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MARCH 1985

VOLUME 3
ISSUE 3

THE INDEPENDENT GUIDE FOR APPLE COMPUTING

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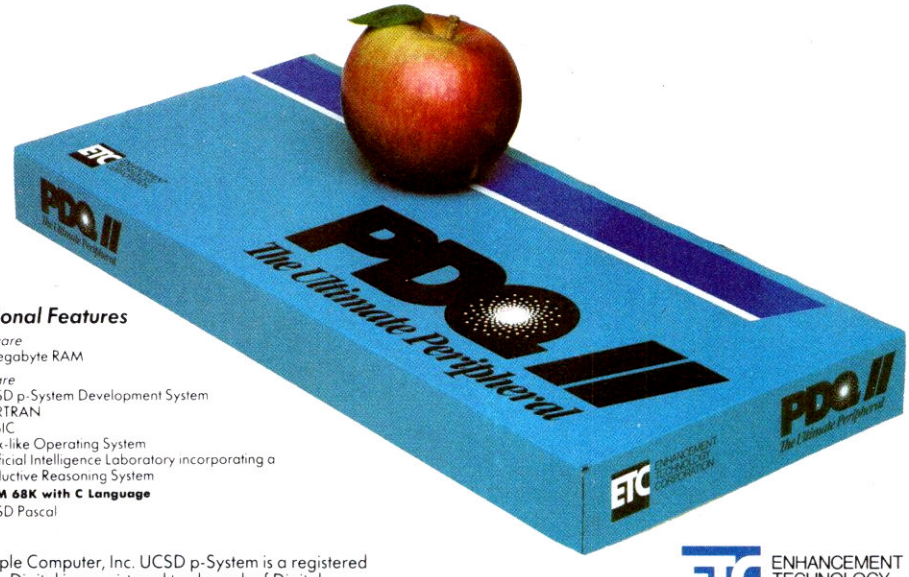

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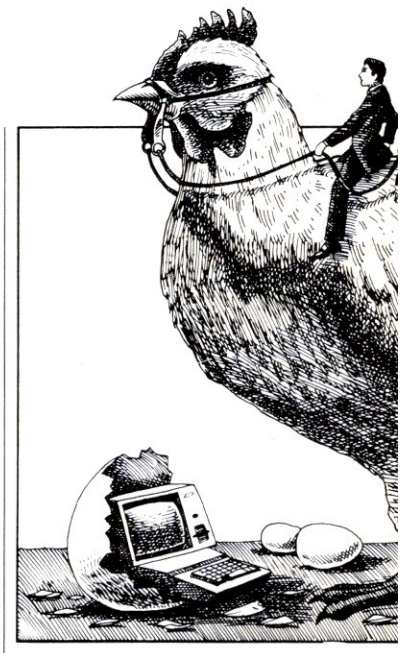

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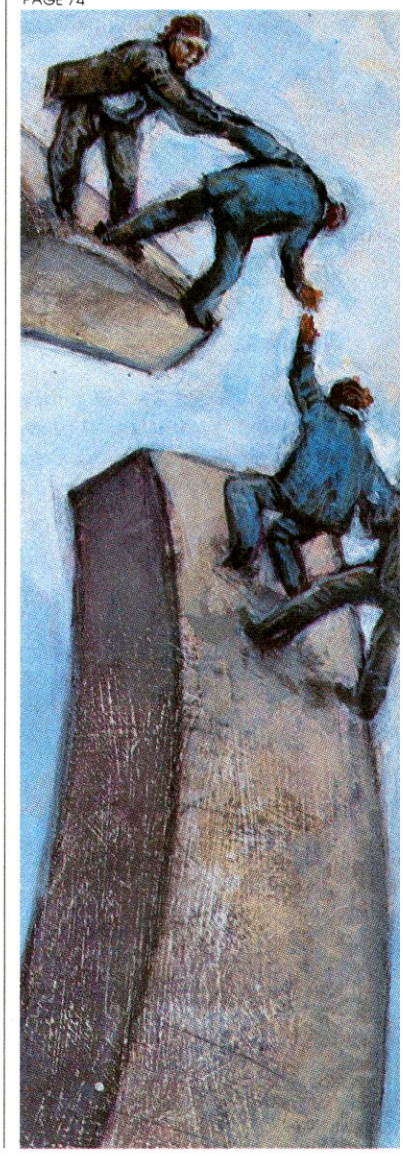

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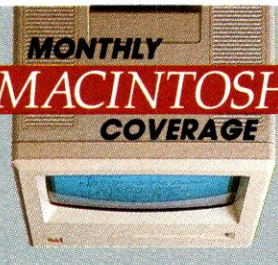

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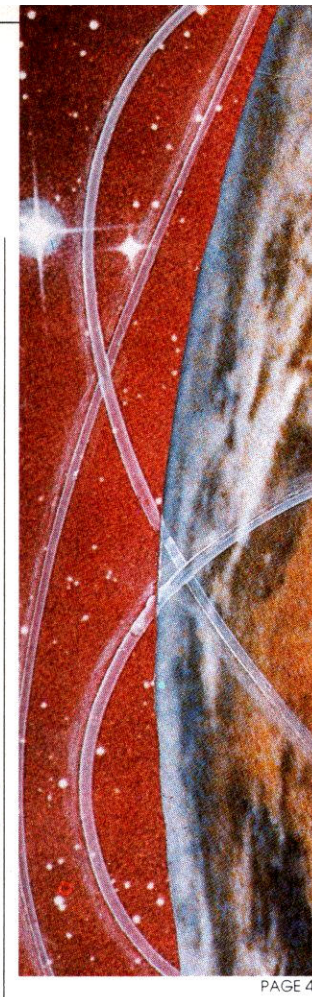

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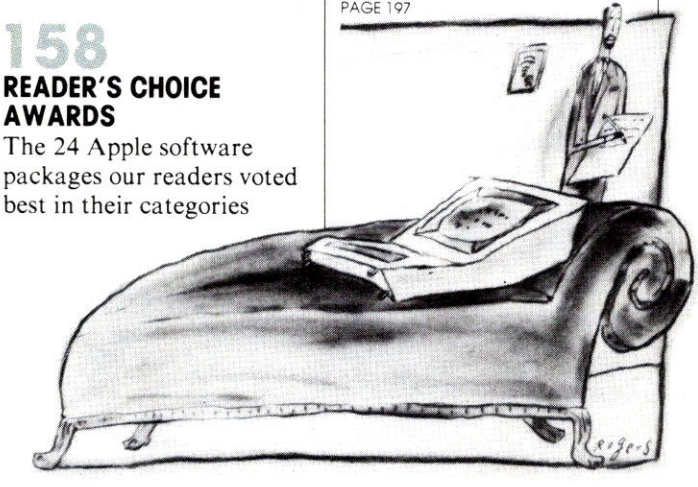

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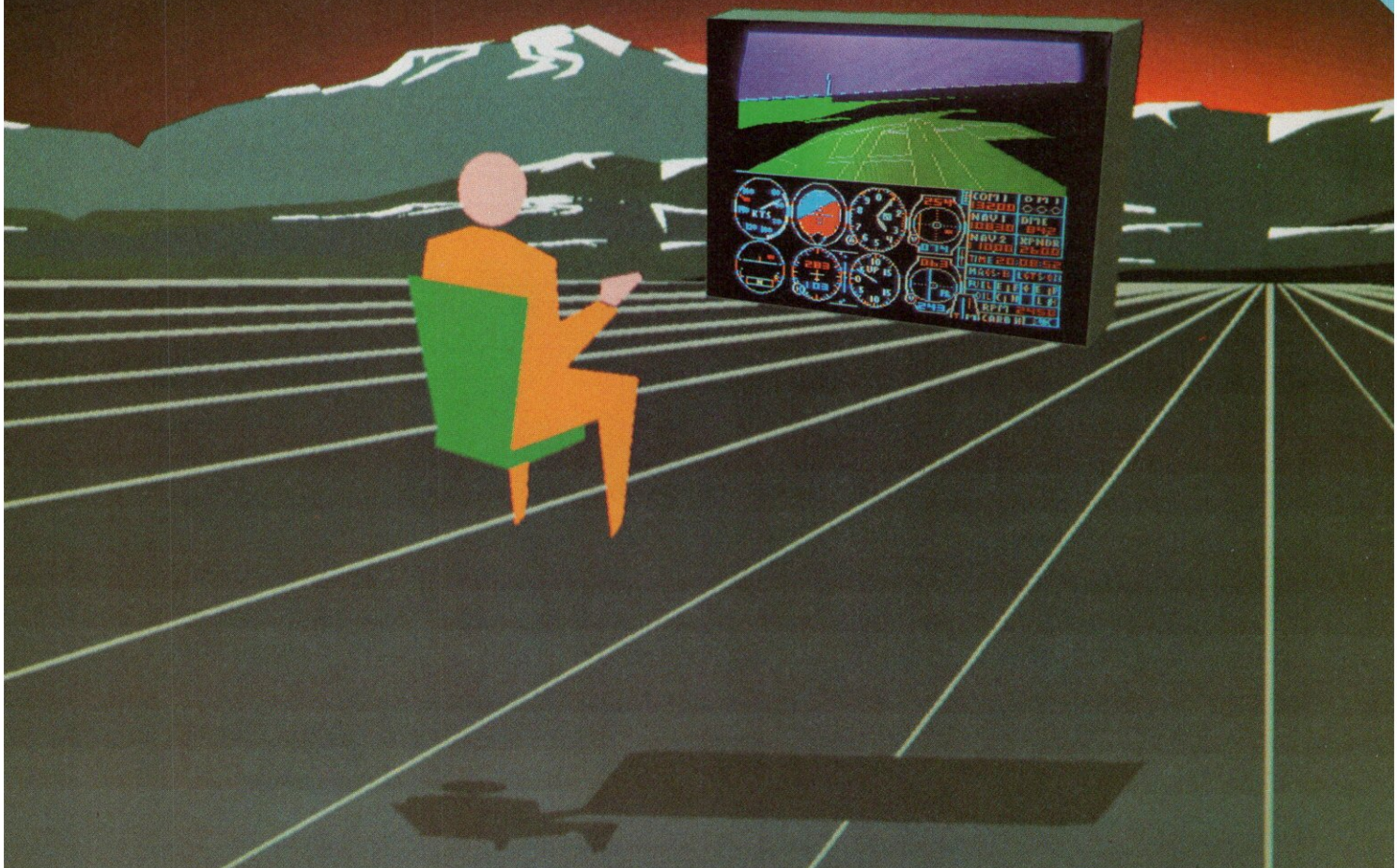

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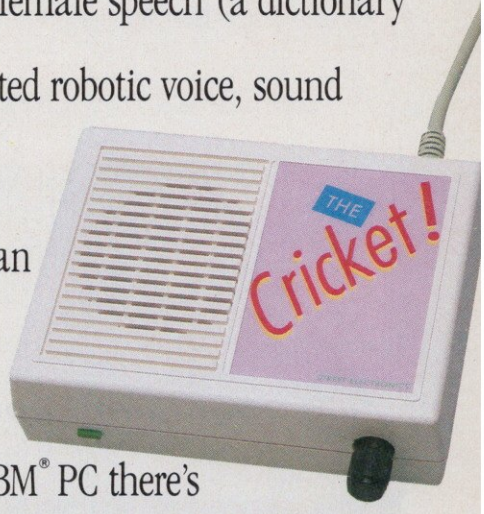

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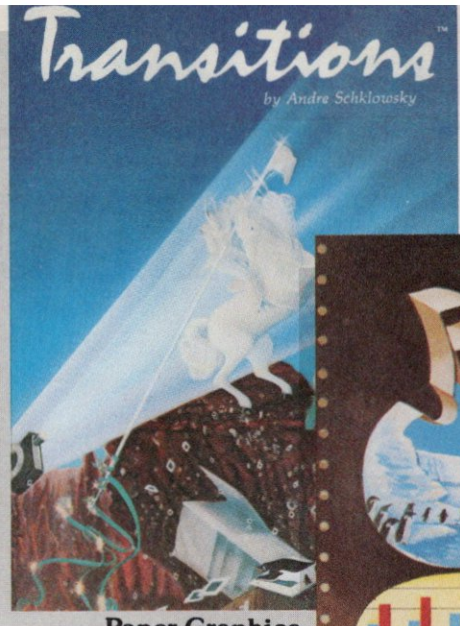

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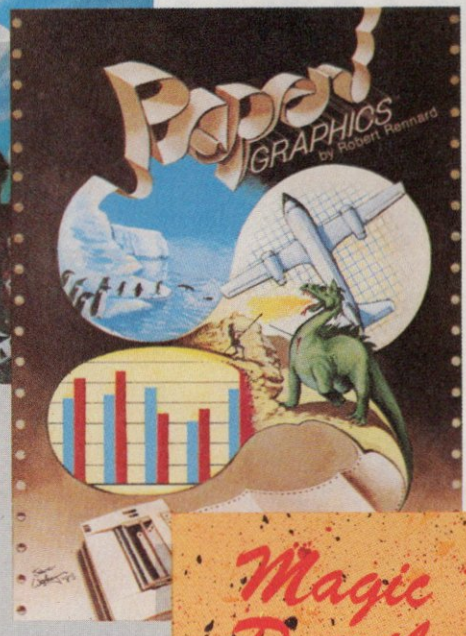

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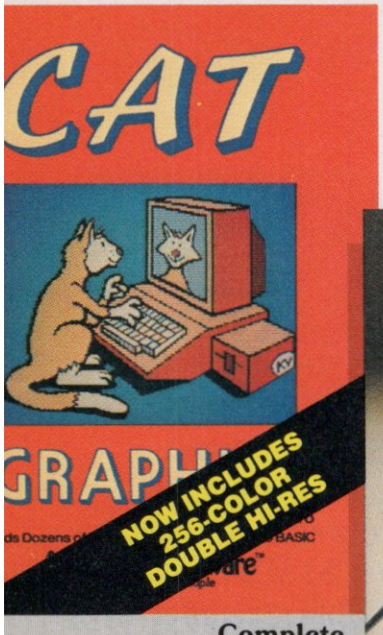

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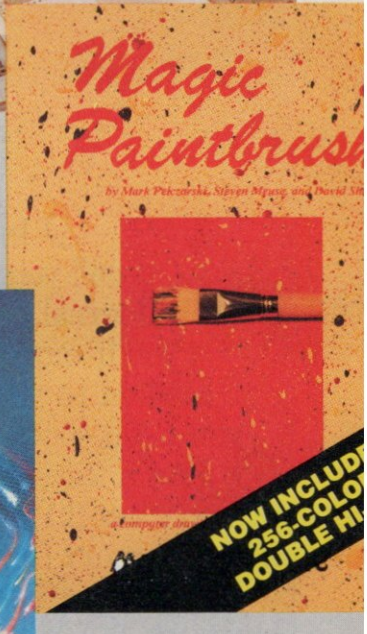

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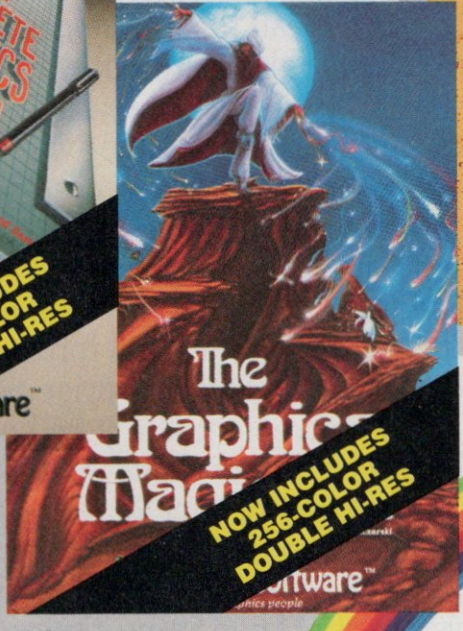

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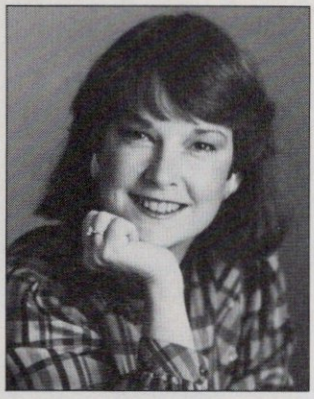

Apple Computer prepares to stun the personal-computer world with its new AppleTalk network, a typeset-quality printer, and a card that will allow IBM computers to connect with AppleTalk.

THE MACINTOSH OFFICE

One of my favorite things to do during the winter months is catch up on my reading. If you are looking for some good reading, this month's issue of *A+* will definitely fill the bill.

Our cover story this month introduces The Macintosh Office. Announced at Apple's annual stockholder's meeting in January, The Macintosh Office is the cornerstone of Apple's strategy to make its products the second personal-computer standard in the business world.

The foundation of The Macintosh Office is a new network called AppleTalk. At one-twentieth of the cost of IBM's network, AppleTalk is an impressive breakthrough in low-cost networking.

Along with AppleTalk, Apple announced a fancy new laser printer called LaserWriter. With typeset-quality output at three to eight pages a minute, the LaserWriter will change our attitude toward printing forever.

Although these two announcements would be significant enough in themselves, Apple is getting ready to stun the personal-computer world by going into the IBM add-on peripheral business with a card that will allow IBM personal computers (and compatibles) to connect to AppleTalk. Apple plans to have this card available later this year. Apple also told us of its intention to introduce a fileserver for the AppleTalk network in the near future.

The Macintosh computer is the star of The Macintosh Office, but Apple has not forsaken Apple II owners. Apple informed us that it plans to make an interface for the Apple II family of products that will enable them to be a part of an AppleTalk network.

Speaking of the Macintosh, many of you have probably noticed that we have increased our coverage of Apple's prodigy. Sales are booming, and new owners are eager to find information on the Macintosh. As the magazine that serves all Apple-computer users, we are responding to this need with additional pages devoted to the Mac. Please note that I said *additional* pages—we do not intend to reduce our coverage of the Apple II line of products.

One of the fastest-growing applications in offices today is telecommunications. For an overview of telecommunications products for the Apple II series, from the simple to the sophisticated, read Mark Andrew's article, "Telecommunications"—a must for anyone who's about to purchase a telecommunications package—along with Chip Carman's chart of selected telecommunications software. You Macintosh owners will also find a telecommunications article of interest to you, "Bridging the Compatibility Gap" by Fred Davis and Keith Thompson.

We are delighted to be continuing our home-repair series. Last year our Apple II Plus repair guide was a huge success, so we decided to bring you more such articles (see "First Aid for Disk Drives" by Michael Nadelman and Chip Carman).

If you are looking for information about spreadsheets, be sure not to miss the second half of our excerpt from *The Endless Apple*. The author, Charles Rubin, discusses how to adapt your Apple II for optimum spreadsheet use and has provided an update exclusively for *A+*.

If all this doesn't keep you busy, there's even more! Don't miss our review of Brøderbund's latest hit, Dazzle Draw. I don't have enough room to tell you about everything in this issue, so be sure to look carefully at the table of contents for other articles of interest. Happy reading! ✚

Maggie Canon

MAGGIE CANON/**EDITOR**

IF YOU'RE REALLY SERIOUS ABOUT PROTECTING YOUR DATA, PUT AN ELEPHANT™ IN YOUR OFFICE.

Elephant Premium Floppy Disks. They're specially designed for the more demanding needs of business, and because they are, we test them at a higher standard. In fact, 150% of the industry standard. And then they're certified 100% error free at that more critical level.

So we can say with confidence that Elephant Premium will protect your data when other disks won't.

Plus, Elephant Premium is the only floppy disk that features The Elephant Organizer™ – the easiest way ever to store, reference and protect your disks.

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Dennison

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Serving business for over 140 years.

CLEANING DEVICES

Dear *A+*,

I read "Dispatches" in your December issue with considerable interest. The section "Your Computer's Mid-Life Crisis" has information that all of us would do well to think twice about. Next to the problem of dust, those of heat and power are important.

Numerous devices are on the market to clean the power line, including a combined fan and power-line filter. The combination is terrific, but has one large drawback. Any blower that draws air from the computer's enclosure creates a negative pressure about the entire enclosure. Air is intended to enter at the right side and be drawn out the left. The air contains dust, and not only does it come in the vent on the right side, but also through any other holes, such as those around the dust-sensitive keyboard.

Anyone concerned about heat should install a blower that *pushes* air into the right side and includes an air filter. By blowing clean air in, the blower creates a positive pressure inside the computer that prevents airborne dust from getting inside and wrecking your expensive investment. Anyone who uses a blower that pulls the air through had better plan on some extra cleaning, or the buildup of dust could eventually cause expensive damage.

I do not know of such a product that is custom-made to work with the Apple II series of computers, but it can't be far off. Meanwhile, you will have to visit your local electronic supply firm and buy the makings.

Bruce D. Cable
Havre de Grace, MD

LEFT OUT

Dear *A+*,

I was pleased to see Vanessa Schnatmeier's article on computer insurance in your November 1984 issue. It was a well-written, balanced piece on the subject. But she left us out!

Our rates are quite competitive. We provide "All-Risk" coverage with a number of unique features, including limited-personal-liability coverage and coverage for the property of others. We can provide coverage for custom programs on request.

Please note that we handle the claims for this program, which can be an advantage for policyholders, since they will be dealing with people who know both insurance and computers.

Keep up the good work!

Stan Young
President
Compusurance, Inc.
P.O. Box 561952
Miami, FL 33256-1952
(305) 665-6617

PEACHTREE PROGRAMS

Dear *A+*,

I wish to call your attention to the story in the November issue on SAT software.

There are several errors in the description of the EduWare products, one being a review of a product we do not have—Math Attack. Peachtree Software Incorporated does market, under the EduWare name, the following:

PSAT/SAT Analogies
Retail price: $29.95
Supported hardware: Apple II, II Plus, IIe, or IIc
Number of disks: 2

SAT Word Attack Skills
Retail price: $29.95
Supported hardware: Apple II, II Plus, IIe, or IIc
Number of disks: 3

PSAT Word Attack Skills
Retail price: $29.95
Supported hardware: Apple II, II Plus, IIe, or IIc
Number of disks: 3

Genie Ragin
Peachtree Software Incorporated
Atlanta, GA

SYLLOGISTIC SLIPUP

Dear *A+*,

I don't wish to seem pedantic, but since computer programming is generally considered to be an extremely logical activity, it is only fair to point out that Freff's opening syllogism ("Opening Musical Vistas," November 1984) fails completely as an exercise in deductive logic.

Without going into the problem in great technical detail, I would point out that the syllogism presents the fallacy of the "undistributed middle term," the "middle term" being the term (in this case "a lot of fun") that appears in both premises. A brief example will illustrate the flawed logic.

A. Cows are brown.
B. Fido is brown.
C. Fido is a cow.

But Fido is a dog, not a cow. Freff's deductive syllogism is valid only if it is rearranged.

A. Making music is a lot of fun.
B. Most human beings make music.
C. Most human beings like to have a lot of fun.

I don't think this rearrangement would seriously affect the point he wishes to make, but it does make sense logically, unlike the syllogism he provides.

Don Richard Cox
Knoxville, TN

COMEDY CORRECTIONS

Dear *A+*,

Thanks for mentioning Comedy by Wire in "Dispatches" in your December issue. Although I welcome the attention, I want to correct some mistakes in your column.

1. My name is Billiam, not William.
2. The comedian's name is Robert Klein, not Kline.

Billiam Coronel
New York, NY

NEWS+

BY FREDERIC E. DAVIS

NETWORK MANNERS

You're more likely to get into a fight if you argue with someone electronically, according to a recent study carried out by Carnegie-Mellon University. Scientists there have been comparing groups using electronic mail and teleconferencing with groups that hold face-to-face discussions.

With the proliferation of electronic-mail services, teleconferencing software, and low-cost networks such as AppleTalk, we will be doing more of our communications electronically. The results of the study at Carnegie-Mellon should make us more aware of our behavior when using the computer. According to the new study, not only are rudeness, profanity, exultation, and emotional outbursts more prevalent when you converse via computer, but people using computers also tend to take longer to agree, make more extreme decisions, and are more self-righteous than people talking matters out in person. Researchers think these differences in behavior may be caused by the lack of nonverbal cues that inhibit extreme behavior in face-to-face meetings.

Not all the findings are negative, however. On the up side, members in a teleconference are more candid and tend to contribute more equally to a conversation, rather than holding back because of fear or deference to hierarchy. Thus, more creativity and initiative can enter into the decision-making process.

MACLIBRARY

Microsoft, the world's largest independent software producer, is best known as the creator of MS-DOS and PC-DOS for the IBM PC and compatibles. But now the company is placing its bets on the Macintosh.

As evidence of Microsoft's commitment to the Mac, consider a statement of company founder and president Bill Gates, as quoted in *Business Week*: "The next generation of interesting software will be done on the Mac, not the IBM PC." In accordance with Gates' wishes, Microsoft is currently devoting 50% of its resources to developing and marketing products for the Macintosh.

In order to get the Microsoft name on more high-quality software, Microsoft has established the MacLibrary, a software-publishing division, to market software created by other third-party developers. Alan Boyd, publisher of the MacLibrary, says Microsoft is interested in seeking out unique and original programs for the Macintosh in several major categories: business productivity, entertainment, self-improvement, recreation, programming tools, home software, and new software concepts.

The first three programs to be published under the Microsoft MacLibrary label will be a powerful version of Logo, a tutorial on Multiplan and Chart by Micro Courseware Corporation, and a new-business simulation called Entrepreneur by Harvard Associates, creator of MacManager. Entrepreneur is a competitive simulation of the software industry; it should prove to be an interesting game. Another 20 MacLibrary programs are scheduled to be released over the next nine months.

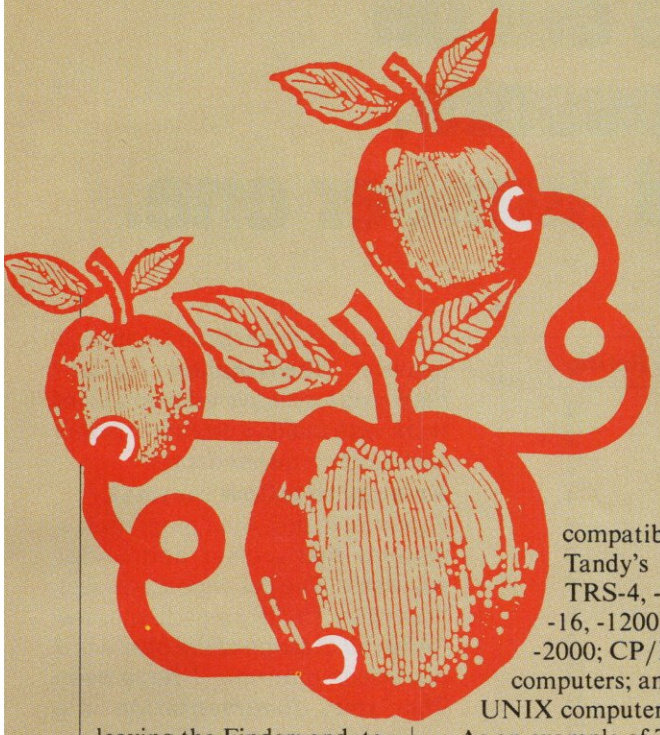
FASTER FINDER

MacTedium got you down? Looking for a faster version of the Finder? Juggling a lot of disk volumes on a hard disk? Developing a new product for the Mac? FastFinder, a fascinating new utility program for the Macintosh, may be just what you're looking for.

