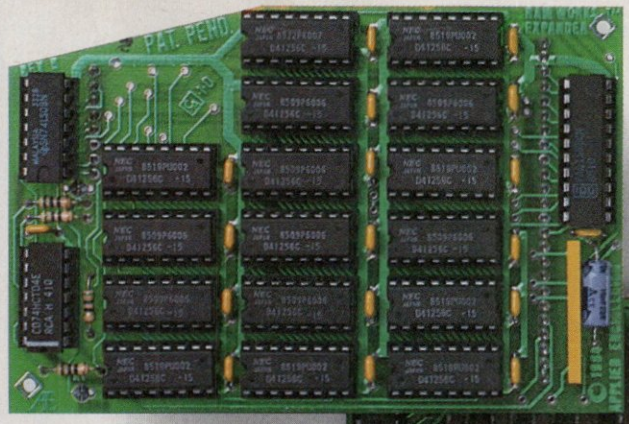


RGB Option

option with your RamWorks II. Or add it on at a later date.

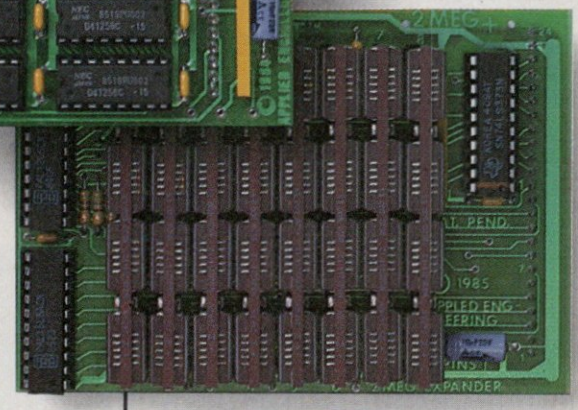
It Corrects Mistakes.

Let's say you bought some other RAM card (and that's a mistake) and your RAM card is not being recognized by AppleWorks, Advanced Visicalc, Flashcalc, Supercalc 3A, or other programs, and you want RamWorks II.



512K Expander

2 MEG Expander



No problem. The memory chips on the card that you now have, which is where most of the money is, can be unplugged and then plugged into the expansion sockets on RamWorks II.

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CIRCLE 226 ON READER SERVICE CARD

BY FREDERIC E. DAVIS

NewsPlus

MCIBM MAIL

Who might be reading my MCI mail?

Soon after IBM acquired a large interest in MCI Communications, I began to get paranoid about MCI Mail. Would I really want to risk that IBM, or anyone else, might be reading my Apple-related MCI mail? Scanning MCI Mail's memory for certain key words could yield some mighty sensitive data.

A quick check with my local legal-eagle revealed that electronic-mail services were not protected by federal wiretapping laws because these laws failed to address data communications. Well, my paranoia got the best of me, and I decided not to send electronic mail that had to do with proprietary, unreleased products or contained any other sensitive information.

In order to correct this potentially problematic situation, Sen. Patrick Leahy, D-Vt., and Sen. Robert Kastenmeier, D-Wis., have recently introduced legislation that would protect the privacy of electronic information. The bill, known as the Electronic Communications Privacy Act, requires, among other things, that law-enforcement agencies obtain a court order before eavesdropping on electronic mail and closes loopholes in federal wiretapping legislation. Proposed penalties range from six months in jail and a $50,000 fine to one year in jail and a $250,000 fine.

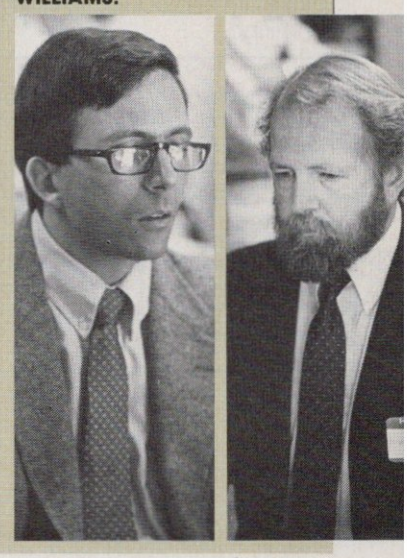
APPLEWORKS VS. SYMPHONY

The spreadsheet wizards were prepared for battle. Charles Rubin (*A+* consulting editor and author of *The Endless Apple* and *AppleWorks*) was armed with a $1756 Apple IIe system running Apple's AppleWorks integrated software; Andrew Williams, Ph.D. (author of *What If?* and *Lotus 1-2-3 from A–Z*) was armed with a $2886 IBM PC system running Lotus' Symphony 1.1 integrated software. Their mission: prepare a monthly sales report.

Both Rubin and Williams had exactly the same data in their computers, fictitious sales quotas from Widget, Inc. They had both organized their sales-quota information into five categories: products the company sells, sales of these products, vendors it buys from, people who sell its goods, and customers who buy them. Both the IBM PC and the Apple IIe were equipped with two floppy-disk drives and 640K RAM; the Apple's RAM was expanded with Applied Engineering's RamWorks board. The contest, which took place last September, was sponsored by Steve High Public Relations of San Jose, California, and was created to find out which computer system was really more practical.

At the starting signal, both computer experts went to work. They had only half an hour to produce a sales

THE SPREADSHEET WIZARD CONTESTANTS, CHARLES RUBIN (LEFT) AND ANDREW WILLIAMS.



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THE CHALLENGER HARD DISK REPLACES THE APPLE POWER SUPPLY.

Apple has landed a $1.2 million contract with the U.S. Postal Service.

report that showed (1) sales for the month by product, (2) sales for the month by individual salesmen, (3) sales for the month by customer, (4) new customers gained during the month, (5) all Widget, Inc., customers listed by the date of the last sales call, and (6) the effect of increasing commissions from 5% to 7.5% and to 10% each time a new sales-volume threshold was crossed. In addition, the report had to contain some text explaining the various tables and spreadsheet reports.

After the time had elapsed, only Rubin, using AppleWorks, was able to complete the sales report. Rubin felt his victory was due in large part to the simplicity of AppleWorks' operation and to AppleWorks' ease of recovering from accidental mistakes and typographical errors. Williams, explaining his loss, said, "Symphony is an incredibly complex program." Dan Pote of Applied Engineering, supplier of the Apple IIe memory expansion, stated that this contest went to show that "the Apple II is the best computer in the world."

SOUP UP YOUR APPLE II

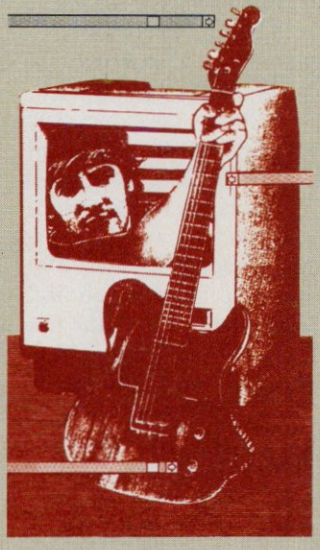
Apple's new product introductions featured in last month's *A+* cover story allow you to soup up your Apple-II-series computer with increased RAM, color monitors and color printing, and the great new 3½-inch 800K drives. So what more could you want? Well, one thing that caught my attention recently was a new internal 3½-inch hard disk for the Apple II Plus and IIe that adds both speed and power to your computer: the Challenger.

The Challenger replaces the Apple's power supply and contains its own heavy-duty power supply, as well as a 10- or 20-megabyte shock-resistant hard-disk drive. The Challenger also features streaming-tape backup and can be networked with Apple IIs, IIIs, or IBM PCs. For more information, contact Space Coast Systems, 301 South Washington Avenue, P.O. Drawer 2767, Titusville, FL; (305) 268-0872.

NIFTY SOUNDS

If any of you have tried out Silicon Beach Software's games or Hippo's SoundLab, then you know that the Macintosh is now emitting some pretty realistic sounds. Silicon Beach has a fantastic demo of Bruce Springsteen singing "Born in the USA" playing on an unaltered Macintosh that I heard at a recent AppleFest. Hippo's SoundLab is a sound-effects disk for the Mac with everything from train whistles to conga drums. These true-to-life sounds are created with audio digitizers, which are doing for the Mac's sound what video digitizers are doing for Mac graphics.

An audio digitizer takes a sound and converts it into digital (numeric) information that can be stored on a diskette and played on the Mac's built-in sound-generation hardware. One of the first commercially available digitizers is the MacNifty Sound Digitizer, which connects to the Mac's modem port and accepts any audio source via a standard RCA-style jack (you'll find one on the back of most hi-fi systems).



The MacNifty can record sounds at sampling rates from 5.5 kHz to 22.2 kHz and allows editing of the sound waveforms with conventional Macintosh cut-and-paste operations. Other features include an on-screen oscilloscope, reverb, echo-chamber effects, ramp-up/ramp-down, flange-up/flange-down, down-sampling, the ability to play selections backwards, and software control for starting and stopping a tape recorder.

The product works only with a 512K or larger-capacity Macintosh. The sound samples are real memory hogs and take up quite a bit of disk space. For example, a 15-second sample takes up about 60K in a compressed disk file. The MacNifty Sound Digitizer with Fractal SoundCap software sells for $129.95 and is available from MacNifty Inc., 13895 Industrial Park Blvd., Minneapolis, MN 55441; (800) 328-0184 or (612) 559-5728 in Minnesota.

APPLE WINS CONTRACT

Apple has landed a $1.2 million contract with the U.S. Postal Service to provide Apple IIe computers as training simulators for ZIP-code sorter machines. The Apples will be replacing $11,000 dedicated simulators; the switch to Apples will save the Postal Service an estimated $8 million a year.

I predict that Modula-2 will become a major software-development language.

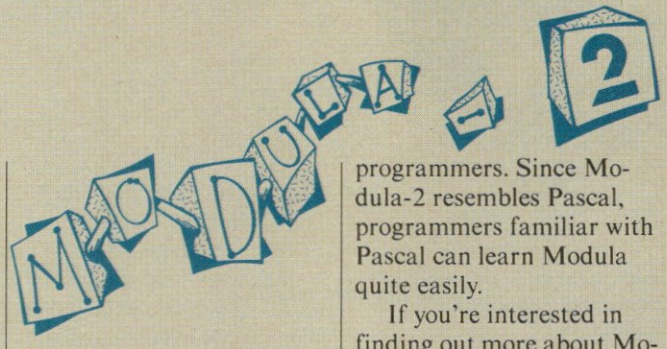
FRANKLIN TRIES AGAIN

After losing $10 million dollars in 1983 and being ordered to pay Apple $2.5 million in damages for infringing Apple's copyrights, Franklin Computer has

emerged from Chapter 11 bankruptcy with a new product line, the Ace-2000-series computers. The Ace 2000 is billed as an Apple II Plus-, IIe-, and IIc-compatible, and Franklin guarantees that this time it did not infringe Apple's copyrights. Retail prices for the computers range from $699 to $999.

MODULA-2

Move over, Pascal; here comes Modula-2. Niklaus Wirth, who developed Pascal, has created a new computer language called Modula-2, which is a descendant of Pascal and



bears quite a few resemblances to its predecessor. Although Modula-2 has been around as an experimental language for a couple of years, it is finally gaining acceptance as a major programming tool. Major software developers such as MicroPro International and Hayes Microcomputer Products are now developing commercial software with Modula-2.

I predict that Modula-2 will become one of the major software-development languages in the next few years. Modula-2, as the name suggests, allows programs to be built in modules, a technique that has several advantages over programming methods with existing languages. These advantages include concurrent multiprocessing, easy use of coprocessors (coprocessors will play an increasingly important role in micros), and the ability to transport programs more easily to various computers.

Also, I think that the days of programmers creating best-selling software singlehandedly are almost over. The next generation of great software will be designed by groups of programmers. Modula-2's design allows each module to be separately developed by a programmer or team of programmers. Since Modula-2 resembles Pascal, programmers familiar with Pascal can learn Modula quite easily.

If you're interested in finding out more about Modula-2, watch for Steve Rosenthal's "Thoughtware" column in next month's *A+*. If you have a modem, you might also be interested in a Modula-2 bulletin-board system being operated by Interface Technologies Corporation; the number is (713) 523-7255, and the system operates at 300, 1200, or 2400 bps with a recommended setting of 8 bits, no parity.

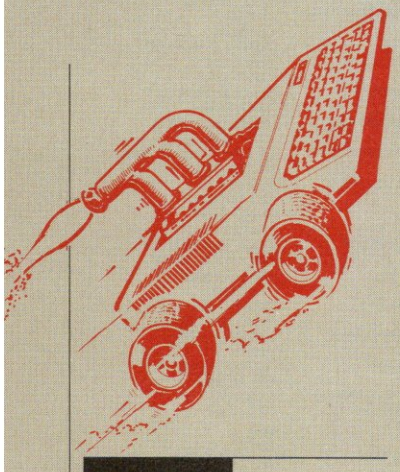
DELUXE MUSIC CONSTRUCTION SET

Entertainment-software giant Electronic Arts has just released its Deluxe Music Construction Set program for the Macintosh. The program claims to have more than 50 features not found in MusicWorks, and the company is offering MusicWorks owners a discount on the purchase of a Deluxe Music Construction Set.

BUILD A BIGGER SPREADSHEET

The makers of two spreadsheet programs, SuperCalc3a and MouseCalc, have announced that these two products will take advantage of the additional memory provided by the

new Apple II Memory Expansion Card. Both of these programs will allow you to build spreadsheets that are more than 500K in size. Both SuperCalc3a and MouseCalc provide the ability to create color graphics, and both programs work splendidly with the new color monitors and allow you to print the color graphics with the ImageWriter II. Now, who ever said the Apple II wasn't a great business computer?



APPLE PROFITS ARE UP

Apple Computer reported higher-than-expected fourth-quarter profits of between $12 million and $15 million dollars, on revenue of about $400 million for the fiscal quarter ending October 1. Apple attributed the higher earnings to strong sales to schools, an upturn in retail sales, and cost-cutting measures implemented during the firm's summer reorganization.

MULTIPLAN TRADE-IN FOR CRUNCH

Paladin Software has announced a trade-in program that gives Multiplan owners an opportunity to trade in their Multiplan program diskette and receive a $100 discount on the purchase of the Crunch spreadsheet until December 31, 1985. Crunch, which retails for $295, costs $195 with the trade-in.

EPSON'S PORTABLE PRINTER

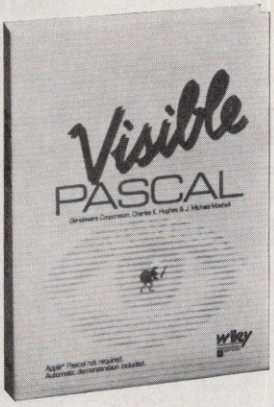
Epson America, Inc., has brought out a new four-pound portable ink-jet printer called the HS-80 that retails for $449. It should make a nice companion to a traveling Apple IIc. The new HS-80 is just a little over one foot long by about five inches wide and three inches tall and features a serial interface and

rechargeable batteries that are good for about 50 pages of printing.

MICROSOFT RELEASES MAC FORTRAN

Microsoft has announced the availability of a new ANSI FORTRAN 77 compiler for the Macintosh that includes a debugger, editor, librarian, linker, resource compiler, and Macintosh toolbox routines. The product is available now and retails for $295. +

FREE 15-DAY TRIAL OFFER



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The New York Times
August 6, 1985

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Yonkers and New York
Big L Electronics
W. Hempstead, W. Babylon, Syosset, New Hyde Park, Patchogue
Binary Orchard Inc.
Hamburg, West Seneca
Broadway Computers
New York
Byte Shop
Merrick
Caldor
Lake Ronkonk, East Patchogue, Wappingers Falls, Riverhead, Rocky Point, Bridgehampton, Vails Gate, Glens Falls, Kingston, Middletown, Latham, Mahopac, Bedford Hills, Albany, Yorktown Heights, Peekskill, Pelham Manor, Schenectady, Nanuet, White Plains, Yonkers, Newburgh, Port Chester, Poughkeepsie, W. Babylon, Levittown, Coram, Clifton Park
CIA Software
Flushing
Computer Discount of America
Huntington
Computer Software Plus
Brooklyn
Computer Tech.
Brooklyn
Computerware
East Meadow
Computerworld
Bayshore
Crazy Eddie
Nesconset, Mass, New York, Syosset, Elmhurst, Brooklyn, Carle Place, Hartsdale, Bronx, Nanuet
East 33rd Typewriter
New York
Electronic Man
New York
Electronics Boutique
Albany
Executive Photo & Supply
New York
Focus Electronic
Brooklyn (2 locations)
Four Guys
New York
Games 'N Gadgets
Garden City, Huntington, Nanuet
Glossy Photo
New York
Great American Software
Flushing
Home Software
Albany
Intercontinental
Flushing
Island Video & Computer
Coram
J&R Computer Outlet
New York
J&S Electronic
New York
Leigh's Computers, Inc.
New York
Lloyd's
New York
Lloyd Corner
New York
London Luggage
New York
Micro Co.
New York
Micro Electronics
Valley Stream
Montgomery Grant
New York
Park Avenue Video
New York
Photo Sound
New York
Programs Plus
Brentwood
Quartz Electronics
New York
Quo Vadis
Ridgewood
Show & Tell Video
Bayshore
Softwaire Centre
Forest Hills
Software City
Mount Kisco, Syracuse, Wappinger Falls, Brooklyn, Flushing, Tonawanda, Spring Valley
Software Link
White Plains
Software Seller
Harrison
Staten Island Software
Staten Island
Sysut-I, Inc.
Brooklyn
Thruway Market
Walden

New York (cont)
Wall Street Camera
New York
Willoughby's
New York
World Trade
Bayside

North Carolina
Byte Shop
Greensboro
Games 'N Gadgets
Raleigh
Oasis Software
Wilmington

North Dakota
Colborn School Supply Co.
Grand Forks
Software House
Fargo

Ohio
Abby's Software
Fairborn
B. Dalton Software Etc.
Columbus
Big Bytes Computers
Poland
Computers Plus of Ohio
Mansfield
Disk Drive
Toledo
Electronic Connexion
Kettering
Electronic One
Columbus
Games 'N Gadgets
N. Randall
Magic One Computer
Barberton
Microwave Magic
Fairfield
North Coast Programming
Willoughby and Solon
Program Store
Columbus
Software and More
Cincinnati
Software City
Columbus
Swallens
Cincinnati
Sylvan Enterprises
Cincinnati
Video Computer World
Oregon
Video H.Q.
Cleveland

Oklahoma
Computer Software Center
Oklahoma City
Home Software
Tulsa and Oklahoma City
Videocomp
Lawton

Oregon
At Computers
Klamath Falls
Egghead Software
Beaverton
Link Three, Inc.
Beaverton
Software Galeria
Beaverton

Pennsylvania
B. Dalton Software
Monroeville
Bamberger's
Whitehall, King of Prussia
Black Sun
Emmause
De Re Computers
Harrisburg
Electronics Boutique
Langhorne, King of Prussia, Whitehall, Exton
Floppy Disk
Mechanicsburg
Games 'N Gadgets
Lancaster, West Mifflin, King of Prussia, Media, Philadelphia

Rhode Island
Caldor
Woonsocket, Warwick, Lincoln
Future Images
Woonsocket
Software Connections
Warwick

South Carolina
Horizon Commodore Super Store
Greenville (2 locations)
Software Solutions
Charleston

Tennessee
Games 'N Gadgets
Memphis

South Carolina (cont)
Inacomp
Brentwood
Software Store
Memphis
The Computer Shoppe
Nashville, Knoxville, Memphis, Chattanooga, Madison

Texas
B. Dalton Software Etc.
Houston
Babbages
Dallas, Houston, Plano, Mesquite, Fort Worth, Irving, Hurst
Casa Computer
Lubbock
Compurite
Houston (2 locations)
Computer City
San Antonio
Computer Experience
San Antonio
The Computer Store
San Angelo
Data Pro Computer Center
Wichita Falls
Edu-Tron
Fort Worth
Floppy Wizard
Houston
Frisco Electronics
San Antonio, Austin
Home Software
Friendswood
National Video Austin
Austin (4 locations)
Software & Things
Austin
Software Store
San Antonio
Videoland
All locations

Utah
Software Center
Salt Lake City
Software Hut
Salt Lake City
Stokes Brothers, Inc.
Salt Lake City, West Valley, Orem, Ogden, Layton

Virginia
Computer Works
Petersburg
Crown Book & Software
Alexandria, Woodbridge, Reston, Springfield, Vienna, Manassas, Mclean, Falls Church, Fairfax
Family Computer Center
Fairfax
Games 'N Gadgets
Hampton, Virginia Beach
L&Y Electronics
Woodbridge
Next Generation Computer
Williamsburg
Program Store
Falls Church
Software Central
Norfolk
Software Mart
Springfield
Softwarecenter, Inc.
Vienna
University Bookstore
Blacksburg

Washington
Butler's T.V. and Computer Service
Federal Way
Egghead Software
Tukwila, Bellevue
Nibbles and Bites
Tacoma

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Milwaukee
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Compusoftware
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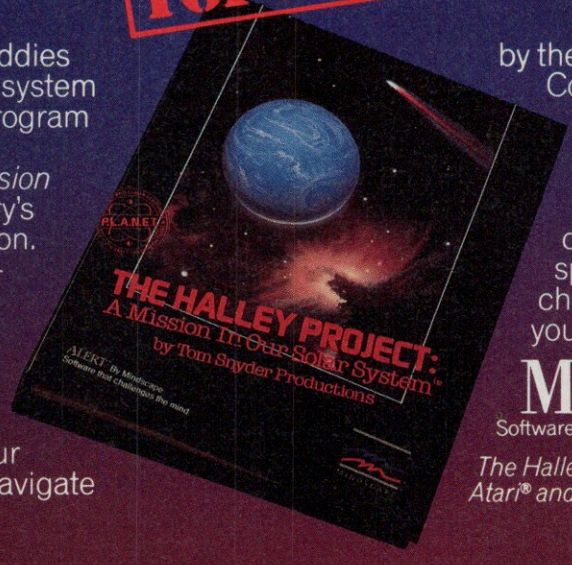

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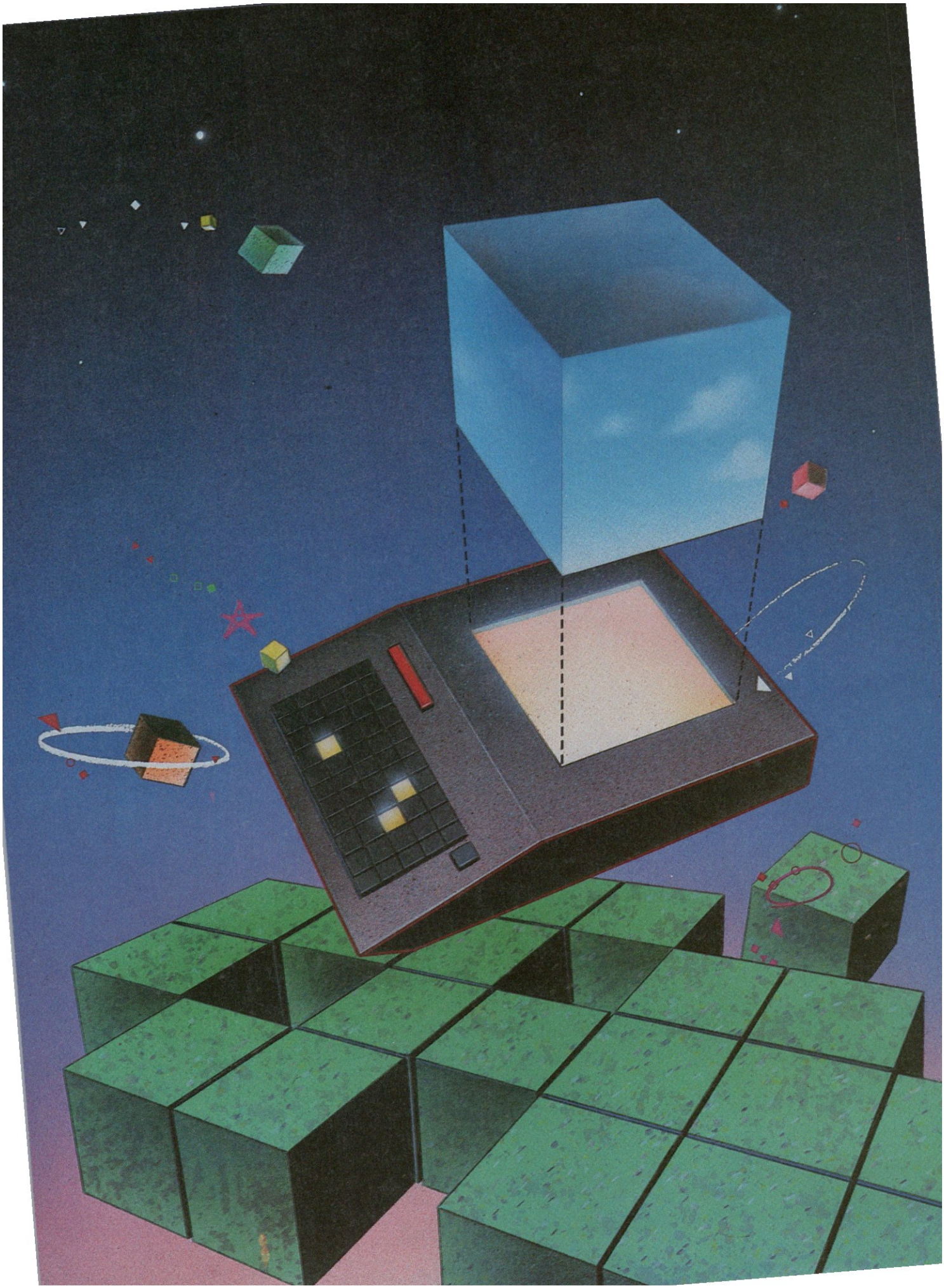


EXPANSION

UPDATING YOUR APPLE II WITH EXTRA RAM

Memory expansion is the wave of the future.

BY CHARLES A. RUBIN

Random-access-memory (RAM) expansion has been a favorite option for Apple owners since 1979, when fulfilling the promise of VisiCalc often required extra memory. In the early days, however, even as little as 16K of RAM was expensive, and buyers had to have a specific and fairly critical need in order to justify the cost.

Today, RAM prices are dropping every month, and third-party hardware manufacturers are scrambling for your memory-expansion dollar by offering up to 2½ megabytes of extra memory on a single card, along with software that lets you put it to work in several ways.

Beyond 64K

The eight-bit processor of the Apple II family of computers can address only 64K of RAM at a time. Both Apple and third-party hardware developers have worked around this limitation in two important ways, however. The first technique is bank-switching, which lets the processor access data or program instructions in the motherboard's 64K, as well as in additional banks of 64K located on RAM-expansion cards.

When it needs data or program instructions that aren't in the internal 64K, the processor can simply direct its attention to the appropriate external bank of memory and retrieve them. This techique allows the Apple to use more than 64K of RAM, even though it never uses more than 64K at a given time. Both the Apple IIe and the Apple IIc switch banks of RAM in 64K increments; the older Apple II Plus must switch banks in 16K increments. Either way, though, the computer doesn't really care whether it is switching from its internal memory to one external bank or ten external banks, so the total memory available for program or data storage can grow quite large.

The problem with adding RAM is that application programs must be specifically designed or modified to make use of the extra RAM. Since most software is written for a standard, 64K Apple, the extra banks of RAM go unused. At this point, the only class of programs that can normally use the extra RAM are spreadsheets, in which modeling room is critical.

The other technique for using extra RAM is to configure a RAMdisk. Hardware makers sell special software that tells the operating system that a certain amount of the extra RAM should be identified and used just like a disk drive. With a RAMdisk, a standard program can store and retrieve data at electronic speeds instead of waiting for a disk drive to spin. The program itself doesn't have to be aware of the RAMdisk, because the operating system (CP/M, Pascal, DOS 3.3, or ProDOS) handles the writing to and reading from this electronic disk. Most RAMdisk software includes a multiple-disk saving feature that prompts you to change data disks when you save files larger than what one 143K Apple disk can hold.

Using RAM

The most widespread use for extra RAM is for building large spreadsheet files. Early RAM cards came with preboot software that modified VisiCalc to access extra banks of 16K on an Apple II Plus. Today, software such as MagiCalc and FlashCalc can use up to 512K of bank-switched RAM right out of the box. At least three RAM-card manufacturers are offering software that modifies AppleWorks so that its Desktop (RAM space available for files) can increase from 55K (on a 128K system) to more than 700K (with one megabyte of extra RAM). With these specific products that use or can be modified to use the extra RAM, you can create larger spreadsheet, word-processing, and database files than you can on an IBM PC or a Macintosh.

If you own a IIe with only 64K of RAM, you are also missing out on double-high-resolution graphics, which requires an extra 64K bank of RAM to operate. The newer Apple IIc has 128K of RAM, but the basic IIe must be ex-

AKIO MATSUYOSHI

panded to have at least this much RAM to be able to use double-hi-res graphics programs such as Brøderbund's Dazzle Draw.

Another advantage to increased memory is that it lets you make serious use of integrated programs. Even with the 55K Desktop you have with AppleWorks on a 128K system, you can't fully use the program's integrating features because there simply isn't enough room in RAM—each of the 12 files you can put on the Desktop can be only 4K or 5K in size. With 512K of Desktop space, however, each of your 12 files can be up to 40K.

Bigger isn't the only way to make an Apple better, as RAMdisks prove. The second major criticism of the Apple 8-bit processor (after limited RAM access) is of its slow processing speed, compared to the speed of newer, 16- and 32-bit processors. A RAMdisk can help erase this handicap by letting you run application software entirely from RAM, instead of waiting for program overlays to load from disk.

AppleWorks, for example, is a program that occupies more than one 143K floppy disk, and users can experience delays when they move from one module (such as the spreadsheet program) to another (such as the word-processing program). The problem is that only so much of the program can fit into 64K of RAM, and sections of code must move into memory from the disk as the programs perform various functions.

With RAMdisk software, however, you can load all of AppleWorks into an electronic disk. Your Apple still has to swap program overlays, but it swaps them at lightning speeds that you can barely notice, rather than making you wait a few seconds while it gets more instructions from a floppy disk.

RAM in Apple's Future

If these operational advantages aren't enough to convince you about the promise of RAM, perhaps a look at the

RAMCARDS

This chart contains a sampling of products, and the information herein is based on manufacturers' claims.

	PRICE	COMPUTER	MAXIMUM RAM ON CARD	EXPANDS APPLEWORKS DESK	CONNECTOR FOR COPROCESSOR	SOFTWARE AVAILABLE	OPERATING SYSTEM
ADD-RAM 16 Advanced Logic Systems, Inc. 1195 East Arques Avenue Sunnyvale, CA 94086 (408) 730-0307	$99	II, II+	16K	NA	NO	NO	NA
ADD-RAM 80/256 Advanced Logic Systems, Inc. 1195 East Arques Avenue Sunnyvale, CA 94086 (408) 730-0307	$199	IIe	256K	YES	NO	NO	NA
	Includes 80-column card and 256K RAM.						
ADD-RAM 80/64 Advanced Logic Systems, Inc. 1195 East Arques Avenue Sunnyvale, CA 94086 (408) 730-0307	$99	IIe	64K	YES	NO	NO	NA
	Includes 80-column card and 64K RAM.						
IIe EXTENDED 80-COLUMN CARD Apple Computer, Inc. 20525 Mariani Avenue Cupertino, CA 95014 (408) 996-1010	$249	IIe	64K	YES	NO	NO	NA
	Built-in RAMdisk support. Card has 128K bytes in Pascal.						
KACHE BOARD Ohio Kache Systems Corp. 75 Tahlequah Trail Springboro, OH 45066 (513) 746-9160	$695	II, II+, IIe	NA	NA	YES Z80	YES	NA
	Disk-controller system with SCSI interface and on-board cache that gives a hard disk the apparent access speed of a RAMdisk						
LEGEND E' CARD Legend Industries, Ltd. 2220 Scott Lake Road Pontiac, MI 48054 (313) 674-0953	64K, $299 128K, $359 192K, $389 256K, $419 512K, $519 768K, $644 1 MB, $769	IIe	1 MB	YES	NO	YES	DOS 3.3, ProDos, CP/M
	One board; no piggyback; cables and RGB included. 16 levels of gray display; pictures on green screen. Expands AppleWorks desktop to 1735K.						
LEGEND S' CARD Legend Industries, Ltd. 2220 Scott Lake Road Pontiac, MI 48054 (313) 674-0953	64K, $315 128K, $375 192K, $435 256K, $495 512K, $595 768K, $695 1 MB, $795	II, II+, IIe, III	1 MB	YES	NO	YES	DOS 3.3, Pascal, CP/M (all versions)
	Expands AppleWorks desktop to 1024K. Slot-independent. Emulates SOS for Apple III.						

future will. After seven years of watching other companies produce RAM cards for its computers, Apple itself is coming out with its own one-megabyte memory-expansion card for the IIe (see "Apple's Bevy of New Products" on pages 19–25 of last month's issue). Other manufacturers are also building the future into their RAM boards with expansion ports that allow the newer, 16-bit 65816 processor to use the RAM. This new processor, which Apple is considering as an upgrade for its II series, can run existing Apple software faster and opens up new software-development capabilities by allowing direct access to far more RAM than the IBM PC does.

Even if the 65816 processor never catches on, extra RAM will enable developers to create coresident programs that perform accessory functions with your main application. For example, you might be able to use a word-processing program along with an accessory program that contained a spelling checker, a thesaurus, and a communications program. After you finished editing a document, you could invoke any of these accessories and use them to proofread, embellish, or transmit your document. Other miniapplications that could reside in RAM without disturbing the main application are appointments calendars, print spoolers, and calculators.

So, although RAM cards have done duty only with specific programs or as electronic disks until now, a great deal of innovation is in store for us next year. When the next wave of enhancements hits, the difference in performance and ease of use between standard Apples and expanded-memory Apples will make RAM expansion the road to the Apple II's future. ✚

Charles Rubin is the author of The Endless Apple *and* AppleWorks, *both from Microsoft Press. He writes about computing for various magazines.*

	PRICE	COMPUTER	MAXIMUM RAM ON CARD	EXPANDS APPLEWORKS DESK	CONNECTOR FOR COPROCESSOR	SOFTWARE AVAILABLE	OPERATING SYSTEM
MAX-816 Micro Magic P.O. Box 281 Millersville, MD 21108 (301) 987-6083	**$495**	**II, II+, IIe**	**1 MB**	**YES**	**YES** **65C816**	**YES**	**MAX-OS**
	Will be available in 6 MHz version with low-cost upgrade. Has fully arbitrated expansion interface connector. Requires no preboot on Apple software.						
MULTIRAM CX Checkmate Technology, Inc. 590 South Rockford Drive Tempe, AZ 85281 (602) 966-5802	**256K, $329.95** **512K, $429.95** **CX kit, $149.95**	**IIc**	**512K**	**YES**	**OPTIONAL** **65C816**	**YES**	**DOS 3.3, ProDOS, Pascal**
	This card has an additional CX Kit that includes a 16-bit operating system and demonstration and utility software.						
MULTIRAM IIe Checkmate Technology, Inc. 509 South Rockford Drive Tempe, AZ 85281 (602) 966-5802	**64K, $159.95** **128K, $219.95** **192K, $269.95** **256K, $289.95** **320K, $309.95** **384K, $329.95** **512K, $359.95** **576K, $379.95** **768K, $429.95**	**IIe**	**1½ MB**	**YES**	**OPTIONAL** **65C816**	**YES**	**DOS 3.3, ProDOS, Pascal, CP/M 2.23 optional**
	Card can be combined with MultiRam RGB card for total 1½ MB and can be used with optional 65816 EX card.						
NEPTUNE Titan Technologies, Inc. 310 West Ann Street Ann Arbor, MI 48104 (313) 662-8542	**64K, $249** **128K, $399** **192K, $499**	**IIe**	**192K**	**NO**	**NO**	**YES**	**DOS 3.3, Pascal, CP/M 2.20, 2.23**
	Same bank-switching scheme as Apple's Extended 80-Column Card						
RAMWORKS II Applied Engineering P.O. Box 798 Carrollton, TX 75006 (214) 241-6060	**64K, $179** **256K, $219** **512K, $269** **1 MB, $389** **1.5 MB, $549** **3 MB, $1699**	**IIe**	**3 MB**	**YES**	**YES**	**YES**	**DOS 3.3, ProDOS, Pascal, CP/M (all versions)**
	This card uses and accesses auxiliary-slot memory on IIe. Expands AppleWorks desktop to 2277K. Works with any CP/M card. RGB color option.						
TITAN RAM Titan Technologies, Inc. 310 West Ann Street Ann Arbor, MI 48104 (313) 662-8542	**32K, $179** **64K, $199** **128K, $269**	**II, II+, IIe**	**128K**	**YES**	**NO**	**YES**	**DOS 3.2, 3.3, Pascal 1.1, CP/M 2.20, 2.23**
Z-RAM Applied Engineering P.O. Box 798 Carrollton, TX 75006 (214) 241-6060	**256K, $399** **512K, $479**	**IIc**	**512K**	**YES**	**YES** **Z80B**	**YES**	**DOS 3.3, ProDOS, Pascal, CP/M (all versions)**
	Expands AppleWorks desktop to 425K.						

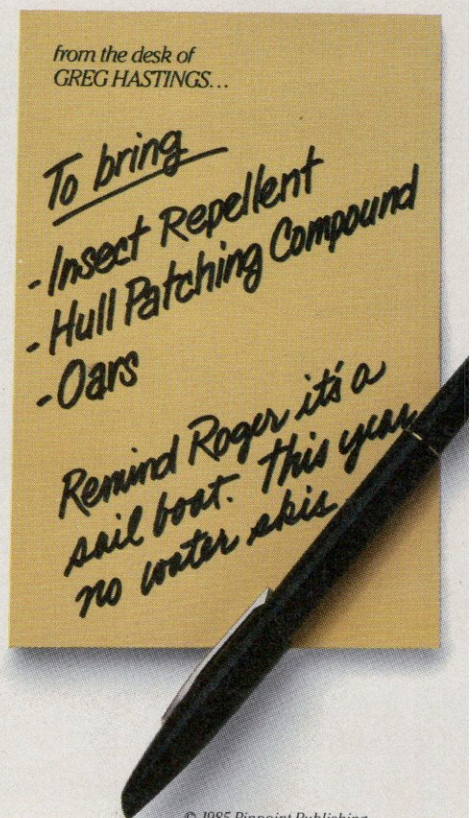
AppleWorks™

Only Pinpoint adds pictures to any AppleWorks document. So you can create party invitations that are truly exciting. Even if the weather isn't.

Don't spend hours addressing envelopes and misspelling names. Pinpoint picks up names and addresses from invitations (or any documents) and drops them, letter perfect, onto envelopes. Even if you don't always spell those tongue-twisting names right, at least you'll be consistent.

One glance and you can see your social schedule for months ahead. So it's a snap to slip this year's party in between the garlic festival and your breakdancing lessons.

Jot down important thoughts whenever they strike. The note pad is perfect for reminding you of things you can't do without. Or things you can.



Impress a friend with a personal invitation. It's easy. The automatic dialer finds phone numbers displayed anywhere on the screen, not just in special files.

And it re-dials busy numbers automatically. So you're next in line as soon as your friend's broker hangs up.

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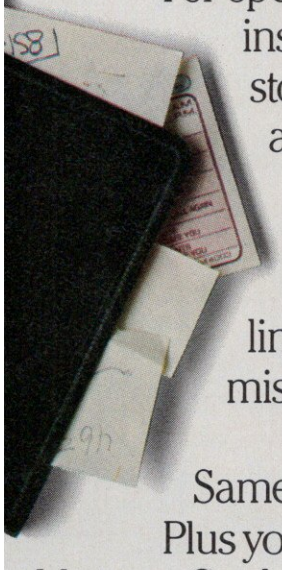
Accessories. $69.

Nine accessories to be precise. And in no time, they'll be so much a part of your AppleWorks routine, you'll think of them as built-in, not added-on. Why? For openers, these handy desktop timesavers "pop-up" via windows from inside AppleWorks *(and most other ProDOS programs).* So you can stop what you're doing to jot down a note, address a letter, or call a friend.



You can even figure out some figures with our calculator. Tap data bases or other computers through our communications window. Even whip out short memos, forms and labels with our line-at-a-time typewriter. And then continue AppleWorks without missing a beat. Or a byte.

What's more, Pinpoint's as easy to use as AppleWorks itself. Same commands. Same hardware.

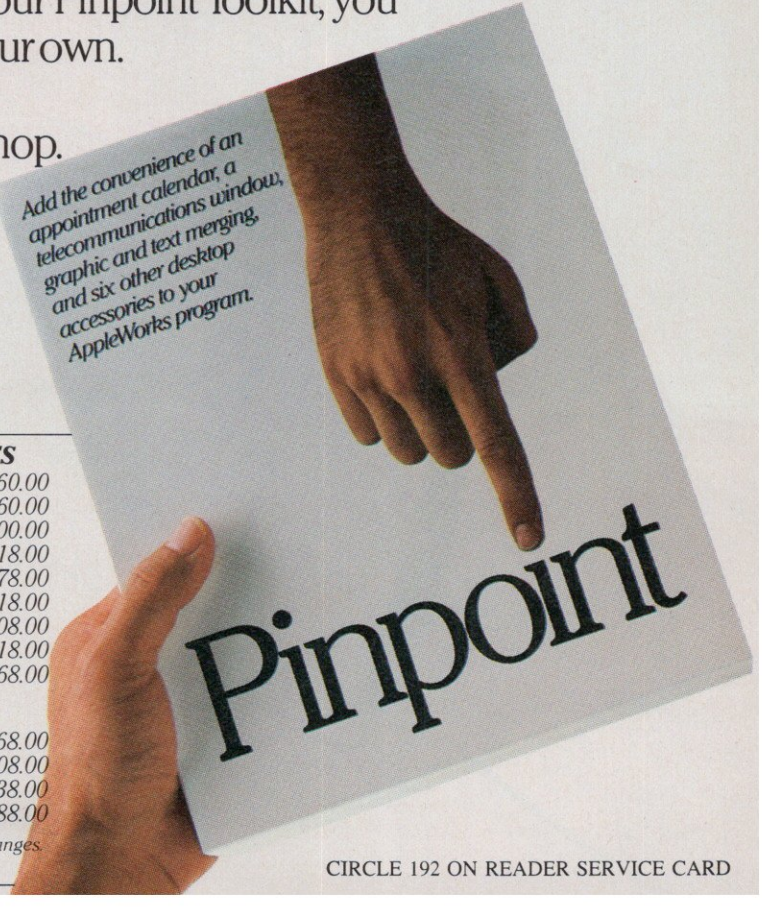
Plus you can boost Pinpoint's performance by adding an Apple Extended Memory Card, the new, high-capacity UniDisk 3.5 floppy, a hard disk, a modem, or one of many popular printers. And with our Pinpoint Toolkit, you can even add desktop accessories of your own.

Want more?

Then visit your local computer shop.

Or call (415) 530-1726 for a dealer near you. You'll see that Pinpoint does more than give AppleWorks a handful of accessories.

It gives AppleWorks the works.



SPECIAL PURCHASE– MAXIMUM PERFORMANCE BUNDLES

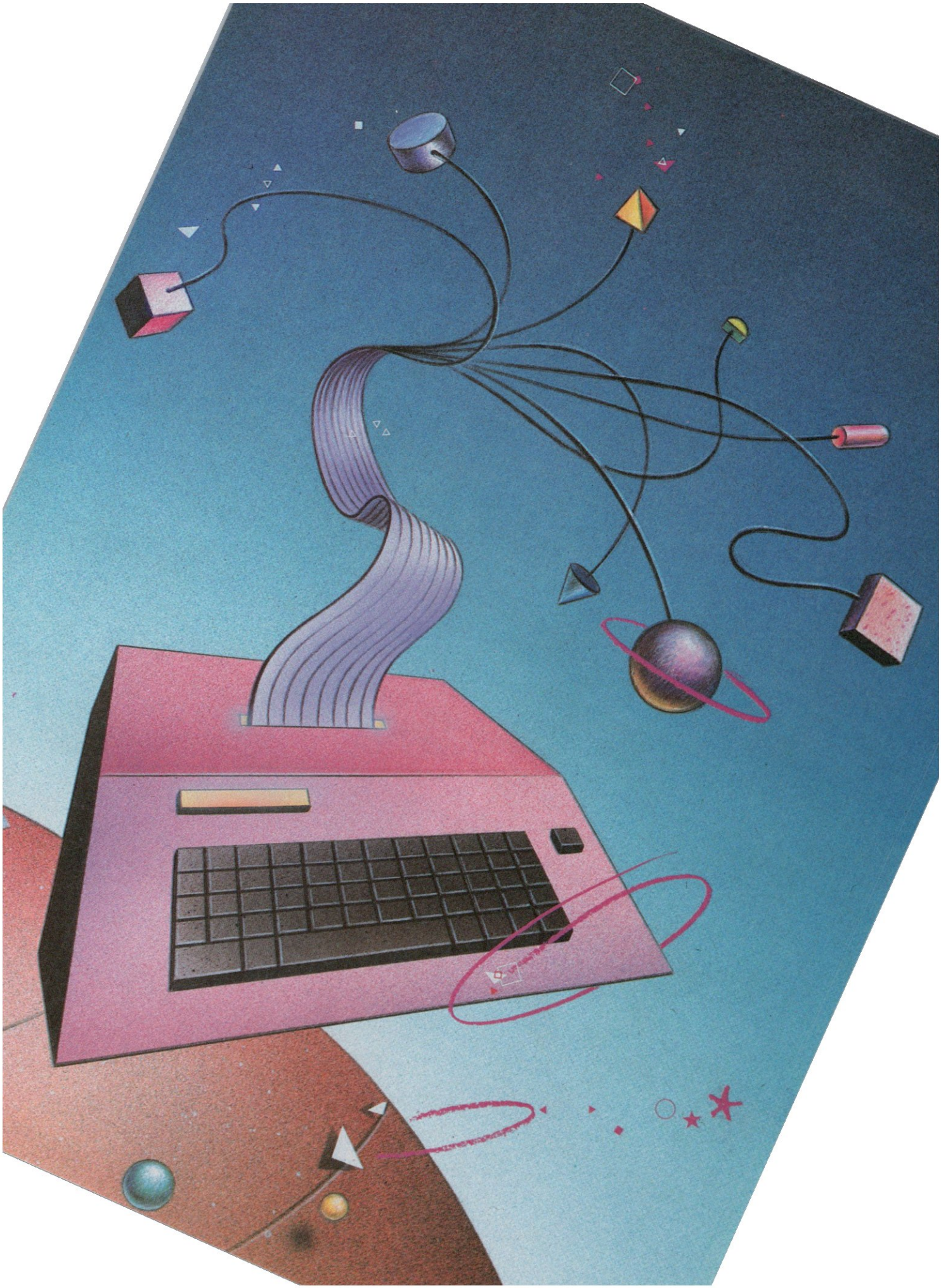
10MB SIDER Hard Disk, Sideware, plus Pinpoint for only	*$660.00*
20MB SIDER Hard Disk, Sideware, plus Pinpoint for only	*$960.00*
Pinpoint, plus 256K RAM for RamWorks/Multi-Ram/Apple	*$100.00*
64K RAMWORKS, AppleWorks Expander Software, plus Pinpoint	*$218.00*
64K RAMWORKS, AppleWorks Expander, Pinpoint, plus 256K RAM	*$278.00*
512K RAMWORKS, AppleWorks Expander Software, plus Pinpoint	*$318.00*
1Meg RAMWORKS, AppleWorks Expander Software, plus Pinpoint	*$408.00*
256K Z-RAM, AppleWorks Expander Software, plus Pinpoint	*$418.00*
512 Z-RAM, AppleWorks Expander Software, plus Pinpoint	*$468.00*

FAMOUS BRAND MODEMS, Bundled with Pinpoint

Prometheus 1200A, 1200 Baud External	*IIc/IIe*/MAC*/IBM**	*$368.00*
Prometheus 300c, Compact 300 Baud External	*Mounts on the IIc*	*$208.00*
Volksmodem 1200, 1200 Baud External	*IIc/IIe*/MAC*/IBM**	*$238.00*
ZOOM IIe, 300 Baud Internal	*IIe/Enhanced IIe*	*$188.00*

**Requires $10-15 cable and/or serial interface card, Subject to availability and price changes. Most items available from your dealer.*

CIRCLE 192 ON READER SERVICE CARD



AppleWorks Modify Plus

Software for your Apple II plus

Appleworks is the most widely used integrated software package for the Apple IIe and Apple IIc. Now, **AppleWorks Modify Plus** allows Apple II plus owners to use AppleWorks on their personal computers.

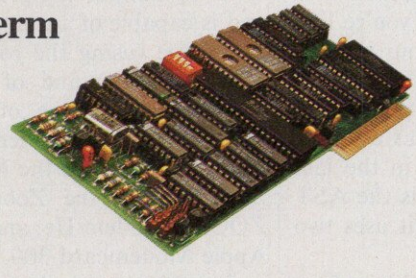
Videx's AppleWorks Modify Plus is a new software package designed to bridge the compatibility gap between AppleWorks and the Apple II plus. All you need is your original AppleWorks program disks (version A or B), an Apple II plus with at least 64K of memory, a Videoterm (with inverse chip) or UltraTerm 80/132-column card. AppleWorks features stay intact; the commands have been slightly changed to accommodate the differences between the Apple II plus and Apple IIe keyboards.

The following memory cards can be used by AppleWorks Modify Plus to expand the Appleworks workspace up to 121K;

- Titan Technologies: 32K, 64K or 128K Saturn Ramboard or . . .
- Legend Industries: 64KC, 128KDE or S'Card memory board or . . .
- Any memory board compatible with the above cards.

Contact your dealer today for more information about AppleWorks Modify Plus.

UltraTerm



The UltraTerm is simply the best display card you can buy for Apple II computers. Compatible with our best selling Videoterm 80-column card, UltraTerm has a built-in soft video switch, eight different display modes, highlight, lowlight, and inverse video in one easy-to-use card. UltraTerm is the ideal display card for AppleWorks Modify Plus*.

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*AppleWorks Modify Plus provides 80 x 24 display only.

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Erik Sandberg-Diment
The New York Times 1/8/85

Your computer productivity is directly proportional to your speed at the keyboard. That's why *Typing Tutor III*™ *with Letter Invaders*™:

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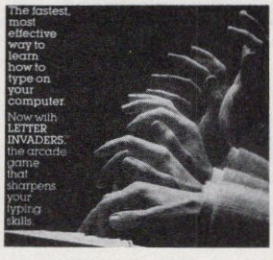

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CIRCLE 101 ON READER SERVICE CARD

64K). For a really large buffer, try Quadram's Buffered Serial Interface Adapter—it comes with a 64K buffer you can expand to 128K or 256K.

Modem-Interface Cards

External modems such as the Apple Modem and the Hayes Smartmodem are connected to the IIe through asynchronous serial-interface cards just like the ones for use with printers. (The only card I've found that won't work with both modems and printers is the Serial Grappler.) The firmware on these cards typically has a Dumb Terminal mode in which you can communicate with another computer through your modem without disturbing the program in memory. If you want to do anything more serious, such as recording incoming information and saving it to disk, you are going to need a disk-based intelligent terminal program.

THE 300-BPS-MODEM MARKET IS FADING QUICKLY

Two chips, the 6850 and 6551, commonly control the data flow through a serial interface. If you have a choice, always pick a card that uses the 6551, because its transmission speed can be changed under software control. With the 6850, you have to pop the top off the IIe and flip switches on the interface card when you want to change the transmission rate. This procedure is very annoying, especially if you're like most people and often use your modem to communicate at both 300 and 1200 bits per second (bps). The Apple Super Serial Card uses the 6551, as do most other serial cards designed in the last year or two. (An exception is the AST Research Multi-I/O Card; it uses two 6850s.)

If you're buying a serial-interface card, try to buy one that comes with a modem cable. Nothing is more frustrating (or expensive) than trying to design a cable on your own. Even if you do see a cable in the box, however, be careful. Most manufacturers seem to think their cards will always be used with printers, so they include a cable that works with a printer but not a modem. Sometimes, if you're lucky, there will be a way to configure the card so that the same cable will work with both modems and printers. On the Apple Super Serial Card, for example, all you need to do is position the "jumper block" so that it points to the word *modem* or the word *terminal* printed on the card. The Videx PSIO card solves the problem by providing two connectors on the card, one marked DTE (data-terminal equipment—a modem) and the other DCE (data-communications equipment—a printer).

Instead of buying a serial-interface card and a separate external modem, you can buy an internal modem that plugs right into the IIe. The main advantage of buying an internal modem is that the net price is lower than that of an external modem because you don't have to buy a serial-interface card—it's already built in to the card. It is also much easier to install than an external modem, since you don't have cabling problems.

The best-known internal modem for the IIe is the Hayes Micromodem. It operates at 300 bps or 110 bps, has an on-board speaker that lets you listen in order to monitor the progress of a call, and is capable of automatically dialing the phone (using the rotary or Touch-Tone methods) and of automatically answering it. Three other Micromodem-compatible modems that have proven popular are the Multitech Multimodem IIe, the Zoom Telephonics ZOOM/Modem IIe, and the Transend Apple Modemcard 300.

The 300-bps-modem market is fading quickly, however, since the faster 1200-bps modems are becoming very inexpensive. (These modems can also operate at 300 bps.) There are four major 1200-bps internal modems for the Apple IIe: the Novation 212 Apple-Cat II, the Prometheus ProModem 1200A,

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

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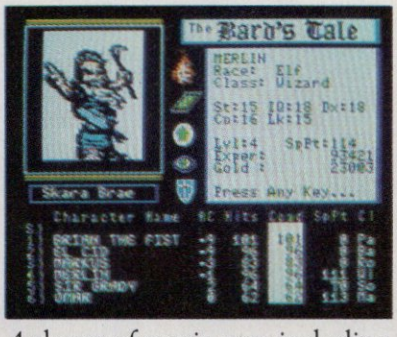

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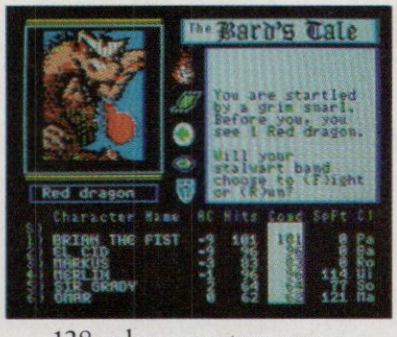

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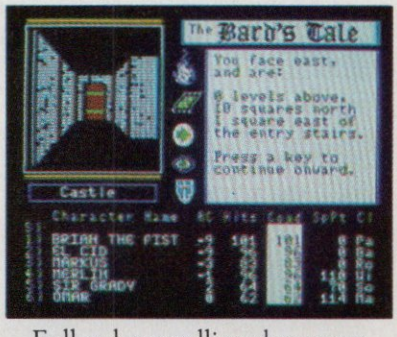

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the Microcom Era 2, and the Cermetek Apple-Mate 1200.

The Apple-Cat and the ProModem are both two-card peripherals, although you have to plug only one card into a slot (the other can go on top of the power supply). The other two are single-board modems, so they're more convenient to deal with.

The Apple-Cat is an interesting peripheral, but it uses nonstandard modem circuits that some software can't fathom. You can add all sorts of options to it, such as a BSR control transformer that lets you turn your house lights on and off under program control, a Touch-Tone decoder, and a telephone handset for voice calls.

The ProModem and the Apple-Mate are more traditional, in that they emulate the effect of connecting an Apple Super Serial Card to a Hayes Smartmodem. Since almost all communications software works with this combination, you should encounter no software-compatibility problems if you use these modems.

The claim to fame of the Era 2 modem is that it uses Microcom's proprietary MNP error-detection protocol. If the modem with which you are communicating also uses MNP, all transmission errors that bad phone lines cause will be automatically corrected.

Multifunction Cards

If you need more than one I/O interface, you should consider purchasing a multifunction card. One of these multifunction cards typically contains the circuitry for two or three interfaces; the extra interfaces are assigned to other unused slots on the IIe, even though the card does not physically occupy those slots—they are called phantom slots. Multifunction cards are a bit tricky to install, since you usually have to set a lot of switches in order to select which phantom slots are to be used, but they are very economical. If you were to buy separate cards for each function, the overall cost would likely be a lot higher.

Although there is no such thing as a standard multifunction card, most manufacturers have one goal in mind: to serve people who use both a modem and a printer. Since a modem requires a serial interface, you'll generally find such an interface on a multifunction card. A printer, of course, may require a serial or parallel interface, so you see some cards with a second serial interface and others with a parallel interface instead.

THERE IS NO SUCH THING AS A STANDARD MULTIFUNCTION CARD

Here is a list of the most popular multifunction cards for the IIe and what's on them:

- Prometheus Versacard—serial, parallel, and clock
- Quadram Multicore—serial, parallel, clock, and 256K memory
- AST Research Multi-I/O Card—two serial and clock
- Street Electronics BusinessCard—two serial and clock
- RC Systems Slot-Buster—serial, parallel, speech synthesizer, and buffer
- Checkmate Technology Gambit—two serial, parallel, clock, 512K, and 6502 coprocessor

Apple IIc Peripherals

Many special I/O peripherals can add to the slotless Apple IIc.

Elsewhere in this issue you will see how easy it is to add clocks, coprocessors, and extra memory. Several manufacturers also make serial-to-parallel converters that can plug into one of the two serial ports at the back of the IIc, which means that you can finally use any of the popular parallel printers with the IIc.

Some converters are almost as intelligent as a IIe printer-interface card. For example, Orange Micro has a product called the Grappler C that automatically converts any ImageWriter commands it receives into the equivalent commands for the parallel printer you're using. The Grappler C currently works with most C. Itoh, Epson, Okidata, and Star Micronics printers.

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Thus, you don't have to rely on your IIc software to control your printer as long as it works with the ImageWriter (the standard printer for Apples). The Screen Print command in Apple's MousePaint program, for example, works only with the ImageWriter. With the Grappler C in place, however, the dump will work even if you are using a completely different printer, such as the Okidata Microline 92.

If you don't need the command-conversion feature, you can buy Orange's Hot Link instead. It's less expensive and doesn't have to be plugged into a wall socket. Street Electronics' Live Wire also contains a clock that lets you automatically time- and date-stamp your ProDOS files. Practical Peripherals' SwitchPort IIc comes with a disk containing MousePaint drivers and graphics-dump routines for most popular parallel printers.

One other unique IIc peripheral deserves special mention: the Prometheus ProModem 300c. This is a small 300-bps auto-dial, auto-answer, Hayes-compatible modem that fastens directly to the modem and game/mouse ports on the IIc. You can still use your mouse or joystick, however, because an equivalent mouse/game-port connector is located on the side of the modem.

One particularly nice feature of the ProModem 300c is that it gets all its power from the +5v pin on the game/mouse port, so you don't need to plug it into a wall socket. Since the modem clips right onto the back of the IIc, you don't need a modem cable.

More to Come

A lot of I/O cards haven't shown up in our discussion: disk-controller cards; 80-column (and, thanks to Videx, wider) cards; and analog-to-digital (A/D) and digital-to-analog (D/A) cards, for example. Never fear: sooner or later we'll be reviewing many of these types of cards in the pages of *A+*. ✚

Gary B. Little has written three books about the Apple II. His latest is a detailed study of the internal structure of ProDOS: Apple ProDOS, Advanced Features for Programmers *(Brady Communications, 1985). Little also likes playing with new peripherals.*

MODEM CARDS FOR II, II+, and IIe

This chart contains a sampling of products, and the information herein is based on manufacturers' claims.

	PRICE	300 BPS	1200 BPS	TERMINAL SOFTWARE INCLUDED	AUTO-ANSWER	AUTO-DIAL	BSR INTERFACE
APPLE MODEM CARD 300 Transend Corporation 1887 O'Toole Avenue Suite C209 San Jose, CA 95131 (408) 435-0701	**$79 W/O SOFTWARE $109 W/ TRANSEND $168 W/ EASYCOM/ EASYGO** *Hayes-compatible*	YES	NO	YES	YES	YES	NO
APPLE-CAT II Novation, Inc. 20409 Prairie Street Chatsworth, CA 91311 (800) 423-5419 in CA (818) 996-5060	**$319** *To use BSR, you need to buy an Expansion Module and a BSR transformer. Optional firmware ROM allows users to control modem from keyboard. Touch Tone decoder (chip) allows the modem to decode touch tones.*	YES	NO	YES	YES	YES	YES
APPLE-CAT II 212 Novation, Inc. 20409 Prairie Street Chatsworth, CA 91311 (800) 423-5419 in CA (818) 996-5060	**$595** *Upgrade card for Apple-Cat II for $349.*	YES	YES	YES	YES	YES	YES
APPLE-MATE 1200 Cermetek Micro Electronics 1308 Borregas Avenue Sunnyvale, CA 94088-3565 (408) 752-5095	**$299** *This Hayes-compatible board provides communications software in ROM on the card. The board also provides call-progress monitoring of busy tone, ring-back tone, and human voice.*	YES	YES	YES	YES	YES	NO
ERA 2 Microcom, Inc. 1400A Providence Highway Norwood, MA 02062 (800) 822-8224 in MA (617) 762-9310	**$499** *Software includes Microcom Networking Protocol (MNP), which allows users to communicate error-free with any on-line database.*	YES	YES	YES	YES	YES	NO
MICROMODEM IIe AND SMARTCOM I Hayes Microcomputer Products, Inc. P.O. Box 105203 Atlanta, GA 30348 (404) 449-8791	**$199**	YES	NO	YES	YES	YES	NO
MULTIMODEM IIe Multi-Tech Systems, Inc. 82 Second Avenue S.E. New Brighton, MN 55112 (800) 328-9717 in MN (612) 631-3550	**$199** *Hayes MicroModem II-compatible used with software on Hayes MMII. Tone-dial capability.*	YES	NO	YES	YES	YES	NO
PROMODEM 1200A Prometheus Products, Inc. 4545 Cushing Parkway Fremont, CA 94538 (415) 490-2370	**$449** *Convenient communications software is built into the board. Powerful communications software is also included on disk.*	YES	YES	YES	YES	YES	NO
ZOOM/MODEM IIe Zoom Telephonics, Inc. 207 South Street Boston, MA 02111 (800) 631-3116 in MA (617) 423-1076	**$179 W/ BASIC SOFTWARE $199 W/ NETMASTER SOFTWARE**	YES	NO	YES	YES	YES	NO

CONTINUED NEXT PAGE ▶

Why Are Apple Owners So Loyal?

People who have the best often are, but in the case of Apple there's more. Apple owners think back to how Apple got started in 1977, just two people working out of a garage and what happened is the talk of Wall Street and the computer industry as well. Many like the fact that Apple only makes computers. Unlike their competition they don't make typewriters, copiers or telephones. They do just one thing and that's one reason they do it so well.

At Applied Engineering we think the same way. You see, Applied Engineering is the only major hardware manufacturer totally dedicated to the Apple computer. Whereas most of our competitors must divide their customer support and engineering time between IBM, Atari, Radio Shack or other computers, our engineers only design products for the Apple. This dedication allows us to be much more familiar with the Apple and the people who use them.

We don't expect you to buy an Applied Engineering peripheral on loyalty alone, but when you compare our products to those made by QUADRAM, MICROSOFT, AST and others you'll find out why Applied Engineering means a quality design, innovation, craftsmanship and total Apple compatibility.

The other guys do pretty well considering how busy they are with IBM. But at Applied Engineering, ALL of our work involves the Apple. In fact, all of our employees were Apple owners before they came to work for us. The people in shipping, engineering, quality control, order entry, all use Apples at work and at home.

This one track mindedness of ours allows us to offer the largest storage with AppleWorks and Supercalc and our Z-80 card now includes the new 4.0 operating system. We can expand the Apple IIe to over 3 MEGABYTES of memory and we've got clock cards, music cards, A to D converters, digital controllers, and a BSR system so your Apple can control your whole house with no additional wiring!

Applied Engineering recognizes that we've got to do a better job than our IBM counterparts because we know you're smarter than the average computer buyer, you bought an Apple. You see, our competition has it a little easier, their customers aren't as smart as you. After all, they bought the wrong computer.

So if you need more memory, or 80 columns, or RGB color, double hi res graphics, if you want to know the time and temperature or other "real world" conditions, if you'd like to run CP/M software, have a RAM disk, increase the storage of AppleWorks and other programs, if you want your Apple to play music, talk and sing, if you'd like your Apple to control the lights and appliances in your house, then do what NASA does, what Ford does, what the U.S. Government, Hughes Aircraft, Honeywell, Westinghouse, AT&T, Apple Computer, and even what Steve Wozniak does, call Applied Engineering. Then you will discover what thousands of companies and over a hundred thousand Apple owners already know, that you can be smart and loyal all at the same time.

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For information and specifications on Applied Engineering's line of Apple peripherals, please see our ads in this magazine. Prices are given.

MULTIFUNCTION CARDS

This chart contains a sampling of products, and the information herein is based on manufacturers' claims.

	PRICE	COMPUTER	SERIAL PORT	MODEM PORT	PARALLEL PORT	CLOCK/ CALENDAR	BSR INTERFACE	16-BIT PORT	6850	SOFTWARE AVAILABLE	OPERATING SYSTEM
BUSINESSCARD Street Electronics Corporation 1140 Mark Avenue Carpinteria, CA 93013 (805) 684-4593	**$219.95**	**IIe**	**YES**	**YES**	**YES**	**YES**	**NO**	**NO**	**NO**	**YES**	**ProDOS**
Has 256K EPROM that includes screen-dump capabilities. More than 60 printer and communications commands, accessed by Macintosh-type pull-down menus and dialog boxes.											
GAMBIT Checkmate Technology, Inc. 509 South Rockford Drive Tempe, AZ 85281 (602) 966-5802	*Not available at press time	**II, II+, IIe**	**YES**	**YES**	**YES**	**YES**	**NO**	**YES**	**NO**	**YES**	**DOS 3.3, ProDOS, PASCAL**
Includes 80-column display, built-in RAMdisk, and 65C02 coprocessor. Supports CP/M 2.23.											
MULTI I/O CARD AST Research Inc. 2121 Alton Irvine, CA 92714 (714) 476-3866	**$235**	**II+, IIe**	**YES**	**YES**	**NO**	**YES**	**NO**	**NO**	**YES**	**YES**	**ProDOS**
One board instead of three. Requires lower power consumption and produces less heat.											
MULTICORE Quadram Corporation 1 Quad Way Norcross, GA 30093 (404) 923-6666	**0K, $219** **64K, $279** **128K, $329** **256K, $399**	**II, II+, IIe**	**YES**	**YES**	**YES**	**YES**	**NO**	**NO**	**NO**	**YES**	**ProDOS**
RAM drive faster than compatible boards on market. Serial port can be used for communications.											
PROMETHEUS PRODUCTS, INC. Versacard 4545 Cushing Parkway Fremont, CA 94538 (415) 490-2370	**$199**	**II, II+, IIe**	**YES**	**YES**	**YES**	**YES**	**YES**	**NO**	**YES**	**YES**	**DOS 3.3 ProDOS PASCAL CP/M**
Can add Graphics ROM. Based on 6850 asynchronous communications-interface adapter.											
PSIO DUAL FUNCTION INTERFACE CARD Videx, Inc. 1105 N.E. Circle Boulevard Corvallis, OR 97330 (503) 758-0521	**$229**	**II, II+, IIe**	**YES**	**YES**	**YES**	**NO**	**NO**	**NO**	**NO**	**YES**	**DOS 3.3, ProDOS PASCAL**
Compatible with Videoterm and UltraTerm display cards, in addition to Apple's standard 40-column screen. Serial transmission rate and other parameters stored in nonvolatile RAM.											
SLOT BUSTER RC Systems 121 West Winesap Road Bothell, WA 98012 (206) 771-6883	**$229.95**	**II, IIe**	**YES**	**NO**	**YES**	**NO**	**NO**	**NO**	**NO**	**YES**	**DOS 3.3 ProDOS PASCAL CP/M**
Includes a text-to-speech synthesizer with unlimited vocabulary.											

PRINTER INTERFACES

All cards marked by an asterisk use the 6502 chip. All others use the 6551 chip.

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Apricorn
7050 Convoy Court
San Diego, CA 92111
(619) 569-9483
List Price: $79.95

SERIAL-TO-PARALLEL
Discwasher
1407 North Providence Road
P.O. Box 6021
Columbia, MO 65205
(314) 449-0941
List Price: $89.95

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Orange Micro, Inc.
1400 North Lakeview Avenue
Anaheim, CA 92807
(714) 779-2772
List Price: Grappler C, $119; Hot Link, $69

SERIAL BOX
PBI Software
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Foster City, CA 94404
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in CA (800) 843-5722
List Price: $69.95

SWITCHPORT IIc
Practical Peripherals, Inc.
31245 La Baya Drive
Westlake Village, CA 91362
(800) 641-0814
in CA (818) 991-8200
List Price: $109

LIVEWIRE
Street Electronics Corporation
1140 Mark Avenue
Carpinteria, CA 93013
(805) 684-4593
List Price: $99.95

SERIAL INTERFACES FOR THE II, II PLUS, AND IIe

DISPATCHER*
Advanced Logic Systems, Inc.
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Sunnyvale, CA 94086
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List Price: $139

SUPER SERIAL CARD
Apple Computer, Inc.
20525 Mariani Avenue
Cupertino, CA 95014
(408) 996-1010
List Price: $139

SERIAL INTERFACE* AND SUPER SERIAL IMAGER
Apricorn
7050 Convoy Court
San Diego, CA 92111
(619) 569-9483
List Price: Serial Interface, $100; Super Serial Imager, $130

MODEL 7710* AND MODEL 7711
California Computer Systems
740 South Milpitas Blvd.
Milpitas, CA 95035
(408) 945-0500
List Price: Model 7710, $116; Model 7711, $120

MACROCOMM
Macrotech Computer Products Ltd.
1370 Marine Drive
North Vancouver, BC V6B 4M3
Canada
(604) 984-8305
List Price: $159

SERIAL GRAPPLER
Orange Micro, Inc.
1400 North Lakeview Avenue
Anaheim, CA 92807
(714) 779-2772
List Price: $119

SERIAL INTERFACE
PC Ware Incorporated
4883 Tonino Drive
San Jose, CA 95136
(408) 978-8626
List Price: $130

SERIALL
Practical Peripherals, Inc.
31245 La Baya Drive
Westlake Village, CA 91362
(800) 991-8200
in CA (818) 991-8200
List Price: $159

SERIAL INTERFACE ADAPTER AND BUFFERED SERIAL INTERFACE ADAPTER
Quadram Corporation
1 Quad Way
Norcross, GA 30093
(404) 923-6666
List Price: Serial Interface Adapter, $99, Buffered Serial Interface Adapter, $139 with 64K

ALPHABITS II
Street Electronics Corporation
1140 Mark Avenue
Carpinteria, CA 93013
(805) 684-4593
List Price: $120

PRINT-IT! (serial version)
Texprint
220 Reservoir Street
Needham Heights, MA 02194
(800) 255-1510
in MA (617) 449-5808
List Price: $199

FINGERPRINT+ (serial version)
Thirdware Computer Products
4747 N.W. 72nd Avenue
Miami, FL 33166
(305) 592-7522
List Price: $149

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PRINTERMATE
Advanced Logic Systems, Inc.
1195 East Arques Avenue
Sunnyvale, CA 94086
(408) 730-0307
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(408) 996-1010
List Price: $165

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7050 Convoy Court
San Diego, CA 92111
(619) 569-9483
List Price: Parallel Printer Interface, $80; Graphics Printer Interface, $100

MODEL 7720
California Computer Systems
740 South Milpitas Blvd.
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(408) 945-0500
List Price: $100

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Greengate Productions
2041 Pioneer Court, Suite 15
San Mateo, CA 99403
(415) 345-3064
List Price: $42

PKASO/U
Interactive Structures, Inc.
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(800) 255-1510
in MA (617) 449-5808
List Price: $199

FINGERPRINT+ (parallel version)
Thirdware Computer Products
4747 N.W. 72nd Avenue
Miami, FL 33166
(305) 592-7522
List Price: $149

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1105 N.E. Circle Blvd.
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(503) 758-0521
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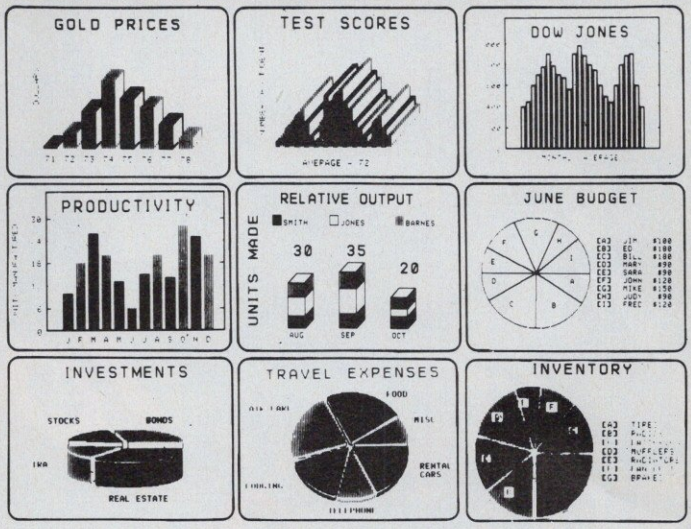
AlphaChart!



Don't pay more for less! The pictures shown above are examples of charts created with AlphaChart!, perhaps the most powerful and friendly Apple II chart program on the market. Within seconds, keyboard-entered data can be converted into picture-perfect pie or bar charts, in 26 user-selectable styles, automatically scaled and labelled, and in color or black and white. And if you want to customize your charts by adding extra artwork or text, or display them in a slide show, AlphaChart! comes with these valuable extras. . . . .

A **slide projector,** for orchestrating automated, stand-alone screen presentations of a series of charts, timed and sequenced by the user. This program alone is worth the cost of the disk. It can be used with any graphics files created with any program.

A **graphics editor,** for alteration and embellishment of charts. Besides standard point-by-point sketching, built-in structures permit push-button creation of circles, rectangles, lines, shape-table shapes, and exotic woven plaid patterns. If you wish to add clarifying text to the charts, you may type on the screen in several different letter font styles. For the artist, the graphics editor can also be used to sketch any imaginable scene from scratch.

A **shape table editor,** for creating special shapes for your charts. These shapes can also be used for animation in your programs! A sample animation program shows how to do it.

AlphaChart! includes a screen-dump program for printing your charts on paper. AlphaChart! is more! Just read what these people have to say about it. . .

"I noticed the advertisements for Spectral Graphics' AlphaChart! program and figured that, with a money-back guarantee, I would try it. Boy, am I glad I did! This is a fantastic program. You can master its many varied capabilities in less time that it would take to describe them. I would recommend it to everyone, even if you have absolutely no need for a graphing program. It's just fun to play with." **S.A. Smith, San Bernadino, Calif. . . letter to SOFTALK, June, 1984, page 14.**

"The software does much more than the advertisement suggests. Without question, this is among the best buys in software that I have ever come across, and certainly among the best written. It is extraordinarily easy to use, very well thought out, and priced to kill your competition (which I wish you every success in doing)." **Anthony J. Scriffignano, North Caldwell, New Jersey.**

"I have long been distressed by the lack of software available in the scientific academic community. At last there is a simple yet robust graphics program applicable for our purposes: AlphaChart!, by Spectral Graphics Software. Business folks and scientists alike will really appreciate how user-friendly it is; I was able to produce my first three-dimensional, multi-colored, labeled bar graph within five minutes of booting the disk–without reading my documentation. I would have had to pay a scientific illustrator much more than the whole program costs just to produce that one graph. . . . you can't do without this gem." **John B. Iverson, Richmond, Indiana. . . letter to SOFTALK, April, 1984, page 23.**

ONLY $29.95 Apple II+/IIe/IIc. Satisfaction guarantee or your money back (really!). Send a check or purchase order to **SPECTRAL GRAPHICS SOFTWARE,** 6333 Pacific Avenue, Suite 256, Stockton, California 95207.

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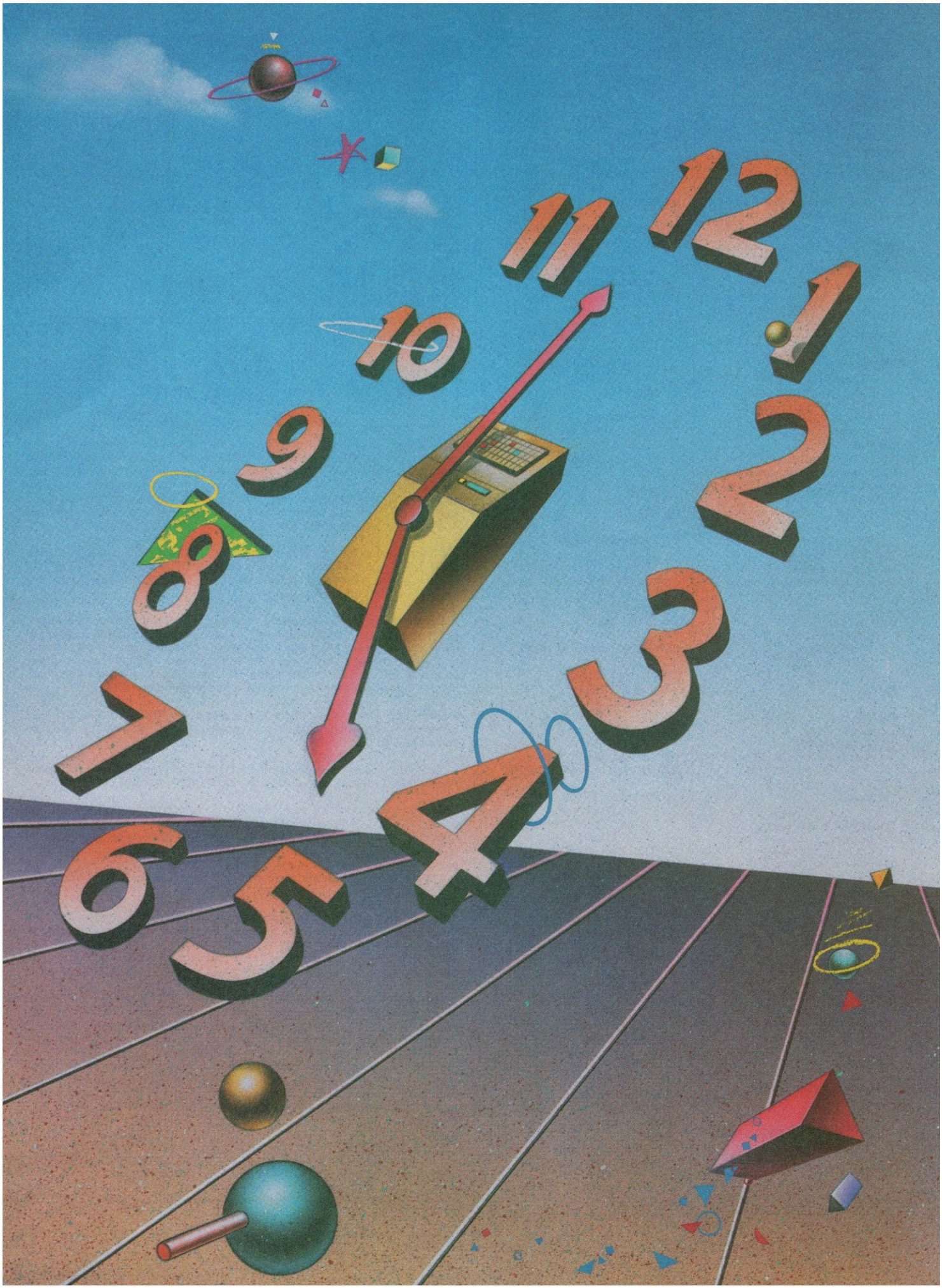
CIRCLE 109 ON READER SERVICE CARD



Clock peripherals for your Apple II

Although every activity of your Apple II is tightly controlled by timing, the computer is surprisingly ignorant of time. The 6502 or 65C02 microprocessor executes instructions in lockstep with the vibrations of an oscillator on the main circuit board of the Apple, performing something like 500,000 operations each second. The circuitry that provides the microprocessor with timing signals, although sometimes called a clock, is more akin to a kitchen timer. The time of day or day of week is beyond its ken.