FastFinder, developed by Michael Lehman of Tardis Software, is a sort of hacker version of the Finder and is definitely for computer experts only. FastFinder replaces Apple's version of the Finder with a text-oriented operating system (no icons) that is piled with features yet takes up less space on your disk and operates up to five times faster than Apple's Finder.

FastFinder has more features than I have room to mention here, but I will give you some highlights: it handles up to 12 on-line disk volumes at once (very handy for hard disks such as the Corvus); it does not limit the number of files in the directory; disks eject

immediately; you can invoke utility functions, such as combining text files, scanning a file, and displaying a file's contents, without



leaving the Finder; and, to top it off, you can store frequently used command sequences as script files for instant replay. For more information, contact Tardis Software, Inc., 2817 Sloat Road, Pebble Beach, CA 93953; (408) 372-1722. Tell them *A+* sent you.

APPLETALK ALTERNATIVES

AppleTalk may be cheap, but it's not the only networking solution for Apples. Corvus Systems' Omninet has been popular with users of Apple II-series computers for many years. Corvus now offers hard disks for Omninet, with more than 100 megabytes of storage. Also, Sunol Systems of Pleasanton, California, produces a network that links Macintoshes with Apple II-series computers.

Another innovative network is Tops, from Centram Systems West of Berkeley, California. The Tops network allows many different machines to share files, printers, and other resources. Tops can be used with the Macintosh; the IBM PC XT, AT, and compatibles; Tandy's TRS-4, -12, -16, -1200, and -2000; CP/M computers; and UNIX computers.

As an example of Tops' flexibility, you could save files created with your Macintosh on the hard-disk drive in an IBM PC XT and print out a dBASE II database created on a CP/M computer using a high-speed printer attached to a minicomputer that operates with UNIX. Tops operates at about 800K bits per second (three times faster than AppleTalk) and allows you to interconnect up to 65,000 networks of 254 nodes each.

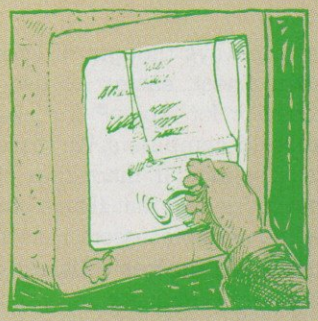
WIRELESS NETWORK

A new wireless communications network may soon be available for the II series, III, Mac, and Lisa. Becos Industries of Campbell, California, has developed an infrared communications device that connects to a computer's RS-232 port and communicates using diffused infrared radiation. The system permits up to 99 channels of simultaneous communication at data-transfer speeds of up to 400,000 bps. It may be the ultimate solution to cable clutter.

MAC-LIKE SOFTWARE FOR APPLE II FAMILY

Apple is helping software developers create a new generation of Apple II software that features a Macintosh-like user interface with icons, pull-down menus, and windows. The new software packages will run only on the IIc, or on a IIe that has had a chip upgrade to provide IIc compatibility. The IIe chip-upgrade involves replacing the 6502 processor and several ROM chips.

Industry reaction to the new Mac-like user interface has been very positive; third-party developers think it will extend the already legendary life span of the Apple II. In spite of some expressions of concern that this type of user interface operates very slowly, preliminary products we have seen run surprisingly quickly. Next month's *A+* will have more information about this important development.

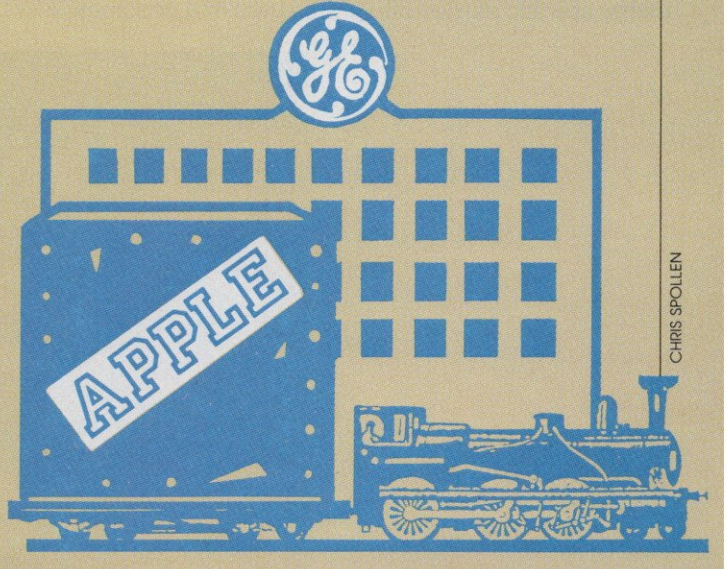


WILLIAM CONE

GE TO SELL APPLES

Apple Computer, Inc. has added another powerful company to its growing list of retailers. General Electric Information Services of Rockville, Maryland, a division of General Electric, has announced an agreement with Apple that makes GE a value-added reseller of Apple products.

GE will sell Apples to their corporate clients as part of GE's business-information systems. This news is especially good for Apple, which is trying to establish itself as a force to be reckoned with in the business-computer marketplace. +



CHRIS SPOLLEN

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

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

Format-II makes editing easy.
There's our unique editing process: simple, mnemonic commands logically relate to the task you want to perform. To center text, you press [C]. To delete, [D]. To justify, [J].

And since what you see on the monitor is exactly what will print out, editing and formatting is always a breeze.

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

Format-II supports all printers.
Unlike other word processors, Format-II is compatible with *every* printer that works with the Apple, from the simplest dot matrix printer to the most advanced letter quality printer.

A built in mailing list at no extra cost!
Actually a database system resembling an index card file. A SORTING program will arrange the mailing list alphabetically or numerically. Powerful LOGIC commands merge specific entries into form letters and documents.

Peelings II Magazine Rating

FORMAT-II	1
SCREEN WRITER II™	2
PIE WRITER™	3
WRITE AWAY™	4
LETTER PERFECT 5™	5
WORDSTAR™	6
MEGAWRITER™	7
APPLE WRITER II™	8
PERFECT WRITER™	9
CORRESPONDENT™	10
SPELLBINDER™	11
MAGIC WINDOW II™	12
ZARDAX™	13
SUPERTEXT 40/80™	14
GUTENBERG™	15
WORD HANDLER™	16
SELECT™	17
SANDY™	18

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

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

An easy to follow manual.
Essential to any good program is a manual that's clear and understandable. The Peelings II reviewer describes the Format II manual. *"All in all, it is one of the best word processor manuals I have seen. The latest documentation is a model of clarity and organization."*

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

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

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

For a reprint of the full review, or to order Format-II, contact: Kensington Microware, Ltd. 251 Park Avenue South, NYC, NY 10010 , (212) 475-5200.

Format-II requires 64 K and an 80 column card.
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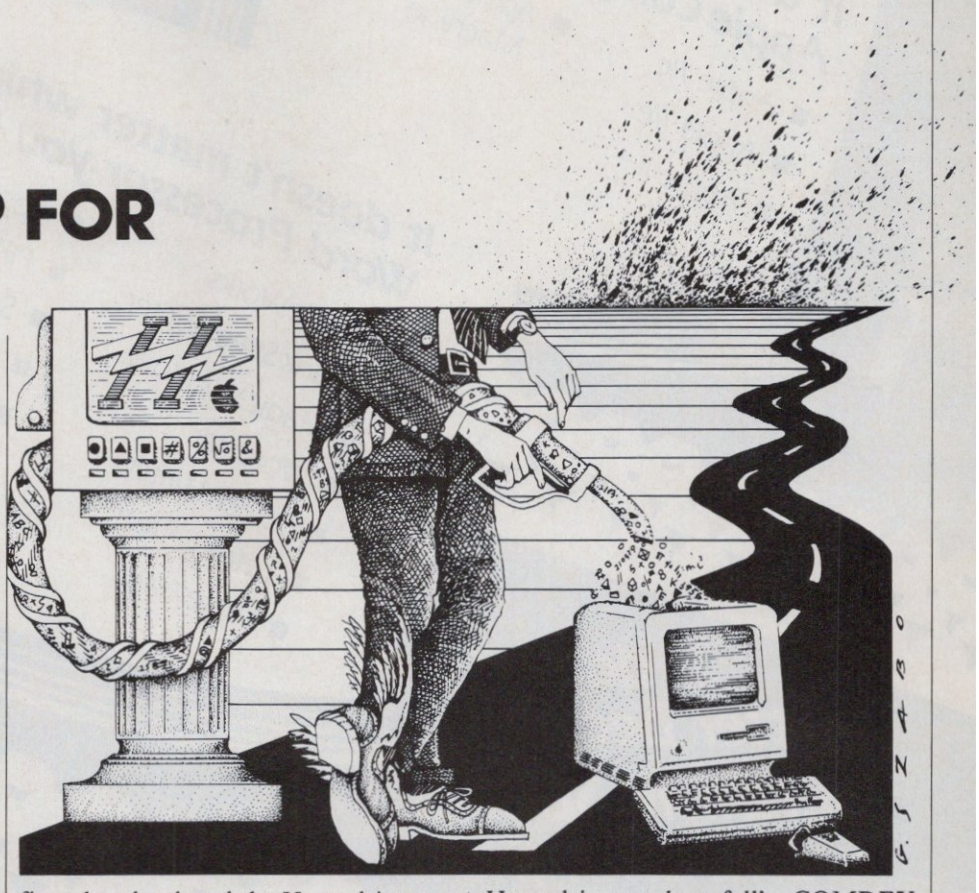
CIRCLE 277 ON READER SERVICE CARD

THOUGHTWARE
BY STEVE ROSENTHAL
The Hyperdrive hard disk for the Macintosh

A GIANT LEAP FOR MACKIND



Dynamite is the word you'll hear most often from users of the new Hyperdrive hard disk for the Macintosh. With this tiny ten-megabyte drive tucked away inside it, Apple's desktop wonder suddenly becomes a serious business competitor to the box from Boca Raton.

If you're already a Macintosh user, you know that the stock machine's most limiting performance factor is the time it spends reading and writing to the floppy disk. Although the actual rate at which the Mac transfers data back and forth is about the same as that of most other floppy-based computers, Macintosh software has to record a virtual torrent of data even for routine operations. In addition, on a 128K Mac, the limited memory space makes for frequent swapping of parts of the operating system or programs in and out of memory because they can't all fit at the same time.

One solution that some Macintosh owners have turned to is an external hard disk. Hard-disk drives not only store more information than floppies do (so you don't have to shuffle as many disks), but they also transfer information in and out at a much higher rate. Applications that spend most of their time reading from and writing to the disk run five times faster with a hard disk.

Five times faster makes a huge difference, but a hard disk itself can do even better. Because of its higher rotational speed and closer packing of bits, the hard disk itself can spit out our collected bits at least ten times as fast as a floppy. On the Mac, however, there's simply no way to get data in and out of the case that fast.

That's where the Hyperdrive comes in. General Computer Company, the firm that developed the Hyperdrive, realized that if you couldn't get data through the case between disk and memory fast enough, the solution was to put the disk right inside the Mac. Therefore, the Hyperdrive is a ten-megabyte *internal* hard disk that fits inside the Macintosh case, with a piggyback circuit board that connects directly to the Macintosh circuitry. In addition to providing disk-drive electronics, the added board can be configured with the 384K of memory necessary to bring a 128K Macintosh up to 512K.

Apple's desktop wonder suddenly becomes a serious business competitor to the box from Boca Raton.

General Computer announced the Hyperdrive at last fall's COMDEX trade show in Las Vegas, where it was one of the hit items exhibited. To get an early look, I managed to convince the Hyperdrive team to lend *A+* one of the field-test models. Note, therefore, that what I say here is based on about a week's testing of a preproduction unit. Formal reviews at *A+* have to wait until we can get the exact product that will be shipped to customers, even though the product is supposed to be available before this issue of *A+* reaches you. If you want the name of a dealer or details right away, you can reach General Computer Company at (800) 422-0101 or (617) 492-5500.

The Hyperdrive unit *A+* examined was almost in final form, though. The only differences I expect you'll find between this unit and the final delivered product may be some minor software changes and added utilities.

Unchanged on the Outside

From the outside, a Hyperdrive Macintosh looks just like a standard

GUSTAV SZABO

It doesn't matter which Apple Computer you use...

- Apple //c
- Apple //e
- Apple II+
- Apple-Compatible Machine

It doesn't matter which Word Processor you have...

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- Bank Street Writer
- Magic Window
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- AppleWriter
- PFS:WRITE
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- Format II
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- And More!

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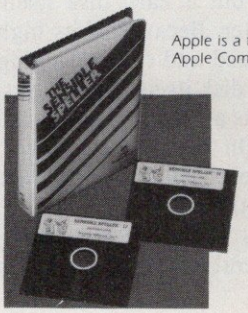
Sensible Speller, now available in the ProDOS and original "IV" version, is compatible with the particular Apple hardware and software you already have*. And, more important, it is designed to meet your needs!

You will not be embarrassed any longer by misspellings which can destroy the credibility of your documents, reports and other important papers. **Sensible Speller** catches your spelling mistakes with tireless efficiency. What's more, it displays misspelled words in context, suggests correct spelling, and allows immediate replacement of misspelled words with correct ones.

Of course, a spelling checker is only as good as its vocabulary. And that's why **Sensible Speller** is so excellent; it comes with the 80,000 word vocabulary of the official Random House Dictionary and it provides for adding thousands of more words on disk.

Shouldn't you have a **Sensible Speller,** the most popular of all spelling checkers? It is available at your dealer for $125 in the ProDOS or original "IV"* version or order direct, enclosing $1.25 for shipping. Visa/MasterCard/Check/COD welcome.

*It works with all the following word processors, with owners of trademarks indicated in parentheses: DOS 3.2 & DOS 3.3-AppleWorks & AppleWriter, all versions (Apple Computer, Inc.); Bank Street Writer (Brodebund); Format II (Kensington Microware); HomeWord & Screen Writer (Sierra On-Line Inc.); Word Handler (Silicon Valley Systems); CP/M-Wordstar (Digital Research Corp.-Micropro International); PFS:WRITE (Software Publishing, Inc.); and others. All features are not available with CP/M, PFS: WRITE & Word Handler.



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model. The only change you can see, in fact, is the added Hyperdrive logo next to the colored Apple on the front plastic panel.

Turn on the Hyperdrive model, and you do hear a change. A standard Macintosh is silent when it's not accessing the disk, but it's fairly noisy for a personal computer when reading and writing on the internal or external drive. In contrast, the Hyperdrive machine emits a constant buzz from the hard disk that changes little when you read or write (and, of course, since the floppy drives are still usable, it makes the same noises as the standard model when you read data from removable disks or write it to them).

Most people won't find the noise level objectionable. Technically, the field-test model measured 52 decibels at one foot, a little quieter than an idling standard office typewriter. In a moderately busy office, in fact, you may not even hear the buzz at all. You almost certainly won't hear the added fan, which keeps the hot spot at the top of the Macintosh case at about the same 120°F as an unmodified machine, despite the added circuitry.

When you turn a Hyperdrive machine on, you'll see the familiar icon asking for a disk, but just wait for three seconds—you don't need to put a disk into the internal floppy drive after all. After the first few seconds of the standard Macintosh boot sequence, the Hyperdrive kicks in, bringing up the system from the internal hard disk instead of the floppy. That's when you first notice the speed.

Instead of the usual leisurely pace at which a normal Macintosh presents the start-up messages, the speed of these initial screens on a Hyperdrive Mac is more than twice as fast. Depending on how many files you've left on the hard drive, boot time is usually half of what it is on the unaltered machine.

The difference in loading application programs is still more dramatic. If you double-click on the MacWrite icon, you can start entering your text seven seconds later on the Hyperdrive Macintosh—you'd have to wait four times that long on a normal machine. Going from MacWrite to MacPaint takes less than 15 seconds, instead of close to a minute.

With a Hyperdrive installed, a Macintosh is even faster than the equivalent Lisa 2/10. For example, Bill Duvall at Consulair Corporation has been developing a C compiler using a field-test Hyperdrive unit. A typical compilation of the compiler itself takes 25 minutes on a Lisa but just 11 on the Hyperdrive Mac.

All these time comparisons assume that you have the right disks in the machine, but on an ordinary Macintosh, all too often that's not the case. Even on a 512K Mac, in any serious business use, one of the boxes you see most often on the screen is the request to insert some other disk instead of the one currently in the drive. With the wrong combination of disks, it can take up to four minutes simply to leave one application and start up another. In human terms, having a machine constantly tell *you* to fetch *it* a disk quickly becomes annoying.

A Macintosh is still the best machine to win the hearts and minds of the computer-fearful.

With ten megabytes on the hard disk, you won't have to change disks very often. Although you can still use the normal internal and external floppy drives on a Hyperdrive Macintosh, once you've loaded in your programs and data, the only times you'll want to use your floppies will be to back up files from the hard disk, transfer data to another machine, or use an original disk that must be present for some copy-protected software.

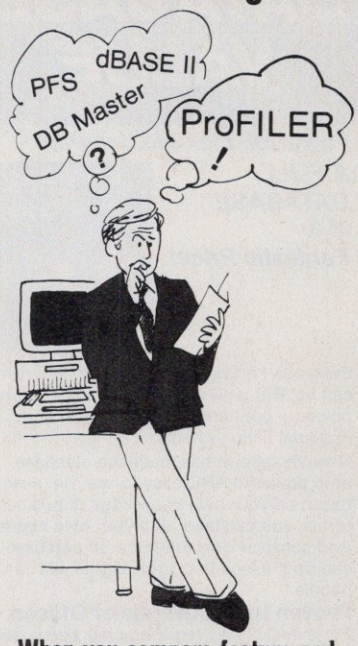
On the Other Hand

The Hyperdrive must have disadvantages as well, you must be saying, and of course you're right. The first is price. At a list price of $2795, a Hyperdrive upgrade costs more than a 128K Macintosh. (It's $2195 for an upgrade to a 512K Mac, because you don't get any extra memory).

If you're using a Macintosh in a business environment where many people have to learn how to use it and staff training costs are a consideration, you'll probably have no trouble justifying the cost. A Macintosh is still the best machine to win the hearts and minds of the computer-fearful, and the Hyperdrive adds the power and speed you need for serious business. If cost is an object, however, you may have to think about some of the non-Macintosh solutions.

Within the Apple line, a Hyperdrive Macintosh stacks up fairly closely with a Lisa 2/10, a machine that has had

Confused About Data Base Programs?



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The Data Manager for the Apple Computer with all the NEW features you've been waiting for.

8 times faster than DOS 3.3 – Twice as fast as ProFILER 1.0

FEATURE	ProFILER†	PFS File*
Multiple Forms per Disk	YES	NO
Maximum Records per File	1500+	1000
(65,000 w/ ProFILE Hard Disk)	YES	NO
Report Generator Included	YES FREE	NO ($100)
Pro DOS Operating System	YES FREE	NO
Full Screen Editor	YES	NO
Works on Apple II+, IIe, IIc, III, Franklin	YES	YES
Arrow Keys function OK	YES	NO
Multiple Index Files	YES	NO
Auto Catalog of Data Files - **NEW**	YES	NO
Variable Printer Initialization - **NEW** Reports to Screen or Printer - **NEW**	YES	NO
Easy Word Processor Interface - **NEW**	YES	NO
Apple writer II® Mailmerge Interfaces - **NEW**	YES	NO
Cost DataBase	$89.95	$90.00+
Report Generator	FREE	$90.00+
TOTAL COST	$89.95	$180.00+

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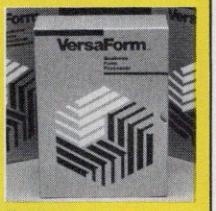

Everyone knows how effective a database can be. But until now, they've either been powerful but hard to use, or just simple personal filing systems.

Now VersaForm has made the database both powerful AND easy to use. Because it's based on your own knowledge of business forms, you can tailor it to your own needs. And because it's a full-featured database, it can do the jobs that lightweights just can't handle.

Proven In Thousands of Offices

For over 3 years, VersaForm has been used by manufacturers, bankers, doctors, farmers, and many others. It's THE program for serious business tasks such as invoicing, to your own needs. And because it's a full-featured database, it can do the jobs that lightweights just can't handle.

VersaForm can:

- Prevent errors by checking entries before accepting them.
- Save time by doing calculations automatically.
- Print on existing pre-printed forms —
- Sort on any item, indexed or not.
- Store up to 4,000 characters in each record, up to 4,000,000 bytes per file.
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only limited success in the marketplace. Even though in both cases you're talking about a selling price of $4000–$5000 for a complete package, the Hyperdrive Macintosh occupies less space, is more portable, runs faster, and is supported by a much wider variety of software. The Lisa, on its side, does offer multitasking and up to one megabyte of memory.

Outside the Apple family, you can find dozens of computers with hard disks in that same price class or even for less. Because the Macintosh has been such a conceptual success, most of these machines are quickly adding more "Macintosh-like" features, mostly optional mice and windowing software with pull-down menus. Again, if style and detail don't count, then many of these machines can be considered worthwhile alternatives—but if you're sold on the Macintosh and on the software that is finally arriving for it, you may want to stick with the real thing.

The second Hyperdrive limitation is copy-protection. Just as with hard disks for any other computer, manufacturers cannot render their disks uncopyable without also making them impossible to run from a hard disk. Unfortunately, although you can usually buy disks that will crack any copy-protection scheme just days or weeks after it is announced, development of programs that transfer protected applications to hard disks takes longer. Thus, even with a hard disk, you may be reduced to running some applications in regular floppy form.

To add injury to insult, you'll find that some protected applications make extensive use of overlay files that reside on disk. Because of the interaction among the Macintosh's Finder (the operating-system program that gets disk files), the programs, and the disk—even if a protected program needs only a small piece of code from its original disk—the program often reads all its overlay and status files from the floppy and writes it to them.

Aside from getting around copy-protection problems, you'll have to make remarkably few changes in your habits and programs if you switch from a stock Macintosh to a Hyperdrive model. General Computer went to great lengths to have its disk respond to programs just the way a floppy would, so your normal applications should run without any problems.

Most of the exceptions involve some limitations in the Finder that General Computer has not yet been able to work around. Some of these may be fixed in the final release but had resisted solution up to the field tests.

You can't have more than about 250 files on a single disk on either a standard disk or on the Hyperdrive (because the Finder never expected that many on a floppy and can't keep track). With ten megabytes available, you might easily go over the limit.

General Computer's solution is to allow you to define multiple "drawers" on the floppy, each of which the Finder treats as a separate drive. In addition to pacifying the Finder, this technique allows you to organize files into volumes so *you* can find them. So far, though, you may notice a lack of tools to help you find files tucked away in various folders and volumes.

More significantly, the Finder does a lot of calculating every time it shows you the desktop to figure out where all the icons should be placed. A good part of the delay in opening and closing an application is really this calculation time, not just the disk access. The Finder goes through this process for each currently available disk or volume.

From my own point of view, I'm ready for an alternative to the Finder that would be quicker and more powerful.

Thus, if you have dozens or hundreds of files neatly organized in various drawers, you may have to wait up to several minutes for the Mac to do its calculations. To work around this time drain, the Hyperdrive software allows you to take drawers that you're not currently using off-line. This strategy does save time, but it means that you must invoke the Hyperdrive Manager software to "mount" and "unmount" volumes, and files you request from unmounted disks will be taken as simply missing. In the field-test version, the Manager utility ran as a separate program—in the final release, it will probably be a desk accessory (available in any program by pulling down the Apple menu bar at the top left of the screen).

Given that General Computer has opted for maximum compatibility, using the Manager probably represents the best possible solution. From my own point of view, I'm ready for an alterna-

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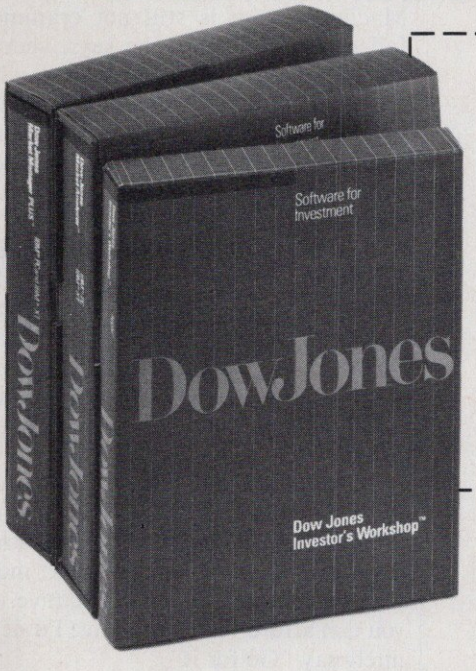

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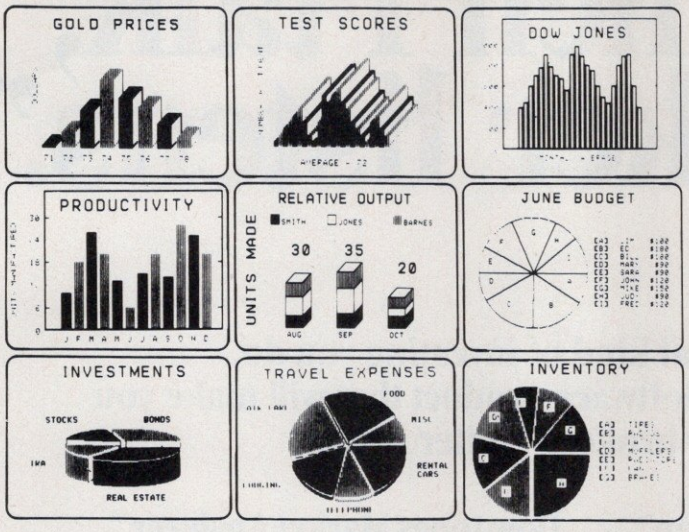

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tive to the Finder that would be quicker and more powerful, even if it were a little less friendly.

The other problems are more minor. For a somewhat obscure reason, you can't do a full disk copy from a floppy to the Hyperdrive. Instead of simply dragging the floppy-disk icon over to a file drawer, you'll have to take a few seconds to open the disk, click on Select ALL, and then drag the selected files to the drawer.

Not surprisingly, you can't format the Hyperdrive with the standard Macintosh Erase Disk command.

On the hardware side, you won't have to make any changes at all for the Hyperdrive. Because it's internal, you can still connect an external disk, a printer, and a modem all at the same time. If you want to hook up to Apple's new AppleTalk network, you won't be short a port, as you might be with external hard disks that use the modem port (a practice that also limits external hard disks to the transfer speed of the port, which is less than one-fifth the speed of the Hyperdrive transfer).

General Computer Company or its dealers take care of the installation of the Hyperdrive (included in the price), so you don't have to worry about figuring out what to plug in where. According to Chip Carman, one of *A+*'s technical wizards, even with the added piggyback board and disk drive, the Macintosh case is still not crammed full of parts. Service, he says, should not be much more difficult than with an ordinary Mac. General Computer provides a warranty on both your Macintosh and the Hyperdrive parts, so you don't lose any protection after the implant.

The Macintosh has been a wonderful first machine, and it's one of the easiest computers to use for small, short tasks. Software vendors, after a slow start, are now providing the tools for larger, more complex jobs. The Macintosh hardware must also rise to the occasion.

After a week of using the Hyperdrive, I'll find it hard to go back to my ordinary Macintosh. This addition makes using the machine faster, more pleasurable, and more productive. If you can afford the investment, I'd definitely say "Go for it!" ✚

Steve Rosenthal is a writer and lexicographer who tries to maintain a perspective on other joys and problems in the world besides those involving personal computers.

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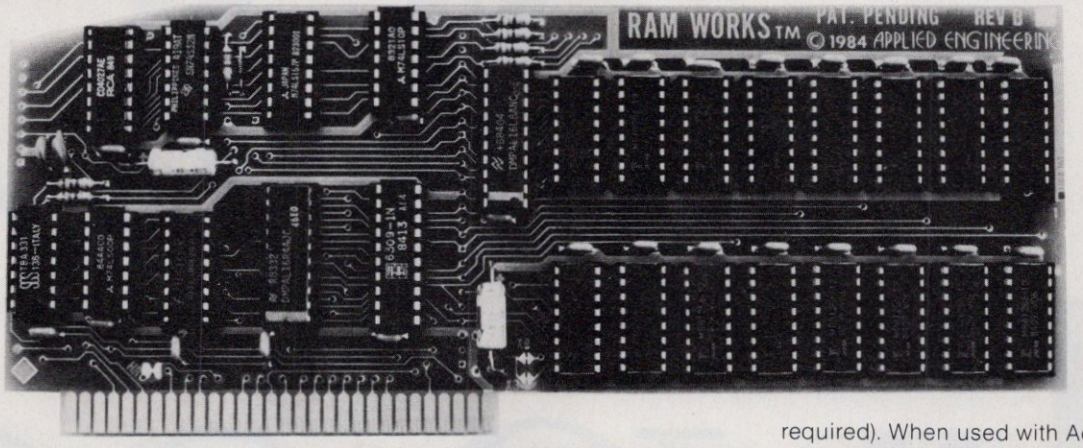

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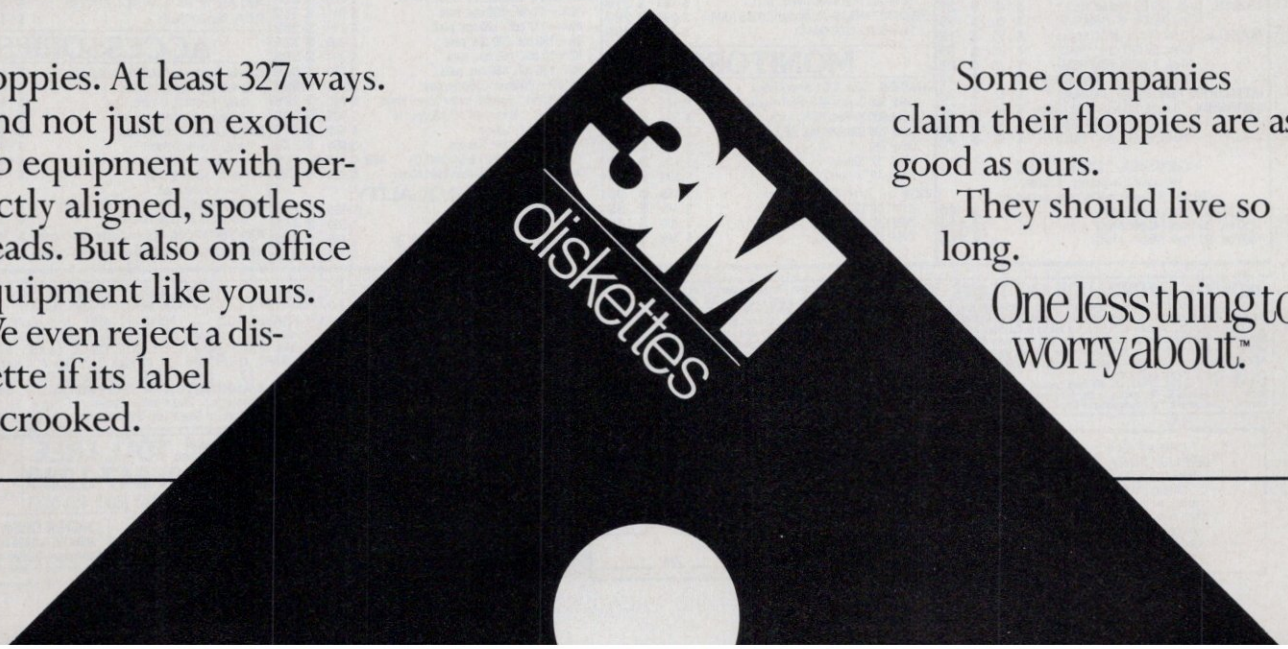

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APPLETALKTALK

▶ APPLEWORDS
BY STEVE ROSENTHAL

A short glossary

BACKBONE NETWORK
A network that connects two or more local-area networks (LANs). AppleTalk networks, for example, can be connected by high-speed Ethernet networks, public-packet networks, or private wide-area networks.

BIT STUFFING
The practice of inserting extra bits into a message stream so that data patterns look different from control values. AppleTalk uses bit stuffing as part of its SDLC (synchronous data-link control) protocol.

BRIDGE
A connection between two or more similar networks. Bridges can connect multiple AppleTalk networks, effectively making a network of more than 32 stations.

BROADCAST
To send a message to all stations or an entire class of stations that are connected to the network. AppleTalk allows messages to be broadcast to all the nodes connected to the network by using the special node address number 255.

CSMA/CA
An abbreviation for *carrier-sense multiple access with collision avoidance*. This mouthful refers to the method AppleTalk and some other networks use to regulate the use of the network when more than one station wants to transmit at the same time. With CSMA/CA, each station listens to see if the network is clear before sending (the carrier-sense part) and then waits a random amount of time before starting (the collision-avoidance part). If two stations start up at the same time, it is up to other layers in the network to notice the garbled message.

DEVICE DRIVER
The software that customizes the general AppleTalk software to the requirements of a particular computer or I/O device. Just as with printer drviers for computers, writing network device drivers requires an intimate knowledge of both the device for which the driver is intended and the host system.

DROP CABLE
The short cable that runs from the network-connection module to its associated computer or other device. In AppleTalk, standard drop cables are 18 inches long, ending in serial-port-style connectors (DB-9 or DB-25).

GATEWAY
A connection between two dissimilar networks. Using the right gateways, you can connect AppleTalk to other brands and types of local-area networks.

LINK
Viewing AppleTalk as a series of layers, the software and hardware that regulates the way data is assembled and sent out to the network and captured on the incoming side. In AppleTalk, the link layer—or Link Access Protocol (Lap)—is responsible for assigning and checking addresses, regulating access to the network, and checking whether received data is intact.

NETWORK
Looking at AppleTalk as a set of layers, the part of the software that routes data from the one machine to the right destination.

NODE
A connection or switching point in a network. Each computer, printer, or communications device connected to the network is a node. AppleTalk allows up to 32 nodes in each network, but this number can be extended as necessary by connecting multiple networks with bridges and gateways.

OPEN SYSTEMS INTERCONNECTION REFERENCE MODEL
A model for networks developed by the International Standards Organization (ISO), dividing the network functions into seven connected layers. Each layer builds on the services provided by those under it. AppleTalk follows the general OSI model, but most of the individual layers are simplified versions of the full ISO standard.

PACKET
A grouping of data made up by chopping a message into small blocks and adding routing and control information. Longer messages are sent as sequences of packets. It's easier for networks to handle data in packet form than as long streams of continuous data.

SDLC
An abbreviation for *synchronous data-link control*, the line protocol (way of regulating how data is sent over a network or communications line) that AppleTalk uses. Widely used for communicating with large IBM computers, synchronous data-link control capability is built into many communications chips, including those in the Lisa and the Macintosh.

SERVER
A station on a network that handles special chores, such as disk storage, printing, or communications. For example, Apple's new LaserWriter printer can serve as a printer server on an AppleTalk network.

SIGNALING
The way pulses are represented by electrical signals in a network. AppleTalk uses the RS-422 signaling standard, in which pulses are represented by the difference in voltage between two wires.

SOCKET
The connection between a software program or network layer and the next layer up or down. The socket functions as a software equivalent of the hardware port, passing on messages and data in a known format and sequence.

THROUGHPUT
The amount of data transmitted through the system per unit of time, after checking, routing, and other overhead information is subtracted. Apple claims that AppleTalk, because it has a low overhead, has a high throughput rate for its signaling rate.

TRUNK
The main cable connecting the nodes in a network. In AppleTalk, the trunk is a set of twisted-pair lengths connected through connection modules. Individual nodes attach to the connection modules through drop cables.

TWISTED PAIR
A cable made up of two wires that have been wrapped around each other in order to lessen any tendency to pick up electrical noise. AppleTalk uses a twisted-pair cable with an added shield layer. +

THE MAC

BY MAGGIE CANON
AND FREDERIC E. DAVIS

APPLE'S NEW OFFICE-AUTOMATION SYSTEM CAN CONNECT MACs, LISAs, APPLE IIs, IBM PCs, PRINTERS, FILE-SERVERS, AND MANY OTHER DEVICES.

Imagine that you're working in a futuristic office. You come in to work in the morning and discover an urgent message from the company president. The message says you must prepare a special report about your department and give a presentation to the president and a group of clients that afternoon.

You call the members of your department together for a special meeting. In only a few short hours, you and your coworkers must collect the data, write explanations, produce some charts and graphs, lay out the text, and print the result. After you outline your needs, your staff goes to work.

One employee obtains the financial figures from the company's mainframe, which is attached to the office network, and then uses a modem to get market information and statistics from on-line databases. As he receives the information, the researcher sends it to the staff writer via the office's network. The writer prepares the text on a word processor and sends it over the network to the graphics department.

The top graphics designer specifies the fonts, designs the layout, creates the graphics, and lays out the page on a computer screen, using special page-layout software. Then she sends the report to a high-speed laser printer that prints a ten-page typeset-quality report in only a few minutes. Finally, as an aid for your presentation, you get a summary of the finished report, along with all its charts and graphs on overhead transparencies. The report looks first class, and you feel confident and well prepared for your presentation. It turns out to be a rousing success, and the company president praises your department on its effort. The best part is that you pulled the whole project off within several hours, and the people involved did all the work right at their desks, using networked Macintoshes.

Sounds great, but you're sure that it's just another one of those personal-computer pipe dreams.

Tomorrow's Office, Today

On January 23, 1985, Apple Computer, Inc., took this vision of the workplace from fantasy to reality with the announcement of a major new office-automation strategy at its annual stockholders' meeting. The new strategy is dubbed The

OFFICE

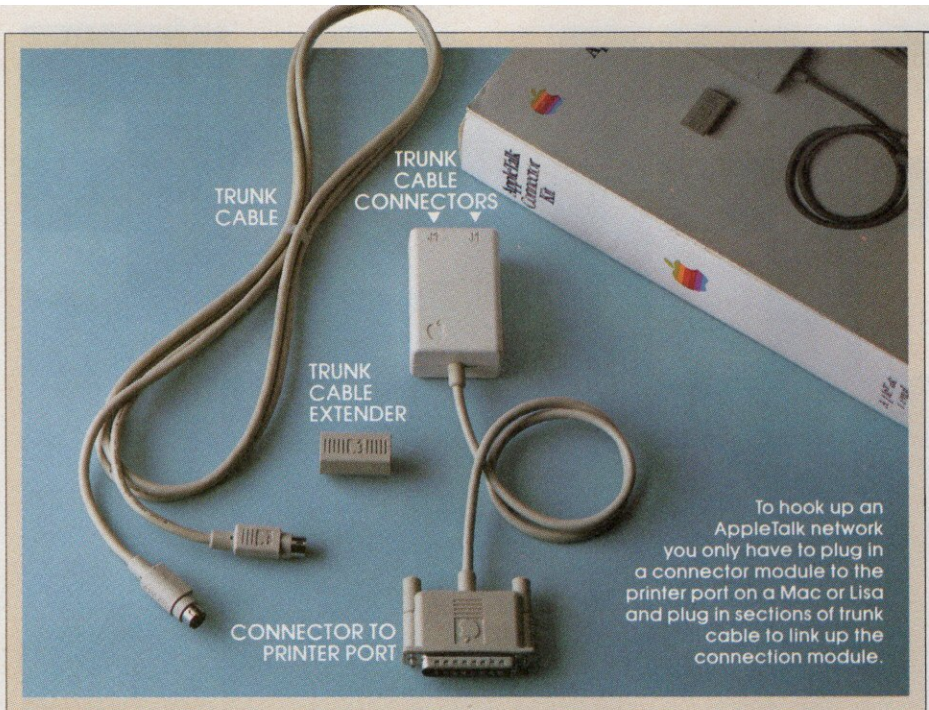
Macintosh Office. The Macintosh Office strategy features the connection of a wide variety of computers and peripherals by a low-cost, easily installable network called AppleTalk.

The AppleTalk Personal Network is the core of the Macintosh Office strategy. Networking has been an industry buzzword for a good many years, but it remained just that—an industry buzzword—until now.

Dreams of networks (they are often called local-area networks or LANs) have been with us since the advent of the information age. With computers entering every facet of the workplace, information has become the lifeblood of modern business. Networking computers is a logical step toward improving the flow of information, saving money on peripheral devices, and saving time on information input.

Despite years of ballyhoo, this concept has been slow to get off the launching pad. Up to now, the average cost of an office network has been more than $1000 a connection, and it required a specialist to install and maintain. Networking was too expensive and too technically complicated for most companies to invest in, especial-

DOW CLEMENT PHOTOGRAPHY



NETWORK DESIGN

One of the key factors in AppleTalk's ease of installation is Apple's choice of the way the connections to the network are connected and addressed. In local-area network terminology, AppleTalk is a self-configuring linear bus.

Apple had three basic choices for network topography (shape): linear bus, star, and ring (see figures 1–3). Linear buses, particularly the type

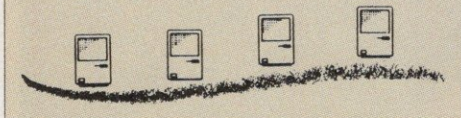


Figure 1: The multidrop-line network design

known as multi-drop lines, pass the same signal to each unit on the network, relying on the individual nodes to recognize which message is meant for them.

The main advantage of bus-type networks is that stations can easily be added or removed from the network, and malfunctions in one unit are unlikely to affect the rest of the network. Their main disadvantage is that they require some sort of access-control protocol if multiple senders are connected to the same link. A good example of a multi-drop-line network is cable television, which allows addition or removal of subscriber nodes without impairment of the operation of the rest of the network.

A star network, by contrast, relies on a central node to control the flow of information in the network (see figure 2). Star networks were the most common

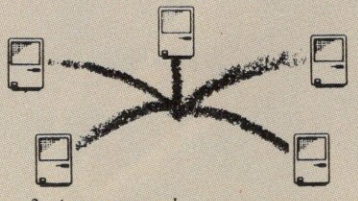


Figure 2: A star network

of the early networks—a good example of a star network is the telephone system. The central node is the main switching station that routes all the calls in a particular area. The weakness of the star design is that problems with the central node can bring the whole system to its knees.

A ring network (figure 3) circulates messages in one direction, passing information from node to node around the ring. As each station receives the message, it checks whether to absorb the data or pass it on. The main advantage of a ring network is that each station is guaranteed access to the network

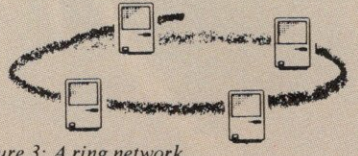


Figure 3: A ring network

at regular intervals. A weakness of the ring network is that a problem with any one node can disrupt the flow of information and cause problems in the operation of the network. Ring networks are widely used in industrial control.

ly smaller companies with fewer than 1000 employees. AppleTalk changes all that.

The AppleTalk Personal Network facilitates the interconnection of a wide variety of computers and peripherals. In addition to functioning as a network, AppleTalk can serve as a peripheral bus for a simple computer, allowing the connection of various peripherals to a single serial port on the computer.

A major advantage of the AppleTalk Personal Network is that you can easily install it yourself. Hooking up an AppleTalk network is easier than hooking up a home stereo system. All you have to do is plug in a connection module to the printer port on a Mac or Lisa and plug in sections of trunk cable to link up the connection modules. The sections of trunk cable come in precut lengths, with connectors that fit in only the correct way. You can connect the computers and peripherals in any sequence, and the software automatically reconfigures the network whenever you turn it on.

A single AppleTalk network allows you to connect a combination of up to 32 computers and peripherals. Apple's research has shown that most current office networks have an average of only five computers connected to them.

Apple designed AppleTalk for connecting a small group of computers together at the lowest possible cost. Its reasoning was that many high-cost networks were designed for large corporations in skyscrapers that needed to connect hundreds or even thousands of computers. Apple has designed the AppleTalk network for smaller work groups, such as a small company or a department within a large firm.

To take into account the growing trend toward interconnecting computers and to allow for larger installations, however, the AppleTalk development effort has also included an extensive set of methods to link multiple AppleTalk networks to each other and to link AppleTalk to other types of systems.

Two or more AppleTalk networks can be linked by a bridge (a device that links networks that use the same protocols). AppleTalk defines three basic types of bridges: local bridges, half-bridges, and backbone bridges.

Local bridges interconnect more than one AppleTalk network within the same building; half-bridges connect remote AppleTalk networks using modems, line drivers, satellite dishes, or any other communications system; and backbone bridges interconnect several

AppleTalk networks through a high-speed linking network such as Ethernet.

Dartmouth College in Hanover, New Hampshire, is using its own university network as a backbone network to connect many AppleTalk networks. Dartmouth now has several thousand Macintoshes networked in this fashion. Various companies are already developing ways to use their existing networks as backbone networks for linking up many AppleTalk work groups.

AppleTalk has a very flexible structure that was designed for use with various incompatible networks. AppleTalk can also serve as a tributary network that can feed into other types of networks, using devices known as gateways to translate protocols between the networks. This setup allows AppleTalk to link up with mainframe networks and other brands of local-area networks.

Computers in an AppleTalk network can send and receive electronic mail and can share peripheral devices connected to the network such as printers, plotters, and hard-disk drives. Sharing information can increase productivity, and sharing peripherals can reduce costs by allowing many computers to use a single device in common.

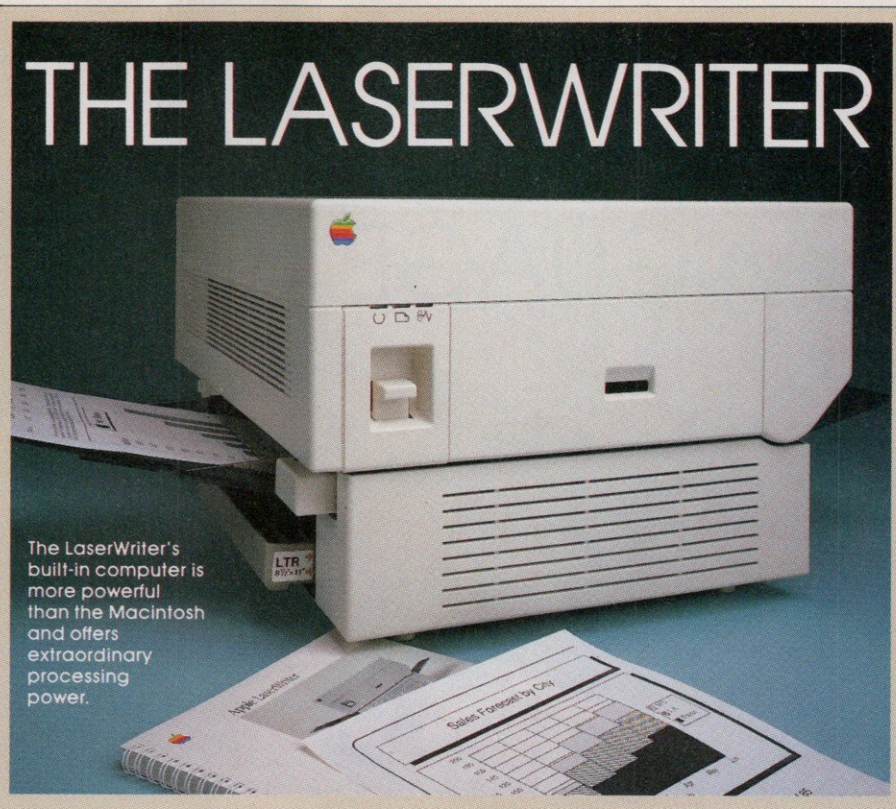
Speed vs. Throughput

Networks are often described in terms of speed. Slow networks, such as those connected by modems or line drivers, operate at less than 9600 bps. High-speed networks, such as Ethernet, operate at speeds of up to 10,000,000 bps or more. The AppleTalk network falls in the low-to-middle-speed range and operates at more than 230,000 bps.

Judging a network by speed alone can be somewhat misleading. Many high-speed networks are designed to accommodate hundreds or even thousands of nodes, and the high volume of traffic on these networks can significantly slow down the actual throughput of information. Since the AppleTalk Personal Network is designed for smaller groups of computers, the volume of traffic is less, and the actual throughput of information is fast.

The software that controls the network is another factor that affects performance and throughput. AppleTalk relies heavily on clever programming techniques to increase network performance. For example, if you created a page of typeset-quality graphics on an IBM PC and wanted to transfer it to another PC on IBM's PC Network, the computer would have to transfer the bit map of the entire page to the other PC, which would require the transfer of

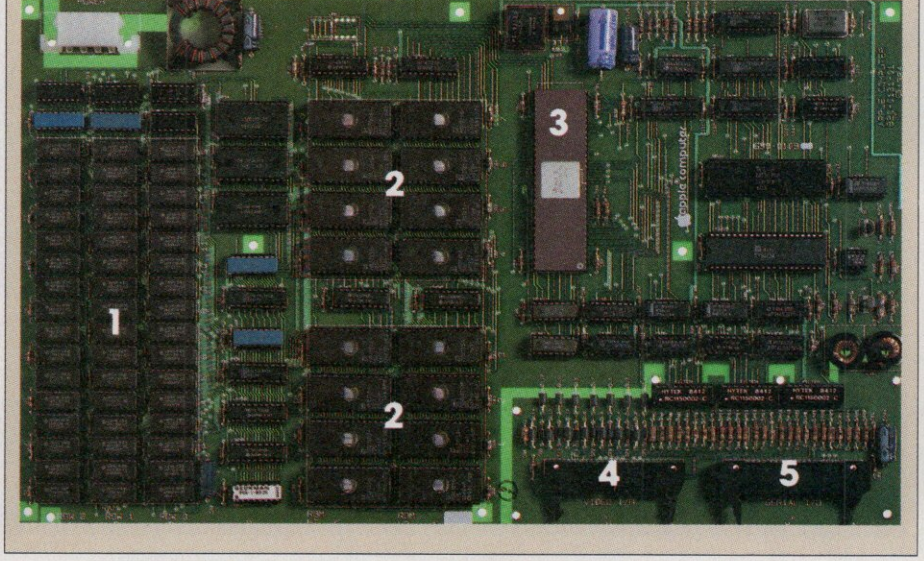
THE LASERWRITER



Although the $6995 price tag attached to the laser printer Apple has introduced to go along with the AppleTalk network might make you wince, Apple is convinced that offices will find the cost reasonable. The LaserWriter is not just a printer—it also contains a computer that is more powerful than the Mac or the Lisa. The LaserWriter's built-in computer offers extraordinary processing power, built-in type fonts, and advanced software. It has a speedy 12-megahertz Motorola 68000 processor, with 1½ megabytes of RAM and a whopping half megabyte of ROM. The LaserWriter's print engine is based on the canon LBP-CX print engine, which uses xerographic laser technology for printing images on paper.

The LaserWriter has two different interface connectors, an AppleTalk connector and an RS-232 connector. The AppleTalk connector allows the LaserWriter to be a shared peripheral in a network of Macintosh, Lisa, and other AppleTalk-equipped computers. To increase the printer's versatility, the RS-232 connector provides an easy way to hook up the LaserWriter to almost any type of computer with serial-communications capabilities, such as the Apple II and III series.

1. 1½-megabyte RAM (random-access memory) **2.** ½-megabyte ROM (read-only memory) **3.** 12-megahertz Motorola 68000 processor **4.** Input connector for AppleTalk-equipped devices **5.** Auxiliary-input connector for RS-232-equipped devices.



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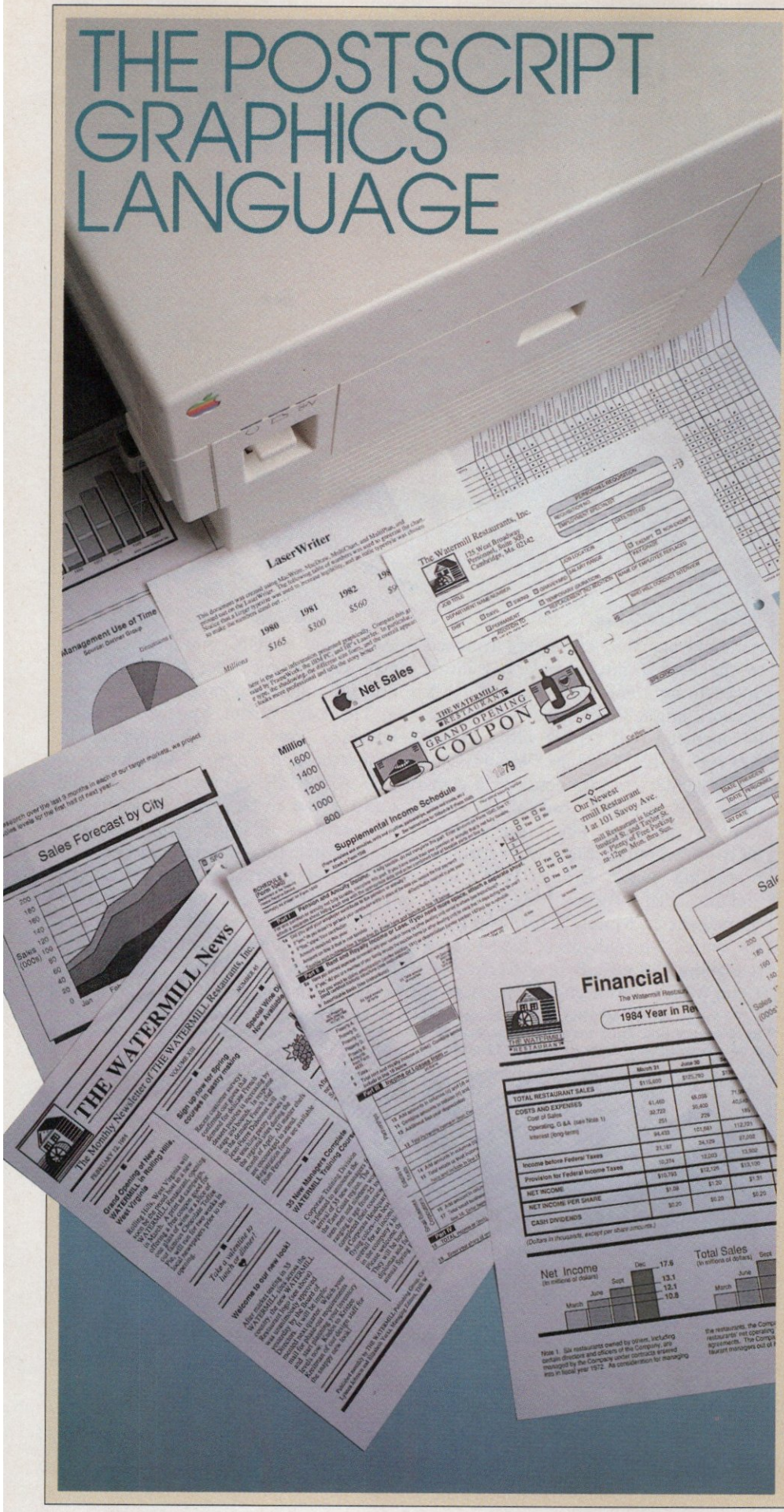
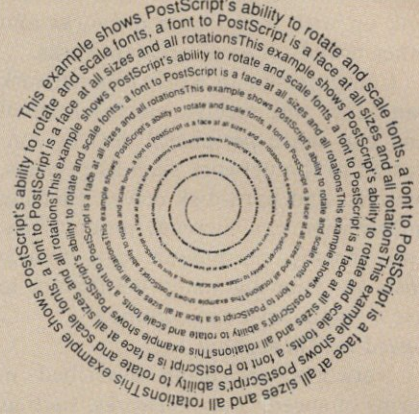


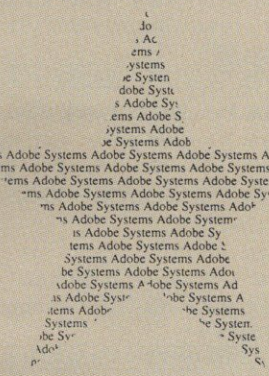
The LaserWriter's built-in computer uses a powerful and flexible new graphics language called PostScript, developed by Adobe Systems, Inc., of Palo Alto, California. PostScript is one of the powerful hidden features of the Macintosh Office System. Any computer (including an Apple II or III) can use PostScript to describe a page to the LaserWriter in a compact, concise manner. The LaserWriter uses this condensed description to construct all the images on the page.