If you want your Apple to tell time—human time—you must obtain a clock/calendar peripheral. As with other Apple peripherals, the usefulness of your clock is tied directly to the availability of software to use the information it can provide. BASIC programs and commercial application programs can read information from the clock and use it for their activities, but the system software is another story.

DOS 3.3 provides no official mechanism for using time information from a clock. Some clock manufacturers do provide a modified DOS 3.3 that can store—or "date-stamp"—time information in the DOS 3.3 catalog, however. ProDOS recognizes clock peripherals and does stamp your files with the time and date.

Date-stamped files have obvious advantages. You can tell when the file was created or last modified and, therefore, save yourself manual record keeping. Programmers can tell which program is the most recent version, writers can immediately find their current draft, and businesspeople can determine when the mailing list was last updated. If you have a hard disk, the time/date stamp can simplify the backup process—you need copy only those files that have changed since the last backup. These advantages are just a beginning, though; a clock/calendar can do more than just stamp your files.

Clock peripherals can generate interrupts; that is, the clock circuitry can signal the microprocessor to stop what it is doing and execute another program. Thus, you can use your Apple to remind you of appointments or important events. If you add a BSR/X-10 controller, the clock-calendar card can dim your lights, turn your stereo on and off, and start the coffee brewing at 7 A.M. With the proper communications software and a modem, your Apple can automatically call your favorite information utility at the least expensive time and download or upload files of interest.

BY MICHAEL CALLERY

AKIO MATSUYOSHI

TEACHING YOUR APPLE TO TELL THE TIME

As hard disks become more common, your clock/calendar can provide automatic backup onto a streaming tape or second hard disk as frequently as necessary, without your intervention. In a network, your Apple can send automatic messages to other computers at predetermined times. These possible applications are only the tip of the iceberg.

For this article, I looked at several of the most popular clock/calendar cards for the Apple II and IIe and one new clock device for the IIc.

Mountain Computer Clock

This product is the granddaddy of Apple clocks. It was the first and, for a long time, the only clock peripheral. This interface card is the largest and most complex of all the clock cards that I tested.

The package provides software for DOS 3.3 and Pascal only. Standard ProDOS can not recognize the Mountain Clock, but assembly-language programmers should have little difficulty patching ProDOS as described in the *ProDOS Technical Reference Manual* to accept the Mountain Clock time format. The clock card's extensive manual provides many programming examples, as well as the technical details of the clock's operation. The battery on the Mountain Clock activates only when the Apple is turned off, and it maintains the clock's operation for four days. If you must leave the Apple off

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3204 NATL. PARKS HWY., CARLSBAD, NM 88220

FREE CATALOG

*Works with the Multram IIe & IIc cards from Checkmate Technology.

EXPANSION

longer, the AC adapter in the package will extend the life of the battery.

Thunderclock

Thunderware's clock card has become the Apple standard because the clock driver in ProDOS was designed for the Thunderclock. Most ProDOS software can automatically use the Thunderclock. The Thunderclock can also provide the time and date in the Mountain Clock format and may work with software meant to support only the Mountain Clock. The card comes with software for use with DOS 3.3 and ProDOS, including TUT, an extensive ProDOS support package. When you install TUT, a series of new commands becomes available to BASIC programmers, including commands to set the time, read the time, control a BSR device, and so on. To use the BSR commands, you must buy an interface option to connect your Thunderclock to a BSR/X-10 command console. The batteries will operate for "many years," says the documentation, whether your Apple is on or off.

NONE OF THE STANDARD CLOCK CARDS CAN WORK WITH A IIc

TimeMaster II H.0.

Applied Engineering's TimeMaster can emulate either a Mountain Clock or a Thunderclock, as well as operate in its own mode. You can also connect TimeMaster to a BSR/X-10 console. The supplied software works with DOS 3.3 (including date-stamped files), Pascal, CP/M, and ProDOS. To use the CP/M and ProDOS files, you must transfer them from the supplied DOS 3.3 disk, using the APDOS and Convert utilities respectively. And because TimeMaster emulates the Thunderclock, ProDOS date and time stamping work as expected. With Applied Engineering's AppleWorks patch, which the company supplies with the product (if you purchased a TimeMaster before June 1985, you can order the patch disk for $20), AppleWorks displays the time and date on the screen. The battery automatically recharges when your Apple is on and maintains a full charge if you turn your Apple on at least one hour a week.

Multi I/O

The AST Multi I/O card provides three different functions. The card has circuitry for two serial ports, in addition to the clock. You have to assign each function to a slot, and the assigned slot cannot contain another interface card. Thus, if you assign the serial printer port to slot 1 and plug the Multi I/O card into slot 2, you must keep slot 1 empty. Jumpers on the card enable you to alter slot assignments or disable an individual function. Although this multifunction card does not save you slots, it results in cooler operations because the AST card has less circuitry than three separate cards do.

The Multi I/O card's software comes only in ProDOS format, although you can convert some of the utility programs to run under DOS 3.3. Multi I/O provides date stamping under ProDOS and can give you the date in the Mountain Clock data format. The battery on the card lasts for approximately one year.

IIc System Clock

Apple chose not to include clock circuitry in the Apple IIc, and, since the computer has no slots, none of the standard clock/calendar cards can work with a IIc. Creative Peripherals comes to the rescue. The IIc System Clock is a small box of the same color and design as the Apple IIc. It plugs into one of the serial ports at the rear of the computer. You can plug your printer or modem, in turn, into the clock box.

Creative Peripherals' software includes a utility disk and Time Trax, an extensive calendar/appointment scheduler. The utility disk installs a clock driver on your start-up disks so that date stamping under ProDOS occurs as expected.

Although both the Mountain Clock and the Thunderclock are solid and well built, I am most impressed with the TimeMaster II H.O. card. Time-

CIRCLE 137 ON READER SERVICE CARD

Here's the inside story on all the colorful things that have happened at Apple.

Go ahead, accuse us of sensationalism.

Over the next four pages, we're going to bare our specs and divulge all the nitty gritty details about the latest developments to come out of Apple Computer.

Starting with our new Apple® ColorMonitor IIe and ColorMonitor IIc.

In all modesty, we think these are the best color monitors you can buy at any price for your Apple II, II+, IIe or IIc personal computer.

Both have composite color, 13-inch screens that let you produce a dazzling array of multi-hued graphics. Without going to the expense of adding an RGB interface card or external adaptor.

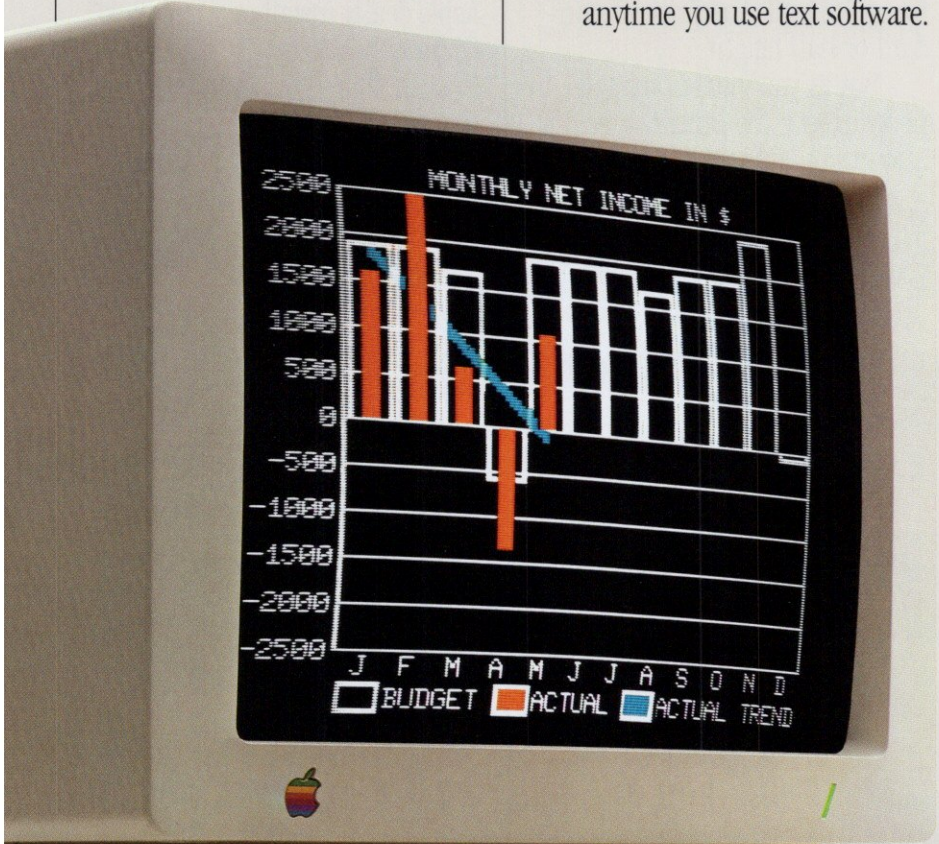
Simply plug the monitor directly into the video output jack on the back of your Apple, and you're ready to start computing in living color.

Which is terrific for games and graphics oriented programs like Apple Logo II, Instant Pascal™ and Dazzle Draw.

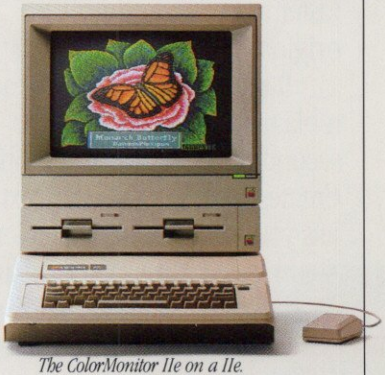
But not quite so terrific for text programs. As anyone who's ever gone blurry-eyed from trying to read words on a color CRT will readily attest.

Not to worry.

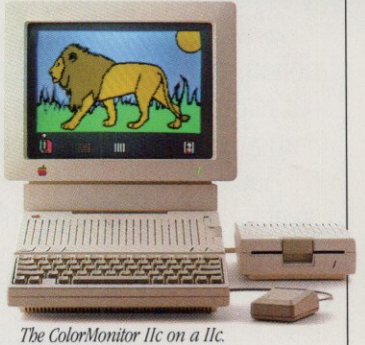
We've designed both ColorMonitors to automatically go from color to a high resolution, 80-column monochromatic mode anytime you use text software.



As you can see, we've also styled each ColorMonitor to fit in with our family looks. The ColorMonitor IIc is pure white, and has an optional rigid stand. While the ColorMonitor IIe is designed to rest on top of your Apple IIe, and comes in our favorite shade of beige.



The ColorMonitor IIe on a IIe.



The ColorMonitor IIc on a IIc.

And thanks to some particularly bright Apple engineers, our ColorMonitors are compatible with virtually all existing Apple II software.

Well, there you have it. The scoop on one of the most colorful events in Apple history. But as you might expect, it's certainly not the whole story.

If you turn the page, you'll see that the saga continues.

The truth about our new color printer in black and white.

In case you haven't heard, Apple has a whole new cast of characters.

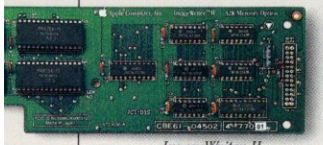
Our ImageWriter™ II printer.

Like its predecessor, the original Apple ImageWriter, our ImageWriter II is one of the most dependable dot matrix printers very little money can buy. And it's compatible with every Apple personal computer.

But that's where the similarities end.

The ImageWriter II prints faster and clearer than the original ImageWriter.

It cruises through drafts at a blazing 250 characters per second. Produces sharp graphics. Creates near letter-quality text. And lets you print in six vivid colors.



ImageWriter II 32K Memory Option.

Simply change the black ribbon to the continuous cloth, multi-color ribbon, and you're ready to churn out reams of yellow, red, blue, orange, green and purple output.

You can print pictures and greeting cards with software like Stickybear Printer. Design your own color drawings with Blazing Paddles and Dazzle Draw. And whip out color business graphics using SuperCalc 3A, pfs: GRAPH or Mouse Calc.

As you would expect, you can vary the pitch and spacing on the ImageWriter II. And print in standard or half height.

But as you would probably never expect, the ImageWriter II is also expandable.

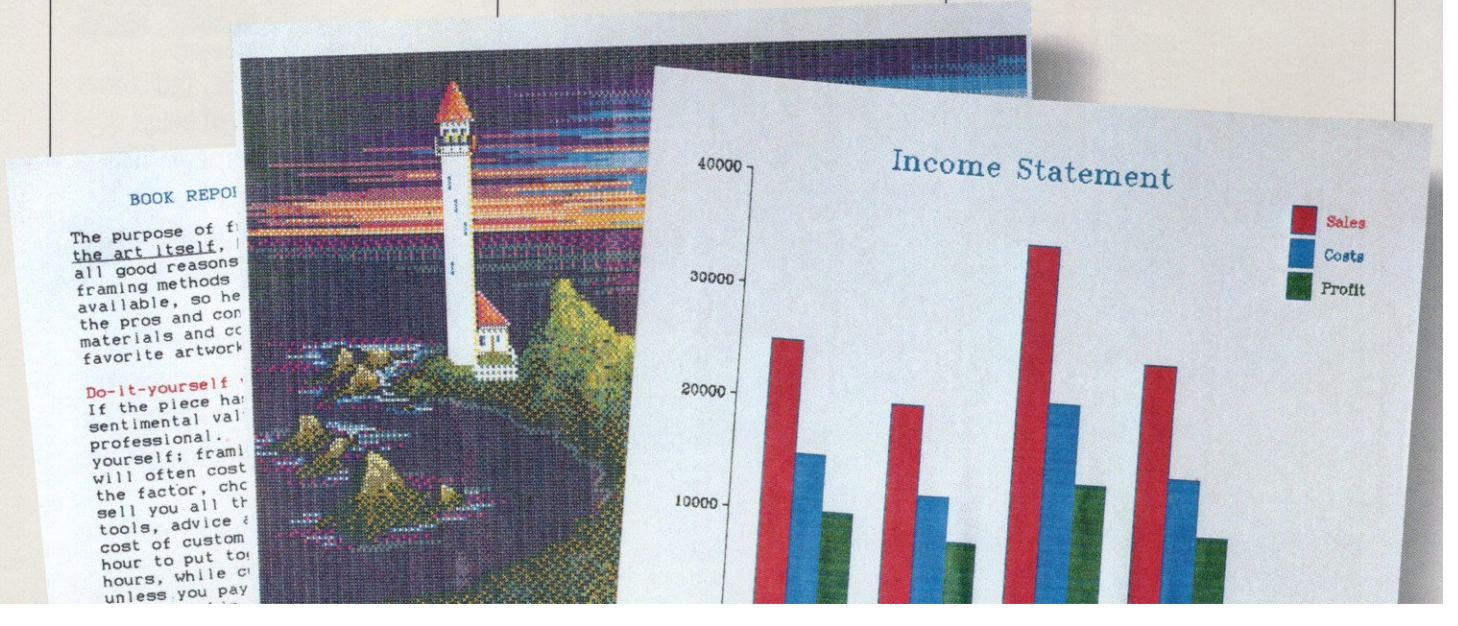
By adding the ImageWriter II 32K Memory Option print buffer, you can continue to compute while the printer continues to print.

Attach the ImageWriter II SheetFeeder, and you can automatically load single sheets of paper into the printer.

And by having your authorized Apple dealer install our AppleTalk™ Option, the ImageWriter II can even be shared by several different Macintosh™ workstations.

Which means, for businesses, it can vastly improve the looks of one very important piece of paper:

Your budget sheet.

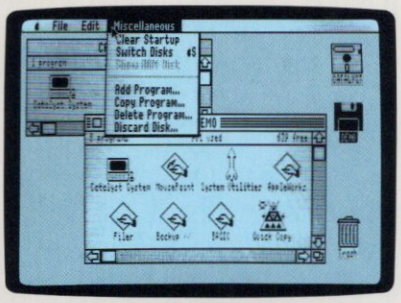


Stop flipping between floppies.

We call it the "floppy disk shuffle."

Having to boot and re-boot floppy disks every time you want to go from one application to another.

Well, the end of your shuffling is in sight.



Catalyst 3.0 with desktop icons.

Quark, Inc., will soon be shipping a unique new program called Catalyst™ 3.0 that's designed to be used with Apple II computers equipped with mass storage.

Catalyst 3.0 lets you install multiple programs on a single storage device. Macintosh-type desktop icons show you what's loaded on the program. To select the item you want, simply use an optional mouse or keyboard to open the file.

Look for Catalyst 3.0 to show up on dealer shelves soon.

Then you'll finally be able to boot all those floppies for good.

A plug for our new modem.

With the introduction of our new Apple Personal Modem, we've solved one of the biggest problems known to modems:

Where to hide them.

The Apple Personal Modem plugs directly into a standard A/C wall outlet. So unless your computer room is decorated with paisley wallpaper, it'll blend right into the immediate surroundings.

Of course, aesthetics aside, it's also one darn good modem.

The Apple Personal Modem offers 300/1200 baud operation. Has the latest VLSI technology. Features automatic dial, re-dial and answer capabilities. Uses the industry standard Hayes AT Command Set. Plus it's totally compatible with current Apple communications software.

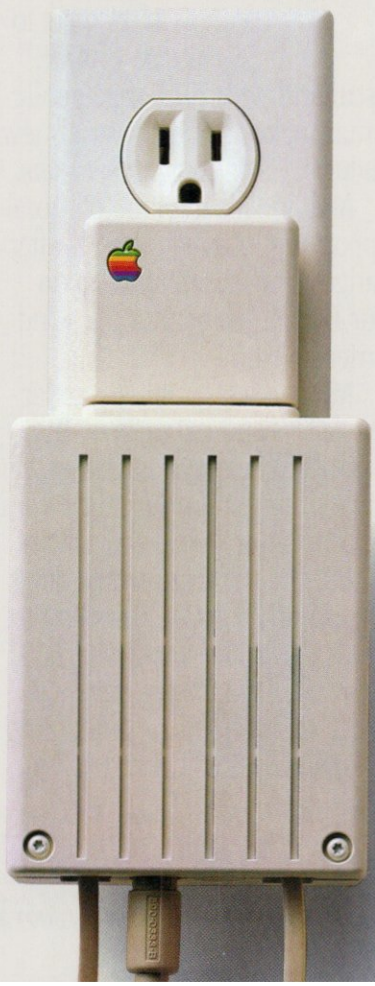
And even though we designed the Apple Personal Modem to be out of sight, there's one part of it that's definitely not:

The price.

We've increased our drive.

Our capacity for work just got bigger.

The new Apple UniDisk™ 3.5 external drive uses 3½" dual-sided microdisks to add a humongous



800 kilobyte capacity to your Apple II, II+, IIe or IIc. Which is more than five times the amount of storage available from a standard 5¼" drive.

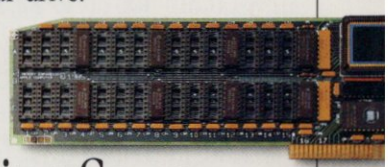
The UniDisk 3.5 is also faster than 5¼" drives. So you'll spend less time listening to that all-too-familiar whirring sound.

You can even "daisy chain" a second UniDisk 3.5 off the first one. In case you're planning to write the next great American epic or something.

As you may not know, disk drives are the most vulnerable components of any computer system. So it's nice to know that no other disk drive is closer to fail-safe than our UniDisk 3.5.

Because no other company has our dedication to quality. Our concern for reliability.

Or our drive.



Coming Soon: The biggest Apple IIe in memory.

The Apple II Memory Expansion Card should be on dealer shelves soon.

Before long, you'll be able to instantly and easily add another 256K, 512K, 768K or full megabyte of RAM to your Apple II, II+ or IIe. Making it one of the most powerful personal computers in its class. Or business. Or home.

Snow white and dwarf monthly payments.

Once upon a time, most people had to dwindle their checking accounts down to the right side of the decimal point in order to buy an Apple.

Or stretch their charge cards to the place where they didn't have a choice but to leave home without them.

Then, mercifully, our finance department invented the Apple Credit Card.

With an Apple Credit Card, you may qualify for up to $2,500 of instant credit to spend on the Apple computer or peripherals of your choice.

And, from now until December 31st, 1985, we'll generously waive the 10% down payment.

Which means the only thing you'll have to come up with are the small monthly payments.

Getting your Apple Credit Card is almost as easy as breathing. All you need is another major credit card. And a valid I.D.*

Which means, that very same day, you'll be able to take your new Apple home.

Where you'll both live happily ever after.

Group therapy for Apple users.

Have you ever felt like you needed help—serious help—with your Apple, but didn't know where to turn?

Then we suggest you join an Apple Users Group.

From Kennebunkport to Kaanapali, Apple Users Groups are springing up by the dozen.

They meet to discuss ProDOS,™ Pascal and WPL. Exchange public domain software. Demonstrate new products. Listen to guest speakers.

And provide the kind of moral support that comes in handy after "Range error" has popped up on your DOS 3.3 screen for the 42nd consecutive time.

Many groups publish regular newsletters and magazines. And operate bulletin boards that let you get the information you want from the comfort of your own modem.

But the most important thing to know about Apple Users Groups, is that they're not just for hackers. In fact, most members have only novice or intermediate computing skills. Which is why they join in the first place.

To get in touch with the Apple Users Group in your area, check with your local authorized Apple dealer.

With over 400 Apple Users Groups already in existence throughout the U.S. and Canada, chances are the help you need is right around the corner.

Your computer should join a health club.

Computers—even Apples—can sometimes be temperamental little devils.

And if something goes wrong with yours after the 90-day limited warranty expires, you're the one who'll be out of shape.

Unless you get Apple*Care*.℠

Apple*Care* is our extended service contract that covers the cost of parts and labor for up to three years. And the annual fee is usually about half the cost of a single repair.

You can buy Apple*Care* from your participating authorized Apple dealer. And the contract will be honored at more than 2,400 Apple dealers across the country.

So even if you decide to move to some out-of-the-way place like Keokuk, your Apple*Care* coverage will go along with you.

Although we can't guarantee your family will.

*By major, we mean MasterCard, VISA, American Express, Diner's Club and Carte Blanche. Certain restrictions may apply. © 1985 Apple Computer, Inc. Apple and the Apple logo are registered trademarks of Apple Computer, Inc. ProDOS, DuoDisk, UniDisk, ImageWriter and AppleTalk are trademarks of Apple Computer, Inc. AppleCare is a service mark of Apple Computer, Inc. Macintosh is a trademark of McIntosh Laboratory, Inc. and is being used with its express permission. Catalyst is a trademark of Quark Incorporated. Instant Pascal is a trademark of Think Technologies. Dazzle Draw is a trademark of Broderbund, Inc. Stickybear is a trademark of Optimum Resource, Inc. Blazing Paddles is a registered trademark of Baudville, Inc. SuperCalc is a trademark of Sorcim Corporation. PFS is a registered trademark of Software Publishing Corporation. Mouse Calc is a trademark of Version Soft. Hayes is a registered trademark of Hayes Microcomputer Products, Inc.
For an authorized Apple dealer near you, call **(800) 538-9696.** In Canada, call **(800) 268-7796** or **(800) 268-7637.**

Master provides the greatest array of features of all the clocks I reviewed. If your needs are confined to ProDOS and if you also need two serial ports, you may find that the AST card is your best value. If your need for a clock is based on a particular piece of software, you should buy the clock the software company recommends. +

Michael Callery teaches computer graphics at the New School in New York and creates instructional software. He is the author of Commodore Magic *(E.F. Dutton) and the coauthor of a book on Apple graphics coming soon from Prentice-Hall.*

PRODUCT INFORMATION

The Clock
Mountain Computer
399 El Pueblo Road
Scotts Valley, CA 95066
(408) 438-6650
List Price: $280
Requires: Apple II, II Plus, or IIe

Thunderclock
Thunderware
P.O. Box 1299
Orinda, CA 94563
(415) 254-6581
List Price: $150
Requires: Apple II, II Plus, or IIe

TimeMaster II H.O.
Applied Engineering
P.O. Box 798
Carrollton, TX 75006
(214) 241-6060
List Price: $129
Requires: Apple II, II Plus, or IIe

Multi I/O
AST Research
2121 Alton Avenue
Irvine, CA 92714
(714) 863-1333
List Price: $235
Requires: Apple II, II Plus, or IIe

IIc System Clock
Creative Peripherals Unlimited
22952 Alcalde Drive #160
Laguna Hills, CA 92653
(800) 228-1165
in CA (800) 533-8997
List Price: $79.95
Requires: Apple IIc

CLOCK/CALENDAR PERIPHERALS

This chart contains a sampling of products, and the information herein is based on manufacturers' claims.

APPLE II, II+, AND IIe CARDS	PRICE	OPERATING SYSTEM	STORES YEAR	BATTERY LIFE
MI-CHRON CLOCK/CALENDAR CARD Mi-ChRon Company 2119 Stuart Street Longmont, CO 80501 (303) 651-1843	**$65**	**DOS 3.3, ProDOS**	**YES**	**4 YRS.**
Provides on/off command through the card's ROM for continuous time on the monitor's screen.				
PROCLOCK Practical Peripherals, Inc. 31245 La Baya Drive Westlake Village, CA 91362 (800) 641-0814 in CA (818) 991-8200	**$159**	**DOS 3.3, ProDOS, PASCAL, CP/M**	**YES**	**10 YRS.**
Ability to generate software-controlled interrupts. The software allows you to display the date and time on-screen while in AppleWorks.				
SEIKO DATAGRAPH 2001 Creative Peripherals Unlimited 22952 Alcalde Drive #160 Laguna Hills, CA 92853 (800) 228-1165 in CA (800) 533-8997	**$199**	**ProDOS**	**YES**	**2 YRS.**
This package includes Time-Trax software and ProDOS- compatible clock/interface and Seiko wristwatch. You can download your schedule into the watch. Also runs on IIc.				
SLOT 3 CLOCK Southern California Research Group P.O. Box 593 Moorpark, CA 93020 (805) 529-2082	**$79.50**	**DOS 3.3, ProDOS**	**YES**	**2 YRS.**
You can put it in slot 3 on an Apple IIe without interfering with an Extended 80-Column Card.				
THE CLOCK Mountain Computer 399 El Pueblo Road Scotts Valley, CA 95066 (408) 438-6650	**$280**	**DOS 3.3, PASCAL**	**NO**	**4 YRS. (IF RECHARGED)**
Battery rechargeable				
THUNDERCLOCK Thunderware P.O. Box 1299 Orinda, CA 94563 (415) 254-6581	**$150**	**DOS 3.3, ProDOS, PASCAL**	**YES**	**4 YRS.**
TIME-TRAX Creative Peripherals Unlimited 22952 Alcalde Drive #160 Laguna Hills, CA 92853 (800) 228-1165 in CA (800) 533-8997	**$119.95**	**DOS 3.3**	**YES**	**4 YRS.**
This package provides time-and-date-scheduling software and includes a free clock. It plugs into the inside game-paddle port and provides pass-through.				
TIMEMASTER II H.O. Applied Engineering P.O. Box 798 Carrollton, TX 75006 (214) 241-6060	**$129; BSR INTERFACE $49**	**DOS 3.3, ProDOS, PASCAL, CP/M**	**YES**	**20 YRS. (IF RECHARGED)**
The battery is rechargeable. The software allows you to display the date and time on-screen while in AppleWorks and insert time and date into AppleWorks data fields. The board also has a BSR interface.				
IIc PERIPHERALS				
IIc SYSTEM CLOCK Creative Peripherals Unlimited 22952 Alcalde Drive #160 Laguna Hills, CA 92853 (800) 228-1165 in CA (800) 533-8997	**$79**	**ProDOS**	**YES**	**2 YRS.**
Inserts time and date into AppleWorks data fields. The clock is from Creative Peripherals and the AppleWorks patch from Applied Engineering, and the unit is available from both companies. This is a pass-through serial port. It allows you to plug other devices into the clock. The software lets you display the date and time on-screen while in AppleWorks.				
LIVEWIRE Street Electronics 1140 Mark Avenue Carpinteria, CA 93013 (805) 684-4593	**$99.95**	**ProDOS**	**YES**	**1 YR. +**
Primarily serial-to-parallel printer cable, with clock feature				
PROCLOCK IIc Practical Peripherals, Inc. 31245 La Baya Drive Westlake Village, CA 91362 (800) 641-0814 in CA (818) 991-8200	**$159**	**DOS 3.3, ProDOS, PASCAL**	**YES**	**10 YRS.**
This card allows screen dumps to the printer and has the ability to jump into machine language at any time, built-in diagnostics, and ability to generate interrupts. This board installs inside your IIc. The installation requires no special tools or soldering. The software allows you to display the date and time on-screen while in AppleWorks.				

AKIO

Extra help for your Apple II's 6502 chip

MORE POWER TO THE PROCESS

CO-PROCESSORS

You don't have to see your Apple II as some sort of lamebrain machine to want to give it some added processing power. Corporations are always calling consultants to help with analysis, general practitioners call in specialists to help with diagnoses, presidents constantly appoint commissions to help make studies—there's no shame in turning to outside resources when it helps get the job done.

For an Apple II, the kind of extra processor you're most likely to add is a coprocessor, a second microprocessor that works along with the II's existing 6502 chip to speed computation, run other types of software, or make disk access more efficient. And just like any other kind of outside experts, coprocessors come in a variety of types, talents, and prices.

Of all personal-computer owners, Apple IIe owners have the widest variety of coprocessors from which to choose for their machines, but you can now buy add-on boards even for the Apple IIc. The II's original open architecture and plug-in-board orientation eases installation on the II, II Plus, and IIe, but the siren call of added power is enough to get many people even to temporarily cleave the sculpted lines of their more monolithic IIc machine.

More useful than considering physical arrangements, however, is to examine coprocessors according to what they do, so let's look at speed-up boards, CP/M cards, 16-bit add-ons, and the new true 8-to-16-bit hybrids.

The 6502 processor chip that comes inside computers in the Apple II family is an elder member of its clan and still quite fit for its age. Nevertheless, newer chips run faster.

If You Hate to Wait

One class of coprocessors speeds up an Apple simply by turning over most processing to a newer 6502 that runs much faster. The only problem is adapting the speedy processor to existing software and hardware that expects a more stately pace.

The Titan Accelerator IIe, for example, includes a 6502 that runs on a 3.5 MHz clock, which is 3½ times as fast as the built-in processor in an unmodified Apple II. In addition to the fast 6502 chip, the board includes 80K of high-speed memory, along with special circuitry to slow down the processor after calls to memory locations used for input and output (memory-mapped I/O addresses in the C000 page). In applications that are processing-intensive, the speed gain can be as much as 3.5 to 1, although in practice, a small gain is more likely, because of the necessity for I/O slowdown.

BY STEVE ROSENTHAL

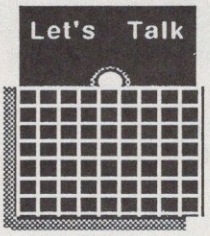
SpeeDemon

The M. c. T. SpeeDemon uses a similar arrangement with a 3.5 MHz 6502 chip, but it includes a 4K cache memory instead of a full set of high-speed memory chips. The cache arrangement lets the SpeeDemon use normal Apple memory and most peripherals and keeps the price down, but it does mean that with some types of software, you can't completely realize the increased speed of the fast processor. Again, because the processor has to slow down for input and output operations, programs that mostly read and write information in and out may not show the improvement that you would see with more computationally oriented applications.

Taking the other tack, the VitaMill Speedup System board from Stellation Two speeds up disk access but not the processing that assembly-language programs—including many commercial programs—do. Programs in Pascal, such as PFS:File and PFS:Report, are accelerated, as is dBASE II and other programs that run under CP/M. The hardware that does the job is a 6809

AKIO MATSUYOSHI

PEOPLE ARE TALKING ABOUT LET'S TALK™



A solid future for the latest and most exciting phase of the telecommunications explosion.
A+ MAGAZINE

Serves as a sophisticated answering machine and information center. You can set up a micro version of CompuServe in your office, school, or home.
InCider

Callers can access 1,000's of files of your business information on-line.
Business Software

Provides professional host telecommunication capabilities, FAR BEYOND the standard bulletin board software.
Call A.P.P.L.E.

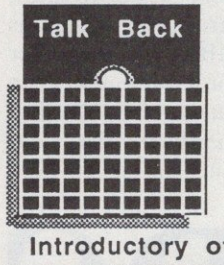
I've operated a BBS system for years. Your system makes GBBS and Networks look like stone age material. It is the best that I've seen.
Randolph Sopicky - Ca.

You couldn't have made it any simpler Now everyone can afford to go on-line
Personal Computing On-line

It's not often we give an A+ rating to any software, but Let's Talk is going to get one. It should be your first choice.
The /// Magazine

Software that lives in your Apple not on the shelf. Find out why people are buying Apples to run Let's Talk. Have your computer call for a demonstration

408 427-0310 Modem
Let's Talk: DATABOARDS $125
Russ Systems, (//e - //c - ///)
320 Dufour St. Santa Cruz, Ca 95060
408 427-1540 Voice



New
Talk Back™ the access software your apple is looking for.
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Introductory offer ... $49

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CIRCLE 344 ON READER SERVICE CARD

processor and 64K of memory, which mostly acts as an intelligent RAMdisk or buffer. For database programs, computer-aided design, or other similar disk-intensive applications, Stellation Two claims a speedup factor of two to four times the normal rate.

The biggest speed-improvement claim of all comes from Applied Informatics Inc. (AII), which says that in numerically oriented computation, its MicroSPEED II Language System board can typically speed up processing 8 to 10 times, and the even higher-speed MicroSPEED II+ Language System board by 10 to 15. With just the right program (lots of square roots), you can see an improvement by as much as a factor of 100.

YOU DON'T HAVE TO LEARN FORTH TO USE THE MICROSPEED

AII gets this seemingly incredible speedup with a math coprocessor chip (a special microprocessor that is preprogrammed for arithmetic operations) and a language that's similar to Forth. You don't have to learn Forth to use the MicroSPEED (it hooks into Applesoft automatically and speeds up number crunching in BASIC), but with the MicroSPEED you can undertake tasks, such as machine control or simulation, that need the utmost in tight coding and speeding of execution.

CP/M for the 80s

Before the rise of the Apple II as a popular personal computer, most common desktop machines were based on a different type of microprocessor chip than the 6502, the Zilog Z80, and ran an operating system called CP/M. Although the Apple II quickly became the leader in educational and home applications, for quite a while the array of business software for CP/M-based machines was, if not better, at least better known.

Rather than rewrite all CP/M software for Apple DOS—now ProDOS—the more elegant solution is to graft a Z80 right onto the Apple II. That's the basic concept behind cards such as Microsoft's Softcard; the Appli-Card from Personal Computer Products, Inc. (PCPI); the CP/M Card and Z-Engine from Advanced Logic Systems; and a dozen others.

With a CP/M card, you are able to run MicroPro's WordStar, Ashton-Tate's dBASE II, Sorcim's SuperCalc, and thousands of other business programs. CP/M is admittedly a bit weak in the graphics and games areas, but the cards are all designed to allow you to revert back to the Apple II mode when you want to use a more visually oriented program.

Z80 or CP/M cards, as they're variously known, run the Z80 chip as a kind of application specialist, with the Apple 6502 continuing to handle a portion of the chores. Typically, the added Z80 acts as the processor and controller, with the native 6502 continuing to perform the input and output operations.

Like the 6502, Z80 chips have also gone through several speed generations. Older Z80 cards use the Z80A, which has a top clock speed of 4 MHz. Newer boards use the Z80B, which ticks along at 6 MHz. The faster speed, plus the sharing of tasks between the processors, makes the combination faster than either a stock Apple II or even many newer 16-bit machines.

When you're not running CP/M, most CP/M cards that include their own on-board memory let you use that space for a RAMdisk. PCPI goes even further with its Appli-Card: In addition to using the standard 64K of on-board RAM as an electronic disk with Apple DOS, you can expand memory by up to 256K to get a 192K RAMdisk with DOS or a 128K RAMdisk with CP/M. If you are running CP/M, you can use the Apple's extra memory as a printer buffer. Applied Engineering's RamWorks Z80 card can have a RAMdisk with up to 1088K.

Most CP/M cards run the 2.2 version of CP/M, which is the standard that almost all business software assumes. The ALS CP/M Card and the

Have You Ever Wanted Your Apple to Run Faster?

It Can with the Accelerator IIe.

Tired of driving in the slow lane? Watching IBM PCs with superior speed pass you by? With the Accelerator IIe from Titan Technologies you can run Apple power applications such as Appleworks, Supercalc 3a, and Howardsoft's Tax Preparer up to 3½ times faster! Just drop an Accelerator IIe under the hood of your Apple II, II+, or IIe, and put it in high gear! Titan has been doing just that since it introduced Accelerators to the industry in 1982.

The Accelerator IIe boosts your productivity, letting you complete your tasks 3 times faster. That means you get more work done—or more time to play. It's the perfect complement for your power software and hardware (especially memory expansion boards!).

How does the Accelerator IIe speed up the performance of your Apple? By combining a high performance processor together with high speed memory.

The 65C02: High Performance Engine

The heart of the Accelerator IIe is its 65C02 engine, running at a pulse pounding speed of 3.6 MHz. The Accelerator effectively replaces the Apple's modest 1 MHz 6502, giving your Apple a performance increase of up to 3½ times faster on most applications.

Memory

It takes more than just a fast engine to Accelerate your Apple, it takes fast memory too. The Accelerator IIe's got it—80K of 120 n.s. high speed RAM! 64K of this memory replaces the slower Apple system memory and language card. Your Apple program automatically executes out of the Accelerator's high speed RAM, giving your software added performance over the slower Apple memory. An additional 16K of ROM emulation memory loads the contents of Apple ROM into the Accelerator's high speed RAM. This gives programs which use Apple ROM, like Applesoft BASIC, an added turbo boost! The Accelerator IIe's on board memory approach ensures that *all* programs will run fast, contrasting dramatically with the hit-or-miss approach employed by the competition's memory caching scheme.

But on board memory is only half the story. Coupled with memory expansion boards for high speed data storage and retrieval, the Accelerator IIe transforms your Apple into a high power machine with performance rivaling the IBM PC!

Software Compatibility

The Accelerator IIe boosts your Apple's performance without sacrificing compatibility. It's compatible with virtually all Apple software including power applications such as the BPI and Manzanita accounting series, Multiplan, Apple Pascal, and much, much, more. And if you find you're running too fast, the Accelerator IIe has a special slow down feature to let you down shift to normal Apple speed.

Hardware Compatibility

The Accelerator IIe is right at home with the optional equipment in your machine including such high performance accessories as the Titan RAM boards, 80 column cards, the Grappler, Ramworks, Apple's Profile hard drive, modems, clock cards, mouses, and more.

Transparent Operation/Ease of Installation

Once installed, the Accelerator IIe's operation is completely transparent. No preboot disks or procedures required. Your Apple will drive the way it always has—only faster! Speaking of installation—it's a breeze! A simple procedure configures the Accelerator for your Apple system. After that pick a slot, any slot, and plug it in. That's all there is to it. Then turn on your Apple and floor it!

Backed by the Industry

The Accelerator IIe is Apple's reason number 3 of their 10 reasons to buy an Apple IIe as stated in their ad campaign run in Time, Newsweek, People, Omni, and Sports Illustrated. Personal Computing had this to say about the Accelerator IIe: "A year's experience with a Titan Accelerator board has renewed my appreciation of the Apple's seemingly endless upgrades. My hopped-up Apple works as reliably and simply as ever; yet its responsiveness makes it feel like a state of the art 16-bit machine."*

Backed by Titan

Titan Technologies backs the Accelerator IIe with a 1 year warranty and an outstanding technical support department.

To Accelerate your Apple, call Titan at (313) 662-7777. We'll put you in touch with the Accelerator showroom nearest you, and you can drive it away for only $319.00

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WE ASKED THE EXPERT

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"The Mouse Series™ is the natural evolution of Apple II software. The customer of today needs power... that's a given. The Mouse Series lets you get over that learning curve... quickly. It brings many of the advantages of the Macintosh to the Apple II." Steve Wozniak

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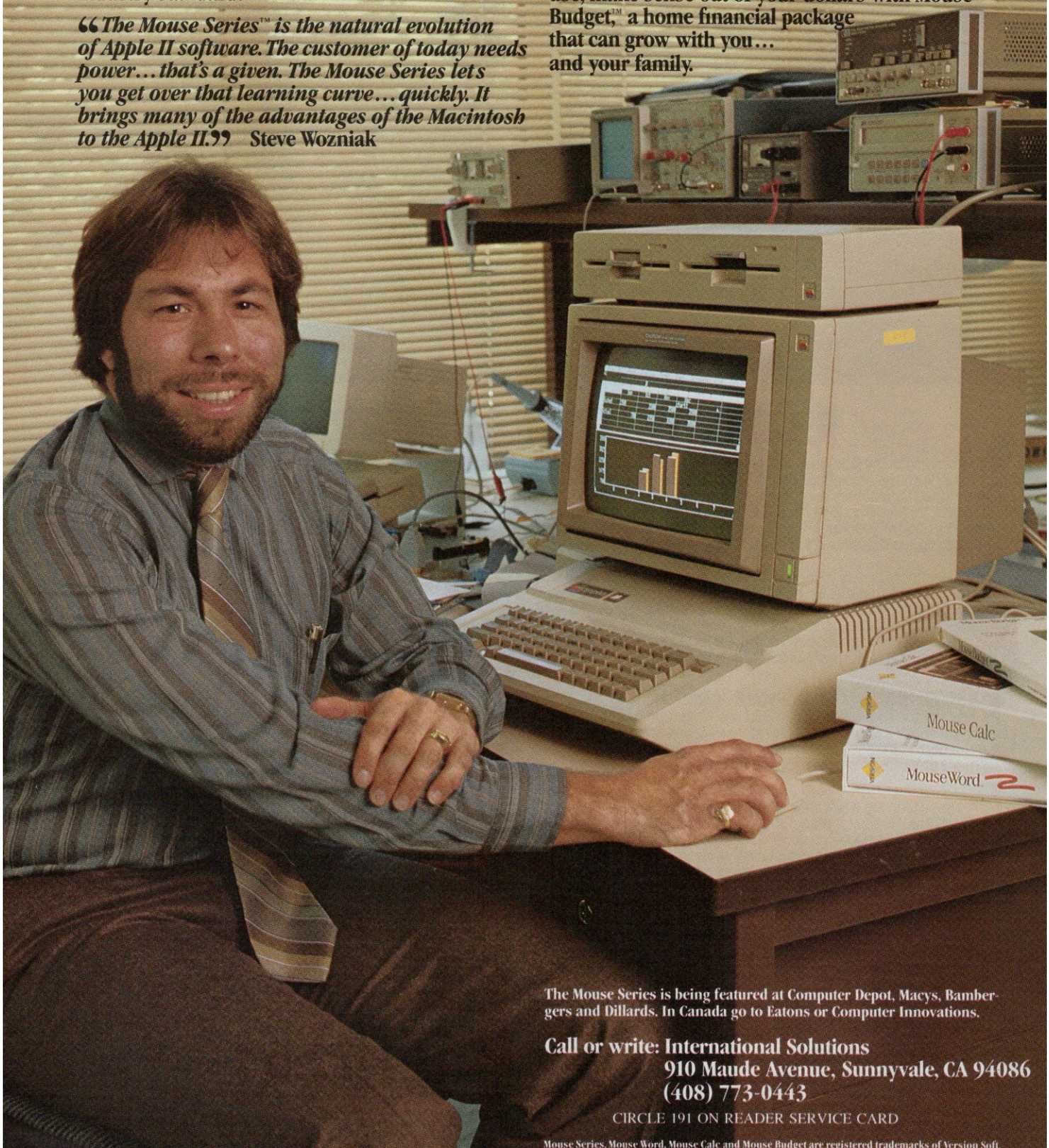

The Mouse Series is being featured at Computer Depot, Macys, Bambergers and Dillards. In Canada go to Eatons or Computer Innovations.

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Digital Research CP/M Gold Card run CP/M Plus (also known as CP/M 3.0), which can keep track of more memory and read from and write to disk more efficiently than other CP/M versions. Applied Engineering has its own software, called CP/AM 4.0, which runs standard CP/M software but which also features menu-driven utilities as well as built-in RAMdisk software. If you want the Digital Research card, you'll have to hunt up a used one at some swap meet—Digital Research says that because the CP/M market is better in Europe, it has shipped its entire stock out for overseas sales.

MOST CP/M CARDS RUN THE 2.2 VERSION OF CP/M

A Host of Guests

CP/M cards aren't the only type of alternative processor you can add to your Apple. If you want to work with the processor the IBM PC uses, you can add a board based on the Intel 8088. If the 68000 family of the Macintosh and many professional workstation-class machines is more to your liking, you can choose a board containing one of those chips.

In either case, the Apple II connection for these chips isn't as straightforward as what you'll find for the Z80. Unlike the Z80 boards, which appeal in large part to people who want to use existing software, the 8088 and 68000 boards appeal more to schools, experimenters, and people with dedicated or specialized applications. Nobody will ask to see a hacker license before you order one of these, but the vendors freely admit that these products are not for everyone.

The 88Card from PCPI gives you the standard Intel 8088 of the IBM PC, along with 64K of memory (it uses 64K of memory from your Apple, for a total of 128K). You also get MS-DOS, Version 1.25, and Microsoft's MBASIC language. The result is a minimal MS-DOS system, rather than a complete IBM PC equivalent—it won't do IBM graphics, and 128K is, by MS-DOS standards, a very small machine.

To run more-recent MS-DOS software that requires MS-DOS 2.0 or above, you'll need ALF's 8080 Processor/Memory Card instead. Along with the 8088, it provides 128K of memory and a socket for an 8087 numeric coprocessor. You can run almost all 128K MS-DOS programs on this configuration, since it draws on the Apple RAM for the space it needs in order to emulate the IBM's built-in ROM routines. With a Sider hard disk, it can even emulate an IBM PC/XT (that is, if you consider a limit of 128K a true emulation). To read and write data or programs in the IBM PC format, ALF markets an optional DC3 disk controller. Connected to your 8088-augmented Apple, the DC3 runs ALF's single or dual PC-format disk drives.

On the 68000 side, the smallest step up is Stellation's McMill, a 68008 processor board that lists for less than $200. Like the 8088, the 68008 uses an 8-bit data path to the outside world, so it can use existing memory and peripherals. Internally, it's the same 16-bit/32-bit hybrid as the 68000, however, and uses exactly the same code and data. Stellation Two provides a cross-assembler (it runs on the normal 6502 of the Apple II but produces output code to operate the 68008) with an editor, a Tiny BASIC, and a version of the Forth language known as FIG-Forth. You also get a monitor and debugger for the 68000 on a disk.

If you're more serious about your 68000s, you can turn instead to Stellation's McMill Plus, a board that used to be sold as the Qwerty Q-68. The McMill Plus features the same 68008 that the unadorned McMill has. In addition, the McMill Plus includes 8K of on-board RAM, an 8K EPROM with a built-in monitor and debugger, and special circuits for development and debugging. You also get the same cross-assembler, BASIC, and FIG-Forth that come with the less-advanced version.

If you want a full 68000 chip, En-

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hancement Technology will be happy to sell you one of its PDQ II board sets, which combine a full 16/32-bit chip with up to 256K of memory. When you're not running the 68000, you can use the memory as a RAMdisk under either DOS or ProDOS. Enhancement Technology's software support includes an Applesoft-compatible version of BASIC, which the company claims is from 6 to 20 times faster than Applesoft BASIC, and an optional BASIC compiler. If you plan to do some more-serious development work, Enhancement also offers CP/M-68K (a version of CP/M for 68000-based machines), along with compilers for C, Pascal, and FORTRAN. For a more Macintosh-like interface, the firm also plans to offer Digital Research's GEM (much like the version on the Atari ST512).

Programming an 8088 or a 68008 is no breeze, but if you really want to be a pioneer, reach for a 65C816. That's the new processor chip with a Jekyll and Hyde personality that wakes up as an ordinary 6502 but, when you trigger it, becomes a fast, efficient, 16-bit processor capable of directly keeping track of 16 megabytes of memory. Apple has widely been rumored to have a 65C816 upgrade for the Apple II line in the works, but meanwhile, you'll be out on your own. Until the development houses release tools such as compilers and debuggers, you'll probably have to write all your own software from scratch if you get a 65C816 board.

OUR APPLE COMPUTERS MAY OUTLAST US ALL

Com Log Company, Inc., has an APLC16 board with a 65C816, plus sockets for 256K of memory, ready for you if you fit the bill. The initial promotional material, in a refreshingly direct section labeled "Honesty," warns, "If you are a person who uses only prepacked software, the APLC16 will do nothing for you (yet)." The firm does say it is working on Apple BASIC16, but at press time for this issue, Com Log had not announced a delivery date—check with the company for the current software picture if you're not quite ready to tough it out alone.

A similar board should be out from Checkmate Technology by the time you read this. The MultiRam IIe card, which currently has a "16-bit microprocessor port," will get a 65C816 upgrade to turn into a full-fledged coprocessor. With up to 768K of memory per card, it should give the 65C816 some space to flex its 24-bit addresses. The firm also plans to deliver a similar upgrade for the Apple IIc.

As Mark Twain said about himself in his day, the reports of the demise of the Apple II series of computers have been greatly exaggerated. Nothing material lasts forever, but the potential of the II design still has not reached its final limits. With an upgrade here and there, a coprocessor when needed, and an occasional replacement of a part or two, our Apples may outlast us all. ✚

Steve Rosenthal currently writes his A+ articles alone but hopes someday to work with a coprocessor.

COPROCESSOR CARDS

This chart contains a sampling of products, and the information herein is based on manufacturers' claims.

65816	PRICE	COMPUTER	SPEED & COPROCESSOR	SOFTWARE INCLUDED	SOFTWARE REQUIRED	AVAILABLE RETAIL	AVAILABLE DIRECT
APLC16 Com Log Company, Inc. 7825 E. Redfield Road, Suite F Scottsdale, AZ 85260 (602) 248-0769	**W/O MEMORY, $395** **256K RAM, $595**	**II, II+, IIe**	**1 MHz 65816**	**NO**	**YES**	**NO**	**YES**
	This is a development system. Software must be developed by user.						
MAX-816 Micro Magic P.O. Box 281 Millersville, MD 21108 (301) 987-6083	**$495**	**II, II+, IIe**	**4 MHz 65C816**	**YES**	**NA**	**NO**	**YES**
	In Emulation mode the processor runs existing Apple software; when in Native (full 16-bit) mode, the processor uses MAX-OS operating system. The card has fully arbitrated expansion interface connector and requires no preboot for Apple software.						
MULTIRAM CX KIT Checkmate Technology, Inc. 509 South Rockford Drive Tempe, AZ 85281 (602) 966-5802	**$149.95**	**IIc**	**2 MHz 65C816**	**YES**	**NA**	**YES**	**NO**
	This kit must be used in conjunction with the MultiRam CX memory card (see RAM-card chart). The kit includes 16-bit operating system and demonstration and utility software.						
MULTIRAM IIEX Checkmate Technology, Inc. 509 South Rockford Drive Tempe, AZ 85281 (602) 966-5802	**$189.95**	**IIe**	**2 MHz 65C816**	**YES**	**NA**	**YES**	**NO**
	This card works in conjunction with MultiRam IIe memory card (see RAM-card chart).						

COPROCESSOR CARDS CONTINUED

68000	PRICE	COMPUTER	SPEED & COPROCESSOR	SOFTWARE INCLUDED	SOFTWARE REQUIRED	AVAILABLE RETAIL	AVAILABLE DIRECT
PDQ SUPER-32 SYSTEM Enhancement Technology Corp. P.O. Box 1267 Pittsfield, MA 01202 or 17 Keeler Street Pittsfield, MA 01201 (413) 445-4219	$695	II+, IIe	10 MHz 68000	YES	NA	NO	YES
68008							
MCMILL Stellation Two P.O. Box 2342 26 West Mission Street Santa Barbara, CA 93120 (805) 569-3132	$195 *Entry-level development system*	II, IIe, II+	1 MHz 68008	YES	NA	YES	YES
MCMILL PLUS Stellation Two P.O. Box 2342 26 West Mission Street Santa Barbara, CA 93120 (805) 569-3132	$295 *Includes 68000 screen monitor/debugger, additional hardware, bus, and RAM.*	II, II+, IIe	1 MHz 68008	YES	NA	YES	YES
8088							
8088 PROCESS/MEMORY CARD AFL Products Inc. 1315 Nelson Street, Unit F Denver, CO 80215 (800) 321-4668 (303) 234-0871	$395 *Includes 128K memory. With an optional disk controller for $145 and a single AFL disk drive for $350 or a dual AFL drive for $530, the package can emulate a 128K IBM PC with monochrome display.*	IIe	5 MHz 8088	YES	NA	NO	YES
ACCELERATOR							
ACCELERATOR IIe Titan Technologies, Inc. 310 West Ann Street Ann Arbor, MI 48104 (313) 662-8542	$319 *Cannot speed up anything that uses DMA Channel or a Z80 card.*	II, II+, IIe	3.6 MHz 65C02	YES	NA	YES	NO
SPEEDEMON M. c. T. 1745 21st Street Santa Monica, CA 90404 (213) 829-3641	$249	II, II+, IIe	3.5 MHz 65C02	YES	NA	YES	NO
THE MICROSPEED II LANGUAGE SYSTEM Applied Informatics Inc. 12217 Wheeling Avenue Upper Marlboro, MD 20772 (301) 627-6650	$395	II, II+, IIe, III	2 MHz INTEL 8231A	YES	NA	YES	YES
THE MICROSPEED II+ LANGUAGE SYSTEM Applied Informatics Inc. 12217 Wheeling Avenue Upper Marlboro, MD 20772 (301) 627-6650	$495	II, II+, IIe, III	4 MHz INTEL 8231A	YES	NA	YES	YES
VITAMILL SPEEDUP SYSTEM Stellation Two P.O. Box 2342 26 West Mission Street Santa Barbara, CA 93120 (805) 569-3132	$295	II, II+, IIe	1 MHz 6809	YES	NA	YES	YES

CONTINUED NEXT PAGE ▶

COPROCESSOR CARDS CONTINUED

OTHER	PRICE	COMPUTER	SPEED & COPROCESSOR	SOFTWARE INCLUDED	SOFTWARE REQUIRED	AVAILABLE RETAIL	AVAILABLE DIRECT
QUADLINK Quadram Corporation 1 Quad Way Norcross, GA 30093 (404) 923-6666	**IBM, $495 COMPAQ & COLUMBIA, $510**	**IBM COMPAQ COLUMBIA**	**1 MHz 6502 EMULATES APPLE II, II+**	**YES**	**NA**	**YES**	**NO**
This card plugs into an IBM or IBM-compatible and then allows you to run Apple programs.							
TITAN III PLUS IIe Titan Technologies, Inc. 310 West Ann Street Ann Arbor, MI 48104 (313) 662-8542	**Not available at press time*	**III**	**1 MHz 6502**	**YES**	**YES**	**YES**	**NO**
The software emulates a 128K Apple IIe, or 192K ProDOS RAMdisk in IIe mode with 256K RAM installed in Apple III.							

Z80	PRICE	COMPUTER	SPEED & COPROCESSOR	SOFTWARE INCLUDED	SOFTWARE REQUIRED	AVAILABLE RETAIL	AVAILABLE DIRECT	WORKS WITH THESE CP/M VERSIONS
2eZ Orbital Systems, Inc. 5225 East Hearn Road Scottsdale, AZ 85254 (602) 830-6457 (602) 996-5064	**$80 KIT, $55**	**IIe**	**3.58 MHz Z80**	**NO**	**YES**	**YES**	**YES**	**2.23 OR LOWER**
Lifetime warranty (one-time $30 repair charge with kit).								
MICROSOFT SOFTCARD Microsoft Corporation 10700 Northup Way Bellevue, WA 98004 (206) 828-8080	**$425**	**II+, IIe**	**6 MHz Z80**	**YES**	**NA**	**YES**	**NO**	**2.28**
THE CP/M PLUS CARD Advanced Logic Systems, Inc. 1195 East Arques Avenue Sunnyvale, CA 94086 (408) 730-0307	**$399**	**II, II+, IIe**	**6 MHz Z80**	**YES**	**NA**	**YES**	**YES**	**3.0**
Includes 64K RAM. Software is available to support your ProFile or compatible hard disk. Includes special utility to convert CP/M files to ProDOS. No partitioning or rebooting required.								
Z-80 PLUS Applied Engineering P.O. Box 798 Carrollton, TX 75006 (214) 241-6060	**$139**	**II, II+, IIe**	**4 MHz Z80**	**YES**	**NA**	**YES**	**YES**	**1.6–4.0**
Card comes with CP/M, Version 4.0								
APPLI-CARD Personal Computer Products, Inc. 11590 West Bernardo Court Suite 100 San Diego, CA 92127 (619) 485-8411	**$375**	**II, II+, IIe, III**	**6 MHz Z80**	**YES**	**NA**	**YES**	**YES**	**2.2**
CIRTECH UK LTD. CP/M PLUS SYSTEM Greengate Productions, Inc. 2041 Pioneer Court Suite 15 San Mateo, CA 94403 (415) 345-3064	**$240**	**IIc**	**8 MHz Z80**	**YES**	**NA**	**YES**	**NO**	**2.2, 2.23**
Full support for AppleMouse IIc within any CP/M program. Also provides disk-based help system, screen-dump capability, and built-in disk formatting and copying functions. Optional CP/M programmers' pack available.								
E-Z Orbital Systems, Inc. 5225 East Hearn Road Scottsdale, AZ 85254 (602) 830-6457 (602) 996-5064	**$80 KIT, $55**	**II, II+**	**3.58 MHz Z80**	**NO**	**YES**	**YES**	**YES**	**2.23 OR LOWER**
Lifetime warranty (one-time $30 repair charge with kit). CP/M 2.23—660K version needs 64K II or II+; CP/M 2.20—56K version needs 48K.								
Z-ENGINE Advanced Logic Systems, Inc. 1195 East Arques Avenue Sunnyvale, CA 94086 (408) 730-0307	**$199**	**II, II+, IIe**	**2 MHz Z80**	**YES**	**NA**	**YES**	**NO**	**2.2**
Z80 CARD PC Network 320 West Ohio Street Chicago, IL 60610 (800) 621-SAVE in IL (312) 280-0002	**$35**	**II, II+, IIe**	**1.8 MHz Z80**	**NO**	**YES**	**NO**	**YES**	**2.2**
Requires 64K memory.								

THE RIGHT CONNECTIONS

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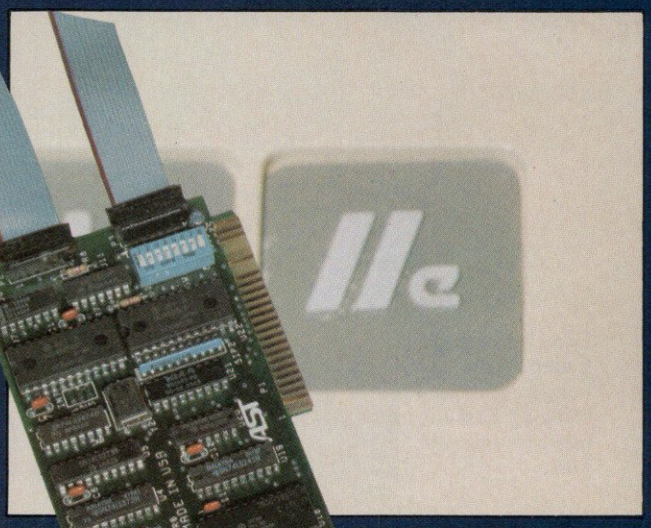
Software Utilities



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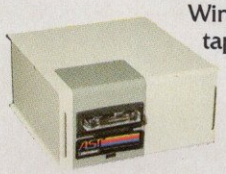
MicroStar™ is the 10 MB hard disk and tape backup (opt.) system that provides the right connection between the Apple IIe and dependable 3.5" Winchester Disk/Cartridge tape mass storage.



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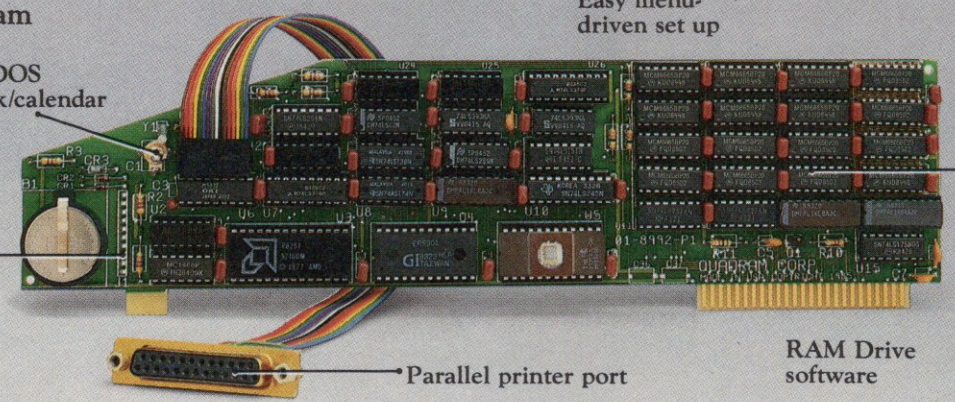

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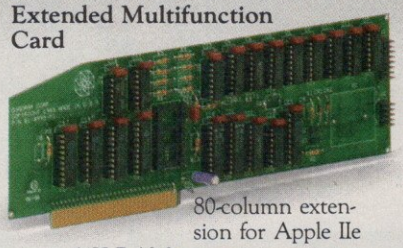

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Serial Interface Adapter

Serial printer or communications interface • Supports graphics for Apple Imagewriter and Scribe printers • Apple Super Serial Card compatibility • Easy "switchless" serial configuration.

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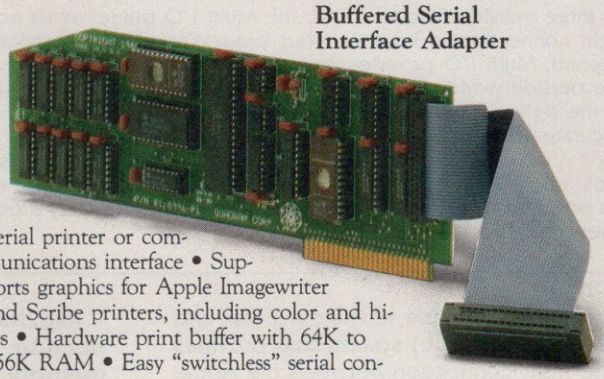

Serial printer or communications interface • Supports graphics for Apple Imagewriter and Scribe printers, including color and hi-res • Hardware print buffer with 64K to 256K RAM • Easy "switchless" serial configuration.

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CIRCLE 139 ON READER SERVICE CARD

▸ APPLEWORDS
BY STEVE ROSENTHAL

A glossary of terms for use with our IIe Expansion articles, pages 26–62

65C816
A new processor chip that can substitute directly for the 65C02 processor used in the Apple II line but that also adds 16-bit features such as more and faster processing and the ability to work with more memory.

8-, 16- AND 32-BIT
General classifications for processor chips and computers, based on the number of bits of data they normally process in internal operators. The 6502 family of the Apple II handles 8 bits at a time, the new 65C816 adds 16-bit operations, the 68008 and 8088 work with 16 bits internally but communicate to other chips using 8 bits at a time, and the 68000 of the Macintosh works with 32 bits internally and communicates to the outside world using 8 or 16 bits at a time. The more bits a processor has, the greater the amount of memory it can directly keep track of (see *address bits*).

ACCESS TIME
For memory chips, the time it takes to respond with data after they have received an address and a request to read. Faster memory chips are more expensive but are necessary for some of the faster processors. Typically, access times for chips used in Apple II coprocessors must be in the neighborhood of 100 to 300 nanoseconds (billionths of a second).

ADDRESS BITS
The number of bits that a processor chip or system uses for forming memory addresses. Each additional bit doubles the amount of memory the system can keep track of. The 6502 family of the Apple II line and Z80 coprocessors use 16 address bits and can keep direct track of approximately 64,000 bytes of memory; the 8088 used in some coprocessors uses 20 bits and can keep track of 1 megabyte, and the 68000 family of the Macintosh and some coprocessors uses up to 32 bits for as much as gigabytes (billions of bytes) of storage.

BANK SWITCHING
A technique for allowing a system to use more memory than it can keep track of directly by alternately assigning one group of memory addresses to several blocks of memory. The Apple II family of computers uses this technique to provide access to more than 64K (about 64,000 bytes) of memory.

CLOCK SPEED
The rate of pulses from the master timing circuit of the computer, or the maximum rate a chip is designed to accept. Clock speed is not always a good indication of processing speed, since some processor chips typically require more clock pulses than others to get the same job done. Partisans of the new 65C816 chip for the Apple II say that this chip in particular is far speedier than its clock speed indicates.

CMOS
A technology for making integrated circuits that features extremely low power consumption. CMOS (pronounced SEE-moss) is becoming popular not just for portables, but also for memories and processor chips because it produces little heat and requires small power supplies. Apple has moved to CMOS processors for its Apple II line (that's what the *C* means in 65C02), and most new high-density memories are also built with this technology.

COPROCESSOR
An added microprocessor chip or complete board that either helps out with specialized tasks or substitutes for the main processor for running certain programs. The most common coprocessor for the Apple computer is the Z80, which runs programs under the CP/M operating system, but you can now get a variety of more sophisticated coprocessors as well.

CROSS-DEVELOPMENT
Developing software on one computer or central processing chip for use on another system. One reason for adding a coprocessor to an Apple II computer is to use it for a cross-development system. That way, you can use many of the hardware systems, peripherals, and programs that you already have.

DMA
An abbreviation for direct memory access, meaning the transfer of data to and from memory without routing through the central-processing-unit chip. This technique allows other processors or peripheral devices to make high-speed transfer to memory and temporarily to use the internal connections between boards. Most coprocessor boards for the Apple II use DMA.

DRAM
Short for dynamic memory, meaning a type of memory chip that keeps its contents only if supplied with regular clock pulses and a chance to periodically refresh the data internally. DRAM (often pronounced DEE-ram) is far less expensive than static RAM (which needs no refreshing) and is the type that almost all current personal computers use.

EMULATION
The operation of one processor chip or computer system so it acts like another. For example, the new 65C816 can directly emulate the 6502 of the Apple II, so the II doesn't know that anything has changed.

SOCKETED
For chips, attached to a circuit board by being plugged into a socket rather than soldered directly onto a board. Socketing chips raises manufacturing costs slightly but allows the substitution of upgraded chips or easy replacement of any chips that may fail. Apple has placed several chips in sockets on some of its Apple-II-series computers, quite apparently to provide a means for possible later upgrades.

UPWARD-COMPATIBLE
Said of a chip or computer that can perform the job of a previous unit without change but that adds new or improved functions. In particular, it often means systems or chips that can run previous software without requiring any changes. Upward compatibility is particularly useful at the introduction of a processor or system, because it allows immediate access to an existing software base. +

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ACCESSORIES
BY VANESSA SCHNATMEIER

holiday gifts

Now that it's December, you know what we're in for: the ten-best-anything lists, pictures of children posing cutely with Kris Kringle, end-of-the-year wrap-ups, synthesizers playing nothing but Christmas carols, TV specials featuring Perry Como and Cher—the usual stuff.

One common feature of the season is worthwhile, though. We mean, of course, the holiday gift list. We at *A+* know this is the time of the year you lurch desperately from store to store, trying to figure out what to buy the computer fanatic who has everything. So, for the second year in a row, *A+* presents a set of modest proposals for what will make your holidays fun and your computer-using friends happy. Look this list over before you begin your frantic search, and you stand a better chance of having yourself a merry little Christmas.

Books

Books are a perennial favorite, especially among computer folk. These last few years have been big for the history of Silicon Valley. If your loved one is a history buff, impress him or her with a bundle of the choicest compubiogra-

TOM LANDECKER PHOTOGRAPHY

phies: we suggest *Hackers* by Steven Levy, *Fire in the Valley* by Paul Freiberger and Michael Swaine, and *The Network Revolution: Confessions of a Computer Scientist* by Jacques Vallee as good for starters.

For those with a philosophical bent, try *Tools for Thought: The People & Ideas behind the Next Computer Revolution* by Howard Rheingold.

Computers aren't only for the young, those whiz-kid hackers notwithstanding. If you have an older relative who still exhibits signs of computerphobia, or if you are that older relative, then you might consider Greg Kearsley and Mary Furlong's *Computers for Kids over 60*, a clear, brief, and simply written introduction to computing.

If that relative or friend has passed the phobia stage and entered the interested neophyte stage, give him or her a copy of *The Apple Home Companion* by George Beekman and Dennis Corliss. Although this book also commences with basic information, it goes into much more detail, specifies software, and explains how to write your own applications.

Ambitious programmers who want a line on good markets for their wares will love to consult the latest edition of

combine business and pleasure with a computer-shaped cake.

Programmer's Market, a Writer's Digest Book, or *The Craft of Programming* by Craig Jensen. Macintosh programmers who aren't in it for the money can examine the *Macintosh Program Factory* by George Stewart.

For the do-it-yourselfer, you might think about a fascinating book called *The Plain English Repair and Maintenance Guide to Home Computers*. As someone who loves to tinker with everything from old toasters to recliner chairs, I found this book ideal.

There's even a book that combines the Macintosh computer and cats: *MacCats . . . 99 Ways to Paint a Cat with MacPaint* by Floyd Flanagan. Beginning to get the picture? Books are always appropriate, as long as you know the recipient's obsessions.

Business

Briefcases are wonderful gifts, but they're a trifle, shall we say, overdone—not to mention expensive. For your business-minded loved ones, especially those who tote diskettes from place to place when on the job, try a leather diskette organizer. K.S. Universal offers these leather booklets in styles that fit either eight 5¼-inch or ten 3½-inch diskettes. They come in black, brown, or burgundy, at $24.95 plus $2.50 shipping. Sorry, no gold trim or BMW decals available.

Computers generate a lot of stray bits of information. If the Day Runner "personal management system" helped you keep the data of your daily life under control, you'll welcome the Computer Companion, which lists at $39.95 from Alfred Publishing. This fat black notebook is designed to become your computer Bible, as you fill it with your lists of commands, contact numbers, and other important tidbits.

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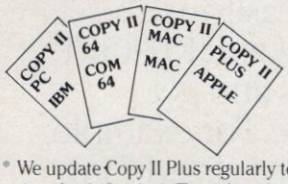

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CIRCLE 130 ON READER SERVICE CARD

What do you get your office mates for Christmas? If you're in charge of getting refreshments for the office party this year, we suggest combining business with pleasure and getting a computer-shaped cake. Computer Cakes, in San Rafael, California, for example, bakes cakes shaped like computer keyboards and peripherals at approximately $40 each. Imagine how soul-satisfying it would be to really take a bite out of the keyboard that's been irking you all day.

Let's get serious for a moment. Do you hear your spouse constantly grousing about a defective printer, a machine that's so much a lemon that it makes her pucker to look at it? You might want to buy her a one-year maintenance contract. It isn't necessary to buy coverage for the whole system. One national computer-support firm, Computer Doctor, quotes a price of $47 a year for an ImageWriter and $249 for a Mac 512K with no external disk drives.

If your sweetie is short on software, consider buying him a public-domain-software sampler. Macintosh and Apple II users can get it from The Public Domain Exchange in San Jose, California. You should also check with your local users' groups.

Speaking of users' groups, are all your computer-using loved ones members of the appropriate users' groups? If not, consider buying them a membership for a year.

Does your friend own a Lisa? The machine isn't completely unsupported—a group called The NetWorkers is publishing a quarterly magazine/newsletter about the Lisa; the premiere issue of the publication, *LisaTalk*, which costs $10, contains the transcript of an on-line conference on the machine, with Apple Computer representatives going head to head with gruntled and disgruntled users.

Games

Games abound everywhere. The trick is to find the most fun for the dollar. Here are only a few of the many possibilities:

- Racter, by Mindscape Software. You may remember Racter as the "author" of the computer novel *The Policeman's Beard is Half-Constructed*. Well, here Racter displays his skills as a raconteur, regaling you with his thoughts on culture and life. This is more entertainment than game, but Racter's revelations are riveting.
- Berzap, from Infinity Ltd., which is "making software safe for America." This game is unusual in that it is

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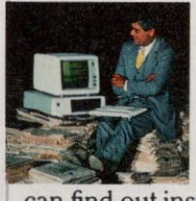

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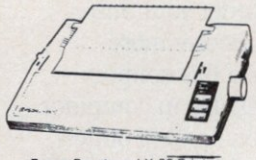

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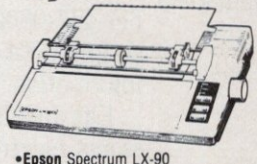

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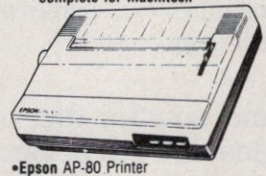

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"shareware"—copy the software and, if you like it, send in $15 for the documentation. The game's actual contents are fun as well, particularly the accompanying literature.

- Quink, from CBS Software, is a recognition game, in which your fingers dart around the keyboard selecting "loner" subjects from a grid of names. Good to train your kids for multiple-choice tests.

certain gifts will always be appreciated.

- Gnosis VII, from Magnetic Harvest, a "fantasy-based word logic puzzle in the midst of a role-playing scenario." You're judged on what you know and how you approach obstacles.
- Cutthroats, from Infocom. An interactive-fiction game in which you "talk" to the characters in the story and they respond, based on your actions. In this story, you're dragooned into searching for sunken treasure with some so-called friends. Blub, blub for you if you're a landlubber.
- For the real children in your family, try A Christmas Adventure, from Bit-Cards. The software asks the child's name at the start, and thereafter the disk has his or her name imbedded. You're led through a hunt for the lost Santa Claus. Good Christmas fare.

Accessories and Miscellaneous

Certain gifts will always be appreciated by your computer friends:

- A package of cheap or quality floppy disks: $25 to $39 for a box of ten 5¼-inch or 3½-inch disks.
- A copyholder, preferably the swivel style that clamps to the side of a desk, although an easel style will also serve. Swivel copyholders run from $35 for letter size to $70 for legal size; easel copyholders cost $18–$35.
- A computer-maintenance kit. NEC offers a "complete computer and printer care kit," containing platen cleaners, antistatic compound, general cleaning compounds, bristle brush, swabs, nonlint cloths, and rubber gloves for the fastidious, all for $27.

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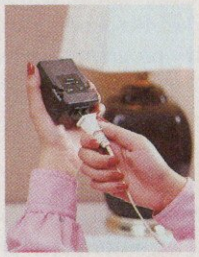

into an outlet. The Interface can control up to 256 Modules throughout your home and won't interfere with normal use of lights and appliances.
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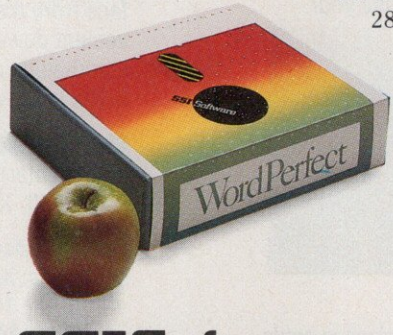

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- A box of computer paper at $30 for 3000 sheets of blank 18-pound paper. For people who want to put on a class act, buy a box of 20-pound Rag Content Blank for about $75.

These are only the usual gifts. Discerning gift givers can try some presents more off the beaten path:

- The AppleMouse II or IIc, for Apple-II-series users. $149 or $99, respectively, will buy MousePaint software; the mouse itself; and, for the II version, a Mouse Interface Card.
- If you already have a mouse, make it live up to its name: get NYBILS, the Soft-Wear Mouse. That's correct, it's a mouse costume for your mouse. Your dull-beige plastic mouse will be transformed into a soft, wee, sleek white beastie that skitters across the tabletop. $9.95 plus $1.50 shipping and handling will get it to you from Foresight Designs.
- An adjustable footrest. Some people use a book (see book list) or a small, placid cat. Rubbermaid makes a special tool for resting your weary toes, with three angles to suit your feet and antiscratch, antiskid pads to stand up to your abuse. $29 mail-order from Pacific Computer Supply.
- A set of tools to create your own T-shirts. The Underware line, by Diversions, Inc., starts out with a special ribbon that fits onto your printer to make iron-on T-shirt transfers. Once you've got the transfer, you can use a special colored pen, large or small, from Diversions to fill in your design.
- MacMike, a sound digitizer from Phonetix. This machine lets you store your digitized voice or other sonic input, compress it, play with it, play it back, study it, and blank out sections of the recording.
- Finally, if there's a frustrated aviation expert and Mac user on your gift list, get *The Great International Paper Airplane Construction Kit* from Neosoft, Inc. It comes with software that lets you forever create the perfect paper-airplane pattern.

Computer Fantasy Island

The gifts we've mentioned are already on the market. We're still waiting for the computer gifts of our dreams, though. Some people look at computer gifts and ask why; we look at computer gifts and ask why not. The following list may answer both questions:

- A voice-activated home-control system. If they can design robots to respond when you shout, "Look out!", why not a house that listens when you tell it to "shut off the oven at 7 P.M.