The Macintosh Office System will be PostScript's first widely publicized application, but the language is not restricted to the LaserWriter or even to


This example shows PostScript's ability to rotate and scale fonts, a font to PostScript is a face at all sizes and all rotationsThis

which is PostScript-compatible, and the company plans to introduce other PostScript-compatible typesetting machines later this year. The availability of these products means that you can easily transfer Macintosh output to a commercial typesetting device.

This development may be of revolu-



tionary significance to the typesetting and printing industry. You will now be able to use your Macintosh to create true typeset materials suitable for publication. The LaserWriter will also eliminate the need for expensive galley proofs in the printing process. This cost reduction should be a real boon for poets, small presses, scholarly publishers, and others with tight budgets.

To top it off, Aldus of Seattle, Washington, is developing an amazing soft-

Times Roman
Helvetica
Courier
Symbol: Αδοβε
ITC Avant Garde Gothic
ITC Bookman
ITC Zapf Chancery
ITC Zapf Dingbats: ✻❡♣❝❢
ITC American Typewriter

ware package for the Macintosh called PageMaker that allows you to do professional page layout on a Macintosh. This product turns the Macintosh Office (with a LaserWriter and access to a PostScript-compatible typesetter) into a professional typesetting shop. PageMaker, priced at $495, is one of the more expensive application programs for the Macintosh, but since it is designed for the professional marketplace, the price seems reasonable. In fact, the product looks so good that we're even toying with the idea of using it here at *A+* to assist in the production of the magazine.

more than 1000K of data. In contrast, transferring a page of typeset-quality graphics on AppleTalk would require the transfer of less than 10K of data, because pages are encoded in a special graphics language called PostScript that takes much less memory for transferring a page. Apple expects that with the use of these advanced programming techniques, the performance of the AppleTalk network will compare favorably to that of IBM's PC Network.

Most networks for personal computers cost $500–$2000 per connection (a node in IBM's PC Network or Xerox's Ethernet costs $700–$1000), and many require an expensive central controller, head-end, or hub. AppleTalk, by contrast, costs $50 per connection for the Macintosh and Lisa and a few hundred dollars per connection for Apple IIs and even IBM PCs. When you compare the price of networks to their performance, AppleTalk emerges as a clear winner over any other networking solution for personal computers.

Apple realized significant price advantages by designing a relatively low-speed network for small groups of computers. The low speed allows the network to be constructed with low-cost, widely available semiconductor parts, which reduces the cost per node dramatically. Lower speed also allows for the use of inexpensive cable that costs 15 to 30 cents per foot, in contrast with costs as high as $4 per foot for the heavy-duty yellow Ethernet cable.

Since AppleTalk is based on the Zilog 8530 programmable communications chip, which is already built into every Mac and Lisa, the use of this chip makes other communications boards or serial interfaces unnecessary, which further reduces manufacturing costs.

Another significant savings, especially for smaller companies, is that any Macintosh user can set up and maintain an AppleTalk network. No network specialist is required, and office personnel can even run the wiring from desk to desk.

AppleTalk for Other Devices

Since the AppleTalk network hardware uses widely available low-cost parts, building interfaces for many other types of peripherals and computers will be easy. Apple plans to develop AppleTalk interfaces for a variety of computers, including the Apple II series and the IBM PC and compatibles.

AppleTalk is designed as an open system that can communicate with devices and networks that run different protocols. AppleTalk's networking protocols are consistent with the seven "layers" of the International Standards Organization (ISO) open-systems interconnection (OSI) reference model.

Apple will publish these protocols and provide information designers need to come up with interfaces for other standard protocols. Apple is already working on devices that will connect AppleTalk to other manufacturers' proprietary protocols, such as IBM's PC Network and Xerox's Ethernet. These devices will allow AppleTalk to serve as a tributary network that feeds into different network systems.

For technical details regarding AppleTalk, please see "The AppleTalk Personal Network" on page 35.

The LaserWriter

To go along with the AppleTalk network, Apple also introduced a fancy and pricey new laser printer called the LaserWriter.

The output from the LaserWriter is virtually typeset quality. The LaserWriter prints 300 dots per inch, and typesetting equipment prints 700 or more dots per inch, but it's hard to tell the difference without a magnifying glass.

The sample documents that illustrate this article (see facing page) are all examples of actual LaserWriter output. As you can see, the quality is excellent, far exceeding the capabilities of so-called "letter-quality" printers, which have been the standard of excellence until now. The LaserWriter now takes its place as the premier personal-computer printer by which other printers will be judged.

The LaserWriter is faster than the Imagewriter and most letter-quality printers, not to mention much quieter. Several variables affect its speed. Depending on the content of the pages, the LaserWriter can print up to eight pages a minute. A complex page of text and graphics takes about 20 seconds to print, and a simple page takes 10 seconds. Subsequent pages that use the same font come out significantly faster.

One of the first things that comes up in conversations about the LaserWriter is its price. Other less-expensive laser printers are available, but they cost less for a reason. The difference is that the LaserWriter is a powerful computer combined with a print engine, and the lower-cost models are basically only print engines with a simple interface, which limits the complexity and quality of their output. Other low-cost laser printers such as HP's LaserJet can print only one font at a time. Each font

is contained in a separate ROM cartridge. The low-cost laser printers cannot mix large fonts and graphics nearly as well as the LaserWriter can.

The computer built into the LaserWriter uses a powerful and flexible new graphics language called PostScript, developed by Adobe Systems, Inc., of Palo Alto, California (see "The PostScript Graphics Language" on page 30). The Macintosh (or any other computer) uses PostScript to describe each page to the LaserWriter in a compact, concise manner. The LaserWriter uses this condensed description to construct all the images on each page.

The LaserWriter comes equipped with four fonts built into ROM: Courier, Times Roman, Helvetica, and Symbols (for math and logos). You can also load other fonts into the LaserWriter's RAM. Adobe Systems, Inc., plans to announce more than 50 loadable fonts during 1985.

The LaserWriter can work with a virtually unlimited range of font sizes, from 3 points up, while retaining the quality of reproduction necessary for presentation graphics. Standard Mac font styles are also supported.

With the LaserWriter, you can use graphics from either MacPaint or MacDraw, but MacDraw gives the best results. MacPaint's graphics are transferred to the LaserWriter as bit-mapped graphics, which means they appear much as they do on the Mac's screen. MacDraw graphics transfer as a series of objects that the LaserWriter redraws at a much higher resolution than what is possible with MacPaint. Therefore clip art you create with MacDraw produces better results on the LaserWriter than does clip art you create with MacPaint. Since most current clip-art packages for the Mac were created with MacPaint, we will now probably see a new wave of clip-art packages created with MacDraw.

Almost any type of paper works with the LaserWriter printer, but standard copier paper works best. The printer accepts letterhead and bond paper from 8 pounds to 34 pounds. The size of the paper can be letter, legal, or A4 or B5 (European sizes), in 100-sheet cassettes. To print envelopes and labels, you have to manually feed them into the printer. The LaserWriter also prints on standard transparency material.

The LaserWriter's designers gave it a replaceable toner cartridge that not only includes toner, but also contains the printer components that can cause the most maintenance problems. The cartridge costs $99 and needs replacement every 2000–3000 pages, which works out to a cost of 3–5 cents per page. Apple estimates that the mean time between servicing is about 40,000 pages, and the mean time between major maintenance is 100,000 pages. Apple recommends an average print load of 3000–4000 pages per month to keep the LaserWriter healthy.

Several additional components of the Macintosh Office weren't officially announced at the stockholders' meeting, but Apple outlined its plans to introduce several related products later this year: a fileserver, an AppleTalk interface card for IBM PCs and compatibles, and interface devices for the Apple II series.

The first of the products that should be available is the fileserver, which is a mass-storage device for the network. You can think of a fileserver as a huge filing cabinet that is available to everyone connected to the network. Apple will offer two versions of the fileserver, one with 20 megabytes of storage and another with 40 megabytes of storage. Apple plans to bring the fileserver to market sometime this summer.

In a bold move, Apple has also announced its intention to market a peripheral board for the IBM PC family and compatibles. It will allow these computers to directly connect to AppleTalk networks to share information and resources. Not only does this product make integrating Macintoshes and PCs a simple and straightforward task, but it also positions AppleTalk as a price/performance leader among IBM PC networks. The IBM-interface board will cost several hundred dollars, which is much less expensive than IBM's $700-per node PC Network. Tecmar also plans an AppleTalk interface board for the PC family.

To allow the entire Apple computer family to participate in the network, Apple will also market a board for the Apple IIe and a connector device for the IIc. These products should be ready sometime this fall. Since the AppleTalk network is built out of semiconductor parts that are widely available and inexpensive, third-party developers will probably have their own AppleTalk interfaces available sooner. Apple is encouraging third-party development of AppleTalk network products. According to Gursharan S. Sidhu, the main engineer at Apple responsible for AppleTalk, "Our message to third-party developers is clear: You are our development team." ✚

▶ PRODUCT INFORMATION

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

AppleTalk Personal Network Connector Kit
Includes: connection module, 2-meter precut cable, cable connector
Requires: Macintosh or Lisa (versions for Apple II series and IBM PCs and compatibles available later this year)
List Price: $50
CIRCLE 750 ON READER SERVICE CARD

AppleTalk Personal Network trunk cable
List Price: 10-meter precut section, $50; bulk roll of 100 meters, about $400
CIRCLE 751 ON READER SERVICE CARD

LaserWriter
List Price: $6995
Requires: Any computer equipped with AppleTalk or RS-232 communications capabilities
CIRCLE 752 ON READER SERVICE CARD

PageMaker
Aldus Corporation
616 First Avenue, Suite 400
Seattle, WA 98104
(206) 467-8165
List Price: $495
Requires: 512K Macintosh or Lisa with MacWorks
CIRCLE 753 ON READER SERVICE CARD

Linotronic
Allied Linotype
425 Oser Avenue
Hauppauge, NY 11788
(516) 434-2000
Contact: Pat Juliano, VP Sales
CIRCLE 754 ON READER SERVICE CARD

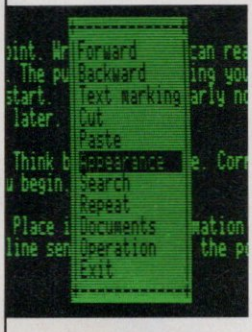
FOR DEVELOPERS AND OTHERS WHO WANT TECHNICAL DETAILS
Inside AppleTalk
Inside the LaserWriter
Apple Computer, Inc.
467 Saratoga Road, Suite 621
San Jose, CA 95129
(408) 996-1010
List Price: $75 each
CIRCLE 755 ON READER SERVICE CARD

Macintosh AppleTalk Manager Manual
AppleTalk software supplement (disk with AppleTalk drivers and Pascal interface)
To order these items you must be a software or hardware developer and submit a proposal for an AppleTalk application to: Macintosh Developers Group MS 2-T, Apple Computer Inc., 20525 Mariani Avenue, Cupertino, CA 95014
CIRCLE 756 ON READER SERVICE CARD

PostScript Language Manual
Adobe Systems Inc.
1870 Embarcadero Road, Suite 100
Palo Alto, CA 94303
(415) 852-0271
List Price: $30
CIRCLE 757 ON READER SERVICE CARD

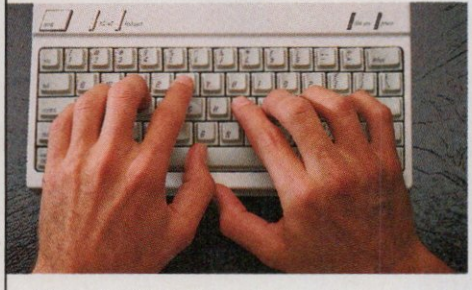
If a Word Processing Program Doesn't Give You These 8 Tools for Better Writing, It's Not Perfect.

1 Pop-up menus—so you can start writing better right away.



Perfect Writer™ pop-up menus use simple English language words. No complicated commands to memorize or slow you down.

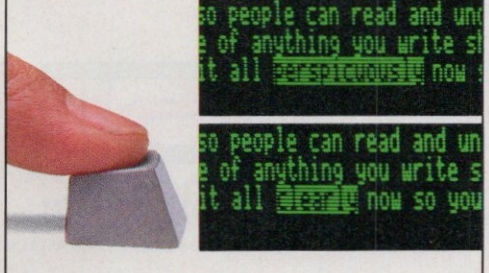
2 Simple function and operation that keeps your mind on what you're writing.



You edit with the keys right under your fingertips. And menus appear right in the workspace with your document.

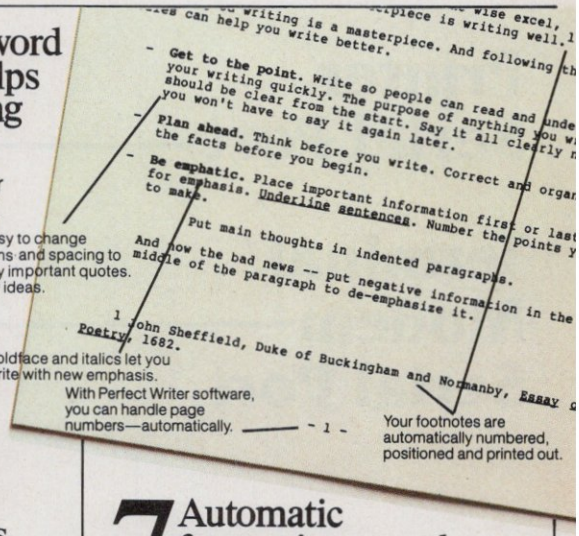
3 Powerful editing features at the touch of a single key.

You can move text. Search and replace. Add or delete words, sentences, even entire paragraphs.



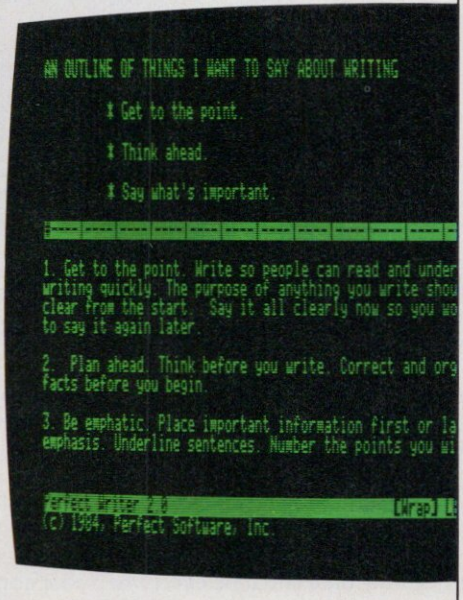
4 A built-in 50,000 word dictionary that helps you prevent spelling mistakes.

The Perfect Speller™ spelling checker scans your document and points out spelling errors. Automatically.



5 A built-in thesaurus to help you choose exactly the right word.

With the Perfect Thesaurus™ disk, the right word for what you're writing is always right at your fingertips.

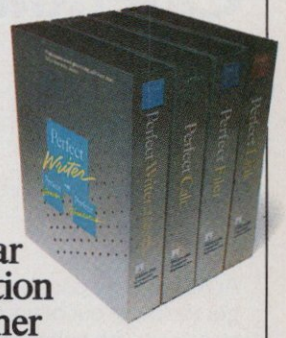


6 Split-screen windows that help keep your thoughts organized—while you write.

You can use one window to jot down notes, key points or an outline—as you develop your text in the other window.

7 Automatic formatting to make your writing look even better on paper.

Perfect Writer appearance features work with most popular printers. So it's easy for your document to look like a masterpiece.



8 Modular integration with other Perfect™ Software.

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Costa Mesa, CA 92626

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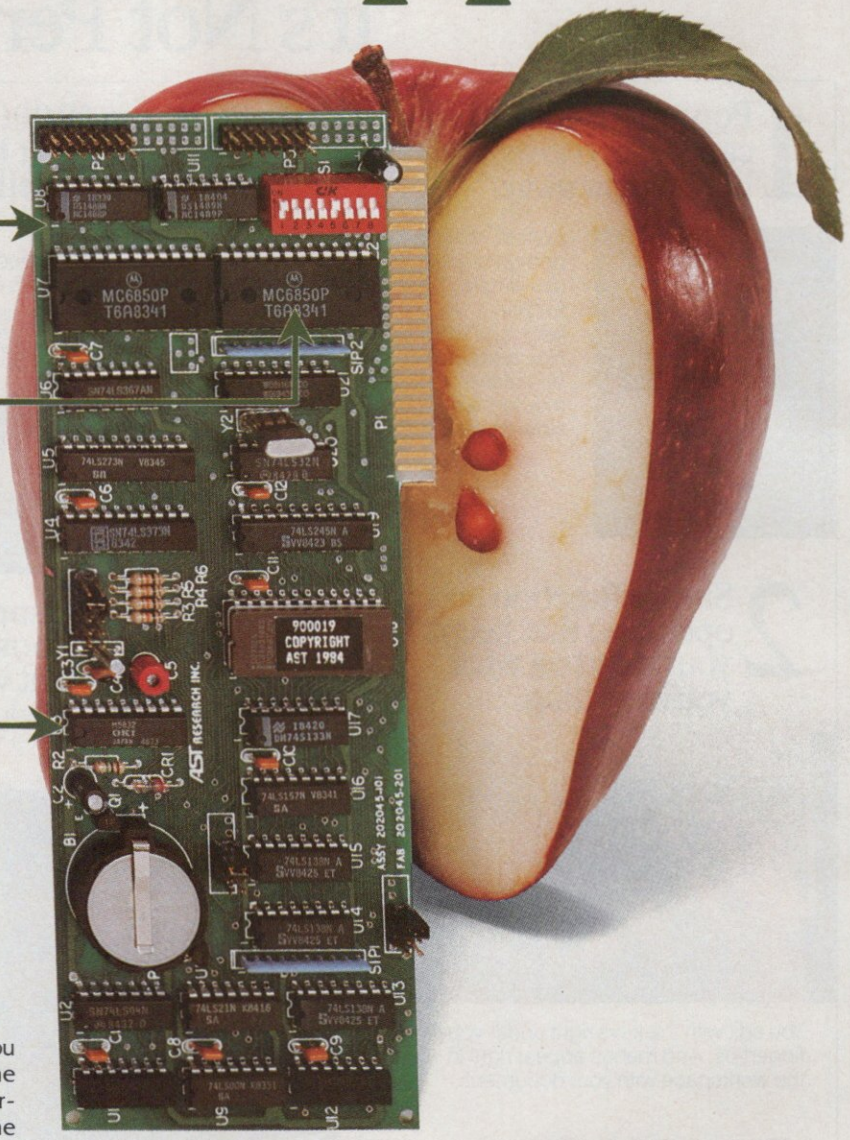
CIRCLE 441 ON READER SERVICE CARD

AST's into Apples!

Printer Serial Port

Terminal/ Modem Serial Port

Clock Calendar



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Introducing Multi I/O,™ the most comprehensive enhancement board you can buy to fill the slots in your Apple IIe.™ With Multi I/O, you only need one board and one slot to do the job of three. You see, Multi I/O gives you a printer serial port, a terminal/modem serial port, and a ProDOS™-compatible clock/calendar with battery backup all on one card!

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CIRCLE 323 ON READER SERVICE CARD

APPLETALK

▶BY FREDERIC E. DAVIS

THE APPLETALK PERSONAL NETWORK

TECHNICAL SPECIFICATIONS

One of Apple Computer's goals over the last few years has been to ensure that you could use a computer even if you weren't interested in the technical details. You won't have to become a LAN (local-area network) expert to use or even to hook up AppleTalk.

If you're interested in getting the full story, however, you'll be happy to know that Apple is disclosing all the nitty-gritty details. You can get the full technical information, including extensive documentation, directly from Apple. (You can obtain the developers' handbook called *Inside AppleTalk* by sending $75 to Apple Computer, Inc., 467 Saratoga Avenue, Suite 621, San Jose, CA 95129—California residents should include sales tax.) Until then, or if you only want an overview, here's *A+*'s summary of the AppleTalk Personal Network technical specifications.

AppleTalk supports up to 32 nodes per network, with a raw data transmission rate of 230.4K bits per second (bps) over a total cable length of up to 300 meters (see figure 1). As with IBM's PC Network and most other local-area networks, AppleTalk is conceptually composed of a series of layers, each of which has a specific role in the handling of information.

The AppleTalk software is compact, taking up only 6K of memory per computer.

The hardware (or physical layer) performs the functions of bit encoding/decoding, synchronization, bit transmission/reception, and carrier sensing. This layered architecture of AppleTalk allows the physical layer to be replaced by another medium, as long as these functions are provided. Thus, Apple or a third-party developer can easily upgrade the network hardware (for higher speed and the like) without affecting network software.

AppleTalk uses an inexpensive linear trunk cable for transporting data. The trunk cable has intervening connection modules that can be connected anywhere along it. The connection modules are attached to nodes (computers or peripherals) with a short drop cable. This type of network is known as a multidrop line or multipoint link.

The AppleTalk multidrop line is an electrically balanced, transformer-isolated serial-communications system. Balanced, transformer-coupled signaling reduces both RFI (radio-frequency interference) and noise susceptibility on the network.

The connection module and drop cable passively connect each node to the trunk cable, which allows a device to fail without disturbing communications. You can easily add or remove nodes with only minor disruption of service.

The connection module is a small plastic case measuring $3 \times 2 \times 1$ inches that contains a transformer, resistive and capacitive circuits for noise immunity, and two three-pin miniature DIN connectors. Attached to the plastic case is an 18-inch drop cable that terminates at the node with either a DB-9 (Mac) or DB-25 (Lisa) connector (see figures 2 and 3, pages 36 and 37).

The AppleTalk connection modules contain a transformer with a 1:1 turns ratio and tight coupling between primary and secondary windings. The transformer has electrostatic shielding that provides ground isolation, as well as protection from static discharge.

The two three-pin connectors have switches connected to a 100-ohm terminating resistor (R2 in figure 3). Each of the three-pin connectors has a coupled switch (J1 and J2 in figure 3); if both connectors are used, the switches are open, but if one of the connectors is not used, the 100-ohm terminating resistor is connected across the line. The connection across the line that the resistor creates lets AppleTalk know that this connection module is a terminating node on the network.

The connection module also contains a capacitor and four other resistors. One resistor (R1 in figure 3) provides static drain for the cable-shield-to-ground connection. Two other resistors (R3 and R4 in figure 3) increase the noise immunity of the receivers, and the

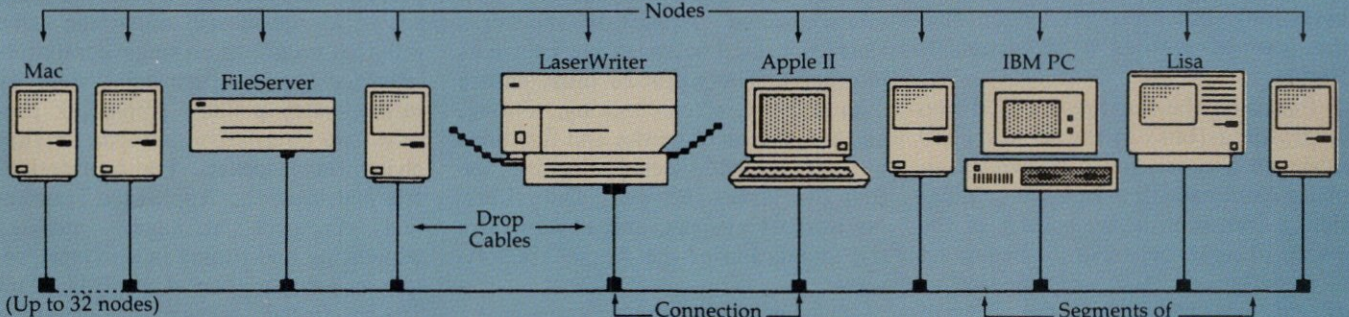

Figure 1: Diagram of AppleTalk network topology

last resistor (R5 in figure 3) and the capacitor (C1 in figure 3) isolate the frame ground and prevent potentially hazardous ground-loop currents.

Trunk Cable

The trunk cable is a shielded, twisted-pair cable (Belden 9272 or equivalent) with an impedance of 79 ohms and a capacitance of 68 picafarads per meter. The cable is shielded with an 85% coverage braid and has 22 AWG stranded conductors rated at 17 ohms per 300 meters. It is available from Apple in precut lengths of two meters and ten meters, terminating at each end with a three-pin DIN connector. Apple also offers a 150-meter bulk roll with separate connectors for custom installations.

Hardware Driver

The hardware you need to create an AppleTalk node consists of three main components: a controller, a driver (transmitter), and a receiver. Although AppleTalk does not mandate the use of any particular chips, Apple has chosen to make its controller a Zilog 8530 Serial Communications Controller chip, which is already built into every Macintosh and Lisa. The Zilog 8530 is a powerful, complex chip that can be instructed to use a variety of communications methods and protocols, including both RS-232 and RS-422. The driver chip (26LS30) and receiver chip (26LS32) Apple chose are both standard RS-422 support chips. All three of these chips are widely available at a low cost.

For AppleTalk, the Zilog 8530 is programmed to use the SDLC (synchronous data-link control) mode, assembling data and retrieving it from packets or frames marked by special bit patterns known as flags.

SDLC is a bit-oriented protocol, which means that data to be sent over the network does not have to conform to any particular pattern of bytes or characters (the SDLC protocol automatically takes care of any bit pattern that looks like the special flag sequence). Frames in AppleTalk can be up to 600 bytes long, but messages longer than that can be sent as a succession of frames.

Pulses on the line are encoded into binary data (bits) in the 8530's FM0 mode, in a process also known as biphase space encoding. In FM0 modulation, a transition in the voltage of the electrical signal occurs at the beginning of every bit cell. A *0* is represented by an additional transition at the center of the bit cell, and a *1* is represented by no transition at the center of the cell. The electrical transition at the beginning of each bit position provides the reference point that allows each station on the network to keep its receiving clock signal in step with the sender; therefore, the signal is said to be "self-clocking."

Signaling, the control of the actual electrical impulses, involves the RS-422 method (similar to the RS-232 standard used for most serial connections, but using balanced signals). Each of the attached devices must have the equivalent of a standard RS-422 driver chip (26LS30) and receiver chip (26LS32) for properly balanced signaling. The receiver chips are always connected to the system and pass all AppleTalk data to the controller chip. Only one driver chip is enabled at a time, with the AppleTalk software controlling which device can transmit data.

Figure 2: AppleTalk connection module

Software Specifications

AppleTalk's software is designed to support file exchanges among computers and peripherals on a single AppleTalk network and among machines on interconnected AppleTalk networks (interconnected networks are known as internets). The software must ensure data delivery, error checking, routing, and translation of names and functions into network addresses. Protocols in the first five layers (Physical, Data Link, Network, Transport, and Session) are the foundation of the AppleTalk software.

The AppleTalk software consists of a set of routines and a pair of device drivers called the Macintosh AppleTalk Manager. The AppleTalk Manager is about 6K of code that becomes part of the Macintosh's operating systems, allowing application software to send and receive information via AppleTalk. Apple will provide a Pascal interface that gives programmers an easy way to use the AppleTalk Manager's capabilities.

The first layer of the software contains the AppleTalk Link Access Protocol, which handles node-to-node delivery of data on a single AppleTalk network and is the most important part of the network for developers to understand. The Link Access Protocol is responsible for finding out when the line is free, sending the data, and recognizing which data should be received.

While the Link Access Protocol software layer is handling the flow of data to and from the hardware layer, AppleTalk's Datagram Delivery Protocol handles data routing, including the forwarding of data over links among various interconnected networks.

The Datagram Delivery Protocol works in conjunction with the Routing Table Maintenance Protocol, which each bridge uses for such purposes as keeping track of each reachable network on the internet and for finding the shortest way to reach each network.

The AppleTalk Link Access Protocol uses CSMA/CA (carrier-sense multiple access with collision avoidance) for access control. *Carrier sense* means that a sending node first listens to the network to hear if any other node is using the line and defers to ongoing transmission. *Collision avoidance* means that the protocol attempts to minimize collisions. A collision occurs when two (or more) nodes transmit frames of data at the same time. In AppleTalk CSMA/CA, all transmitters wait until the line is idle for a minimum time plus an additional time determined by a number whose range is adjusted according to perceived network traffic.

Most application software will connect to AppleTalk with interfaces known as sockets (in much the same way that programs on single computers interface to the operating system by calling entry points). AppleTalk provides two alternative methods for supplying those sockets. For transaction-oriented uses, the AppleTalk Transaction Protocol manages message sequencing and timing in a request/response format. The AppleTalk Data Stream Protocol takes care of changing streams of characters into packets,

sending them on their way, checking the received packets for errors, requesting retransmission of bad packets, and making sure that any duplicate packets are discarded.

Other AppleTalk protocols include the AppleTalk Transaction Protocol, which manages socket requests and responses; the Name Binding Protocol, which gives user-definable names to network nodes; the AppleTalk Filing Protocol, which is used for fileservers; and the Printer Access Protocol which the LaserWriter and other printers use. AppleTalk uses an eight-bit identification number (node address or node ID) and an appended 16-bit frame-check sequence (FCS). Calculation of the FCS involves the standard CRC-CCITT polynominal. The receiving node discards packets received with an invalid FCS, and the transmission is retried.

In addition to possessing the ability to direct packets of information to a specific node, AppleTalk allows the broadcasting of packets to all the nodes on the network by having the sending node use the node-address number 255.

The AppleTalk software-protocol architecture is an example of a layered, open system. AppleTalk's layered structure conforms to the ISO-OSI (International Standards Organization-Open Systems Interconnection) reference model, a standard for local-area networks. The use of the ISO-OSI structure facilitates the design of new functions and applications for AppleTalk. This approach allows third-party developers to combine their efforts with Apple's, create defined software and hardware interfaces, link to other networks, and to replace any element of the standard AppleTalk software.

Apple has created the framework, set the standards, and validated the overall AppleTalk concept. It's up to the rest of the personal-computer community to take it from there. Since Apple enjoys the broadest third-party-developer support, we expect to see many creative new network applications making their debut on AppleTalk. We'll keep you posted about new developments in future issues of *A+*. ✚

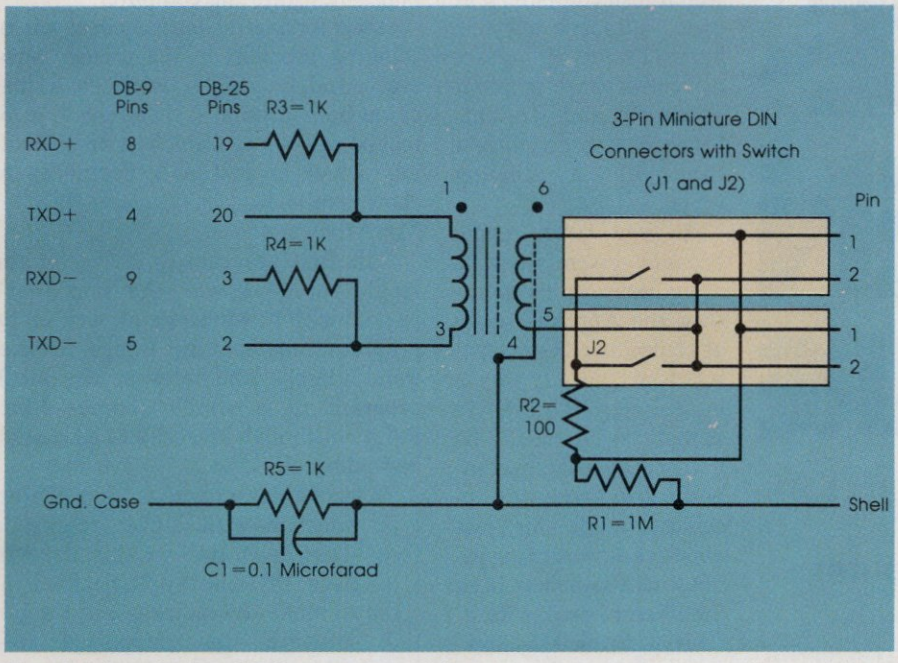

Figure 3: Schematic of AppleTalk connection module

for addressing nodes on the network. AppleTalk nodes have no permanent address or ID number built into them. When a node is activated, it guesses a node number either by extracting its number from long-term memory or by generating a random number. The node then attempts to send a message to the node number it has guessed, and awaits an acknowledgment. If it receives an acknowledgment, it knows that the chosen number is already in use, so it repeats the process with a different guess until it succeeds in finding a unique, unused number.

Packet integrity is ensured through the use of a two-byte checksum (16-bit cyclic-redundancy check) at the end of the AppleTalk Link Access Protocol frame.

Frame length may vary arbitrarily, with a stipulated maximum length of 600 data bytes. This data is assembled into frames with a three-byte header

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BY J. ANTHONY DIRKSEN

MOUSE-DRIVEN SOFTWARE

FOR APPLE II COMPUTERS

The entire personal-computer industry has taken to the mouse like Hamlin rats dancing to the Pied Piper's tune.

Ever since Apple introduced mouse technology on the Lisa in 1982, these handy little accessories have been breeding like—mice. In fact, the entire personal-computer industry has taken to the mouse like Hamlin rats dancing to the Pied Piper's tune.

It's easy to understand why. According to the promises, the mouse makes computing so simple that you just point at whatever you want. Move the mouse on a table, and you move a pointer on the screen. When you see something you like, click the mouse button, and the computer does the rest.

On the Lisa and the Macintosh computers, at least, almost everyone agrees that using mouse-driven software is about as simple and straightforward as controlling a car with a steering wheel.

In late 1983, Apple brought essentially the same mouse to its mainstay, the Apple II series of computers. As a hardware advance, it was a logical step. The Apple II had proven itself to be a most adaptable computer. Just about any accessory made for just about any other computer had somehow been modified to work with it.

It was unclear, however, whether the Apple II would be able to support some of the spiffier—and more useful—features of mouse technology. Unlike the new computers, the Apple II is run by a slower, eight-bit microprocessor that some people thought had been strained to the limit. Whereas the Lisa and the Macintosh do some of their tricks by simultaneously manipulating tens of thousands of pixels on the screen, the Apple II is basically a character-driven machine, which usually has to keep track of a much smaller number of fully formed characters.

Significant Differences

All these hardware details, though, pale by comparison when you consider the most significant difference between the Apple II and its younger cousins: From the ground up, the design of the Lisa and the Macintosh reflected a completely new way of thinking about computers. It's possible to interact in a different way with these computers, and the mouse is the single most important tool that makes that interaction possible. The Macintosh doesn't even have arrow keys, which forces you to use the mouse whenever you want to move the cursor on the screen.

The Apple II *does* have arrow keys, however, and the technology surrounding its development was rooted in more traditional views of how to use a computer.

Transferring the mouse itself to the Apple II was probably an easy enough task. As with hundreds of other Apple II peripherals, the job involved building a board, attaching an accessory, and plugging it into the computer.

Transferring the entirely new way of thinking inherent in the mouse, however—and making it work on a machine built around a different kind of technology—was a much more difficult job, which is just now beginning to show results.

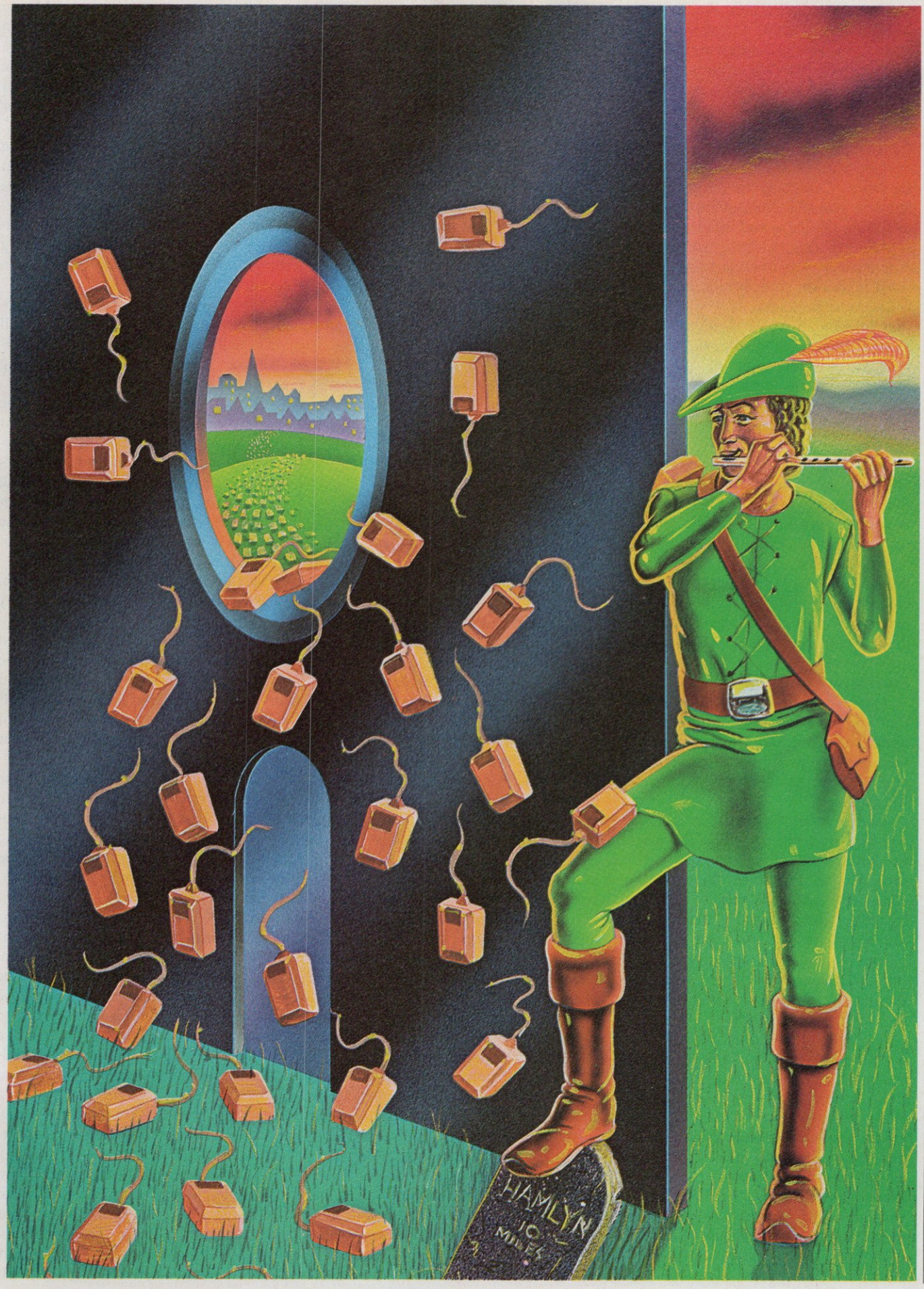
MacMimics

The first program to arrive for the AppleMouse II was the one that's packed with it: MousePaint, written by programming whiz Bill Budge. MousePaint closely resembles a Macintosh program of a similar name—MacPaint—although it sacrifices resolution and adds color.

It's possible to make a MousePaint-type program with higher resolution (see "Dazzle Draw," in this issue of *A+*, page 58), but Apple decided instead to make the mouse—and the initial software that supported it—compatible with any Apple II ever made, providing it's been upgraded to 64K of memory.

Although less dazzling than Dazzle Draw and less serious than MacPaint, MousePaint succeeds well at what it tries to do—giving mouse owners a way to use their new accessory right away. It's a capable piece of graphics software that offers an entertaining way to quickly generate some high-quality pictures. Furthermore, if you're going to buy an AppleMouse anyway, it costs you essentially nothing.

The MousePaint package includes an on-disk tutorial that teaches the basics about transporting the mouse around your tabletop. Unlike the program itself, however, the MousePaint tutorial won't work with the early Apple IIs that don't have Applesoft BASIC in hardware and an auto-start ROM. (If you're one of those early Apple owners, however, you're probably used to taking on all sorts of challenges with your system.)



ADRIAN DAY

One more important detail about MousePaint is that it currently supports only Apple's Imagewriter, Dot Matrix, and Scribe printers. If you want to use MousePaint with another kind of printer, either save each image to disk and print it—by performing a screen dump with another program—or get MousePrint from Ahware of Danville, California, a program that lets you transfer MousePaint pictures to Epson, Okidata, and other printers.

Another original program for the AppleMouse was Jane, a combination word processor, spreadsheet, and database. At first glance, it would appear that Jane on an Apple II might be able to challenge the Macintosh, since it manages to get some of the same ideas—including icons, ease of use, a graphics orientation, and the integration of applications—into an Apple II system.

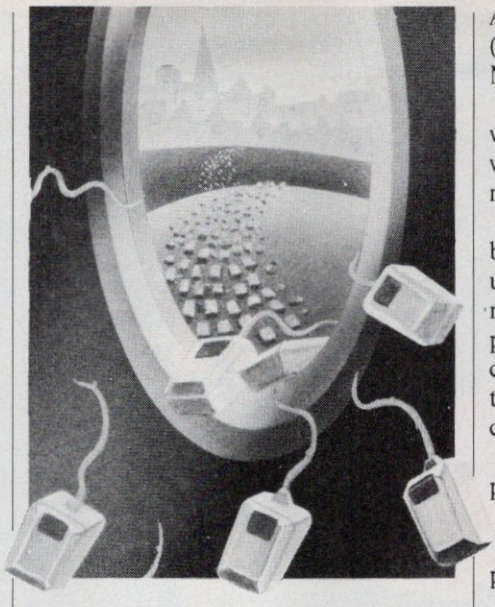
Jane does have its limits, however, and even an average user might reach them relatively fast. The main problem is simply that Jane—like the Macintosh—tries to do everything in a graphics mode. The Apple II isn't really designed to be a graphics-driven machine, though, and it just can't keep up. So, as your files grow, Jane slows down, making it inappropriate for most heavy applications.

Stirring Software

I don't want to give the impression that you can't employ the mouse to do useful work, but, so far at least, the best mouse-driven programs on the Apple II are the ones that don't try to copy the Macintosh.

Bank Street Writer, for instance, was already a classic before the mouse version arrived. It was one of the first programs to introduce the idea that computers could be easy to use. Designed for children, Bank Street Writer also found its way into a lot of serious places, where adults—who didn't want the headaches of learning a word-processing program—discovered that they, too, could process words.

With the mouse, Bank Street Writer is better than ever. With the keyboard, the program's biggest fault is the same thing that makes it so simple—it uses a large number of on-screen menus to guide you step-by-step through every decision you have to make. The experienced user won't find many shortcuts around these menus. With the mouse, you can speed through the menus and make selections much more quickly than you can by using the keyboard alone.



The best mouse-driven programs on the Apple II are the ones that don't try to copy the Macintosh.

Another well-designed mouse program, Dollars and Sense—a personal financial-management program—can be controlled almost exclusively with the mouse, except when you are entering your actual financial data. As you move the mouse through the Dollars and Sense menus, an inverse display highlights each possible selection; choices that aren't implemented until you do something else remain the same.

If you don't quite know what to do at any stage in the program, you can point and click the mouse inside the on-screen brackets ([ ]) on any line and get a short help message. Using these messages, a typical user can probably figure out most of the instructions necessary to run Dollars and Sense without ever opening the manual.

Another good mouse-related feature of the program: when you're editing existing information about accounts, you can move the mouse to the specific part of each line that needs changing. If you misspell an entry, for instance, you can move the mouse to the part of the word that's incorrect and fix it, rather than retyping the entire line.

A Mouse by Any Other Name . . .

Both Bank Street Writer and Dollars and Sense are available separately. They can also be purchased together in a bundle with an alternative mouse for Apple II computers—the A+ Mouse (no relation to this magazine) from Mouse Systems.

If you build a better mousetrap, the world will beat a path to your door. But what happens if you build a better mouse?

Arguably, the A+ Mouse may be a better mouse. It's an optical device that uses light to read its location from a metallic grid of small squares. The AppleMouse, by comparison, is mechanical, calculating its position by tracking the movements of a small ball that's in contact with a tabletop.

Mouse Systems claims that the AppleMouse, because it's mechanical, will eventually wear itself out. The A+ Mouse, in contrast, has no moving parts and nothing to break down.

Of more immediate importance, the feel of the A+ Mouse is quite different than that of the AppleMouse. It's lighter; comfortably sloped; and, since it's optical, requires less arm movement to control. You can place the special metallic grid—on which the A+ Mouse moves—in your lap or set it on top of file folders on your desk.

Is the A+ Mouse good enough, though, to warrant paying extra money and giving up MousePaint? Personally, I'm not sure I'm ready to be weaned from the AppleMouse or to add one more thing—the grid—to keep track of on my desk. Nevertheless, the A+ Mouse is worth trying, especially if you're interested in Bank Street Writer or Dollars and Sense.

The A+ Mouse is designed for the Apple IIc, but you can also plug it into the mouse port of any other Apple—including the Macintosh or Lisa—or into the AppleMouse II board (which you can buy only with Apple's mouse).

A Tricycle for the Mind

Probably some of the best applications for using the mouse are those that don't pretend to be anything but fun. Kids' programs, in particular, may be quite suited to mouse control, since the mouse gives children an easy way to command the computer. The mouse even makes it possible for small children to use some relatively advanced programs.

My four-year-old, for instance, figured out all by himself how to write songs with Music Construction Set. Fortunately, he hasn't discovered how to save his atonal compositions to disk.

The idea behind Music Construction Set is elegantly simple. The screen displays a staff, notes, rests, and program controls. To write music, you simply

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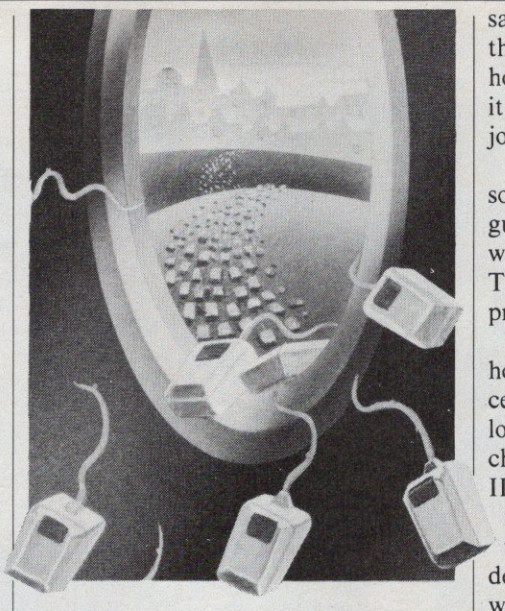
pick up a note, carry it up to the staff, and place it wherever you want. To play the music, just point at the picture of the piano and click. Like its relative Pinball Construction Set, the Music Construction program is basically a playground where you can try out some new things on your computer without learning a lot of technical information.

Another good program, How About A Nice Game of Chess, allows you to use the mouse to move playing pieces around the on-screen board. After you select a piece, the options for your next move are highlighted as you drag the mouse on the table.

It's just about the simplest, most natural way to play a game such as chess on a computer. Compare it to other chess programs, which require that you type in those A5 to C7 codes that sound like something out of assembly language.

One major problem with some mouse-driven entertainment programs occurs when they're designed to work with alternative types of peripherals as well as with the mouse. In that situation, most programmers design around the least-sensitive device—usually the joystick—which makes the connection between mouse and on-screen cursor a lot less smooth than it could be.



The mouse gives children an easy way to command the computer.

Still, that drawback may not detract from children's software programs, such as Grandma's House, because the sacrifice in sensitivity is made up for by the fact that kids can easily pick up on how to use the program and can control it more naturally than they could with a joystick.

So far at least, the mouse-driven software on the Apple II hasn't even begun to come up to the standard of software for the Lisa or the Macintosh. The promises are there, but so far the programs aren't.

The situation may soon change, however. Apple has seeded many of its certified developers with tools that allow them to control the Mousetext characters that are built into the Apple IIc. Mousetext replaces the inverse flashing characters of the old Apple II with a set of graphics characters that developers can manipulate as they would any other fully formed character.

Apple is also equipping developers with new tools that give them easy, consistent ways to control the double-high-resolution graphics built into the Apple IIe and IIc. The owners of the earlier Apple systems may be left behind as these new programs appear. The owners of newer systems, though, will probably get programs with twice the on-screen resolution. These programs may begin to approach the style and the

▶ LITTLE-KNOWN FACTS ABOUT MICE

Here are a few tricks—and some surprises—that the AppleMouse manual doesn't include:

1. The mouse runs faster on an Apple IIe than on an Apple IIc—for a simple reason. On the Apple IIc, the computer's main microprocessor must keep track of the mouse's button and position as well as control many other aspects of the system.

On the Apple IIe, on the other hand, a separate microprocessor on the mouse-interface card looks after that information, freeing the main microprocessor for other work.

Getting that bit of extra speed requires a trade-off. Because the video display on the Apple IIe wasn't created with the mouse in mind, the mouse can produce streaks on the screen, leaving a split-second ghost behind as you drag it across the table.

2. You can use the mouse as an alternative joystick on the Apple IIc, but only when you are using BASIC programs.

Because both of the devices share the same port, the mouse position can be translated into a joystick position, using the procedure below. (The mouse button, however, will not work as a joystick button does. Instead, you will need to use the open-apple and closed-apple keys.)

With your system in BASIC, type PR#4 and press Return. Type CONTROL-A to initialize the mouse and PR#0 to return output to the screen; then run the program.

3. Apple's mouse patent covers its "pull-down menu, point-drag-click" procedure as well as the mouse itself. What this could mean—in theory, at least—is that Apple owns the sole right to that unique menu/mouse approach used in software for the Lisa and the Macintosh.

Certified Apple developers presumably will be allowed to use this patented procedure when developing software for Apple's systems. Companies developing mouse-driven programs for other systems may have to use "pop-up" menus and extra mouse clicks to avoid violating Apple's patent.

4. To display the Mousetext characters with their corresponding Roman characters on an Apple IIc, run this program:

```
5  D$ = CHR$(4)
10 PRINT D$; "PR#3"
15 FOR X = 1 TO 32
20 INVERSE
25 READ M$
30 PRINT CHR$ (27); M$;
35 NORMAL
40 PRINT " ";
45 NEXT X
50 RESTORE
55 PRINT CHR$ (24);
60 PRINT
65 FOR Y=1 TO 32
70 READ MM$
75 PRINT MM$" ";
80 NEXT Y
85 NORMAL
90 DATA @,A,B,C,D,E,F,G,
   H,I,J,K,L
95 DATA M,N,O,P,Q,
   R,S,T,U,V,W,X,Y
100 DATA Z,[,\,],^,_
```

5. The Apple III can utilize the same mouse and mouse board as the Apple IIe does, but not all the same software. A commercially available Apple III mouse program called Draw On is available from *On Three Magazine*.

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speed—if not the total integrated design—of a Macintosh.

The Apple II mouse-driven software programs that have already arrived basically represent first-generation software—some of it quite good. Almost all of it had to be created from scratch, however. What has already arrived is pretty impressive. What is still to come promises to be even better. +

J. Anthony Dirksen, a free-lance writer based in Silicon Valley, used his Apple II Plus, IIe, and IIc to test the programs described in this article.