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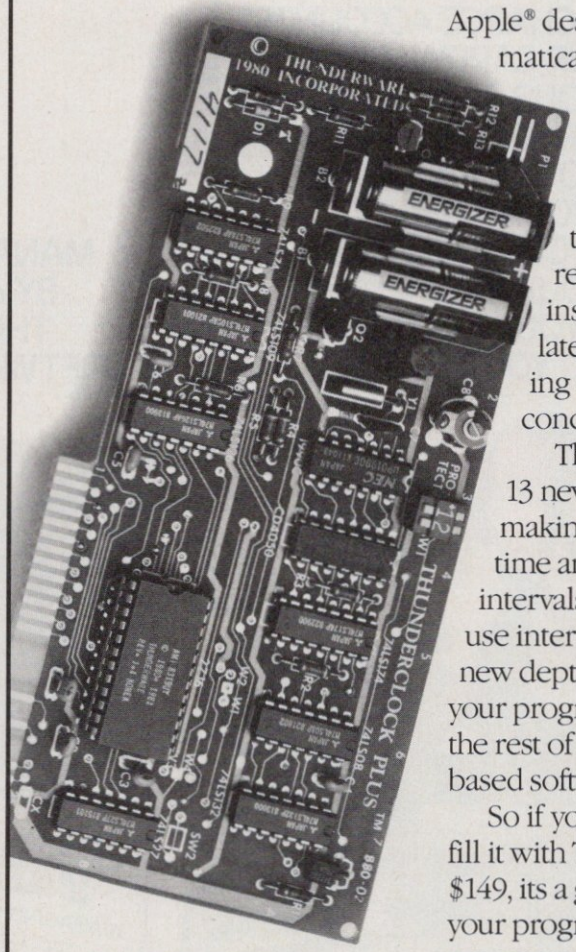

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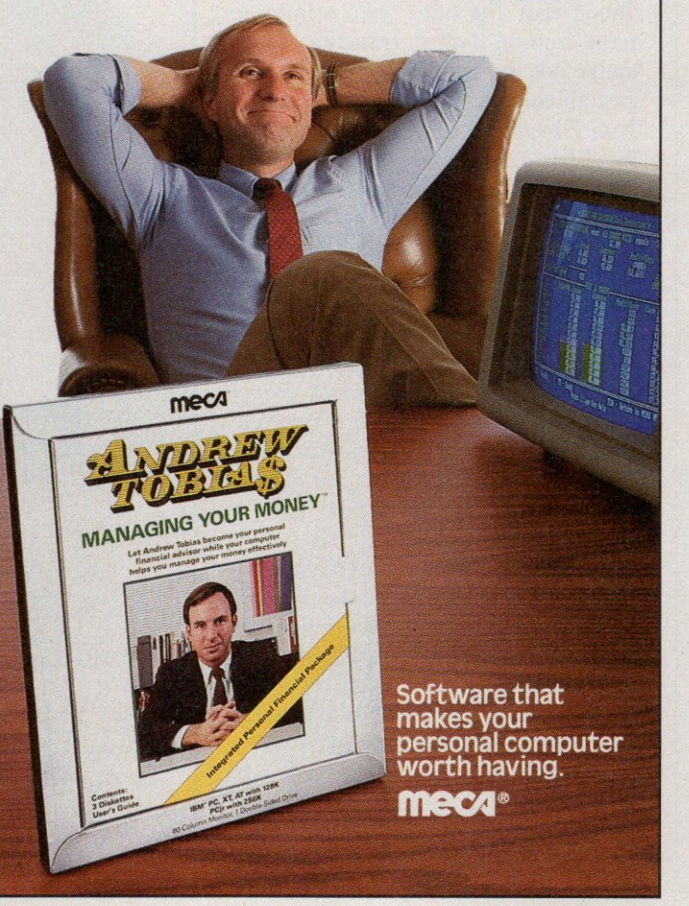

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unless the roast isn't properly browned"? You should be careful how much responsibility you load on the system, though, or some morning you might find yourself standing inside the garage and saying, "Open the pod bay doors, HAL."

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Vanessa Schnatmeier is a free-lance writer whose chief interests are women's issue and computer marketing.

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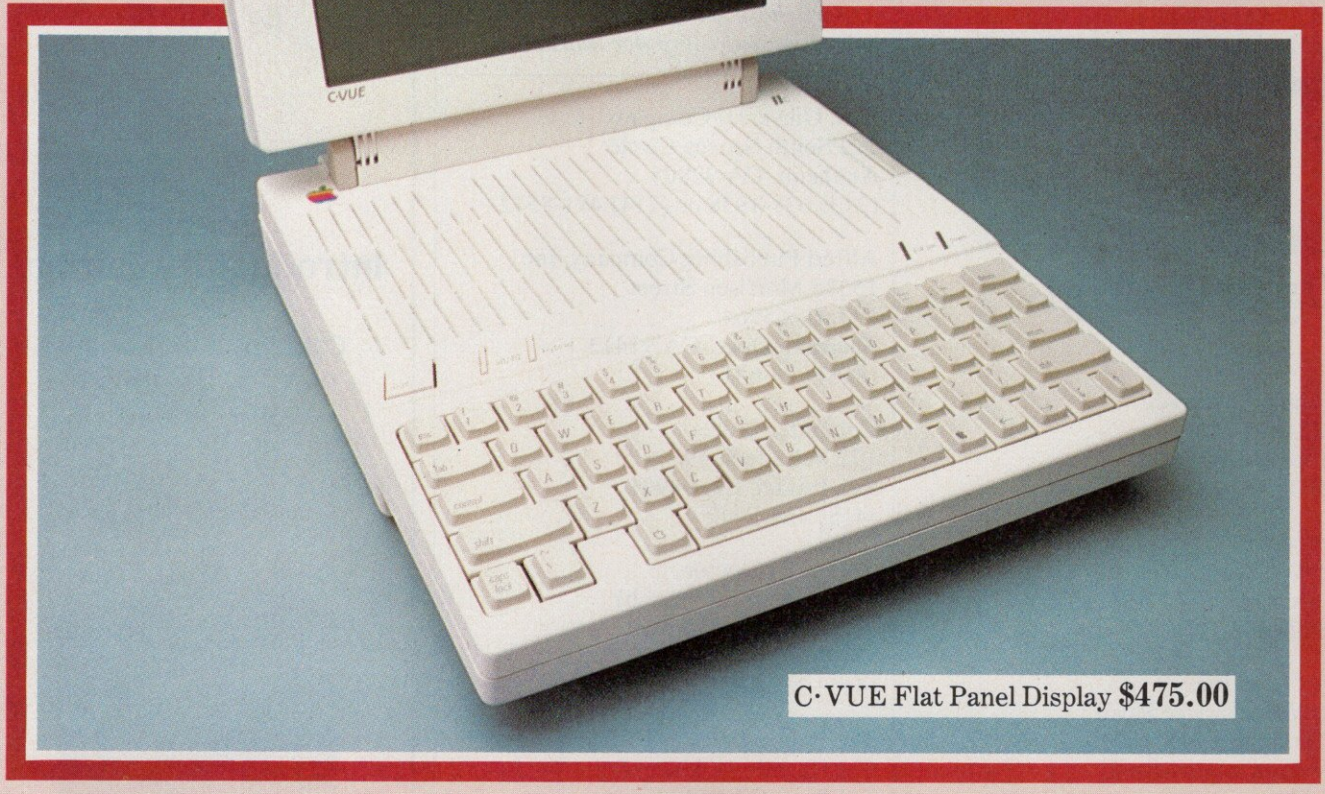

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THE MUPPET INSTITUTE OF TECHNOLOGY

EDUCATION/*BY CHRIS ALBERTSON*

The popular stars of TV and the silver screen have found another medium for reaching their admirers: computer software.

It is one of those dignified blocks on Manhattan's smart East Side. A handful of wealthy people probably live there, but, for the most part, the well-kept buildings that line both sides are embassies; consulates; and staid, deep-rooted foundations. Except for the street number and a discreet Ring Bell sign, one posh old brownstone is unmarked. With its gray facade (New York brownstones come in many colors), security camera, and substantial door nestled firmly between a pair of stone columns, number 117 fits perfectly into this conservative setting. But something quite unorthodox lies beyond this door, for 117 is the home of Henson Associates (HA! for short) and the official headquarters of M.I.T.

M.I.T., but isn't that in Cambridge, Massachusetts? "No, that's the other one," explains Christopher Cerf, a man whose many hats include an unofficial dean's cap. "This is the Muppet Institute of Technology."

According to M.I.T. historian Jay Itzkowitz, this, the lesser-known of the two institutions, was founded in 1858, but then "quickly losted, and not founded again until a few years ago, when Kermit the Frog stumbled across the place while out for a short hop." Not so coincidentally, Kermit has since been named chancellor, and Miss Piggy has taken the title La Prima Deana. Like their famous Muppet colleagues, these stars of television and the silver screen have found yet another medium through which to reach their millions of admirers: computer software.

As I stride across the marble floor of the reception area, admiring the long, winding staircase and three-story-high Muppet chandelier,

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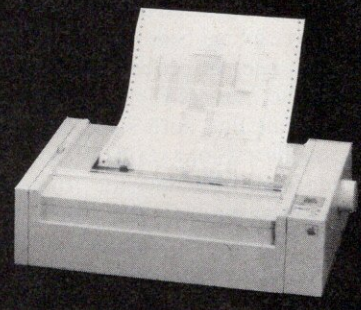

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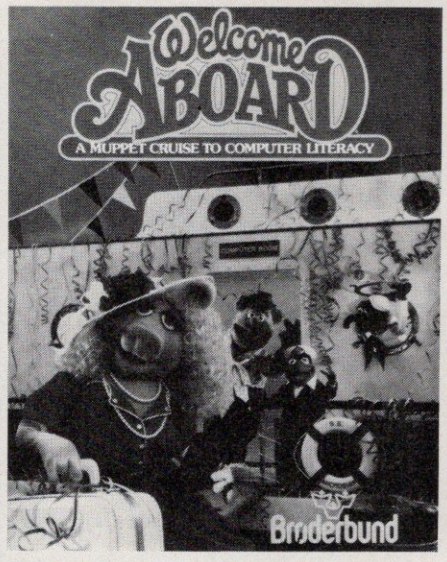

Welcome Aboard, from Brøderbund

I think of my favorite superstar, Miss Piggy, and how she symbolizes the progress her species has made. Pigs have come a long way since they had apples stuck in their mouths and were served at banquets. Of course, many still find themselves on, rather than at, the breakfast or dinner table, but a few have carved out successful careers, and it is safe to say that none is more celebrated than Miss Piggy.

Understandably, apples of the tree-grown variety can have an unpleasant connotation to the modern pig, but Apple computers are quite another matter, and for proof of that, one need only look at Miss Piggy's radiant face on a recent photograph for which she posed as Miss Apple IIc. Busy as her schedule is, the porky, perky star spends a good part of her time these days at the keyboard, faithfully answering fan mail and other

Ms. Piggy spends a good part of her time at the keyboard.

messages from fellow passengers aboard the S/S Microship, a cruise vessel that is the center of a new software package called Welcome Aboard.

Welcome Aboard is one of several products that are now bringing the Muppets to monitor screens from coast to coast. "It's a program for the whole family," says Cerf, whose own company, Christopher Cerf Associates, has close ties to Muppeteer Jim Henson's organization. "This is a program that you would get very early in your computer life. The idea is that the Muppets

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have taken over a cruise ship not unlike the Love Boat and that it is computer operated, but the computer operator didn't show up, so you, the newcomer at the terminal, are forced into action. We set out to do something that is silly, yet useful and educational."

Silly, educational, and fun are the key words guiding most Muppet activity, including the development of computer software and hardware designed for children of all ages. So far, Welcome Aboard comes closest to being for adults as well. Developed by the programming wizards at Brøderbund—in creative collaboration with Henson Associates, Cerf, and others—it consists of five modules, or "tours of duty," housed on three diskette sides. Since each of the program's modules comes with an on-screen tutorial, it has no printed documentation. It does have a handy booklet, *The Muppet Guide to Computerese*, and a fold-out travel brochure filled with "the most horrendous jokes" and greetings from Captain Kermit and members of his crew, who also describe the services they render.

Having a Muppet crew is a mixed blessing, says Cerf, as he runs his cursor across the unusual menu, a cross section of the ship itself (see below), and brings us onto the bridge. Here we are greeted by Kermit, who rather foolhardily allows us to set the S/S Microship's course. "For that we use a Logotype language, a subset of Logo called Slowgo that asks you to program the course and, in the process, teaches you some simple Logo commands." Sailing around on a chart that includes the notorious Bermuda Triangle (enter it and the ship disappears), it is plain to see that this endeavor is a marvelous introduction to programming.

"This is the only program that has portholes instead of windows," Cerf informs me, as we hit a pile of rocks and our porthole begins to fill up with water. "You see," he adds, pointing to a shipwrecked sailing ship resting at the bottom of the sea (and our screen), "no matter how stupid your mistakes are, something amusing will happen."

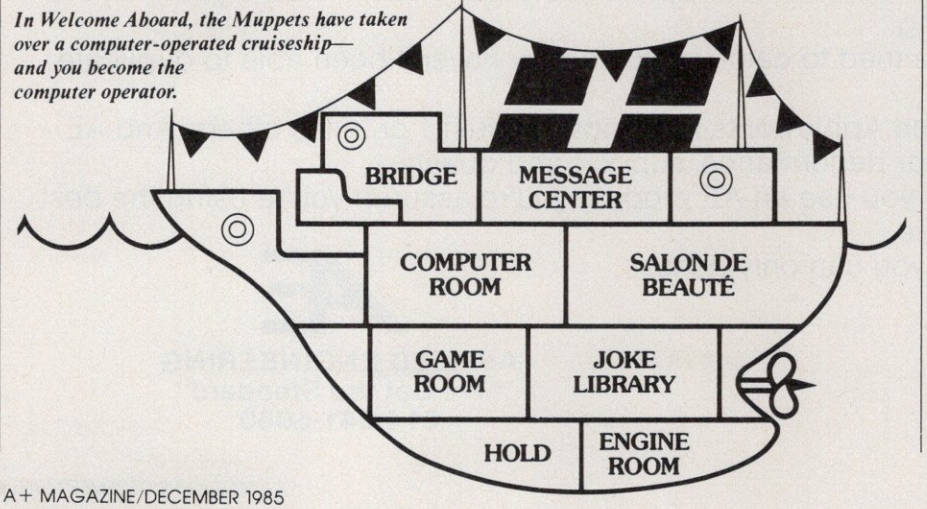
Next, we visit Scooter in the Message Center, for a painless lesson in word processing. This module is actually a small word-processing program with a built-in electronic-mail simulator, and—the designers being the same—any similarity to Brøderbund's popular Bank Street Writer is decidedly calculated.

A Note from Miss Piggy

Imagine my surprise when I find that I have two messages waiting. One is from Kermit, who assures me that he is not seasick, despite his color, and the other from Miss Piggy. "I would love to electrochat with you, Chris," she writes, "but moi am using my hair dryeur, and if I turn on my computeur the fuses will, er, defusify and go blooey." You can send a message to anyone, not just Muppet characters, and a prompt, amusing reply will always be in the electronic in box, a message that seems to have something to do with what you're saying but actually disregards it entirely. Henry Beard, the man who started *National Lampoon*, is the actual author of the messages. The program does not have any printer drivers, but a simulation allows the setting of margins and the dumping of text to a high-resolution printer on the screen, complete with tapping sound effects.

The Great Gonzo's Salon de Beauté is Cerf's own favorite: "A computer-aided-design simulation, it's really designed to help kids and adults learn how to use menus, the arrow keys, and Return. We pretend it is a chance for you to redesign Miss Piggy, however—to make her over by selecting from a very wide and beautiful array of clothing and hairstyles." When we leave the Salon de Beauté, we have Miss Piggy all

In Welcome Aboard, the Muppets have taken over a computer-operated cruiseship—and you become the computer operator.



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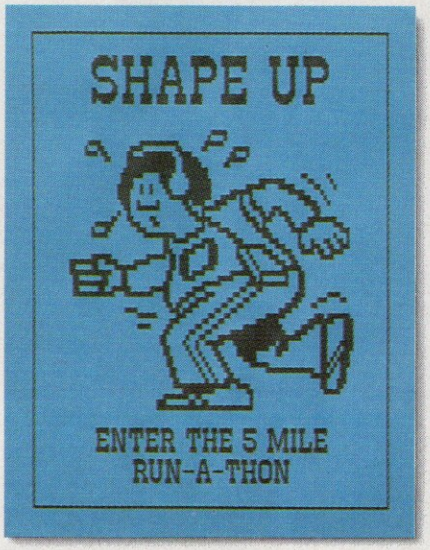

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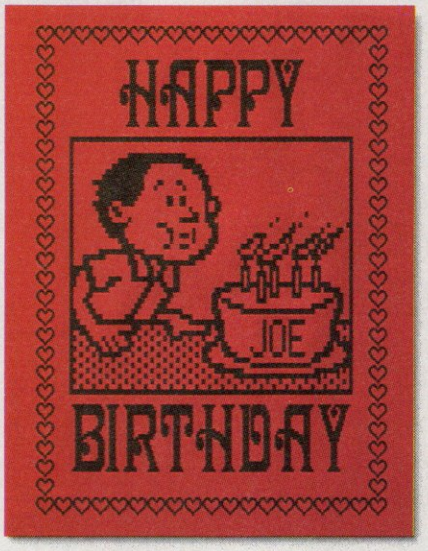

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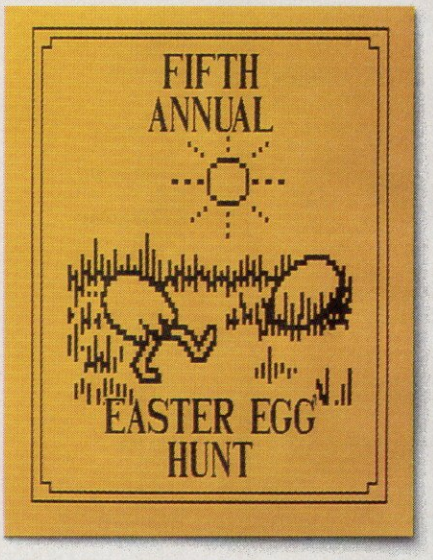

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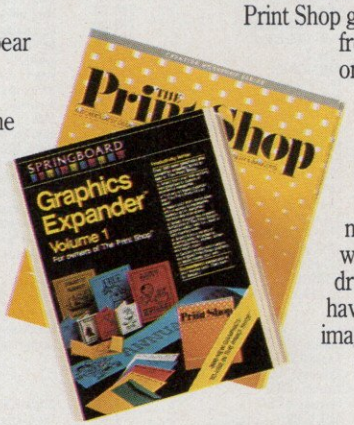

that work just as well with graphics from The Print Shop or The Print Shop Graphics Library.™ You can select from a variety of drawing pens, fill patterns, automatic lines, circles or boxes. Flip graphics left to right or magnify them for detail work. The tools are fun to use and make it easy to personalize your Print Shop creations.

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Available for the Apple II+, IIe, IIc. IBM and Commodore versions are coming soon.
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CIRCLE 261 ON READER SERVICE CARD

dolled up in blue corn rows and a flaming tank top that looks so heavy that it might take a porklift to get her to the Captain's table for the planned first-night dinner. I hate to leave her looking like that, but we have another stop to make, Fozzie Bear's Joke Library.

Here we find a touch of Bank Street Filer, complete with a search feature. "All of Fozzie's terrible material is here in the database," Cerf gleefully points out. "You can do a search and get all of Fozzie's terrible jokes on the subject of your choice, or add your own subject." I opt for the latter and enter the name of our editor, Maggie Canon. "What do you call an eight-thousand-pound Maggie?," the program asks. Not knowing the answer, but fearing the worst, I press Return. "Sir!" it says.

It is time to move on, but first I have to find out where they get those dreadful jokes. "Well, a combination of people, most of whom prefer to remain nameless, but I'm one of them," Cerf admits. "A lot of them are just terrible old jokes. A major contributor was Paul McMahon, who works at Muppets and moonlights as a talking potato; he literally has a potato costume that he does stand-up comedy in, at little clubs. That's the kind of mind that it takes to create a lot of these programs. This one combines writing and art and animation, and very bad joke writing—and we went to the right places for all of those things."

Before disembarking, I think I'll drop by the Game Room for a round of Flip!, the ship's arcade game, but Sam the Eagle, serious bird that he is, manages to discourage me.

Tutorials can indeed be fun. "We had a totally good time doing this," Cerf comments, handing me what must be the most unusual keyboard ever designed, "and most people will never see half of what's in there."

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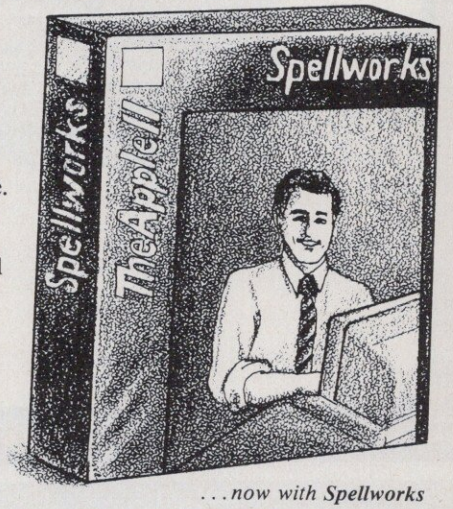

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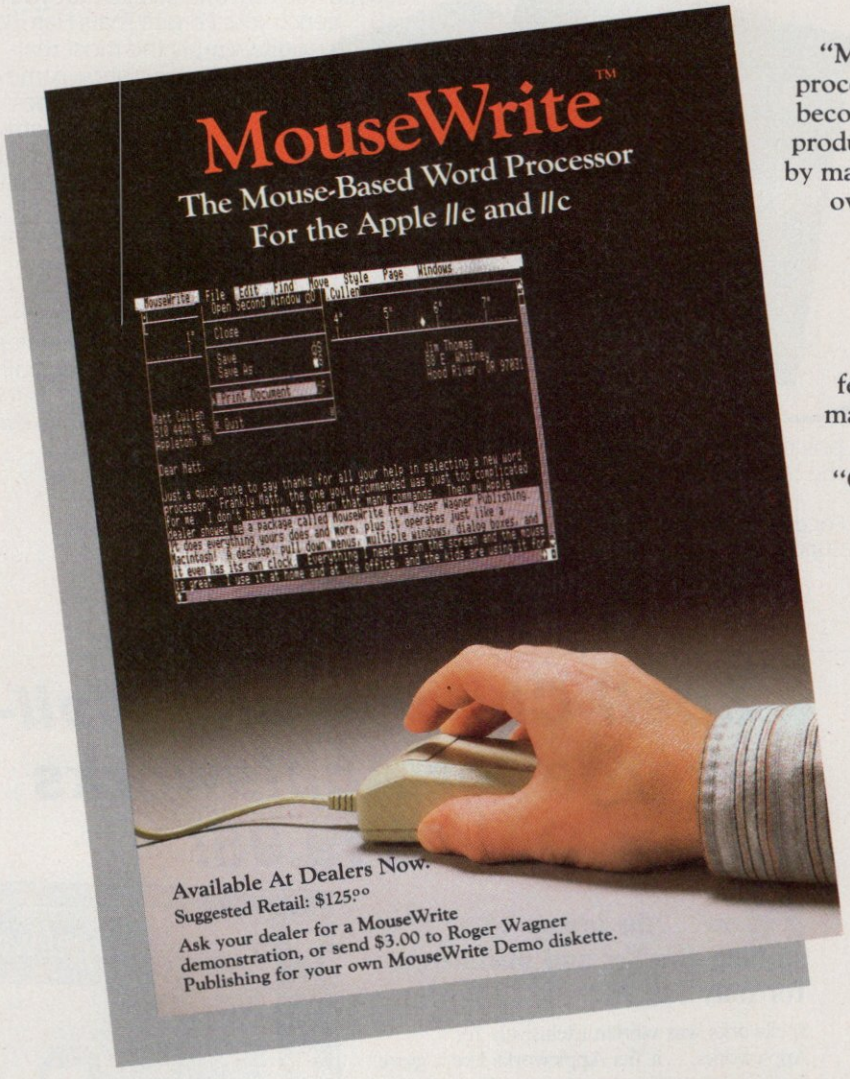

"MouseWrite, the Macintosh-like word processor for the Apple //e* and //c is fast becoming recognized as a significant new product. Already well received in reviews by many leading computer magazines, you owe it to yourself to discover what the MouseWrite excitement is all about. Here are the highlights of some of those reviews:

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"...I would recommend MouseWrite without reservation to anyone searching for a full featured word processor..." **Creative Computing, Sept. 1985**

MouseWrite is in computer stores now! To find out more about MouseWrite, stop by your local computer store and ask for a demonstration.

*MouseWrite runs under ProDOS (hard disk compatible), and requires an Apple //c or enhanced //e with extended 80 column card. Mouse is optional, but recommended.

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Koala's Muppet Learning Keys

keyboard for ages 3 and up is one of the most imaginative Apple peripherals I have seen. A team effort involving Koala Technologies, Henson Associates, Cerf's company, and Sunburst Communications, this keyboard has the look of a crowded desktop.

Getting started is a simple matter of plugging the Muppet Learning Keys into the nine-pin game port of an Apple IIe or IIc and booting up the Discovery disk. An illustration of Miss Piggy tied to a railroad track serves as the help button—push it and Kermit appears, showing, with gestures only, how the program works. You might have fun matching letters and numbers or getting nine Miss Piggys to wiggle the old hips, but this one is strictly for the little ones and those who wish to see them having fun learning.

The Muppet Learning Keys keyboard for ages 3 and up is one of the most imaginative Apple peripherals I have seen.

The Muppet Learning Keys require special software, such as the supplied Muppet Discovery Disk. CBS Software and The Learning Company have adapted some of their programs for the Muppet keyboard, and Sunburst Communications is developing a kindergarten curriculum for this amazing plug-in peripheral. It will consist of the aforementioned Discovery disk and two others, all "action packed, noisy, colorful," and buzzing with Muppet characters. Future plans include overlays for the board itself.

Other programs have already been

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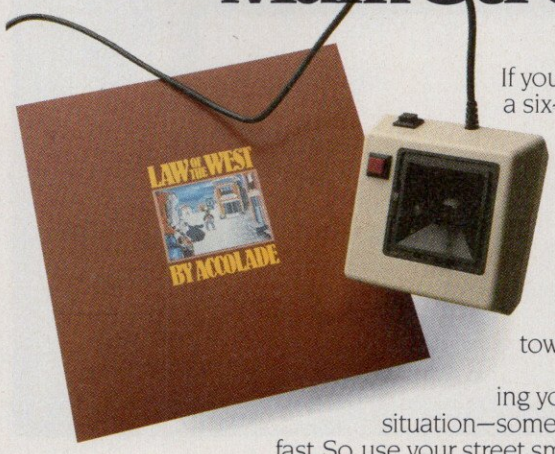

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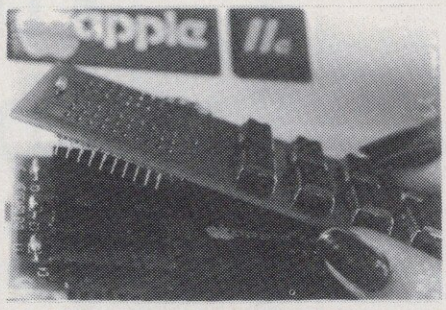

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Kermit's Electronic Story Maker, from Simon & Schuster

written or converted for this keyboard. The Discovery disk alone is worth the package's $79.95 price if you want to introduce a preschooler to computers.

The Muppet Learning Keys and the programs mentioned so far are not officially a part of the M.I.T. curriculum, but they have the blessing and participation of Kermit and the gang. Kermit's Electronic Story Maker, on the other hand, is an official product of the Muppet Institute of Technology, and that is because it is released by Simon & Schuster. "M.I.T. has close ties to Simon & Schuster," explains Cerf. "It all started in a meeting with Frank Schwartz, who was at that time the president of Simon & Schuster Software. We knew that we had to have an august institution, and we were groping for the name of it. We were talking about the Muppet Institute and everything, when Frank noted the similarity between the Muppet Institute's initials and another school he knew, but most of us hadn't heard of it—up in Cambridge somewhere."

Kermit's Electronic Story Maker is almost as much fun as Welcome Aboard. It lets you create and save a story by constructing a series of simple sentences, which are automatically illustrated and animated. Christopher Cerf's fine hand is easy to detect in this program, but he is quick to give the lion's share of credit to Joyce Hakansson and her team of software developers, including a former Walt Disney animator, who here has Miss Piggy, Scooter, the rest of the Muppet gang, and even a banana and a bathtub spinning, walking, flying, and swimming in environments that range from a library to a jungle, the ocean bottom, and outer space.

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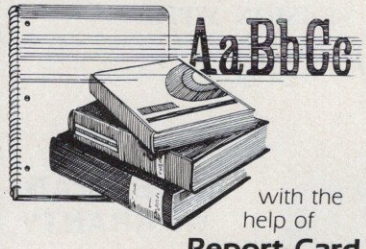

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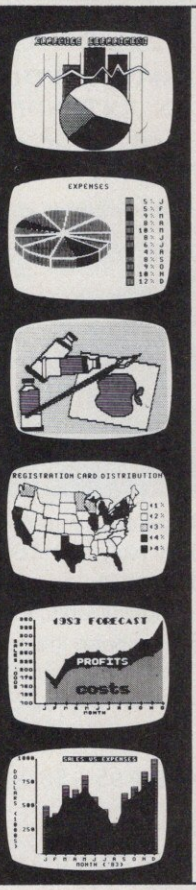

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this program is that we can illustrate a verb, which we never could do in a book, because if we draw a picture of a horse running, the kids look at it and say *horse*. With the computer, you can leave the noun the same and change the verb, so that the kids can really get a sense of what the verb added to the sentence."

After booting the appropriately green disk and listening to the whimsical rendering of the Muppet theme that opens the program, I start writing. "The banana flies in the library. Miss Piggy bounces on the hippo in the soup as Fozzie watches. While Gonzo rolls in the bathtub in the desert, the monster hides. In the desert, as the bathtub bounces in the boat, the clock rings. The rat oom-pahs in the theater while Gonzo swims. Under the sea, while the bathtub walks, the cow barks. While Kermit rolls in the plane in the cave, Foo-Foo moos." You get the idea. Of course the clock can also tick, there is a telephone that can ring, Foo-Foo can bark, and the moos can be associated with the cow. You don't have to be under 30 to enjoy the animation and sound effects as the story you have assembled finally unfolds. Miss Piggy is always a delight, whether reduced to

The child learns by exploration that things like swims *and* stands *are action words.*

dancing pixels (pig-cells?) or bopping across the television screen with a guest celebrity.

"At first, a child who is prereading might just point and push the button and watch the picture change," says Bill Prady, of Henson Associates, "but then, as he finds he has a particular goal, he wants a particular picture, so he's going to have to figure out which part of the sentence to change. If he wants Kermit to do a different thing, he's going to have to change the verb, so he learns by exploration that things like *swims* and *stands* are action words that govern what the character is doing."

Adds Cerf, "That there are hundreds of different sentence structures and that the structure makes a difference in the meaning is something that we are subtly trying to get across."

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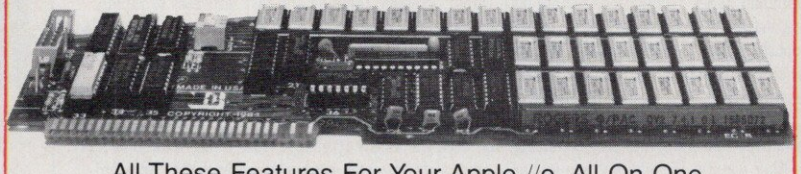

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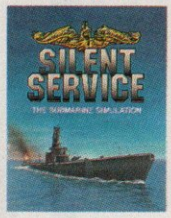

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ogy's slogan is "Where Newness Is Old Hat," and on the institution's insignia, under the frog, is the motto "Learnum Est Funum." That is not how it was when I was growing up, but times have changed. I feel the big eyes of a hundred Muppets upon me as I walk back across the marble floor and out into the real world on East 69th Street. Oh, to be a child in this day and age. ✚

Chris Albertson is a New York music critic who has been using Apple computers since 1979.

PRODUCT INFORMATION

Muppet Learning Keys
Koala Technologies
2065 Junction Avenue
San Jose, CA 95131
(408) 946-4483
Requires: Apple IIe or IIc
List Price: $79.95 (includes The Muppet Discovery Disk)

Welcome Aboard
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Kermit's Electronic StoryMaker
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Requires: Apple II, II Plus, IIe, or IIc (works with Muppet Learning Keys)
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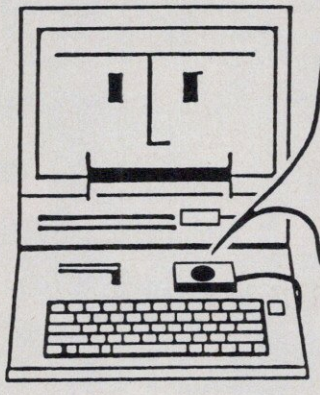

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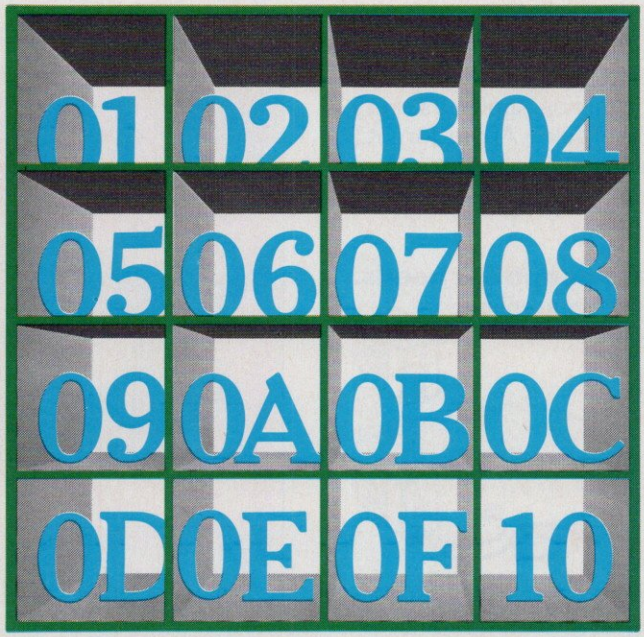
BOOK EXCERPT/*BY RICHARD MANSFIELD*

PART I Apple Machine Language for Beginners



This month A+ is presenting the first part of a two-part series on learning machine-language programming on the Apple II family of computers. This series is aimed at readers with an elementary knowledge of the BASIC language, with the goal of allowing amateur programmers to make the transition from BASIC to machine language with relative ease. The series is excerpted from the new book Apple Machine Language for Beginners, *written by Richard Mansfield and published by COMPUTE! Publications (1985), courtesy of COMPUTE! Publications. Readers who find they enjoy learning machine language should consider buying this well-thought-out book, which is available at most major bookstores.*

Sooner or later, many programmers find that they want to learn machine language. BASIC is a fine general-purpose tool, but it has its limitations. Machine language (often called *assembly language*) performs much faster. BASIC is fairly easy to learn, but most beginners do not realize that machine language can also be easy. And, just as learning Italian goes faster if you already know Spanish, if a programmer already knows BASIC, much of this knowledge will make learning machine language easier. There are many similarities.

To make it easier to write programs in machine language (called ML from here on), most programmers use a special program called an *assembler*. This is where the term *assembly language* comes from. ML and assembly language programs are both essentially the same thing. Using an assembler to create ML programs is far easier than being forced to look up and then POKE each byte into RAM memory. That's the way it used to be done, when there was too little memory in computers to hold *languages* (like BASIC or assemblers) at the same time as *programs* created by those languages. The old-style hand-programming was a very laborious process.

ML *instructions* are like BASIC commands; you build an ML program by using the ML *instruction set*. Like BASIC, ML has a series of commands which you use to communicate with the computer when you write a program. ML commands are always three-letter abbreviations, like INC, and ML programs use these commands and numbers that you generally add to the commands as additional information, like INC 2.

Knowing ML, being able to talk directly to your machine, changes things so much that it's like getting a whole new computer, a much more powerful computer.

Let's examine some advantages of ML, starting with the main one—ML runs extremely fast.

Figure 1 shows two programs which accomplish the same thing. The first is in ML, and the second is in BASIC. They get results at very different speeds indeed, as you'll see.

MICHAEL SANCHEZ

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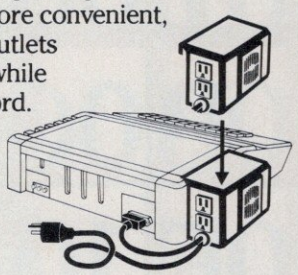

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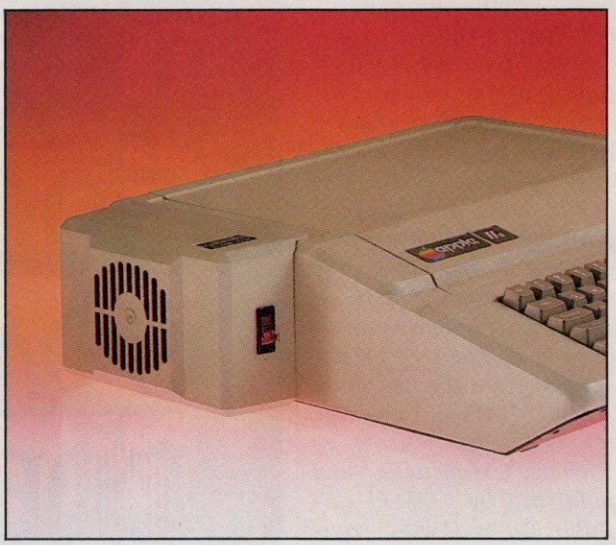

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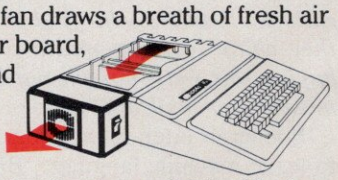

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Machine Language

```
169 193 160 0 153 0 4 200 208 250 153 0 5 200 208
250 153 0 6 200 208 250 153 0 7 200 208 250 96
```

BASIC

```
5 FOR I = 1 TO 1000: PRINT "A";:NEXT I
```

Figure 1: Comparison of machine-language and BASIC programs

```
10 FOR I = 770 TO 798: READ A: POKE I, A: NEXT I
20 PRINT "CALL 770 TO ACTIVATE "
30 DATA 169, 193, 160, 0, 153, 0, 4, 200, 208, 250,
   153, 0, 5, 200, 208, 250, 153, 0, 6, 200, 208, 250,
   153, 0, 7, 200, 208, 250, 96
```

Figure 2: A BASIC program called a loader

The two programs in figure 1 both print the letter *A* 1000 times on the screen. The ML version takes up 29 bytes of RAM (Random Access Memory). The BASIC version takes up 45 bytes and takes about 30 times as long to finish the job. If you want to see how quickly the ML works, you can POKE those numbers somewhere into RAM and run the ML program with a CALL command to the little program.

In both BASIC and ML, many instructions are followed by an *argument*. We mentioned the instruction INC 2. In that example, the number 2 is the argument. In BASIC, the CALL instruction must be given an argument which tells it where to CALL, where the ML program it's going to run is located in RAM. The CALL instruction will turn control of the computer over to the address given as its argument. There would be an ML program waiting there.

Just remember that an argument is the second item in a pair and that an argument modifies (makes more specific) a given instruction. In the pairs INC 2, CALL 151, and Send a Letter, the *2*, *151*, and *Letter* are the arguments. The INC, CALL, and Send are the instructions.

To make it easy to see the speed of our 1000 *A*'s ML example program, we'll just load it into memory without yet knowing much about it. We'll use a BASIC loader program (figure 2) that simply POKEs all the numbers of the ML program into memory; then you CALL from BASIC to activate the ML program.

A *disassembly* is like a BASIC program's LISTing. You can give the starting address of an ML program to a *disassembler*, and it will translate the numbers it finds in the computer's memory into a readable series of ML instructions. The built-in Apple monitor contains a disassembler that you can use to examine and study ML programs. Note that you have to give a start address whenever you write (with an assembler), list (with a disassembler), or run (with CALL) an ML program. That's because, unlike BASIC programs, ML programs can be located anywhere in RAM memory.

Here's what our little example ML program looks like when it has been translated by a disassembler:

```
0302-    A9 C1     LDA    #$C1
0304-    A0 00     LDY    #$00
0306-    99 00 04  STA    $0400,Y
0309-    C8        INY
030A-    D0 FA     BNE    $0306
030C-    99 00 05  STA    $0500,Y
030F-    C8        INY
0310-    D0 FA     BNE    $030C
0312-    99 00 06  STA    $0600,Y
0315-    C8        INY
0316-    D0 FA     BNE    $0312
0318-    99 00 07  STA    $0700,Y
031B-    C8        INY
031C-    D0 FA     BNE    $0318
031E-    60        RTS
```

The BASIC program (called a *loader*) in figure 2 above will POKE the ML instructions (and their arguments) into memory for you.

After running this program, type CALL 770 as instructed, and the screen will instantly fill.

BASIC stands for Beginner's All-purpose Symbolic Instruction Code. Because it is all-purpose, it cannot be the perfect code for any specific job. The fact that ML speaks directly to the machine, in the machine's language, makes it by far the more efficient language. This is because however cleverly a BASIC program is written, it will nevertheless always require extra running time to finish a job. This same problem slows down every other computer language as well: Logo, Forth, Pascal, C, whatever. None of them is the machine's language, and, thus, none can run at maximum speed.

To see why this is, think of the common PRINT instruction in BASIC. A PRINT statement drags BASIC into a series of operations which ML avoids. BASIC must ask and answer a series of questions. Where is the text located that is to be PRINTed? Is it a variable? Where is the variable located? What's its length? Where on the screen is the text to be placed?

ML is far more efficient. ML does not need to hunt for a string variable. And screen addresses do not require a complicated series of searches in an ML program. Each of these tasks, and others, slows BASIC down because it must serve so many general purposes. The screen fills slowly because BASIC has to make so many more decisions about every action it attempts than does ML.

Inserting ML for Speed

A second benefit which you derive from learning ML is that your understanding of computing will be much greater. On the abstract level, you will be far more aware of just how computers work. On the practical level, you will be able to choose between BASIC or ML, whichever is best for the purpose at hand. This choice between two languages permits far more flexibility and allows a number of tasks to be programmed which are clumsy or even impossible in BASIC.

Quite a few of your favorite BASIC programs would benefit from a small ML routine, "inserted" into BASIC with a CALL, to replace a heavily used, but slow, loop or subroutine. Large sorting tasks, smooth animation, and many arcade games and other kinds of programs *must* involve ML. And most programs can benefit from ML patches. It's no accident that nearly all commercial computer programs are written in machine language.

BASIC vs. Machine Language

Because of the great efficiency and speed of ML, it's not surprising that *BASIC itself is written in ML*. It's made up of many ML subprograms stored in your Apple's Read Only Memory (ROM). BASIC is a collection of special words such as *STOP* and *RUN*, each of which stands for a cluster of ML instructions. One such cluster might sit in ROM (unchanging memory) just waiting for you to type

LIST. If you do type in that word, the computer turns control over to the ML routine which accomplishes a program listing. The BASIC programmer understands and uses these BASIC words to build a program. You hand instructions over to the computer and then rely on the convenience of referring to all those prepackaged ML routines by their BASIC names. The computer *always* works with ML instructions. That's why you cannot honestly say that you truly understand computing until you understand the computer's language: machine language.

Another reason to learn ML is that custom programming is then possible. Computers come with a disk operating system (DOS) and BASIC (or other higher-level languages). After a while, you will likely find that you are limited by the rules or the commands available in these languages. You will want to add to them, to customize them. An understanding of ML is necessary if you want to add new words to BASIC, to modify a word processor (which was written in ML), to personalize your computer—to make it behave precisely as you want it to.

BASIC's Strong Points

Of course, BASIC has its advantages and in some cases is to be preferred over ML. BASIC is usually simpler to *debug* (to get all the problems ironed out so that it works as it should). There are some ML debugging techniques which work quite well, but BASIC is the easier of the two languages to correct. For one thing, BASIC often just comes out and tells you your programming mistakes by printing error messages on the screen. Nevertheless, some assemblers can also print error messages and identify offending line numbers.

A talent for conserving bytes, like skill at trapping wild game, will likely become a victim of technology.

Contrary to popular opinion, ML is not necessarily a memory-saving process. ML can use up about as much memory as BASIC does when accomplishing the same task. Short programs can be somewhat more compact in ML, but longer programs generally use up bytes fast in both languages. However, worrying about using up computer memory is quickly becoming less and less important.

Soon programmers will probably have more memory space available than they will ever need. In any event, a talent for conserving bytes, like skill at trapping wild game, will likely become a victim of technology. It will always be a skill, but it seems as if it will not be an everyday necessity.

So, which language is best? They are both best—but for different purposes. Many programmers, after learning ML, find that they continue to construct some of their programs in BASIC or some other language, but add ML modules where speed is important. An all-ML program will, however, generally be more efficient, more flexible, and far faster than any alternative. Remember, it's no accident that the great majority of professional and commercial programs are written in pure ML.

But perhaps the best reason of all for learning ML is that it is fascinating and fun.

THE FUNDAMENTALS

The difficulty of learning ML has sometimes been exaggerated. There are some new rules to learn and some new habits to acquire. But most ML programmers would probably agree that ML is not inherently more difficult to understand than BASIC. More of a challenge to debug in some cases, but it's not worlds beyond BASIC in complexity. In fact, in the 1970s, many of the first home computerists learned ML before they learned BASIC. This is because an average version of the BASIC language used in microcomputers takes up around 12,000 bytes of memory, and the early personal computers (KIM, AIM, etc.) were severely restricted—they had only a small amount of available memory. These early machines were unable to offer BASIC; it took up more space than they had, so everyone programmed in ML.

Interestingly, some of these pioneers reportedly found BASIC to be just as difficult to grasp as ML. In both cases, the problem seems to be that the rules of a new language simply are "obscure" until you know them. In general, though, learning either language probably requires roughly the same amount of effort.

The first thing to learn about ML is that it reflects the construction of computers. ML programmers often use a number system (hexadecimal) which is not based on ten.

We count by tens because it is a familiar (though arbitrary) grouping for us. Humans have ten fingers. If we had eleven fingers, the odds are that we would be counting by elevens.

What's a Natural Number?

Computers count in groups of twos. It is a fact of electronics that the easiest way to store and manipulate information is by on/off states. A light bulb is either on or off. This is a two-group; it's *binary*, and so the powers of two become the natural groupings for electronic counters: 2, 4, 8, 16, 32, 64, 128, 256. Finger counters (us) have been using tens so long that we have come to think of ten as *natural*, like thunder in April. Tens isn't natural at all. What's more, twos is a more efficient way to count.

To see how the powers of two relate to computers, we can run a short BASIC program which will give us some of these powers. *Powers* of a number is the number multiplied by itself.

Two to the power of two (2^2) means 2 times 2 (in other words, 4). two to the power of three (2^3) means 2 times 2 times 2 (8).

```
10 FOR I =0 TO 16
20 PRINT 2 ^I
20 NEXT I
```

ML programming *can* be done entirely in the familiar decimal number system. For beginners, that's probably a wise thing to do. However, you'll probably see hex used in magazine articles and books, and hex does format on the screen or paper more neatly than decimal numbers. Another advantage of hex is that it relates visually to the binary numbers that the computer is using. The arguments for some advanced ML commands like ROL and EOR are more easily visualized with hex than with decimal.

Why not just always program in the familiar decimal numbers (as we do in BASIC)? Because hex is based on groups of 16 digits, not decimal's groups of 10. And 16 is one of the powers of two. Thus, 16 is a convenient grouping (or *base*) for ML because it organizes numbers the way the computer looks at numbers. For example at the most ele-

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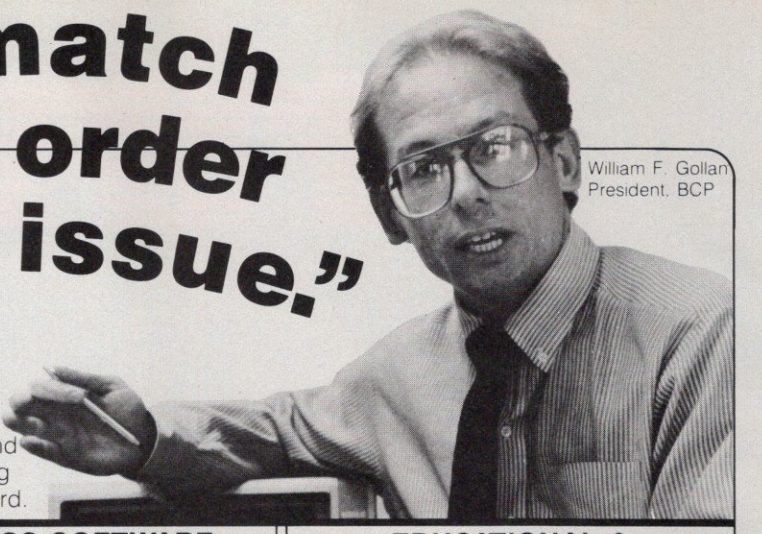

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mentary level all computers work with *bits*. A bit is the smallest piece of information possible: Something is either on or off, yes or no, plus or minus, true or false. This two-state condition (binary) can be remembered by a computer's smallest single memory cell. This single cell is called a bit. The computer can turn each bit *on* or *off* as if it were a light bulb, or a flag raised or lowered.

It's interesting that the word *bit* is frequently explained as a shortening of the phrase BInary digiT. In fact, the word *bit* goes back several centuries. There was a coin which was soft enough to be cut with a knife into eight pieces. Hence, *pieces of eight*. A single piece of this coin was called a bit and, as with computer memories, it meant that you couldn't slice it any further. We still use the word *bit* today as in the phrase *two bits*, meaning 25 cents.

Centuries ago, there was a coin soft enough to be cut with a knife into eight pieces. Hence, pieces of eight. A single piece of this coin was called a bit.

Whatever it's called, the bit is a small, essential aspect of computing. Imagine that we wanted to remember the result of a subtraction. When two numbers are subtracted, they are actually being compared with each other. The result of the subtraction tells us which number is the larger or if they are equal. ML has an instruction, like a command in BASIC, which compares two numbers by subtraction. It is called CMP (for *compare*). This instruction sets *flags* in the CPU (Central Processing Unit) of the computer, and one of the flags always shows whether or not the result of the most recent action taken by the computer was a zero. We'll go into this again later. What we need to realize now is simply that each flag has two possible conditions: up or down. In other words, this information (that there's a zero result or a nonzero result) is *binary* and can be stored within a single bit. Each of the six flags within the 6502 chip is a bit. Together, the flags are all held within a single byte. That byte is called the status register.

Our computers group bits into units of eight, called *bytes*. This relationship between bits and bytes is easy to remember if you think of a bit as one of the "pieces of eight." Eight is a power of two also (two to the third power). Eight is a convenient number of bits to work with as a group since we can count from 0 to 255 using only eight bits. We'll see how this is done in a minute.

A byte—able to "hold" 256 different numbers—gives us enough room to assign all 26 letters of the alphabet (and the uppercase letters, punctuation marks, and so on) so that each character we might want to print will have its own particular number. The letter *A* (uppercase) has been assigned the number 65 (in the standard ASCII code that computers use to communicate). The letter *B* is 66, and so on. Most microcomputers, however, do not adhere strictly to the ASCII code, except when they are communicating with other computers, for example, through telephone links. The Apple code uses 193 for the ordinary letter *A*, whereas 65 is used for the flashing *A*.

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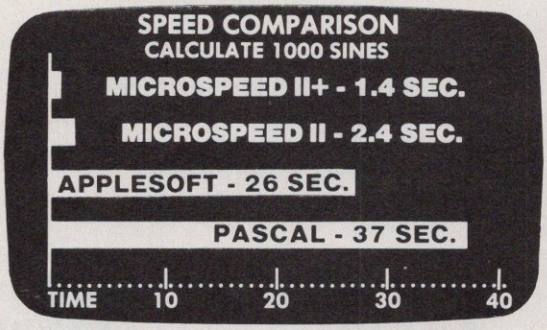

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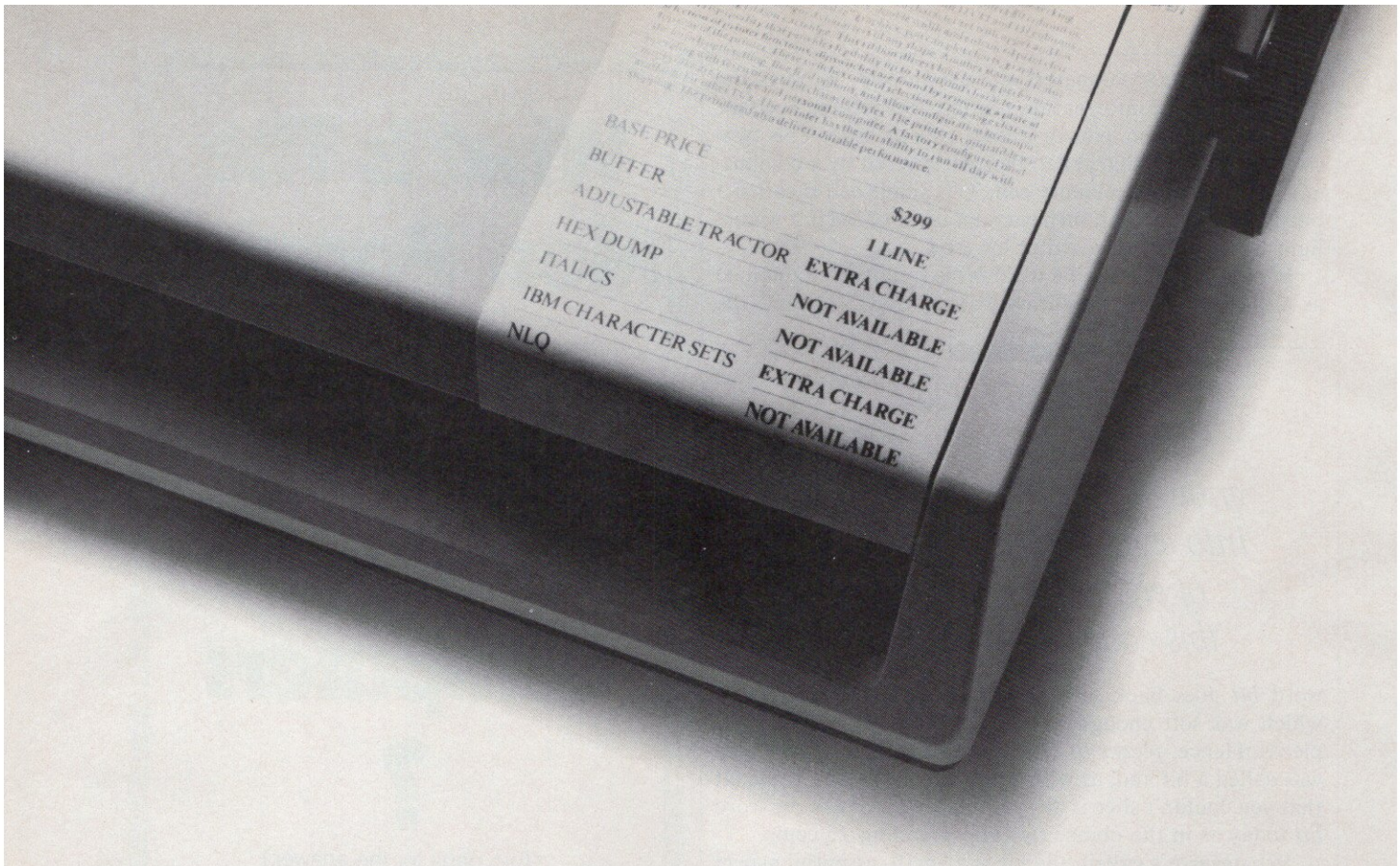

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The ASCII code, an assignment of numbers to letters and symbols, forms a convention by which computers worldwide can communicate with each other. Text can be sent via modems and telephone lines, and it will arrive meaning the same thing to an alien computer. It's important to visualize each byte, then, as being eight bits ganged together and that a byte is able to represent 256 different things. As you might have suspected, 256 is another power of two (two to the power of eight).

So these groupings of eight, these bytes, are a major aspect of computing; but we also want to simplify our counting from 0 to 255. We want the numbers to line up in a column on screen or on paper. Obviously, *decimal* numbers are erratic: The number 5 takes up one space, the number 230 takes up three spaces. Hex numbers between 0 and 255 will always, predictably, take up two spaces (here's 0–255 expressed in the hexadecimal format: $00–$FF).

In addition to being easier to format in printouts, hex is also somewhat easier to visualize in terms of the *binary* number system—the on/off, single-bit way that the computer manipulates numbers:

Decimal	Hex	Binary
1	01	00000001
2	02	00000010
3	03	00000011 (1+2)
4	04	00000100
5	05	00000101 (4+1)
6	06	00000110 (4+2)
7	07	00000111 (4+2+1)
8	08	00001000
9	09	00001001 (8+1)
10 (note new digits)	0A	00001010 (8+2)
11	0B	00001011 (8+2+1)
12	0C	00001100 (8+4)
13	0D	00001101 (8+4+1)
14	0E	00001110 (8+4+2)
15	0F	00001111 (8+4+2+1)
16 (note new column	10	00010000
17 in the hex)	11	00010001 (16+1)

See how hex $10 (hex numbers are usually preceded by a dollar sign to show that they are not decimal) *looks like* binary? If you split a hex number into two parts, 1 and 0, and the equivalent binary number into two parts, 0001 and 0000, you can see the relationship.

Many ML programmers like to use hexadecimal numbers because they're a superior visual analogue of the internal manipulations inside the computer; hex is simply more like binary because hex is a power of two and decimal (base ten) is not a power of two. It's up to you whether or when you add hex to your bag of tricks. (In the early days of programming, another base, base eight, called *octal* was very popular. It's still used today in the programming of some large computers.) You can use hex and decimal interchangeably, even on the same line of program code. You can write LDA $0A or LDA 10, whichever you prefer.

Here's what it looks like when you count up from zero in both systems:

DECIMAL
0 1 2 3 4 5 6 7 8 9

And now you start over by moving to a new column with the number 10.

HEX
00 01 02 03 04 05 06 07 08 09 0A 0B 0C 0D 0E 0F

And then you start over with $10, $11, and so on.

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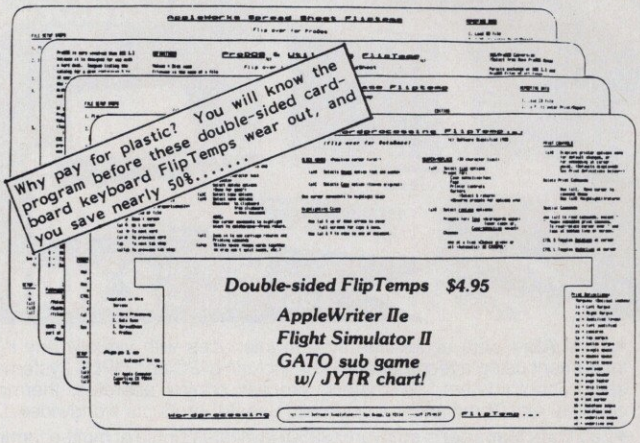

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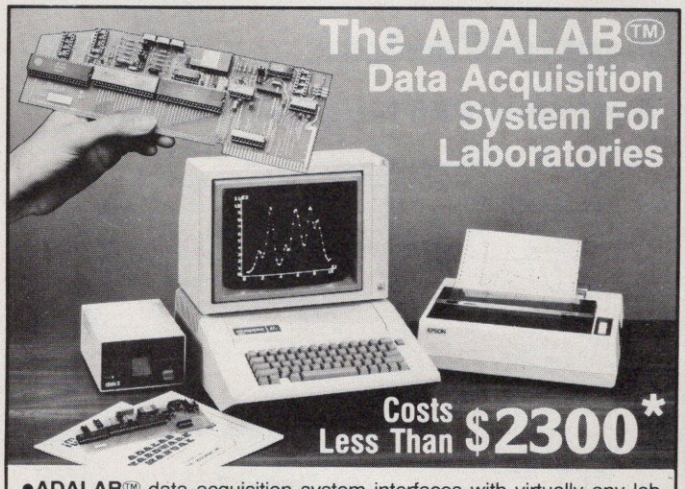

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See how we ran out of digits when trying to count up to 16 in hex? Hex substitutes the first few letters of the alphabet to count past 09.

The first thing to notice is that instead of the familiar decimal symbol 10, hex uses the letter *A* because this is where we run out of symbols and must start over again with a 1 and a 0. Zero always reappears at the start of each new grouping in any number system: 0, 10, 20, and so on. The same thing happens with the groupings in hex: 0, 10, 20, 30, and so on. The difference is that, in hex, the 1 in the "10's" column is actually what we would call a 16 (in our normal decimal way of counting).

Hex is one of those things, like telephone books and dictionaries, that you have to know how to use, but you don't have to memorize.

The second column is now a 16's column; 11 (hex) means 17 (decimal), and 21 means 33 (2 times 16 plus 1). Learning hex is probably the single biggest hurdle to overcome when getting to know ML.

Don't be discouraged if it's not immediately clear what's going on. (It probably never will be totally clear—hex is, after all, unnatural.) And remember that hex is an *option*, not a requirement, when programming in ML.

It's just that much ML printed in magazines and books uses hex. That's why you at least need to be able to make the conversion (you can use Appendix F [of Mansfield's book] to convert between decimal and hex if you don't want to get deeply into hex). Nobody really knows it that well. Most ML programmers use one of the calculators sold by Sharp, TI, or Hewlett-Packard that perform hex/decimal conversions. Hex is one of those things, like telephone books and dictionaries, that you have to know how to use, but you don't have to memorize.

It's possible that someday hex will go the way of octal, and we'll stick to the easy, obvious decimal mode entirely (except for excursions into binary numbers from time to time). If you want more understanding, you might want to practice the exercises at the end of this chapter. As you work with hex, it will gradually seem less and less alien.

To figure out a hex number, multiply the second column by 16 and add the other number to it. So, $2A would be 2 times 16 plus 10 (recall that A stands for 10).

Hex does seem impossibly confusing when you come upon it for the first time. It will never become second nature, but it should be at least generally understood. You need not memorize hex beyond learning to count from 1 to 16; this teaches you the symbols. Be able to count from 00 up to 0F. (By convention, even the smallest hex number is listed as two digits as in 03 or 0B. The other distinguishing characteristic is the dollar sign that is usually placed in front of the digits: $05 or $0E.)

It's enough to know what they look like and be able to find them when you need them.

Another thing that makes all this easier is that if you *do* need to work with hex, most ML programming involves working with hex numbers only between 0 and 255. This is

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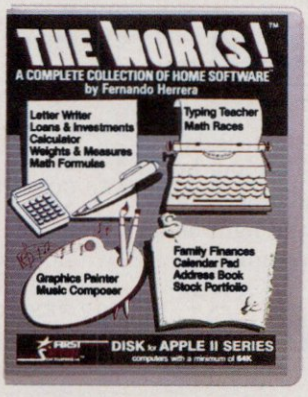

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Figure 3: Night in the City of Bytes

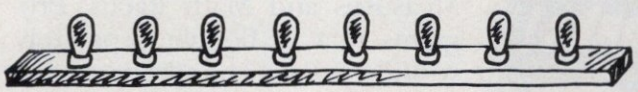
because a single byte (eight bits) can hold no number larger than 255. Manipulating numbers larger than 255 is of no real importance in ML programming until you are ready to work with more advanced ML programs. For example, all 6502 ML instructions are coded into one byte, all the flags are held in one byte, and many addressing modes use one byte.

To learn all we need to know about hex for now, we can try some problems and look at some ML code to see how hex is used in the majority of ML work. But first, let's take an imaginary flight over computer memory. Let's get a visual sense of what bits and bytes and the inner workings of the computer's RAM look like.

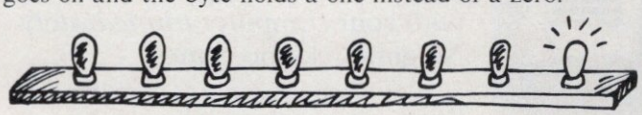
The City of Bytes

Imagine a city with a single long row of houses. It's night. Each house has a peculiar Christmas display: On the roof is a row of eight lights. The houses represent bytes; each light is a single bit (see figure 3).

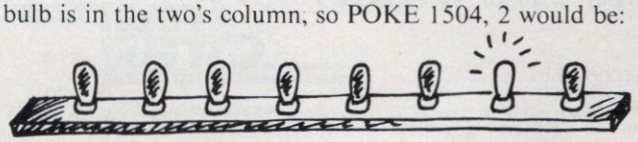
If we fly over the City of Bytes, at first we see only darkness. Each byte contains nothing (zero), so all eight of its bulbs are off. (On the horizon we can see a glow, however, because the computer has memory up there, called ROM memory, which is very active and contains built-in programs.) But we are down in RAM, our free user-memory, and there are no programs in RAM yet, so every house is dark. Let's observe what happens to an individual byte when different numbers are stored there; we can randomly choose byte 1504. We hover over that house to see what information is "contained" in the light display.



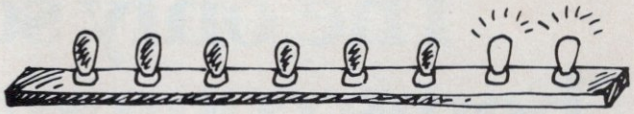
Like everywhere else in the City of Bytes, this byte is dark. Each bulb is off. Observing this, we know that the byte here is "holding," or representing, a zero. If someone at the computer types in POKE 1504,1, the rightmost light bulb goes on and the byte holds a one instead of a zero:



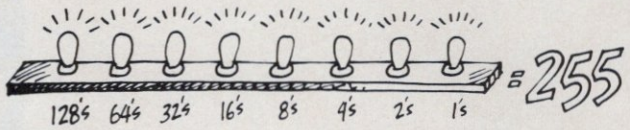
This rightmost bulb is the one's column (so far, this is exactly the way things would work in our usual way of counting by tens, our familiar *decimal* system). But the next bulb is in the two's column, so POKE 1504, 2 would be:



And three would be one and two:



In this way—by checking which bits are turned on and then adding them together—the computer can look at a byte and know what number is there. Each light bulb, each *bit*, is in its own special position in the row of eight and has a value twice the value of the one just before it:



Eight Bits Make a Byte

Eight bits together make a byte. A byte can hold a number from 0 through 255 decimal. We can think of bytes, though, in any number system we wish—in hex, decimal, or binary. Because the computer uses binary, it's useful to be able to visualize it. Hex has its uses in ML programming. And decimal is familiar. But a number is still a number, no matter what we call it. After all, five pennies are always five pennies, whether we symbolize them by 5 (decimal) or $05 (hex) or 00000101 (binary) or just call them a nickel.

A Binary Quiz

BASIC doesn't understand numbers expressed in hex or binary. Binary, for humans, is very *visual*. It forms patterns out of zeros and ones and lets you see an x-ray of the interior of a byte. The following program will let you quiz yourself on these patterns.

Here is a game which will show you a byte as it looks in binary. You then try to give the number in decimal:

```
100 REM BINARY QUIZ
110 C1 = 177:C0 = 79
140 X = INT (256 * RND (1)):D = X:P = 128
170 HOME
180 FOR I = 1 TO 8
190 IF INT (D / P) = 1 THEN PRINT CHR$ (C1);:D =
    D - P: GOTO 210
200 PRINT CHR$ (C0);
210 P = P / 2: NEXT I: PRINT
220 PRINT "WHAT IS THIS IN DECIMAL ": PRINT
230 INPUT Q: IF Q = X THEN PRINT "CORRECT ":
    GOTO 250
240 PRINT "SORRY, IT WAS ";X
250 FOR T = 1 TO 1000: NEXT T
260 GOTO 140
```

This next program will print out an entire table of binary numbers from 0 to 255:

```
100 REM COMPLETE BINARY TABLE
120 FOR X = 0 TO 255: PRINT X;
130 Z = X:L = 7
140 FOR Q = 0 TO 7:T = INT (X / 2)
150 K$(L) = CHR$ (48 + (X - T * 2))
160 L = L - 1:X = T: NEXT Q
180 X = Z
190 PRINT TAB ( 10);
200 FOR I = 0 TO 7: PRINT K$(I);: NEXT I
205 PRINT
210 NEXT X
```

Examples and Practice

Here are several ordinary decimal numbers. Try to work out the hex equivalent (see Part II, next month, for answers):

1. 10	_____	6. 32	_____
2. 15	_____	7. 128	_____
3. 5	_____	8. 129	_____
4. 16	_____	9. 255	_____
5. 17	_____	10. 254	_____

We are not making an issue of learning hex or binary. As you work with ML, you will familiarize yourself with some of the common hex numbers. And remember, you can program in ML without needing to worry about hex numbers. For now, we only want to be able to recognize what hex is. One other reason that we're not stressing hex too much is that ML is generally not programmed without the help of an assembler.

This short BASIC program is good for practicing hex and also shows you how a two-byte hex number relates to a one-byte hex number. It will take decimal in and give back the correct hex.

```
10 H$ = "0123456789ABCDEF"
20 HOME
30 PRINT "ENTER DECIMAL NUMBER";: INPUT X
40 IF X > 255 THEN GOTO 30: REM NO NUMBERS
   BIGGER THAN 255 ALLOWED
50 FOR I = 1 TO 0 STEP - 1
60 N = INT (X / ( 16 ^ I)):X = X - N * 16 ^ I
70 HE$ = HE$ + MID$ (H$,N + 1, 1)
80 NEXT I
90 PRINT HE$
100 HE$ = "": GOTO 30
```

For larger hex numbers (up to two bytes, $FFFF equals 65535), we can just make a simple change to the above program. Change line 40 to IF x>65535 THEN 30, and change line 50 to FOR I = 3 TO 0 STEP - 1. This will give us four-place hex numbers. These larger hex numbers are used in ML mainly for addresses, since the 6502 can directly address 65536 bytes (bytes with addresses from 0 to 65535). This is the reason that many microcomputers max out at 64K. There are special ways to get around this, but an eight-bit microprocessor like the 6502 is generally limited in the total amount of RAM memory it can access directly.

The number 65535 is interesting because it represents the limit of our computers' memories. In special cases, with additional hardware, memory *can* be expanded beyond this. But this is the normal upper limit because the 6502 chip is designed to be able to *address* (put bytes in or take them out of memory cells) up to $FFFF.

The 6502 often addresses by attaching two bytes together and looking at them as if they formed a unit. It's like the way that putting eight bits together forms the unit we call a *byte*. The largest number that two bytes can represent is $FFFF (65535), and the most that *one* byte can represent is $FF (255). Three-byte addressing is not possible for the 6502 chip. *Machine language* means programming instructions which are understood directly by the 6502 chip itself. There are other CPU (Central Processing Unit) chips, but the 6502 is the Apple's CPU. It's the one covered in this book. +

Next month's excerpt will delve further into the fundamentals of machine language.

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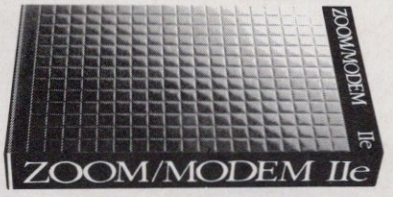

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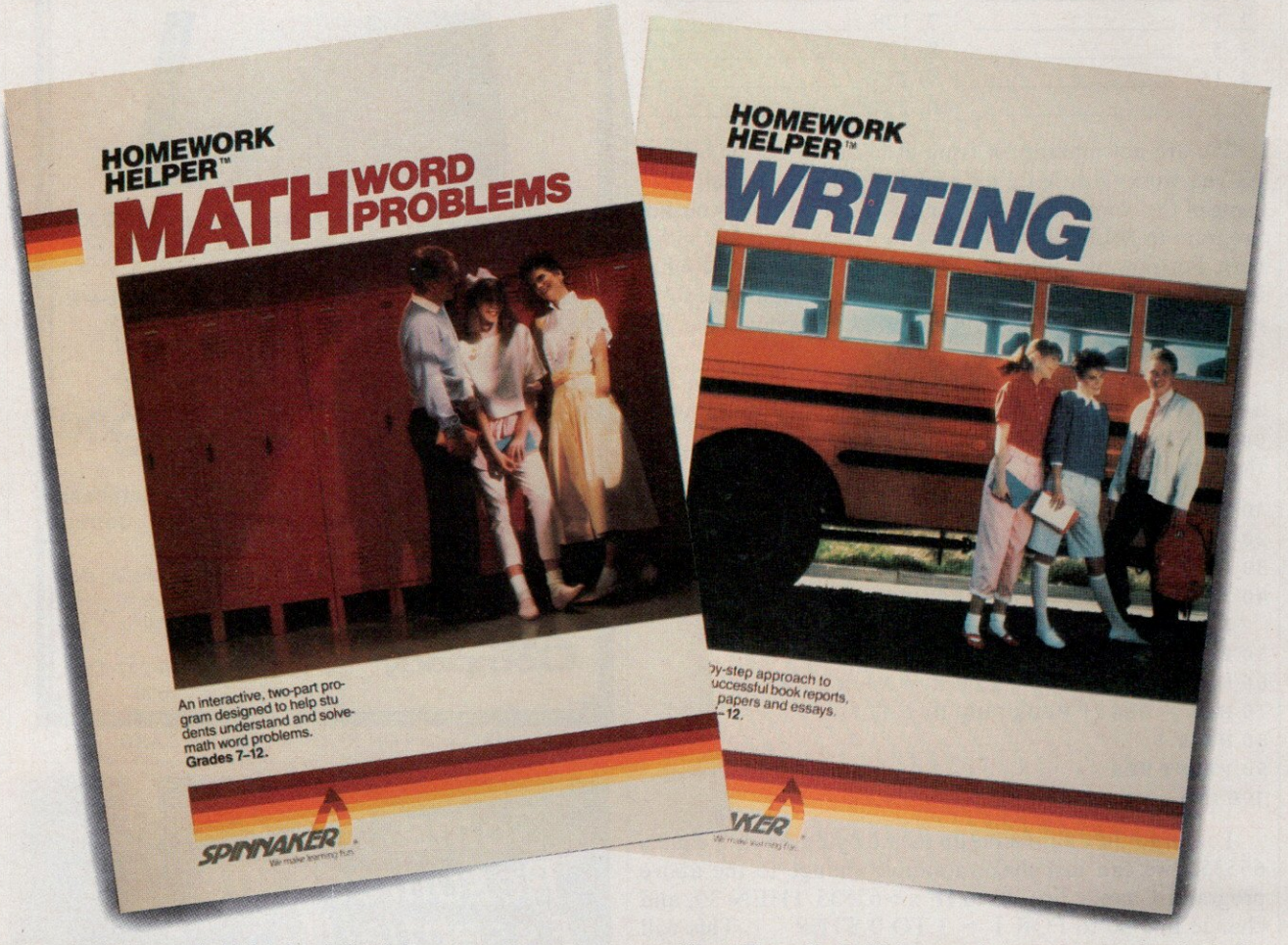

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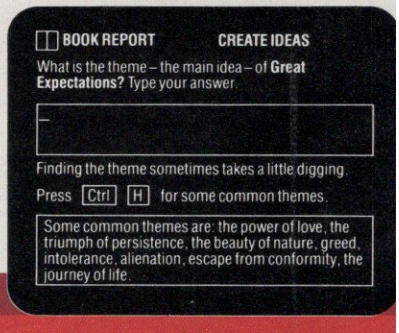

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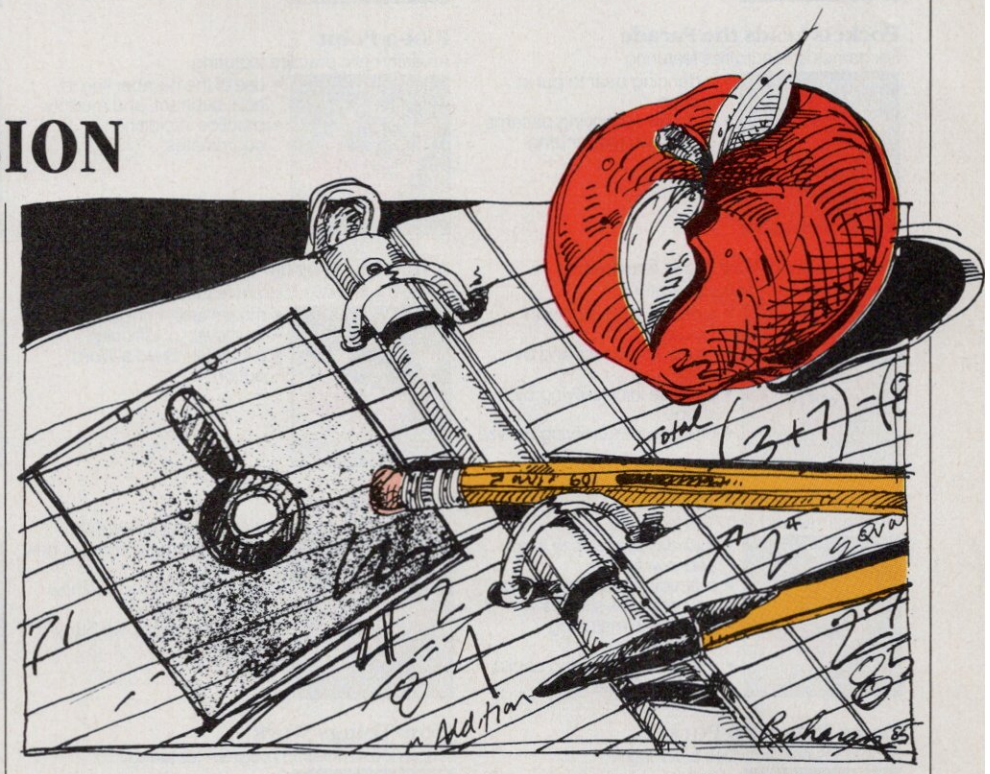
BY DAVID D. THORNBURG

TEACHING WITH FILEVISION

Software that lets teachers program their own educational software



Last month I suggested that one of the main reasons educators don't create more of their own educational software is because traditional programming languages make a distinction between two separate domains: programming and execution. Although those of us who work with traditional programming languages may not see this dichotomy as a problem, we can see why it might present difficulties to people who are used to the direct manipulation of their environments. The creation of a ditto master involves direct manipulation of the instructional medium, the creation of a Logo program does not—its impact is indirect.

Enter Filevision

This month I want to explore some direct-manipulation programming software that is a good authoring system for many types of instructional programs: Filevision from Telos Software Products in Santa Monica, California.

This product exists in two forms, both of which run on the Macintosh. The original product can run on a 128K Macintosh with a single drive, and the more powerful Business Filevision requires a 512K Macintosh with an external drive. I will focus mainly on the use of the original version.

Filevision is one of those rare pieces of software that defies placement in any existing category. Its maker bills it as a visual-database program in that it lets you create object-oriented graphic images (similar to those you create with MacDraw) for which each object class can have a data form associated with it. Each instance of an object can have its own visual representation and can have its own information carried in its form.

This description gives a broad view of this product, but it only hints at the power of this package as a tool for the creation of instructional materials. For example, you can link Filevision picture elements together in such a manner that certain material (e.g., a help message) can be hidden from view until a student selects another element of that object (e.g., a picture of a button that says PRESS HERE FOR HELP).

Filevision is a rare piece of software that defies placement in any existing category.

A Prime Example

I built a simple piece of instructional software in Filevision to illustrate how this program can be used as an authoring system. The application is based on a piece of number theory I learned from Fr. Stanley Bezuszka at Boston College. The opening screen shows the integers from 1 to 66 arranged in six rows (see figure 1, next page).

Each of the numbers in the figure belongs to a data class called Number. Each number has a data form associated with it that contains fields for the various attributes I want to work with (see figure 2). In Filevision you can go from the picture to a data form by double-clicking on the object with the mouse.