▶ PRODUCT INFORMATION

AppleMouse IIe, AppleMouse IIc
Apple Computer, Inc.
20525 Mariani Avenue
Cupertino, CA 95014
(408) 996-1010
List Price: IIe, $149; IIc, $99
CIRCLE 615 ON READER SERVICE CARD

Mouseprint
Ahware
805 Luz Court
Danville, CA 94526
List Price: $22.95
CIRCLE 616 ON READER SERVICE CARD

Jane
Arktronics Corporation
P.O. Box 4190
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(313) 769-7253
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Bank Street Writer
Brøderbund Software
17 Paul Drive
San Rafael, CA 94903
(415) 479-1170
List Price: $69.95
CIRCLE 618 ON READER SERVICE CARD

Dollars and Sense
Tronix/Monogram
8295 South La Cienega Blvd.
Inglewood, CA 90301
(213) 215-0529
List Price: $100; Apple IIc version, $119.95
CIRCLE 619 ON READER SERVICE CARD

A+ Mouse
Mouse Systems
2336H Walsh Avenue
Santa Clara, CA 95051
(408) 988-0211
List Price: $150
CIRCLE 620 ON READER SERVICE CARD

Music Construction Set
Pinball Construction Set
Electronic Arts
2755 Campus Drive
San Mateo, CA 94403
(415) 571-7171
List Price: $40 each
CIRCLE 621 ON READER SERVICE CARD

How About a Nice Game of Chess
Odesta Corporation
3186 Doolittle Drive
Northbrook, IL 60062
(312) 498-5615
List Price: $34.95
CIRCLE 622 ON READER SERVICE CARD

Grandma's House
Spinnaker Software
215 First Street
Cambridge, MA 02142
(617) 868-4700
List Price: $29.95
CIRCLE 623 ON READER SERVICE CARD

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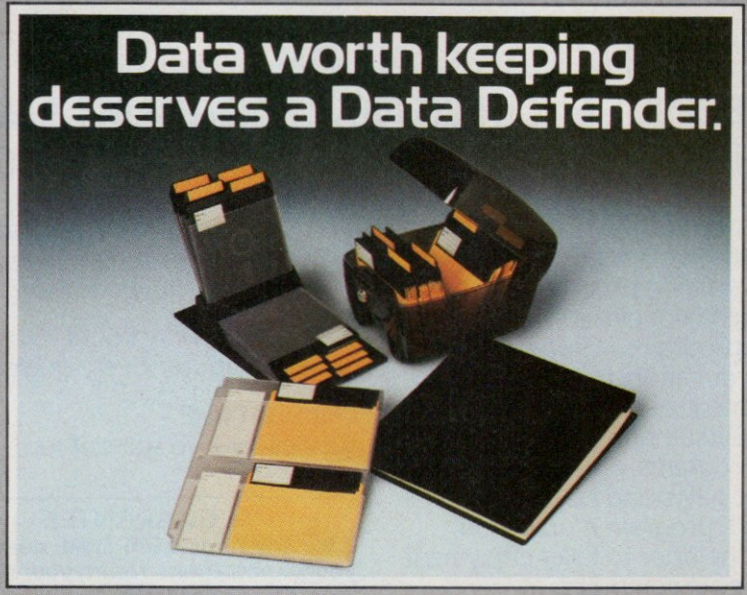

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▶ BY JONATHAN NEHER

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Math Magic	Methods & Solutions	II, II+, IIe, and IIc	48K	39.99	572
Picture Perfect	Methods & Solutions	II, II+, IIe, and IIc	48K	54.99	573
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Story Maker, A Fact and Fiction Toolkit	Scholastic, Inc.	II, II+, IIe, and IIc	64K	39.95	578
Cat 'n Mouse	Methods & Solutions	II, II+, IIe, and IIc	48K	49.99	579
Crypto Cube	Designware, Inc.	II, II+, IIe, and IIc	48K	39.95	580
How About a Nice Game of Chess	Odesta	II, II+, IIe, and IIc	64K	34.95	581
Mouse 21	Artsci, Inc.	II, II+, IIe, and IIc	48K	29.95	582
Music Construction Set	Electronic Arts	II, II+, IIe, and IIc	48K	40.00	583
Pinball Construction Set	Electronic Arts	II, II+, IIe, and IIc	48K	40.00	584
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Fontrix 1.2	Data Transforms, Inc.	II, II+, IIe, and IIc	48K	75.00	594
Graphics Department	Sensible Software	II, II+, IIe, and IIc	64K	124.95	595
Quick Draft	Interactive Microware, Inc.	II, II+, and IIe	48K	50.00	596
The Graphics Magician Picture Painter	Penguin Software	IIe and IIc	128K	59.95	597
The Graphics Toolkit	DEMCO Electronics	II, II+, and IIe	48K	595.00	598
PRODUCTIVITY					
Design Your Own Home Architecture	Avant Garde	II, II+, IIe, and IIc	48K	99.95	599
Design Your Own Home Interiors	Avant Garde	II, II+, IIe, and IIc	48K	69.95	600
Design Your Own Home Landscape	Avant Garde	II, II+, IIe, and IIc	48K	69.95	601
Jane	Arktronics Corporation	II, II+, IIe, and IIc	64K	125.00	602
SmartHome I	CyberLYNX Computer Products	II, II+, IIe, and IIc	48K	499.00	603
Bank Street Writer	Brøderbund	IIe and IIc	128K	69.95	604
Cut & Paste	Electronic Arts	II, II+, IIe, and IIc	48K	50.00	605
Format II	Kensington Microware Ltd.	II, II+, IIe, and IIc	64K	150.00	606
UTILITY					
Micro Cookbook	Virtual Combinatics	IIe and IIc	48K	40.00	607
Catalyst IIc	Quark, Inc.	II, II+, IIe, and IIc	64K	149.00	608
Pic-Quick	Third Wave Technology	II, II+, IIe, and IIc	48K	39.95	609
Print-Quick	Third Wave Technology	II, II+, IIe, and IIc	48K	39.95	610
EasyCom/EasyGo	Transend	II, II+, IIe, and IIc	64K	129.00	611

This chart contains a sampling of products, and the information herein is based on manufacturers' claims. For more information on the products listed above, circle the appropriate card number on the Reader Service Card in this issue.

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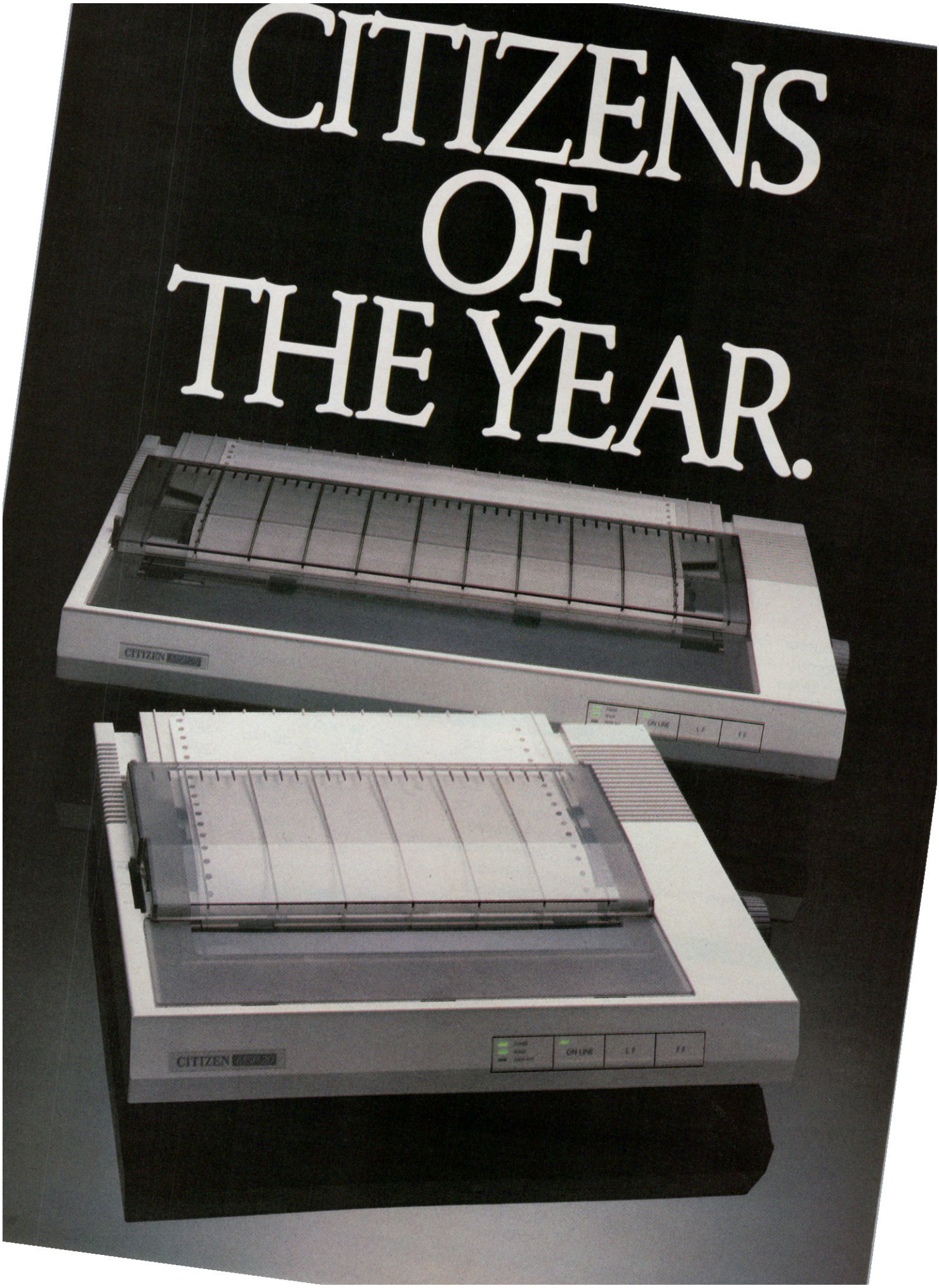

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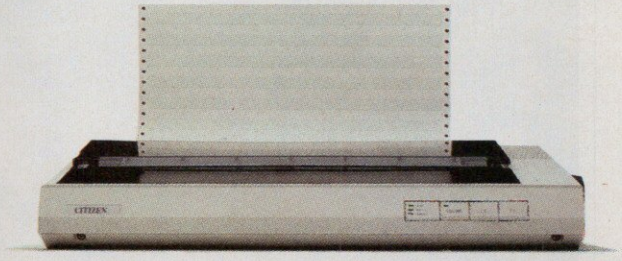

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TELECOMM

SEVEN TELECOMMUNICATIONS PROGRAMS FOR THE APPLE IIe AND IIc

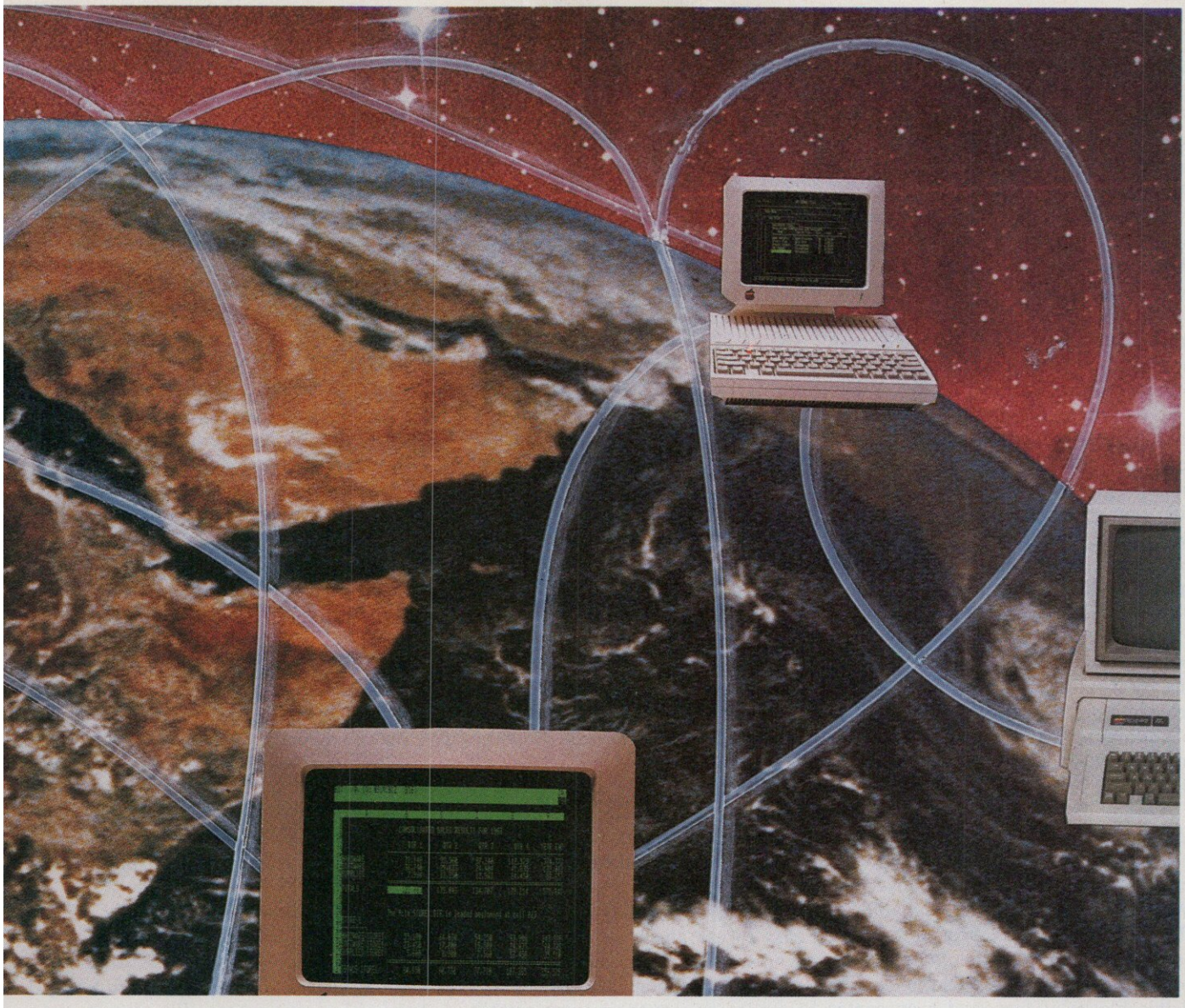
It takes more than a modem to turn an Apple computer into a link with the outside world. A telephone modem, no matter how "smart" it may be, cannot do a thing without the help of a special kind of software package called a telecommunications program. Hence, if you're considering buying a modem for the Apple in your home or office, it's a good bet that you're also going to be shopping soon for a telecommunications program.

A telecommunications program is a piece of software that can interface a computer with a telephone modem. A telephone modem, in turn, is a piece of hardware that can connect a computer to a telephone line. If you want to connect your Apple to a modem, therefore, you'll also need a telecommunications program.

The many telecommunications programs on the market vary widely in features, capabilities, and price. Almost any telecommunications program can handle simple tasks, such as receiving, displaying, and printing out information that comes in over telephone lines. If your needs are more complex, however, you'll need a more advanced telecommunications program.

Storing incoming data on a disk or sending out a disk-based file, for example, requires a software package that can control the operation of a disk drive. If you own an autodial modem, you'll probably want a communications program that can dial telephone numbers automatically. Finally, if you plan to subscribe to a data service that requires the use of a password or a user-identification number, a program that can remember passwords and ID numbers—and can transmit them automatically—will come in very handy.

Most of the telecommunications programs now on the market can handle disk operations and can dial numbers and log on to databases automatically. Many



UNICATIONS

communications packages offer automatic features that are even more advanced, as you'll see in the following seven software reviews.

Apple Term II

Apple Term II, billed as a "modem utility program" for Apple IIe and IIc computers, is not the most advanced telecommunications package on the market. The price is right, though—Apple Term II is free. Just buy an Apple 300 or 1200 Modem, and you'll get an Apple Term II program at no additional charge.

For a piece of free software, Apple Term II is a very likable little program. It can't save incoming data on a disk, and it can't send out disk-based files. It does support the use of a printer, though, and thus can provide you with printouts of incoming and outgoing data.

Apple Term II can't remember ID numbers or passwords, so it can't log on automatically to data services. It can remember and automatically dial up to 12 telephone numbers, however, and that's more numbers than some programs that aren't free can memorize.

Apple Term II is menu-driven and is probably the easiest to use of all Apple IIe and IIc communications programs. It is not packed with features, but it ranks high in reliability and convenience, which makes it an excellent beginners' program.

PFS:Access

PFS:Access is not free, but it's reasonably priced, and it offers a few more features than Apple Term II does. It can download incoming data (store it on a disk), and it can upload disk-based data (send it out over a telephone wire). It can store eight telephone numbers and dial them automatically, and it can remember passwords and ID numbers and use them in automatic log-on operations. PFS:Access is completely menu-driven and is almost as easy to use as Apple Term II. The suggested retail price for the new edition—designed for Apple

MARC YANKUS

IIe and IIc computers—is only $70.

PFS:Access is part of the growing family of PFS software, a line of integrated software that includes PFS:File, PFS:Graph, PFS:Write, and PFS:Report. A potentially serious shortcoming involves the tight integration of PFS:Access with other PFS products. Although PFS:Access can upload and download disk-based data, the diskettes that it uses for data storage have to be formatted with PFS:Write, the word-processing program in the PFS software line. Thus PFS:Write disks are not compatible with disks created with other word-processing programs. When you receive a file using PFS:Access, therefore, you can't save it on a disk unless you also own PFS:Write. Furthermore, if you want to transmit information that was created with some other word-processing program, you won't be able to use your PFS:Access program to send it anywhere.

Transend: EasyCom/EasyGo

EasyCom/EasyGo, manufactured by Transend, has long ranked as one of the best-selling and most respected telecommunications programs for Apple computers. It's now available in a new ProDOS version that retails for $129.

One of the best-known features of EasyCom/EasyGo is a built-in word-processing program. It's not in the same class as WordStar, or even Apple Writer, but it has far more capabilities than the rudimentary text editors that come with many telecommunications programs. It can justify text, move and delete blocks of text, and even center and right-justify lines. All in all, it's a pretty good word-processing program, especially when you consider that it's thrown in free as part of the EasyCom/EasyGo package.

EasyCom/EasyGo can dial numbers automatically, log on to data services automatically, and upload and download disk files of any size. You can even put the program into an unattended mode, so it can exchange files and data with other computers while you're away.

Unfortunately, you may run into one problem with EasyCom/EasyGo: The program requires a slight hardware modification—specifically, the use of a $20 cable adapter—before it will work properly with an Apple IIc connected to an Apple 300 or Apple 1200 Modem.

The problem, as explained by Transend and confirmed by Apple, is that the connecting cable supplied with the Apple IIc is not hooked up to a certain pin on the output port of the Apple 300 or 1200 Modem. If this pin were connected, it would supply a signal—called a carrier-detect signal—to the IIc. Since it isn't connected, no carrier-detect signal can reach the computer.

Most telecommunications programs designed for the Apple IIc don't need this signal, but EasyCom/EasyGo does; so, for $20, Transend will sell you a small cable adapter called an Adaption Contraption. Plug the Adaption Contraption into the back of the Apple 300 or 1200 Modem, plug your Apple IIc cable into your Adaption Contraption, and EasyCom/EasyGo will work with no problems (at least mine did).

With ASCII Express, you can create macros that upload files, download files, dial numbers, and run your computer in an unattended mode.

Terminus

Terminus, an excellent telecommunications package published by Quark, functions as a stand-alone program or in combination with Word Juggler, Quark's first-class wordprocessing program. Terminus is menu-driven and easy to use and costs just $89. It can send and receive disk-based files, and it can dial telephone numbers and perform log-on sequences automatically. A built-in text editor—patterned after Word Juggler—comes with the program. The Terminus editor recognizes the same editing commands as Word Juggler does; so, if you like Word Juggler, you'll also like creating and editing files with Terminus.

There's a catch here, though—if you own Word Juggler, you won't need the Terminus editor, because Word Juggler and Terminus are designed to work together as one integrated program. You can load Terminus into your computer's memory directly from the Word Juggler program—and when you do that, Word Juggler also remains in RAM. You can then switch back and forth between Word Juggler and Terminus at the touch of a key, using Terminus and Word Juggler as one program.

Using Terminus and Word Juggler together, you can create and edit documents with Word Juggler and transmit them with Terminus.

Although Terminus is a great telecommunications program for Word Juggler fans, you may encounter one problem when you use the Terminus program. Apple IIc computers manufactured in 1984 have a defect that keeps Terminus from performing automatic log-ons without user intervention. It can sometimes simply hang up and stop, bringing communications to a sudden halt.

The problem stems from the fact that most of the Apple IIc computers built during 1984 contained a timing crystal that ran slower than government transmission standards called for, which prevents them from being fully compatible with some modems, such as the Hayes Smartmodem 1200. It now appears that these computers are also incompatible with some software programs, including Terminus.

Apple has since changed the design of the computer to eliminate the problem and has offered a free equipment upgrade to IIc owners having incompatibility problems with their modems. Whether this offer will also be made to Apple IIc owners who have purchased the Terminus program is not yet certain, but if you own Terminus and can get an upgrade, do so. The program does work with the upgraded Apple IIc (and, presumably, with the new IIc), and it also works fine with the Apple IIe.

ASCII Express: The Professional

If ASCII Express were just a little easier to configure and use, and if it came with something more than a very primitive text editor, I'd give it the highest possible rating.

The program, billed as "a complete telecommunications package," is exactly that. If professional standards for telecommunications programs exist, I'm sure that ASCII Express meets them handily.

I'm impressed with this program's powerful ability to create macros (a macro is a string of characters that can be invoked from the keyboard with one or two keystrokes). With ASCII Express, you can create macros that upload files, download files, dial numbers, and run your computer in an unattended mode while you're away. You can set up macros that load and execute themselves automatically each time you boot ASCII Express, dial a data service, automatically log on when they're loaded, and even accept incoming calls and start exchanging data upon receipt of a special password.

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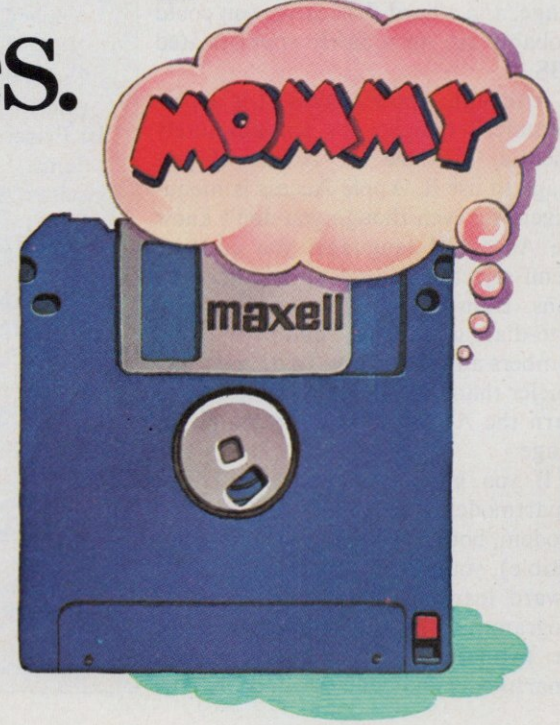

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disk-based files of any length and can transfer data, using special error-checking communications protocols. The program reads and creates files that are compatible with almost any word-processing program that runs on an Apple IIe or IIc. For people who like to swap software by telephone, ASCII Express can even transmit and receive ready-to-run BASIC programs.

Once you've learned how it works, you can turn ASCII Express into a tailor-made telecommunications program. Whatever your needs are, it's almost certain that ASCII Express will be able to meet them; in fact, you'll probably find that it meets needs you didn't even know you had.

ASCII Express, in both its ProDOS and its DOS 3.3 versions, retails for $129.95.

Apple Access II

Apple Access II is an unusual telecommunications program. It sells for only $75, is quite easy to use, and comes with its own programming language—called the Apple Access II language. Once you learn it, you can create wonderfully complex phone-and-modem programs of your very own.

Apple Access II enables you to write programs that will print messages on your computer screen, issue prompts for user inputs, dial telephone numbers automatically, and log on to data services automatically. If you've ever considered starting your own computer BBS (bulletin-board service), Apple Access may be just the telecommunications program you need. With an Apple IIe or IIc, the Apple Access II language, and a hard-disk drive, you could probably set up a fairly sophisticated BBS.

Although Apple Access II is a programmer's delight, it's not absolutely essential to know the Access II language to use it. Apple Access is menu-driven, so, even though you don't know the Access II language, you can use menu selections to set up communications, transmit and send files, create auto-dialing macros, and even dial numbers automatically. To do anything fancier than that, though, you'll have to learn the Access II programming language.

If you know how to use a Hayes Smartmodem (or Apple's 300 or 1200 Modem, both of which are Hayes-compatible), you already have a good start toward learning the Apple Access II programming language, in which all of the two-letter codes that the Hayes Smartmodem recognizes can be used as instructions in programs. A number of other two-letter commands round out the programming language's vocabulary.

The Apple Access II package doesn't come with a text editor. To write a program, you have to use a ProDOS-based word-processing program, such as Word Juggler or the new ProDOS-based Apple Writer. To issue an instruction, all you have to do is precede any legal command with the symbol @. You can insert remarks into a program by prefacing them with the @ symbol plus two exclamation points, like this: @!! If you don't precede a typed command line with the symbol, it will be interpreted as text and sent over the telephone when it is encountered during the execution of a program.

If you like to program, you'll get a big kick out of Apple Access II.

Once you've written a program in Apple Access II, you can boot the master disk and run your own program at any time by simply pressing the open apple and C simultaneously.

Apple Access II is the only Apple-compatible telecommunications program I've heard of that comes with its own programming language, a feature that makes it a unique and versatile telecommunications package. If you like to program, you'll get a big kick out of Apple Access II.

Write Away

Many telecommunications programs have built-in text editors, but Write Away is different—it's an extremely powerful word-processing program with a built-in telecommunications component.

The Write Away's design is like that of many earlier word-processing programs. It has two modes, a Deferred mode and an Immediate mode. When you're in the Deferred mode, your cur-

PRODUCT INFORMATION

Apple Access II
Apple Computer, Inc.
20525 Mariani Avenue
Cupertino, CA 95014-2094
(408) 996-1010
List Price: $75
Requires: Apple II Plus, IIe, or IIc; 48K RAM
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Apple Term II
Apple Computer, Inc.
20525 Mariani Avenue
Cupertino, CA 95014-2094
(408) 996-1010
List Price: Included with Apple modems
Requires: Apple II Plus, IIe, or IIc; 48K RAM
CIRCLE 648 ON READER SERVICE CARD

ASCII Express: The Professional
United Software Industries, Inc.
1880 Century Park East, Suite 311
Century City, CA 90067
(213) 556-2211
List Price: $129.95
Requires: Apple II, II Plus, or IIe; 48K RAM
CIRCLE 649 ON READER SERVICE CARD

EasyCom/EasyGo
Transend
2190 Paragon Drive
San Jose, CA 95131
(408) 946-7400
List Price: $129
Requires: Apple II, II Plus, IIe, or IIc; 128K RAM
CIRCLE 650 ON READER SERVICE CARD

PFS:Access
Software Publishing Corporation
1901 Landings Drive
Mountain View, CA 94043
(415) 962-8910
List Price: $70
Requires: Apple IIe or IIc, 128K RAM
CIRCLE 651 ON READER SERVICE CARD

Terminus
Quark
2525 West Evans, Suite 220
Denver, CO 80219
(303) 934-2211
List Price: $89
Requires: Apple II, II Plus, IIe, or IIc; 128K RAM
CIRCLE 652 ON READER SERVICE CARD

Write Away
Midwest Software Associates
1160 Apple Seed Lane
St. Louis, MO 63132
(314) 997-6470
List Price: $175
Requires: Apple II, II Plus, IIe, or IIc; 64K RAM
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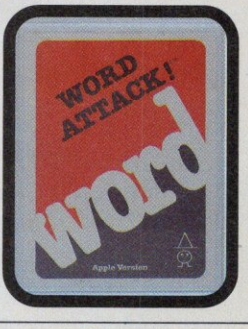

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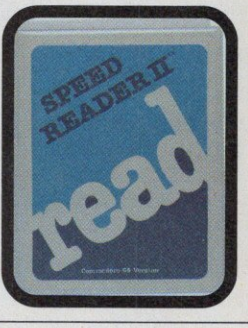

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sor sits on a "command line" at the bottom of the screen, and you can't type any text. You can type in various commands, though. You can scroll your screen display up or down; move, copy and delete text; and perform many other functions.

By pressing the Semicolon key, you can switch to the Immediate mode. Then your cursor will move off the command line and into typing position, and you can type text on your screen.

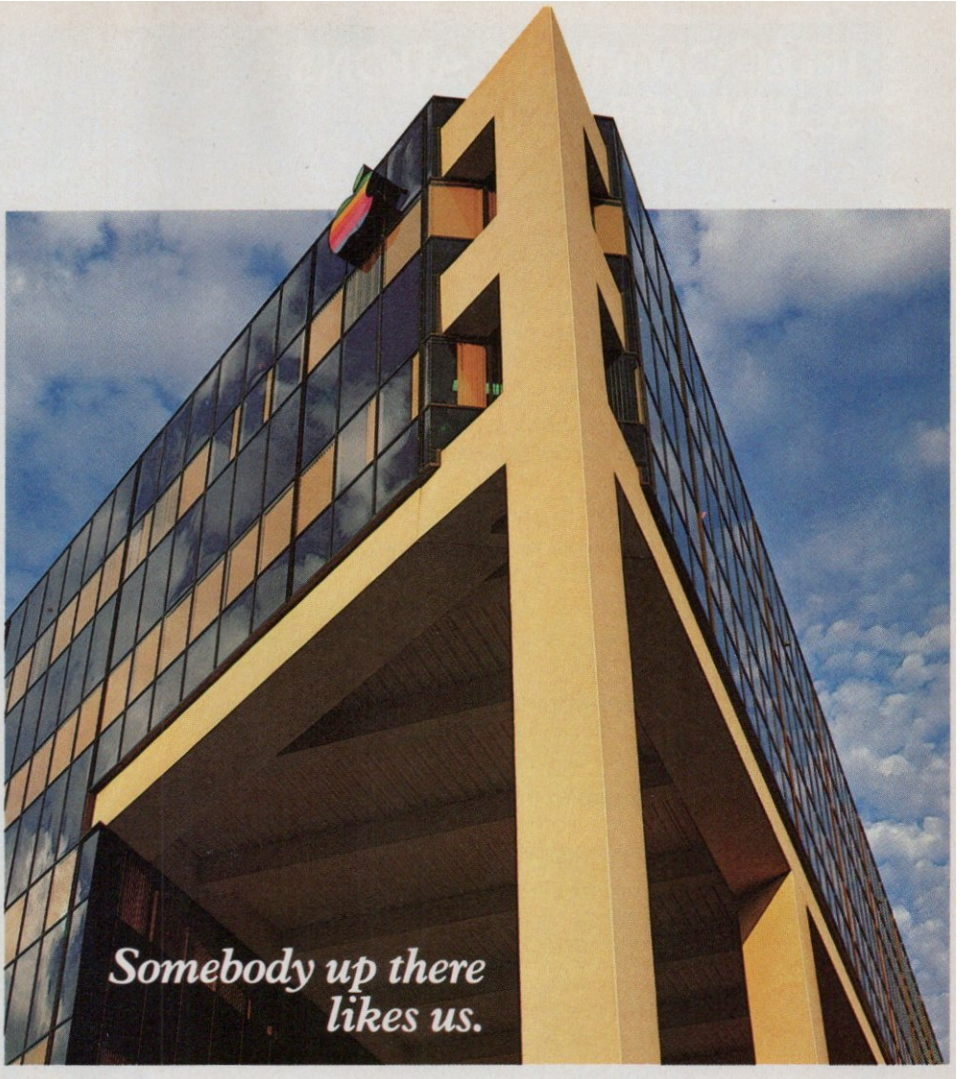
Line-oriented word-processing programs can have powerful sets of control functions. A disadvantage, though, is that they're line-oriented, not screen-oriented. So, if you want to make a change on a line you're not typing on, you have to go into the Command mode, type a command that will scroll the text on your screen up and down, and then switch back into the Immediate mode again. Only then can you do any typing on the line you've moved to. To go back to the line you were on before, you have to go through the whole process again.

Another warning about Write Away: It's written under DOS 3.3—not ProDOS, Apple's new disk-operating system for the Apple IIe and IIc. If you own a DOS 3.3-equipped Apple and have no plans to switch to ProDOS, this may not be a problem for you. If you have an Apple IIc or a ProDOS-equipped Apple IIe, however, you won't be able to use Write Away with disks that you format using your computer's disk-operating system.

The telecommunications package that now comes with Write Away has some handy features: it uses macros that are created with Write Away, it can dial numbers and log on to databases automatically, it can send and receive disk-based files, and it can run your computer in an Unattended mode. If you install a Thunderclock, it can even be preprogrammed to turn your computer on and transfer files automatically at a given time of the night or day. Write Away retails for $175, including its telecommunications program.

For more information on telecommunications programs, see Chip Carman's chart on pages 56–57. ✚

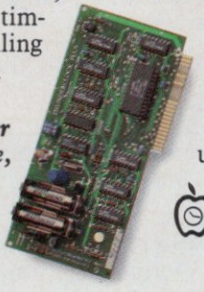
Mark Andrews is a former consumer-electronics columnist for the New York Daily News. *He has written numerous magazine articles and is the author of 11 books about computers. Andrews is currently at work on* Apple Roots, *a book about Apple IIc and IIe assembly language.*



The people at Apple® should know a good peripheral when they see one. And when they developed ProDOS™ to upgrade the Apple II line, they made it automatically recognize and read Thunderclock.

Not surprising, when you consider Thunderclock's long list of useful applications. In the office, the lab and at home. It starts with time and date stamping disk files and just keeps growing. To automatically accessing data bases, sending electronic mail, timing experiments, controlling your sprinklers and even tracking satellites.

The fact is, the better you are with your Apple, the more useful Thunderclock becomes.



Thunderclock adds a new dimension to all the new ProDOS-based software (like APPLEWORKS™ and WORD JUGGLER IIe™). And gives you access to the time from years down to milliseconds. It comes with a one-year warranty and never misses a tick. On-board batteries keep it running for up to four years before you snap in a new pair.

So if you want to make ProDOS really produce, turn to page 36 in the *Basic Programming With ProDOS* manual. Then get yourself a Thunderclock. You'll see why somebody up there likes us.

See your dealer or contact us today.

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DOS 3.3 PASCAL CP/M	**Hayes Terminal Program** Hayes Microcomputer Products Norcross, GA	■	■	■	■	■					■	■	■	■
	Smartcom 1 for IIc Hayes Microcomputer Products Norcross, GA	■		■	■	■				■	■	■	■	■
	Smartcom 1 for IIe Hayes Microcomputer Products Norcross, GA	■		■	■	■				■	■	■	■	■
DOS 3.3	**ASCII Express—The Professional** United Software Industries, Inc. Century City, CA	■	■	■	■	■	■		■	■	■	■		■
	Com-Ware II Novation, Inc. Tarzana, CA	■	■	■	■	■	■				■	■	■	
	Person-To-Person 1.2 Trutec Software Berkeley, CA	■	■	■	■	■	■	■	■	■		■		■
	Terminal Program II Telephone Software Connection, Inc. Torrance, CA	■	■	■	■	■	■	■	■	■	■	■		■
	Write Away Midwest Software Associates St. Louis, MO	■	■	■	■	■	■		■	■	■	■		■
ProDOS	**AppleTerm II** Apple Computer, Inc. Cupertino, CA	■	■		■	■								
	ASCII Express—The Professional United Software Industries, Inc. Century City, CA	■	■	■	■	■	■		■	■	■	■		■
	EasyCom/EasyGo Transend San Jose, CA	■	■	■	■	■	■		■	■	■	■		■
	Person-To-Person 2.0 Trutec Software Berkeley, CA	■	■	■	■	■	■	■	■	■	■	■		■
	PFS: Access Software Publishing Corp. Mountain View, CA	■	■	■	■	■	■	■				■		■
	Terminus Quark Denver, CO	■	■	■	■	■	■		■	■	■	■		■
PASCAL	**Pascal Interactive Terminal Program** Software Sorcery, Inc. Vienna, VA	■		■	■	■					■	■		■
	P-Term—The Professional United Software Industries, Inc. Century City, CA	■	■	■	■	■	■		■	■	■	■		■
CP/M	**Z-Term—The Professional** United Software Industries, Inc. Century City, CA	■	■	■	■	■	■		■	■	■	■		■

This chart contains a sampling of products, and the information herein is based on manufacturers' claims. For more information on the products listed above, circle the appropriate card number on the Reader Service Card in this issue.

MODEM	COMPUTER	MINIMUM RAM	NOTES	PRICE	RS #
Smartmodem 300, Smartmodem 1200	II, II+, IIe or III	48K		$ 99.00	545
Smartmodem 300	IIc	128K	Also operates under ProDOS	*	546
Micromodem II or IIe	II, II+, or IIe	48K		119.00	547
Most major modems	II, II+, or IIe	48K		129.95	548
Apple-Cat II modem	II+ or IIe	48K		*	549
Most major modems	II, II+, IIe, or IIc	48K		69.95	550
Most major modems	II+, IIe, or IIc	48K	IIe requires Extended 80-column Card	55.00	551
All major modems	II, II+, IIe, or IIc	64K	Includes full-feature word processor	175.00	552
Apple 300/1200 modem	II+, IIe, or IIc	48K		*	553
Most major modems	II, II+, IIe, or IIc	64K		129.95	554
Most major modems	II, II+, IIe, or IIc	128K	Supports mouse	129.00	555
Most major modems	IIe or IIc	128K	Uses a mouse, emulates Macintosh desktop, and includes word processor	99.95	556
Most major modems	IIe or IIc	128K		70.00	557
Most major RS-232 external modems	II, II+, IIe, or IIc	128K		89.00	558
Most major modems	II, II+, IIe, or IIc	48K	Includes documented source code	54.95	559
Most major modems	II, II+, or IIe	48K		129.95	560
Most major modems	II, II+, or IIe	48K		149.95	561

*included with modem

DOUBLE-HI-RES ELEGANCE WITH DAZZLE DRAW

Dear readers,

If you have an Apple IIc or an Apple IIe with an Extended 80-column Card, go to your nearest Apple software dealer and buy Brøderbund Software's Dazzle Draw.

Sincerely
Roberta Schwartz

Is this a strange way to begin a software review? It's because I'm writing it under the influence of Dazzle Draw. This double-high-resolution paint program has rekindled the excitement I felt when I purchased my Apple II Plus and keyed in a hi-res demo. Undaunted by the limitations of the "high" resolution and six-color palette, I was enraptured by the world of pixels.

Now it's two years, three Apples, and dozens of graphics-software packages later. Just as I was beginning to think it was time to look for a computer that had more graphics capabilities, double high-resolution appeared (see "Seeing Double," *A+*, December 1984 and January 1985). Now David Snider has written a program that, pardon the cliché, is the icing on the cake.

A Color Mac?

If you use your Apple computer to create graphics for any purpose—business, education, games, or pleasure—you should explore double hi-res with Dazzle Draw. If your Apple can't provide double hi-res and you have been considering an upgrade, this program may convince you to do so.

Dazzle Draw uses icons, windows, and pull-down menus. It's already been heralded as software that turns an Apple IIe or IIc into a color Macintosh. As exaggerated as that claim may seem, I can understand the enthusiasm of the claimants. The combination of double hi-res, 16 hi-res colors, and good software to bring it all together is something to crow about.

> IT'S BEEN HERALDED AS SOFTWARE THAT TURNS AN APPLE II INTO A COLOR MACINTOSH.

What You Get

Dazzle Draw comes in an exceptionally attractive box that's sure to draw attention to the product. In the box you get a comprehensive, illustrated manual; one program disk; and an extra disk label. The label is for the one copy of the disk that you're allowed to make. Brøderbund has a reasonable replacement policy: Within 90 days, replacement is free; after 90 days, you'll incur a $7.50 charge for the disk, postage, and handling.

What You See

Boot the program to see a stunning title page and then a screen that is horizontally divided into three sections. The narrow band at the top includes the five pull-down menus and an Undo box. The band at the bottom is for the tool windows. The larger, center portion of the screen is your "canvas."

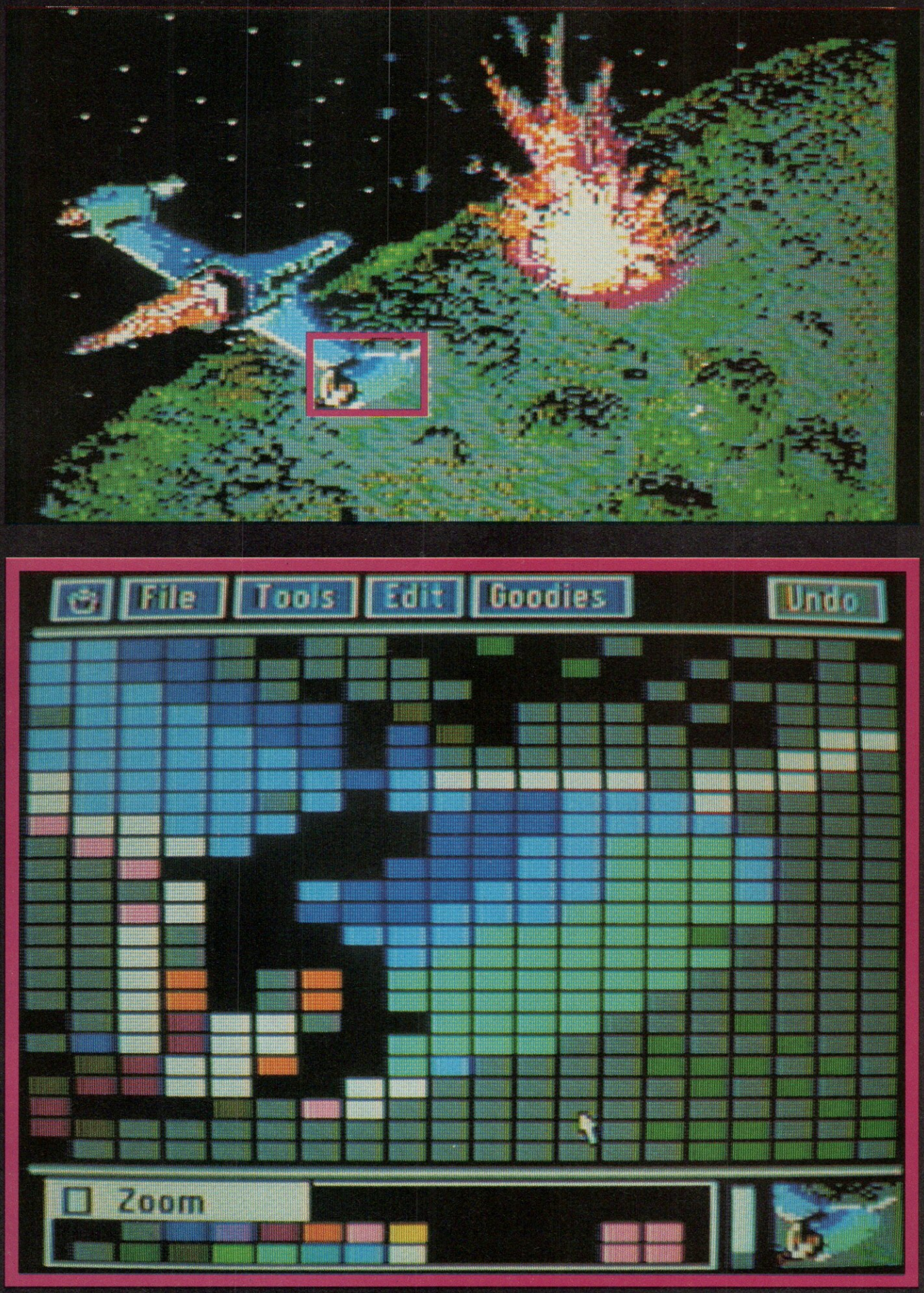
Pull Down the Menus

Use your input device (Dazzle Draw works with any popular input device, including the Apple Graphics Tablet and AppleMouse II) to move the cursor over the menu bar. Press the button, and a list of the menu options appears: Help, Adjust Color of Screen, Printer Setup, and Quit. Move the cursor down until your selection is highlighted and release the button. Click, pull down, and select—every menu works this way.

Open the File menu to load and save files, delete files, format a disk, or create a "slide show" disk. Dazzle Draw has two filing systems, a Professional File/ProDOS system and an Easy File system. If you choose to work with the Professional File system, you can take advantage of a Make Directory option to organize your disk files into categories. The manual clearly explains both systems.

Draw and Paint

When you're ready to create a work of art, pull down the Tools menu to select Paintbrush, Spray Paint, Flood Fill, Zoom, Text, Shapes, or Lines. As soon as you select your tool, a window



When you're in the zoom mode (above), there is a zoom scroller and a small window that shows the magnified area of your picture in actual size.

GRAPHICS COURTESY OF BRØDERBUND SOFTWARE

opens at the bottom of the screen. Here you use your cursor to customize your tools: brush shape and size, font style and size, spray-paint density, line width and type, color mix—you're the artist; help yourself.

Capture, Copy, Cut and Paste

After you've created your first dazzling graphic, save it to disk. Then experiment with the editing options. Wonder how the picture would look if you used red instead of yellow? Find out. Pull down the Edit menu and select Capture. Define a section of your image by enclosing it within the Edit box.

Now pull down the Edit menu again and select Exchange Colors. You can replace any color in the editing area with another color or exchange it with another color. Who knows? If Gainsborough had used Dazzle Draw, Blue Boy might have ended up green.

Capture another area of your graphic and try the other editing options. They let you flip the captured section horizontally or vertically, invert it, cut it out, copy it to another area of the drawing, erase it, put it into a "clipboard" (memory) for later use, or save it to disk.

The Tools menu and the Edit menu would be enough to satisfy most of us, but Dazzle Draw offers even more. Pull down the Goodies menu for bonus features. Choose Modify Pattern to magnify paint patterns and edit them. You can create your own patterns or color mixes, use them, and save them to disk. Select Grid and Color to help you distinguish individual pixels when you're using the Zoom or Modify Pattern options. When you're painting, try

YOU CAN CREATE YOUR OWN PATTERNS OF COLOR MIXES AND SAVE THEM TO DISK.

Mirrors. View Picture removes the menu and function bars so you can see your entire graphic, and Clear erases the picture. Do you want to send a copy of your picture to a friend? Print Picture lets you print your masterpiece in color or black and white, depending on your equipment.

Dazzle Draw provides almost every option that Apple-computer artists could wish for, but the variety of choices is not what makes it so special. Other programs are available that have most of the graphics options I've mentioned above. Dazzle Draw's uniqueness is in its attention to detail.

When you're working on a graphic, a scroll bar lets you scroll the screen out from underneath the menus. When you're in the Zoom mode, for editing, you can use a Zoom scroller and a small window that shows the magnified area of your picture in actual size (see page 59). In the Modify Pattern mode, you can experiment with the color mixes; watch an Active box to see how the colors look in the full-size picture; and then, if you don't like what you've done, click on the Revert box to restore the original pattern.

When you load files, you don't have to type their filenames, because they scroll down for review. Click on the name of the file you want, and it's loaded. Everything works easily and flawlessly, and all the options are accessible with your input device. You can click on the Undo box and undo your last move at any time. Program response is instantaneous.

There's more, but I'll let you discover that as you use it.

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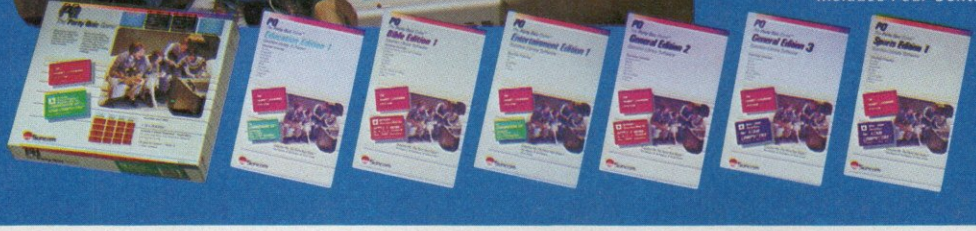

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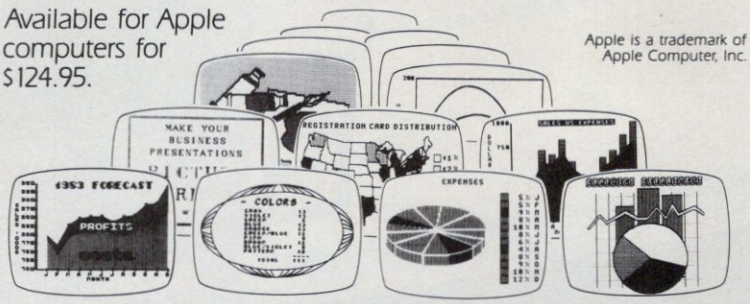

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think that we've found the perfect graphics package . . .

Because menus and tools occupy the top and bottom sections of the screen, you can't see your entire graphic as you work. My main criticism of Dazzle Draw is that while you work, you're restricted to approximately three-quarters of your image. Scroll the screen up, and you lose sight of the top portion of your picture; scroll the screen down and the bottom portion disappears from view. I regard this limitation as a serious handicap. The program should offer a way to "put away" the menu bars and tool windows when you don't need them.

Double-hi-res pictures take up a lot of disk space, so I was surprised to find out that Dazzle Draw doesn't include a picture-packing routine, especially in its slide-show utility. Without a packing routine, only six images fit on a disk. A six-picture slide show has only limited applications.

A statement on the title page of the Dazzle Draw documentation warrants comment: "No special license fees are required for use of Dazzle Draw created artwork in other software packages. A credit to Dazzle Draw®© 1984 Brøderbund Software, Inc. must be used." This notice is equivalent to a demand by paintbrush manufacturers for credit on every canvas painted with their brushes. I can accept a request for credit, but "must" is extreme. I can't help but wonder how Brøderbund Software can determine whether a graphic image was created with Dazzle Draw or with some other double-hi-res-graphics program.

Praiseworthy

I'm looking forward to a revised Dazzle Draw that would negate my three criticisms. Whether or not a revision is forthcoming, I highly recommend this software. Most everything about it—the packaging, the manual, and the program—deserve the highest praise. ✚

▸ PRODUCT INFORMATION

Dazzle Draw
By David Snider
Brøderbund Software
17 Paul Drive
San Rafael, CA 94903
(415) 479-1170
List Price: $49.95
Requires: Apple IIc or Revision B Apple IIe with Extended 80-column Card with jumper connector

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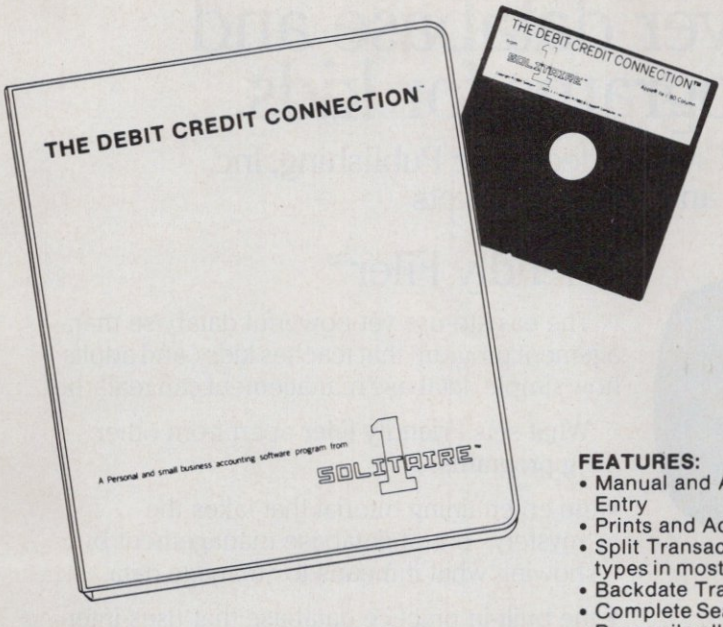

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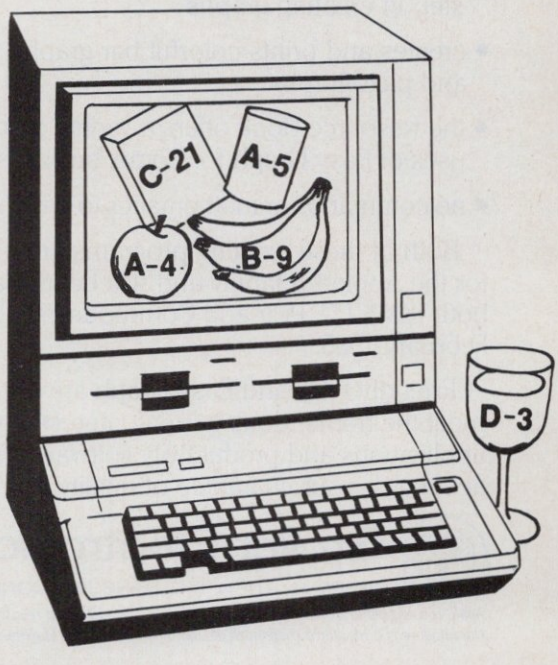

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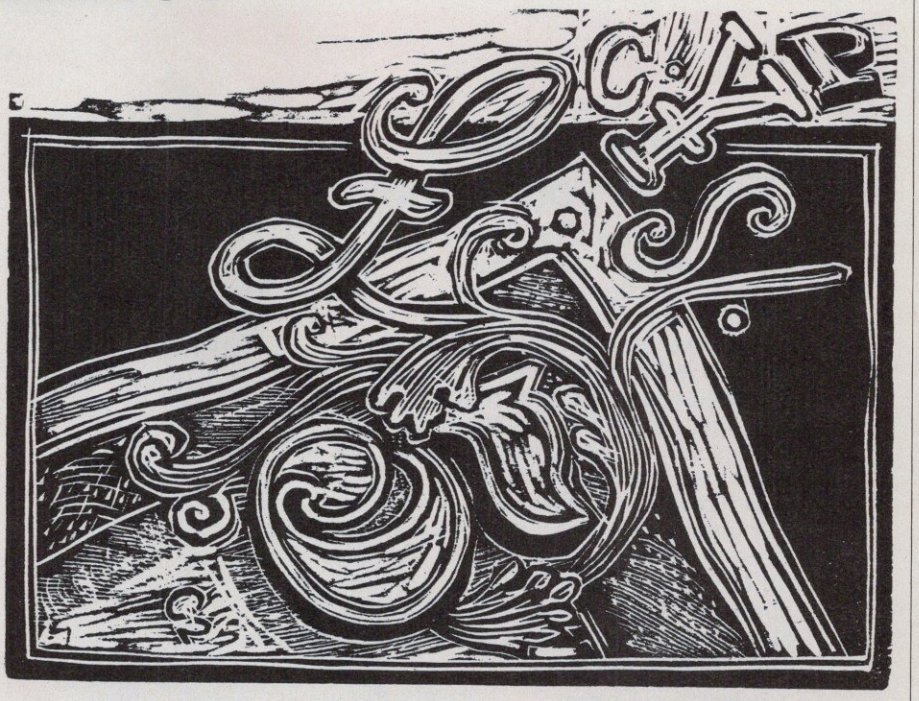
MONEY MATTERS
BY KENNETH M. LANDIS
A spreadsheet for international travelers

FOREIGN-CURRENCY CONVERSION



Ah, spring is just around the corner, and with it comes vacation-planning time: Rome, Paris, Tokyo, Singapore—the romance of traveling across the face of the globe without a care in the world.