For this application I wanted students to fill in the various fields on their own by typing Yes in the fields for which the various attributes were true. For example, 1 is an odd number, so the Odd field should contain a Yes. Once students have filled in the forms for all the numbers, they can go back to the main picture screen and explore the program some more.

For example, one exercise might be to have the computer highlight all the

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Six games and activities featuring

- a private plane for piloting in all directions
- identification of the positions In, Out, Next to, Over, Under, Right, and Left

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The Fun (ages 6 to 10)

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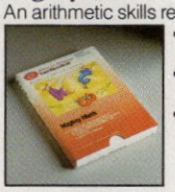
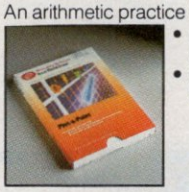


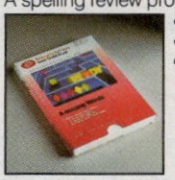
- practice in adding, subtracting, and multiplying
- practice in determining the place value of numbers
- practice in building sets

Plot-a-Point
An arithmetic practice featuring



- use of the number line to add, subtract, and multiply
- practice in plotting coordinates

A-mazing Words
A spelling review program featuring



- mazes and monsters
- four levels of difficulty
- a special "Build a Word" option

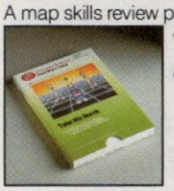
Word-Player
A vocabulary reinforcement program featuring

- practice in the spelling of new words
- the opportunity to use new words in context
- a "Create Your Own Story" option

How Things Work
A science simulation program featuring

- animation of simple machines
- use of simple machines to solve problems

Take Me North
A map skills review program featuring



- practice in using cardinal and intermediate directions
- practice in interpreting map symbols

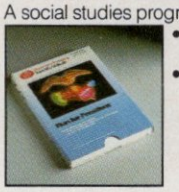
Space Port
A visual memory skills review program featuring

- practice in remembering sequences
- nine levels of difficulty

***IBM PCjr. (Apple® IIe, IIc in December)**

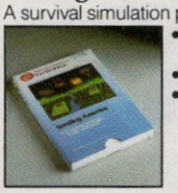
The Challenge (ages 10 and up)

Run for President
A social studies program featuring



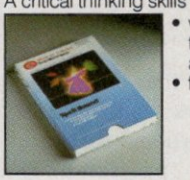
- review of geography facts about the United States
- a review of U.S. state facts

Settling America
A survival simulation program featuring



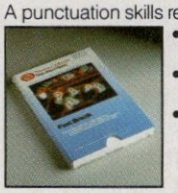
- practice in making value judgements
- practice in making decisions
- helps expand knowledge of post-Revolutionary America

Spell Bound
A critical thinking skills review program featuring



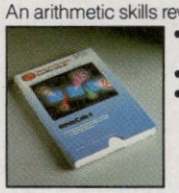
- vocabulary reinforcement through use of verbal analogies
- four levels of difficulty

Fast Break
A punctuation skills review program featuring



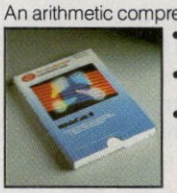
- explanation of commonly used punctuation marks
- practice in using punctuation marks in context
- four levels of difficulty

WhizCalc I
An arithmetic skills review program featuring



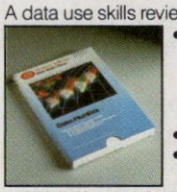
- practice of basic arithmetic operations
- nine levels of difficulty
- a "Create Your Own Problems" option

WhizCalc II
An arithmetic comprehension program featuring



- practice in solving arithmetic word problems
- a database of over 100 word problems
- exposure to a junior spreadsheet

Data Hurdles
A data use skills review program featuring



- ten activities that review ordering, rounding, sets, totals, fast math, time, money, percentages, measuring, and comparing
- on-screen tutorial skill reviews
- three levels of difficulty

***IBM PCjr, Apple IIe, IIc**

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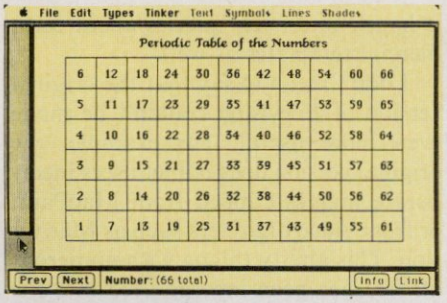

Figure 1: The initial view of a math lesson created with Filevision

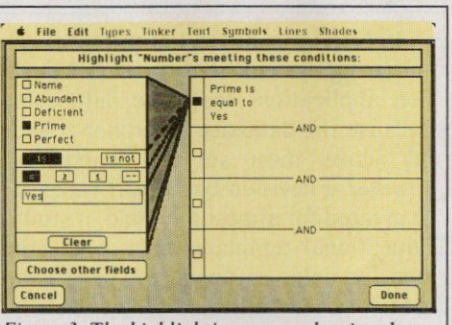

Figure 3: The highlighting screen showing that all prime numbers will be highlighted

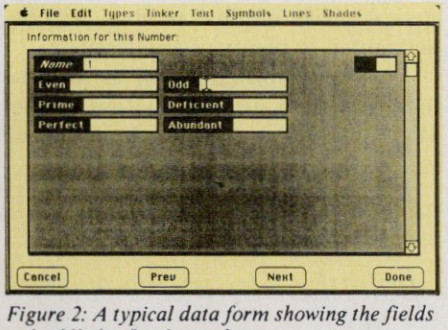

Figure 2: A typical data form showing the fields to be filled in by the student

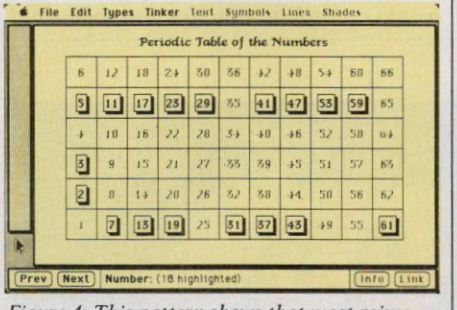

Figure 4: This pattern shows that most prime numbers appear in the first and fifth rows.

prime numbers. Highlighting is a feature built into Filevision that presents a special screen on which you can select the highlighting criteria (see figure 3).

You can combine up to four expressions to define the highlighting parameters. Once you've made the choice (in our case, it was to highlight prime numbers), you click the mouse in the Done box, and a modified version of the original screen appears, with the selected objects highlighted (see figure 4).

In this case, students can see that all the prime numbers besides 2 and 3 are in the first or fifth rows. With this information, learners can make inferences about the occurrence of prime numbers.

By the way, this chart holds other interesting patterns for other types of numbers and is worth the effort to explore if you are interested in such things. (You can write to me, c/o *A+*, 11 Davis Drive, Belmont, CA 94002, for a copy of the template, along with documentation. Please send a blank Macintosh diskette and a self-addressed, stamped envelope.)

This example illustrates several points. First, I created it by constructing the images and data forms in the same domain as the one in which they appeared on the screen. Second, I created it in 30 minutes, which is about the same amount of time it takes a student to work through this material, making the ratio of programming to use time much smaller than it would have been with programs constructed in a traditional language such as BASIC or PILOT. Third, the subject matter of this lesson is far too specialized to demand the attention of a commercial developer of instructional software, making it an ideal application for a teacher-generated program.

Because Filevision-based lessons are created and used in the same domain, the creator of an instructional unit can lock the picture file so users can't change it—an especially important feature if you're creating a large module.

The Missing Link

Just as separate graphic elements can link together in Filevision to create a complex object, Filevision supports another type of linking that is of tremendous benefit to creators of educational software—the ability to link several databases together.

As an example of how linked databases might be used, consider the creation of a lesson on the solar system. The main screen might contain a slice of the sun with the nine planets strung out in a row to show their relative sizes. As you select each planet with the mouse, its name appears below it. You can then choose one of two options: (1) view a data form with a brief summary of the planet's features or (2) automatically link to another picture file that shows a more detailed view of the planet, along with its moons.

This new file is a different database that contains its own objects. The nature and detail of information in this file can be quite different from that in

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the original picture. For example, the in-depth file on Saturn might contain different data objects for the planet itself, the rings, and the moons.

How It Stacks Up

Because Filevision keeps track of linked files in an internal register, you can go back and forth through many levels without ever having to know a file's name! This freedom encourages learners to browse through a multidimensional domain without thinking about anything except the material being covered.

If Filevision has a limitation as an authoring system, it is that all Filevision applications look like databases. Because the database metaphor is useful across most subject boundaries, however, Filevision-based software can be created for almost any field of study. Educational templates have been created for fields as diverse as veterinary medicine, chemistry, biology, history, and mathematics—to name just a few. Many are available commercially or in the public domain. Telos offers a free catalog of public-domain templates and is happy to answer queries about commercial templates as well.

I don't mean to say that the original version of Filevision couldn't be made even more useful. For example, the original version does not let users incorporate images clipped from MacPaint or from video digitizers such as MacVision. This ability (along with numerous others) has been incorporated into the recently released Business Filevision, but Business Filevision requires a 512K Macintosh and an external drive. The less-expensive original product will be well suited to plenty of applications.

The utility of Filevision as an authoring system justifies the use of the Macintosh as an instructional computer at all grade levels, but I know that schools are not going to rush to replace their Apple-II-series computers with Macs—at least not immediately. I, for one, would be quite happy if a slightly-trimmed-down version of Filevision became available for the expanded Apple IIe or IIc.

Filevision has the potential to make every educator a creator of instructional software.

This direct-manipulation programming tool has the potential to make every educator a creator of instructional software as well. ✚

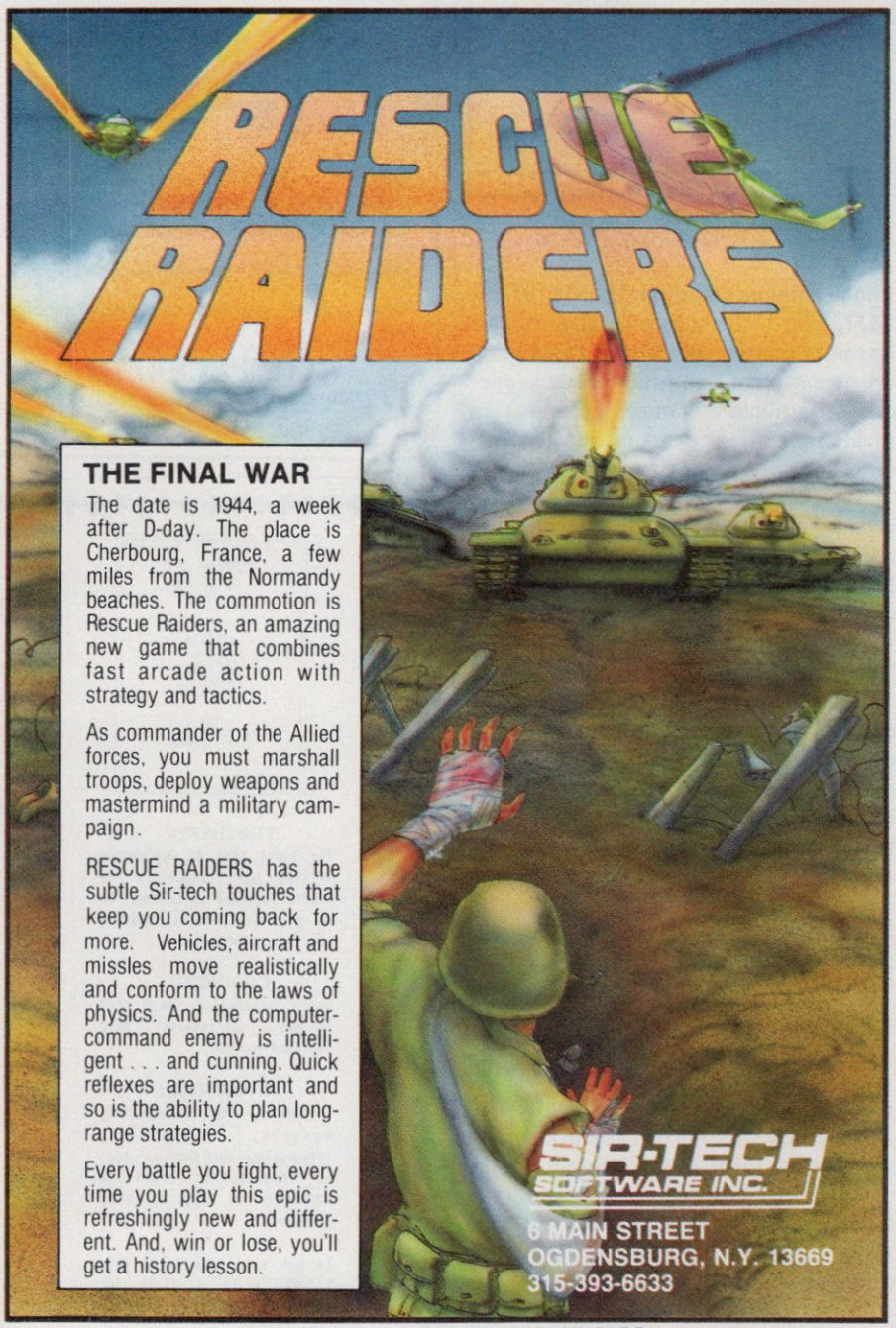
Dr. David Thornburg has been active in the field of personal computers since 1978. He is the inventor of the KoalaPad touch tablet and is the principal designer of Muppet Learning Keys. He has written more than ten books on computing, many of which are of interest to educators. He welcomes reader comments, which you can send c/o A+, 11 Davis Drive, Belmont, CA 94002.

PRODUCT INFORMATION

Filevision and **Business Filevision**
Telos Software Products
3420 Ocean Park Blvd.
Santa Monica, CA 90405
(800) 554-2469
in CA (800) 368-3813

List Price: Filevision, $195; Business Filevision, $395

Requires: Filevision—Macintosh, 128K RAM; Business Filevision—Macintosh, 512K RAM, external disk drive or hard disk



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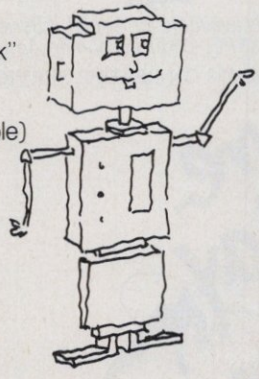
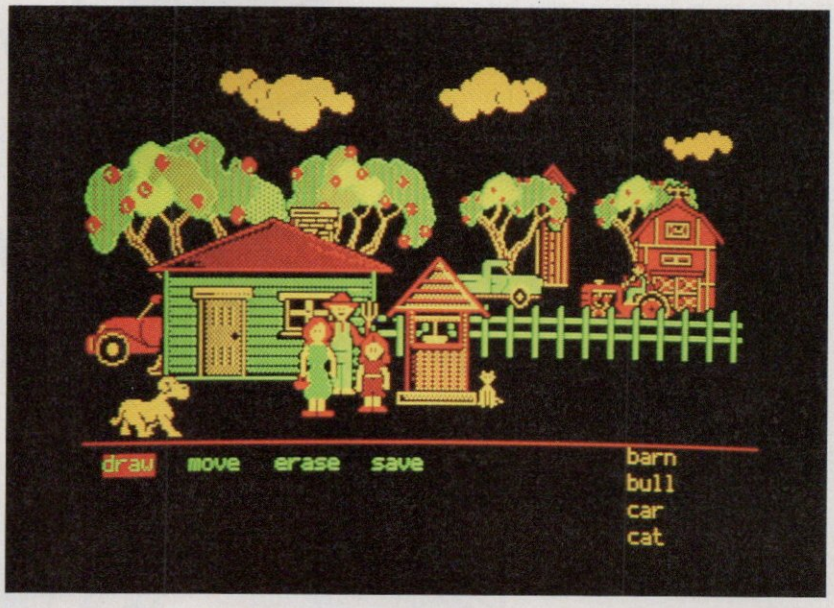
Ruby the Scene Machine™

Compu-Teach™

The Farm

The video "coloring book" that builds vocabulary (IBM and Apple)





Ruby the drawing robot lets youngsters take command. Her Scene Machine is a highly interactive game that creates an endless variety of pictures based on familiar farmyard objects.

Easy to control and simple to use, Ruby draws objects that the youngster chooses and places them anywhere in the frame, on command. Drawings are created from a menu of available objects, so that vocabulary, spelling and reading skills are all involved as the child makes choices. All of Ruby's objects are common in a child's world, and appear frequently in the reading exercises of early schooling.

In addition to reading skills, Ruby also teaches perspective and spatial relations. Objects can be placed in front or in back of each other, can be made to appear large in the foreground or can "shrink" into the background.

Favorite pictures can be saved and even reproduced. All the possibilities make for endless variety in a game that challenges the imagination.

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Like all Compu-Teach programs, Ruby the Scene Machine has been developed by leading educators including our founder and Chairman of the Board, Roger Schank, Ph.D. Dr. Schank is professor of computer science and psychology at Yale University and founder of the Artificial Intelligence Project. His guiding principle in developing educational software is that learning is an active process. Compu-Teach presents children with enjoyable and highly interactive situations – games that teach important concepts.

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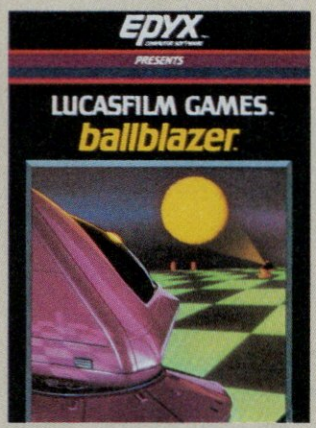
GATO

THAT'S entertainment



Are games on your holiday gift list? Read this special section before heading for the nearest software counter.

3-D DELIGHT

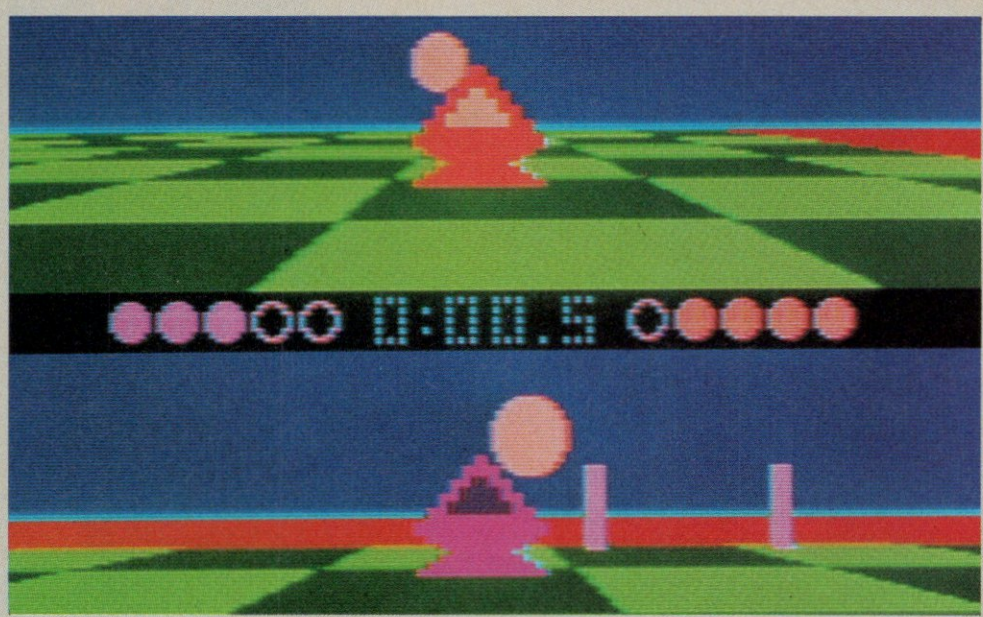
The poor starfish! It's single, lonely eye captures the earth's beauty. The visual wonders of 3-D are denied to many sea inhabitants and other forms of life. The magic of stereoscopic vision requires two eyes situated in close proximity on the front of the face. (Creatures such as elephants, having one eye on each side of a protruding skull, lack depth perception.) For 3-D vision, both eyes must be parallel, sharing an overlapping optical field. Each eye reveals a slightly different angle to the brain; the combined perspective—a retinal composite—projects a seamless 3-D picture.

Human beings, lacking the extraordinary gifts of night vision, hindsight (in the literal sense), telescopic ability, and other traits of a multitude of sharp-eyed earth dwellers, nevertheless exhibit nature's most exciting ocular treasure: 3-D viewing.

Capitalizing on this trait, a 3-D tidal wave has flooded the coin-operated- and home-based-game market. No actual scenes appearing on any screen involve 3-D glasses or filtered lenses, but most still portray a realistic illusion of 3-D imagery, employing highly sophisticated graphic cues.

Ballblazer, one of the latest examples, is from Epyx Computer Software and Lucasfilm Games. You play a fast-action, soccer-type game with your opponent (he, she, or Apple) on a 1155-square grid, riding a glider known as a Rotofoil and shooting a high-energy ball between two roaming goalposts. Your computer horizontally reveals a split-level view of two different scenarios, your rival's perspective and your own. The twin-screen, 3-D format resembles a similar type of 3-D scrolling in two previous games, Capture the Flag and Wayout, both designed by Paul Edelstein.

Ballblazer's features include the ability to steal each other's ball, guide it around the playing field, and "pushfield" it for a



goal. You can also coast like a hockey player, aim for long shots, and choose different game options. Your joystick or keyboard controls your movement forward or backwards, left or right, and diagonally.

In addition, a rubbery electro-border on each side of the grid plane produces a spring-cushion effect. You can deflect the ball against this electro-border to score various hook shots. In order to achieve Masterblazer status, you must rely on two essentials, strategy and dexterity.

The colorful, vivid graphics reveal front and side angles of moving shapes all around you—a total, embracing 3-D effect. Liquid kinematics put you boldly into the scene of action. Ever-changing grid squares race by you and heighten the sense of depth and motion.

The Epyx/Lucasfilm folks have perfected the art of fluid animation, and Ballblazer is destined to be a 3-D classic.

John DiPrete

Ballblazer
Epyx/Lucasfilm Games
1043 Kiel Court
Sunnyvale, CA 94089
(408) 745-0700
List Price: $40
Requires: Apple II, II Plus, IIe, or IIc; 64K RAM; one disk drive; joystick optional
CIRCLE READER SERVICE NO. **400**

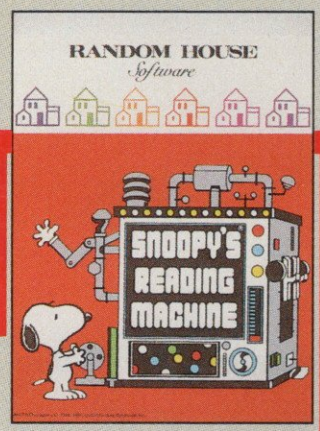
SPELLING OUT THE WHOLE PICTURE

Random House Software's special Apple game series for children portrays the world's most lovable reinforcers—the Peanuts gang.

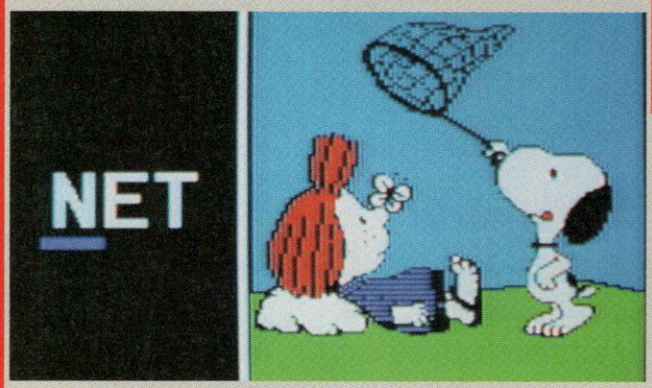
Let's take one game from this predominantly educational line of programs, Snoopy's Reading Machine, designed for youngsters aged 3 to 7. This particular teaching tool presents on the computer screen a host of wonderful scenes in response to the correct keyboard-controlled or joystick-directed choices.

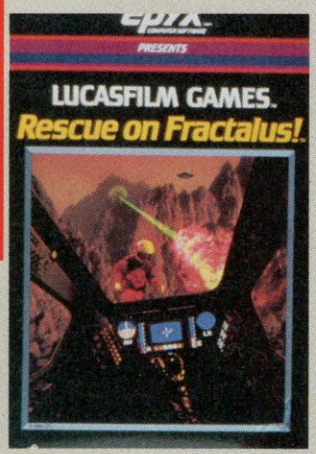
The program offers five basic word families—AT, ET, IG, OP, UG—for the purpose of forming simple words. The word families AT, ET, and IG appear on side 1; the word families OP and UG and Snoopy's word game are on side 2.

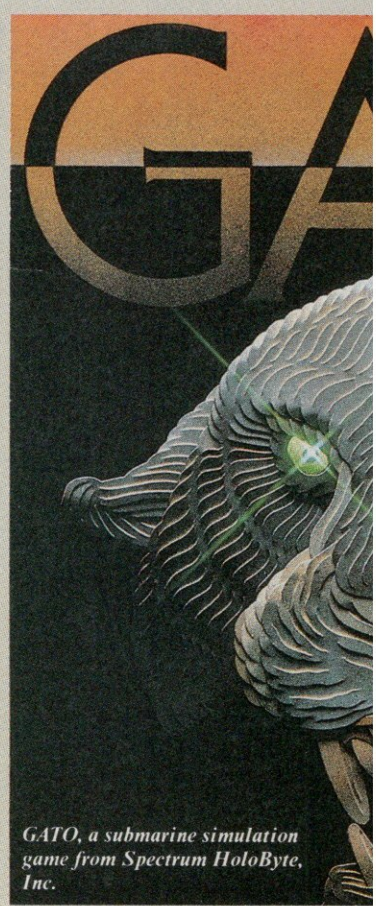
The game has three levels of difficulty. In each level, children can choose which word family to work with. In level 1, the goal is



Right and below: Snoopy's Reading Machine, from Random House Software, is designed for ages 3 to 7.



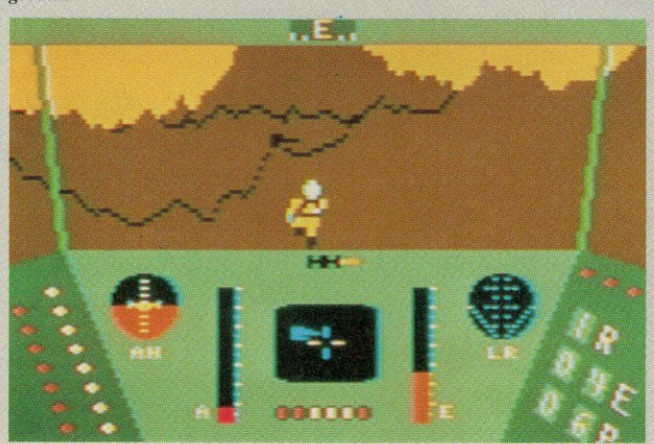




GATO, a submarine simulation game from Spectrum HoloByte, Inc.

Crusade in Europe from MicroProse Software

Right and below: Rescue on Fractalus!, from Epyx/LucasFilm Games, is a shoot-'em-up, one-player pilot game that takes place in a spaceship cockpit. Your goal is to rescue stranded air pilots on the ground.



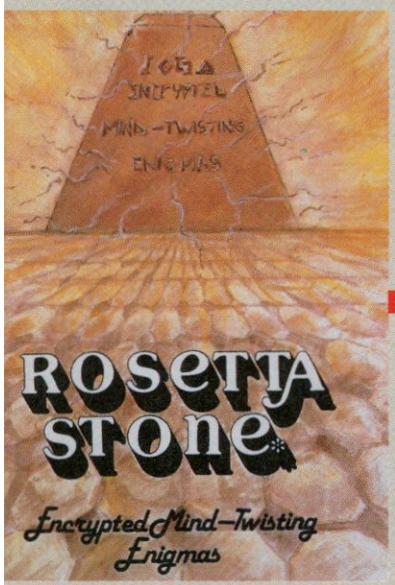
to create a simple picture. A word family appears on the blank screen. When a child adds a first letter to this family to form a word, a corresponding illustration appears.

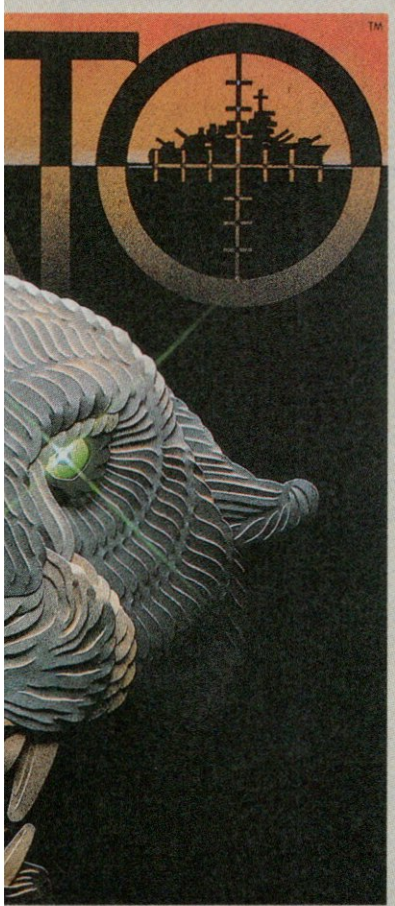
In level 2, the screen depicts a picture that represents a word, accompanied by the appropriate word family. Selecting the correct first letter to form the word corresponding to the picture completes the scenario. Immediately, a brief, animated musical sequence involving one or more Peanuts characters comes to life with a skit that somehow involves the word.

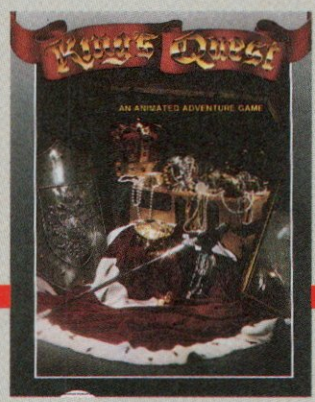
Level 3 resembles level 2, except that players must type in the correct first letter to word families. (In the previous levels, the space bar or joystick changed the first letter each time to form a new word.) Level 3 offers the same type of colorful, animated graphic reward.

Snoopy's word game on side 2 features the same types of action scenarios and picture completions but is more complicated, since players must unscramble word families to form words. Wrong choices, of course, always fail to inspire the computer. (Unfortunately, the right choices do not materialize on the screen after mistakes to enlighten error makers.)

A warning to adults: You will have to stick close to your kids when they're learning how to operate the various levels, at least during the initial stages. The

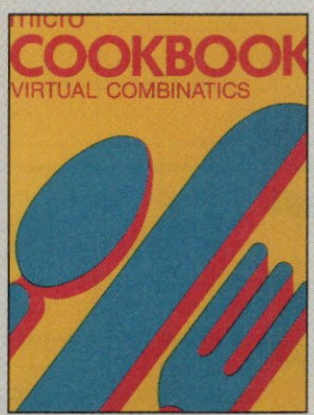


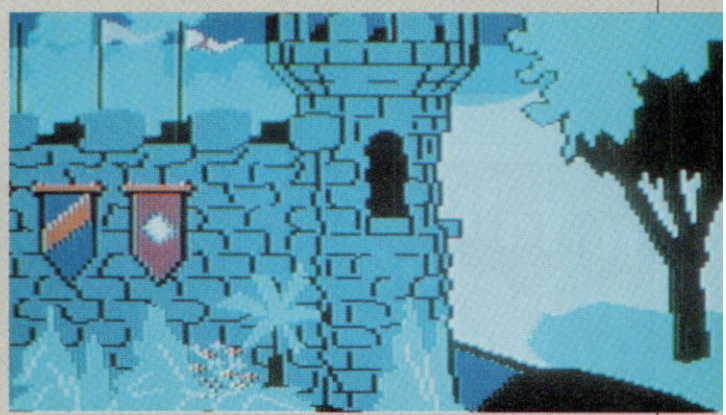




Left: Rosetta Stone, a decoding game from Hunt's Software Works. Below: Micro Cookbook from Pinpoint Publishing

Right and below: King's Quest, from Sierra On-Line—a leap ahead of graphic adventure games of the past





Wishbringer, from Infocom, Inc. gives you a magic stone with the power to grant seven wishes.

written and screen directions for this program are a bit vague in places. I found trying to start Snoopy's game on side 2 especially tough going. (Hint: To play this part of the program, search through the word families until you find the title "Snoopy's game" and enter that.) Trial and error do set things right in time, however, and once you get going, both sides of Snoopy's Reading Machine provide entertainment and knowledge.

Preschoolers should enjoy learning the basics of good reading skills with this program.

John DiPrete

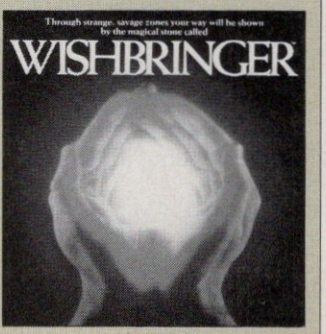
Snoopy's Reading Machine
Random House Software
201 East 50th Street
New York, NY 10022
(800)241-6042
List Price: $39.95
Requires: Apple II Plus, IIe, or IIc; 48K RAM; one disk drive, joystick optional
CIRCLE READER SERVICE NO. **401**

WHEN YOU WISH UPON A STONE

What would you wish for if you were suddenly granted seven wishes? Wealth? Culture? Social position? While playing Wishbringer, Infocom's newest text-adventure game, you come into possession of a magic dream-stone that has the power to grant seven wishes. Think about it—seven wishes. That's pretty generous, considering that most genies give you three wishes and most birthday cakes allow only one.

According to *The Legend of Wishbringer*, a pamphlet reprinted by the Historical Society of the Festeron Free Public Library and included in the game packaging, seven specific wishes are bound into the stone. During the course of the game you may be able to wish for rain, advice, flight, darkness, foresight, luck, and freedom. The wishes, if you use them wisely, can help you solve the puzzles and obstacles that hinder your quest.

In Wishbringer, you are a postal clerk in the small seaside village of Festeron. Your mean boss, Mr. Crisp, orders you to bring a special-delivery letter to the proprietoress of the magic shop on the other side of town. All in a day's work, you think. But you begin to get suspicious when one of



the townspeople, the gravedigger, sees the outside of the envelope and tells you he thinks he buried that old woman years ago.

You ignore the gravedigger's mutterings—after all, a person who spends all his time in a spooky graveyard has got to have some strange notions, right?—and you dutifully hand the letter to the woman.

Uh-oh—it seems that the letter is really a ransom

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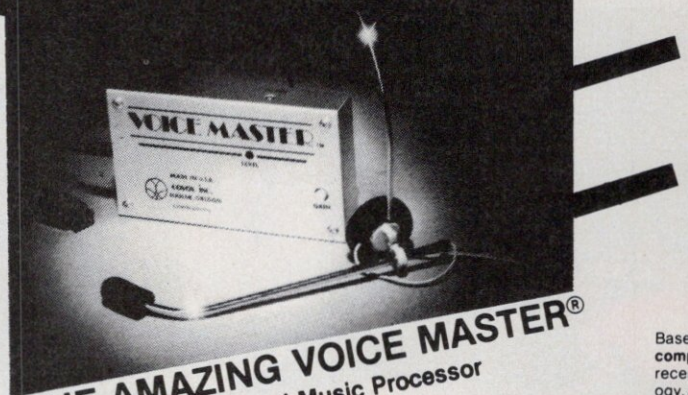
It Recognizes!
It Writes Music!
and more . . .



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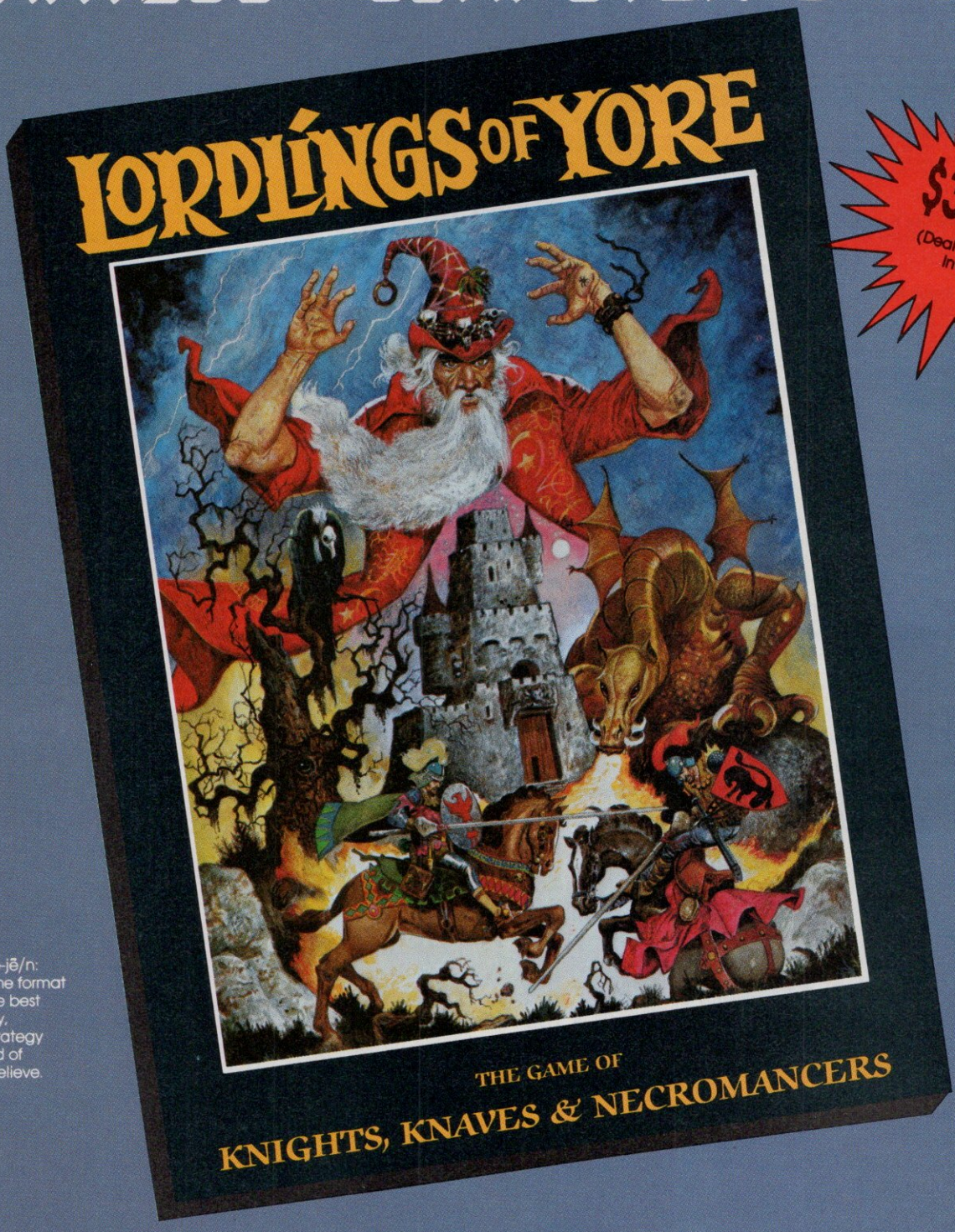

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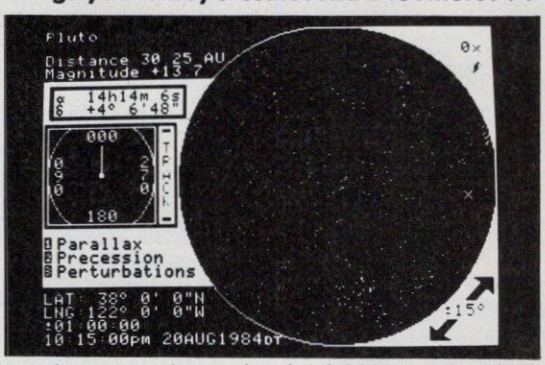

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THAT'S entertainment

note. The old woman's cat was stolen by someone called the Evil One, and the price for its return is none other than the magic stone, Wishbringer. The old woman pleads with you to find her cat and bring it back. Before you even have time to blink, she ushers you out of the shop, and your troubles begin.

Your once peaceful town is now barely recognizable; it has been transformed into a seething pit of wickedness. A vulture hovers overhead. The town goldfish has become a piranha. You hear the marching of boots. Are they searching for you? The ransom note said you had until dawn, and the clock is ticking away . . .

As has become standard for all Infocom products, the game packaging is unique and intriguing. Along with the disk and the pamphlet, you get a mysterious sealed envelope, a postal map of Festeron, and an enchanted stone that glows in the dark. Really!

Infocom has labeled Wishbringer an introductory-level game, which means that it won't be intimidating for novice adventurers. Using the magic stone is one way of making the game easier, but you can solve all of the puzzles with logic alone, which makes the game challenging to experienced adventure players. Trust me, no matter how many other games you've played in the past, you're going to make good use of all eight save-game positions.

So, have you figured out what you'd wish for if you had the chance? I don't even need a moment to consider. I want more Infocom games. When Infocom releases a new game, the question that goes through your minds should not be "*Should* I get the game?" but, rather, "*When* should I get the game?" And the answer should always be "Immediately."

Donald Oliver

Wishbringer
Infocom, Inc.
125 Cambridge Park Drive
Cambridge, MA 02140
(617) 492-1031
List Price: $39.95
Requires: Apple II, II Plus, IIe, or IIc; 48K RAM; one disk drive
CIRCLE READER SERVICE NO. **402**

EUROPEAN WAR EFFORT

With the advent of computer games such as Eastern Front and Armor Assault in recent years—and now Crusade in Europe—the war gamer's dream has come true. Real-life simulations of historical battles and hypothetical future crises, once confined solely to board games, have sprung to life in computer game programs.

MicroProse's latest war effort features the reenactment of the Battle of the Bulge, the Normandy Invasion, Operation Market-Garden, and other World War II campaigns. Players must choose their opponent (the computer or a human rival), the specific historical event, and the type of scenario and/or hypothetical variant. (The hypothetical variants set up astonishing possibilities. For instance, what if the Germans had scored significantly better in the Battle of the Bulge?) Each scenario features a different set of rules and victory conditions.

Your joystick or keyboard controls the plotting

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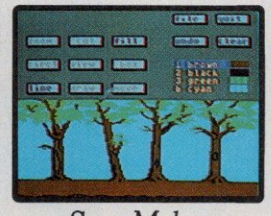
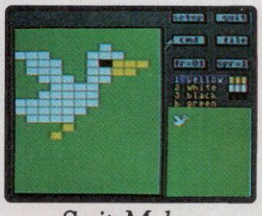
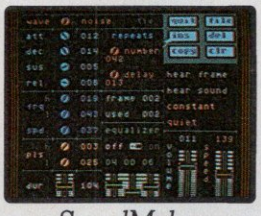


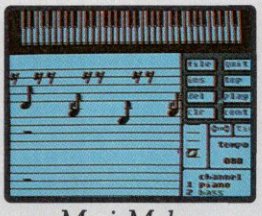
SceneMaker



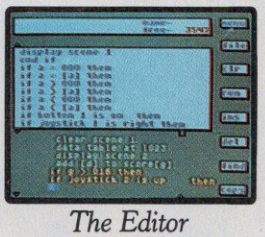
SpriteMaker



SoundMaker



MusicMaker



The Editor

"(GameMaker is)...designed for everyone who has ever wanted to build his own computer game, but never had the time to learn assembly language."

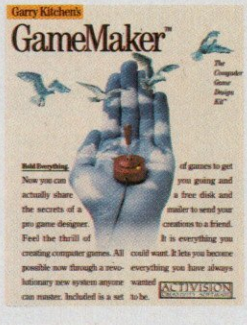
—Ric Manning/Louisville Times

There's no question! Now is the time to turn that great game idea of yours into a real piece of computer software. With GameMaker, Garry Kitchen brings you the single most powerful computer game design tool ever offered. But he didn't stop with just power. He put all the tools of his trade together and then made them more accessible than ever before for owners of the Commodore 64/128 and the Apple II series computers. GameMaker includes these incredible tools:

SceneMaker. Create the background scenes for your game. Either use scenes that have been pre-programmed or create scenes of your own.

SpriteMaker. Create the characters or objects that move in your game. Use full animation to make them life-like. You can select from many pre-programmed sprites or you can create almost any kind you can imagine.

SoundMaker. Smashing, blasting, singing, whooshing and a whole lot more can be created, or you can select from a variety of commonly-used effects already created for you.



MusicMaker. A little musical introduction for your creation? How about some background music or a grand finale? You can create it all.

The Editor. This is where you bring together all the components you created with SceneMaker, SpriteMaker, SoundMaker, and MusicMaker. All the commands needed to make a game program are listed for you. Just choose the ones you want to use, put them in order, and presto! Your new game is off and running.

The Design Contest.

If you've always thought you had some great ideas for games (and you know you have), there's never been a better time or a better way to get them on a disk. Because you can enter the GameMaker Design Contest, and, if your game is judged to be the best, we'll publish it! And that will make you a published software designer. Has a nice ring to it, doesn't it? Published...Software...Designer. Design the most exciting and creative computer game you can imagine and send it to us. All the rules and information for this unique contest are in specially-marked GameMaker packages. Gentlemen—and ladies—start your minds.

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Ultima IV

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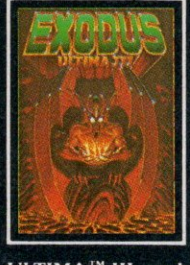
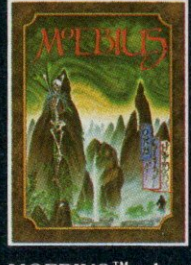


ULTIMA™ III sends you on an incredible fantasy role-playing journey through monster-plagued Sosaria in search of the elusive Exodus.



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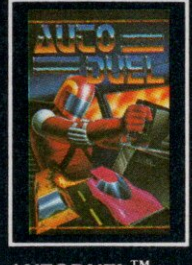
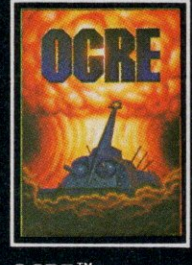


AUTODUEL™ is a futuristic, fast-paced strategy role-playing game where the right of way goes to the biggest guns.



OGRE™ is a strategy game fought on the nuclear battlefield of tomorrow as an inhuman juggernaut Cybertank battles conventional forces.

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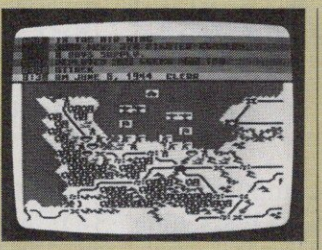
CIRCLE 145 ON READER SERVICE CARD

of moves, dictated by your military strategy. You direct a cursor over a map of land and water regions; the scrolling screen presents a bird's-eye view showing famous sites of conflict, positions of deployed troops, and cities and towns.

The war action is telescoped into "accelerated real-time," which means a span of eight "real" hours takes place in several computer seconds.

While simultaneous action goes on (contrary to most opponent games, in which individuals take turns) players can check the status of units, thus receiving vital information on strength and experience levels, and program troops to attack and defend, move to designated areas, or report for repairs.



Additional features enable you to handicap either the Germans or the Allies, save a game, replay past battles, increase or decrease the speed of play, and use a host of other practical aids.

The complexity of the functional graphics, perhaps for the sake of brevity, do not exceed symbolic shapes for units and terrain. No matter: The game's beauty dwells elsewhere.

Actually, to give a complete rundown would require a 55-page manual, which—in fact—comes packed with this software. The manual itself reflects the depth of research that went into this design. Certain historical portions of the text capture the essence of World War II with striking factual detail and even moments of philosophical insight. The following passage from page 37 reveals the high quality of the writer's knowledge and expertise: "If the Allies' crusade in Europe proved anything, it proved that, having come to power because he understood that trust in others could be a source of weakness, Hitler ultimately lost power because he could not understand how it [the Allies' trust in each other] could be a source of strength."

Crusade in Europe recreates, in true war-gaming style, the authentic scenery, props, and atmosphere of this period in almost idiosyncratic wholeness—an impressive achievement. Although I personally found the sheer bulk of the data almost foreboding, certainly most beginning and expert war-gaming fans will relish the mass of particulars.

John DiPrete

Crusade in Europe
MicroProse Software
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Hunt Valley, MD 21030
(301) 667-1151
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"IT'S LIKE PLAYING AN ANIMATED CARTOON!"

From a review of King's Quest,
Computer Games Magazine

No other computer games combine the graphics and animation of Sierra's bestselling 3-D Animated Adventures. They feature:

- **dozens of animated characters that come alive--they walk, talk, run, climb, even swim!**
- **hundreds of three-dimensional screens more detailed than any seen before--animated characters pass in front of trees, behind rocks, even around other characters!**
- **optional joystick control--use keyboard with optional joystick to guide the main character around a fantasy world.**
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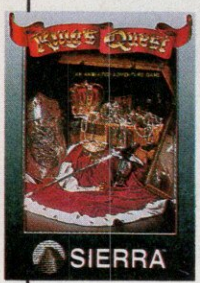

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The Black Cauldron: *"the closest thing yet to a living game"—Roe Adams, Computer Gaming World Magazine. Developed with Walt Disney Personal Computer Software Staff. For IBM PC/PCjr, $39.95.* © 1985 Walt Disney Productions.

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THAT'S entertainment

SCI-FI SHOOT'-EM-UP

After the astonishing success of *Star Wars*, *The Empire Strikes Back*, and *Return of the Jedi*, what type of endeavor could further engage the awesome mental capacity associated with George Lucas? Hint: The answer relates in some way to this section, "That's Entertainment." You guessed it: computer games!

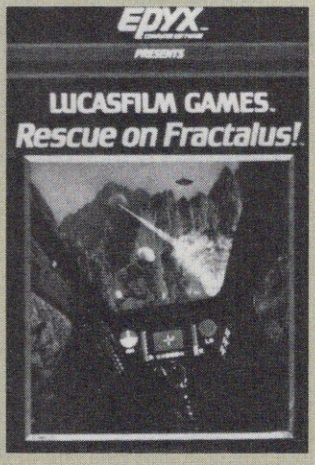
The tentacles of fame and fortune have branched out into software aimed at science-fiction enthusiasts. Yep, the Lucasfilm people now strike back with Rescue on Fractalus!, a shoot-'em-up, one-player pilot game that takes place in a cockpit.

You pit your spacecraft against Jaggi saucers, gun emplacements, and other dangers from the planet Fractalus. Your joystick guides you up or down, left or right, while you travel forward, positioned in front of the ship controls.

Staring out through the main window at the 3-D landscape, you must dodge the enemy and hit various targets on your journey. Wheeling and dipping as if you were in a real ship, you must scale up mountain walls, plunge through gaps in jagged outcroppings, and avoid death in the sky.

Your goal is to rescue stranded air pilots on the ground. First, you must track down the victims on your long-range scanner, land your vessel, and then open your air lock to admit your passengers.

A fuel indicator registers your power supply at the right of your targeting scope (you maintain fuel by rescuing pilots and returning periodically to the mother ship). Additional instruments below the main window reveal the number of enemies shot down, pilots remaining to be rescued, your ship's altitude and compass direction, and other data. You press the Apple's first joystick button to fire torpedoes.



Whoa, there! I think we've painted the general picture. Let's pause to take a breath. Now, then: Does it sound exciting so far?

Well—if it does, sorry. Rescue on Fractalus! rates only a passing C in the 3-D and shoot-'em-up game categories. Here are a few of my gripes: I found the images of mountains too monotonous, too typical, and too mundane. The forward-scrolling graphics present a relentless, artificial scene of unfolding brown terrain. Worst of all, the entire scene shifts around too much, at the slightest touch of your joystick. Also, the tiny targets strewn about the mountains

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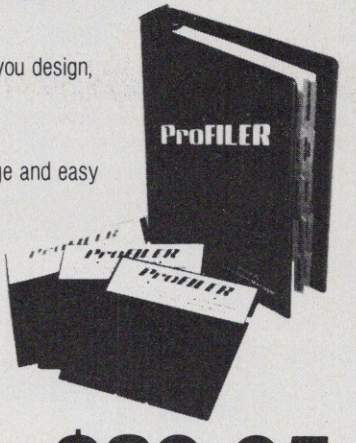

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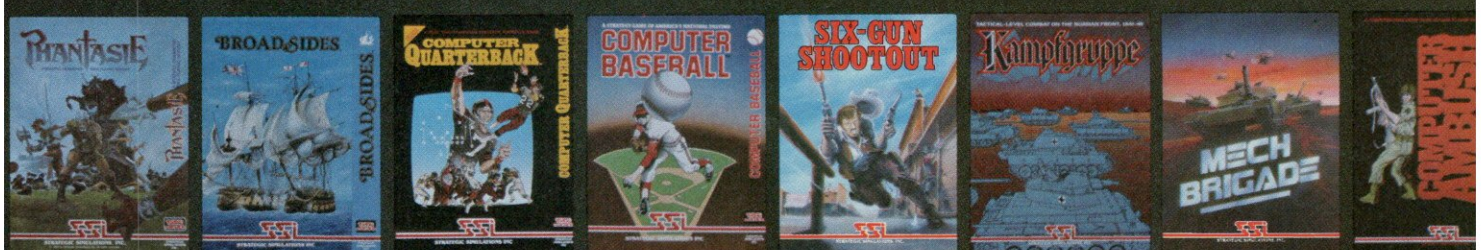

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lack detail and charm.

In terms of plot, the routine of hunting and rescuing lost pilots is boring. It's a hunting/gathering mission, little else.

The design and function of the cockpit incorporate several nice touches, and the concept of night flying is nice, but again some sterility creeps in. Do we really care about the annoying and picayune wealth of sheer detail?

Burned me out with this one, Lucaspeople. I think I'll go back to Ballblazer, a game that really shows off your 3-D talents.

John DiPrete

Rescue on Fractalus!
Epyx/Lucasfilm Games
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Sunnyvale, CA 94089
(408) 745-0700
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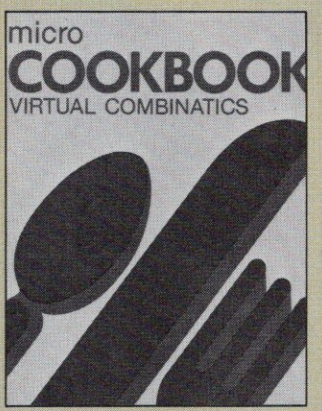
ELECTRONIC COOKBOOK

What's for dinner? Twelve people will be at your dinner party. You need to have about five courses (some of which must be meatless for your vegetarian guests). What should you cook? What do you need to buy?

Not to worry! All you need to do is think of a theme—let's say Oriental. Then you let your Micro Cookbook do the work—well, some of the work. Micro Cookbook can select the recipes; modify them to serve 12; print them, if necessary; and even make up your shopping list.

The Micro Cookbook is an electronic cookbook with recipes making up the bulk of the stored data. Like more conventional cookbooks, it also contains a glossary, charts, and tables to help in cooking.

The package includes a program diskette and a Basic Recipes diskette containing more than 150 recipes. Eleven additional recipe diskettes are available at this time. Some—Appetizers, Breads (Regular or Food Processor ver-



sions), Meatless Meals, and Soups and Salads—focus on a specific kind of food. Three diskettes concentrate on method of preparation: Food Processor Cookery, Microwave Cooking, and Wok Cookery. And you can also get specialty disks: Colozona Special Diet Recipes, Kid's Cookery, and the soon-to-be-available Holiday Cooking.

Plenty of Choices

The program offers five ways to choose a receipe from any of the diskettes. You can view an index of recipe names, or you can start by looking at the Classification index to find something Greek, for instance. In the latter case, the Cookbook gives you a list of all the Greek recipes for your further choice.

If you're more concerned with using a certain ingredient—chicken, for instance—you begin with the Ingredient index. Here you will get a list of recipes that use chicken. You can also combine the classification and ingredient search, by indicating that you want a Greek recipe that uses chicken. A list of all the Greek recipes with chicken will appear on the screen.

Last, if you know the name of the recipe you want, you can type the name (or as much of the name as you can remember, along with an asterisk for the forgotten part) and go directly to the recipe without using an index at all.

> Let Micro Cookbook plan your party meals.

You can also enter new recipes to the Basic Recipes diskette, to any of the additional chapters, or to a recipe diskette you create yourself. (Each Cookbook diskette can hold up to 255 recipes.) To maintain your recipes and make the best use of them, various program options let you adjust serving sizes; switch recipe files; modify or remove recipes; and print recipes, shopping lists, and indices.

The program also includes some desktop functions unrelated to recipe management. One is a calculator, and another is a scratch pad (ProDOS version only) that permits you to use part of memory to hold something you may want to print later. The desktop functions also let you move easily to AppleWorks.

As a cookbook, the program is most valuable to users with a computer in the kitchen or an adjoining family area. The recipes are interesting and palatable.

Even a Child Can Do It

The Micro Cookbook's recipe-retrieval system is fast and simple enough that my 11-year-old can use it, following only screen instructions. Recipe maintenance is more complicated, however.

The desktop functions are nice, but the scratch pad scrolls too quickly to be read; it's better just to print the contents.

Pinpoint's technical support people are readily available; they return calls and answer letters.

Mary Jansiewicz

Micro Cookbook
Pinpoint Publishing (formerly Virtual Combinatics)
P.O. Box 13323
Oakland, CA 94661-0323
(415) 530-1726
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DAVENTRY'S DILEMMA

"Sir Graham, I am an old man. I fear my end is near. I have chosen you to prove yourself worthy of the throne." The king's words kept ringing in my ears as I searched the kingdom far and wide for the three magical items that, if rightfully returned, would make Daventry wealthy and strong. Now, as if the king's little bombshell weren't enough to send me reeling, you could've knocked me over with a four-leaf clover when I found out that

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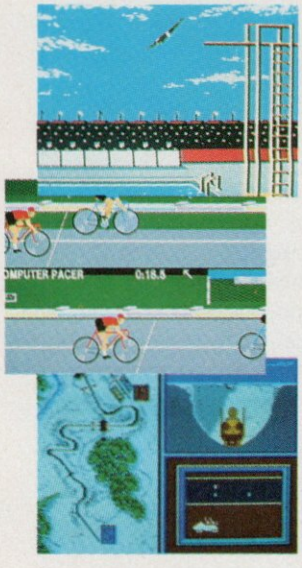

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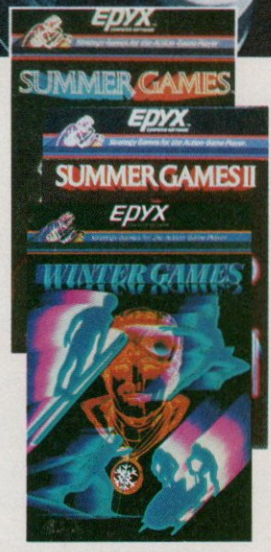

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Sierra On-Line had turned my mission into a graphics adventure game! Before I go further, I'd better introduce myself: I'm the aforementioned Sir Graham.

So, as I was saying, I *had* to rush out and get the game posthaste. And when I booted it up on the king's personal computer (Daventry's a thoroughly modern medieval kingdom, you see), I was truly amazed. It's a dazzling game, if I do say so myself.

As I wandered through the 80 or so locations in the game, I was first struck by the sheer beauty of the screens. The lakes are clean, pure, and swimmable; the trees are strong, tall, and (sometimes) climbable; and the grass is a verdant green (the double-hi-res graphics perfectly capture the vibrant colors of the land). A staggering leap ahead of all graphic adventure games of the past, King's Quest has remarkable three-dimensional ef-

fects. You'll be downright tickled when you make me walk all the way around trees and go behind walls and buildings!

Anyway, Daventry has lots of people to transact with. Some of them are friendly and helpful like my Fairy Godmother, but you'll have to do some quick thinking to assist me in dealing with some others, such as the Wicked Witch, the Giant, and a crotchety old gnome. Are you ready for what this gnome told me? He said that if I could guess his name, he'd give me something useful. Now, OK, I'm a sucker for riddles, but even though I got three guesses, I couldn't figure it out. I tried Abner, Herman, and even Shirley, but none of those were it. I even called him by the name of that *famous* gnome from the neighboring kingdom (he's some kind of a weaver), thinking these two guys might've switched identities, or maybe they were twins or something, but I still came up empty-handed. I've heard some of the things gnomes are being called these days, so this fare-thee-well's name could be *anything*! I was about to give up, when I read (in a tasty place) that I ought to be thinking backwards. Well, *excuse me*! I'm having enough trouble thinking forwards.

Since there's more than one way to skin a cat, there are several solutions to some of the puzzles in King's Quest. A touch of the Tab key shows the score (164 points maximum). Don't be afraid to try different things to see what produces the best score.

Oh, I almost forgot to tell you the neatest feature of all: 26 save-game positions. Usually, adventure games have only 8, but I figure since Sierra On-Line had me for a star, they knocked themselves out to improve the trappings.

So, just take it from me,

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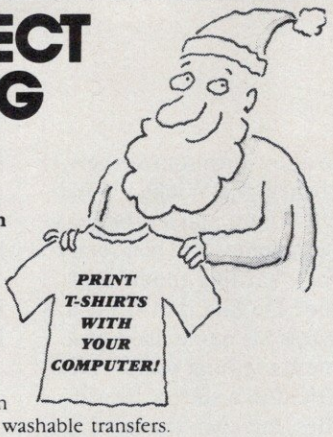

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Data Dynamics
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you have to get this game. When you see my likeness on your monitor, you'll be able to tell I'm a pretty honest guy. I'm not receiving royalties or anything from it—it's just that King's Quest is terrific. And if you can succeed in helping me find the mirror, shield, and chest, expect a few surprises from my boss, the king. I've also heard rumors around the castle that there's going to be a sequel, called King's Quest II: Romancing the Throne. How can it miss, since I'm going to be the star of that one as well?

Sir Graham
(Donald Oliver)

King's Quest
Sierra On-Line
P.O. Box 485
Coarsegold, CA 93614
(209) 683-6858
List Price: $49.95
Requires: Apple IIe or IIc, 128K RAM, one disk drive
CIRCLE READER SERVICE NO. **406**

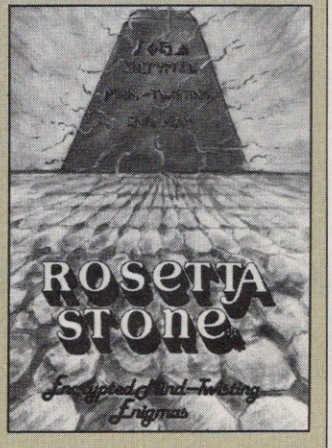
A SLOW-PACED GAME FOR FAST MINDS

Don't confuse Rosetta Stone with *Romancing the Stone*. Rosetta Stone from Hunt's Software Works is billed as encrypted mind-twisting enigmas and not as a series of cliff-hangers. So what if it is not action-paced and uses no animated graphics. It has some of its own unique and interesting qualities.

Rosetta Stone is a decoding game with nine different levels for people aged 10 and up who like to decipher mystery messages. A random clue sentence from a specific list of topics such as trivia, dinosaurs, or children's literature is displayed on the screen. Using the clue sentence and your own hypotheses, you must decode a new sentence. Your reward for all of your hard work is a rousing refrain of "Hail, Hail the Gang's All Here."

This product incorporates three different types of decoding tasks into the nine levels. Level 1 involves a simple character-for-character substitution from what looks like Egyptian hieroglyphics to the English alphabet.

Level 2 features group reversal, where you must unscramble a message by



dividing characters into groups of constant length and reversing the letters in each group. Level 3 is similar, but this time the groups of letters are rotated throughout the mystery message instead of being reversed. This process of grouping treats spaces like other characters, making your task more difficult. No hieroglyphics appear in levels 2 and 3. Level 4 gives you random practice with the first three levels—any type of game may appear in it. Levels 5 through 9 progress from difficult to impossible and combine two or three of the decoding tasks.

As you might have guessed, Rosetta Stone can take some time to learn, and you can become very in-

MYSTERY! INTRIGUE! ADVENTURE! EXPLORE THE WORLD'S GREAT CITIES AS YOU STALK A MASTER THIEF TO THE FAR CORNERS OF THE GLOBE!

"Excuse me, have you seen this woman?"

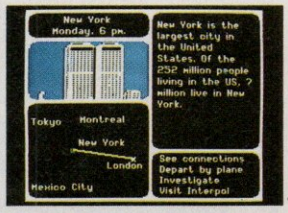
EXPLORATIONS

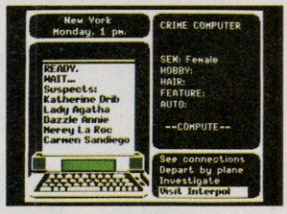
WHERE IN THE WORLD IS CARMEN SANDIEGO?™

BY DANE BIGHAM

SOMEONE HAS MADE OFF WITH the Statue of Liberty's torch...and you've been assigned to the case! This could only be the work of *Carmen Sandiego and her gang*—the dastardly crew that has sworn to swipe each and every one of the world's most famous landmarks and treasures.

You're off on a whirlwind international chase! From London, to Bamako, to Peking, to Kathmandu...you'll find yourself in one strange city after another, with only your Crime Computer and your trusty copy of The World Almanac to guide you. You'll learn to use your computer and Almanac together to find your way around and decipher the clues you uncover. And, with enough dogged detective work, you'll soon collar the cunning culprit.





But don't get overconfident! The Mona Lisa, The Crown Jewels... you've got more treasures to protect, more cases to crack, more crooks to catch.

So now that you know what you're up against, what in the world are you waiting for?

WHERE IN THE WORLD IS CARMEN SANDIEGO? *combines all the best aspects of graphic adventures, mysteries, and arcade animation in a captivating crook's tour of the world. It comes complete with* The World Almanac® *and Police Dossier on Carmen and her gang. Players can work together, with one operating the computer while the other scours The Almanac and Dossier for vital information. With 10 possible suspects, 30 cities, and nearly 1,000 clues,* Carmen Sandiego *is a different game every time you play—for endless hours of family entertainment.*

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WHERE IN THE WORLD IS CARMEN SANDIEGO? is available for Apple personal computers. Look for it at your favorite Brøderbund Software dealer. For more information about Brøderbund products, please write us at 17 Paul Drive, San Rafael, California 94903-2101. Apple is a registered trademark of Apple Computer, Inc. The World Almanac is a registered trademark of Newspaper Enterprise Association, Inc. © 1985 Brøderbund Software, Inc.

volved. Fortunately, you can save games at any point and pick up where you left off, which is especially useful in school settings.

> Rosetta Stone can take time to learn, and you can become very involved.

The eight pages of instructions that accompany the program are brief and to the point. On-line hints and instructions are also good, but the best way to learn is by doing or watching someone else play.

The keyboard commands for manipulating letters are almost as involved as the game itself. Game players fond of joysticks and mice are in for a rude awakening.

Our resident gifted students, aged 16 to 17, easily became involved and were sufficiently challenged by the higher-level games. They envisioned the game being used at home or in a school enrichment program for students with long attention spans.

After a few hours of Rosetta Stone, you will either be addicted to decoding or ready for less-demanding mental activities such as watching *Romancing the Stone*.

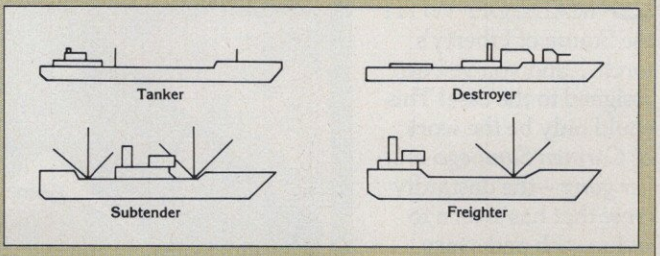
Doug and Denise Green

Rosetta Stone
Hunt's Software Works
3658 Charles Street
San Diego, CA 92106
(619) 224-6774
(800) 624-9497
List Price: $39.95
Requires: Apple II Plus, IIe, or IIc; 64K RAM; one disk drive; printer optional
CIRCLE READER SERVICE NO. **407**

WORLD WAR II SUBMARINE SIMULATION

Spectrum HoloByte has recently released its Apple II version of GATO, a submarine simulation game designed to give you a taste of naval action in the South Pacific during World War II. As players of the Macintosh versions are aware, this game is no mere shoot-'em-up, but an adult-level, true-to-life simulation that is full of authentic touches and realism. For example, if you submerge to a depth greater than 20 feet, you must proceed under battery power, since diesel engines do not operate below 20 feet. If you submerge to a depth of greater than 400 feet (not recommended), you will soon find your sub cracking up under the pressure.

Play commences the mo-



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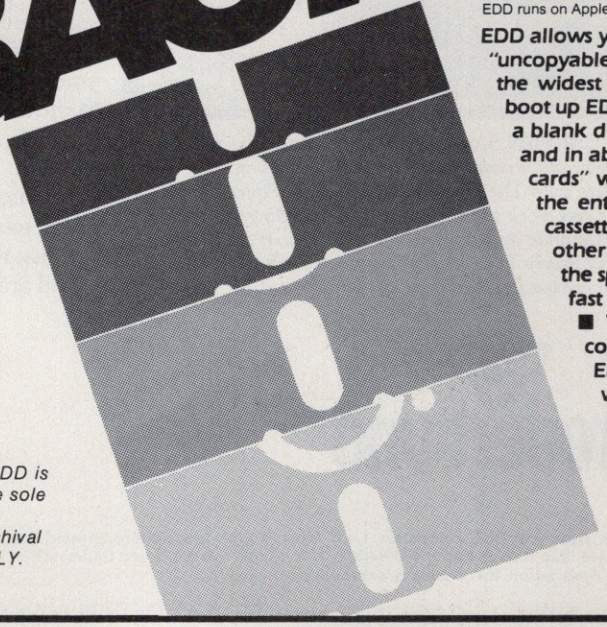

Warning: *EDD is sold for the sole purpose of making archival copies ONLY.*

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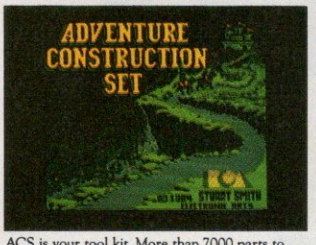
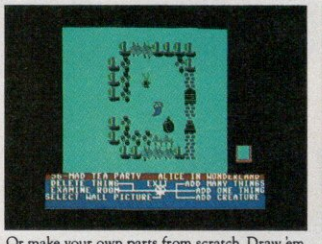
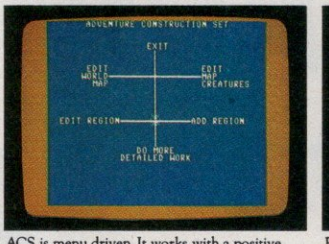


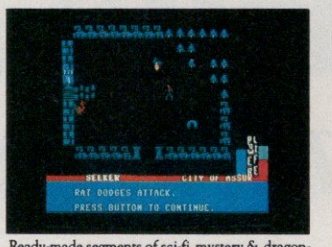
ACS is your tool kit. More than 7000 parts to build from. Power to spare!



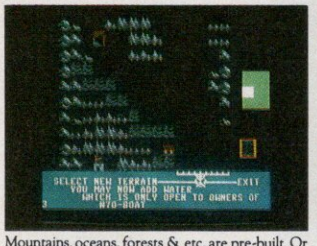
Or make your own parts from scratch. Draw 'em. Give 'em properties. Go for it!



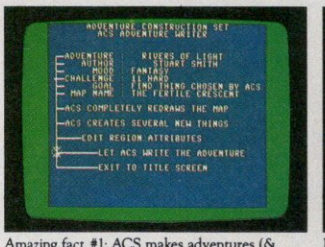
ACS is menu driven. It works with a positive "stick shift" controller. Easy as pie!



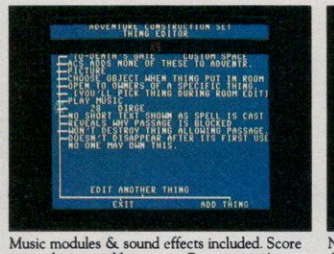
Ready-made segments of sci-fi, mystery & dragon-type adventures included. A real bargain!



Mountains, oceans, forests & etc. are pre-built. Or make your own landscapes. You're the boss!

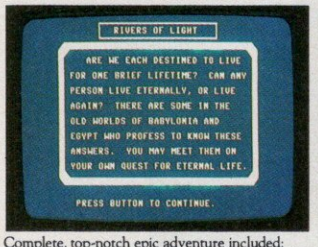


Amazing fact #1: ACS makes adventures (& finishes parts of yours) by itself. This is No Lie!

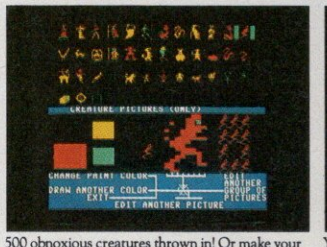


Music modules & sound effects included. Score your adventures like movies. Be a maestro!

No arms control here! Endless weapons of your design. (Endless armor & cures, fortunately.)

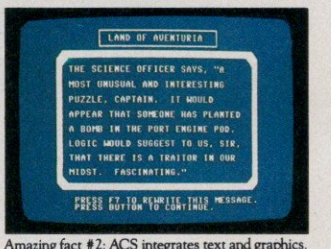


Complete, top-notch epic adventure included: *Rivers of Light* by Stuart Smith, author of *Ali Baba!*

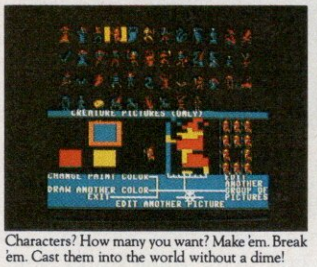


500 obnoxious creatures thrown in! Or make your own. Point 'em at the population! See their priorities!

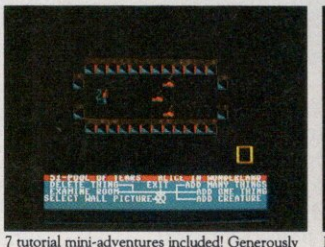
You get magic! 31 variations on 15 Big Spells! You get technology. You get religion. All right!



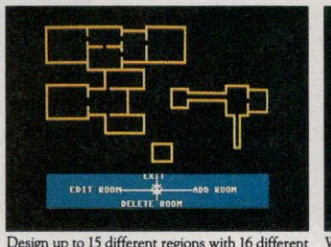
Amazing fact #2: ACS integrates text and graphics. All other products wimp out in this regard.



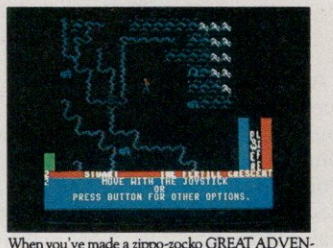
Characters? How many you want? Make 'em. Break 'em. Cast them into the world without a dime!



7 tutorial mini-adventures included! Generously survivable for those tentative first timers!



Design up to 15 different regions with 16 different rooms in each one. Space out!



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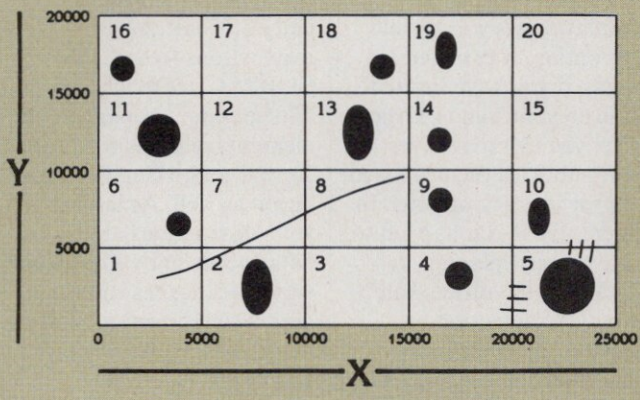
CIRCLE 202 ON READER SERVICE CARD

ment you receive your orders from COMSUBPAC (for Commander Submarine Force Pacific Fleet). Your assignment might be to rescue a downed aviator or to mine an enemy navigation route. The way you carry out your assignment is entirely up to you. Just like a real submarine commander, you are free to choose whether to attack an enemy vessel or to avoid it if the circumstances so dictate. You can navigate on the surface or underwater, being aware that the fuel requirements are different.

> If someone torpedos the sub tender, you can end up in very deep water.

GATO has nine game screens to help you on your missions. The main control screen shows the view from the bridge or through the periscope. This screen also displays the submarine's instrument cluster, which consists of three dials (depth, speed, and heading); oxygen, fuel, and battery indicators (a blinking light and beep inform you when the batteries are low); periscope direction; current power source; torpedo status; and a damage indicator. This last category is also available as a separate screen. By the way, if your sub sustains damage, it will stay damaged for the duration of the game unless you can get it to the sub tender, the only friendly ship in the area. Consequently, if someone torpedos the sub tender, you can end up in very deep water, in more ways than one.



Some navigation aids are the Radar Window (which has a range 10% greater than that of the periscope) and two area charts. Of these, the Patrol Area Chart represents the game "universe," or playing field where all the action takes place. This chart is further divided into 20 quadrants; a key command brings up the quadrant your sub is currently occupying. If you wish, you can use the game's Rapid Sub Deployment (RSD) option, which propels you to any specific quadrant when you type the coordinates. Although true

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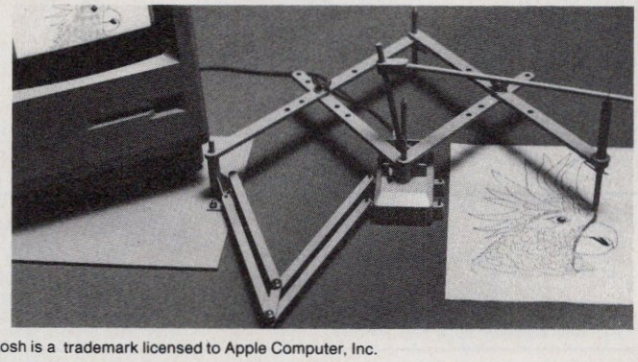

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CIRCLE 140 ON READER SERVICE CARD

simulationists will eschew this option, it can come in handy if you have limited time on your hands. Otherwise, you can maneuver your sub with the keyboard and/or joystick options. Incidentally, if you happen to find yourself playing GATO at the office, you can avoid detection by pressing the Delete key whenever the boss wanders by. Doing so freezes the

> The game becomes progressively more true to life.

game and turns the screen into a financial spreadsheet.

The game's ten levels of play range from the relatively simple to the diabolically difficult. Your instructions from COMSUBPAC are always in Morse code, although at the elementary levels (0, 1, and 2), you get an English translation as well. At levels 3–6, your instructions are in Morse code only, with visual (dots and dashes running across the screen) as well as audio signals. At levels 7 and above, you receive nothing but the audio signals, which you must transcribe and then translate before embarking on your mission. As if this weren't enough, at levels 3 and above, enemy-ship traces are not visible on the Patrol Area Chart, and at levels 5 and above, enemy-ship traces are not visible on the quadrant charts either, leaving you at the mercy of your radar and periscope.

As you move from the elementary to the more difficult levels, the game

> At levels 7 and above, you receive nothing but audio signals.

becomes progressively more true to life. This realism is due to Bill Graves, a retired U.S. Navy captain who assisted authors Ed Dawson and Paul Arlton in the creation of the original version of the game.

GATO goes beyond mere graphic simulation of a visual environment by simulating a submarine commander's subjective environment as he experiences action in the Pacific during World War II. In GATO, players don't just sit back passively watching the environment unfold, but actively participate in the course of the game. The requirement of strategic ability, rather than mere hand/eye coordination, is what makes this game a true challenge, even for experienced computer-game players.

Nicholas Lavroff

GATO
Spectrum HoloByte, Inc.
1050 Walnut, Suite 325
Boulder, CO 80302
(303) 443-0191
List Price: IIe and IIc versions, $39.95; Mac version, $49.95
Requires: Apple IIe, IIc, or Macintosh; 128K RAM; one disk drive; joystick optional

CIRCLE READER SERVICE NO. **408**

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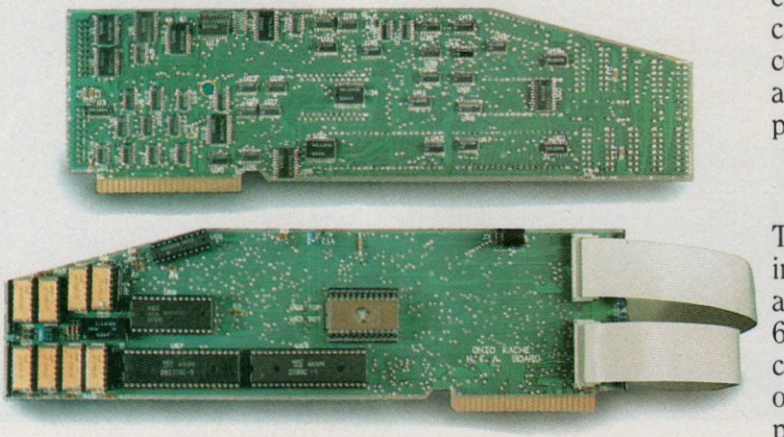

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OKS

CIRCLE 178 ON READER SERVICE CARD

BY MICHAEL WIESENBERG

A TICKET CHALLENGE

The debut of a monthly puzzle column

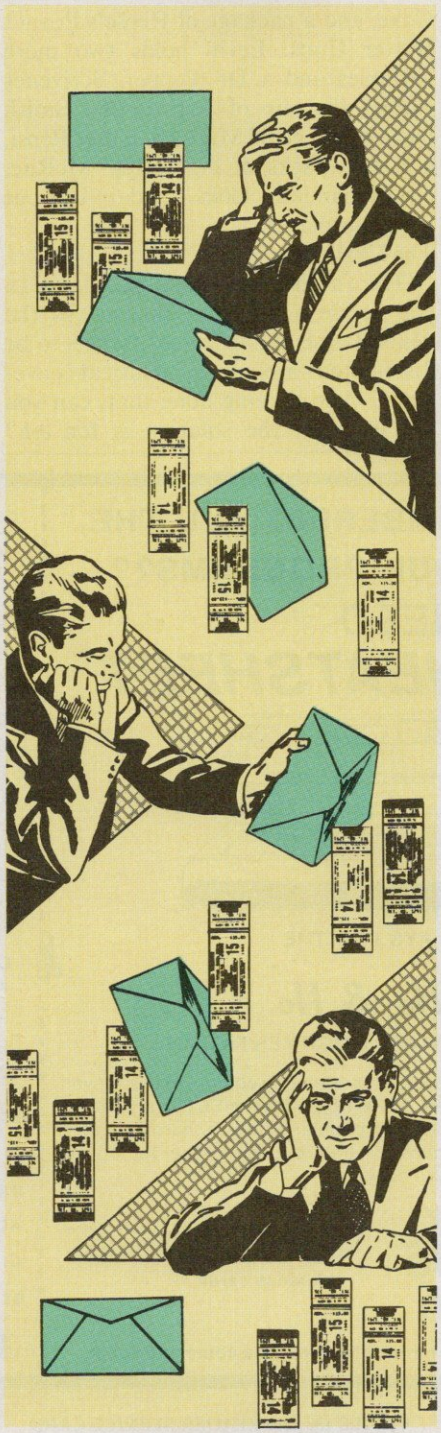
"Junk-food run!" The magic words that sustain the programmers of I-Q Industries in the heart of Silicon Valley are usually heard about 2:30 P.M., when lunch has worn off but it's not nearly time to think of dinner. Four regulars head for a building on their site that houses enough vending machines to satisfy the cravings of even the most confirmed sugarholic. The machines in their own building dispense the standard candy bars and soda pop, but that's not enough for this crew.

Hotshot young programmer Bob Levin leads the group. Today he's wearing a relatively clean Minneapple T-shirt that might stay on for a week or could be replaced tomorrow with Mr. Natural. "Everybody know about the new work schedules?"

Spotswood Gilbert, senior programmer, at six feet, four inches, is six inches taller than Levin. "Oh sure, work 10% more than your scheduled time for the same pay. The Austerity Program, I call it," he responds.

Grey Scrivener, senior technical writer specializing in software manuals, glances at his reflection in one of the overhead convex mirrors perched at the intersection with another corridor to prevent collisions, and pats his already perfect coiffure.

"Well, I'm glad I'm doing the manual for FORTRAN 8X on the new computer, so I don't have to take a pay cut or worry about getting laid off. You know, I thought I would give the compiler a good workout. Any of you see 'Computer Calisthenics' in *Dr. Dobb's Journal*? Puzzles and mental exercises best solved by computer. I wrote a program to solve the puzzle about multiplying letter values of words to come up with the one that's closest in value to a million. I don't think that my program is very efficient, though; it's been running continuously for a week, and so far I haven't even looked at all the seven-letter possibilities. But I haven't broken the compiler yet; it must be pretty robust."



WILLY KEATS

System operator Marian Smith, without whom none of them could get any work done, because all the computers would die of aggravated glitches, lights another cigarette without pausing in her stride. "No wonder everything runs so slowly on Zool lately. Maybe you oughta be doing that stuff at home on your Macintosh."

They arrive at the machines just as programmer Sally McRae, the fifth member of this kaffeeklatsch, walks up. She is wearing Nikes, jeans, and a New York Marathon T-shirt. Unlike some who casually wear such shirts, McRae has actually *run* the New York Marathon. And the Boston Marathon. And the San Francisco Marathon. And several other marathons. "Hi, gang. Guess who I saw today?"

Gilbert pulls a handle that releases a package of lemon cookies. "Don't tell me *you're* joining us for junk food?"

"Of course not; I had lunch at the Mendocino Ice Cream Company. And that's where I saw . . . "

Scrivener slides a blueberry fruit-at-the-bottom yogurt from the chilled-food dispenser. "And that's where you saw Steve Jobs."

"Yes, that's right. How did *you* know who I saw?"

Scrivener adjusts the knot on his toast-colored knit tie. "I know that the only Mendocino Ice Cream Company on the Peninsula is in Woodside, which is where Jobs lives. And I know he's had enough spare time lately to go out for ice cream. I also know you're not impressed by ordinary celebrities, so I figured that if you saw anyone important enough to say 'Guess who I saw'

about, it had to be Jobs."

Levin looks at Scrivener with respect. "Hey, that was great reasoning on your part, figuring what Sally was going to say. Maybe you can work out a puzzle I found in an old *Bent*."

"What's a bent?"

Gilbert fishes a Hershey bar and a Twix from one machine's trough and drops 50¢ into the soda machine. "Not *a* bent, *The Bent*. It's the magazine of the Tau Beta Pi Association, which is the national engineering honor society. I get it, too."

Levin pops a Twinkie into his mouth. "I subscribe for their puzzles column. One of *The Bent's* readers sent this puzzle in:

A ticket agent has ten tickets to different shows. He is placing these into ten identical envelopes. The order of the envelopes can be ignored, and some of the envelopes can be empty after he has placed all his tickets in envelopes. In how many different ways can ten tickets be distributed among ten envelopes?

"Let's look at the much easier case of three tickets and three envelopes. Let's call the tickets A, B, and C. Here are all the possibilities:

	ENVELOPE 1	ENVELOPE 2	ENVELOPE 3
1.	A-B-C	empty	empty
2.	A-B	C	empty
3.	A-C	B	empty
4.	B-C	A	empty
5.	A	B	C

"The puzzle column in *The Bent* asked only for the specific case of ten tickets and ten envelopes, but I would like to devise a program that handles the general situation of any number of tickets and any number of envelopes."

As they all walk back to their building, Gilbert carries his Twix, Hershey chocolate bar, lemon cookies, Cherry Coke, and a package of Reese's Peanut Butter Cups. Levin holds two more Twinkies and a Dr. Pepper. Scrivener carries the cup of yogurt, and Smith has a package of M&M's, a diet Pepsi, and two packs of cigarettes. McRae, empty-handed, looks disdainfully at their purchases.

The Challenge

Here's the challenge, people. Can you devise a program that solves the general case of x different tickets to be distributed among x identical envelopes? And, having done that, can you tell us what the solution is for ten? Your program must be short and elegant. It can be in any programming language that runs on an Apple-II-series computer or a Mac. The algorithms can be demonstrated in a pseudolanguage, if that is the best approach, or perhaps in a flowchart. The best solution wins you a one-year subscription to *A+* and a Certificate of Excellence in Programming and will be published here. Remember that a good program is self-documenting.

All entries for this month's contest must be received by December 10, 1985. Please send all entries to Computer Calisthenics, c/o *A+* Magazine, 11 Davis Drive, Belmont, CA 94002. If you want us to return your entry, enclose a self-addressed, stamped envelope or diskette mailer. The winner will be selected by the author, whose decision will be final. The winning program will be announced in the March 1986 issue of *A+*. ✚

Editor's note: Michael Wiesenberg's "Computer Calisthenics" column originally appeared in Doctor Dobb's Journal. *A+ would like to thank Michael Swaine, editor-in-chief of Doctor Dobb's, for his permission to use the Computer Calisthenics name.*

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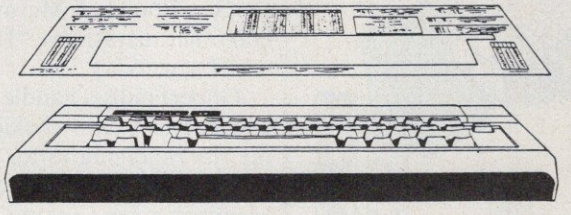

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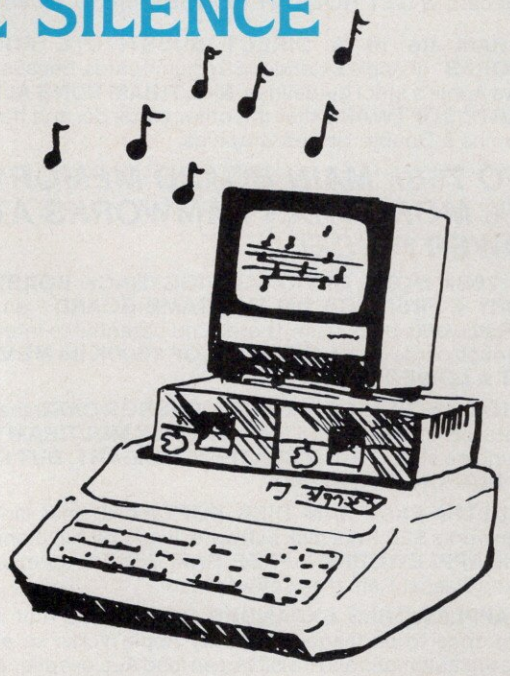
MOCK·ING·BOARD

BREAK THE SILENCE



MOCKINGBOARD A is a stereo music and sound synthesizer with six voices. Suggested retail price $99.00. This model can be upgraded for speech synthesis with the purchase of a **MOCKINGBOARD B** speech upgrade. Suggested retail price $89.00.

MOCKINGBOARD C is all of the above in one package. Suggested retail price $179.00. Mockingboard A, B and C are compatible with the Apple II, II+ and IIe.

MOCKINGBOARD D is a stereo music, sound and speech synthesizer for the Apple IIc. Suggested retail price $195.00.

A-MAX is short for Audio Maximizer. A-MAX brings new dimensions of sound to your Apple or IBM. A-MAX replaces the internal speaker with a stand-alone case containing stereo speakers, a headphone jack and dual volume controls. Mockingboard may also be used with A-MAX. Suggested retail price $49.95.

THE DEVELOPERS' TOOLKIT provides easy-to-use software allowing you to incorporate music, sound and speech into your own BASIC programs. In addition, the Toolkit contains numerous other helpful utilities to simplify programming and make learning fun. Suggested retail price $29.95.

SPEECH DEVELOPMENT SYSTEM allows the user to easily create and modify customized speech at home using simple bar charts to change speed, volume and even inflection. Suggested retail price $39.95.

FOREIGN LANGUAGE RULE TABLES allow your computer to speak to you in French, German and proper British English. Suggested retail price $24.95.

CLASSIC ADVENTURE GAME takes you through a colossal cave in which you must collect treasures. Many who enter the cave are never heard from again. Classic Adventure is compatible with MOCKINGBOARD C and MOCKINGBOARD D. Suggested retail price $19.95.

Mockingboard sound is sweeter than ever! Watch for new and exciting titles this holiday season, such as **SKYFOX** by Electronic Arts, **WILLY BYTE** by DTI Data Trek, **ULTIMA IV** by Origin Systems, **UNDER FIRE** by Avalon Hill, **ADVENTURE CONSTRUCTION SET** by Electronic Art, **GUITAR MASTER** by Mastersoft, **AT THE GATES OF MOSCOW 1941** by Strategic Games and many more.

* The new Mockingboard D supports Music Construction Set and Under Fire. Check with your dealer for new titles that are being written for this Mockingboard.

To hear Mockingboard perform, visit your local dealer or call (401) 941-1130. For the name of your local dealer that carries Mockingboard, call 1 (800) 341-8001.

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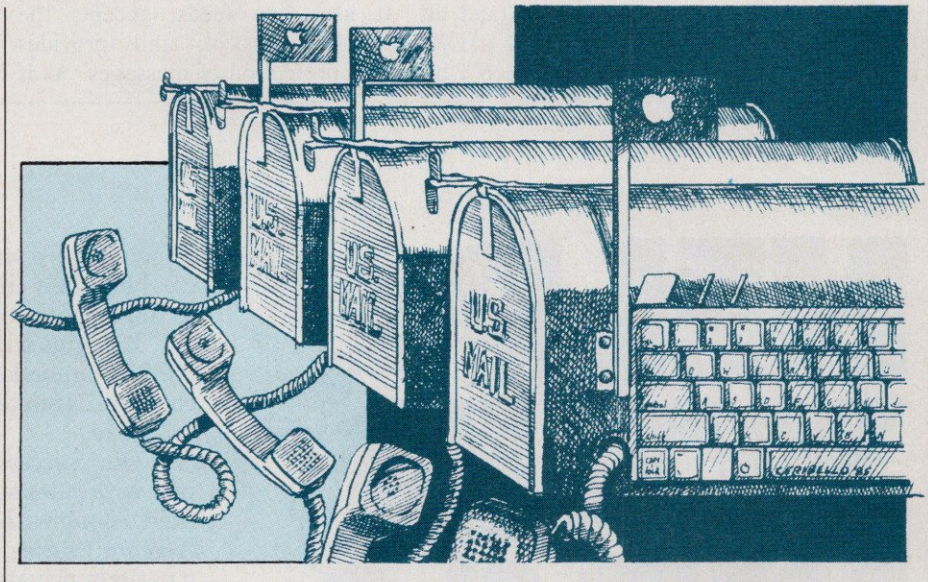
CIRCLE 146 ON READER SERVICE CARD

BY RUSS LOCKWOOD

MAILBOXES, MORALITY, AND MISCELLANY

Telecommunications statistics, products, and issues



A friend of mine—a financial wizard who helps make computer-purchasing decisions for a major aerospace company—called the other day, ostensibly to spread some Christmas cheer. However, the news he bore had all the appeal of a visit from the Ghost of Christmas Future. While scanning the numerous reports, articles, and other news items that pass across his desk daily, he came across a figure that stuck in his mind like a coin in Scrooge's pocket: Modems have achieved only 8% market penetration.

Gee, I don't want to cry in my eggnog, but 8% is a pretty paltry sum. It shouldn't really surprise you, though. After all, with millions of personal computers out there, the largest telecommunications service, CompuServe, claims "only" 200,000 subscribers. I suspect that Apple users own a higher percentage of modems and that *A+* readers surpass even this percentage. We can probably blame the telecommunications trepidation on Commodore 64 and IBM PC owners.

Seriously, like Rudolf's nose on a foggy night, this otherwise dark report has a bright side. With only 8% penetration, 92% of personal-computer owners are potential modem buyers. When they find out that they can bypass those hideous pink "while-you-were-out" notepads and leave real messages, send a report across the country faster than ZapMail, research a topic in less time and more extensively using an on-line database rather than the local library, and pursue their hobbies at home with thousands of interested and helpful on-line friends, then they will realize the importance and convenience of telecommunications.

THREE MODEM MAILBOXES

In the meantime, while the non-modemed masses decide which modem to buy, we modem mavens can reap the benefits of telecommunications and telecommunications technology. Three companies, Hayes Microcomputer Products, Prometheus, and Anchor Automation, are offering the equivalent of modem mailboxes.

Ninety-two percent of personal-computer owners are potential modem buyers.

These electronic devices answer the phone and store messages—in their own random-access memory (RAM), which is external to the computer's RAM—even while you use the computer for other work. You do not have to load in a telecommunications program or even monitor the system. The electronic mailboxes hold your mail until you want to view, print, or record the messages to disk.

Frankly, storing files in RAM is not a breakthrough in technology. RAM-disks have been around for quite some time, and print buffers use the same techniques. This application is completely new, however, and three of the major modem manufacturers think the market potential is great enough to develop, advertise, and sell such devices.

Hayes Transet 1000

Hayes bills its Transet 1000 as a "multifunction print and communications buffer." It hooks up to a Macintosh, IIc, or IIe with Super Serial Card. As a print buffer, it drives printers, plotters, and other devices that are accessible through a serial or parallel port. As a communications buffer, it requires a Hayes 300, 1200, or 2400 Smartmodem with Smartcom telecommunications software.

JIM CERIBELLO

The Transet 1000 comes with 128K RAM, two 9-pin bidirectional serial ports (one male and one female), and one 15-pin serial/parallel output-only port (female). It accepts data at speeds of up to 19,200 bits per second (bps). Its factory setting has one serial port connected to the computer, the other connected to a Smartmodem, and the last port linked to a parallel printer.

You can reconfigure the device pretty much any way you want it. You can hook up two computers to one modem. If you do not use a modem, you can hook up two printers. Likewise, you can hook up two computers to one printer. The Transet 1000 is truly versatile.

The memory comprises three buffers: Immediate, which holds all data; Replay, which holds data sent to a printer or plotter; and Mailbox, which holds telecommunications messages. In the Replay buffer, the real workhorse of the Transet 1000, you can protect one file from accidental erasure and print multiple copies of the same file.

The Mailbox buffer uses a setting of eight data bits, no parity, and one stop bit. It uses line feeds, accepts the XMODEM protocol, and provides password protection of messages. As if that weren't enough, you can scan RE: summaries of your mail before you read, erase, save, or print messages. I like this feature. I fear that the day of junk electronic mail will be short in coming. Anything that helps me skim through mail is a real boon.

One year, all the Whos down in Whoville traded in their bingle bang bongers for modems and computers.

You invoke other functions by pressing a particular sequence of three buttons on the faceplate next to the display lights. The manual does a commendable job of explaining a sometimes complex process.

The Transet 1000 is meant primarily for the business market, although I hasten to add professionals as well. It boasts an extensive command set, which requires diligence to learn effectively, and unsurpassed versatility. At $399 retail (cables not included), the Transet 1000 may seem a bit pricey, but

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it can also eliminate telephone tag, and that can save you thousands of dollars in phone bills and lost man-hours.

Prometheus ProModem 1200

The ProModem 1200 is a fine 1200/300-bps modem. What makes it really good is the addition of an Options Processor that adds RAM and a battery backup. The RAM holds the incoming electronic messages. In the event of a power failure, the battery retains the first 2K worth of data. Admittedly, 2K is rather small, but, as the old saying goes, it is better than nothing.

A far better feature is the automatic receipt/transfer. Combining this feature with the built-in telephone directory allows you to send stored messages to a preselected group of telephone numbers at a preset time, which lets you contact many people with a minimum of effort, as well as take advantage of cheaper nighttime rates.

Taking advantage of all the features of the modem and optional mailbox requires some effort to learn the command set. The hookup is simple enough, and the Macintosh interface makes operating the modem as easy as possible, but be prepared to spend some time.

The company sells two versions of the Options Processor: The $99 model expands the ProModem 1200 to 64K, and the $149 model expands the modem to 512K. If you need a modem and want to take advantage of a built-in mailbox, certainly consider the ProModem 1200 with its optional Options Processor.

Anchor Automation Computer Mailbox

This stand-alone unit installs between a modem and the RS-232C port (with 25-pin female D connector) of your computer. It accepts data at speeds of 300, 1200, and 2400 bps and has 64K of CMOS RAM to store messages. Best of all, it has *full* battery backup—an Everready 4.5 volt (included), which the manual claims will last several years. Prying off the nameplate reveals the battery and 12 DIP switches governing data bits and parity, transmission rate, and other signals.

On the front faceplate, the Computer Mailbox has a Bypass-Online switch. In the Online position, you can issue commands to the device. When set at the Bypass position, the Computer Mailbox ignores all commands and becomes completely unobtrusive, allowing data to pass between modem and computer untouched and unrecorded. The commands allow you to read and erase messages, set one of three password levels, limit the length of stored messages, enable and disable remote command operation, and provide Help and private messages.

That is pretty much all there is to the Computer Mailbox except, of course, the price of $299. It is easy to set up, operate, and appreciate.

Which of these three fine modem mailboxes do you buy? That depends on your equipment and your needs. Any of the three would be a fine addition for those with heavy telecommunications requirements. The final choice, however, remains with you.

TELETIPS

This section deals with news, views, and breakthroughs in the telecommunications world. It offers a quick overview of new features of services we have already reviewed. I obtain the information by culling the numerous press releases and periodicals that streak across my desk each day.

Modem Morality

Pull up a chair, settle back, and let me tell you an all-too-true fable. One year, all the Whos down in Whoville traded in their bingle bang bongers and

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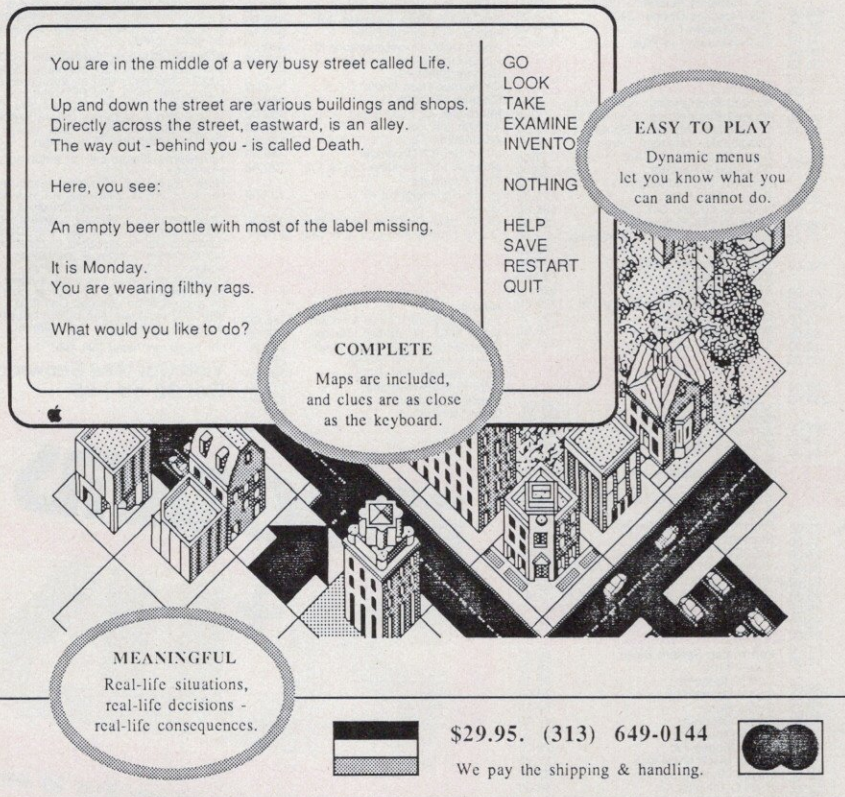

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hooter hen honkers for computers and modems. They liked the idea of telecommunications so much that they set up their own bulletin-board systems (BBSs)—about 1500 or so, depending on whose estimates you believe.

Most Whos used their modem virtuously, exchanging tips on winning games, forming professional associations, and just making friends. Alas, in and among the Whos was a Grinch, tight of shoe, devious of thought, and small of heart. He called himself 414, after the area code of Whoville. This Grinch used the modem to break into data banks and used the BBSs to post stolen credit-card numbers.

Fortunately, someone, perhaps Max, tipped off Santa. The Federal Bureau of Investigation Elves cracked down on 414 Grinch, seizing equipment and shutting him down. All's well that ends well, right?

Wrong.

- Seven New Jersey teenagers were arrested and their bulletin board closed down for publishing credit-card numbers, details on assembling a bomb, and private computer telephone numbers at the Pentagon.
- Two California teenagers were arrested for posting extortion demands on a bulletin board.
- Two New York teenagers were arrested for posting credit-card numbers and asking for help in invading an insurance-company computer.
- A Texas teenager's bulletin board was shut down after stolen credit-card numbers appeared.
- Altogether, more than 25 bulletin-board systems were shut down in 1985 because of illegal activities.

The moral of the story: 414 Grinch is only the tip of the iceberg.

You can help, though. If, while perusing a BBS, you find references to stolen credit-card numbers, contact the local office of the FBI, anonymously if you wish. Personally, I do not want to have my credit-card number showing up on a BBS. I certainly do not want to have to explain to the credit-card company why hundreds of dollars of charges on my card are not mine.

Among the Whos was a Grinch, tight of shoe, devious of thought, and small of heart.

Perhaps those that use stolen credit-card numbers scoff at the idea of being caught. I believe Kenneth Goldin of Cherry Hill, New Jersey, a 19-year-old prelaw student attending George Washington University in Washington, D.C., never thought he would get caught, either.

According to an Associated Press news story, Goldin became so addicted to an interactive space-war game on CompuServe called MegaWars that he resorted to using stolen credit-card numbers to pay for his on-line habit. Goldin originally paid with his father's credit card until he ran up large bills and was banned from using the card.

He visited the trash bin of a local shopping mall and used credit-card numbers he found on discarded carbon copies of receipts. Next, he tapped into the computer of a credit-reference company and found out which card numbers had the highest credit limits. A post-office box and several accounts later, Goldin was finally caught.

Goldin pleaded guilty to wire fraud and was fined $500 and placed on three years' probation. The charge of credit-card fraud, which carries a prison sentence of up to five years and a fine of up to $250,000 were dropped.

By the way, he must also repay the bill he ran up.

Statistics and Liars

I opened this month's column with the shocking information that only 8% of computer owners own modems. The percentage could be slightly larger.

According to a Business Communications Company (BCC) report on the on-line-database industry, 5.5 million microcomputers were shipped in 1984, a 50% increase over 1983. That means 17 million microcomputers are installed in U.S. homes and offices.

According to the BCC, approximately 10% of these have modems, and the company expects modem sales to increase 30% a year for the next five years. Although traditional on-line-database markets—libraries, corporate information specialists, and information brokers—are pretty well penetrated, the increase in modems and microcomputers will prove to be a boon for the on-line-database industry. BCC forecasts a 23% average growth through 1990, with revenues of $6.263 billion.

On the down side, the home-consumer end of the market, which repre-

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sented less than 1% of revenue in 1984, is not expected to become a "real force until the turn of the century." On the other hand, cut-rate pricing for the "after-hours crowd" and more-convenient software will help fuel growth in this area.

A Christmas Present

Activision has released Hacker, a "game" in which you have just accessed a remote computer system and must try to find out what it is and what it does. The program has no rules—when you start, you see Logon please . . . , and you are on your own. So would you like to play a game?

LOGGING OFF

Well, the end of the column, like the end of the year, comes all too quickly. I hope 1985 has been as good to you as it has been for me. I offer this New Year's resolution: to provide even better coverage of the telecommunications industry. I would like your help. Send your comments, tips, criticisms, and critiques to my CompuServe PPN 70210,750, electronically to APLUS on MCI, or to *A+* directly at 11 Davis Drive, Belmont, CA 94002. Until next time, happy holidays and have a Grinch-free new year. ✚

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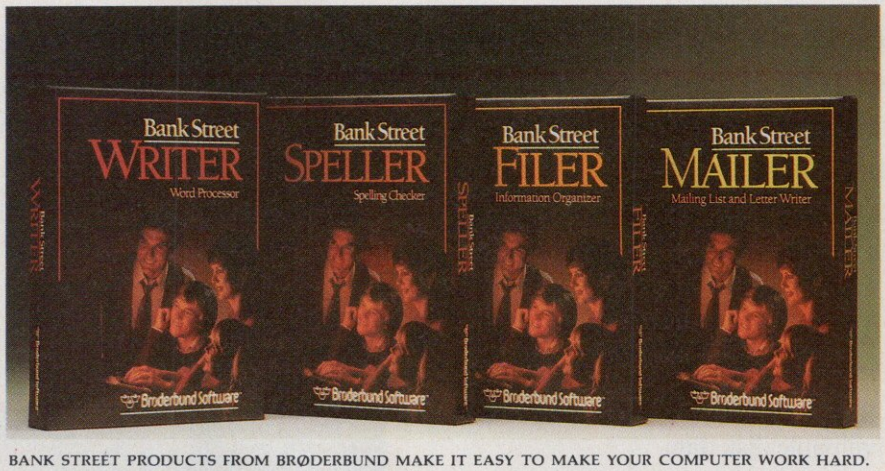

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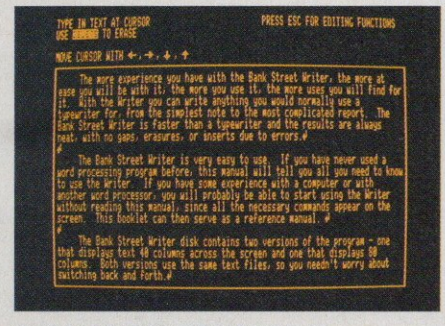

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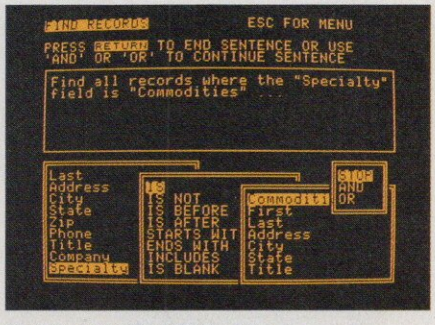

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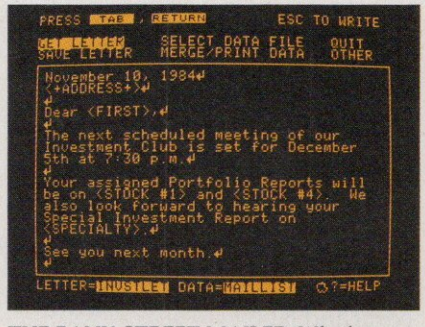

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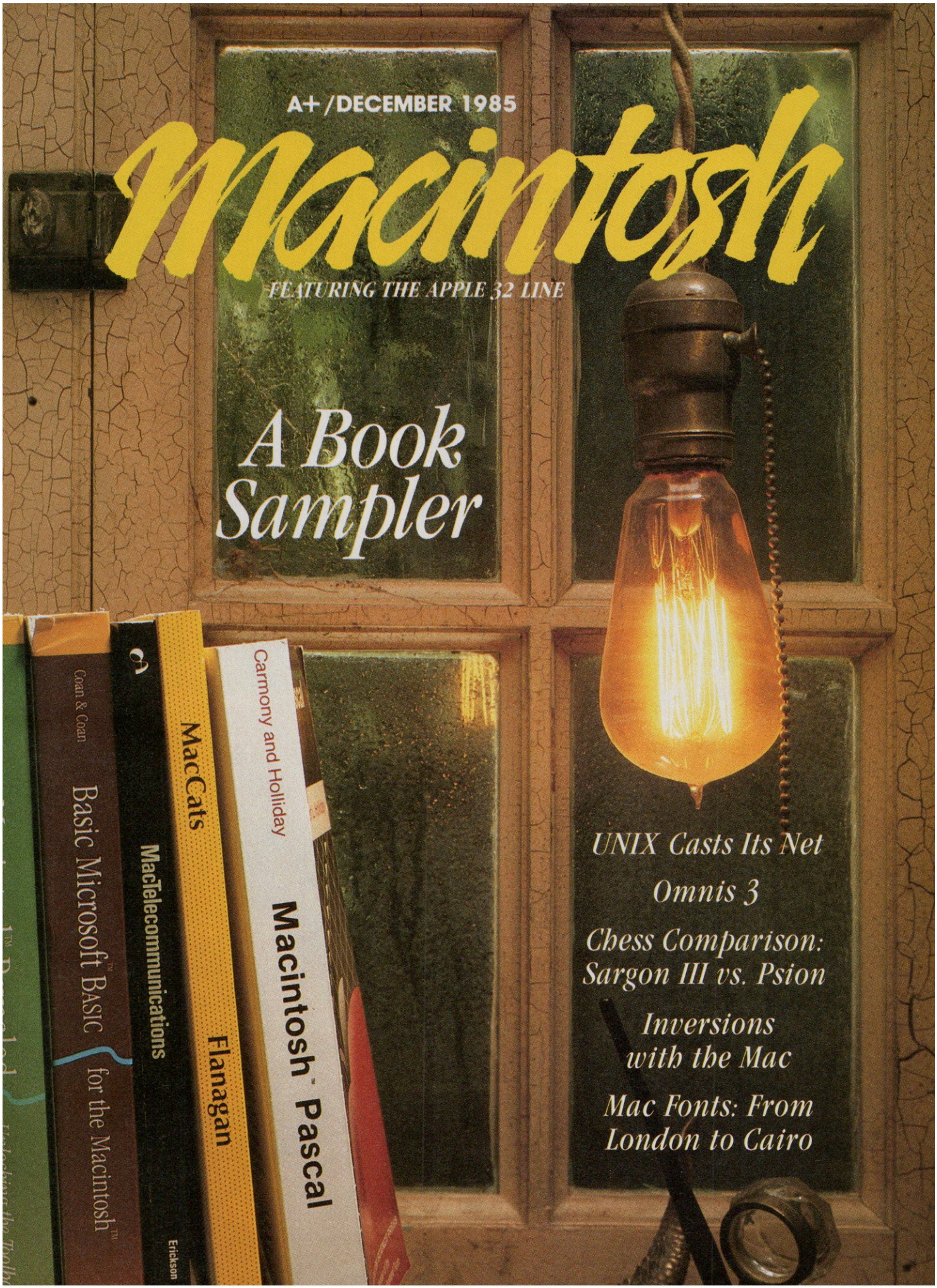
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MacTelecommunications
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Flanagan
Carmony and Holliday
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A Macintosh Book Sampler

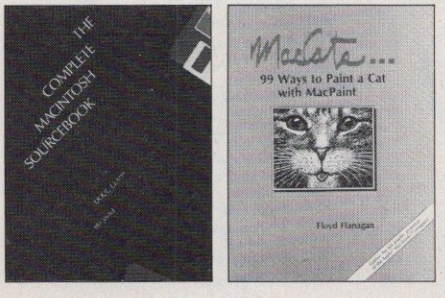
Many ways to read up on your favorite computer

Since you bought your Macintosh, you've probably assembled quite a collection of hardware and software manuals. Although these manuals are useful (well, some are), they don't always tell us everything we need or want to know. In hopes of fulfilling this need, the book-publishing industry has produced a variety of books about the Macintosh. Besides a wide selection of introductory books, you can find books that help you learn to program your Macintosh, use some of the more popular software applications, and expand your horizons through your Macintosh. Even as we write, the list continues to grow.

To give you an idea of what's available, we've assembled a sample of Macintosh books. Any one of them would make a great gift for the Mac aficionado on your Christmas list or a special holiday treat for yourself.

A Potpourri

It was only a matter of time before someone took on the enormous task of compiling a list of all the products available for the Macintosh. Well, *The Complete Macintosh Sourcebook* by Doug Clapp and Pat Ryall turned out to be quite a list (all 369 pages of it). Although no sourcebook can be truly complete, especially about a product line that is constantly growing, this book makes an excellent attempt, with more than 750 annotated Macintosh product listings. Inside you'll find sections on software (12 different categories), hardware and accessories (printers to dust covers), publications (books, newsletters, and magazines), software development (developer services and programming languages), users' groups, public-domain software, telecommunications services, and much more. General-information categories or specific products are easy to find, thanks to an extensive index, and some products appear in more than one section of the book (e.g., Microsoft Chart is under both "Business Software" and "Graphics"). We hope the authors will update this book on a regular basis to keep up with the flood of new products.



A fun and extremely good book about MacPaint is *MacCats—99 Ways to Paint a Cat with MacPaint* by Floyd Flanagan. Although this book sounds frivolous, it is actually a well-written introduction to and tutorial on the capabilities of MacPaint. Flanagan has created an entertaining and painless way of learning MacPaint through drawing cats. The book's chapters show you how to clone your cat (copy), brush your cat (use the brush), write fancy cat names (use text options), put your cat in a story (use MacWrite), and employ other MacPaint techniques. If you know any cat lovers (or even cat despisers) who still haven't explored MacPaint, then this book will definitely make them sit up and purr.

Now that we're all artists with MacPaint, how about becoming animators too? *Macintosh Game Animation* by Ron Person shows you how to animate figures and backgrounds, program special effects, and use MacPaint drawings in programs you create. The book begins with an overview of animation and a chapter on structuring programs. Although you don't need to be an experienced programmer to use this book, a prerequisite is that you feel comfortable programming in BASIC. Examples throughout demonstrate different techniques in MS-BASIC 2.0 (or later versions), and two appendices cover MacBASIC and MacPascal. The book includes topics such as using the Macintosh ROM drawing functions, incorporating MacPaint drawings into your BASIC programs, animating background using overlays, incorporating collision detection and identification (as in games), and adding sound effects. It also includes four utility-program listings: Pattern Maker, Cursor Maker, MacPaint-to-BASIC Convertor, and Animation Maker. These utilities plus two demonstration programs are also available on disk for $19.95.

If you want to use your Macintosh to communicate with the outside world, then *MacTelecommunications* by Jonathan Erickson and William D.

CARTER DOW PHOTOGRAPHY

Miles Computing Entertainment Software. The Promise Fulfilled.

When the Macintosh first came out, everyone looked at it and said, "Wow, wait 'till the gaming wizards get ahold of this baby..." And some of them did. But some of the "quick and dirty" products that have appeared have left some entertainment software for the Mac a little disappointing.

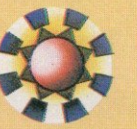
Here at **Miles Computing**, software designers who simply will not put up with second best, or half-baked concepts, have delivered entertainment products of such intensity of effort and such depth that our designers say "Wow, wait 'till people get ahold of *this*..."

MacAttack! was the first, an amazing best-selling programming feat. It's a 3-dimensional tank battle zone simulation where you defend a city in your radar-equipped Sherman Tank. You must survive by out-maneuvering conventional and heat-seeking missiles coming from your opponents who can only be eliminated by accurate shooting on your part. Deadly tanks and planes roam about in this unique game with three levels.

Harrier Strike Mission is follow-up to MacAttack! in a tour-de-force of Assembly language utilizing sensational 3-D graphics. This flight combat simulator features the famous Harrier Jump Jet, a fighter aircraft which can maneuver like a helicopter but has all the punch of the latest in modern jet armament. You are pitted against an enemy-occupied island firing heat-seekers, not to mention fighter aircraft in mid-air combat. You must take off from an aircraft carrier, take out the command post and fuel depot on the island and return to your ship. With two skill levels and your choice of day or night mission, mouse or joystick controls, it's the ultimate 3-D flight combat simulator.

Then there's **Fusillade**. You're the last person stuck on Planet Fusill, and must defend a city from power-hungry kamikaze looters in a fast-action shoot-out which escalates at dizzying speed as wave after wave attacks your position in over 30 knuckle-whitening levels. Mouse, keyboard or joystick controlled.

If real trouble is what you're looking for, **MacWars** has it. Miles Computing just can't keep away from 3-D, and this one has a black planet strewn with a deadly obstacle course of surface and sky targets through which you fly your laser cannon-equipped and shielded space ship. On the way to the enemy's planet-sized space station you must survive waves of enemy space paraphernalia, and only your mouse or joystick stand between you and destruction as the waves keep coming, and coming, making things "rather difficult indeed" for you.



For those who want to exercise brain muscles, we have **Overlords**. The object is galactic domination, with power struggles. Struggles against whom? Well, up to *32* players, that's who! Players can be either people or the Macintosh itself, or can even be linked up via Apple Computer's Apple Talk network, the very first game to do this. You can have multiple players on one computer, or link up to other computers, each player with its own strategy and personality. You can use the ships that come with it, over a dozen, or design your own, and by zooming in and out over the Galaxy, set out for high adventure.

Miles Computing Entertainment Software. The Promise Fulfilled.

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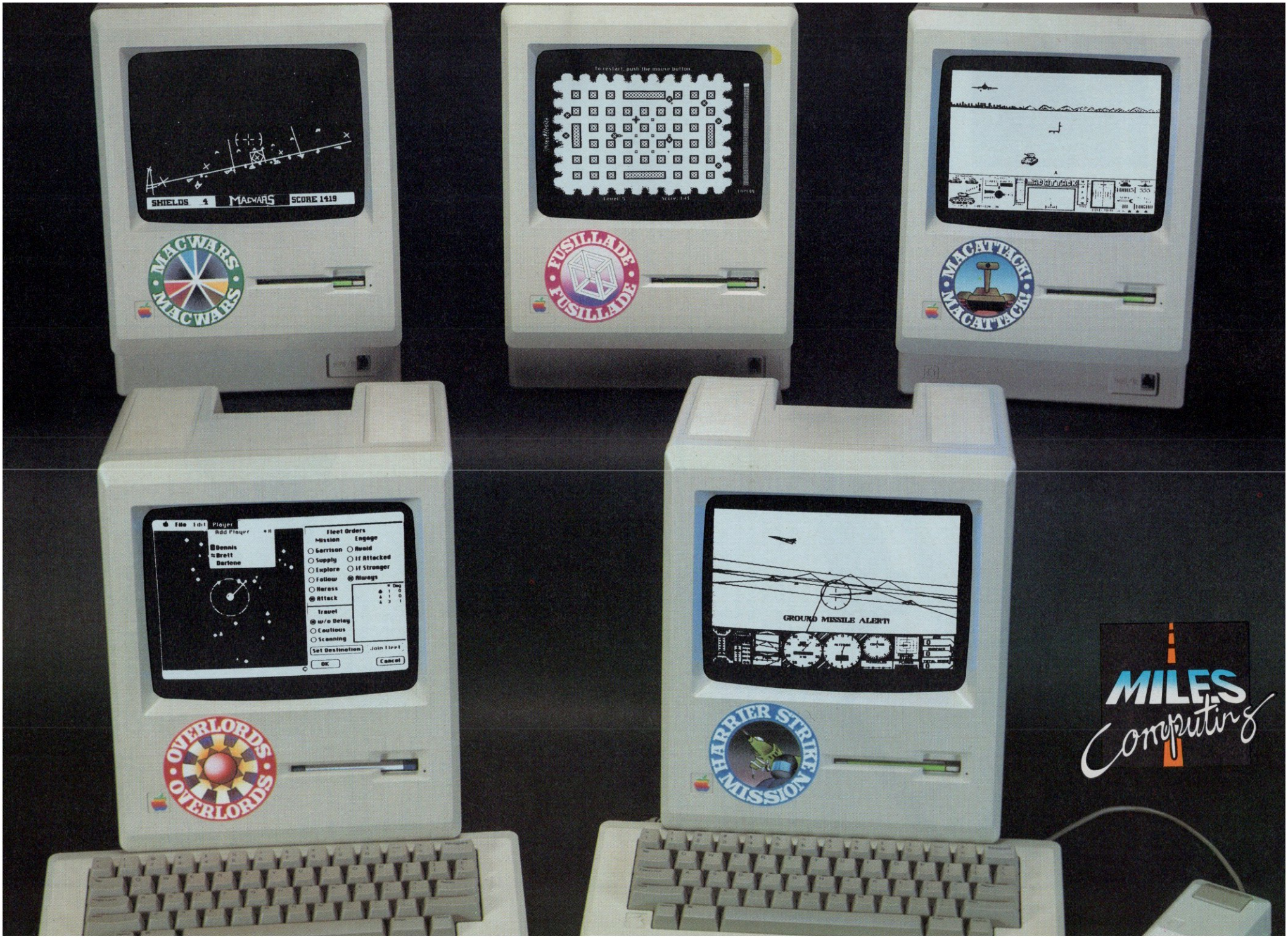
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MACWARS
SCORE 1419
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FUSILLADE
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MACATTACK!
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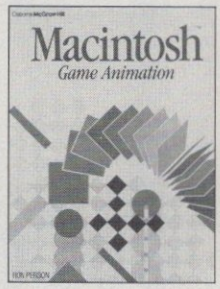
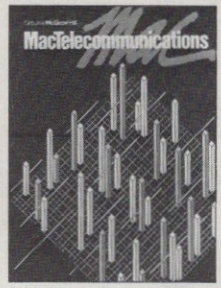
Cramer will put you on-line. Geared for "telecomputing" novices, this book presents an easy-to-understand overview of telecommunications and the hardware and software require-





ments of the Macintosh. Using MacTerminal as an example of a communications program, the book presents a step-by-step explanation of how to configure MacTerminal to communicate with another computer. Clearly marked topic headings and the extensive use of screen shots make the instructions easy to follow.

A chapter on information services gives you specific instructions for accessing CompuServe, The Source, and the Dow Jones News/Retrieval service. Additional chapters deal with home banking, shopping, electronic mail, computerized libraries, travel information and reservations, buying and selling stocks and bonds, bulletin boards, public-domain software, and "telegames." Also included is information on Macintosh-to-mainframe communications, a sample listing of available information services, and an appendix with more technical information about Macintosh telecommunications.

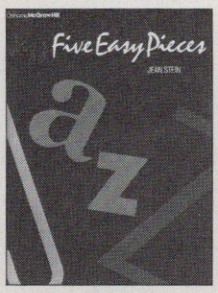
Books about Software

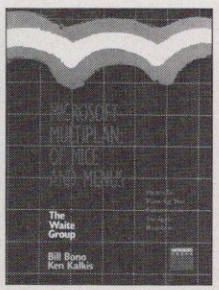
If learning the basics of Lotus' Jazz has left you less than jazzed, pick up Jean Stein's book called *Jazz/Five Easy Pieces*. This introductory book is divided into five sections, each corresponding to a Jazz application, on Jazz's worksheet, database, word processing, graphics, and communications. In each section, a beginning chapter introduces relevant terms and provides information about special icons, a command table, and keyboard shortcuts for that particular application. The subsequent chapter(s) contain a tutorial. Throughout the book, command tables show in a glance all the available menu commands for each application. Explanations and instructions are easy to follow, although the pictures aren't always positioned on the same page as the corresponding explanations.

CIRCLE 163 ON READER SERVICE CARD

As an alternate tutorial for learning Jazz, *Jazz/Five Easy Pieces* can help get your fingers tapping.

Suffering from the "what can I do with Multiplan" blues? Well, step right up and take a look at *Microsoft Multiplan: Of Mice and Menus* by Bill Bono and Ken Kalkis. This book is designed to help small-business owners create a simple accounting system with Multiplan, but many of its chapters are equally suited for home or personal use. The first chapter is a quick tutorial on the basics of Multiplan; experienced users can skip it. The rest of the book presents tutorials on setting up checkbook managers, cash-flow statements, budgets, income statements, depreciation schedules, and loan analyzers. Throughout the chapters, you get to know some of the powerful features of Multiplan such as template creation and the use of Link and Paste. The authors deserve special praise for writing a truly excellent tutorial. Its explanations are understandable, the steps within the





tutorials are clearly separate from the explanations, page layout is easy on the eyes, and it has lots of screen shots to help you out.

Are you ready to explore the world of pie charts and line graphs with Microsoft's Chart? An excellent guide for your adventure is *Presentation Graphics on the Apple Macintosh* by Steve Lambert. Written for new users of Chart (and with an eye to novice Macintosh users), this book has a wonderful conversational tone that makes you feel as if your own personal tutor were sitting by your side. After an introductory chapter on the Macintosh, Lambert gives you a quick tour of terms and techniques Chart uses. We found this chapter to be easier to understand than the Chart manual itself. The majority of this book comprises an overview and tutorial for each of six different types of presentation graphics (column, bar, line, pie, area, and scatter graphs). Additional chapters give an overview of techniques and considerations for

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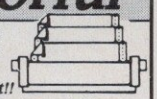

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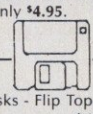

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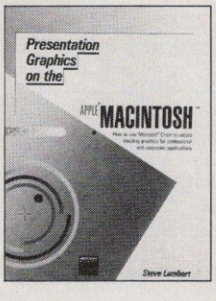
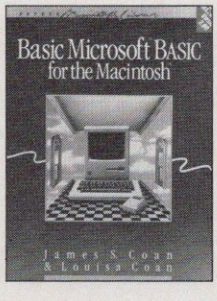
creating graphs, a description of Chart's menu commands, and information on using Chart with Multiplan, MacPaint, and MacWrite.

Mac Programming

Learning to use Microsoft BASIC on your Macintosh? *Basic Microsoft BASIC* by James and Louisa Coan is a good complement to the Microsoft BASIC manual. The Microsoft manual provides mostly reference information for using BASIC commands and the Microsoft BASIC operating system, and it has little information on programming in this language. The Coans' book fills this void with a well-organized, clearly written text that contains many example programs and Macintosh screen shots. The book gently and methodically advances you from simple ideas to more advanced programs and techniques. If we were to ask anything more from this book, it would be a more humorous, witty style to make reading more enjoyable. Nevertheless, *Basic Microsoft BASIC* teaches the language with a direct approach and wisely promotes structured, readable programs that result from planning and thorough documentation.

Pascal is a language often recommended for people who are learning to program for the first time. If you're looking for a witty book, whose authors really seem to care about first-time programmers, you should consider *Macintosh Pascal* by Lowell Carmony and Robert Holliday. The book promotes Pascal's structured style and exploits the Macintosh as a superb machine on which to learn programming. In fact, one of the first





chapters is dedicated to making you comfortable with using the Macintosh Pascal operating system for running and manipulating your programs. This very readable text proceeds from the simple to the more complex and makes use of many screen shots to demonstrate techniques. Not only does the text contain many sample programs, but it even has a detailed example of applying

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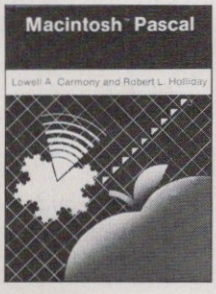
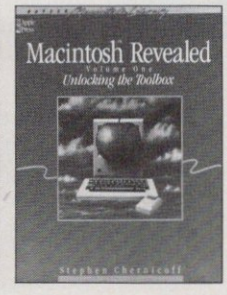
"top-down" programming methodology to a problem. To enhance your learning, you can order a diskette ($20) from the publisher that includes many of the book's programs and even some programs with bugs to allow you to practice your debugging skills. Our opinion is that this book is a winner for anyone interested in learning Pascal on a Macintosh.

So now you're an experienced pro-





grammer and want to understand how the Macintosh works and how to write programs that use this computer's unique features. The following two books are just what you need. Be advised, however, that both of them use sample programs written in Pascal and therefore expect you to be able to read that language.

Stephen Chernicoff's *Macintosh Revealed, Volume One: Unlocking the Toolbox* goes into detail on how to access Macintosh ROM routines, which are the tools that the Mac's user interface uses. The book describes how to utilize, set up, and work with the basic, lower-level features of the Mac, including Quickdraw, the Mac memory, fonts, ports, and resources, and loading in and starting up programs such as the Finder. Each chapter is broken into a "guidebook" consisting of descriptions, illustrations, and occasional program fragments, and a "handbook" with programming details (including assembly-language information) and notes for quick reference. The book also includes "helpful hints," invaluable appendices, and other goodies. We highly recommend this book if you want to make use of the Toolbox in your own programs.

Macintosh Revealed, Volume Two: Programming with the Toolbox, also by Chernicoff, should become available as this article goes to print. This second volume promises to deal with overlapping windows, customized menus, scroll bars, dialog boxes, and higher-level parts of the Toolbox.

The Hidden Powers of the Macintosh by Christopher Morgan focuses

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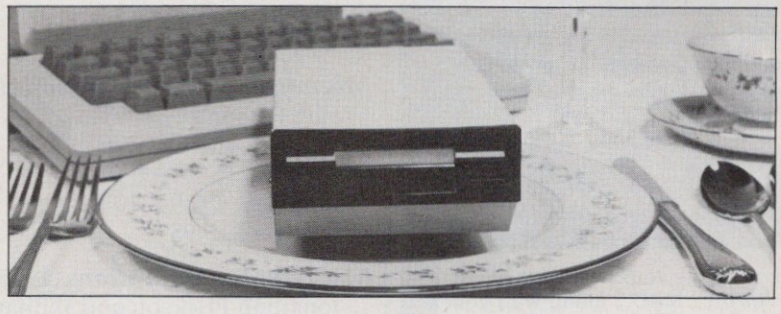

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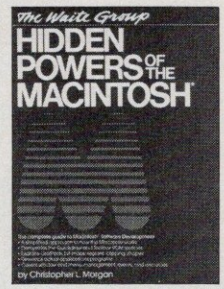
on most of the higher-level programming aspects of the Macintosh but is rather lean on the lower-level aspects of the Macintosh ROM routines. *Hidden Powers* starts off by discussing the origins of the Macintosh design, its internal organization, the separation of the operating system into managers, and the way applications are made up of resources. The text then describes how to use the various managers: the Event, Window, Control, Dialog, Menu, File, and Text Edit Managers. Morgan also details QuickDraw and window overlapping. The strength of this book is that it provides many valuable programming examples (some quite extensive) to illustrate how you can use Macintosh ROM routines together in an application program.

Happy reading!



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Francesca Venning-Townsley works with, writes about, and teaches others to use computers. David Townsley is a product engineer in the semiconductor industry. Both are frequent contributors to A+.

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The Complete Macintosh Sourcebook (1985)
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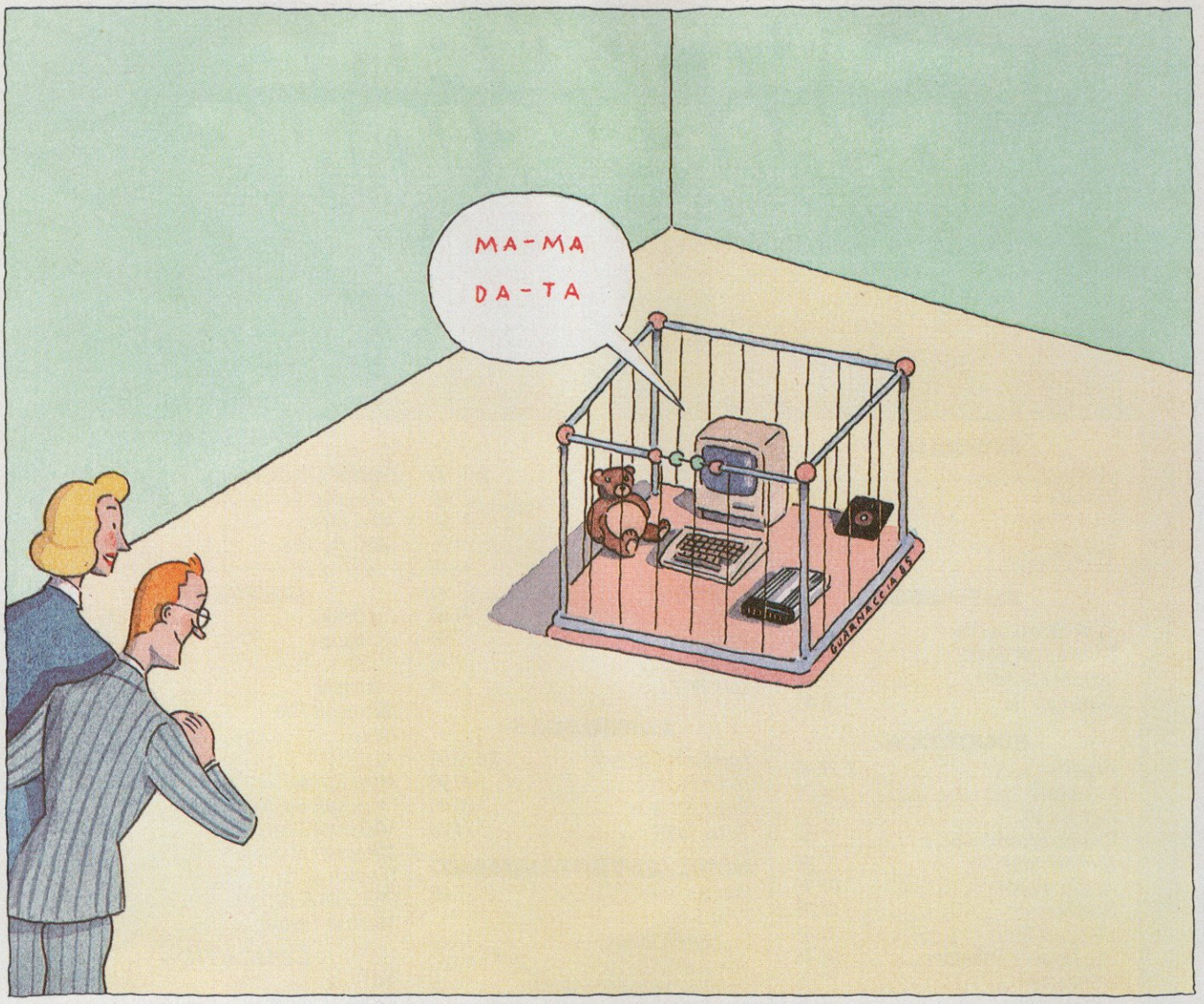

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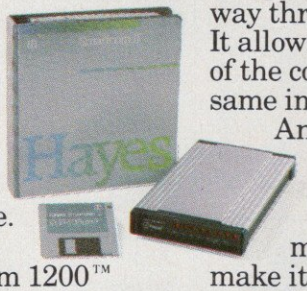

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BY VANESSA SCHNATMEIER

Lutzky-Baird announces three products that enhance its UNIX/Macintosh network.

UNIX Casts Its Net

Lutzky-Baird Associates, the firm that built the first network linking Macintoshes to UNIX machines, is planning to add to the network the ability to interface with the IBM PC, the IBM AT, and still more UNIX-based machines.

The company is "staking its reputation" on three products due to be released at the November COMDEX meeting in Las Vegas: a "Window on UNIX" that in effect turns the Macintosh into a terminal for a UNIX-system computer, a print spooler, and an IBM PC interface.

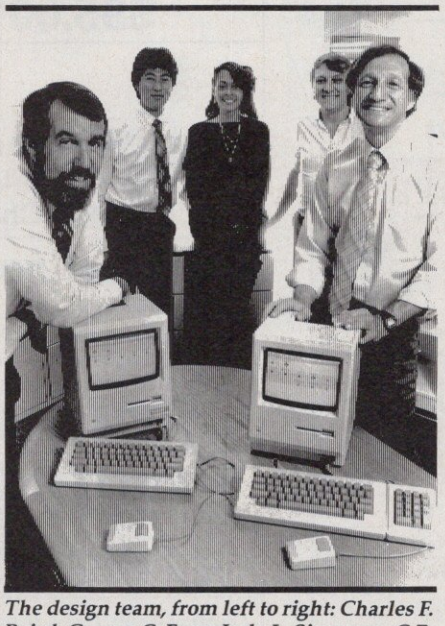
"We're trying to put in features that will allow a user within the network to access information and not worry about the specifics on how to get the information. [This system] should be as transparent as possible. We're being very careful to watch what people using the systems are telling us," says Charles Baird, one of the company's top triumvirate.

The company's original product, called Ultra-Talk (see "UNIX and the Macintosh," *A+*, September 1985, pages 150–157), uses Zilog 8000 computers, Macs, and the AppleTalk local-area network to create a multiuser Macintosh system. Depending on the number of Macintoshes and the capacity of the Zilog machines, companies could hook up between 20 and 40 Macs. In its new form, the product is called Ultra-Office.

What makes this product stand out is its appealing graphic interpretation of the UNIX file structure. You can watch the hierarchical file structure of UNIX unfold with Macintosh icons as you access its various levels.

Lutzky-Baird calls its file structure a "library system" rather than a file system, as part of its effort to demystify UNIX for users unfamiliar with the system's twists and turns.

The library system manages the structure of the information "checked out" and "returned." If the file is protected, only the owner of the file can "check out an original."



The design team, from left to right: Charles F. Baird, George C. Fang, Judy L. Simmons, C.R. Winge, David A. Lutzky

The PC interface, which had yet to go into its testing stage at press time, will provide Mac users another way to connect their machines to IBM PCs. The idea is to get PCs and Macintoshes using the same document.

The new release of Ultra-Office is designed to lean more toward PC users, rather than Mac users. Indeed, instead of using the familiar Mac graphics, the new release's "lowest common denominator" interface uses only elementary graphics and function keys. Instead of icons, the program will use side-by-side lists like a tennis seeding diagram.

The IBM PCs will also get a plug-in card as part of the new interface; the card will have an AppleTalk connector built in, so that AppleTalk can plug into a PC just as it would into a Macintosh. In an upcoming version of the card, according to Lutzky-Baird, some of the interface software will be modified to run as an adjunct to MS-DOS in order to allow IBM PCs and IBM PC ATs to work with the Ultra-Office.

Says cofounder David Lutzky, "This is for companies who want both PCs and Macs talking to the same fileserver."

The print spooler, which allows use of the Macintosh for other tasks while documents are being printed, will reportedly work with the LaserWriter and a selected subset of line printers. Lutzky explains that with the Macintosh Choose Printer command, you can select the printer you want to use. The machine currently is set up to switch between an ImageWriter and a LaserWriter. To make the choice, you specify the port—the printer port for the LaserWriter and the modem port for the ImageWriter.

With the new spooler, however, you can choose a printer in a similar fashion and name them appropriately, Legalprint for legal-size paper, for instance, or Standardprint, for a standard form. All the files are transmitted through the same port, the printer port, via AppleTalk, and the UNIX machine "gobbles them up," says Lutzky. The files are stored in the UNIX computer and printed out as the desired printer becomes available.

The Window to UNIX product enables the Macintosh to act as a remote terminal with the UNIX computers in

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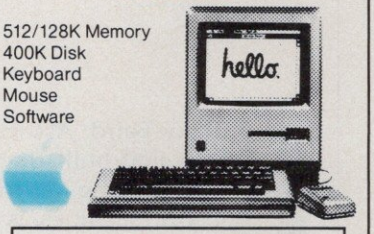

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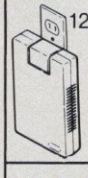

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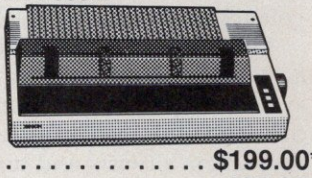

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the network. The difference here is that you communicate over a local-area network, which is much faster than an RS-232 serial hookup.

"This adds a certain complication, because UNIX is expecting to interface on the serial RS-232 wire," Lutzky adds. Lutzky-Baird has solved the problem by modifying the AppleTalk protocols and tricking the UNIX machine into thinking the Macintosh is a terminal. The first terminal slated for emulation is the popular DEC VT-100—again as part of the company's effort to gear its product to the most common machines and then expand as the market dictates.

In the first quarter of 1986, Lutzky-Baird plans to offer an Ethernet "backbone network" to complement its Ultra-Office UNIX-to-AppleTalk link. The backbone network will allow the interconnection of multiple AppleTalk networks and UNIX computers. The system will be capable of meeting the needs of large offices with several types of machines—an ideal setup for an academic environment, says Lutzky. Eventually the firm will also offer network gateways that will allow Ultra-Office networks to share information with a wide variety of mainframes.

Lutzky-Baird is also announcing that it has reached an agreement with Sun Microsystems, manufacturer of UNIX-based graphics workstations, that will allow the Ultra-Office system to work with Sun workstations. This agreement is an excellent move for worming into the UNIX graphics market, where Mac s can expect to serve as junior workstations to an overseeing Sun workstation.

The company has also just signed up to become a certified developer for Digital Equipment Corporation, further solidifying its UNIX ties. DEC machines scheduled for an Ultra-Office port are the VAX 11/780, the 11/750, and the MicroVAX II.

Lutzky-Baird's overall goals are of functionality and presentation formats that are common across the board, says Baird. Its ultimate aim, still down the road a bit, is to design a complete Mac-like user interface for the UNIX operating system that will blend the Macintosh into computer systems and companies that use any major UNIX computer. +

Vanessa Schnatmeier is a free-lance writer who regularly covers the UNIX beat for several publications.

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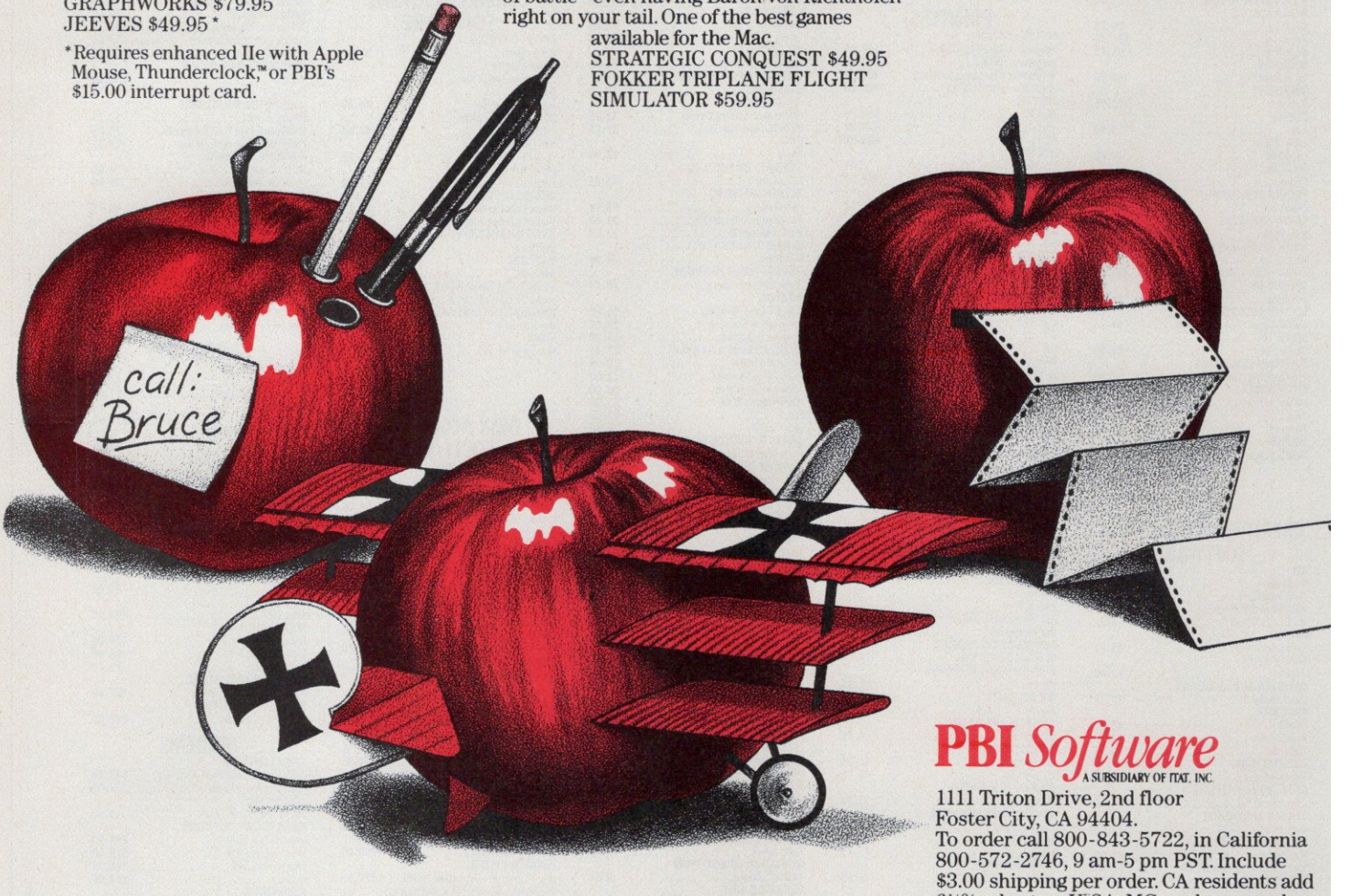

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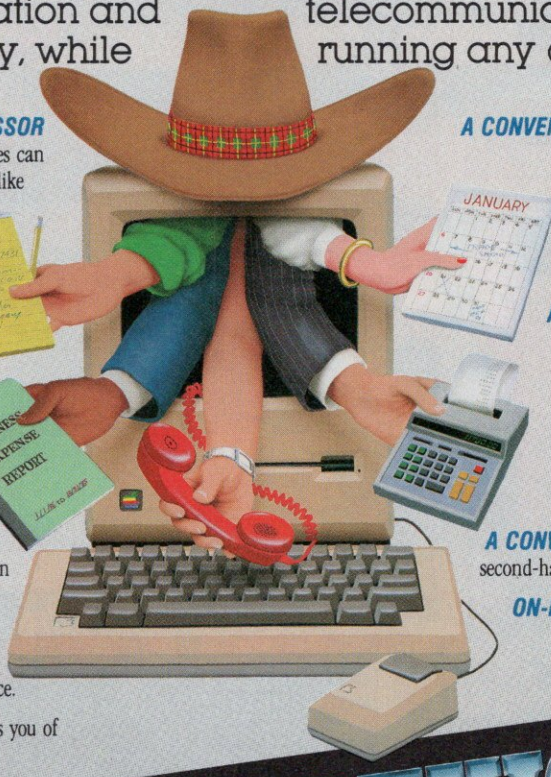

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Omnis 3

Omnis 3 brings the power and flexibility of an industrial-strength data-management program to the Mac.

The Macintosh computer is spreading its wings and taking off. Serious programs such as Microsoft Word and Excel have shown business users that the Mac is much more than just an easy-to-use computer. In the field of database programs, however, few packages have come close to using all the power the Macintosh has to offer, but now you Macintosh owners have a first-class data-management package to call your own: Omnis 3, from Blyth Computers, Ltd.

If you don't need anything more than a simple filing system to track your recipes or Christmas-card list, there are plenty of programs that can do the job. When you need the power and flexibility that nothing but a full-blown, industrial-strength data-management program can provide, though, Omnis 3 has what it takes—and a lot more.

Like most high-end Macintosh programs, Omnis 3 requires a Macintosh computer with 512K of RAM (or a Macintosh XL), an external disk drive, and a printer. For maximum performance, adding a hard disk lets Omnis really flex its muscles. The program is compatible with the AppleTalk network, so you can use it with the LaserWriter printer as well as operate from several workstations. In fact, Omnis 3 also works with the new Corvus OmniDrive hard disk and OmniTalk software, providing multiuser capability with 125 megabytes of central storage.

If you have been using another program for data management while waiting for a package like Omnis 3 to come along, relax. Omnis 3 is able to import data directly from DIF files (as used in VisiCalc and VisiFile), SYLK-format files (e.g., Multiplan), and even ASCII-delimited files from dBASE II and most other database programs. What's more, Omnis 3 can send data back to these programs as well, in the exact file format they need. Omnis 3's data-import/export feature means that it can fit into your organization and work with the software you're now using, which also means that you won't have to reenter data if you're converting your operation to Omnis 3.

Fields of Information

Each record within an Omnis file can hold up to 120 fields of information, with 60 characters in each. You can assign Index status to any field in the record, which allows you to recall records quickly when you're searching for a specific match within that field. Omnis 3 can have up to 12 indexed fields per data file, but there's a catch: Each additional index adds to the file's size, thereby using up storage space on a diskette or hard disk.

Omnis 3 lets you keep data on as many as four separate volumes, such as floppy disks, and use them all within the same application. Thus, you are not limited to the physical capacity of a single floppy disk for your data storage. If you use the software with a hard disk, the four data volumes can be on a single hard disk or on separate disks, and they can be as large as 16 megabytes each—64 megabytes in all.

Relational Linkage

The program's ability to relationally link information in various files sets it apart from many other database packages. Since you can link records in one file to those in another, you can use disk space efficiently and reduce the amount of redundant information in your files. You can link up to 60 files, with up to 12 of them open at any one time.

For example, you can use Omnis 3 to process sales and inventory information. By using the program's relational capability, you can store inventory information in one file, customer data in another, and sales transactions in a third. When you enter an order, Omnis looks up the customer's shipping information in the customer file, updates the inventory to reflect the items sold, and records the sale in the sales journal—all as a result of a single entry. In a nonrelational system, the process would require far more work—you would most likely have to update each file manually.

Defining Data-Entry Screens

You can define up to 12 different data-entry screens for a given file. Since you determine the physical layout of these screens, you can model them after the forms you are currently using, which makes the transition from a paper system to the computerized one that much easier.

The program can check each en-

FRANK BOZZO

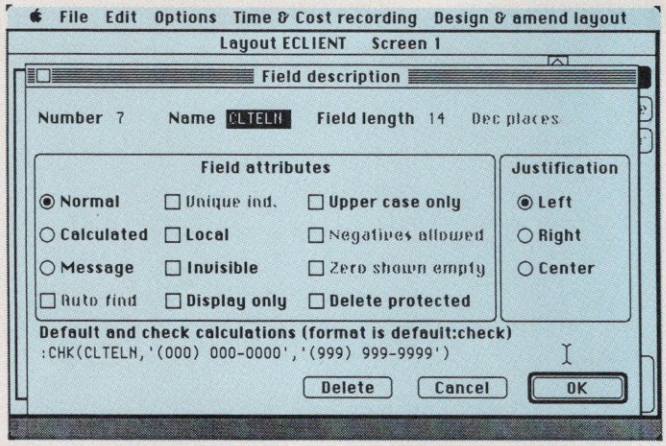


Figure 1: Setting the field attributes for the telephone-number field so that only numbers in the proper format are allowed

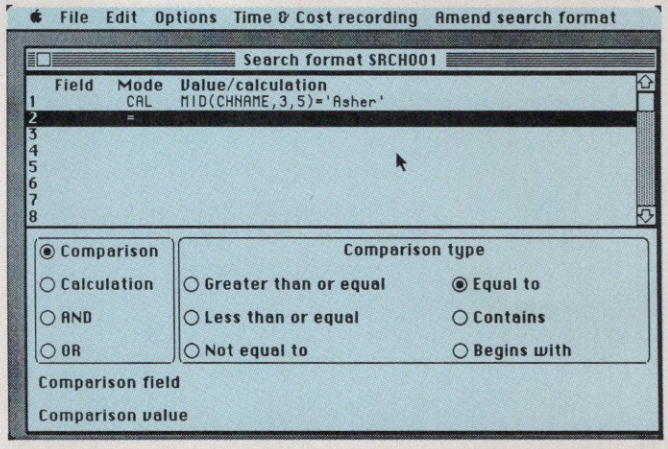


Figure 2: A search format to locate records containing the characters Asher *in the name field*

try's validity as you type it in, and it rejects those that do not meet the conditions you set. In our example of order processing, you could use this feature to check that the amount of customers' orders do not exceed their credit limit or to ensure that telephone numbers are entered in the proper format (see figure 1).

Pressing Tab moves you from field to field while you're editing or adding a record. Pressing Return enters the record into the file—whether you are ready or not, which can take some getting used to. I found pressing Return to be such a natural tendency that I had to retrieve and edit several half-complete records before I got the feel for using Omnis 3.

Using Omnis 3's Find option demonstrates the program's excellent use of indexed fields. If you want to find a specific record, simply enter a value for the program to match in an indexed field, and Omnis 3 will locate the appropriate record with blinding speed. If a customer file is indexed by name, customer number, and ZIP code, you can find a customer's record if you know any of these components. It doesn't matter how large the file is or where the record may be—indexing finds them in seconds. In fact, Find locates records so quickly that Omnis 3 operates at a speed comparable to that of programs that keep all of their data in RAM.

Omnis provides a Search function as well, which locates records by criteria other than those stored in indexed fields (see figure 2). When you use Search, the results are much less dramatic than they are with Find, since Omnis 3 must examine each record in the file individually to find the ones you are looking for, a process that can take several minutes with a large data file.

Producing Reports

Omnis 3's report functions are versatile, although a bit hard to use. The basic report format consists of a header section, a central data area, and a summary section at the bottom that shows totals and averages (see figures 3 and 4). With practice, you can design reports in almost any form and even produce personalized form letters, ideal for confirmation letter or credit statements. The program can sort reports in any order, and the sorts can consist of all the records in the file or only those that meet specific criteria. Omnis 3 also supports a wide array of mathematical and string functions that you can use to calculate values during the report phase.

Putting together a report for the first time is a tedious process; the program has so many options that it is almost overwhelming. Once the report is to your liking, however, you can store the format on a disk and call it up from a pull-down menu when you need it.

Omnis 3 lets you design pull-down menus and mouse buttons for a variety of tasks (see figure 5). This feature allows you to create your own customized data-management applications that are relatively easy for new users to learn to operate. You can also assign your own ⌘-key shortcuts to menu choices, making the system easy to use directly from the keyboard. Adding a new option—or removing an existing one—is a snap.

Figure 3: A report-design screen showing the header, detail, and total sections. The program can sort reports in any order.

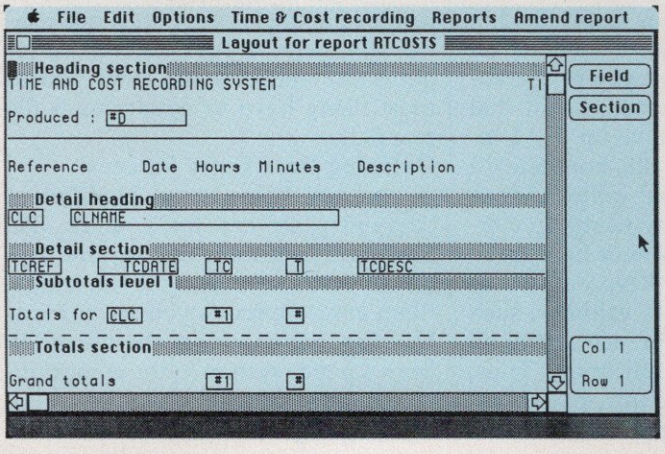
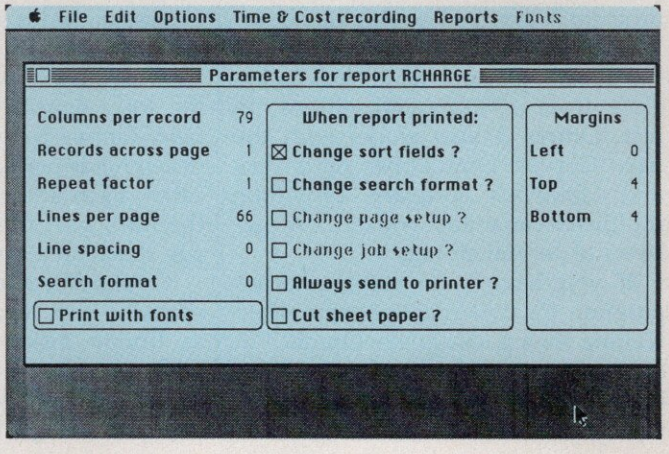


Figure 4: Report parameters that determine how the report is printed. With practice, you can design reports in almost any form.



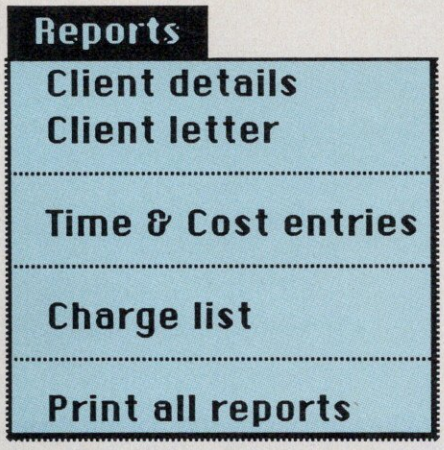


Figure 5: Designing a customized menu

Going deeper unveils the driving force behind Omnis 3: sequences. A form of procedural language, sequences let you program Omnis 3 to perform almost any task automatically. Unlike most procedural languages, however, sequences are built from on-screen options, making them easy to design and modify (see figure 6).

Sequences do their work much faster than do commands from the operator, allowing the program to breeze through the most complex set of instructions. Say you want to scan a file, locate all the records that match a certain criterion, modify those records in some way, print a report, and then close the file; you can design a sequence to do all of this after a single command. You can include prompts and messages to the operator within the sequence instructions and call the entire process from a pull-down menu.

If your application involves sensitive or confidential information, you will appreciate Omnis 3's extensive password protection and file security. Eight different access levels are available, ranging from basic data-entry privileges to full system access. You can change passwords or modify the status of your users easily. A record-locking feature further protects your data by preventing accessing of the same record by two different users at once. These security provisions make Omnis 3 an ideal choice for multiuser operation.

When your application is configured exactly as you want it, you lock the system files, but once you lock a file, it cannot be unlocked or changed in any way. You can still enter or modify records, but you can no longer change the format of the data files, alter reports, or modify entry screens. Naturally, Omnis recommends that you keep an unlocked copy of the files on hand on a separate diskette, in case a change becomes necessary later on. Combined with password protection and record locking, locked system files provide a high degree of security.

Particulars

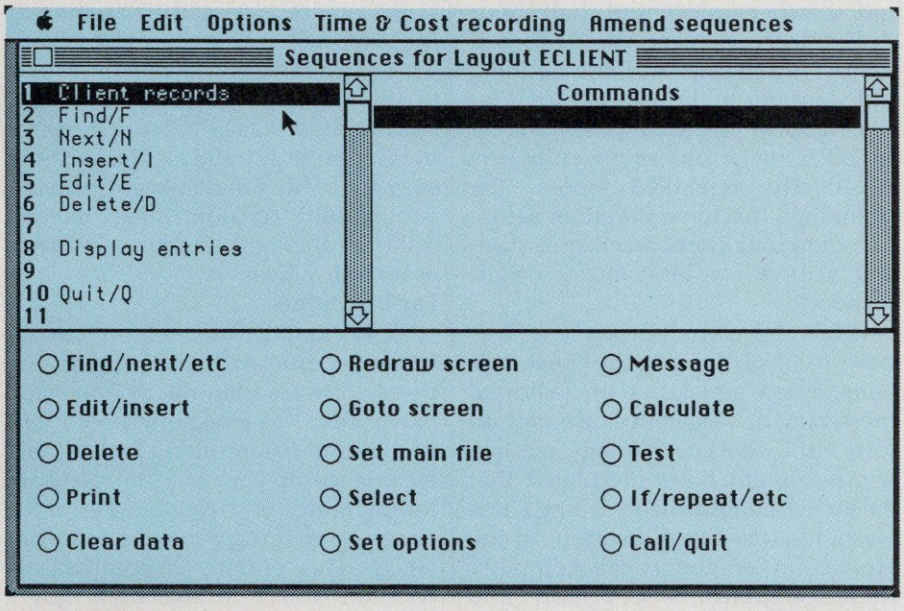
Omnis 3's documentation is thorough and clearly illustrated—far better than the marginal documentation that came with Blyth's earlier offerings. The first section of the manual is a step-by-step tutorial on basic system features, and the rest of the book serves as a reference guide to the more-advanced features. The package also includes a diskette of sample applications, including accounts receivable, personnel management, time/cost recording, and inventory control. You can use them as is or modify them to suit your needs.

The program is backed by a telephone-support network that offers different levels of help. During the first 90 days after purchase, every buyer of Omnis 3 gets three free telephone calls to Blyth's Massachusetts support center. Thereafter, technical support is available for a fee. For example, Level 1 support (which excludes specific help on designing and debugging an application) costs $50 for five calls, $75 for ten. Level 2 support (for advanced users and developers) is available as well, priced at an even higher, unspecified rate.

A backup of the copy-protected system-master disk is included in the package. The software disks are guaranteed against physical failure for 90 days from the date of purchase, but the program itself is not guaranteed in any way.

Omnis 3 is more difficult to learn than most Macintosh software. It is a serious tool and not one that you will master in one sitting. You may never even use all of the program's capabilities, but it's nice to know that Omnis 3 has the extra horsepower under the hood if you ever need it. ✚

Figure 6: Sequences let you program Omnis 3 to perform almost any task automatically. Sequences are built from on-screen options, making them easy to design and modify.



Chuck Doherty is an independent computer consultant and free-lance writer from South Dartmouth, Massachusetts. His work regularly appears in several computer and audio publications.

VITAL STATISTICS

Maximum files per database:	60
Maximum files open at once:	12
Maximum indexes per file:	12
Maximum fields per file:	120
Maximum characters per field:	60
Maximum size of data file: (in megabytes):	64
Maximum rows per report layout:	240
Maximum columns per report layout:	240
Maximum totaled fields per report:	60

PRODUCT INFORMATION

Omnis 3
Blyth Software
2655 Campus Drive,
Suite 150
San Mateo, CA 94403

List Price: $495; multiuser version for 2–5 users, $990; multiuser version for 6–10 users, $1785

Requires: Macintosh, 512K RAM, external disk drive or hard disk

GAMES/*BY MICK O'NEIL*

Sargon II and III pushed open the door to superior computer chess. Now, Psion Limited has produced a chess program that knocks the door completely off its hinges.

A NEW DIMENSION IN

It must have been about six years ago when I rushed over to a friend's house to play chess against his new microcomputer. After an interminable wait while the program loaded from his cassette recorder, I anxiously made the first move. Of course, there was no graphics display, but that hardly mattered. The computer was actually going to play chess! We patiently speculated about possible responses to our king pawn opening while the computer was analyzing. The only indication that the computer was "thinking" was the blinking period in the top right corner of the screen. As the time passed, our analysis grew more complex, and friends gathered around the machine to watch the incredible spectacle. Alas, after about 30 minutes, we quit and reloaded the tape.

We tried a different opening move, and another uneventful half hour passed with no response. And so it went. We left the machine running and went out to dinner and upon returning were greeted by the blinking period. One of our ruder onlookers impatiently remarked about the "blinking" machine. Boredom set in, and computer chess received a stunning setback—at least in our neighborhood!

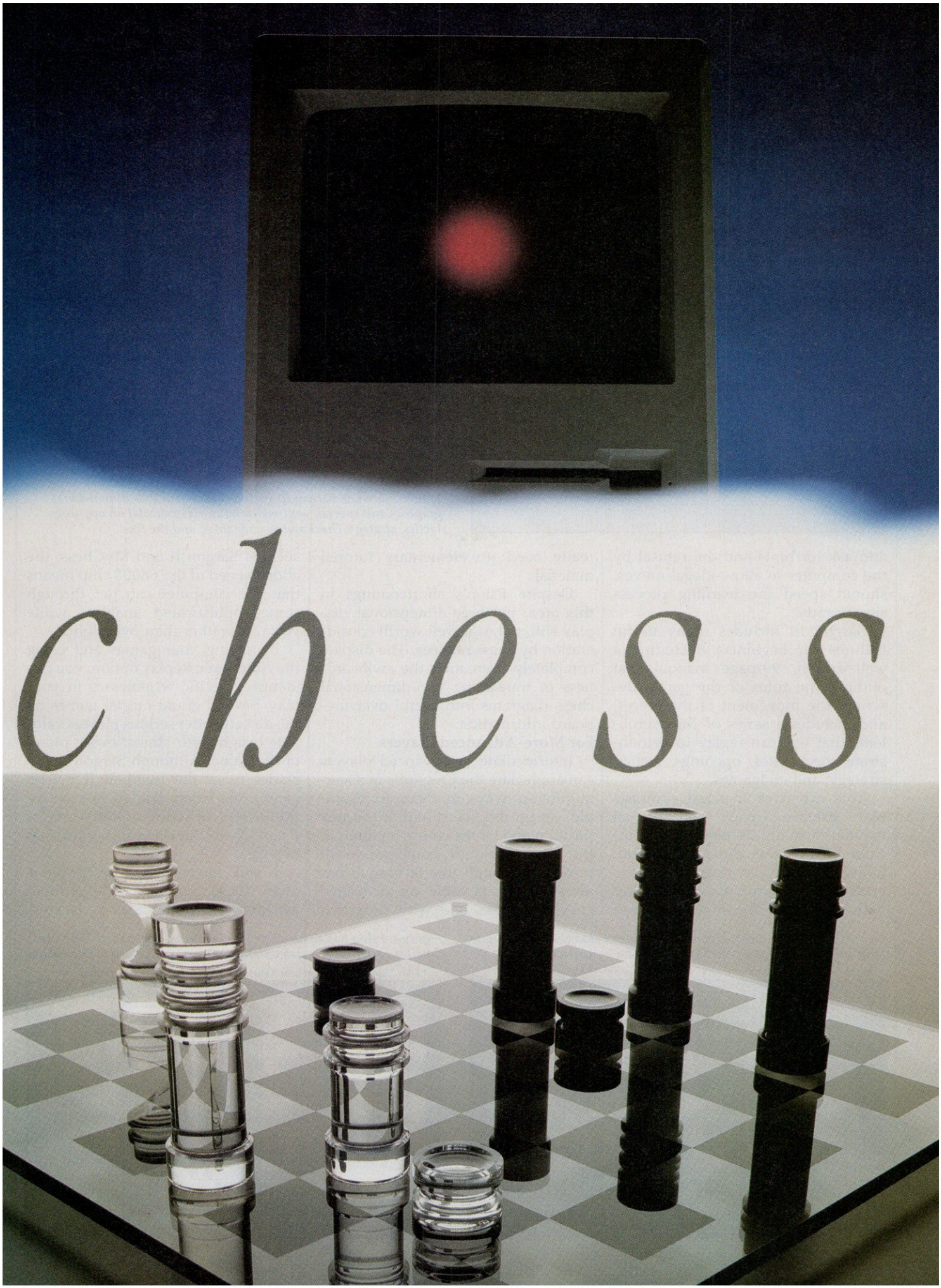
While microcomputer chess was slow to evolve over the next few years, a new generation of dedicated chess-playing machines seemed to corner the chess-technology market. A cynic might have speculated that the increased revenue in selling chess machines was a real deterrent to the production of good microcomputer chess programs. When Dan and Kathe Spracklen wrote Sargon II and Sargon III for the Apple II and Macintosh, the door to superior computer chess was finally pushed open (see *A+*, June 1984, pages 95–100). Now, Psion Limited, a British software house, has produced a chess program that knocks the door completely off its hinges.

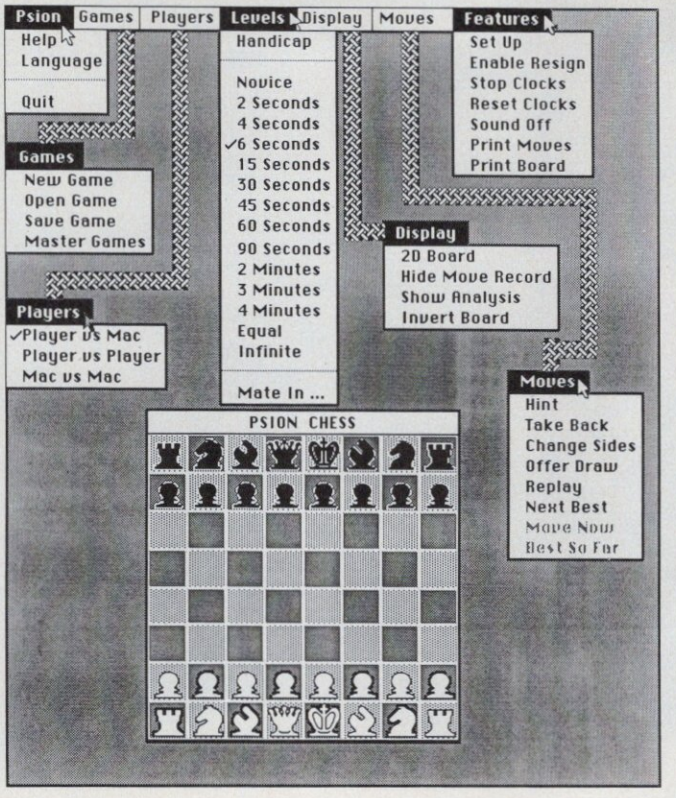
Mate in Three Dimensions

Offering clock displays, sound control, six different languages, more levels, and a brilliant three-dimensional display, Psion appears to have examined many of Sargon's capabilities and enhanced them (see figures 1 through 5). The relative strengths of the programs seem comparable, with Sargon, perhaps, maintaining an edge with its greater depth of openings (68000 positions vs. about 4000). Preliminary tests I conducted showed Sargon and Psion splitting two games at the novice level and two games at the tournament level, and Psion Chess (running on a Sage) even outpointed Sargon in the 4th World Microcomputer Chess Championships in Glasgow in 1984. Though the strength of the programs is important, you should consider their relative utility in the light of your experience as a chess player.

For Beginners

A beginning chess player has an entirely different perspective on chess software than the average club player does. To a beginner, both Sargon III and Psion offer a real tutorial experience. If you find the program intimidating, you can handicap the computer to bring it down a couple of levels. This option, in combination with the ability to take back moves


chess



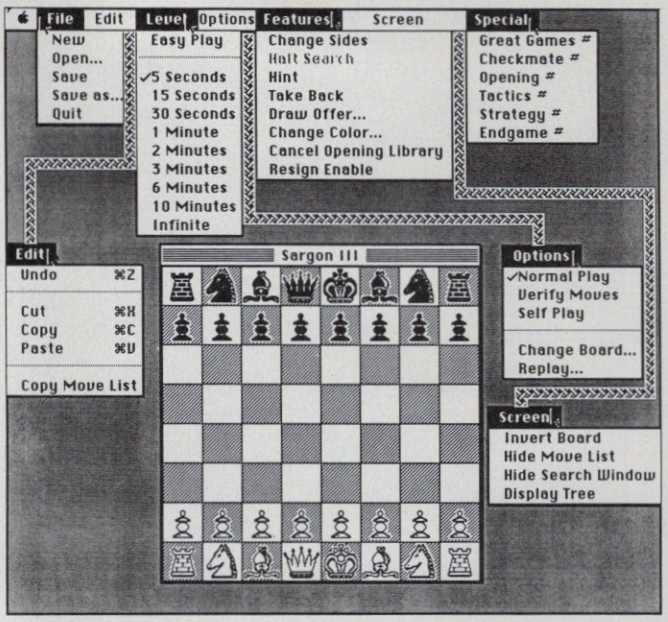


Figure 1 (left): Psion includes many interesting features, including the ability to work in any of six different languages, and fully utilizes the Macintosh pull-down menus.

Figure 2 (above): Sargon III includes excellent two-dimensional graphics and special, well-written tutorial material on openings, tactics, strategy, checkmates, endgames, and the like.

and ask for hints and the refusal by the computer to allow illegal moves, should speed the learning process significantly.

Sargon III includes many useful features for beginners, including a well-written, 99-page manual that outlines the rules of the game, describes the movement of the pieces, and includes a series of chess problems that you can replay to demonstrate checkmates, openings, tactics, strategy, and endgames.

This extensive material contrasts with Psion's 3-page, multilingual manual (actually 24 pages if you include all of the different translations!), which assumes that the program's users are already familiar with chess and the Macintosh and really need no elementary tutorial material.

Despite Psion's shortcomings in this area, its three-dimensional display still makes it well worth consideration by chess novices. The display completely overcomes the awkwardness of translating two-dimensional chess diagrams into useful over-the-board information.

For More-Advanced Players

Intermediate or advanced players can appreciate the programs in several different ways. You can, for example, set up the board with a tourney position and let the computer analyze the best move or combination of moves. Although this technique has always been possible on dedicated chess machines and with programs such as Sargon II and MyChess, the added speed of the 68000 chip means that the computer can get through some sophisticated analyses while you wait, rather than overnight.

By saving your games and using the Automatic Replay option, you can identify specific weaknesses in your play. Several grand-master games on the diskette offer serious players valuable insight into almost every phase of the game. Although Sargon III includes twice the number of master games, the Psion display and the introduction of chess clocks makes Psion Chess the clear choice for club players.

I still have a few reservations about these programs. The printout capability in both cases is lacking.

Figure 3: The three-dimensional display puts Psion chess in a league of its own and makes it worth consideration by chess novices.

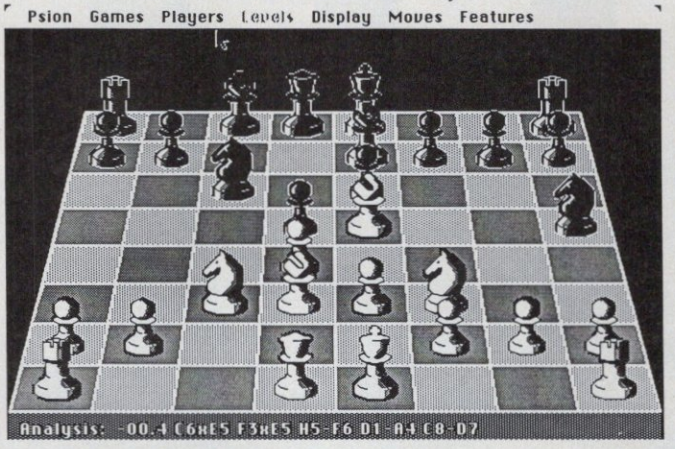
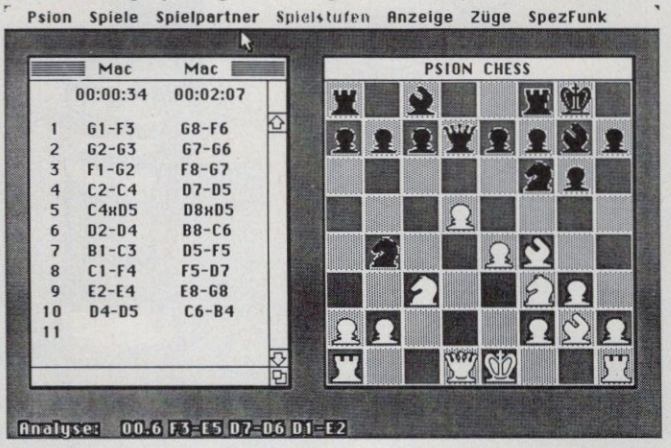


Figure 4: Psion has a two-dimensional option that shows the board, time for each player, a game listing, and an analysis of each position.



Sargon III has no option for printing the board position, and Psion does not allow moves to be printed unless it happens concurrently with the playing of the game (or replaying). In addition, Psion's move printout doesn't recognize page lengths. A good chess program should be able to print a board display in condensed form, along with a nicely formatted move list.

These complaints may seem picky (you can always print out Sargon's board with ⌘-Shift-4), but for such advanced software, the failure to take advantage of the Mac's printing capabilities is disappointing.

Several things can and should be done to make these remarkable programs even better. First, I would like to see a Tournament mode in which the Take Back a Move and Switch Sides options are disabled and the computer keeps track of results. It

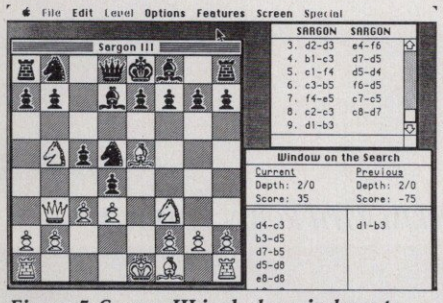


Figure 5: Sargon III includes windows to show the game listing and the analysis.

would add an element of excitement to the game that these features seem to neutralize. Taking back moves is like cheating at golf. It's fun for a while and certainly instructional, but it does take something away from the hunt.

Second, I would expand the Take Back a Move option in the Nontournament mode to let players take back a specified number of moves. This would make these programs a lot more useful for serious analysis involving examination of options.

Finally, although both programs play credible chess, they still need considerable refinement, particularly in the endgame. I noticed an apparent tendency to trade off equally weighted pieces, with disregard for the tactical nuances of the resulting positions.

A Major Advance

Both Psion Chess and Sargon III are excellent programs that offer chess enthusiasts and beginners a wealth of features that can greatly increase their enjoyment of the game. The day when *Modern Chess Openings* and *The Complete Games of Bobby Fischer* are available on video/laser disk cannot be too far off, and a three-dimensional display will make all of this complex analysis much more palatable. Thus, Psion Chess, with its superb three-dimensional graphics, constitutes a major advance for microcomputer chess and is clearly in a league of its own. ✚

	Sargon III	Psion
Levels	♔	♔♔
Display	♔♔	♔♔♔♔
Strength	♔♔♔	♔♔♔
Features	♔♔♔	♔♔♔♔
Tutorial	♔♔	♔
Manual	♔♔	$
Printout	$	$

Poor ♔ Acceptable ♔♔
Good ♔♔♔ Outstanding ♔♔♔♔

Figure 6: A graphic comparison of the two chess programs

Mick O'Neil lives in England, where he is an educational-computing coordinator supervising and administering computer-education programs at 17 U.S. Department of Defense schools in the United Kingdom.

PRODUCT INFORMATION

Psion Chess
Psion, Inc.
40 Linderman Drive
Trumball, CN 06611
(203) 371-4371
List Price: approximately $59
Requires: Macintosh
Features: Multifeatured, multilingual, three-dimensional chess program
Documentation: 24-page multilingual manual (only 3 pages in English)

Sargon III
Hayden Software Company
600 Suffolk Street
Lowell, MA 01854
(800) 343-1218
List Price: $49.95
Requires: Apple II Plus, IIe, IIc, or Macintosh
Features: Extensive opening library (68000 positions) and excellent tutorial material (mates, tactics, strategy, etc.)
Documentation: Extensive 99-page manual with descriptions of 107 master games

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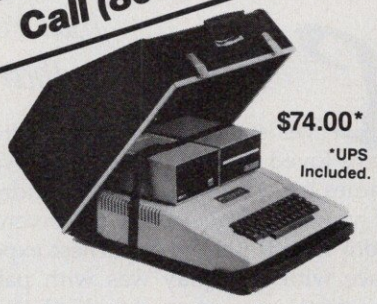

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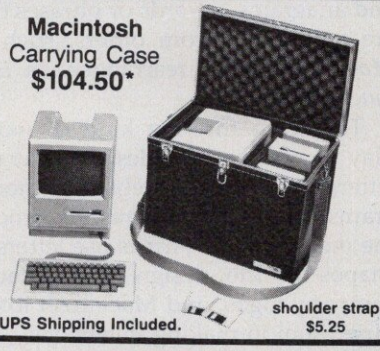

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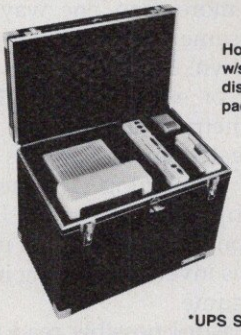

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Scott Kim's inversions

Playing with words and symmetry

GRAPHIC ARTS/*BY SCOTT KIM WITH ROBIN SAMELSON*

An inversion is a word or name that reads in more than one way.

Ever since I learned to write, I have loved to play with words. Word games have been played for hundreds of years, and new ones are invented from time to time. My earliest experience with wordplay was with palindromes—phrases or words that are spelled the same forward and backward, such as, *Camp Mac* or *racecar*—and anagrams—words or phrases that are rearranged from others, such as *Macintosh* being rearranged as *isn't macho.*

The most thrilling kind of wordplay to me involves designs that use letters as shapes. Rebuses, monograms, and word pictures are among the most popular. Artists use letters as shapes in the design of typefaces, company logos, and Macintosh icons. I use them in making inversions.

An inversion is a word or name that reads in more than one way. It may read the same both right side up and upside down, be the same in its mirror image, or exhibit some other kind of symmetry. For the past 11 years, I've created many designs as wordplay by combining symmetry and calligraphy. Most recently, I've been playing on the Macintosh, a machine that turns inversion making into a whole new game.

How can a word possibly read the same upside down as right side up? Normally, when you turn a book upside down, it becomes illegible. Only a few letters, such as *O, H, I,* remain the same. In order to make a whole word read the same both ways, you have to stretch the shapes of the letters. Fortunately, our alphabet is very pliable. The great variety of typestyles we see in print has trained us to recognize many different shapes as the same letter. If it were not for our flexible perception, inversions would not be possible.

Some words become inversions quite easily. On the following pages are a few examples from my book *Inversions: A Catalog of Calligraphic Cartwheels*, a collection of images and essays of interest to anyone who works with visual problems in work or play. Chapters are on topics such as symmetry, vision, letterforms, and how symmetry is embodied in art and music. The book includes a foreword by Douglas Hofstadter, Pulitzer-prize-winning author of *Gödel, Escher, Bach: an External Golden Braid.*

Does your name work as an inversion? Try it and find out. Start by printing your name in capital letters. Turn the page around and print your name again just under the original. Study the upside-down and right-side-up versions of your name, looking for similar shapes. Try making the first letter of your name turn over into the last letter, and then work toward the middle. If printed capitals don't work, try lowercase or cursive. If one form of your name doesn't work, try a different form. Or try a different symmetry. Don't worry about making it too illegible. People are highly skilled letter recognizers, which gives inversion designers endless means of expression to work with.

Inversions don't always work out, but with persistence, ingenuity, and a bit of luck, you'll be surprised at what you can do.

Symmetry and Letterforms

Symmetry exists in all areas of art and science. In mathematics, it is studied abstractly; in nature, symmetry appears all around you; in music, you hear symmetry in canons and fugues. The artist M.C. Escher used symmetry to create impossible worlds. You can combine all kinds of symmetries in making inversions.

Wordplay on the Macintosh

Most people find it hard to talk about symmetry, even though our experience of it is extremely familiar. The reason is that most of us rarely practice putting visual and spatial concepts into words, and this lack is reflected in our language. For instance, there is no standard word for ʎɐʍ sıɥʇ of inverting a word, as opposed to yaw siht of inverting a word—not to mention ɟuıs ʍɘʎ or yaw siht.

Prior to the development of the Macintosh, only a few fields—pho-

tography, acting, and mathematics—existed in which symmetry was important enough that a finely tuned vocabulary evolved. MacPaint, with Flip Horizontal, Flip Vertical, Rotate, and Brush Mirrors, puts symmetry in the hands of the rest of us.

For the past year I have been exploring the Macintosh as a medium for playing with symmetry, creating typefaces and designing logos. In this article, I would like to share some of the discoveries I have made. So, turn on your Mac, pull up a mouse, and get ready to take your imagination out for a spin.

Scottsym

Playing with words and symmetry

GRAPHIC ARTS/BY SCOTT KIM WITH ROBIN SAMELSON

Let's warm up by breaking a few rules. Below is a visual thinking exercise that asks you to see the familiar in a new way. I've written the names of my housemates. I don't expect you to recognize these names, but it will be easier to read them if you turn them upside down.

VNIN hddim e!ɟə?

uesns S37JVH) WIf

Try writing your name with characters that, if turned upside down, will read as the letters in the name. Of course, some letters work better than others. Using a question mark as a C, for instance, may strike you as going a bit too far. If you can't find a solution for your first name, keep trying other names until you do. Here is a way I found to write my own name.

$©ㄇ

Brush Mirrors

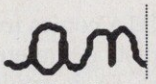
Thinking two things at one time is the basis of designing any inversion. One way to experience this is by writing with Brush Mirrors. Turn it on, and everything you draw with the paintbrush multiplies into a kaleidoscope of imagery. Brush Mirrors is probably the most magical feature of MacPaint.

Let's draw a face like this one.

Select Brush Mirrors from the Goodies menu and click on the vertical line. You need to draw only half the head. When you select the vertical mirror, everything you draw on the left side of the screen is mirrored on the right. Start by positioning your paintbrush as close to the centerline of the screen as you can. Click once to deposit a dot, which helps you find the exact center. Always start from the middle and work outward to make sure your drawing meets in the middle.

Make a single dot for both eyes. If the position doesn't look correct, erase and try again. Since Brush Mirrors does not mirror the eraser, switch to white paint and paint over what you want erased. Add a nose, a mouth, and some hair.

What name shall we choose for this perfectly balanced character? A name made of perfectly balanced characters, of course! Below, I've given you only half the name—Brush Mirrors automatically fills in the rest of the name.



The following names can be written with either the horizontal or the vertical symmetry turned on in Brush Mirrors. As a visual-thinking exercise,

figure out which symmetry (horizontal or vertical) you'll have to use to write the inversion of each of these names.

BOB	HANNAH
YVETTE	DIXIE

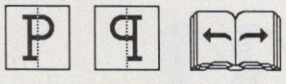
Turn on either the horizontal or vertical line in Brush Mirrors. Select a large round brush and some black paint. Visualize what the inversion will look like and begin. The answer to DIXIE is at the bottom of the third column of this page. Hint: To draw DIXIE, turn on both the horizontal and vertical lines and start at the center of the screen.

Flips and Rotates

In MacPaint, you can reverse a letter three ways: Flip Horizontal, Flip Vertical, and Rotate 180°. Flip Horizontal and Flip Vertical show up in MacPaint as commands on the Edit menu; Rotate 180° is not a MacPaint command, but you can achieve it by using the Rotate command (also on the Edit menu) twice. Before you can use a Flip or Rotate, you must select the area you want to transform by using the selection rectangle.

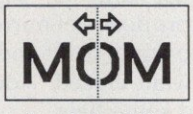
On your way to becoming familiar with Flips and Rotates, it is easy to get confused. The three techniques are so similar that it is hard to remember which is which. Let's study them in more detail. A small mirror will be useful for the following experiments.

Flip Horizontal reverses left to right. To easily remember the operation, place your hand palm down on a page



and turn it over as if turning a page in a book.

A word with Flip Horizontal symmetry has each letter in its left half



mirrored on its right. Words with left-right symmetry read the same in a mirror as they do normally. Place your mirror on this illustration to complete the word OHO.

OH

The name TOYOTA comes frustratingly close to complete symmetry. If it were spelled ATOYOTA, it would read perfectly in a rear-view mirror. The

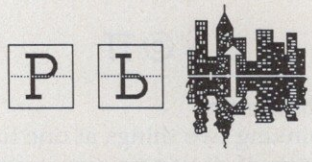
A TOYOTA

problem goes away if we stack the letters vertically.

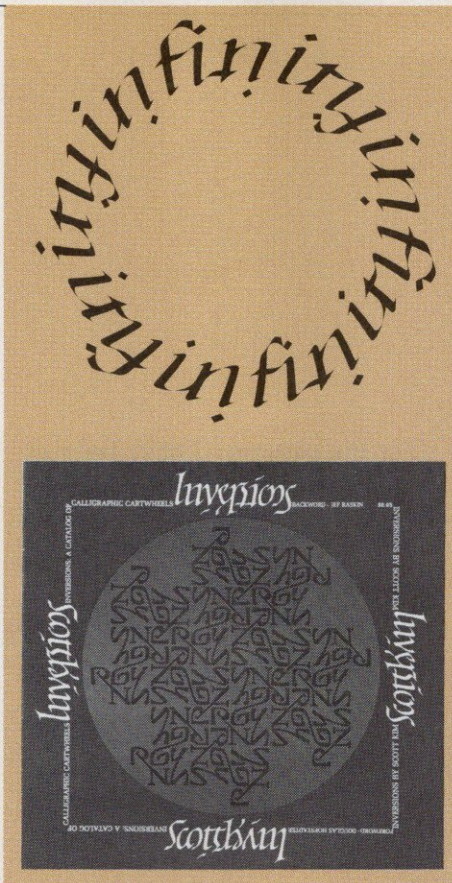
Many other words can be written this way. The illustration shows the 11 capital letters with horizontal symmetry. Can you name four states in the U.S. that use only these letters?

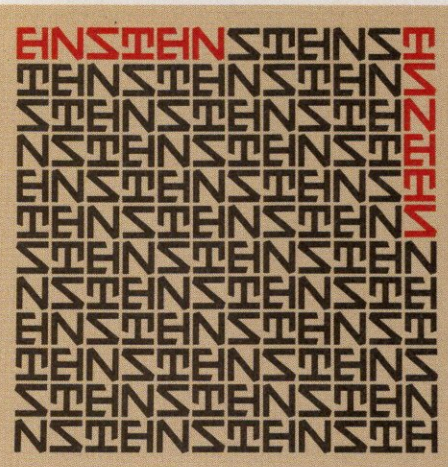
AHIMOTUVWXY

Flip Vertical reverses top and bottom. I like to think of Flip Vertical as the reflection of a city in a lake. Invent another gesture for this image.

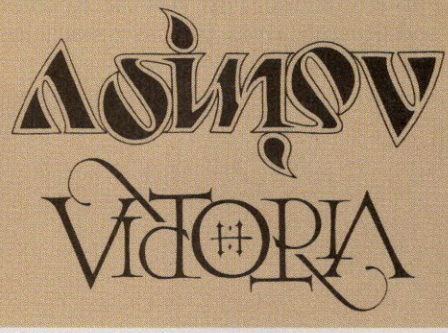


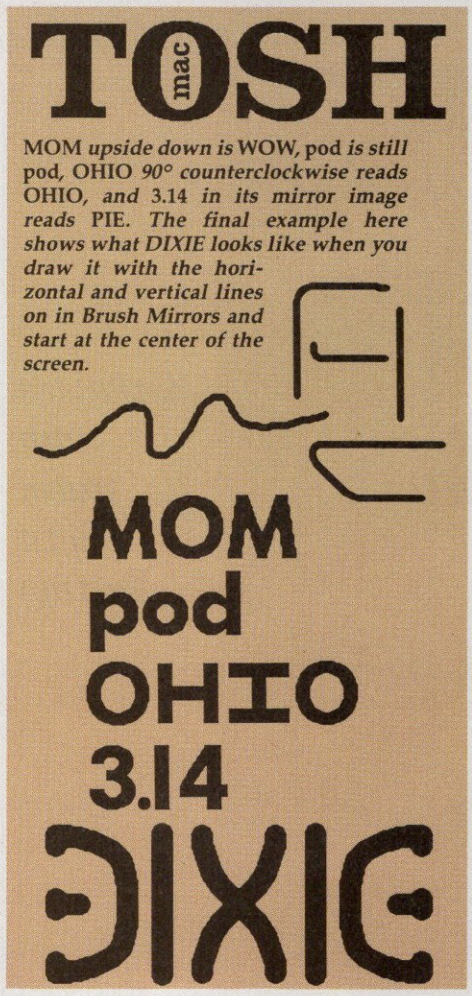
A word with Flip Vertical symmetry

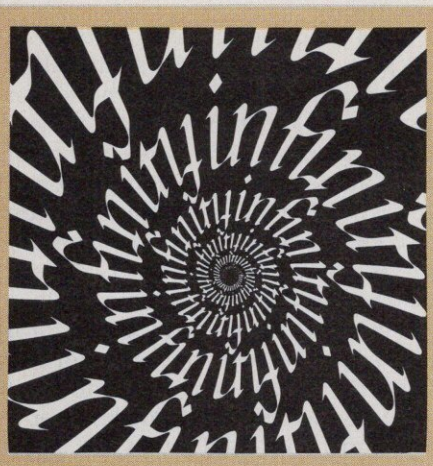




Sample images from Scott Kim's Inversions: A Catalog of Calligraphic Cartwheels







Gutenberg
Gutenberg
Gutenberg
Gutenberg

has the top half of each letter reversed in its bottom half—the top half of C reverses into the bottom half of C, the top half of H reverses into its bottom half, and so on. Words with top-bot-

tom symmetry read the same in a mirror as they do without the mirror. Try placing a mirror on the following illustration to complete the names BOB and DEBBIE.

BOB DEBBIE

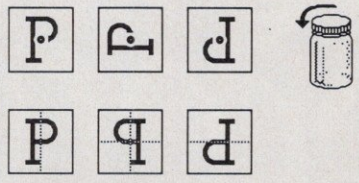
Place a mirror on the page along a horizontal line just above CARBON DIOXIDE. Why does the mirror reverse one word but not the other?

CARBON DIOXIDE

There are eight capital letters with vertical symmetry. Can you think of other seven-letter words that use only these letters?

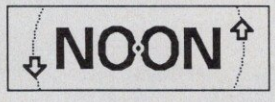
BCDEHIOX

Rotate 180° reverses both left and right and top and bottom. You can think of Rotate 180° either as the combination of a Flip Horizontal and a Flip Vertical or as the combination of two 90° Rotates. The MacPaint Rotate command turns an image 90° to the left, the direction of the twist as you



unscrew the lid of a jar. To remember it easily, try the gesture with your hand.

A word with Rotate 180° symmetry has each letter in its left half turned upside down on its right, as in the word NOON. Words with rotational



symmetry read the same when you turn them upside down as they do right side up. Can a mirror complete the word SWIMS? Try two mirrors.

SW'

The word ZOONOOZ is the ingenious title of a newsletter put out by a

ZOONOOZ

zoo. Altogether it has seven different capital letters with rotational symmetry. Very few rotationally symmetrical words can be made out of these letters.

HINOSXZ

Unfortunately, stacking the letters vertically does not make the problem any easier. Notice that the word OHO has all three symmetries: Flip Horizontal, Flip Vertical, and Rotate 180°.

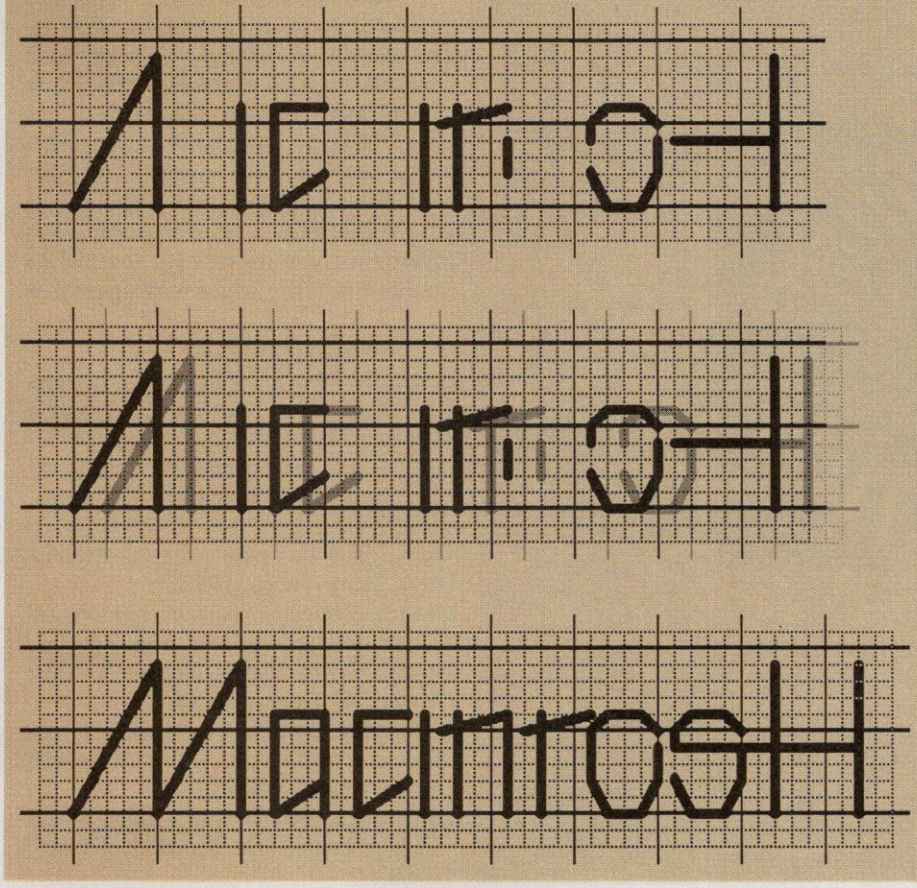
Inversions for the Macintosh

The unique capabilities of computer graphics present a challenge to invent new types of inversions.

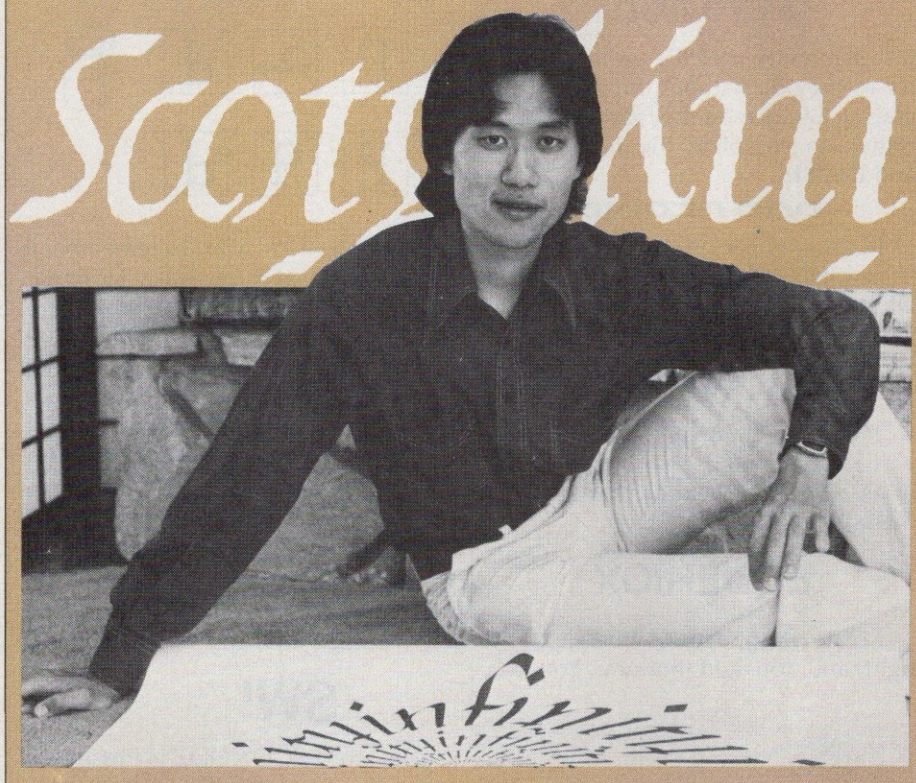
Word slides take advantage of MacPaint's ability to "peel off" transparent copies. You form a word slide by sliding two copies of the same image across each other until they make a word (see word slide opposite).

Here's one inversion you can try out on your friends. Recreate this word slide in MacPaint. First, turn on the Grid under the Goodies menu. Next, go down to the line-thickness menu (in the lower left corner of the

To create a word slide on the Macintosh, you draw an image in MacPaint and use the lasso to slide a copy of it across the original image until the two images form a word.

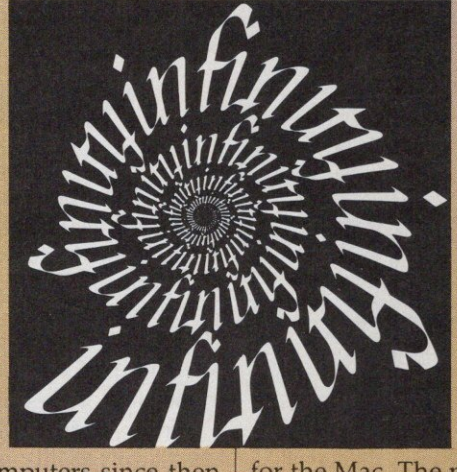


Scott Kim & Inversions



Scott Kim is a Macintosh performing artist. In addition to applying a remarkable art form he calls inversions to the Macintosh, he is completing an interdisciplinary Ph.D. in graphic design and computer science at Stanford University. He is also part of the team that designed the new SwyftCard for the Apple IIe just released by Information Appliance, Inc.

Kim designed his first inversion more than ten years ago and has used several different kinds of computers since then to assist him in producing his symmetrical wordplay. In the infinity spiral pictured here, he mixes idea and image, art and technology, in a swirling evocation of infinity. He created it with the aid of a computer program written in JaM, the predecessor to Adobe Systems' PostScript, the language of the LaserWriter.



The program takes a hand-plotted design, repeats it symmetrically, and then bends it into a continuously expanding spiral. You can read *infinity* in two different ways. The letters *fi*, for instance, when turned upside down become the *y* at the end of *infinity*. The spiral can be read as either *infinity* going in or *infinity* coming out.

Scott Kim and Robin Samelson are partners in Look Twice, a company publishing Inversions for the Mac. The package comes with two diskettes and a copy of *Inversions*. The diskettes contain clip art, animation, puzzles, and construction sets. The package retails for $49.95 plus $3.50 for shipping and handling. Write to Look Twice, Dept. W, P.O. Box 50697, Palo Alto, CA 94303 or call (800) 227-2400, ext. 986, or, in California (800) 772-2666, ext. 986.

screen) and select the second-to-thickest line. Use the straight-line tool and draw the lines on the screen just as you see in my word-slide example on page 185. Leave plenty of room at the right edge of the screen—you will need it in a moment. Be sure to copy the spacing exactly. The image is shown on a grid, so you can match your drawing to mine.

Finished? We're ready to perform the word slide. Use the lasso tool and lasso the entire image. It will start shimmering. In order to make a copy, press and hold the Option key, position your cursor arrow on the image, and then click and hold the mouse button. Slide the mouse to the right and you will see the image move. Move it until you see the name Macintosh. Click outside the image area to turn off the shimmering.

Want to see that again? Tap the Undo key (the key in the upper left corner of the keyboard) several times or hold it down and watch the design flip back and forth in animation.

As you worked through the material in this column, did you notice a difference in how you began to think about symmetry and letters? Can you compare what it would be like to work through these exercises on paper alone, without the Macintosh?

If you are not a visually literate person already, after working with inversions on the Mac, you may find yourself drawing pictures or diagrams to support your explanation of an idea. That is only one side effect we've heard of that comes as a result of playing with symmetry. Whatever your experience, after playing with inversions, you may never see the alphabet quite the same way again. ✚

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FROM LONDON TO CAIRO

PART I

An introduction to Macintosh typography

The Macintosh screen captivates. Though small, the image is crystal clear and rock steady. Freed from the limitations of previous personal-computer technology, the Mac can display typefaces heretofore available only on very expensive computers.

Apple distributes a good selection of typefaces on the Mac system disks, and although they whet the appetite, you can't help but long for more. How about a larger London font? some bold, headline faces? mathematical symbols? Greek? Hebrew? a clean, casual font for personal correspondence? The list goes on.

What are fonts? How does the Mac deal with them? How can you make your own or modify the ones Apple provides? What fonts are currently available? This two-part article will answer these questions.

A Little Background

In typographical terms, the design of a particular alphabet, such as Helvetica or Caslon, is called a typeface. A typeface may be available in several styles including Roman (vertical strokes), italic (slanted strokes), bold, light, and so on. A family of type consists of a series of typefaces, all variants of one basic design.

In typographical design, the spacing between letters is as important as the design of the letters. With traditional typesetting techniques, when certain letters appear next to each other, there is too much space between them, compared to the rest of the spacing. Typesetters reduce the spacing between these characters with a technique called kerning to improve legibility and appearance.

When type is in a text block, the space between the lines of text is called the leading.

Anatomy of a Font

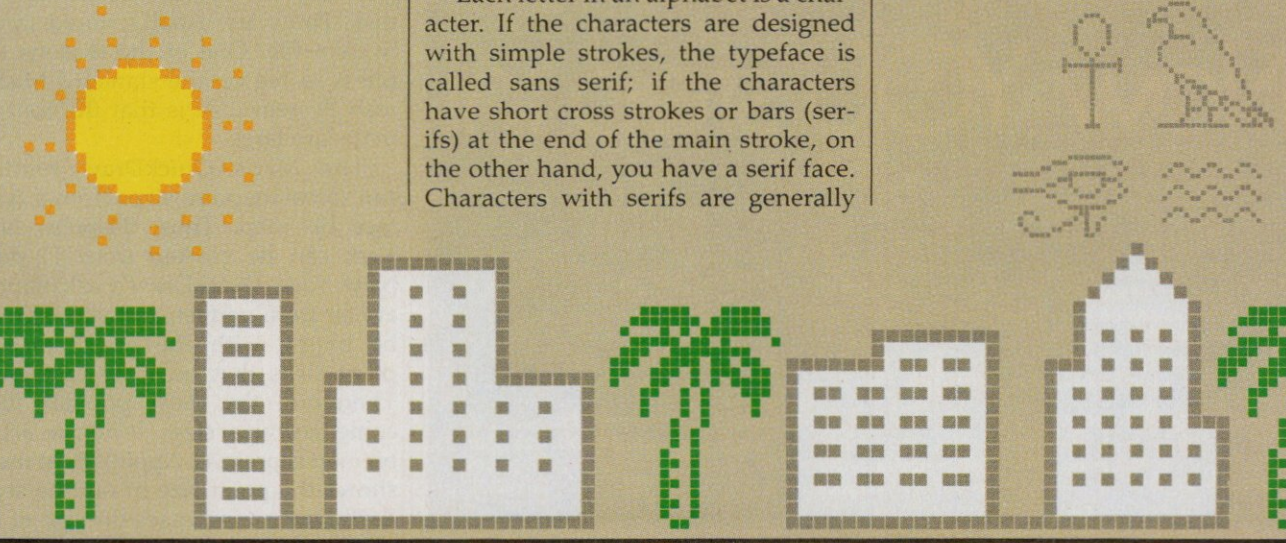
Each letter in an alphabet is a character. If the characters are designed with simple strokes, the typeface is called sans serif; if the characters have short cross strokes or bars (serifs) at the end of the main stroke, on the other hand, you have a serif face. Characters with serifs are generally thought to be more readable, since your eyes use the serifs to stay on each line as you read (see figure 1).

A font is an assortment of all the characters of one typeface and typestyle. A complete font, therefore, is made up of all the uppercase characters, lowercase characters, numerals, punctuation marks, reference marks, and so on.

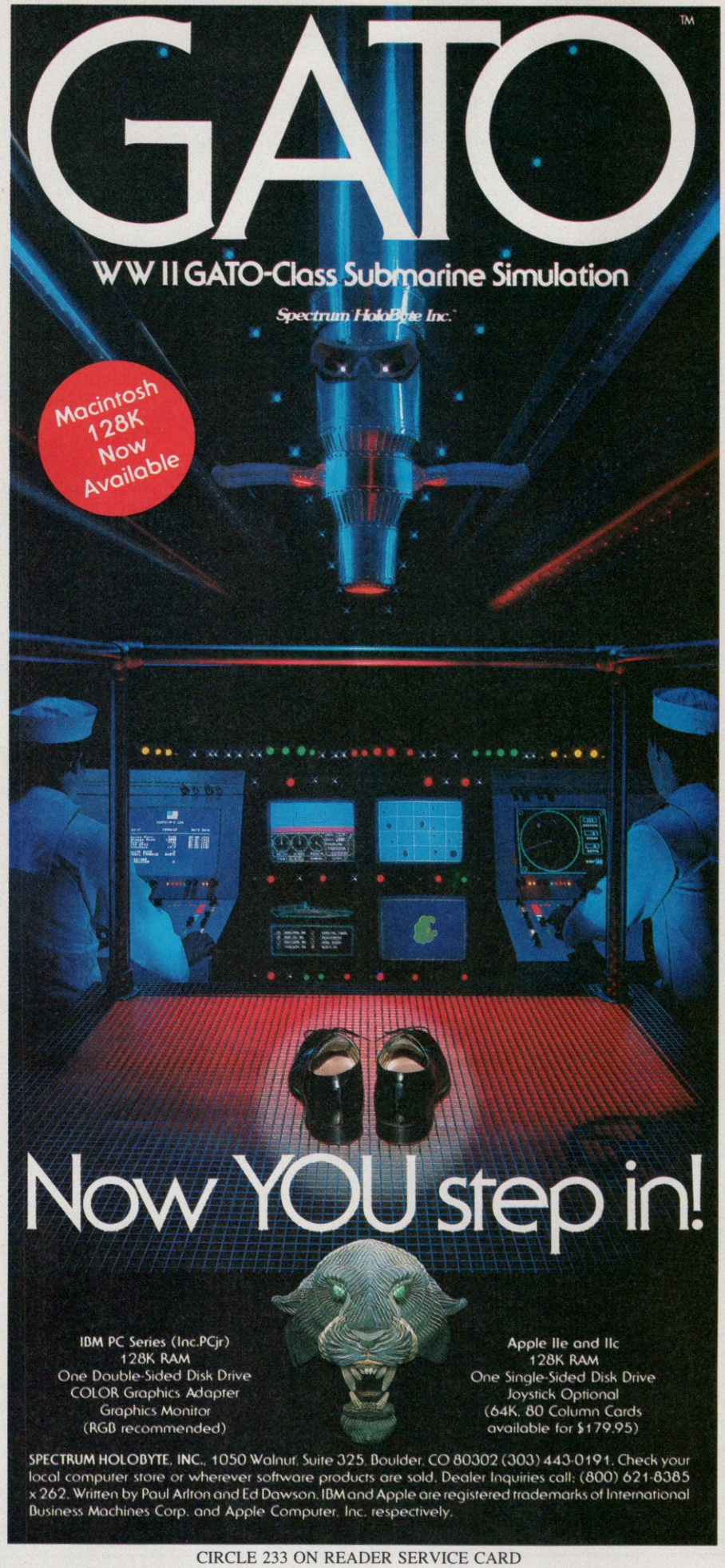
Font sizes are measured in points. There are 72 points to an inch—a 12-point font is 1/6 of an inch tall, for instance. Twelve-point fonts are sometimes called pica fonts, and typographic measurements are often expressed in picas.

There are hundreds of typefaces. Typesetters have classified type into seven major classifications, but, for our purposes, a typeface, and thus a font, fits into one of two major groupings: text and decorative.

A text font is intended for use in the main body of text in books or other publications, and it should be clean and legible. A decorative font is for



Sample characters from the Cairo font.



CIRCLE 233 ON READER SERVICE CARD

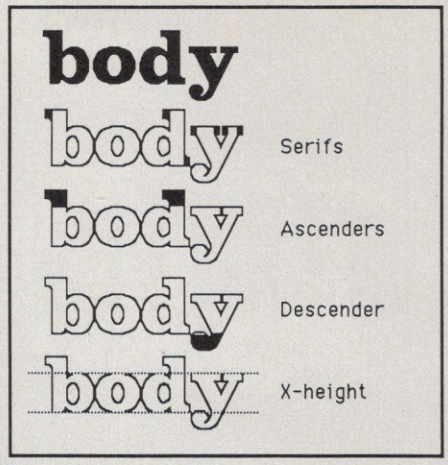


Figure 1: Font terminology

headlines, logos, or posters, which contain only a few words. A decorative font often conveys as much information in the design of its letters as in the actual words. One popular decorative font called Shatter makes you nervous because of its disjointed style. Another, called Byte, conjures up computers, in that its design recalls the computer-readable numbers that appear on the bottom of checks.

Typography and the Mac

The Mac stores its fonts as bit maps; i.e., every dot that appears on the screen as part of a letter is contained in a special file called the resource file. This file also contains icons, pictures, window information—almost everything, in fact, that the Mac does graphically. All Mac programs have resources and can, therefore, have customized fonts.

When the Mac is going to print a letter, it uses a simple rule—start at the application's resource file and look for the specified typeface's bit map. If the desired typeface is not there, the Mac will use the default font from the System file on the boot disk. Fonts are usually stored in the System file. One of the reasons this file is so big on the standard Macintosh System disk is that the font bit maps are large.

The Mac's QuickDraw routines can calculate point sizes from a typeface bit map. Thus, 24-point New York can be created from 12-point New York. QuickDraw's calculations are far from perfect, and you may not be happy with the appearance of point sizes that must be calculated. Therefore, the most popular fonts come in several sizes. When an actual bit map is present, Apple's Font menu shows the point size in outline style. Each bit map increases the size of the

You may not be happy with the appearance of point sizes that must be calculated.

resource file.

The points sizes of the Macintosh fonts do not necessarily translate into standard typographic points. Text printed in 10-point Seattle with MacWrite looks to be equivalent to 12-point type with 2 points of leading on standard typographic equipment.

QuickDraw can also change font typestyles. Most fonts are stored in standard Roman style. To create italics, the Mac calculates new pixel positions for each dot in the font's bit map; to create boldface, it doubles each dot in the bit map.

The Macintosh has two default fonts, the system font (usually Chicago) and the application font (usually Geneva). If application programmers want another font, they must either set it as the default application font or provide a font menu for users to let them change the font. Microsoft's Multiplan takes the former route (its application font is called Seattle), whereas Word, MacWrite, and MacPaint take the latter route.

Fonts, along with icons, dialog boxes, and other Macintosh resources, have resource numbers. Font resource numbers are determined by a combination of the font ID number, which is assigned by Apple, and the point size. Apple has reserved fonts 0–127 for itself, fonts 128–383 for outside developers, and fonts 384–511 for the rest of us. (In practice, resource tools don't always work with fonts numbered above 255, so beware.)

To calculate the resource number of a font, you multiply its font ID number by 128 and add the point size. Font 3 (Geneva), for example, has a base resource number of 384 (3 × 128), and 10-point Geneva has a resource number of 394 (384 + 10). The Mac uses the base resource number for the font name. Thus, if you

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have six sizes of Geneva stored on your System disk, seven resources are associated with the typeface: The first contains only the font name, and the following six contain bit maps.

Fortunately, when you use Mac application programs, you don't have to know any of this information—the application's Font menu lets you choose by pointing and clicking. To use different fonts in most Mac programming languages, you need to know the font resource numbers or the font ID number. Further, to customize a system disk with commercial or public-domain fonts, you may have to delve into the world of font resource numbers. Although Apple has requested that commercial developers clear ID numbers through the company, not all have done so, and only a few public-domain font designers have bothered to avoid conflicting numbers. You may install a font, only to discover that it prints as something else. The Mac's font and resource tools will rescue you, though.

All Mac owners should have received a copy of Font Mover. This program, dated May 2, 1984, was distributed with the Finder 1.1. The current release, called Font/DA Mover (DA stands for desk accessory), was distributed with Finder 4.5 and is dated February 13, 1985. Font Mover lets you remove fonts from the System disk and store them in their own files. You can safely remove all but the four fonts that the Macintosh needs for the system displays. Font Mover also lets you install fonts onto the System disk.

We won't say much about these utilities here. Putting all your fonts into one file is OK for a small font collection, but as your font file grows, it will become unmanageable. Therefore, we recommend that you save each font family to its own file. For example, a file named Geneva would include Geneva fonts in different point sizes. This strategy will let you find and install the fonts easily as you need them.

If you're using the original Font Mover, you'll have to quit the program after removing or copying each font and rename your font files, because Font Mover recognizes only files named Fonts. Font/DA Mover, on the other hand, allows you to specify a filename for a group of fonts. To install a font that's stored in its own file, you double-click on the icon of the font you want—Geneva, San Francisco, Seattle, whatever—which automatically runs Font Mover and brings in the desired font.

With Font/DA Mover, you can customize your System files to contain only the fonts that you will use with an application. What if you want to create your own font, though? You will need a font editor.

Apple's Font Editor works like MacPaint's FatBits does. You move the cursor within a magnified font-design box, which represents the character matrix. Pressing the mouse button turns an individual dot within a character you're editing on if the dot

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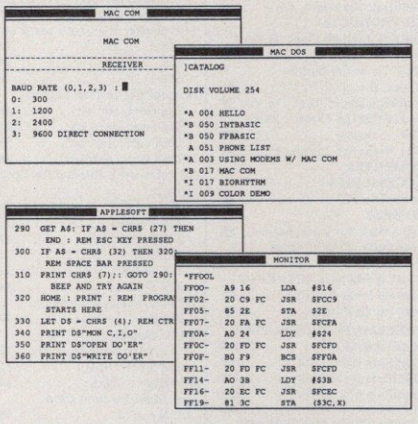

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was off or turns the dot off if it was on. You can see any changes you make immediately, in nonmagnified form, in the window at the bottom of the screen. To choose the letter or character you're going to edit, you click on a new character in either the blown-up Edit area or in the actual-size window at the bottom of the screen (see figure 2).

Characters appear in ASCII order, including Apple's ASCII extensions (with numbers greater than 128) to provide foreign characters and various useful typographical symbols. Pull-down menus let you copy a character from one font-design box to another, enlarge the size of characters, copy a design from one character to another, delete characters, and perform other useful functions.

The Font Editor has been released only to developers and is not an official Apple product. It has made its way into the libraries of users' groups, though. If you use Font Editor, be sure to work on a backup disk, since this program has several spectacular bugs; we have had more problems with its crashing than we have had with any other Macintosh program. You can find some excellent user-written documentation in the disk library of most users' groups.

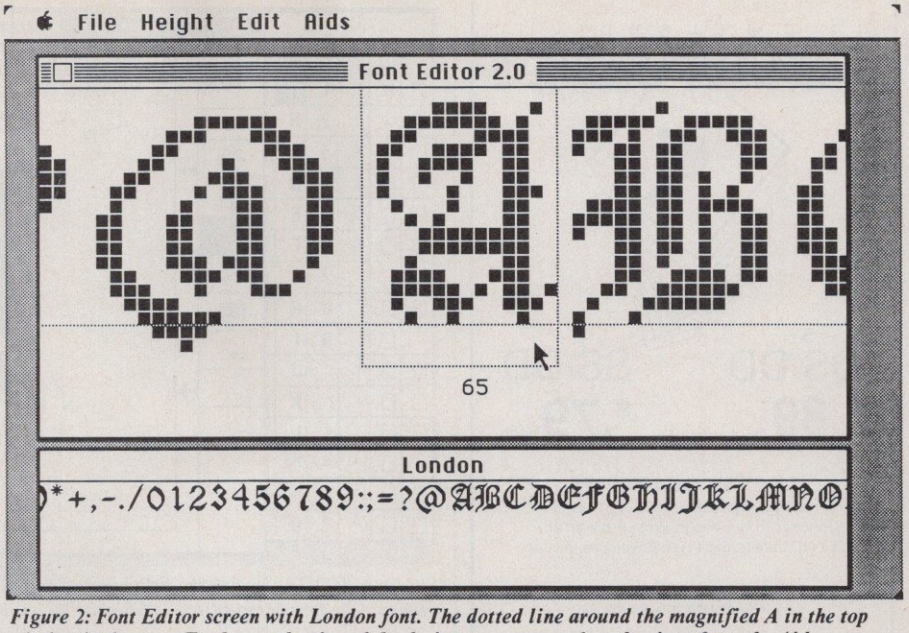

Figure 2: Font Editor screen with London font. The dotted line around the magnified A in the top window is the area. To change the size of the design area, you make selections from the Aids menu.

FONTastic

If you want to create fonts without dealing with the quirks of the Font Editor, you can consider FONTastic, a superb commercial font editor.

This program, from Altsys, is a full-featured font editor and font mover. Unlike the Apple editor, FONTastic makes full use of the Mac interface, windows, and graphic capabilities. FONTastic's main screen features two windows, one showing all the system-font characters in a grid, and the other showing a sample

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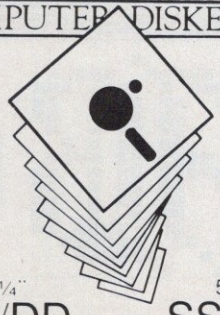

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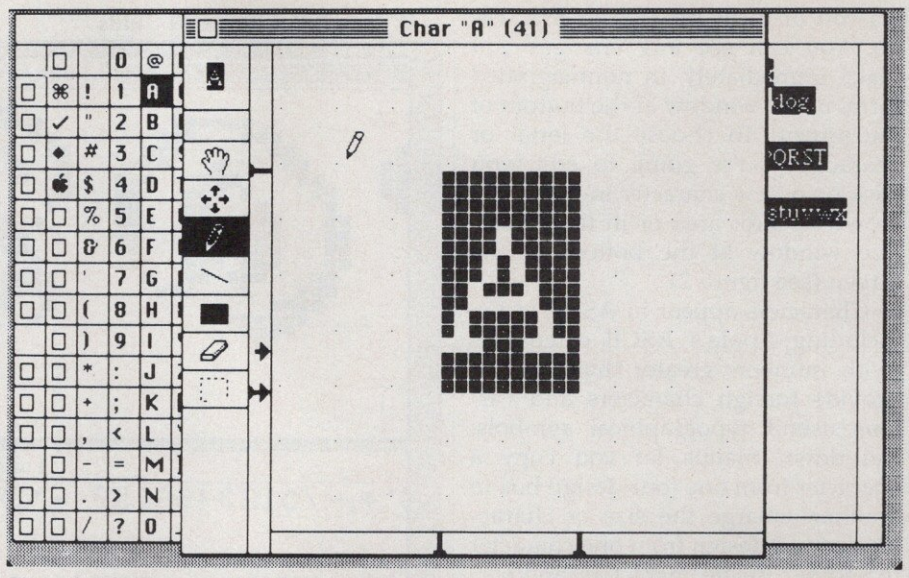

Figure 3: FONTastic with the Edit window active. Note the MacPaint-like tools at the left of this window. The font being edited is Chicago by Night, from the FONTastic distribution disk.

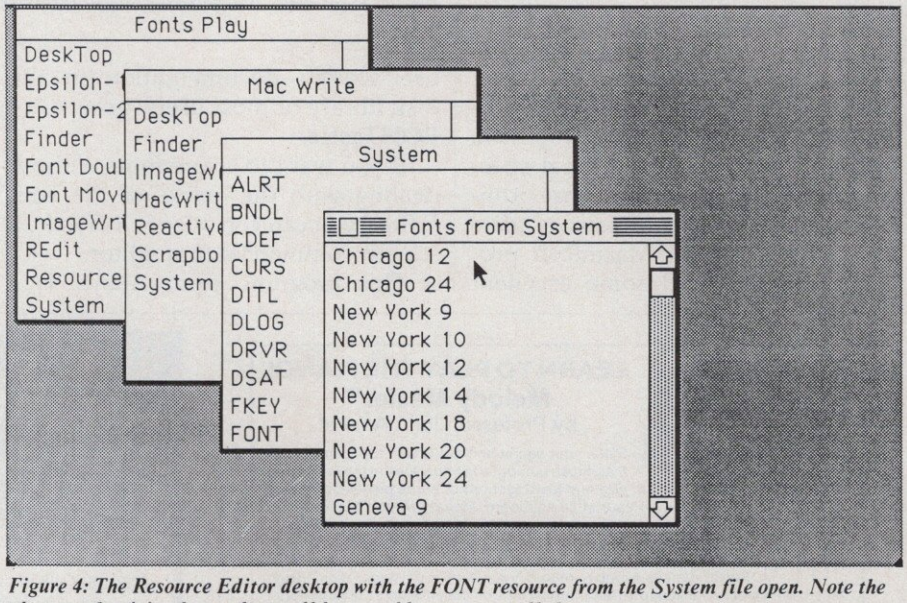

Figure 4: The Resource Editor desktop with the FONT resource from the System file open. Note the absence of a sizing box—the scroll bars enable you to see all the resources.

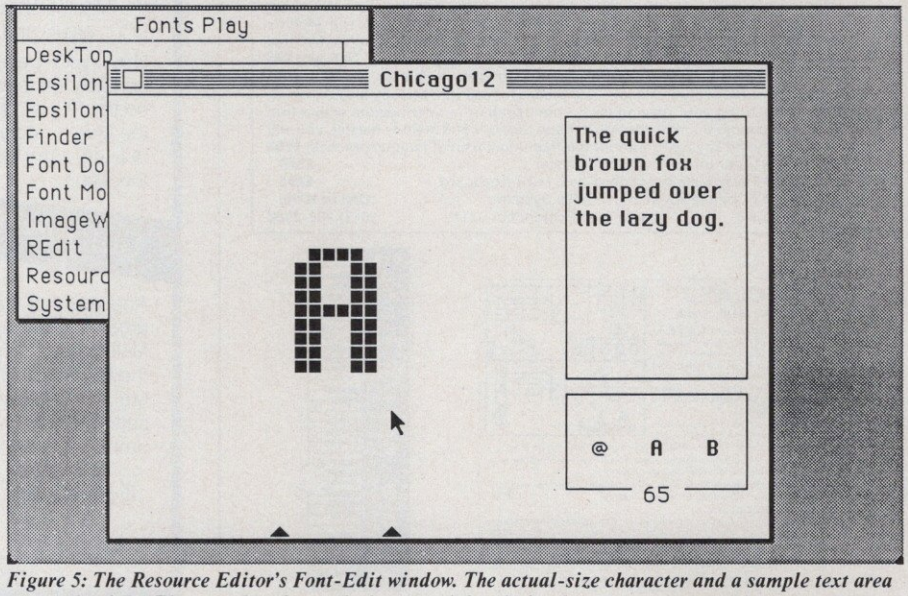

Figure 5: The Resource Editor's Font-Edit window. The actual-size character and a sample text area are on the right. The two triangles at the bottom of the window let you manipulate character width.

message in the currently active font. (You can change the grid display to display all the characters in the active font, but the display is quite distorted with large fonts.)

To edit a character, you double-click on the character in the grid or type the character on the keyboard. A third window opens with the enlarged character and a tool menu that resembles that of MacPaint (see figure 3). The tools include a pencil, a hand, an eraser, a selection box, and so on, and they behave much like the equivalent tools in MacPaint. The border of the enlarged character window marks off the width, height, and baseline of characters. Changes that you make to any of these specifications affect the entire font.

The Special menu allows you to change the style of one character or a selected group of characters. It includes seven styling options, including expand, condense, invert, and outline. You can create a smooth italic font, for example, by letting FONTastic and the Mac do the hard work—actually italicizing the selected characters. You can then clean up any "jaggies" and be assured of an attractive italic. Another choice from the Special menu allows you to scale the font up or down horizontally, vertically, or both.

The ability to scale a font is particularly important, because of the way the Mac produces high-quality printouts with the ImageWriter driver (i.e., from MacWrite, but not from MacPaint). When you print in the High-Quality mode, the Mac gets information about the font from both the current point size and the corresponding font with twice as many points. The information from the double-size font provides cleaner curves and diagonals. Therefore, if you're printing with 12-point New York, a high-quality printout will look better if you also have 24-point New York in the system. Scale a font to double its size and clean up any jaggies while you're in the editor, and your printouts will be superb.

One warning: Don't change the proportions of the letters in the double-size font; keep them the same as those in the smaller font and just smooth the curves. If you change the dimensions or the baseline, you'll get garbage on high-quality printouts.

When you've created your font, selecting Save As from the Edit menu allows you to save the font, under a new name, to a font file. FONTastic automatically manipulates the font ID numbers so that no conflict occurs with existing fonts.

The most recent release of FONTastic (2.0) has many enhanced features, including user-defined font ID numbers and a bit-level cut-and-paste capability that lets you cut characters from MacPaint and paste them into a font. Altsys has created a terrific program, and we highly recommend it.

Resource Editor

Font editors are best for creating entire fonts, but if you don't want to do more than make some simple modifications to a letter or two, Apple's Resource Editor may be your best choice.

The Resource Editor enables you to edit icons, dialog boxes, menus,

CIRCLE 289 ON READER SERVICE CARD

fonts, and almost every other resource used on the Macintosh. You edit each individual resource within a window of the Resource Editor. The program can work with multiple disks, and fonts and other resources are easy to copy from one file to another, even if the files are on different disks. In the prerelease version, Apple cautions you not to change the resources in the System files of the boot disk.

When you first open the Resource Editor, you're presented with a window for each of the disks you have on-line. Each of the windows shows the files on that disk. You can open any of these files by double-clicking on the file's name or by selecting it and choosing Open from the file menu. When you have opened the file, you will see a new window that shows all of the resource types in the file. A resource type has a four-letter name such as FONT, ICON, or BNDL. When you open a resource type, the individual resources within that type appear.

To work with the fonts, you open the System file and then open the FONT resource. All font names in the file will appear in a new window (see figure 4). Opening an individual font, perhaps Chicago 12, brings that font into the Resource Editor's mini font editor (see figure 5). You can edit a font here in much the same way as in a dedicated font editor.

When you have made your changes, close all windows until the screen looks like it did when you first started with the Resource Editor. When you close the System file, the program asks you if you want to save your changes. If you've made a mess, you can recover by choosing not to.

Macintosh fonts are one of the most useful components of Mac graphics. By customizing your font selection, you can produce amazing printouts. The combination of FONTastic and the Resource Editor supplants most of the earlier programs such as Resource Mover and Bill Pugh's Font Doubler. With these tools, you'll have complete control over your Mac's text display.

Next month we'll look at the commercially available fonts: the good, the bad, and the ugly. ✚

Michael Callery and Roberta Schwartz are the authors of Apple Graphics: Tools and Techniques *(Prentice-Hall, 1985).*

PRODUCT INFORMATION

Font/DA Mover, Font Editor, and Resource Editor
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MacTips

Suggestions from our readers

PRINTING LOTS OF LETTERS AT A CLIP

As a freelance writer, I have plenty of opportunity to print out several letters at a clip. The best way to do them, of course, is on continuous-feed paper—but then doing the individual envelopes can be a chore. After some experimentation, I hit on the following process; it may help other Macintosh users who generate lots of letters.

First I create the letters, in one file, separating them with Insert Page Break. When they're finished, I copy each inside address to the page after the last letter.

There are several ways to do this; I usually start at the top, copy the first address, scroll to the second letter, paste the first address above the second, copy the two, delete the inappropriate address (using Backspace, *not* Cut), and so on until I have all the addresses in the Clipboard. Then I paste them to the page after the last letter.

Now I have a page full of addresses. I use Insert Ruler at the top of the page, adjust the margins to 5 inches, and convert the addresses to, usually, Chicago. I put a page break between the addresses.

Next, I print the letters on continuous-feed paper, instructing the Macintosh to print *only* those pages containing my letters.

That done, I remove the tractor paper and instruct the Macintosh to print out the pages containing the addresses, selecting the Cut Sheet option, which allows me to insert an envelope in the printer for each address.

It sounds more complicated than it really is; in reality, it runs quickly and smoothly and is the best method I've discovered to date.

William J. Reynolds
Sioux Falls, SD

FORMATTING FONTS IN MACPAINT

Changing font types and styles can be difficult in MacPaint, and success often depends upon good planning. Here's a method that allows you to be more flexible in changing text in MacPaint.

After pasting text from MacWrite into MacPaint, change the font size so that it is too large to fit into the Select box. Choose Undo, then Paste, and—voilà—the text appears as desired. Repeat this rather unorthodox procedure as many times as you like to try out new looks. This unexpected feature is handy because the ways to change the style and look of text once it is in MacPaint are limited. Once the Select box is deselected, the only way to do it is repaste, and even then the text must originate from a word-processing program or the Note Pad.

Hilarie Klapman
Toronto, Ontario

PRINTING ADDRESSES ON ENVELOPES

Neat and businesslike addresses on envelopes needn't be a hit-or-miss affair. Set up a file template in MacWrite or Microsoft Word with the paragraph justification aligned for Center and bring the cursor three lines down on the page. Type in the address. For example:

A+ Magazine
Eleven Davis Drive
Belmont, CA 94002

Print it out on the envelope.

Return to the document and click the left-justification toggle in the MacWrite ruler. (For Word, highlight the entire address and click on the left-justification in the Paragraph Format menu.) Now the address is on the top left of the page, ready for the letter that will go into the envelope. For business use, go for the bold with the Chicago font and never be afraid of "letter quality" anxiety again.

Anthony Reveaux
San Francisco, CA

FREE-MOUSE DRAWINGS

I am a secretary for the Department of Instructional Technology at the University of Wyoming. Since our acquisition of a Macintosh, I find that I am being called upon more and more to use MacPaint to design fliers, handouts, brochures, and logos, as well as to prepare masters for overhead transparencies. The interesting thing about this is that I make no claims to being an artist, but the Mac makes it so easy to work with images that I am able to get some impressive results.

Rather than trying to copy a drawing freehand (free-mouse?) onto the screen, I have found a way to transfer designs easily and inexpensively. Simply use a sheet of clear film (available where drafting supplies are sold) and trace the image onto it with a suitable light-colored marker. Then tape the film with the tracing on it to the screen of the Macintosh and use a small brush from the MacPaint palette to trace the outline onto the MacPaint drawing board. This can easily be done by anyone with good eye-mouse coordination—and if a line "goes astray," simply select Undo from the menu bar or use the eraser to zap it out and try again. It is important to use a light-colored marker on the film so that you can see the brush beneath it.

Anyone who has access to a thermal transparency maker, such as is used in schools, can simplify the process even more by making a transparency of green on a clear background directly from a photocopy of the desired drawing.

Patricia A. Mason
Laramie, WY

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II SERIES

▸ WORLD BOOK DISCOVERY SOFTWARE

World Book Discovery, Inc. has introduced its first line of educational software. Called Discovery Software, the series includes 21 interactive programs that teach and reinforce essential learning skills for children. The software is organized into three series: preschool, for ages 3 to 5; primary, for ages 6 to 10; and intermediate, for ages 10 and up. Each series is available from World Book either as a package of seven programs or as separate programs, and each program comes with a workbook of activities, projects, and suggestions for games.

The Preschool Package focuses on such skills as number recognition, counting, pattern recognition, and classification. Concepts are introduced through the characters of Pockets the Kangaroo and Mayflower the Duck. Currently available titles include Pockets Goes to the Carnival; Pockets Leads the Parade; Pockets and Her New Sneakers; Happy Birthday, Pockets!; Come Play with Pockets; Pockets Goes on a Picnic; and Pockets Goes on Vacation.

The Primary Package provides practice in skills such as arithmetic, spelling, problem solving, map reading, visual memory, and vocabulary building. Titles include Mighty Math, Plot-a-Point, A-mazing Words, Word-Player, How Things Work, Take Me North, and Space Port.

The Intermediate Package helps older children expand their knowledge of geography, participate in a survival simulation based on late 18th-century America, learn and review critical thinking and punctuation skills, and practice a variety of arithmetic and data-use skills. Titles in this series are Run for President, Settling America, Spell Bound, Fast Break, WhizCalc I, WhizCalc II, and Data Hurdles. *(List Price: $249.95 each package; $39.95 each program)*

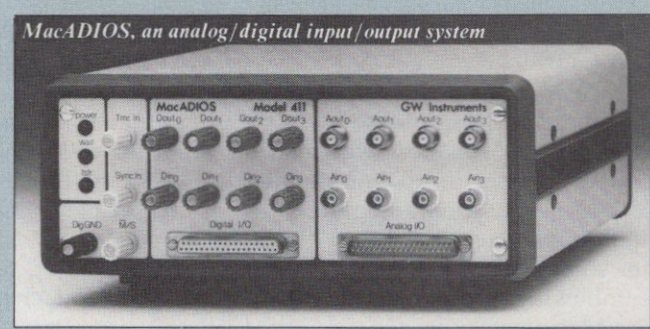
Requires: Apple IIe or IIc
World Book Discovery, Inc.
5700 Lombardo Centre
Seven Hills, OH 44131
(216) 642-3900

CIRCLE READER SERVICE NO. **450**

MAC

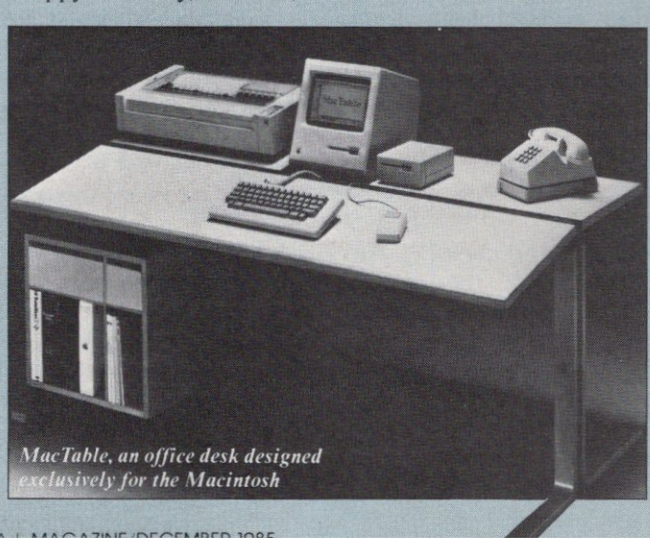
▸ MACTABLE

Scandiavian designers Jakob Jensen and Derek Dennis have created MacTable, a table designed specifically for the Macintosh. Made in Denmark and trimmed with solid beech wood, the table has four surface areas, each of which can be adjusted in-



MacADIOS, an analog/digital input/output system

Discovery Software from World Book



MacTable, an office desk designed exclusively for the Macintosh

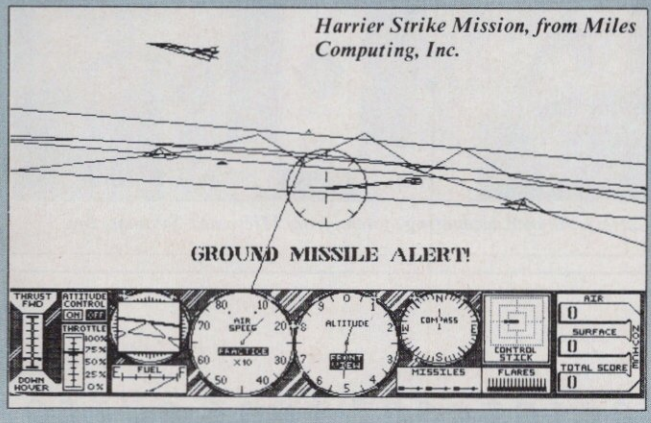
is for the user, keyboard, and mouse; another, which can be tilted backward for comfortable viewing, is for the Macintosh; and the remaining two areas are for printers and other peripherals. MacTable also has a modular side cabinet that contains drawers for disks and papers and can be expanded with another cabinet, shelves, and drawers to make a full-function office desk. *(List Price: $495)*

Scandinavian Computer Furniture, Inc.
14875 N.W. 77th Avenue
Miami Lakes, FL 33014
(305) 557-5777
CIRCLE READER SERVICE NO. **451**

MAC

▸ NUMERIC.TURBO

Assimilation has introduced Numeric.Turbo, a full-function, high-speed input device for the Macintosh. The product combines a full-scale numeric keypad .Turbo.Touch peripheral, a trackball cursor controller. The device can reduce the time required for data input by more than 50% because it includes cursor keys, direct function keys, and a numeric keypad, along with the ball. Numeric.Turbo attaches to either side of the computer's main keyboard with Velcro strips, making it easy for both left- and right-handed operators to use. *(List Price: $149)*
Requires: Macintosh
Assimilation, Inc.
485 Alberto Way
Los Gatos, CA 95030
(408) 395-7679
CIRCLE READER SERVICE NO. **452**



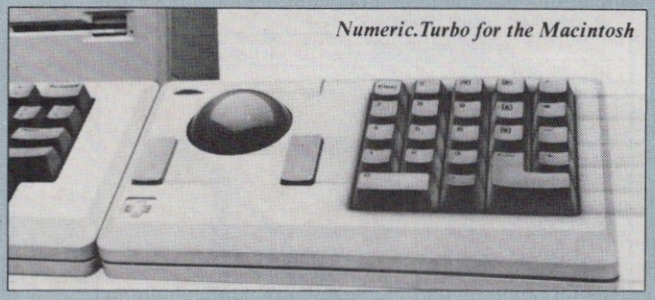
Harrier Strike Mission, from Miles Computing, Inc.

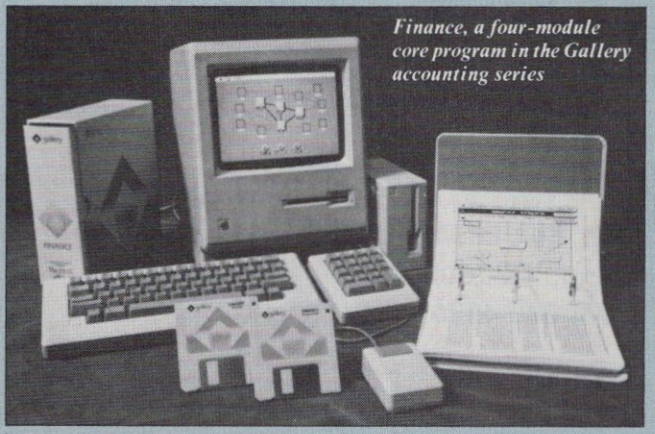
MAC

▸ MACADIOS MODEL 411

Designed for scientists, engineers, teachers, and production facilities, MacADIOS is an analog/ that turns the Mac into a powerful laboratory workstation by controlling and monitoring scientific experiments and processes. The system's external hardware unit provides four analog voltage outputs, eight analog voltage inputs, 16 digital inputs, and 16 digital outputs; a maximum sample rate of 20,833 values per second; a timer; and a programmable clock. MacADIOS also includes an extensive software package, MacADIOS Manager, a general-purpose data-acquisition program. In addition, users can execute highly specific tasks from Microsoft BASIC programs. *(List Price: $2500)*
Requires: Macintosh
GW Instruments
3 Ames Street
Cambridge, MA 02139
(617) 577-1524
CIRCLE READER SERVICE NO. **453**

World Books' Discovery Software features carefully developed content and clear on-screen instructions.


Numeric.Turbo for the Macintosh


Finance, a four-module core program in the Gallery accounting series

MAC

▸ HARRIER STRIKE MISSION

Designed for both experienced pilots and novices, Harrier Strike Mission is a 3-D flight-combat simulator for the Macintosh. In the game, the player pilots a Harrier Jump Jet that is stationed on an aircraft carrier. The carrier is three miles from an island containing the enemy's headquarters and fuel depot, which the pilot must destroy. The enemy protects the island with tanks that launch heat-guided missiles, and five advanced fighter planes that carry missiles. The player's Harrier is equipped with three Sidewinder missiles, two 30mm Aden cannon pads, and 16 antimissile flares. *(List Price: $49.95)*

Requires: Macintosh

Miles Computing, Inc.
21018 Osborne Street
Building 5
Canoga Park, CA 91304
(818) 341-1411

CIRCLE READER SERVICE NO. **454**

MAC

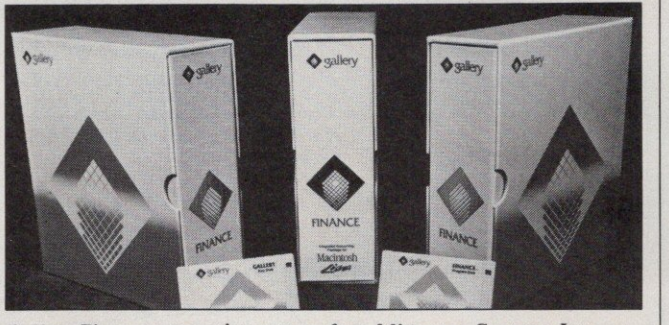
▸ GALLERY FINANCE ACCOUNTING SYSTEM

Micromax Systems has released Finance, the initial core package in its 15-module Gallery accounting and business-management series for the Macintosh. Based on the one-write manual accounting system, the Finance package comprises four integrated modules—Accounts Receivable, Accounts Payable, General Ledger, and Cash Disbursement with optional payroll tracking—integrated into a single program. Finance transmits each transaction entry to all applicable accounts, journals, and ledgers and can assign ID codes to customer and vendor accounts. Its built-in fail-safe features help prevent operator mistakes and lost data, and it can also generate a variety of financial reports. *(List Price: $795)*

Requires: Macintosh 512K, numeric keypad, second disk drive or hard-disk drive

Micromax Systems, Inc.
6868 Nancy Ridge Drive
San Diego, CA 92121
(619) 457-3131

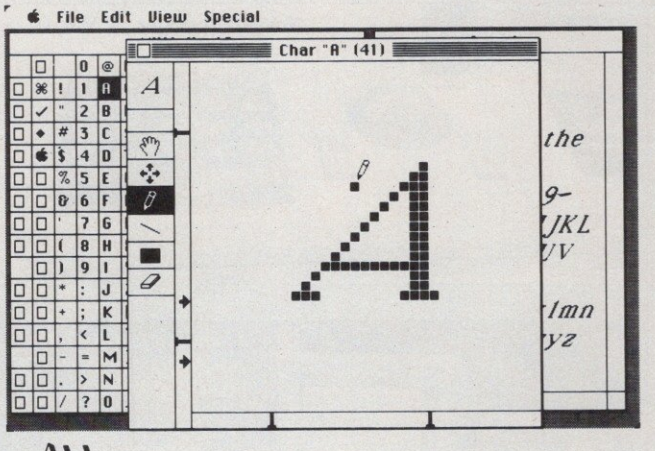
CIRCLE READER SERVICE NO. **455**



Gallery Finance accounting system, from Micromax Systems, Inc.

Fontastic™

Macintosh™ font editor



- **Create** new fonts from scratch
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- **Style** characters automatically
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CIRCLE 235 ON READER SERVICE CARD

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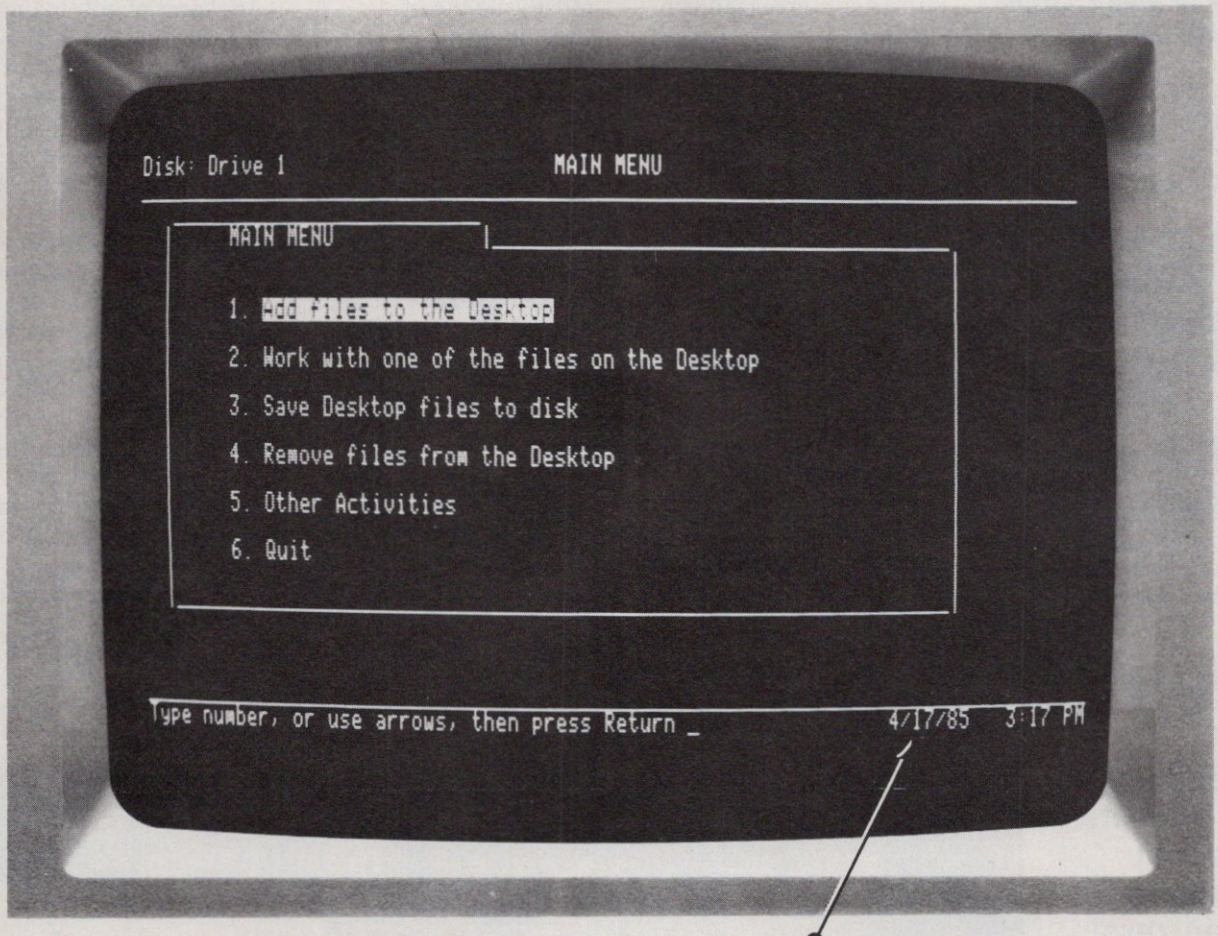

Just Look Right Here

Only the Timemaster H.O. displays the date and time on the Appleworks screen.* If you don't have a Timemaster H.O., you'll just get the help key reminder. The Timemaster H.O. will also automatically time and date stamp your files on disk. And don't forget, the Timemaster H.O. has all the features of all the competition combined, including year, leap year (not just in PRO-DOS), month, date, day, hours, minutes, seconds and milliseconds. The Timemaster H.O. is compatible with PRO-DOS, DOS 3.3, PASCAL and CP/M. And the Timemaster H.O. automatically emulates all other clock cards so you won't have any compatibility problems because the Timemaster H.O. works with ANY program that reads ANY clock.

In fact, you could put ALL the competitive cards in every slot in your Apple and you still wouldn't have all the features of the Timemaster H.O.

The Timemaster H.O. comes with a ton of fun and useful software. It has an easy to read yet detailed manual, a 20 year auto-recharging battery and a 3 year no hassle warranty.

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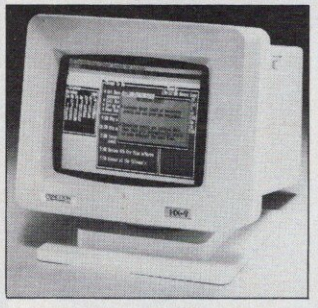
▶ HARDWARE

II SERIES

▶ HX-9 RGB COLOR MONITOR

Princeton Graphics Systems (PGS) has introduced the HX-9, a 9-inch RGB color monitor that is compatible with Apple computers that have RGB capability. The monitor has a built-in color switch that makes 16 full colors available and a green/amber switch for text. Its 0.28mm-dot-matrix, pitch-black, nonglare screen can provide up to 2000 characters or 80 columns by 25 lines of text. When operating at 15.75 KHz, the HX-9 offers a high resolution of 640 × 200 dots. Also available is the HX-9E, an enhanced version of the monitor that offers an additional scan frequency of 22 KHz to provide a resolution of 640 × 350 dots. *(List Price: HX-9, $650; HX-9E, $750)*



The HX-9 9-inch color monitor is compatible with Apple computers that have RGB capability.

Requires: Apple IIe with Video 7 Color Enhancer IIe and/or Princeton RGB 80 Card OR Apple IIc with Video 7 Color Enhancer IIc

Princeton Graphics Systems, Inc.
601 Ewing Street
Building A
Princeton, NJ 08540
(800) 221-1490
in NJ (609) 683-1660

CIRCLE READER SERVICE NO. **456**

II SERIES

▶ ENHANCER SERIES COLOR GRAPHICS INTERFACES

Video-7 has introduced two products—the Color Enhancer and the Screen Enhancer—in its Enhancer Series of high-resolution color-graphics interface cards and adapter boxes. The series enables Apple computers to run with IBM-compatible RGB monitors and is compatible with all Apple II software.

The Color Enhancer provides 16 levels of color and 16 shades of gray to the Apple IIe and IIc and allows readable 80-column text and color graphics to appear on the same monitor. In addition, the Color Enhancers come with an enhanced version of Brøderbund Software's graphics and illustration package Dazzle Draw. With Dazzle Draw, users can create pictures, graphs, and charts in 16 colors and 30 patterns.

Also available for the Apple IIe and IIc, the Screen Enhancer provides 16 shades of gray to the monochrome interface. The Apple IIe version adds 64K

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Ad Number 223 / Fall 1985

EXTRA K™ NEW!

$39.95 *(Apple IIc or 128K IIe: DOS 3.3 & ProDOS)*

Put your 128K to work! Even with 128K of memory, Applesoft programs, pictures and variables only access 48K. The Extra K disk lets you utilize ALL of your 128K speed, capacity & muscle.

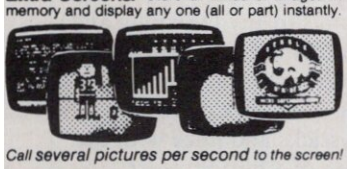
Extra Variables: Your Applesoft programs can function undisturbed in main memory while all variables, strings and other data reside in your extra 64K.

Extra Apple: Have TWO 64K APPLES and programs in memory and switch between them at will. You can even have a ProDOS Apple and a DOS 3.3 Apple in memory and swap files back and forth.

Extra-Fast Copies: Extra K's nibble copier copies *and verifies* unprotected disks in 35 seconds!

Extra Features: Create new "dual personality" ProDOS/3.3 disks. MANY MORE 128K UTILITIES.

Extra Screens: Store all kinds of images in memory and display any one (all or part) instantly.



Call several pictures per second to the screen!

```
10 PRINT CHR$(21): COLOR=2:
   FOR X=0 TO 39 STEP 2: FOR Y=1
   TO 47 STEP 2: Z=Z=0: PLOT
   X+Z,Y: NEXT Y,X
20 POKE 37,255
```

GOSUB 94

BEAGLE GRAPHICS

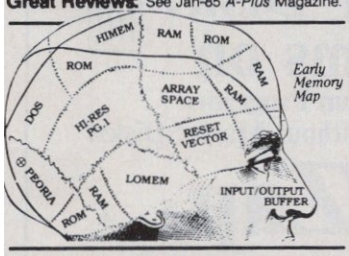
$59.95 *(Apple IIc or 128K IIe: DOS 3.3 & ProDOS)*

Double Hi-Res: Access 16 hi-res colors and 560 (horizontal) x 192 (vertical) pixels (*twice* normal resolution) on your Apple IIc or 128K Apple IIe.

For the Artist: Draw, fill and label double hi-res pictures using just the keyboard, *or* your Apple-Mouse™, joystick, Koala Pad™ or Graphics Tablet. Easy-to-use CUT & PASTE features make manipulations easy. Any image section may be re-located.

For the Programmer: 33 new commands for drawing, filling and manipulating double-res images: convert normal programs & pictures to double-res, save/load image sections, compress pix to 1/3 disk space, make double-res "slide shows"...

Great Reviews: See Jan-85 *A-Plus* Magazine.



Early Memory Map

DOUBLE-TAKE™

$34.95 *(any version of Apple II: DOS 3.3 & ProDOS)*

2-way Scrolling: Program listings and disk catalogs scroll up *and* down, making file names and program lines easier & faster to find. Machine language listings & hex-ascii dumps scroll 2 ways too.

Better List Format: Each Applesoft program statement on a new line for faster program reading.

Variable Display: Print all of a program's variables in the order used, with current values. Or alphabetize every variable and display with line numbers.

Plus: AUTO-LINE-NUMBER, improved Renumber, Hex-Dec Convert, eliminate/re-define cursor...

Beagle GAMES

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$29.95 *(any version of Apple II)*

Hi-Res Strategy: I. O. SILVER is *both* a thinking person's strategy game and a fast-action arcade game. Excellent high-speed animation and action.

BEAGLE BAG™

$29.50 *(any version of Apple II)*

Voted by Apple software buyers to "Top-30 Most Popular" list (all categories), Beagle Bag is one of the best Apple game bargains on the market today.

PRO-BYTER™ NEW!

$34.95 *(Apple IIe/IIc or 64K II+: ProDOS)*

ByteZap Pro: All *NEW*—Inspect ProDOS and DOS 3.3 disks at the byte level. Make changes and disk/program repairs that are normally impossible.

Disk Search: Find any word or phrase on a disk or in a specified file. Repair zapped disk bytes that might cause malfunction. Instant disk maps too.

Customize Disks: Easy instructions show how to make changes to disks, programs, and DOS itself.

Machine Language Sort: One CALL in an Applesoft program will alphabetize a list of words—*super-fast!* Sorts string-arrays—*A$(1), A$(2),* etc.

Converter: Changes any Applesoft program line to machine code that can be executed with a CALL.

Text Typer: See or print ProDOS text files immediately without having to boot your word processor.

More: Put time & date of save in your catalogs. Catalog ALL directories on any ProDOS disk. Make any Applesoft command work like any other...

Machine Language Editor: Type in programs from magazines, and insert and delete at will (no mach. lang. knowledge required). 2-way-scroll memory scanner too. Very useful & educational.

Plus ALL-NEW APPLE TIPS! How to use memory like an extra disk drive, How to disable the LIST command so it says "File Locked", How to disable or swap ANY command, How to rename "Startup", How to personalize ProDOS catalogs...

GPLE™

$49.95 *(any version of Apple II: DOS 3.3 & ProDOS)*

THE Apple Program Editor: GPLE is our "Global Program Line Editor", *THE* most popular, efficient way to edit Applesoft programs. GPLE works like a word processor for Basic program lines.

Insert and Delete: Now you can quickly make changes to your programs. No more awkward "escape-editing" to make changes. No more hassles with extra spaces in quote statements. No more slow "cursor-tracing" to the end of a line.

Search and Replace: Find every occurrence of a string or variable in your programs. Or *replace* any word with any other. For example, change all X's to ABC's, or all "HORSE" strings to "COW".

Function Keys: Define your own Apple "function keys". For example, ESC-1 can Catalog drive 1, ESC-N can clear the screen and type your name and address, etc. Customize your Apple with a set of functions that perform any set of tasks you want.

D CODE™

$39.95 *(any version of Apple II: DOS 3.3 & ProDOS)*

Program Packer: D Code squeezes wasted and unused bytes out of Applesoft programs, saving valuable memory and increasing speed & efficiency.

Automatically combine program lines, shorten variable names and/or remove REMarks. Uncover wasted program lines that can't possibly be executed.

Auto-Proofreader: Typing errors are caught as you type, and *before* someone runs your program. Or you can simply type "CHECK" to scan an *entire program* and uncover potential crashes.

Super-Trace: When a program stops or crashes, type "DUMP" to see the last 10-10,000 statements and line numbers that were executed, in the order executed—an instant program *history.*

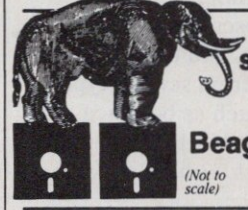
"Live" tracing too, with each executing statement, line no. and selected variable value in a window at the bottom of screen.

Your program runs up here.
Lines & VARIABLES traced down here.

Breakpoints: D Code lets you set up de-bug "breakpoints" so your program stops when you want it to. For example, you can ask that your program be stopped when X gets set to 99, or the 3rd time a particular statement is encountered.

Lightning-Fast Find! Find strings & variables *fast*—large programs searched in about *2 seconds!* This feature alone is worth the price of D Code.

GPLE Compatible: D Code remains "transparent" to your programs and is fully-compatible with Beagle's GPLE, Double-Take, ProntoDOS, etc.



Most software stores carry Beagle Bros disks.

(Not to scale)

PRONTO-DOS™

$29.50 *(any version of Apple II: DOS 3.3)*

Triple-speed DOS 3.3: ProntoDOS lets you load and save files at three-times normal speed. Hi-res images, for example, load in under 3 seconds.

More memory & disk space: Create high-speed bootable disks with 15 extra sectors of space. Move DOS 3.3 (if 64K) for an *extra 10K* of memory.

TYPE command: Displays text file contents.

TRIPLE-DUMP™

$39.95 *(any version of Apple II: DOS 3.3 & ProDOS)*

Print any Apple Image: Triple-Dump lets your dot matrix graphics-capable printer print:

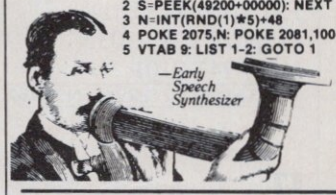
1. Hi-Res and Double Hi-Res graphics
2. Lo-Res and Double Lo-Res graphics
3. 40- and 80-Column text screen text.

All kinds of Apple images can be transfered to your printer with absolutely no programming knowledge. *OR* you can call Triple-Dump's print routines from within your own Applesoft Basic programs.

Special Effects: Triple-Dump lets you select from a full range of special graphic effects: crop, rotate, magnify, compress, adjust density, etc.

GIANT BANNERS too: Print big signs and messages (8½" high letters) on ANY kind of printer.

```
0 HOME
1 FOR X=1 TO 15
2 S=PEEK(49200+00000): NEXT
3 N=INT(RND(1)*5)+48
4 POKE 2075,N: POKE 2081,100-N
5 VTAB 9: LIST 1-2: GOTO 1
```



—Early Speech Synthesizer

APPLE MECHANIC

$29.50 *(any version of Apple II: DOS 3.3)*

Hi-Res Shape Animation: Your drawings are converted into "shape tables" so your programs can perform animation with Apple's built-in Draw & Xdraw commands. *List and Learn* disk demos teach how to create your own animated hi-res programs.

"Use Apple Mechanic routines & fonts in your programs without fee."

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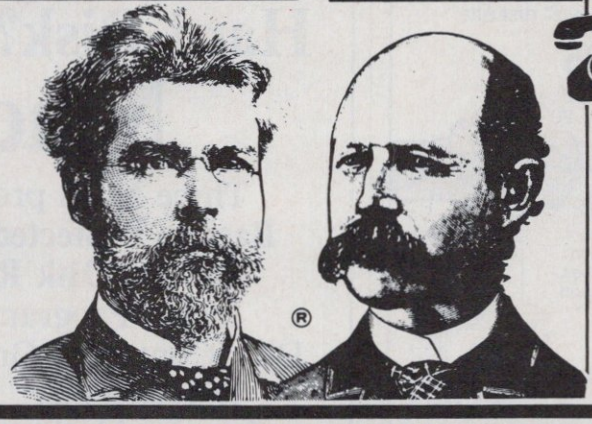
WESTERN: KL
apple: ABCDE
STENCIL: ABC

26 additional fonts available on our *Apple Mechanic Typefaces*™ disk ($20.00).



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☐ Beagle Basic	34.95	☐ I. O. Silver	29.95
☐ Beagle Graphics	59.95	☐ Pro-Byter	34.95
☐ D Code	39.95	☐ ProntoDOS	29.50
☐ DiskQuik	29.50	☐ Silicon Salad	24.95
☐ DOS Boss	24.00	☐ Tip Disk#1	20.00
☐ Double-Take	34.95	☐ Triple-Dump	39.95
☐ Extra K	39.95	☐ Utility City	29.50

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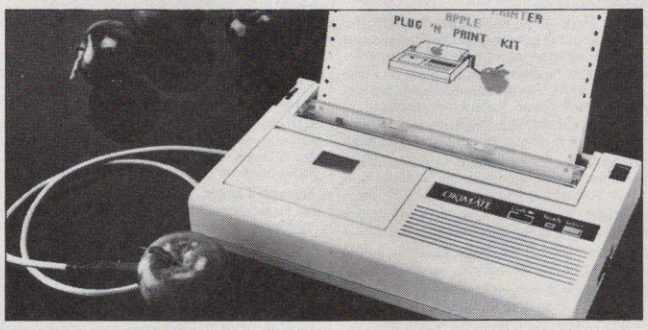
of internal memory and 80-column text capability. *(List Price: Color Enhancer, $179.95 for IIe card, $129.95 for IIc adapter box; Screen Enhancer, $129.95 for IIe card; $79.95 for IIc adapter box)*
Requires: Apple IIe or IIc
Video-7, Inc.
550 Sycamore Drive
Milpitas, CA 95035
(408) 943-0101
CIRCLE READER SERVICE NO. **457**

II SERIES

▸ OKIMATE 20 COLOR PRINTER

The low-cost Okimate 20 ribbon-transfer color printer is now fully compatible with Apple computers. Users can print more than 100 shades of color, even on acetate for overhead-projection slides. In its word-processing mode, the Okimate 20 prints 80 characters per second in standard type and 40 cps in letter-quality type. Underlining, superscripts, and subscripts are standard features, and users can also choose from several type fonts, such as boldface, fine print, and italics. The printer comes with a 24-element printhead, built-in friction and pin-feed paper handling, a variable-width tractor feed, an 8K buffer, the Plug 'n Print interface package, and Color Screen Print software.



The Okimate 20 color printer is fully compatible with IIe and IIc's.

Requires: Apple IIe or IIc
Okidata
532 Fellowship Road
Mount Laurel, NJ 08054
(609) 235-2600
CIRCLE READER SERVICE NO. **458**

MAC

▸ SWITCH BOX

Switch Box, an A–B switch box for the Macintosh, allows users to switch between any two items that connect to either the mouse port or the serial port on the computer. The device adapts to any DB9 plug and enables users to switch between modems, printers, and hard-disk drives or joysticks and mice with the push of a button. *(List Price: $39.95)*
Requires: Macintosh or Macintosh XL
PBI Software, Inc.
1111 Triton Drive
Suite 201
Foster City, CA 94404
(415) 349-8765
CIRCLE READER SERVICE NO. **459**

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SONY® 3½" SS DISKS FOR YOUR MAC

Ten packed disks from the inventor of the 3½" drive.
Treat your MAC right, use the original 3½" diskette.

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Limited Lifetime Warranty. Ten-packed in boxes with envelopes, write-protect tabs and labels.

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Shipping/handling additional. Minimum order $50.00. Visa, Mastercard and prepaid orders accepted. Corporations rated 3A2 or better and government accounts are accepted on a net 30 basis. C.O.D. orders add an additional $5.00 special handling charge. APO, FPO, AK, HI & PR orders add an additional 5% of the total order amount to cover PAL and insurance. Illinois residents add 6¼% tax.

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135 N. Brandon Drive, Glendale Heights, IL 60139

CIRCLE 291 ON READER SERVICE CARD

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Run Programs without Master Disks!

Mac Zap

Three Main programs + extras!
Backup Protected Disks, Automatic!
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Install Programs to Hard Disk!!
Disk Controls Graphics Volum Info
Dissasembler File Info Maps
Regular Updates, 55 page Manual

Also 170 Page Book Apple/Mac/IBM
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Micro Analyst Inc.
P.O. Box 15003
Austin, TX 78761
Call (512) 926-4527

Mac Zap Program $60
Book (Optional) $40
Ship (Overseas $10) $02
Visa/Mc Accepted!

CIRCLE 348 ON READER SERVICE CARD

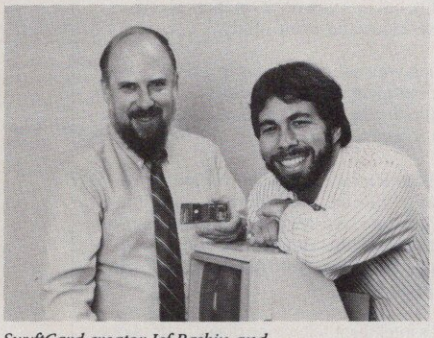
"SwyftCard™ is an incredible addition to my Apple® IIe."

Steve Wozniak,
Apple IIe user

This new $89.95 plug-in card gives you an amazingly easy, blindingly fast way to write, file, communicate and calculate.

You've never seen an Apple IIe do word processing, filing, communicating and calculating the way it does with a SwyftCard.

Steve Wozniak calls it revolutionary, adding "If I had thought of the SwyftCard while creating the Apple II, I would have built it in." Fomenting revolutions comes naturally to SwyftCard inventor Jef Raskin, whose previous efforts to make computers simple and useful include creating the Macintosh™ project at Apple.



SwyftCard creator Jef Raskin and Apple II creator Steve Wozniak

SwyftCard transforms the Apple IIe into the computer it ought to be.

The SwyftCard creates a 40K-byte working space, or "universe," capable of holding about 20 pages of single-spaced text. The universe accepts whatever you put in — text, numbers and data, in any form you choose, without you having to switch programs or modes.

Throughout your workday, you can enter information into the universe in free form: a report, names and addresses, daily to-do list, new telephone numbers, client list — anything you're working on.

A universe resides in memory while you are using it, and when you are done you save it to a disk. An unlimited number of universes can be created, each kept on a separate disk.

The secret to working in a SwyftCard universe is the patent-pending cursor. It works faster than control keys or a mouse, and doesn't make you take your hands off the keyboard.

SwyftCard is a better solution to your day in, day out word processing and data management needs. It is faster, easier and more useful.

How much faster is SwyftCard?

From a power-off start, SwyftCard loads a universe and displays exactly where you were last working in just six seconds, automatically, with no commands.

SwyftCard finds and displays any piece of information in your universe in less than 300 milliseconds.

SwyftCard saves an entire universe to a disk in just eight seconds, including automatic formatting if necessary.

How much easier is SwyftCard?

For all it does, SwyftCard uses only seven commands. And each is available immediately by pressing a single key once.

To start using SwyftCard, simply plug the card into Slot 3 (which most other cards can't use), turn the Apple IIe power on, wait six seconds and begin typing.

To use an Apple program, just load it in; SwyftCard turns itself off and won't interfere.

How much more does SwyftCard do?

SwyftCard communicates with data services without you having to learn their editors, and lets you directly edit information you bring in without special commands or file transfers.

SwyftCard is great with numbers, performing calculations — including scientific work — anywhere in your universe.

Using the SwyftCard-ProDos utility disk, which is included, you can transfer information developed in SwyftCard to other programs, and vice versa.

SwyftCard is not a spreadsheet, nor will it do everything for everybody. But no other system delivers the common sense utility of SwyftCard.

Of course, SwyftCard comes with a complete manual and an on-screen tutorial.

Try SwyftCard for 30 days.

Everyone we've shown this ad to has said SwyftCard sounds too good to be true. Maybe you feel that way too. But everyone we've then shown the SwyftCard to says it's better than the ad claims. So we want you to try it at our risk.

If we sent you product literature or tried to answer your questions by phone, we would just repeat this ad. The only practical way to find out if SwyftCard will help you is to accept the 30-day, no questions asked, money-back trial offer. If you don't like your SwyftCard, return it within 30 days and we'll send you your money back.

To order, call us at:

800-982-5600 in the U.S.
800-562-7400 in Calif.

Computer system requirements

Apple IIe, regular or extended 80-column card, 80-column monitor, one disk drive with controller. For communications: 300 or 1200 baud modems and Super Serial card. To transfer data between SwyftCard and Apple programs with ProDos utility: extended 80-column card or two drives. To print: any Apple, Brother, C.Itoh, Centronics, Epson, HP, NEC, Okidata, Panasonic, Qume, Star, Toshiba and most other printers.

Apple is a registered trademark of and Macintosh is a trademark licensed to Apple Computer Inc.

Order SwyftCard on a 30-day money-back trial offer. Call toll-free: 800-982-5600 in the U.S., 800-562-7400 in California. Or use this coupon.

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City _____

State _____ Zip _____

Phone (_____) _____

Send _____ SwyftCards at $89.95* plus $3.50 U.S. or $10.00 foreign shipping and handling each, totalling $ _____. I prefer to pay as follows:

☐ My check or money order is enclosed (payable to Information Appliance Inc.)

☐ Please bill my credit card account: ☐ Visa ☐ MasterCard

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*California residents please add $6.30 for sales tax.

Mail to: Information Appliance Inc., 530 University Ave., Palo Alto, CA 94301.

Information Appliance Inc.

First Notice

Sidekick™ work-alike for Apple® II. $69.

Everything Apple II is being sold with PINPOINT™ these days.

800,000+ AppleWorks™ owners, millions of Apple II customers, want these convenient desktop accessories for their favorite machine—their favorite software.

For good reason.

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For you, PINPOINT showcases popular printers, modems, high-capacity disk drives, RAM cards and other ProDOS™ software like Catalyst 3.0, Dazzle Draw,™ Mouse Paint™ and AppleWorks itself.

So don't forget to demonstrate Pinpoint for more profitable system sales!

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That's why most Apple II customers walk in, and go out, with a copy of PINPOINT under their arm.

Now you can see why it pays to keep PINPOINT in stock.

Here's a few folks that can help you out: *First Software (800) 343-1290, Softsel (800) 645-7778,* or contact Pinpoint Publishing, Box 13323, Oakland, CA 94661, (415) 530-1726.

ABOUT PINPOINT PUBLISHING. Formerly Virtual Combinatics of Rockport, Massachusetts, publishers of the three-year best seller, MICRO COOKBOOK™ and 14 MICRO COOKBOOK RECIPE DISKS. Pinpoint publishes other information management software products: FYI File,™ FYI File+,™ Authority,™ and The Information Engine.™ Pinpoint also developed and distributes ORTHO's COMPUTERIZED GARDENING.

Advertising and merchandising *support for PINPOINT include Apple Computer sponsored mailings to Apple's customer base, Apple's Holiday advertising, in-store promotions and regular Apple dealer mailings.*

PINPOINT is being advertised in A+, InCider, Personal Computing, InfoWorld, PC Week, Computer & Software News and Computer Retail News.

Point-of-sale materials and sales lead service available on request.

INCLUDED FEATURES: Pinpoint Desktop Accessories are file compatible with AppleWorks. If you can run AppleWorks, you can run Pinpoint. Same commands. Same hardware. And Pinpoint accessories are carefully designed to take full advantage of all Apple II peripherals and accessories.

Notepad. Pinpoint's note pad lets you capture important information or idle thoughts in an AppleWorks file. With all the power and convenience of AppleWorks' familiar text editing commands.

Cut & Paste. Simple cut-and-paste tools let you swap information among ProDOS programs without retyping it. And without the chance of a mistake.

Envelope Addresser. Move a name and address from letter to envelope faster than you can dash off a 9-digit ZIP code. Pinpoint finds addresses automatically, but lets you position them by eye before printing. Also works as a 'cut-and-print' utility.

Appointment Calendar. Plan your schedule a day at a time or months in advance. This appointment calendar shows you the details of your day and highlights appointments up to two months ahead. Plan and print appointment schedules up to 1990.

Graph Merge. Turns reports, letters, notices, whatever into something to see, by merging Dazzle Draw or Mouse Paint pictures into AppleWorks text files. This Pinpoint exclusive also includes complete printer support. Merge up to 16 single or double hi-res graphic images (full screen or cropped as needed) into AppleWorks documents using standard 128K Apple II.

Telephone Dialer. Pinpoint's intelligent telephone dialer finds phone numbers anywhere on the screen, then dials them automatically. Even adds long-distance access codes. Works with any Apple, Hayes or U.S. Robotics and compatible modems.

Communications Window. Any information you can dial up by phone you can plug into AppleWorks. Or save in an AppleWorks file. Ideal for electronic mail and searching online data bases. Works with any Apple, Hayes or U.S. Robotics and compatible modems.

Calculator. Add it, subtract it, multiply or divide it. This calculator is as simple and convenient as your favorite pocket model. But there's a difference. These results can be cut-and-pasted into any AppleWorks document.

Typewriter. A new computerized version, perfect for small typing jobs like labels, memos and forms. Print one line at a time as soon as you press ENTER. Supports all printer attributes, such as bold, underscore, compress print, headlines, etc.

AVAILABLE SOON: PINPOINT TOOLKIT for writing desktop accessories all your own, extending the value of the original PINPOINT software package.

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MAC

▸ SYDEWYNDR

A 3½-inch disk drive for the Mac, SydeWyndr weighs 3½ pounds and comes complete with an attractive case and connecting cable. The drive is based on a proprietary custom CMOS microprocessor design and offers a data-transfer rate of 489.6 kilobits per second and 400K of storage space. The SydeWyndr cable plugs directly into the back of the computer, making installation simple. *(List Price: $350)*

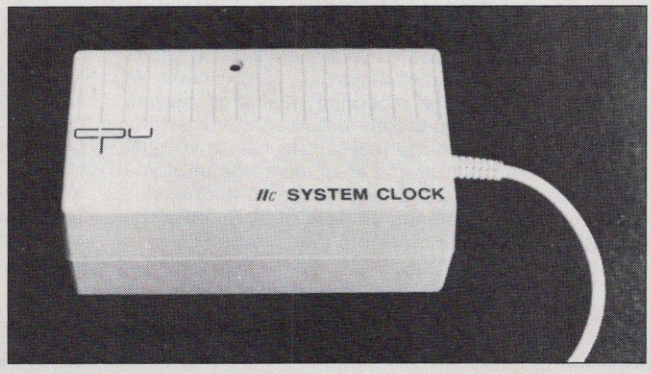
Requires: Macintosh
PKI, Inc.
2539 West 237 Street E
Torrance, CA 90505
(213) 539-2123

CIRCLE READER SERVICE NO. **460**

II SERIES

▸ IIc SYSTEM CLOCK

Applied Engineering has introduced an AppleWorks-compatible system clock for the Apple IIc. The clock, which uses three AA batteries, plugs into the serial port between the IIc and a serial-interface device, such as a printer or modem. It causes the date and time to appear in the lower right corner of the AppleWorks display and also stamps AppleWorks files with the time at which they are saved. The clock is fully compatible with ProDOS and is easy to use from BASIC. *(List Price: $79)*



The IIc System Clock, from Applied Engineering

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

CIRCLE READER SERVICE NO. **461**

II SERIES

▸ MDD-640 MICRO DISK DRIVE

Tymac Controls has introduced the MDD-640, a high-density micro disk drive that can store up to 4½ times more information than can a standard Apple drive. The drive uses a 3½-inch microfloppy diskette and is designed specifically for increased speed and rugged media conversion. *(List Price: $399)*

Requires: Apple II, II Plus, or IIe
Tymac Controls

"Up Your Mac"

Upgrade your Mac™ to 512K or 1 megabyte, 1.5 or all the way to 2 full Megabytes

THE VOAD ADVANTAGES

• Keep Your Mac • You Replace
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CIRCLE 328 ON READER SERVICE CARD

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HAVE YOUR MAC TO GO

BASKET™ is a hard-sided, foam-lined, plastic, locking carrying case fitted for your main unit, keyboard, mouse, numeric keypad, and line cord.

$100.00

D-BASKET™ holds all that BASKET™ does plus external drive and modem **$130.00**
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I-BASKET™ for the letter-size Imagewriter **$100.00**

Order from your dealer or directly from

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DEALER INQUIRIES INVITED *N.Y.S. residents add sales tax.*

CIRCLE 326 ON READER SERVICE CARD

INTRODUCING VERSATRACS T.M.

THE VERSATILE MUSIC TOOL FOR YOUR APPLE II, II + and //e

Integrated software designed for comprehensive music processing, VERSATRACS T.M. gives you the flexibility of digital synthesis and the editing power of a word processor. Now you can perform and record infinite permutations of digital sound in real time creating orchestrations that can be played on your stereo or printed in traditional notation on your dot matrix printer.

AUTO SEQUENCER

- 8 voice polyphonic sequencer with independent assignment of "instruments" to voices . . . can create an 8-piece orchestra using all 8 voices in 1 track or orchestrate using up to 8 tracks.
- 160 instrument definitions on line . . . can change to new instrument during record mode with any combination of instruments recorded sequentially per track.
- Mix-down/Playback with note by note control over the parameters of sound . . .attack, sustain, vibrato rate and depth, amplitude, transposition and tempo.
- Easy creation and use of any scale configuration (tunings to within ½ hertz) . . . can choose from a library of 16 tunings and change during play, record and playback modes.
- Built in metronome to aid in recording and to control the tempo of the playback.
- Loop mode for repeating sequences while recording . . . can also link recorded segments to aid in composition (ie. A B A form).

UTILITIES

- Instruments are constructed by creating waveforms (additive synthesis) and multistage envelopes and saving them to disk in a library of 40 predefined instrument groups (4 per group) . . . a library of 48 waveforms, and 48 envelopes can be accessed to construct or alter an instrument; can mix and match numerous combinations.
- Editing of notes or instrument parameters . . . correct errors in pitch or rhythm, double track, delete track, delete parameter changes . . . if you make an error while recording, just stop playing and back up four measures then start the playback and just join in before you get to the error and keep recording until you make another error or finish the track.
- Automatic printout of score on a dot matrix printer from a recording.

PITCH/RHYTHM SEQUENCER

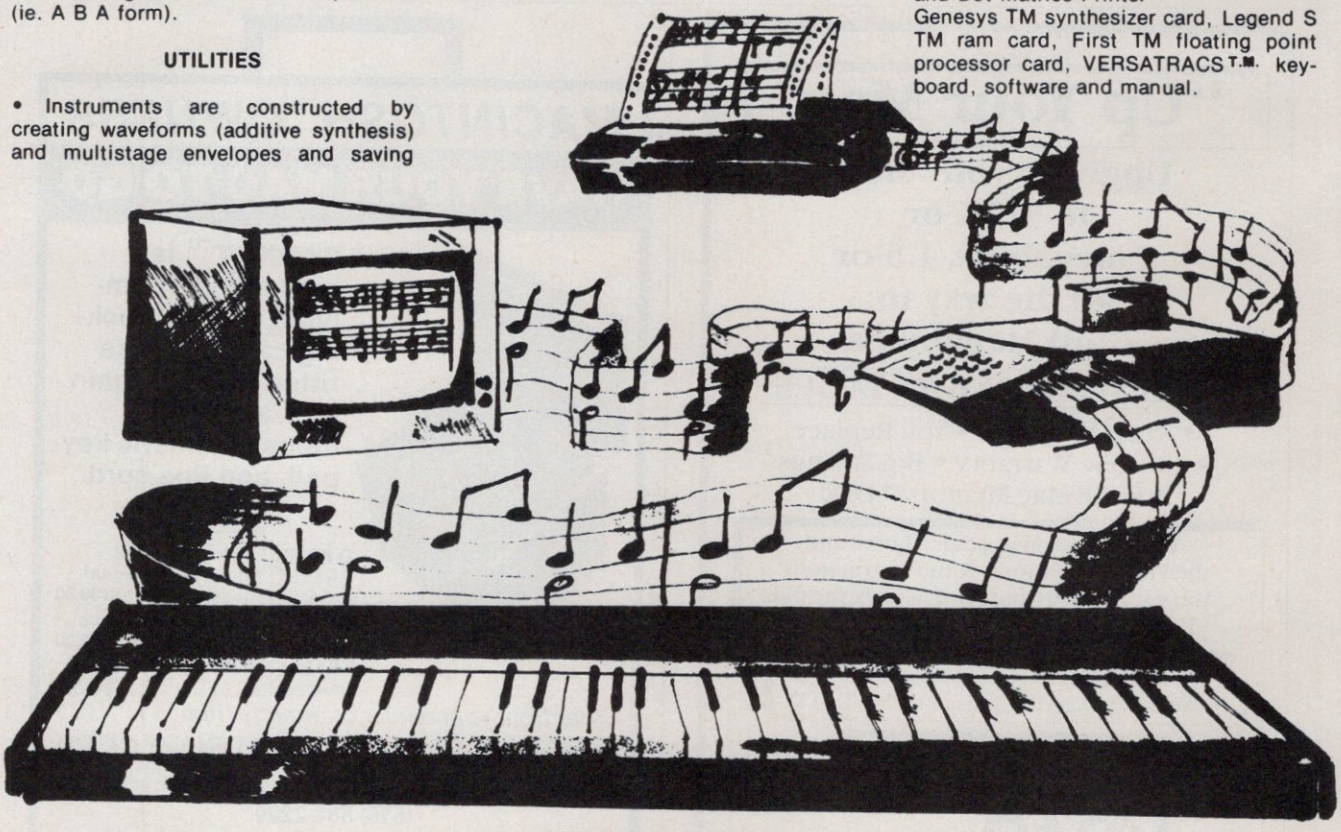
- Artificial time capture of keyboard input of pitch followed by input of Rhythm . . . input pitches with one finger to record the melody and harmony, "X" out mistakes, then tap the rhythm on any key for track on track recording of melody or chords and arpeggios.

MIDI COMPATIBLE

- MIDI "out" allows you to play a MIDI keyboard from the live VERSATRACS T.M. keyboard or recorded output . . . can double the VERSATRACS T.M. voices to get a complex sound or use the MIDI to increase the number of voices to achieve a large ensemble effect using up to 8 MIDI channels . . . also can sync to drum and sync to tape.

COMPONENTS

Apple IIe, II plus or II TM with 1 or 2 Disk drives; Game paddles; Monitor or TV with RF modulator; Audio Amplifier/Speakers and Dot Matrics Printer
Genesys TM synthesizer card, Legend S TM ram card, First TM floating point processor card, VERSATRACS T.M. keyboard, software and manual.



MARKET INTERFACE, INC
126 S. State • Roodhouse, Illinois • 62082 • Telephone (217) 589-4832

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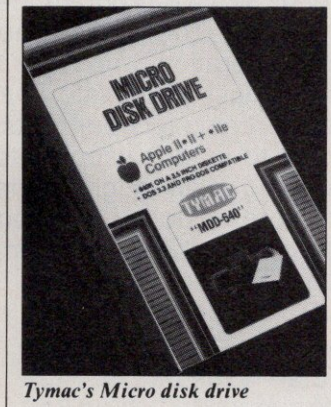
CIRCLE 206 ON READER SERVICE CARD

Corporation
127 Main Street
Franklin, NJ 07416
(201) 827-4050
CIRCLE READER SERVICE NO. **462**



Tymac's Micro disk drive

II SERIES

▸ TRAVELCOMM 1200

Developed exclusively for portable-computer users, the TravelComm 1200 is a lightweight, compact 300/1200-bps modem. The modem's CMOS design permits low power, battery operation, and it also features tone dialing, Auto-Power Up, and Auto-Baud Selection. It comes with a standard RS-232 connector that enables users to plug it into the computer's serial-interface port. *(List Price: $249)*

Requires: Apple IIc

Touchbase Design
1447 South Crest Drive
Los Angeles, CA 90035
(213) 277-1208
CIRCLE READER SERVICE NO. **463**

▸ HARDWARE ACCESSORIES

▸ CRT SPACE SAVER

CRT Space Saver is a desktop storage unit that provides a terminal compartment plus vertical and horizontal storage for manuals, disks, data binders, printouts, and office accessories. Six adjustable dividers allow you to customize the unit to accommodate various sizes of accessories, and a 2½-inch-diameter grommeted power-cord raceway organizes cables. The unit is made of durable textured steel and comes in five colors—black, putty, putty/oak, putty/walnut, and black/walnut. It is available in two sizes: the model 1125 CRT Maxi Space Saver is approximately 58 inches wide, and the model 1126 is 41 inches wide. Both models are about 27 inches high and 11 inches deep. *(List Price: model 1125, $189.95 or $209.95; model 1126, $169.95 or $185.95—color differences determine price variations)*

Buddy Products
A Division of DiFiglio Enterprises
1130 South Leavitt Street
Chicago, IL 60608
(312) 733-6400
CIRCLE READER SERVICE NO. **464**

The TravelComm 1200 modem, for portable-computer users

CHIPWITS™

The sensational Mac program... now for the Apple II!

Introduces young and old to programming!

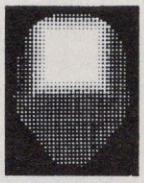
A robot simulation that challenges and entertains!

For all ages over 12! (programmers and nonprogrammers)

64K Apple II family: $39.95

All Macintoshes (including XL's): $49.95

BRAINPOWER
24009 Ventura Boulevard
Calabasas, CA 91302
(818) 884-6911

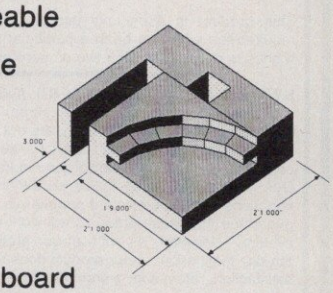


CIRCLE 307 ON READER SERVICE CARD

MiniCad 3D-Designer

a 3-D program for the professional user

- Design 3-D solid objects shaded from a moveable light source in ± one billion precision.



- Use MacDraw type documents from clipboard to create 3-D drawings.

Write or call:
Diehl Graphsoft, Inc.
3246-K Normandy Woods Drive
Ellicott City, MD 21043
(301) 461-9488

MacDraw is a licensed trademark of Apple Computer, Inc.
Mini Cad is a trademark of Diehl Graphsoft, Inc.

CIRCLE 331 ON READER SERVICE CARD

SCRG SOUTHERN CALIFORNIA RESEARCH GROUP

INSTANT
APPLEWORKS™

Now, you can have **APPLEWORKS**™ *built-in* your APPLE //e™. With our programming service, your copy of **APPLEWORKS,** and the **quik-Loader**™, your computer can be ready within 2 seconds after applying power.

After receiving your order, we will immediately send you a kit containing everything you'll need. (Units purchased through dealers will contain the kit). Copy your original **APPLEWORKS** program onto the disks included in the kit. Configure the program the way you want it used, and return it to us in the envelope provided. We will program the necessary "chips", install them in the **quikLoader**, verify proper operation, and rush it to you. When you receive it, just plug it into *any* peripheral slot. No more searching for your disks, waiting for the startup disk to load, swapping to the program disk, and waiting even longer. The quikLoader is faster and more reliable than even a hard disk drive. Updates should be no problem, as the "chips" are re-programmable.

quikLoader– $179.50
programming service– 89.50
Total– $269.00

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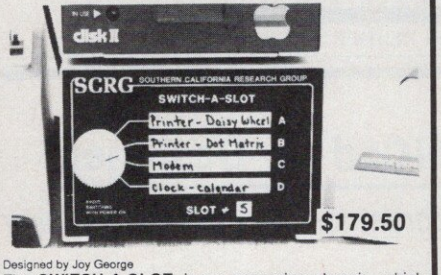
quikLoader (designed by Jim Sather) is a trademark of S.C.R.G.

SWITCH-A-SLOT



$179.50

Designed by Joy George

The **SWITCH-A-SLOT** is an expansion chassis, which allows the user to plug in up to four peripheral cards in one slot. One of these cards is selected for use, and *only* that card draws power.

This product is especially useful where the software requires the printer to be in a particular slot, and the user wishes to choose between two or more printers.

SWITCH-A-SLOT and **EXTEND-A-SLOT** work well with most slow to medium speed cards, such as modems, printers, clock, music, etc. They are not recommended for high speed data transfer devices such as disk drive controllers, alternate processor, and memory cards.
Due to the nature of these products, and unit-to-unit variations of computers and peripherals, we are unable to guarantee that these products will work with any particular system. However, as with all our products, we offer a ten-day trial period. If our product does not operate to your satisfaction, return it for a prompt refund.

EXTEND-A-SLOT

The **EXTEND-A-SLOT** brings a slot outside your APPLE™, allowing an easy change of cards. The 18" (45cm) cable is long enough to allow placement of the card in a convenient location. the high quality connectors are gold plated for reliability. **$34.95**

SLOT 3 CLOCK™

Designed by Chuck Shaffer

The **SLOT 3 CLOCK** will plug into any slot of the APPLE][,][+, or //e. The main feature is that, unlike most cards, it can plug into slot 3 of the //e *without interfering* with the operation of the Extended 80-column card. **PRODOS**™ is fully supported, and the card is APPLESOFT™ compatible. Installation software and a long-life DURACELL™ lithium battery are included.

$79.50

PROmGRAMER™

Hardware design by Bob Brice — Software by Bob Sander-Cederlof

The PROmGRAMER is an inexpensive **EPROM** (**E**rasable **P**rogrammable **R**ead **O**nly **M**emory) programmer for the **APPLE**][,][+, and //e computers. The unit plugs into any slot of the computer, and allows the user to program any standard 5 volt, 27 series **EPROM**. Although not intended as a production tool, the ease of use allows rapid programming, copying, duplication, or modification of **EPROM**s.

$179.50

Paddle-Adapple

The **PADDLE-ADAPPLE** is a game plug expansion adapter that plugs into the interior game I/O socket, and is designed to operate in one of two modes. In the first, it allows you select between one of two devices, such as Koala Pad™ and joystick. The device is selected by the flip of a switch. In the second mode, the **PADDLE-ADAPPLE**, with appropriate software, allows the use of two joysticks simultaneously to allow use with games such as **ONE-ON-ONE**™ and **ARCHON**™.

There are three versions to adapt to any combination of the newer type APPLE connector (the 9-pin 'D' sub-miniature), or the older 16-pin plug.

- The **PADDLE-ADAPPLE** has two 16-pin sockets.
- The **PADDLE-ADAPPLE COMBO** has one 'D' subminiature and one 16-pin connector.
- The **PADDLE-ADAPPLE 'D'** has two subminiature 'D' (9-pin) connectors.

$29.95

9-16 Adapter
for APPLE //e & //c

The 9-16 adapter permits the use of most 16-pin I/O devices with the APPLE //e or //c. Plugging this adapter into the subminiature 'D' connector allows the use of 16-pin device, such as the **PADDLE-ADAPPLE**, paddles, joystick, 16 pin Koala Pad™, etc. The only limitations are those devices that use the annunciators or the $C04Ø strobe. **NOTE**–the //c does not support two joysticks. **$14.95**

16-9 Adapter
for APPLE][and][+

With this adapter, owners of early APPLEs can take advantage of the newer 9-pin game products, such as paddles, joysticks, **MUPPET LEARNING KEYS**™, etc. **NOTE** – If you have more than one game I/O device, consider purchasing our **PADDLE-ADAPPLE COMBO** or **PADDLE-ADAPPLE 'D'** instead. **$14.95**

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II SERIES

▸ LITTLEJACK HEADPHONE JACK

Designed for schoolchildren, game players, and musicians, the LittleJack computer headphone set allows users to work with their computers without disturbing other people. The set includes lightweight stereo headphones, a jack, and an adapter that allows up to eight students to listen simultaneously on school headphone listening sets. LittleJack is easy to install, and when it's in place, users can choose to use the regular computer speaker or direct all sound to the headphones by plugging them into the externally mounted output jack. *(List Price: $24.95)*

Requires: Apple II, II Plus, or IIe

Educational Software Review
1400 Shattuck Avenue
Suite 774
Berkeley, CA 94709
(415) 528-2788

CIRCLE READER SERVICE NO. **465**

▸ MOUSECLEAN KIT

MouseClean from Perk Company is an easy-to-use cleaning kit for the Apple trackball mouse. Each kit contains ten cleaning wands, a bottle of pressurized air, five cleaning-solution pads, lintfree wipes, and instructions for use. *(List Price: $11.95)*

Perk Company
150 Commercial Street
Sunnyvale, CA 94086
(408) 735-1807

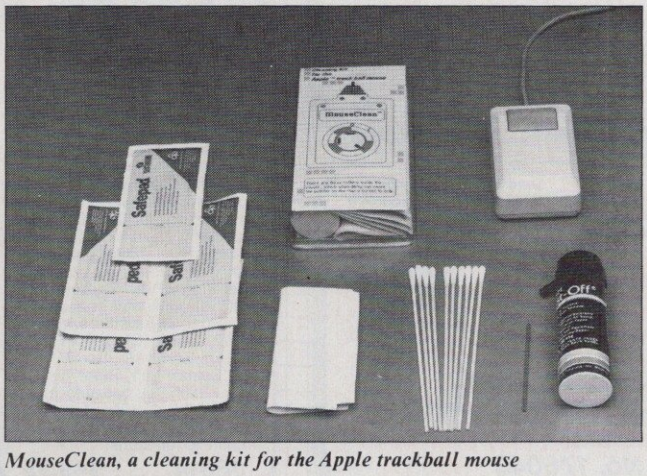
CIRCLE READER SERVICE NO. **466**

MAC

▸ MACNIFTY MACINTOSH ACCESSORIES

Kette Group has introduced three products in its new MacNifty line of accessories for the Macintosh. The MacNifty Stereo Sound System produces synthesized stereo output from the monaural sound of the Macintosh's audio output. The system includes two high-intensity speakers; separate bass, treble, and balance controls; both high- and low-impedance inputs; and all necessary cables.

The MacNifty Port Switch allows you to connect any two peripheral devices to a single 9-pin port on the Macintosh. Example uses for the Port Switch are connecting both the LaserWriter and ImageWriter to the computer's printer port or connecting both a mo-



MouseClean, a cleaning kit for the Apple trackball mouse

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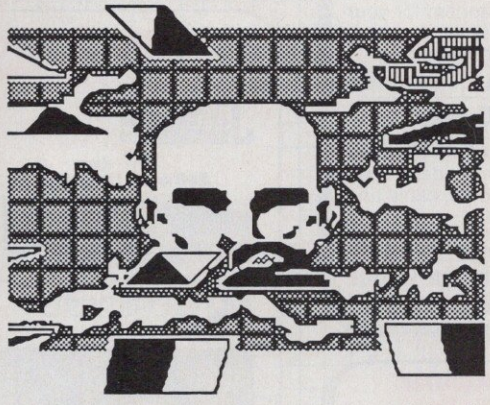

Answer left and right brain memory trials of increasing difficulty. Set difficulty levels. Monitor progress via session reports.
ThinkFast: 64K Apple II's and Mac: **$39.95**

BrainPower, Inc.
24009 Ventura Boulevard,
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(818) 884-6911

CIRCLE 124 ON READER SERVICE CARD

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Vol. 1 No. 4 — The Macintosh Programming Journal — March 1985

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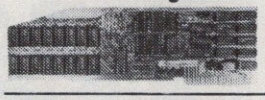

128K RAM Card *RAM Disk!*

The **JE868** is functionally compatible with the Apple II language card and can be utilized with all software that can be used with a standard 16K card. The JE868 requires no modifications to your Apple computer. Five key software programs are included: Memory Management System, utilities, diagnostics, demos, and RAM disk emulators for DOS 3.3, CP/M and Apple Pascal. Also features DOS relocator. Complete with instructions.

JE868 (Expand-A-RAM) . . . $119.95

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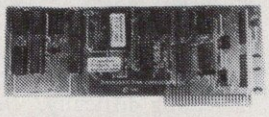

Applesurance Diagnostic Disk Controller Card

The **JE877** serves as a diagnostic tool, an assurance/maintenance tool and a dual disk drive controller. The JE877 will verify and check the operating hardware of your system each time you turn on your Apple II, II+ or *//e*.* Test your RAM, ROM, CPU, and disk drives. Diagnostic routines may be cancelled at the touch of a key. Complete with instructions.

JE877 (DRV-1/Applesurance II) . . . $69.95

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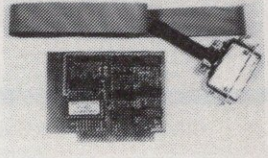

Parallel Printer Card

The **JE880** Printer Interface board is an intelligent interface to most of today's popular dot-matrix graphics printers. The JE880 is fully compatible with Apple CP/M, Apple Pascal (or FORTRAN), and most other operating systems and software packages available for Apple II, II+ and *//e*.* The JE880 is shipped configured for the Centronics standard and can be re-configured for other standards if necessary. Advanced text printing features include: video screen echo ON or OFF, auto/disable linefeed after carriage return, set/clear the 8th bit of the output data, set left margin and more! Complete with instructions.

JE880 (PRT-1). $59.95

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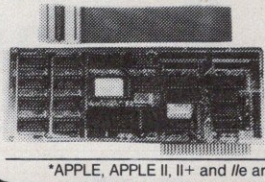

Parallel/Serial Buffer Card

The **JE883** provides the user with up to 64K of additional or buffered memory (18 pgs. of information). Using the parallel jumper cable supplied, the JE883 will attach to the JE880 (above). Parallel Card needed for operation. The JE883 includes a standard parallel input with both parallel and serial (RS232) buffered outputs. With these features you may access and buffer information to two types of printers (one serial, one parallel) simultaneously. Complete with instructions.

JE883 (P/S Buffer). $79.95

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ADD-514 (Disk Drive) $139.95
JE875 (Controller Card) $49.95

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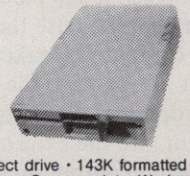


- Direct drive • 143K formatted • 35 tracks • Super quiet • Works with Apple Controllers or other compatibles (JE875) above • Complete with connector-just plug into your controller • Size: 5¾"W x 1⅝"H x 8"D • Weight: 4 lbs.

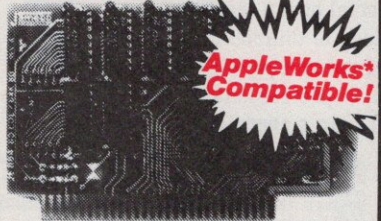
ADD-12. . . . $129.95

APPLE™ *//c* Compatible 5¼" Half-Ht. Disk Drive

- Same specs as ADD-12 (above) except no controller necessary.

ADD-IIc. . . . $129.95

80-Col. plus 64K RAM for your APPLE *//e**



Now you can double the memory capacity and get an 80-column display format for your APPLE *//e** computer at an affordable price. Just plug the JE864 card into your APPLE* and expand your display to 80 characters per line. Perfect for word processing. The JE864 also features 64K bytes of additional memory to allow programming not possible with standard APPLE *//e** computers. Complete documentation included.

JE864. . . . . $69.95

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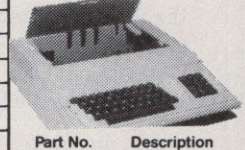

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Part No.	Description	Price
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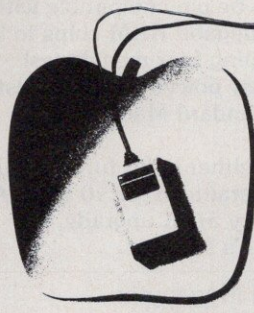

Let the Candy Apple™ red, mouse mat become the apple of everyone's eye. Give your hungry little mouse an apple place to play. The Candy Apple™ mouse mat gives you a clean, soft surface to run your mouse on and it protects the top of your desk as well.

No more pitter-patter less squeaks and squeals always in the right place with the right feel.

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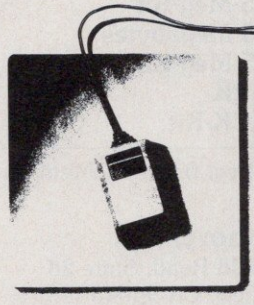

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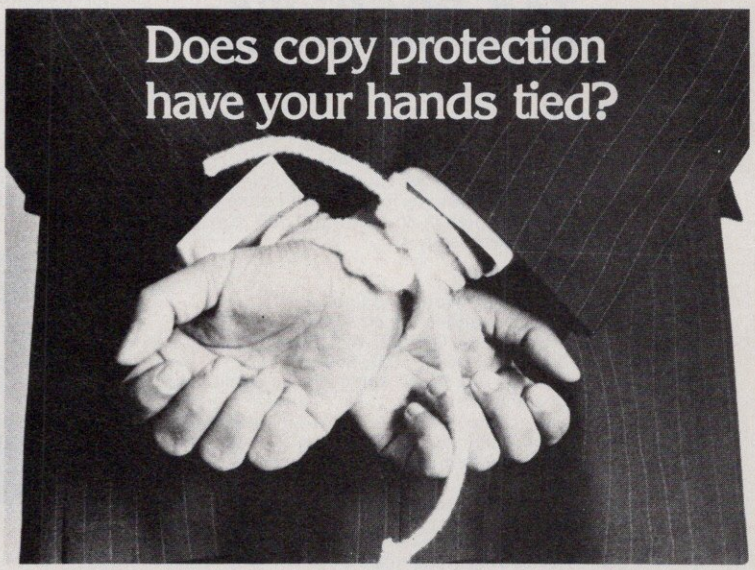
Locksmith requires no additional hardware, but will use any additional RAM memory that it finds, including RAM boards from Applied Engineering and Checkmate Technology.

Don't get caught with your hands tied. Order Locksmith 6.0 today.



NEW LOW PRICE **$79.95**
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VISA

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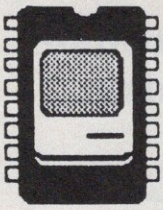

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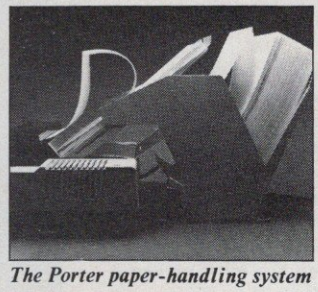
dem and MacVision to the modem port.

Finally, the MacNifty Joystick Converter lets you use a joystick in place of the Macintosh's mouse. In addition, the converter lets you control the speed of the cursor. *(List Price: Stereo Sound System, $79.95; Port Switch, $34.95; Joystick Converter, $44.95)*
Requires: Macintosh
Kette Group, Inc.
13895 Industrial Park Blvd.
Minneapolis, MN 55441
(800) 328-0184
in MN (612) 559-5728
CIRCLE READER SERVICE NO. **467**

▸ THE PORTER SYSTEM

The Porter system is designed to solve the paper-handling and cable problems of most popular microcomputer printers. The system sits behind the printer and holds the printer paper at an angle that allows gravity to help feed the paper into the printer. It can hold up to 1000 sheets of fanfold paper in a space 8



The Porter paper-handling system

inches deep. As well as holding blank paper, the Porter also folds the printed output neatly and stores it at a height that is convenient for reviewing the printout while the printer is running. The system is made from a lightweight metal alloy and is available in models for both 80-column and 136-column printers. *(List Price: 80-column model, $64.50; 136-column model, $74.50)*
Peri-Comp, Inc.
P.O. Box 188
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(414) 248-8585
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▸ HARDWARE/ SOFTWARE

MAC

▸ MACMAINFRAME

Avatar Technologies has introduced MacMainframe, a hardware/software product that works in conjunction with the company's standard host file transfer (HFT) software on IBM mainframes to transfer files between the Macintosh and IBM hosts. MacMainframe also gives Macintosh users full IBM 3278 terminal emulation and either local or remote connection to the host, providing dial-in facilities for multiple users. The hardware unit attaches directly to an IBM 3274 or 3276 control unit using coax cable. The MacMainframe unit attaches to the Macintosh's modem port and also provides an auxiliary RS-232 port for asynchronous communications.

MacMainframe's software, which is fully interactive and easy to use, acts as a desk accessory for use with MacTerminal, allowing users to set up file transfers in standard Macintosh format. The system is also compatible with Avatar's Turbo line of micro-to-mainframe links for the IBM PC. *(List Price: $1295)*
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99 South Street
Hopkinton, MA 01748
(617) 435-6872
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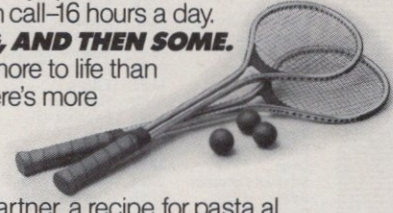

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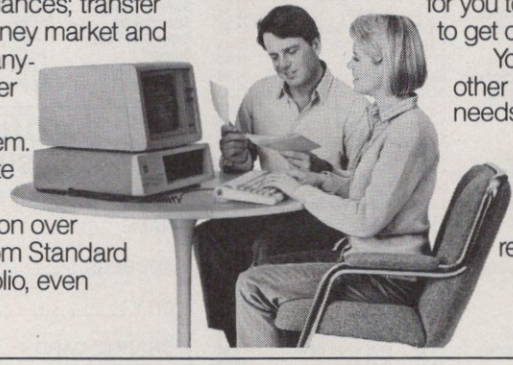

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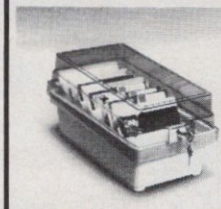

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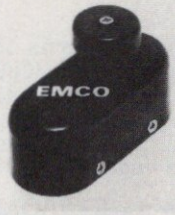

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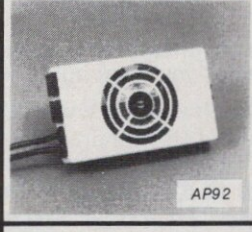

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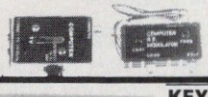

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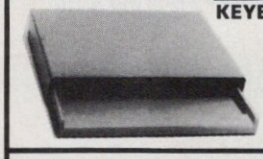

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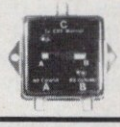

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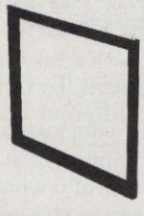

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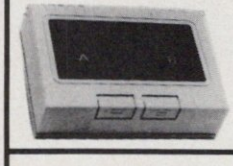
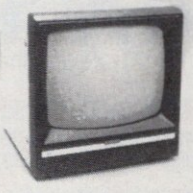


- Two position push button Centronics-style switch
- Parallel transmission
- Beige color to match your PC
- Perfect for connecting two printers to one computer or connect two computers to one printer with parallel interface
- Size: 1⅞"h x 7⅛"w x 5"d

S&H $5.00

MONITORS $100



AMBER :

- Amber HI-RES monitor
- 12" display
- Non-glare screen finish
- 20 MHz
- 1000 lines @ center

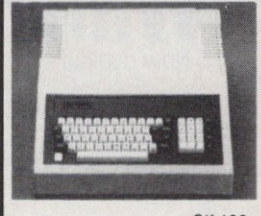
$225

COLOR :

- Color/Green selectable
- 14" display
- Audio/video input
- Audio/video output
- Volume control

S & H $13.00

APPLE™ COMPATIBLE $199.00



INCLUDES (as shown):

- **CASE:** ABS case in light beige, w/spacer for easy motherboard mounting.
- **KEYBOARD:** Same features as KB-95 (above) exc. assembled in case for easy mother BD connection.
- **SWITCHING P.S.:** 110/220 select: 5V/5A, 12V /2.5A, -12V/.5A, -5V/.5A; in case w/power cord and connector.
- **RF MOD. SET:** RF modulator, coaxial cable, TV interface.
- **SPEAKER:** Mounted w/cable and plug.

S & H $12.00

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3541 OLD CONEJO ROAD, SUITE 111
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- California residents please add 6% sales tax
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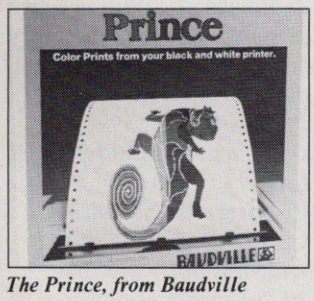
CIRCLE 239 ON READER SERVICE CARD

IIe SERIES

▸ PRINCE PRINTING PACKAGE

A multicolor printing package for black-and-white printers, Baudville's new Prince software and ribbons produce up to 80 full-color prints for paper or transfers to cloth. Prince has a library



The Prince, from Baudville

of art and font styles, can "capture" any standard or double-high-resolution picture for editing and printing, and features special "ribbon saving" software with automatic paper control for perfectly aligned color prints. The package contains four color ribbons and comes with the Craft Kit, with which users can create bright iron-on transfers, personalized disk labels on special label stock, letterheads, and more. *(List Price: $69.95)*

Requires: Apple II Plus, IIe, or IIc; 64K RAM

Baudville
1001 Medical Park Drive SE
Grand Rapids, MI 49506
(616) 957-3036

CIRCLE READER SERVICE NO. **470**

MAC

▸ THE MAX WITH SOFTWARE

EnterSet has signed an agreement with MacMemory Electronics to market The Max, MacMemory's new 1.5-megabyte memory-expansion board for the Macintosh. EnterSet has also agreed to supply its RAMdisk and memory-management software with the board. The Max upgrade's 1.5 megabytes of memory can be configured in two ways: 1 megabyte of contiguous application memory with a 400K RAMdisk or a standard 512K application memory with a 1-megabyte RAMdisk. *(List Price: 128K to 1.5-megabyte upgrade, $795 completely installed, $595 for kit; 512K to 1.5-megabyte upgrade, $645 installed, $525 for kit)*

Requires: Macintosh

EnterSet, Inc.
410 Townsend
San Francisco, CA 94107
(415) 543-7644

CIRCLE READER SERVICE NO. **471**

MAC

▸ SANDDOLLAR

An auto-adjudicating health-claim system for the Macintosh, Sanddollar can process health claims for employers who have 700 to more than 3000 employees, plus their dependents. The system, which includes a Macintosh 512K, a Hyperdrive hard disk, an ImageWriter printer, and a numeric keypad, presents a series of questions and supplies potential answers to the health-plan operator, who then points to the answers and clicks on the correct response. Once the user has entered the amount of the claim, the system automatically processes the claim payment. *(List Price: $27,000)*

Requires: Macintosh

Sanddollar Enterprises, Inc.
2000 E. 116th Street
Carmel, IN 46032
(317) 844-3800

CIRCLE READER SERVICE NO. **472**

Less Wait with MacMate!

MacMate™ Print Spooler and Ram Disk for 512K.

- Allows printing on ImageWriter while continuing to work with Mac.
- Save/load data and applications from ultra fast drive in memory.
- Occupies only 8K disk space —written in 100% machine language.

ONLY $49.95! plus $2.50 shipping

Not for use with Mac XL or LaserWriter.

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(818) 341-2523
Dealer Inquiries Invited

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SMB Development Associates
P.O. Box 3082
Chatsworth, CA 91313

MacMate is a trademark of SMB Development Assoc. Macintosh and ImageWriter trademarks of Apple Computer, Inc.

CIRCLE 249 ON READER SERVICE CARD

MACMIDI™

Discover the musician in you...with a complete Macintosh music production studio featuring:

MIDIWorks™ **$100**
Translate songs between MusicWorks™, ConcertWare™, Professional Composer™ or Music Construction Set™, and play through a MIDI synthesizer for high quality sound.

MegaTrack™ **$150**
Record and playback unlimited tracks with MIDI synthesizers. Convert through MIDIWorks for music printing.

MacMIDI Star™ **$80**
Hardware interface which allows you to directly connect your Mac to 4 MIDI synthesizers. Upgradable to Tape Sync & Video SMPTE. Works with all MIDI software on the Mac.
Package #1: Star/MIDIWorks **$120**
Package #2: Star/MIDIWorks/Casio CZ-101 synth **$495**

MUSICWORKS 18 Haviland Boston MA 02115 (617) 266-2886

- **DX/TX VoicePatch Librarian™** **$150**
  Store forty 32-voice DX7 Virtual Cartridges™ on one disk! Organize, load and save patches instantly.
- **DX/TX Voicepatch Disk™ #1** **$100**
  A disk of useful DX patches prepared by Dave Mash of the Berklee College of Music.
- **MegaTrack™** **$150**
  MIDI "multitrack tape recorder"/music data processor which records up to 72,000 note events and works with any size Mac.
- **MacMIDI 32™ Dual Interface** **$150**
  Connect your Mac to one or two MIDI sources and send on up to 32 MIDI channels.
- **MacMIDI Sync™** **$250**
  All the features of MM32 plus FSK tape and drum box sync.
- **MacMIDI SMPTE™** **$350**
  All the features of MM32 plus SMPTE™ Time Code send/receive and drum machine sync.

MUSICWORKS 18 Haviland Boston MA 02115 (617) 266-2886

CIRCLE 232 ON READER SERVICE CARD

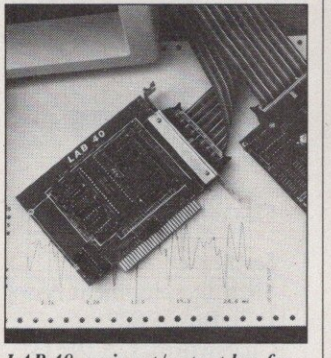
▶ LAB 40

The Local Applications Bus, LAB 40, is a computer-to-peripheral interface and a hardware-development system for such applications as data acquisition, control, test instrumentation, and conventional computer peripherals. Using 40-pin ribbon cable, the bus generator circuit is available as a card that fits inside Apple II computers. The bus takes the form of a structured parallel port with 16 data lines, 8 controls, 8 selects, 7 interrupts, and power lines. The system comes with interrupt routines in machine code, routines to set up the LAB 40 control words, and some sample BASIC programs. *(List Price: $175)*

Requires: Apple II or II Plus, 64K RAM, one disk drive

Computer Continuum
75 Southgate Avenue
Suite 6
Daly City, CA 94015
(415) 755-1978

CIRCLE READER SERVICE NO. **475**



LAB 40, an input/output bus for data acquisition and control

▶ SOFTWARE

▶ UNIX SUPPORT FOR MAC XL

Unipress Software is continuing to support UNIX and UNIX application software on the Macintosh XL/Lisa, even though Apple Computer is no longer manufacturing this machine. Unipress offers the Uni-Plus+ Bell Labs UNIX System V, a multiuser UNIX system that includes a C compiler and development tools, text-processing tools, and Berkeley enhancements.

The company also produces a variety of applications including Unipress EMACS, a multiwindow, full-screen editor; Unify, a multiuser relational database; the Lex word processor; and the Q-Calc spreadsheet. In addition, Unipress offers optional programming languages, such as SVS FORTRAN, Pascal and BASIC-Plus, RM COBOL, and Irvine ADA, and extension boards to provide an additional two megabytes of main memory or to expand the number of users on the system. *(List Price: UNIX V, $990 for single user, $1350 for multiuser)*

Requires: Macintosh XL/Lisa

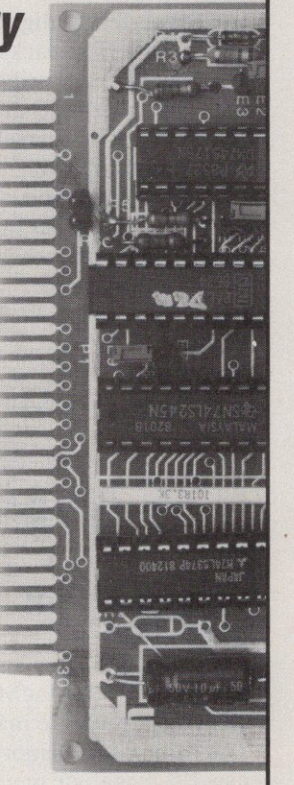
Unipress Software, Inc.
2025 Lincoln Highway
Edison, NJ 08817
(201) 985-8000

CIRCLE READER SERVICE NO. **476**

Finally, an end to the wait for low-cost memory

What You Get	Price	Product	Compatibility
256K plus 80 columns	$199	ADD-RAM 80/256™	Apple IIe®
64K plus 80 columns*	$ 99	ADD-RAM 80/64™	Apple IIe
16K	$ 99	ADD-RAM™	Apple II, II Plus®
80 column screen	$179	SMARTERM II™	Apple II, II Plus, IIe®

*can be upgraded to 256K



▶ ADD-RAM 80/256 and ADD-RAM 80/64 Advanced Memory Boards

Until now if you wanted more speed and memory you had to buy another disk drive. Or another computer. Or you could just wait patiently as the disk drive hummed and the red light glowed.

Now, you can get speed and 64K or 256K additional memory by just slipping an ADD-RAM memory board from Advanced Logic Systems into your Apple IIe. Simply back-up your programs onto the ADD-RAM board for faster access to files and applications. And still retain 80 column screen width.

▶ ADD-RAM and SMARTERM II: Rounding Out the Family

To upgrade your Apple II or Apple II Plus from 48K to 64K, take advantage of the original ADD-RAM. Or if memory is adequate, upgrade to 80 columns with SMARTERM II for your Apple II, II Plus or IIe.

Visit your Apple Dealer today to see ADD-RAM and SMARTERM II in action. Or contact us directly.

If you knew what we know about our products, you'd be our next customer.

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Advanced Logic Systems, Inc. 1195 E. Arques Ave., Sunnyvale, CA 94086. (408) 730-0307

CIRCLE 122 ON READER SERVICE CARD

The 10 MB Sider™ gives you something no $1000 hard disk gives you...

No question about it, you can get a reliable "big name" 10 megabyte hard disk for your Apple II+ or IIe. Trouble is, you're likely to spend a small fortune for it. Because you're not just paying for the subsystem. You're also footing the bill for some hefty distribution costs, retail overhead...and the dealer's profit margin.

Happily, you now have an alternative: the 10 megabyte Sider from First Class Peripherals. This rugged, dependable hard disk offers the speed, convenience and storage capacity to meet your computing needs. But more importantly, it's sold *direct to you* for only $695—complete.

State-of-the-art technology at a state-of-the-art price

The Sider features field-proven Winchester disk technology. Direct booting without floppies. Self-contained power supply. And compatibility with all the most popular Apple software.

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Extension 224

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*Residents of CA, NV and PA, please add appropriate sales tax.

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Address

City

State *Zip*

Telephone (area code)

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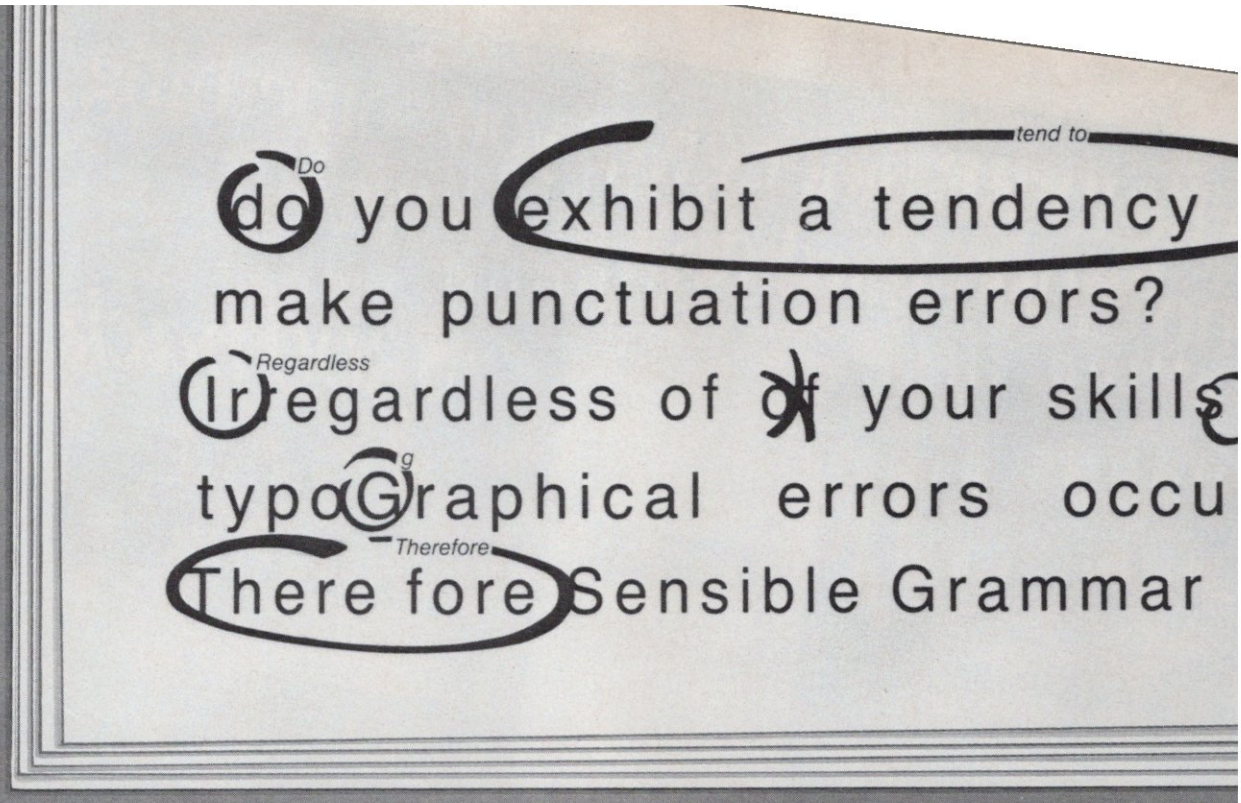
3579 Highway 50 East, Carson City, NV 89701

224

CIRCLE 105 ON READER SERVICE CARD



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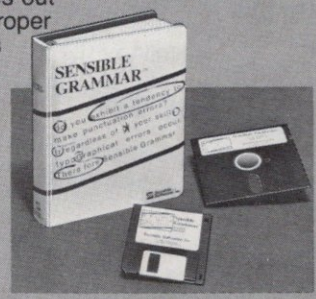
Yes, just like your old English teacher, your Apple Computer can now check your papers for grammatical and many other writing errors. Don't be embarrassed or lose credibility because of simple typos and mistakes. And it's so easy and fast to do with **Sensible Grammar.**

SENSIBLE GRAMMAR

checks your grammar, capitalization, punctuation and abbreviations. It searches out phrases that are inconcise, vague, wordy or repetitive, as well as faulty, informal, pompous or sexist. It calls your attention to cliches and slang. It even allows you to enter your own personal trite and pet expressions and then lets you know every time you use them.

It Never Overrides Your Judgment

Sensible Grammar singles out possible mistakes or improper usage and then suggests a correct replacement word or phrase, but it always leaves you the option to accept or reject the suggestion.



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SENSIBLE SPELLER™ catches your spelling mistakes, utilizing its huge 80,000 word vocabulary derived from the official Random House Dictionary®. Like **Sensible Grammar**, it works with tireless efficiency. It displays misspelled words in context, suggests the correct spelling and allows immediate replacement of misspelled words with correct ones.

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Sensible Grammar and **Speller ProDOS** work with the following word processors, AppleWorks, Apple-er-ProDOS version (Apple Computer, Inc.); Format II Enhanced-ProDOS (Kensington Microware), others: **Sensible Speller IV** works with DOS 3.2 and DOS 3.3-AppleWriter (Apple Computers, Inc.); Street Writer (Brodebund); Format II (Kensington Microware); †Word Handler (Silicon Valley Systems); †CP/M-Word-Inc.); †PFS:WRITE (Software Publishing, Inc.); Digital Research Corp.-Micropro International); and others. Owners of trademarks indicated in paren-a. Black's Law Dictionary (West Publishing, inc.); Stedman's Medical Dictionary (Waverly Press, Inc.). ; CP/M, Pascal, PFS: WRITE and Word Handler versions do not suggest correct spelling of or allow immediate correction of misspellings.

Sensible Grammar™ is available for $99.45; **Sensible Speller**™ for $125.00 in either the "IV" or ProDOS version; **Sensible Technical Dictionary**™ for $59.95; **Stedman's Medical Dictionary**™ for $99.95; and **Black's Law Dictionary**™ for $99.95. The three specialized dictionaries require the **Sensible Speller.** All programs are available separately and can run on Apple® computers.

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210 S. Woodward, Suite 229, Birmingham, MI 48011

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Christmas Card Construction Kit (produce full color Christmas cards) $25.00
IIe & IIc - Full color printing software
Prince - Compatible with Imagewriter, Epson & many other printers $55.00

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Printer ribbons not listed below can be special ordered. Call for pricing!
Type 1 - Imagewriter • DMP • C-ITOH Prowriter, 1550, 8500, 8510 • Nec 8023 & more
Type 2 - Epson MX, FX, HRX 70/80 & more
Type 3 - OKIDATA 82, 83, 92, 93 • Gemini 10X • Star Micronics 10 & more
Type 4 - OKIDATA 182, 183, 192 & 193

Color Kits
Color 6 Pack - 1 each Red, Blue, Yellow, Green, Brown & Purple Matrix ribbons & instructions
Type 1 & 2 ..... $28.00 Type 3 ..... $18.00 Type 4 ..... CALL
T-Shirt Factory - 1 each Red, Blue, Yellow & Black Heat Transfer ribbons & instructions
Type 1 & 2 ..... $28.00 Type 3 ..... $18.00 Type 4 ..... CALL
ColoRibbons - 6 colors; Red, Blue, Yellow, Green, Brown & Purple
Type 1 ..... $5.50 ea./6 for $28.00 Type 3 ..... $3.50 ea./6 for $18.00
Type 2 ..... $5.50 ea./6 for $28.00 Type 4 ..... CALL
Heat Transfer Ribbons - 4 colors; Red, Blue, Yellow & Black
Type 1 ..... $7.50 ea./4 for $28.00 Type 3 ..... $5.00 ea./4 for $18.00
Type 2 ..... $7.50 ea./4 for $28.00 Type 4 ..... CALL
Black Nylon Ribbons
Type 1 ..... $4.00 ea./6 for $21.00 Type 3 ..... $2.50 ea./6 for $12.00
Type 2 ..... $4.00 ea./6 for $21.00 Type 4 ..... CALL
Epson MX-100 $6.00 ea./6 for $30.00

Print Heat Cleaning Kit
Clean Image Ribbon™ Kit - Cleans print head in less than 60 seconds; without removal. Good for up to 60 cleanings.
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MacInker - Re-Ink any fabric ribbon automatically for less than 5¢
Type 1 & 2 ..... $49.95 Type 3 ..... $54.95 Type 4 ..... $59.95
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Blank Ribbons - Ink Your Own
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Continuous Micro-Perf form feed paper tears down to 8½" x 11". Available in Red, Gold, Bright Blue, Powder Blue, Pink & Ivory.
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Imagewriter Cover $11.00
Wide Imagewriter Cover ... $13.00
Laserwriter Cover $17.00
External Drive Cover $6.00
Numeric Keypad Cover $6.00

Apple Skins™ - High quality rip-stop nylon dust covers for your II+, IIe or IIc System. Available in Blue, Burgundy and Grey.
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IIe Professional Cover $22.00
IIe Cover $20.00
IIc External Drive Cover $6.00
IIe External Drive Dover $6.00
Scribe Cover $12.00

The "Clutch" - Constructed on rip-stop nylon, this disk case holds 8 disks and folds down to wallet size $8.00
Mouse Pad - Nylon surface with a neoprene base $8.00
MacLuggage - Cordura & high density foam carrying case for the Mac and Imagewriter (Both Models). Available in Navy Blue.
Macinware ... $50 Imageware ... $40 Imageware (Wide Carriage) ... $50
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CIRCLE 162 ON READER SERVICE CARD

A+ pipeline

MAC

▸ SIDEKICK FOR THE MACINTOSH

Borland International has released for the Macintosh an enhanced version of its desktop organizer SideKick. The Macintosh version offers information management, desktop organization, and telecommunications in one package. In addition, it has concurrent capabilities so that, for example, you can run a word processor, spreadsheet, or drawing program in the background and then call up SideKick's Notepad to draft a memo. Also available is an optional Borland PhoneLink interface for automatic phone dialing. *(List Price: SideKick, $84.95; PhoneLink, $45)*

Requires: Macintosh
Borland International, Inc.
4585 Scotts Valley Drive
Scotts Valley, CA 95066
(408) 438-8400

CIRCLE READER SERVICE NO. **507**

MAC

▸ OVERVUE, VERSION 2.0

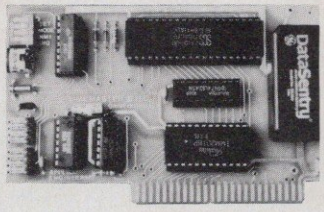
OverVUE, Version 2.0, a new version of the OverVUE database package for the Macintosh, includes several new features that combine a relational database, macros, charts, and math functions to provide the characteristics of both spreadsheets and chart programs. Major new features of this version include the ability to produce bar, column, line, area, and pie charts directly from data; macros; relational joining of databases; a Zoom command that switches between single- and multiple-record layouts; the ability to import data from a variety of sources; and "clairvoyance" abilities that speed data entry. The program's math functions now apply to dates and times and include several new string and conditional functions. *(List Price: $295; upgrade for current OverVUE owners, $19.95)*

Requires: Macintosh
ProVUE Development Corporation
222 22nd Street
Huntington Beach, CA 92648
(714) 969-2431

CIRCLE READER SERVICE NO **502**

Designed For Those Who Only Accept The Best!

TIMEMASTER II H.O.™



- Absolutely, positively, totally PRO-DOS and DOS 3.3 compatible.
- Time in hours, minutes, seconds and milliseconds (the ONLY PRO-DOS compatible card with millisecond capability).
- 24 hour military format or 12 hour with AM/PM format.
- Date with year, month, day of week and leap year.
- Eight software controlled interrupts so you can run two programs at the same time (many examples are included).
- The only card recognized by both the DOS 3.3 and PRO-DOS versions of Apple Writer IIe.
- Appleworks will now time and date stamp all your data automatically.
- The only clock card that will display the time and date on the Appleworks screen.
- Compatible with ALL of Apple's languages. Many sample programs for machine code, Applesoft, CP/M and Pascal on 2 disks.
- On-board timer lets you time any interval up to 48 days long down to the nearest millisecond.
- Auto-recharging nickle-cadmium battery will last over 20 years.
- Two BSR/serial ports for future expansion.

	PRO-DOS COMPATIBLE	INCLUDES DOS DATER	MILLISECOND TIME	YEAR DATA	LARGEST SAMPLE SOFTWARE	REMOTE SET PORT	BSR PORT	EMULATES ALL OTHER CLOCKS
H.O	YES	YES	YES	YES	YES	YES	YES	YES
BRAND A	NO	NO	YES	NO	NO	NO	NO	NO
BRAND C	NO	NO	NO	NO	NO	NO	NO	NO
BRAND M	NO	NO	NO	NO	NO	NO	NO	NO
BRAND P	YES	YES	NO	YES	NO	NO	NO	NO
BRAND S	NO	NO	NO	YES	NO	NO	NO	NO
BRAND T	YES	NO	NO	NO	NO	YES	NO	NO

Full emulation of all other clocks. Yes, we emulate Brand A, Brand T, Brand P, Brand C, Brand S and Brand M too. It's easy for the H.O. to emulate other clocks, we just drop off features. That's why the H.O. can emulate others, but none of the others emulate us. The Timemaster II H.O. will automatically emulate the correct clock card for the software you're using. Of course most programs will use the Timemaster II H.O. in its native mode, but it's comforting to know that you won't have to worry about compatibility problems. You can also give the H.O. a simple command to tell it which clock to emulate. This is great for writing programs for those poor unfortunates who bought some other clock card.

REMOTE CONTROL

Our BSR X-10 interface option for the H.O. allows you to remotely control up to 16 lights and electrical appliances through your BSR X-X-10 home control system in your home or office. You're already wired because a BSR system sends its signals over regular 120 volt wiring. That means you can control any electrical device in your home or office without additional wiring.

CLOCK PRICE $129.00 **BSR Option (may be added later) $49.00**

VIEWMASTER 80™

There used to be about a dozen 80 column cards for the Apple. Now there is only ONE.

- TOTALLY Videx Compatible.
- Perfect for any APPLE II, II+ or IIe.
- 80 characters by 24 lines, with a sharp 7x9 dot matrix.
- On-board 40/80 soft video switch with manual 40 column override.
- Fully compatible with ALL Apple languages and software—there are NO exceptions.
- Low power consumption through the use of CMOS devices.
- All connections are made with standard video connections.
- Both upper and lower characters are standard, with true descenders.
- All new design (using a new Microprocessor-based C.R.T. controller) for a beautiful razor sharp display.
- The VIEWMASTER incorporates all the features of all other 80 column cards, plus many new improvements.

	PRICE	BUILT-IN SOFTSWITCH	LOW POWER DESIGN	80 COLUMN HOME	7X9 DOT MATRIX	LIGHT PEN INPUTS	40 COLUMN OVERRIDE	INVERSE CHARACTERS
VIEWMASTER	139	YES	YES	YES	YES	YES	YES	YES
SUP'RTERM	MORE	NO	NO	NO	NO	NO	YES	YES
WIZARD 80	MORE	NO	NO	NO	YES	NO	YES	YES
VISION 80	MORE	YES	NO	NO	YES	NO	NO	NO
OMNIVISION	MORE	NO	NO	NO	NO	NO	YES	YES
VIEWMAX 80	MORE	YES	NO	NO	YES	NO	NO	YES
SMARTERM	MORE	YES	NO	NO	NO	YES	YES	NO
VIDEOTERM	MORE	NO	YES	NO	YES	YES	NO	YES

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

PRICE $139.00

Z-80 PLUS™
Now Includes New 4.0™ Software

Enter the CP/M world with the new Z-80 Plus card from Applied Engineering and introduce your Apple to thousands of new programs. Only the Z-80 Plus comes standard with the new 4.0 software, the most advanced system for running CP/M programs ever. Only CP/AM 4.0™ has advanced features like built-in disk emulation for popular memory expansion boards (those made by Apple and Applied Engineering and others) to give you a faster system with more storage. You also get menu driven utilities that are much easier to use than the older CP/M utilities so you can get down to all that great CP/M software faster. The Z-80 Plus runs older CP/M programs too, down to Version 1.6 (2.2 is the most popular). With the Z-80 Plus you can run the largest body of software in existence, and the Z-80+ is the only card on the market capable of accessing more than 64K in an Apple IIe. If you have an extended 80 column card, all 128K is usable, and if you have Ramworks, up to 1088K is available to CP/M. And each Z-80+ includes our CP/M Ram Drive software, enabling IIe owners to use an extended 80 column card, or a Ramworks card as an ultra-fast Ram disk enabling CP/M software to run 10 to 20 times faster. So fast acting software like WordStar, and dBASE II become virtually instantaneous! Simply plug the Z-80 Plus into any slot in your Apple. You'll have two computers in one and the advantages of both, all at an unbelievably low price.

- TOTALLY compatible with ALL CP/M software.
- Fully compatible with most hard disks including the Sider and Corvus.
- The only Z-80 card with a special 2K "CP/M detector" chip.
- Fully compatible with microsoft disks (no pre-boot required).
- Specifically designed for high speed operation in the Apple IIe (runs just as fast in the II+ and Franklin).
- Runs WordStar, dBASE II, Turbo Pascal, Fortran-80, Peachtree and ALL other CP/M software with no pre-boot.
- A semi-custom I.C. and low parts count allows the Z-80 Plus to fly through CP/M programs at a very low power level. (We use the Z-80B at a fast 4MHZ.)
- Does EVERYTHING the other Z-80 boards do, plus Z-80 interrupts.

PRICE $139.00

Our boards are far superior to most of the consumer electronics made today. All I.C.'s are in high quality sockets with mil-spec. components used throughout. P.C. boards are glass-epoxy with gold contacts. Made in America to be the best in the world. All products work in Apple IIe, II, II+ and Franklin. Applied Engineering also manufactures a full line of data acquisition and control products for the Apple; A/D converters and digital I/O cards, etc. Please call for more information. All our products are fully tested with complete documentation and available for immediate delivery. All products are guaranteed with a no hassle **THREE YEAR WARRANTY.**

Call (214) 241-6060, 9 a.m. to 11 p.m. 7 days a week or send check or money order to P.O. Box 798, Carrollton, Texas 75006. MasterCard, Visa and C.O.D. welcome. No extra charge for credit cards. Texas residents add 5⅛% sales tax. Add $10.00 if outside U.S.A.

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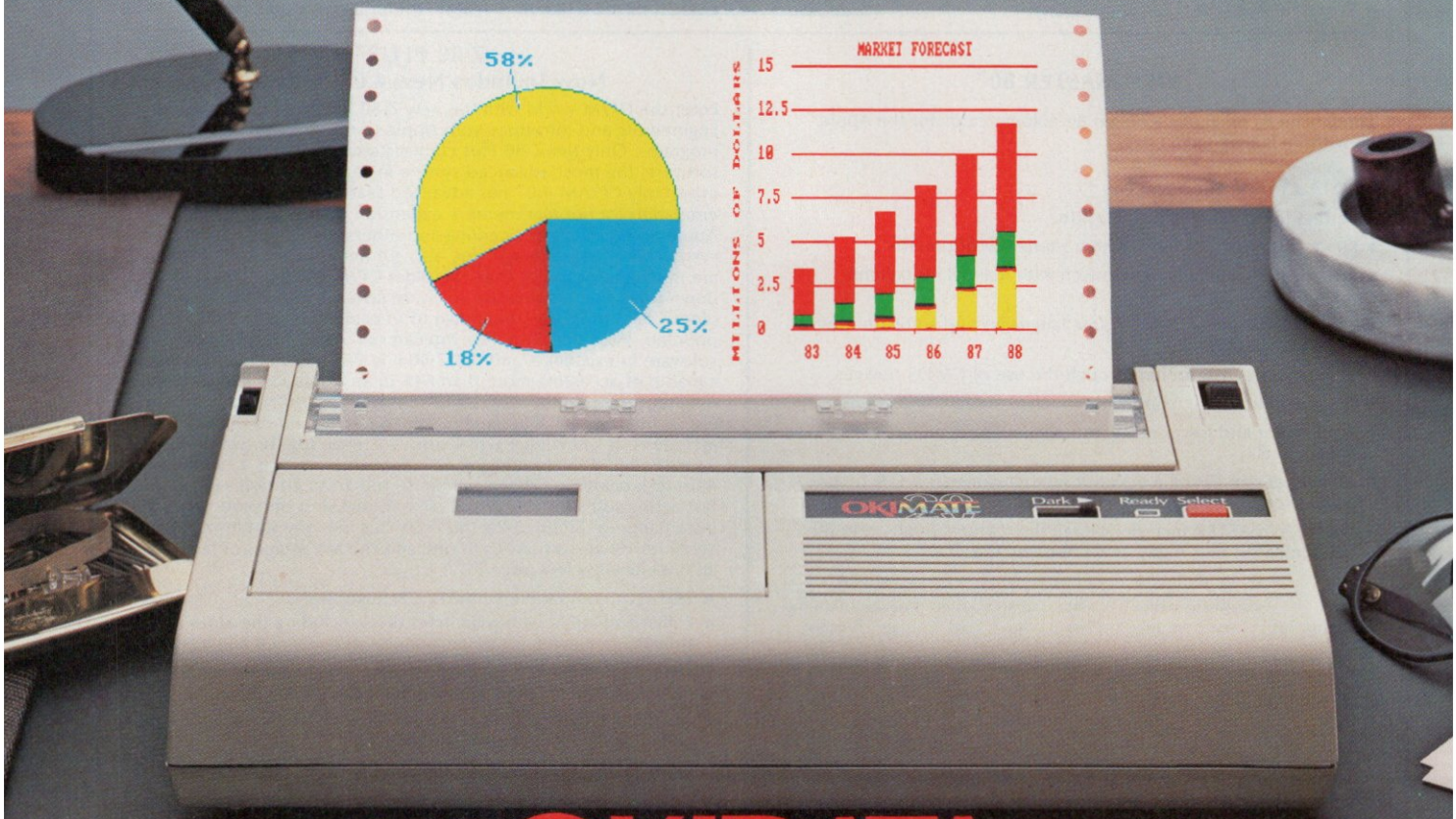
Rank sure has its privileges. And the new OKIMATE 20 certainly is one. For your nearest Okidata dealer, call 1-800-OKIDATA (in New Jersey 609-235-2600). Mt. Laurel, NJ 08054.



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an OKI AMERICA company

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CIRCLE 240 ON READER SERVICE CARD

*$268 is manufacturers suggested retail price.
OKIMATE 20 "Plug 'n Print" package includes black and color ribbon cartridges, paper and two software programs, "Color Screen Print" and "Learn to Print."
The above charts were created with Fast Graphs* and printed using OKIMATE 20's Color Screen Print program through multiple passes.
Apple is a registered trademark of Apple Computer, Inc.
IBM is a registered trademark of International Business Machines, Inc.

MAC

▸ ULTRA-TALK

Zilog, Apple Computer, and Lutzky-Baird Associates have jointly released the first in a family of products called Ultra-Office that are designed for office automation with the Macintosh and the AppleTalk network. Ultra-Talk, developed by Lutzky-Baird, permits the Zilog System 8000 family of UNIX Supermicro Computers to act as a central host so that multiple Macintosh users can execute programs directly on the System 8000. Macintosh users can thus take advantage of the System 8000's extended computing abilities as a file-server, central host, network gateway, or long-haul communications gateway. *(List Price: $1995; $300 per extra Mac, negotiable)*

Requires: Macintosh

Zilog, Inc.
1315 Dell Avenue
Campbell, CA 95008
(408) 370-8000

CIRCLE READER SERVICE NO. **513**

MAC

▸ SMARTMOUSE

Pleasant Graphic Ware has released a disk of more than 100 graphic images for the Macintosh. SmArtmouse provides ready-made images for use in greeting cards, wrapping paper, newsletters, and so on. Users can insert the drawings into documents contained in other application programs. *(List Price: $39.95)*

Requires: Macintosh

Pleasant Graphic Ware
P.O. Box 506
Pleasant Hill, OR 97455
(503) 741-1401

CIRCLE READER SERVICE NO. **510**

MAC

▸ 'TALKING' SOFTWARE

First Byte has released Speller Bee and KidTalk, the first two educational programs in its Talking Notebook Series of software for children from preschool through eighth grade. Both programs use SmoothTalker, the company's text-to-speech synthesizer software.

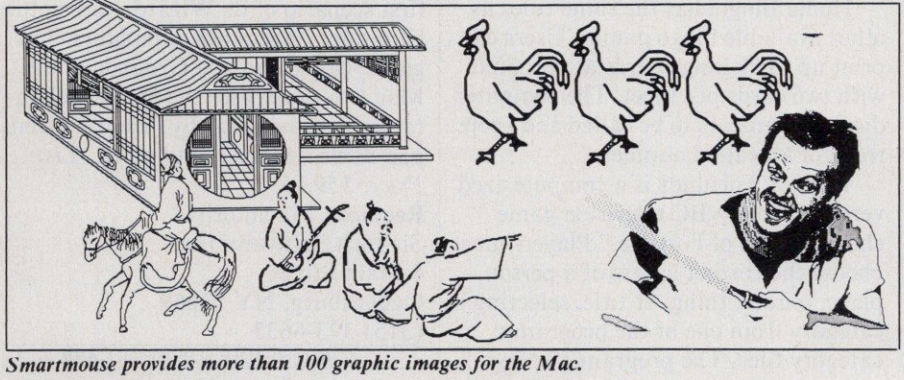
Speller Bee is designed to improve children's spelling skills by providing them with practice routines, games, and simulated test situations. The self-paced program contains 15 lists of prestored spelling words of varying difficulty levels, and users can also create up to 32 spelling lists of their own. In the program's Bee Prepared practice section, children see and hear each spelling word and must then type it. Bee Games comprises three games: Scramble, Search, and Detective. Spell Bee lets children take a spelling test in which the program says a word and the student types it.

KidTalk helps children improve their reading, writing, and communication skills. For nonreaders the program can teach awareness of the alphabet and commonly used words. Children who can already read and write can use it to write text, proofread it, learn word-processing skills, and learn foreign languages. KidTalk includes both male and female voices, and users can control volume, pitch, tone, speed, and pronunciation. *(List Price: $79.95)*

Requires: Macintosh

First Byte, Inc.
2845 Temple Avenue
Long Beach, CA 90806
(213) 595-7006

CIRCLE READER SERVICE NO. **498**



Smartmouse provides more than 100 graphic images for the Mac.

CRACKING TECHNIQUES

Xmas Sale limited offer expires December 31, 1985

Kraking by Disk Jockey.....$64.95 ....SALE..$50.00

Two full sides crammed full of detail, step by step, Kraking tutorials, tips and Kraking programs by the new King of the Krakers.

TWO FULL SIDES
10 Chapters — 8 Appendices
15 Tutorials — 9 Programs

Kraking by Disk Jockey Vol II....$49.95 ADV.SALE..$40.00
Kraking by Disk Jockey Series...$114.95 ADV.SALE..$85.00

Kraking by Disk Jockey Volume II is the great sequel to last years most popular cracking disk. In addition to the many cracks and tutorials it also contains the all new cracking program:
SNOOPY & THE DOCTOR
Snoopy & The Doctor are our answer to The Inspector & Watson, a complete set of disk utilities. Advance orders are being taken for shipment in December 1985.

Xmas Pak
Both CT '86 & Krak by DJ Vol II...$89.90 ADV.SALE..$70.00

CRACKING TECHNIQUES '83.....$39.95 ....SALE..$35.00
CRACKING TECHNIQUES '84.....$39.95 ....SALE..$35.00
CRACKING TECHNIQUES '85.....$39.95 ....SALE..$35.00
CRACKING TECHNIQUES '86.....$39.95 ADV SALE..$30.00
COMBINATION OFFER - CT '84 & CT '84.....SALE..$65.00
TRIPLE OFFER - CT '83, CT '84, & CT '85 ...SALE..$95.00
CT SERIES — CT '83,'84,'85, & '86 — ADV SALE.$115.00

Cracking Techniques, full of tips and tricks of disk copying and cracking, which are complete sell outs at the many computer shows, are now being made available through mail order.

These highly specialized disks contain tips and techniques provided by the top crackers of the world. Anyone who has traveled the vast electronic highways of the computer bulletin boards will easily recognize these famous names: Apple Bandit, Disk Zapper, Red Rebel, Long John Silver, Axe Man, The Burglar, Captain Nibble, Mr. Xerox, Lockbuster, The Colossus, Mister C, Bozo NYC, Clone Man, Reset Vector, The Prisoner, REO Software, Parity Error, Woodpecker, The Beast, Tryptan II, the Fonqus, Jim Phelps, The Marauder, and the Disk Jockey. Some of these famous software pirates have been featured on **ABC's NIGHTLINE, NBC's TODAY,** in **Newsweek, Infoworld, Tech Weekly,** and in the **New York Times.** You can find out why all these people have earned their heavy reputations! Here now are the techniques that made them famous.

Included on the disks are full descriptions on the use and applications of **DEMUFFIN** and **DEMUFFIN+,** techniques for modifying a 16k RAM card into a fake ROM, a dissertation on special techniques, Non Maskable Interrupts, Boot Tracing, Brute Force, and several sections on handling Foreign DOS. The internationally famous Axe Man has several detailed sections on different techniques including "How to use a RAM card as a major cracking tool." Also included are the complete programming codes for building your own copies of the legendary **Bozo's Cracker ROM** and the **Lockbuster's PB ROM.** Contains seven (7) **Apple Bandit** files including how to really use Copy][+ and the super COPYB and the enhanced COPYA from the Disk Jockey.

All of the information gathered together on these disks are the highlights of the 1982-85 pirating season as featured on the infamous Boston Pirate's Harbor bulletin board. **Pirates Harbor** has long been established as the international **Mecca** of software cracking. As an added bonus, complete cracking instructions are provided for many of the top pieces of software, both for games and business. These are not obscure, arcane pieces of lore; they are practical tips and techniques that you can start applying immediately the day you receive your disks.

MacCrack.....$74.95 ....SALE..$65.00
MacCrack Volume II.....$54.95 ADV.SALE..$40.00
MacCrack Series.(Both).....$129.90 ADV.SALE.$100.00

MacCrack is now available for the MACINTOSH. Just like its great forerunners, Cracking Techniques for the Apple II, II+, //c, & //e, this great new disk is crammed full of cracking tutorials, tips, and disk utilities for the MACINTOSH. MacCrack Vvolume II will be available in January 1986 and is on advance sale now.

For MasterCard and VISA only !!
Call toll free - Ask for Operator 68

1-800-824-7888

In Alaska or Hawaii, call 1-800-824-7919

PIRATES HARBOR
P.O. Box 8928
Boston, MA 02114
617-227-7760 Voice
617-720-3600 Modem

These products should NOT be used for illegal purposes.
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YES, I want to learn the Secrets of Cracking
Please RUSH:

_____	Kraking by Disk Jockey (2 sides)		$ 64.95	$ 50.00
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_____	Kraking by DJ Series Both	(adv order)	114.90	85.00
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_____	Cracking Techniques '85		39.95	35.00
_____	Cracking Techniques '86	(adv order)	39.95	30.00
_____	Combo CT '83, & CT '84		79.90	65.00
_____	Triple CT '83,'84 & '85		119.85	95.00
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_____	Four Pak CT '83,'84,'85,& Krak by DJ		188.80	135.00
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_____	Six Pak CT & Krak Series	(adv order)	274.70	185.00
_____	XMAS Pak Krak by DJ II+CT'86	(adv order)	89.90	70.00
_____	MacCrack		74.95	65.00
_____	MacCrack Volume II	(adv order)	54.95	40.00
_____	MacCrack Series (Both)	(adv order)	129.90	100.00

Shipping included for USA. Massachusetts residents add 5% sales tax

[] Check Enclosed for $_____ A+12

[] Mastercard [] Visa _____ Exp Date _____
I understand that Cracking Techniques '86 & MacCrack Volume II will not be shipped until January 1986, and Kraking by DJ Vol II in December 1985. Payment must be in U.S. funds.
All other items shipped ASAP. No COD's! ALL SALES ARE FINAL!

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Our advertising budget is over $2000 each month. We can't afford to spend that much trying to tell you that DMP Utilities upgrades your printer. So listen up, it's now or never...

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24 Imagewriter fonts
20 Epson fonts

Reviews have ranged from "excellent" to "a necessity". DMP Utilities also includes a full-function editor so you can create your own fonts or alter ours. Unlocked, on DOS 3.3.

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*TM APPLE

CIRCLE 108 ON READER SERVICE CARD

A+ pipeline

MAC

▸ REAL-ESTATE SOFTWARE

RealData has updated its real-estate investment-analysis software to accommodate the changes of the 1984 Tax Reform Act. The company publishes a series of software packages designed to help real-estate professionals, CPAs, and bankers perform complex cash-flow, tax, and rate-of-return calculations. Many of the products are templates for popular spreadsheet programs, such as Lotus 1-2-3, SuperCalc, Multiplan, and now Jazz. Packages currently available include Tax Shelter Syndication Analysis, Real Estate Investment Analysis, Commercial/Industrial Real Estate Applications, and Residential Real Estate. *(List Price: $100–$295 each)*

Requires: Macintosh

RealData, Inc.
78 North Main Street
South Norwalk, CT 06854
(203) 255-2732

CIRCLE READER SERVICE NO. **518**

II SERIES

▸ SOFTWARE FROM INKSPOT GRAPHICS

Three games—Triple Trivia, Home Bingo!, and Fantasy Fortune$—and the GFE grading and file-editing program are now available from Inkspot Graphics.

Designed for one to ten players, Triple Trivia is a computerized version of the trivia board game. Users can build their own question-and-answer files to set the game's level for children, teenagers, or adults. Players must fill in the letters of the answer to a trivia question correctly, and they accumulate points for each correct letter.

Home Bingo! has the same rules as other available bingo games. Users can print up to 60 bingo cards at one time, with two cards per sheet. The computer displays numbers to be called and keeps track of all called numbers.

Fantasy Fortune$ is a computerized version of the NBC television game show "Wheel of Fortune." Players must choose the correct letters of a person, place, phrase, thing, or title, selecting a category from one of the program's category files. The program displays the game board on the screen. Users can change or add to answers in the category files.

Designed for instructors, the GFE Program contains a grading and a file-editing program on one disk so that users can switch between the two programs. The grading program can convert raw numeric scores to letter grades and print tables of weighted scores, raw scores, letter grades, and grade-to-date information for each record in the file. It can display or print records listed in ascending order by ID, by name, and by section, and it can also display a percentage table indicating the percent of students in each of the different grade categories.

The file-editing program can automatically create new files or delete old ones when users enter the file-name. Users can also create, edit, or delete records in each file. Once a record has been created, users can change the name, ID number, section number, or any test scores on each record, or they can reenter an entire record. They can also add records to the file all at once, in groups, or one at a time. *(List Price: Triple Trivia, $34.95; Home Bingo!, $26.50; Fantasy Fortune$, $34.95; GFE Program, $36.95)*

Requires: Apple IIe or IIc, one disk drive, printer

Inkspot Graphics
11516 North Port
Washington Road
Mequon Office Park
Mequon, WI 53092
(414) 241-4944

CIRCLE READER SERVICE NO. **503**

MAC

▸ WIZARDRY FOR THE MAC

Sir-tech Software, Inc., is offering the first scenario of its Wizardry adventure games for Macintosh computers. The game, called Proving Grounds of the Mad Overlord, uses the Macintosh interface to advantage by including icons, pop-down windows, and more. *(List Price: $59.95)*

Requires: Macintosh

Sir-tech Software, Inc.
6 Main Street
Ogdensburg, NY 13669
(315) 393-6633

CIRCLE READER SERVICE NO. **490**

APPLEWORKS ENHANCEMENTS

Read why Applied Engineering
is the acknowledged leader in AppleWorks enhancements

- Applied Engineering was first to expand Appleworks beyond 55K.
- Applied Engineering was first to eliminate disk access on Drive 1 in Appleworks, thereby dramatically speeding up the program and reducing disk drive wear.
- Applied Engineering was first to expand AppleWorks to 1 megabyte of memory.
- Applied Engineering was first to expand AppleWorks to 3 megabytes.
- Applied Engineering was first to provide auto segmenting on large files so any size file can be saved on regular floppies.
- Applied Engineering was first to increase the maximum number of records in the data base from 1350 to 16,300.
- Applied Engineering was first to increase the number of lines in the AppleWorks word processor from 2250 to 16,300.
- Applied Engineering was first to display the time and date on the AppleWorks screen.
- Applied Engineering was first to provide auto dating as part of the data base field.
- Applied Engineering was first to provide auto time stamping as part of the data base field.
- Applied Engineering was first to include a built-in print spooler for AppleWorks. So you're back in AppleWorks in 10 seconds not 10 minutes.

With all of these firsts, it's no wonder most people choose Applied Engineering when they want enhancements to Appleworks. Especially when you consider that nearly all the "firsts" listed above are "onlys" too. And our Appleworks enhancements are as easy to use as inserting a disk and pressing return because all enhancements are merged with the AppleWorks program disk and stay there out of sight until needed, only now AppleWorks will run up to 20 times faster, and be easier to use at the same time.

And we're working on new improvements to AppleWorks all the time, so the few remaining criticisms the software reviewers gave AppleWorks will vanish forever. So if you want more out of AppleWorks, order RamWorks II™ and Timemaster H.O.™ for the IIe or Z-RAM™ and IIc System Clock™ for the IIc. You'll find specifications and prices for these products listed in this magazine. Please look for Applied Engineering in the advertiser's index.

There's no question about how they'll increase your productivity. The only question you'll have is how you ever got along without them.

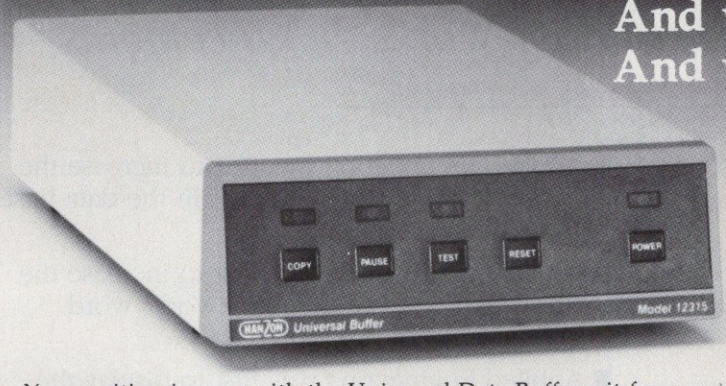
214-241-6060

APPLIED ENGINEERING
"We Set the Standard"

Brainy Buffer.

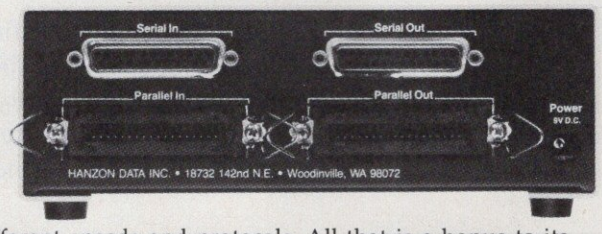
See us at COMDEX/Fall '85

Do you press print and wait? And wait? And wait?

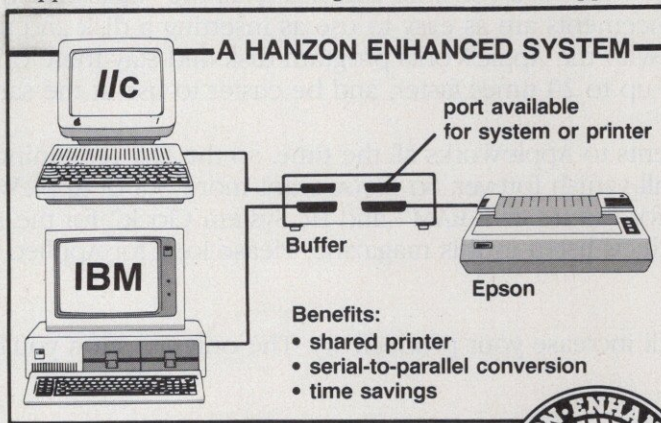


Your waiting is over with the Universal Data Buffer—it frees your computer in seconds while it handles the printing of your file.

And the Universal Data Buffer from HanZon is smarter than the average buffer. For one thing it has two inputs — one serial and one parallel, and two outputs— one serial and one parallel. Since all the ports are active, it means the Universal Data Buffer can interface between serial and parallel devices—even at different speeds and protocols. All that is a bonus to its standard function—as a 64K buffer expandable to 256K. The buffer also has operator controls for selecting additional copies, and pausing.



In this HanZon application we are interfacing an IBM-PC and an Apple IIc to an Epson printer. The Universal Data Buffer automatically handles the serial-to-parallel interfacing and also manages a first-in, first-out file priority for the two computers. A file that comes into the buffer from the IIc will begin printing immediately, but a file that subsequently comes in from the IBM will be stored until the first file is finished.



Call HanZon today for your nearest dealer: 206-487-1717.

HANZON ENHANCED

HANZON

Suggested Retail Price: $385—64K Buffer
$59—64K Expansion module

HANZON DATA INC. • 18732 142nd Ave NE • Woodinville, WA 98072

IBM is a registered trademark of IBM Corporation. Apple is a registered trademark of Apple Computer, Inc. Epson is a registered trademark of Epson America Corporation.

CIRCLE 216 ON READER SERVICE CARD

▶ QUICKEN

Intuit has released a version of its Quicken checking and finance software for IIe and IIc computers. Quicken automatically performs routine financial tasks, such as writing checks to pay bills, keeping track of expenses, and balancing monthly bank statements. As an example, Quicken learns the bills a user pays, and the user can then tell it which bills and how much to pay. The program then writes the checks, records them in the check register, updates the balance, prints the checks, and addresses them for mailing. The Quicken-AppleWorks link lets users transfer data to spreadsheets in AppleWorks without retyping them. *(List Price: $79)*

Requires: Apple IIe with Extended 80-Column Card, or IIc

Intuit
540 University Avenue
Palo Alto, CA 94301
(415) 322-0573

CIRCLE READER SERVICE NO. **516**

▶ PRODOS VERSION OF S-C MACRO ASSEMBLER

The S-C Macro Assembler, Version 2.0, is now available in both DOS 3.3 and ProDOS versions. Both versions support the full instruction set and addressing modes of the 6502, 65CO2, 65802, and 65816 processors and the SWEET-16 pseudoprocessor. As well as including all previous S-C Macro features, the ProDOS version adds more, such as a "blocked include" directive that allows you to assemble even larger programs and a directive that can squeeze text to an average of less than 5 bits per character. The software is not copy-protected, and upgrades are available for owners of previous versions. *(List Price: DOS 3.3 or ProDOS version, $100 each; DOS 3.3 and ProDOS versions together; $120)*

Requires: Apple II, II Plus, IIe, or IIc; 64K RAM

S-C Software Corporation
2331 Gus Thomasson Road
Suite 125
Dallas, TX 75228
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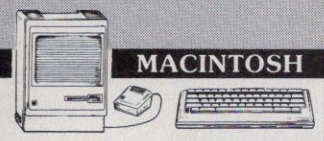

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apple

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OKIDATA, Plug 'n Play, Tractors, Okigraph		CALL
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II SERIES

▸ HAYDEN GAMES FOR THE IIe AND IIc

Hayden Software has released versions of The Holy Grail, Inca, and its new Computer Novel Construction Set for the Apple IIe and IIc. The three programs are part of the company's Time-Quest Adventure Series.

In the Holy Grail, you are a knight who has been sent on a quest for the Holy Grail. As you pass through a medieval countryside, you meet a king, rescue a princess, slay a dragon, and more. The program features full-sentence parsing and real-time simulation.

In Inca, you are the lead character in an adventure to find the treasures of the ancient Incan empire. In order to find this great wealth, you must deal with an evil steamer captain and his thieving crew, negotiate Peru's perilous landscape, dodge man-eating sharks, avoid native headhunters, and solve ancient Incan puzzles. The program includes a novel manuscript that contains clues for solving the game's mysteries.

The Computer Novel Construction Set, also available for the Macintosh, is a toolkit for users who want to design their own text adventures. Users can create custom landscapes, room descriptions, travel paths, characters, and events and can also define the vocabulary for players to use in the game. The program disk includes the Story Maker, the Story Player, a tutorial, and an example text adventure. *(List Price: $49.95 each)*

Requires: Apple IIe or IIc

Hayden Software
Company, Inc.
600 Suffolk Street
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A+ Macintosh DIRECTORY

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THE SOUL OF THE APPLE II

What makes an Apple II unique?

It may not sound like a serious question, but it is: What gives an Apple II, or any other computer model, a unique identity? In an era when you can change a system's boards, chips, and peripherals almost as easily as you can change the programs, what defines a particular computer model? Or, to put it in more allegorical terms, where do you find the soul of an Apple II?

If you're not philosophically inclined, note that the question has some practical consequences. If you are a hardware developer, for example, and you're working on a new product, what does it take to make it Apple-II-compatible? If you're writing software, what equipment can you assume users will have if you advertise your product as being written for the Apple II? And if you're Apple Computer, Inc., itself, how much and how quickly can you change a machine with millions of units already out in the field?

The answers to some of these questions are not nearly as clear as you might immediately think, so let's take a closer look. Consider, for a start, the question of the CPU (central processing unit) chip.

Apple's original choice of the 6502 as the II's CPU has proven, in retrospect, to have been a first-class decision for its time—but time marches on. In order to boost the power of the machine, outside firms now make a whole range of coprocessor cards with various CPUs for the IIe and even an alternative CPU board for the IIc. Apple itself is widely rumored to be working on an enhanced-processor version of the Apple II. Some of these chips run the majority of existing Apple II software, and others run some types of programs (notably ones written in Applesoft) even faster than the original 6502 does. Having the same CPU chip as the Apple II is no longer necessary to run a growing amount of Apple II software.

Some computers from other companies—the Commodore VIC 20, Commodore 64, Atari 400, and Atari 800, for instance—all use versions of the 6502, but that does not make them Apple IIs, or even Apple-compatibles. Not only is having the same CPU chip as that of the Apple II no longer a necessary part of belonging to the Apple II line, but it clearly has never been sufficient by itself.

What defines a particular computer model? Where do you find the soul of a II?

Apple, in fact, has not tried to stop other firms from using the 6502 or even most of the Apple II circuitry. Instead, corporate defenders of the personal-computer faith have drawn the line at the ROM (read-only memory) chips that hold the built-in Apple II programs and routines. You can't sell another computer, they say (with the law standing right at their shoulder), if that other machine contains a copy of the Apple II ROM routines.

Consider for a moment Quadram Corporation's Quadlink, however. This add-in card for an IBM PC or workalike acts much like an Apple II does, but it doesn't have Apple ROMs. Instead, it relies on externally loaded software that contains the same information. Franklin Computer, which is making another attempt at producing an Apple-compatible after a brush with bankruptcy, also claims it can do it without the Apple ROM, in this case by having written its own equivalent built-in program. Two different approaches, two different products—but

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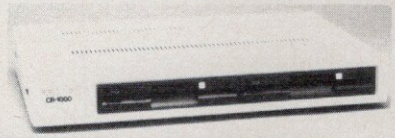

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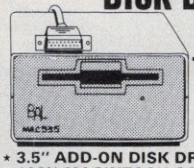

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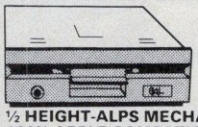

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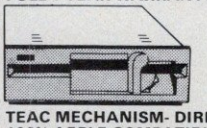

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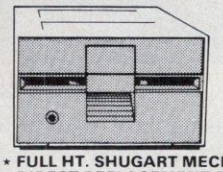

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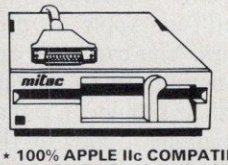

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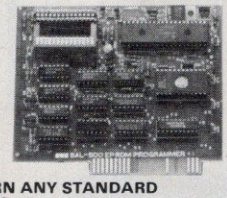

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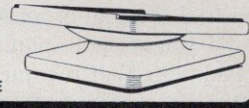

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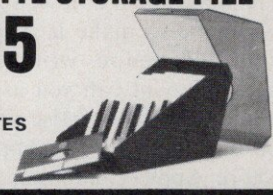

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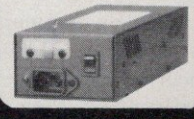

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both run Apple software without Apple ROMs. If these companies can do it, so can others, and so can Apple, which means that ROMs themselves are not what makes a machine an Apple II.

In addition to defending its ROMs, Apple expends a lot of energy protecting the uniqueness of its case design, but few of us would seriously consider the case the defining Apple II characteristic. You can run an Apple II without its case (though the FCC gets upset if you don't provide equivalent shielding), and it does just fine. The IIc and the IIe are different on the outside, yet they both are Apple IIs. Apple justifiably doesn't want someone else selling a machine that might appear to be an Apple Computer product when it isn't, yet the case is obviously not the real boundary.

Apple's choice of the ROM, case, and logo as their lines of defense do not, by the way, represent a philosophical stance or a definition for anticipating future products. The law has its own standards for deciding what is and is not a legitimate member of the Apple II family and, for historic reasons, extends that protection relatively easily and swiftly to the expression of software. If it were up to Apple, the circuitry and maybe even the design approach would merit similar protection.

Can You Depend on the Bus?

Apple's first extensions of the Apple II product line were particularly close relatives because they used the same basic hardware organization as the original. Like the first Apple II, the II Plus and IIe used Apple's version of plug-in slots, which are collectively called a bus. As much as any other parameter, that hardware interchangeability defined the edges of Apple II territory. At one point, you could say that if you could plug Apple II boards into the bus and it ran, a machine was at least an honorary member of the II family.

In the minicomputer world, bus design is often the most salient characteristic of a product family, and it was once the primary distinguishing factor for personal computers as well. For example, the Apple II bus, shortly after its introduction and recognition as the most popular personal-computer bus, deposed the S-100 bus. The IIc shows that you don't have to have the bus to have an Apple II, though.

Until this fall, you could possibly have said that the disk-drive format was part of what defined the Apple II line. One of the initial attractions of the original Apple II was the affordability of its floppy-disk storage system. The engineering of that system gave the Apple II a disk format that packed only 143,000 bytes or so per disk, however, and a distinctive format that no other computer used.

When you bought a program marked "Apple II version," the absolute minimum assumption of the software's makers was that your computer read that Apple disk format. Even a program that ran on an added CPU card such as a Z80 card became an Apple II version, in part, after its translation into the Apple II disk format.

Now, however, the venerable Disk II is being supplemented by the UniDisk 3.5 with its double-sided 3½-inch disks, and someday 5¼-inch Apple disks may even be supplanted. This switch involves more than just rerecording programs. The UniDisk 3.5 is markedly different in speed, capacity, and data organization, and Apple's engineering approach prevents it from working with Apple's older operating system, DOS 3.3. Apple says it will continue to sell

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and provide customer support for the Disk II line, but no longer can you assume that if someone's Apple II writes to a disk, your Apple II can read it.

My guess is that you also won't be able to depend on the Apple II's unique video circuitry for too much longer. Although the level of what you can do with Apple II video has climbed far past what anyone thought possible during the earliest days of the product family, video circuitry has also advanced in both sophistication and performance per dollar. If I were Apple, I would supplement the current video capabilities with more features that would not prevent the original features from working. (In much the same way, 80-column cards do not keep 40-column software from running.) You can already buy more-advanced video cards for the II, II Plus, and IIe. One hundred ninety-two by 280 dots may go the way of the 143K floppy.

Searching in the Software

When biology advanced to a more thorough knowledge of human anatomy and physiology, we could no longer maintain that the human soul rested in one of the less-understood organs of the body. Can we also look for the soul of an Apple II in more ephemeral directions, though?

If we say that any machine that runs Apple II software is either a true II, a clone, or a successful emulation, then we've gone from hardware to software and from a specified component to a standard based on performance.

Even here we have some practical problems. Apple is currently providing customer support for two very different operating systems for the Apple II line, plus a third (DOS 3.2) that is fast disappearing from general visibility. Can a machine belong to the Apple II family if it works in only one or two of these operating environments? The wide variety and the huge extent of Apple II software is great for us users, but—partly as a result—there is not now, and apparently never has been, an official or even commonly accepted list of what programs to include in a test of Apple II compatibility.

There is not an official list of what programs to include in a test of Apple II compatibility.

In the operating-system line, DOS 3.3 is quickly losing ground to ProDOS for new software products. DOS has its virtues, though, and programs that were written for DOS won't suddenly stop working. ProDOS handles large disk drives better, and it's more suited to an evolving and expanding hardware lineup.

In the Other Camp

Looking over at the IBM PC marketplace, a situation with some interesting initial parallels has taken a far different turn. In the IBM PC world, compatibility with the IBM-specific version of Microsoft's MS-DOS operating system is the operative boundary for PC compatibility, with few users caring or knowing whether their systems run the older CP/M-86 or even PC-DOS, Version 1.1. If it runs PC-DOS, Flight Simulator, and Lotus 1-2-3, a non-IBM computer is generally considered an IBM PC workalike.

In the world of bigger computers, verification of compatibility and compliance with specifications often in-

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Finally, just in case you're thinking of paying the extra $65-$90 for an established name, we should point out that Better Working is a division of Spinnaker Software Corporation, one of the most respected companies in home software. And Better Working isn't limited to word processing—there's FILE & REPORT and SPREADSHEET, too.

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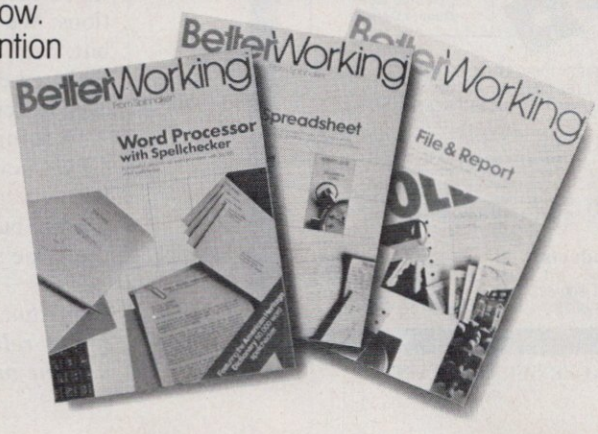

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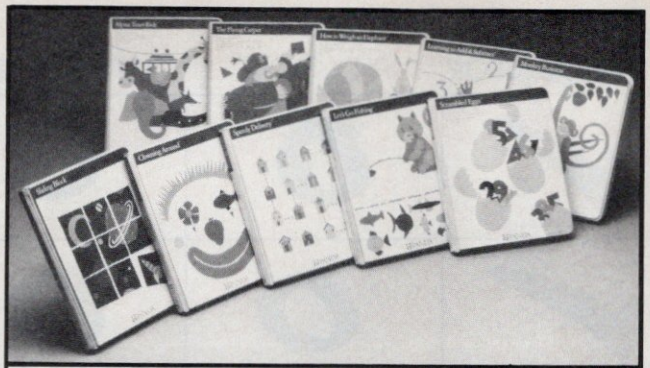

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volves a set of programs called a validation suite. As in other kinds of industrial design and testing, as much or more effort may go into validating compliance as goes into designing it. No one, to my knowledge, has under-

The defining edge is often what was supposed to have been an invisible boundary.

taken such an effort for the Apple II.

Furthermore, for most of us, the critical test of software compatibility is not in the programs themselves but in their ability to be read by the disk drive. Because of the historical forces in the Apple II marketplace, the defining edge is all too often what was supposed to have been an invisible boundary: the ability of a new computer or upgraded version of an existing computer to cope with current forms of copy protection. If you can theoretically run programs on a machine but can't do so in practice because the machine won't read the diskettes, for all practical purposes, the computer is incompatible with the software.

Sum of the Parts

So if no single hardware element or single set of programs defines an Apple II, then what really does? Is anything that Apple calls an Apple II—and nothing else—a member of the Apple II family? We may, it seems, have to settle for a fuzzy definition based on systems as a whole, rather than on specific qualifications.

When Apple announced the IIc, the theme for the event was "Apple II forever." Especially for the IIc and other machines that resist the plugging in of new features, the claim may be a bit optimistic. For the more modular IIs, however, we may someday say something like the old joke about the ax that's been in the family for ten generations: We still get a lot of use out of it, but, over the years, the head has been replaced eight times and the handle an even dozen.

A future Apple II might have a new CPU, new memory, new peripherals, new operating system, and new programs, but somehow it will still have the same soul. +

Contributing Editor Steve Rosenthal writes religiously about the mundane and the magical for A+.

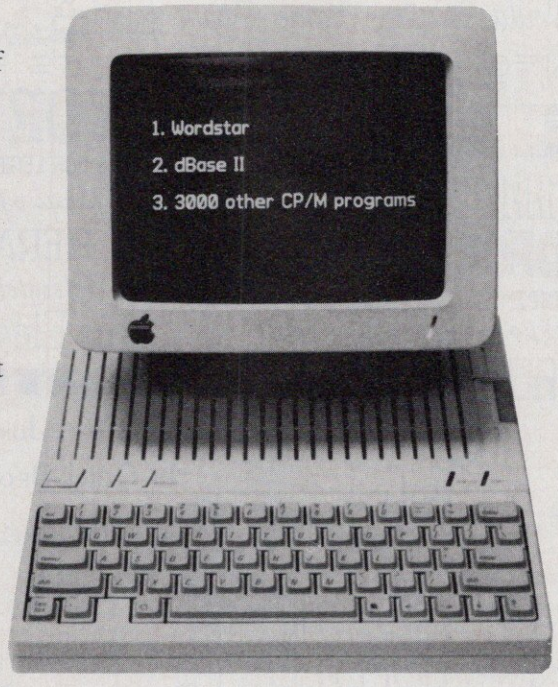
CP/M for the APPLE IIc

Apple IIc owners can now run the single largest body of software in existence. Enter the CP/M world with the new Z-80c from Applied Engineering and introduce your IIc to thousands of new programs. With the Z-80c, you'll be able to run Wordstar, dBase II, Turbo Pascal and thousands of other programs that require CP/M. But your IIc will still be your IIc because the Z-80c only turns on when using a CP/M disk.

The Z-80c comes standard with the new 4.0 software, the most advanced system for running CP/M programs ever. But it also runs other versions of CP/M including the popular 2.2 and 2.23 and is fully compatible with Microsoft disks with no pre-boot.

But naturally you'd expect top performance from the Z-80c. After all, it's from Applied Engineering and we've got years of experience with Z-80 cards for the II+ and IIe.

The Z-80c can use all 128K in the IIc, or 64K can be reserved as a RAM disk.



The Z-80c fits neatly inside the IIc. Installation is easy and only takes about 10 minutes (it just plugs in). After installation, your IIc will act and look just like other IIc's, only now you can run all that great CP/M software that others can only dream about.

The Z-80c comes complete with Z-80 card, 4.0 operating system, utility disk, a plain English owners manual and a 5 YEAR WARRANTY. And although the Z-80c is the only CP/M interface on the market for the IIc, we've priced it as though the competition was fierce.

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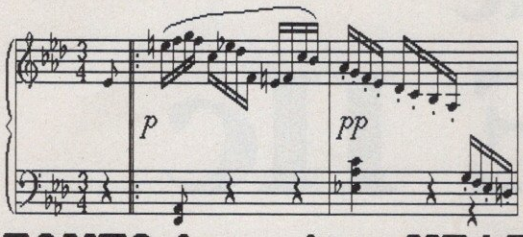

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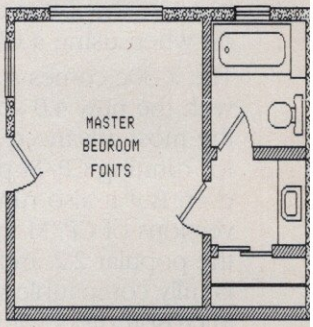

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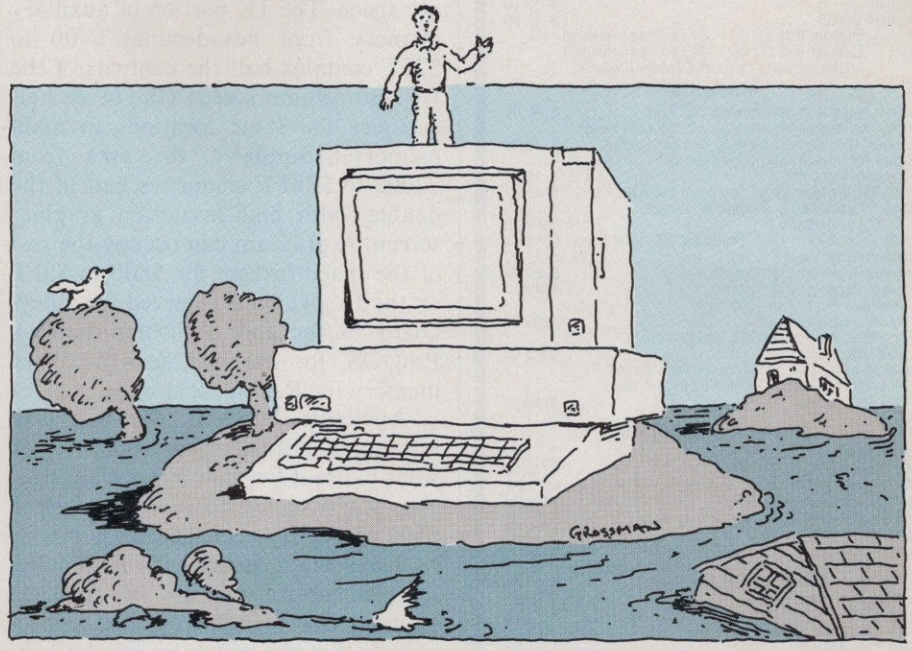
Rescue Squad

BY GARY B. LITTLE



▸ CP/M ON THE IIc

Q. *Is it possible to run CP/M programs on an Apple IIc?*

A. When the Apple IIc was first released in 1984, most people would have answered this question with a no. The feeling was that you just couldn't add a Z80 coprocessor to the slotless IIc. The CP/M operating system runs in computers with a Z80 microprocessor, of course, and not in Apple II computers, which use a standard 6502 microprocessor.

Some technical wizards at Applied Engineering (P.O. Box 798, Carrollton, TX 75006) surprised everyone, however, by designing a small board containing a Z80 that mounts inside the casing of the IIc. Applied Engineering calls its product the Z-80c, and with it you can run the thousands of programs that require CP/M, including WordStar, dBASE II, and Turbo Pascal. Applied Engineering also makes a Z-RAM Z80 card for the IIc. It is similar to the Z-80c, except that you can add 256K or 512K of memory to it. You can use the extra memory for RAMdisk storage or to expand the AppleWorks desktop.

▸ THE ProDOS FLUSH COMMAND

Q. *I've read about the new ProDOS Flush command, but I'm still confused about when I might want to use it. Can you give me some help?*

A. Flush is a little-used ProDOS command that has no DOS 3.3 equivalent. When ProDOS opens a file, a file buffer is allocated to it in memory. Data you write to a file is stored in this buffer first and normally transfers to disk only when the buffer becomes full or when you need to access another file block. If disk operations weren't buffered in this way, I/O operations would be unbearably slow, because any write operation would require so much disk activity that it would slow everything down.

The Flush command forces any data stored in the buffer to be saved to disk right away, even if the buffer is not yet full. By following each ProDOS Write command with a Flush, you reduce the risk of data loss in the event of an unexpected exit from the program—due to loss of power, pressing Reset, or a program bug—when the buffer is partially full. Safety comes at a price, however. Using Flush means more disk activity, so your program runs more slowly.

▸ NO SINGLE-CARD UPGRADE FOR II PLUS

Q. *I've just purchased a secondhand 48K Apple II Plus with two disk drives. I'd like to upgrade to an 80-column, 64K system so that I can run a program I just purchased. Can I get one card that will satisfy my needs?*

A. No single 80-column card is available that contains the extra 16K that you require, so you will have to be satisfied with two separate cards. Slot 0 16K memory-expansion cards for the II Plus are becoming harder and harder to find as time goes on. One source is Apricorn (7050 Convoy Court, San Diego, CA 92111). You can sometimes see 16K cards advertised toward the back of *Byte* magazine as well. Purchase of a 16K card is a must for you. With it installed, you will be able to run the new ProDOS operating system or the Pascal operating system.

Several manufacturers of 80-column cards are still around. The de facto standard card is the Videoterm from Videx (1105 N.E. Circle Blvd., Corvallis, OR 97330), and Applied Engineering (P.O. Box 798, Carrollton, TX 75006) makes a compatible device called the Viewmaster 80.

Videx also makes a video-display card called the Ultraterm that is capable of displaying up to 128 columns and 32 rows of characters. Several word-processing and spreadsheet programs take advantage of the expanded display

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sizes of the Ultraterm; others require a special preboot program available from Videx for an additional charge.

▸ 80-COLUMN AUXILIARY MEMORY

Q. *I have an Apple IIe with an extended 80-column text card. If I write a long program that requires more than 64K, how do I activate the card so that I can take advantage of the extra 64K?*

A. The 64K of memory on the extended 80-column text card is called auxiliary memory. It occupies the same address space as the 64K of standard memory, so you can think of it as a "twin" memory space. The 1K portion of auxiliary memory from hexadecimal $400 to $7FF contains half the contents of the IIe's 80-column screen (the other half occupies the same locations in main memory). Similarly, the area from $2000 to $3FFF comprises half of the double-width high-resolution graphics screen. A program can occupy the rest of the space (except for $800 to $8FF on the IIc, which is reserved for a keyboard buffer and a modem buffer). ProDOS, for example, uses auxiliary memory for RAMdisk storage.

Applesoft, by itself, does not take advantage of auxiliary memory. If you want to use it for data or program storage, you're going to have to write a 6502 assembly-language program.

Three main groups of soft switches let you control the use of auxiliary memory. Soft switches are memory locations that the computer reads to obtain status information or writes to in order to control the way it performs various functions, such as switching among banks of memory. These are the ALTZP, RAMRD, and RAMWRT switches. Each group contains three switches: one that turns an area of memory on, one that turns it off, and one that the computer can read to determine whether the switch is on or off. Figure 1 summarizes the meanings of the auxiliary-memory soft switches.

You have to be very careful when you use these switches, or you'll probably enter software limbo. For example, if you turn on the RAMRD switch while you are running a program beginning at $800 in main memory, the system will crash because it no longer "sees" the active program (unless there is an exact duplicate of it in auxiliary memory).

ALTZP also causes a lot of problems because the 6502 stack from $100 to $1FF is affected, so you must maintain two stack pointers in your software.

As you can probably tell by now, using auxiliary memory is not for the faint of heart or for a novice programmer. If you want more detailed information, consult Apple's *Reference Manual for IIe Only* or *The Apple IIc Reference Manual*. Good sources of some programming examples are my (Gary Little's) *Inside the Apple IIe* and *Inside the Apple IIc* (1985, Brady Communications). ✚

Please send your questions and problems to Rescue Squad, A+, 11 Davis Drive, Belmont, CA 94002.

ADDRESS		*SYMBOLIC NAME*	*DESCRIPTION*
Hex	*Dec*		
$C002	(49154)	RAMRDOFF	Read main memory from $200–$BFFF
$C003	(49155)	RAMRDON	Read aux. memory from $200–$BFFF
$C013	(49171)	RAMRD	Status: >=$80 is ON, <$80 is OFF
$C004	(49156)	RAMWRTOFF	Write main memory from $200–$BFFF
$C005	(49157)	RAMWRTON	Write aux. memory from $200–$BFFF
$C014	(49172)	RAMWRT	Status: >=$80 is ON, <$80 is OFF
$C008	(49160)	ALTZPOFF	Select main memory from $0–$1FF and enable main 16K bank from $D000–$FFFF
$C009	(49161)	ALTZPON	Select aux. memory from $0–$1FF and enable aux. 16K bank from $D000–$FFFF
$C016	(49174)	ALTZP	Status: >=$80 is ON, <$80 is OFF

Figure 1: Auxiliary memory soft-switch and status locations

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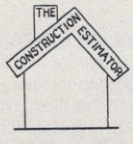

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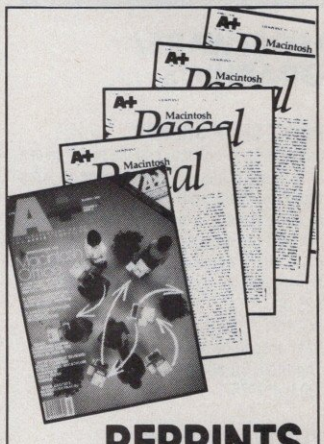

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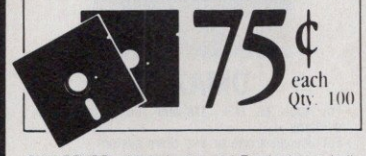

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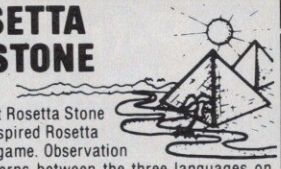

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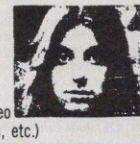

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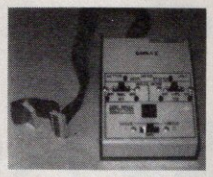

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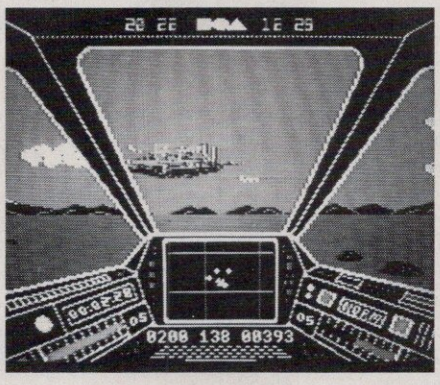

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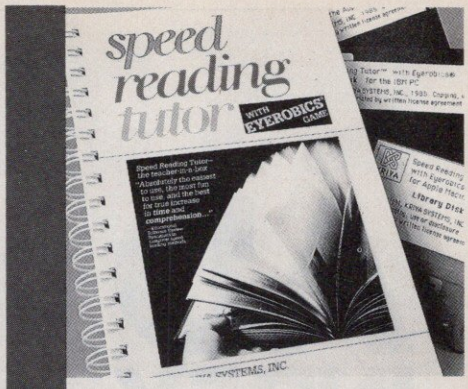

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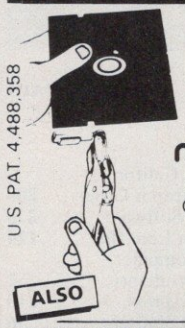

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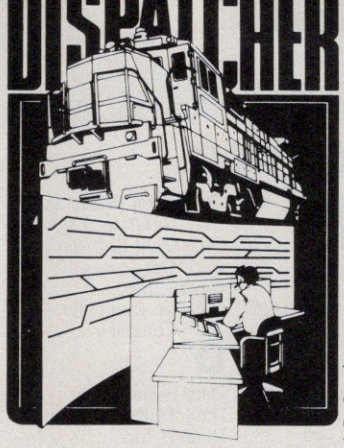

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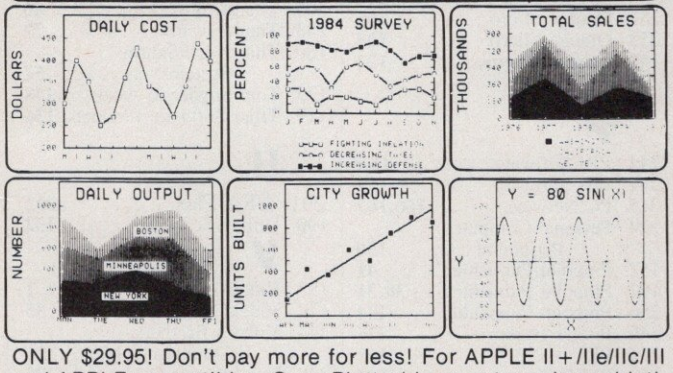

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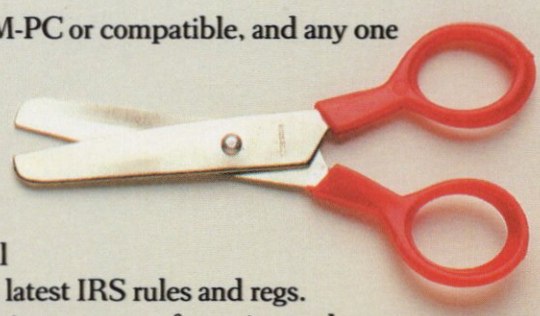

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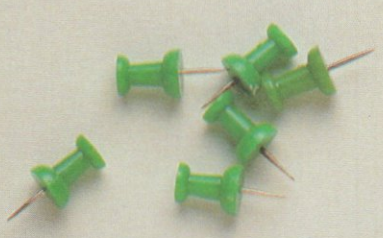

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