Unless you're a career foreign-service officer or in the top 5% income bracket, though, you're going to have a basic concern about the funding of your vacation—whether to eat or travel. Once you have grappled with this choice, you must ask yourself another troublesome question: How do I change my money into their money? The "their" being the country or countries that are hospitable enough to receive you and your dollars.

Changing U.S. currency into foreign currency is a lot more complicated than just converting it. Exchange rates, fees, and commissions vary widely. If you're not careful, you can end up spending hundreds of dollars extra for your vacation without getting any more for your money.

This month, we are going to construct a spreadsheet that helps us analyze our options. We will also explore a series of simple strategies that can help you get more for your money

$84 for a Glass of Chablis?

The key to exchanging money is understanding a basic concept called buying power. Simply, the more you get for every dollar you spend, the higher your buying power.

If foreign currency is quoted to you in dollars, say $1.32 for every British pound sterling, then a pound for $1.27 is a better buy than a pound for $1.32. On the flip side, 1.4 pounds per dollar is a better buy than 1.2 pounds per dollar. Simple, right? If exchange rates stayed the same, exchanging money wouldn't be a problem, but the rates vary greatly based on all kinds of economic factors and where you try to exchange your money.

Defensive Strategies

The first rule of thumb is to exchange your dollars for foreign currency before you leave, if at all possible. Why? Because the odds are that you'll be able to get a better deal at home than you will overseas. No one minds shopping around at home to save some money, but do you really want to chase around Hong Kong looking for a good exchange rate?

When you exchange your dollars, buy travelers checks that are denominated in foreign currency. That way, you have the security of travelers checks but still have local currency.

Don't exchange all your money, though. Exchange rates do change, often quickly and dramatically. Another good rule of thumb is to carry 40–50% of your money in foreign-denominated travelers checks and the balance in dollars or U.S. travelers checks. This way you have hedged to mitigate a change in the exchange rates. If rates go down, your dollars increase in value while your foreign currency falls. The opposite holds true if rates go up. If at all possible, do not use your credit cards. The exchange rate will be based on when the charge clears your account, not when you spend it.

If the exchange rate is favorable before you leave, and you're afraid it may fall, you can prepay all or part of your hotel bill. The portion you have prepaid will lock in the exchange rate for you.

Also, if the exchange rate is good and you're traveling in any class except tourist on an international flight, consider paying for your return leg in foreign currency. Based on the way airlines price their tickets, you could save upwards of $300 on your ticket.

Defensive Apple

Now let's look at how your Apple and a spreadsheet program can help you save money on your vacation.

CARLOS LLERENA AGUIRRE

Figure 1 on page 71 shows the currency-exchange worksheet. After you input the variables and your estimated expenses, the worksheet calculates the dollar cost of your vacation at 18 different exchange rates for one foreign currency. If you are traveling to more than one country, you can simply divide your expenses by country, use one worksheet per country, and then add together all your worksheets.

The Uncontrollable

The first variable you have to fill in is your opportunity cost. Opportunity cost is the percentage rate at which you borrow money, whether you take it from your money-market fund (interest income you would lose), activate your checking credit line, or take a cash advance against your credit card. You need to know the opportunity cost to calculate how much money it would cost you to buy the currency in advance.

For the formula to work, you have to fill in the number of months before your trip. You can enter any number from 0 up. For example, if you are leaving in six weeks, the correct entry is 1.5.

CIRCLE 450 ON READER SERVICE CARD

You can get the present dollar exchange rate for the foreign currency or currencies in question from your banker, a currency dealer, or the newspaper. The airline exchange rate per dollar is available through your travel agent or an airline reservation office.

The last two variables, the percentage of your spending money that you convert to foreign currency and the amount (if any) of your hotel bill you prepay is up to you. The effects of changing these proportions are significant. The more money you have in foreign currency and the more of your hotel bill you have prepaid, the higher your risk, should rates go against you. If rates change in your favor, however—i.e., the dollar gets stronger—you will make money.

The Controllable

The worksheet uses the six most common expense categories for a trip.

The first rule of thumb is to exchange your dollars for foreign currency before you leave, if at all possible.

Simply enter your airline ticket (use separate figures for going and returning); your estimated hotel bill; restaurant and other food charges; gifts; and other expenses such as car rental, sightseeing costs, and so on.

The Almost Incomprehensible

Now that you've supplied all the information the spreadsheet needs, we're ready to go on to the mathematics of what's going on here. The variable and expense cells are simply entry points. No calculations take place in these locations. Rather, they are the site of formatting for dollar signs and percent signs. The total (cell E23) of the expenses is a simple addition.

All of the calculations occur below line 27. The exchange-rate changes in this worksheet appear in increments of .05. The formulas reference the present exchange rate in the variables section and either subtract from or add to it. To make the keying simpler, I did my first subtraction in cell G29, and then copied that formula to the left. Cell C32 contains the present exchange rate. From that cell to the right and on line 35, I added .05 to each previous cell.

The calculation in each cell (see figure 2) is complex. To make building the

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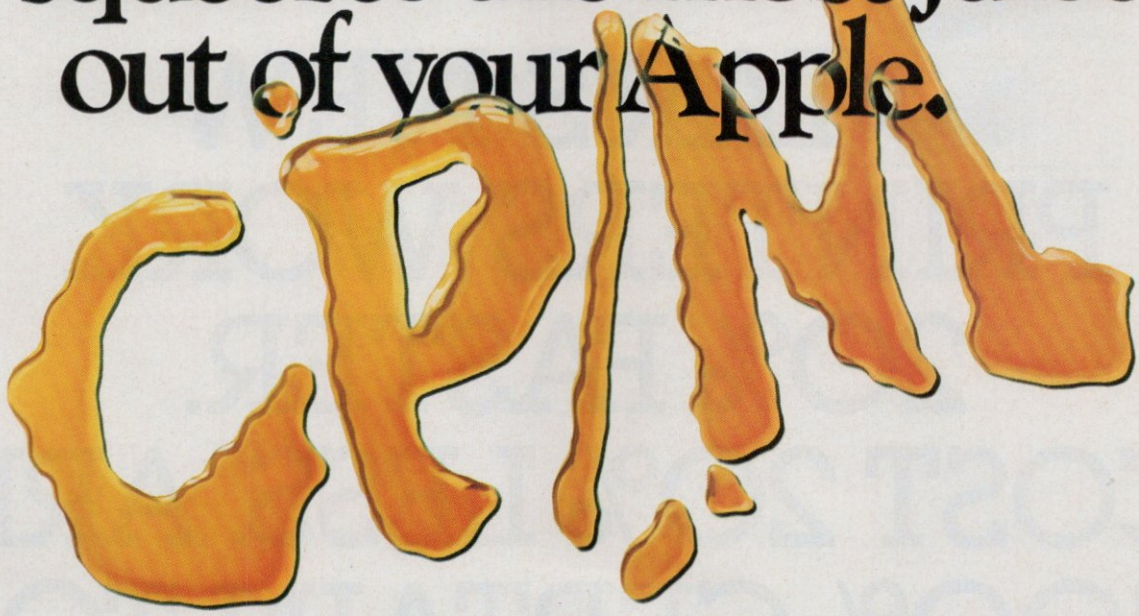

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CIRCLE 319 ON READER SERVICE CARD

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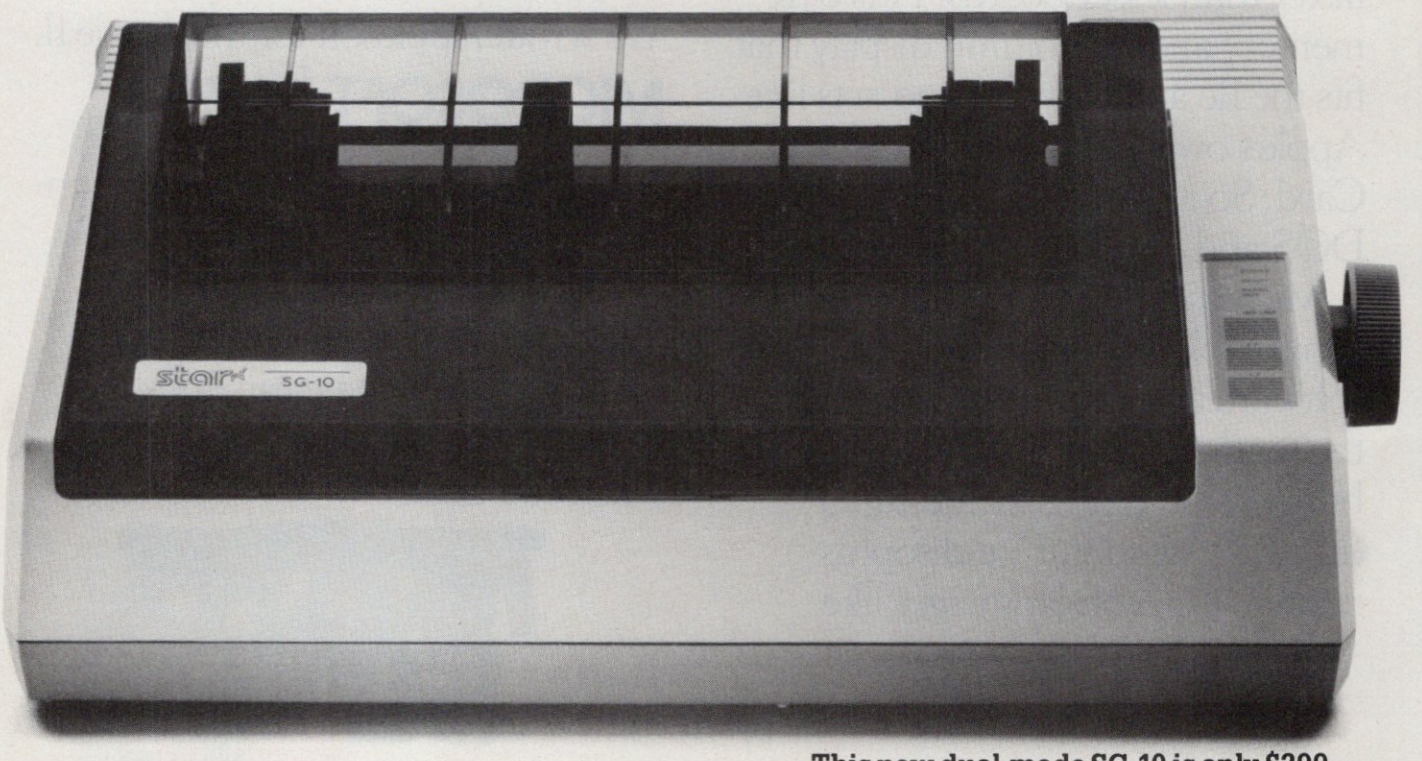

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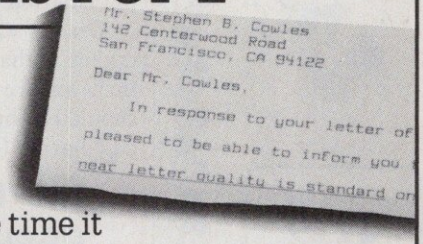
NLQ IS 1 OF 2



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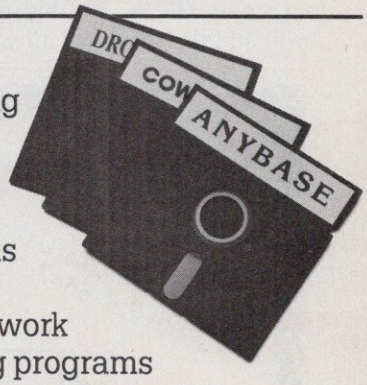

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CIRCLE 211 ON READER SERVICE CARD

worksheet simpler, I have put some of the calculations in their own cells, which makes the formula shorter and easier to understand. For example, rather than recalculate the sum of your return airfare, food, gifts, and other expenses each time the worksheet needs it, your program calculated it once, in cell D41, called the constant. The rest of the worksheet then references this cell.

The calculation starts with the total expenses (E23). To this number you will add the results of all your calculations. Some of the numbers you get will be negative, which will mean a savings: others will be positive, which will cost you more money.

The first section of the formula in figure 2 computes your exposure to changes in the exchange rate for money you have already converted. The sum of the prepaid portion of your hotel bill, plus the amount of money you have converted for your return airfare, food, gifts, and other expenses (cell F41) is multiplied by the new exchange rate and then the old exchange rate. The difference between the two is divided by the new exchange rate. The result tells you your gain or loss in the buying power of your converted currency.

From that amount the worksheet then deducts your gain or loss on the currency you have not converted (section II). The computation involves taking the difference between the new exchange rate and the old, multiplying it by the sum of the money not already converted (E41), and dividing it by the new exchange rate.

The worksheet then adds your borrowing cost for the funds converted before the trip (cell B41—section III) and then deducts the airline savings (or adds the loss—section IV) for paying for your return air leg in foreign currency rather than dollars.

And that's the whole ball of wax! The mathematics within the model allows for some simplifying assumptions that make this analysis possible on an Apple, rather than on 50 acres of mainframe computers. The "loss" in accuracy is small in comparison to the information you can get, though.

One of the assumptions the model makes is that you will pay for your return airfare in foreign currency. You should do this only if the airline-savings calculation (cell C41) is positive. If it is negative, simply make the airlines exchange rate per dollar the same as the present exchange rate per dollar. If you do this, the calculations will cancel each other out.

The 'loss' in accuracy is small in comparison to the information you can get.

The beauty of a spreadsheet is that once you have keyed in the first formula, you simply copy, or replicate it. Make sure that you keep your relative versus absolute references straight. In this worksheet, the absolute references are denoted by a dollar sign before the reference. Using the worksheet will show you how much change you can stand in the currency in question. Experiment and see the effects of changing the proportion of currency you buy and the amount of the hotel bill that you prepay, or paying for your return air leg in foreign currency. When you go, say hello to gay Paris. ✚

Ken Landis is one of the pioneers in the use of Apples as financial tools.

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CIRCLE 192 ON READER SERVICE CARD

```
A/1   B          C          D          E          F          G          H
2  CURRENCY EXCHANGE WORKSHEET
3
4  VARIABLES
5  =========
6
7  OPPORTUNITY COST                          10.00%
8  MONTHS TILL TRIP                            2.5
9  PRESENT EXCHANGE RATE PER $                1.30
10 AIRLINES EXCHANGE RATE PER $               1.23
11 PERCENT CASH IN FOREIGN CURRENCY          40.00%
12 PERCENTAGE OF HOTEL BILL PREPAID          50.00%
13
14 EXPENSES
15 ========
16 HOTEL                                      $600
17 GOING AIRFARE                            $1,000
18 RETURN AIRLINE FARE                      $1,000
19 FOOD                                       $800
20 GIFTS                                      $500
21 OTHER EXPENSES                             $400
22                                         -------
23    TOTAL                                 $4,300
24
25
26
27 AT THE NEW EXCHANGE RATE YOUR ESTIMATED COST WOULD BE
28
29 EX. RATE        1.00       1.05       1.10       1.15       1.20       1.25
30 EST. EXP.     $4,437     $4,404     $4,373     $4,346     $4,320     $4,309
31
32 EX. RATE        1.30       1.35       1.40       1.45       1.50       1.55
33 EST. EXP.     $4,275     $4,255     $4,237     $4,219     $4,203     $4,140
34
35 EX. RATE        1.60       1.65       1.70       1.75       1.80       1.85
36 EST. EXP.     $4,174     $4,161     $4,148     $4,136     $4,125     $4,025
37
38
39 BORROWING  AIRLINE     CONSTANT  NOT CONVERTED CONVERTED
40 COST       SAVINGS
41   $28.93        $54      $2,700       $1,920      $1,380
```

Figure 1: Currency-exchange worksheet

```
                I. COMPUTES CHANGES IN THE EXCHANGE RATE FOR MONEY ALREADY CONVERTED        II. GAIN OR LOSS ON CURRENCY NOT CONVERTED
C30: +$E$23+(((($F$41*C29)-($F$41*$E$9))/C29)-(((C29-$E$9)*$E$41)/C29)
     +$B$41-$C$41
     III. BORROWING COST   IV. AIRLINE SAVINGS

B41: (C2) +F41*((((E7/12)+1)^E8)-1)
C41: (C0) ((+E18*E9)-(E18*E10))/E9
D41: @SUM($E$18..$E$21)
E41: (C0) (E16+D41)-F41
F41: (E16*E12)+(D41*E11)
```

Figure 2: Currency-exchange formulas

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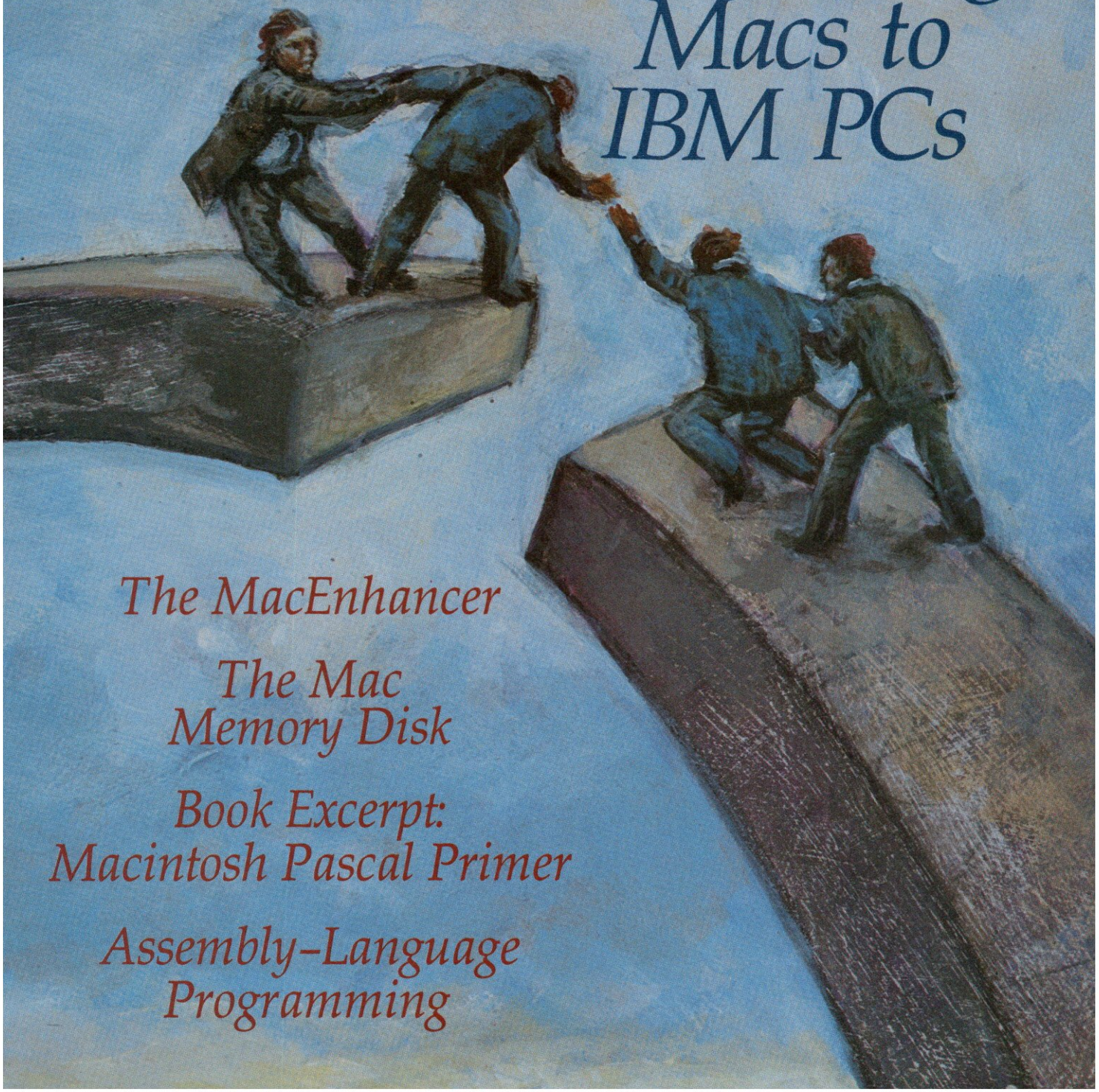
MACINTOSH & LISA

Macintosh

FEATURING THE APPLE 32 LINE

Connecting Macs to IBM PCs



The MacEnhancer

The Mac Memory Disk

Book Excerpt: Macintosh Pascal Primer

Assembly-Language Programming

Connecting Macintoshes to IBM PCs

Although it took a while, you've finally convinced your boss and the purchasing department to buy Macintoshes for your office. They were hesitant because one of their important criteria for purchasing any new computers was some type of file compatibility with the company's IBM PCs and the IBM mainframe. They weren't sure the Macintosh would do the trick.

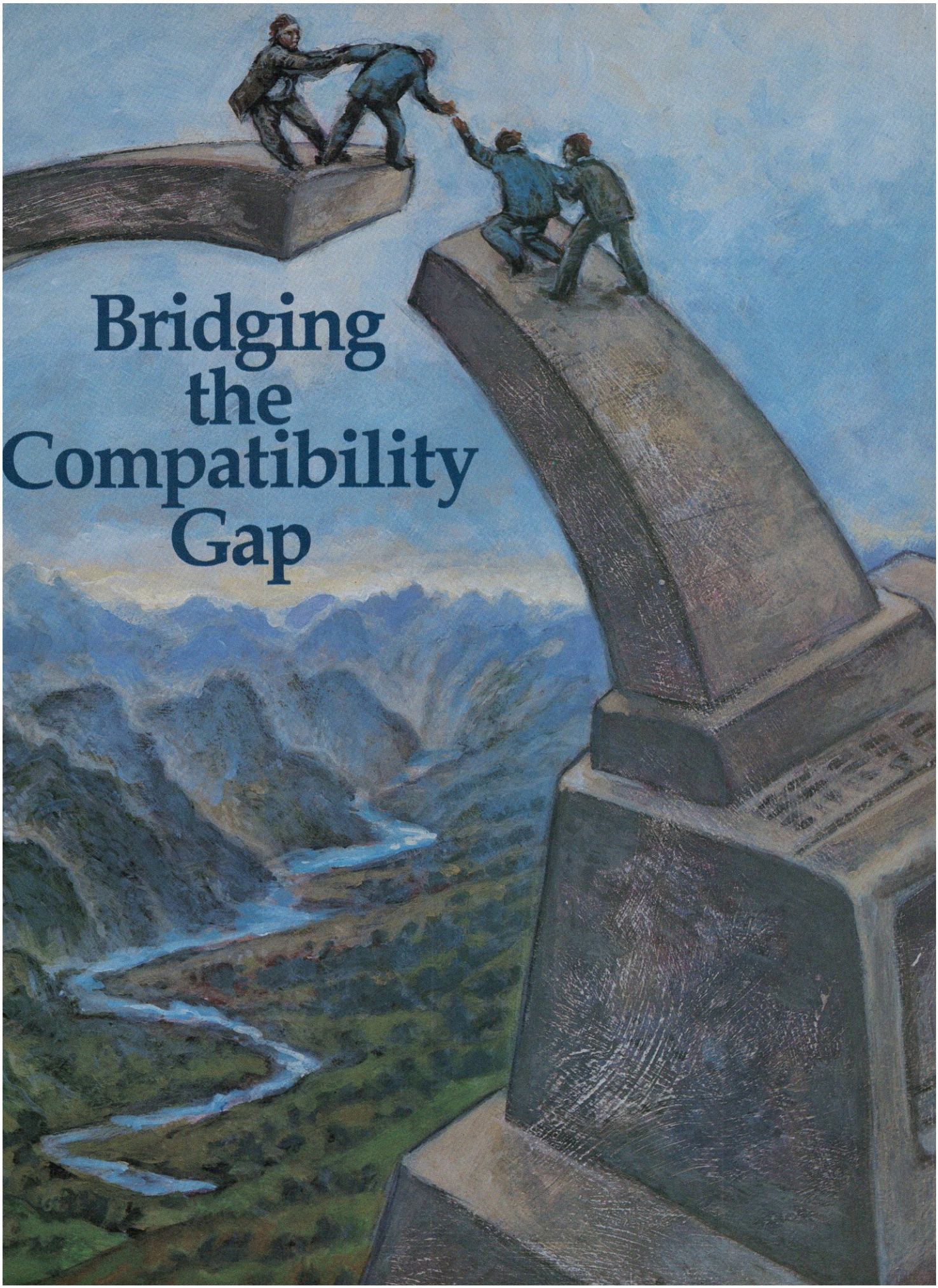
Well, after a good sales job and assurances that the IBMs and the Apples would be able to share files of information and company data, you are now faced with making your promises come true.

The theme of a recent issue of *A+* was hooking Macs and other Apples to mainframes (see "Linking Apples to Mainframes," parts 1–4, October 1984, pages 34–60). Those articles filled you in on the necessary tools for sharing information with the corporate mainframe. Now you must deal with the problem of sharing information between the Macintoshes and the IBM PCs.

In this article, we'll show you how to set up direct communications between Macintoshes and IBM PCs. For our purposes, IBM PC means the IBM PC, PCjr, PC XT, PC AT, and most IBM PC-compatible computers, provided the computer has at least one 5¼-inch floppy-disk drive. The IBM PC also has to have an RS-232 serial port (or an AppleTalk network board).

This article will help to save you from the possible pitfalls of file transfer and will

CARLOS LLERENA AGUIRRE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point you in the right direction for effectively sharing information between these two very different groups of products.

The solutions we are presenting here have two separate components: software and hardware. The hardware carries electrical signals from one computer to the other. The software tells the computers how to send and receive information, encodes and decodes the electrical signals, and manages the information flow.

Several methods of getting information from one type of computer to another are available now. The most common approach is to have one computer, with its own telecommunications software or terminal program, call another computer, with its particular communications software. Each computer has a modem for file transmission, and the modems are connected by a telephone line. Last month, *A+* looked at several products that linked the Macintosh with other computers over phone lines (see "Three Communications Systems for the Mac," February 1984, pages 112 to 129).

Using a modem is good for transferring simple files such as letters or files that have a standard data-transfer format. The most widely used information-exchange format is the DIF format, which many programs such as VisiCalc and DB Master use. Another standard file-transfer format called the comma-delimited ASCII file groups information in blocks that are set off by commas.

Using a modem and standard telecommunications software has some serious drawbacks, however. For one thing, a modem is slow (300 or 1200 bps) compared to other methods such as direct RS-232 cable connection (9600 bps) or AppleTalk connection (230,400 bps). Another disadvantage of using modems is that standard telecommunications software is usually designed to transfer only simple files such as plain text files, DIF files, or comma-delimited ASCII files. Transferring complex spreadsheets, graphics, or database files is often difficult or impossible.

Several methods of getting information from one type of computer to another are available.

Two products, MacLink and PC to Mac and Back, have already sprung up to meet the need for direct transfer of information between Macintoshes and IBM PCs, and more file-transfer utilities are in the works. Other products such as Lotus Development Corporation's Symphony for the IBM PC and the forthcoming Jazz for the Macintosh are sophisticated business software with the ability to share files via modem, cable, or AppleTalk.

Both MacLink and PC to Mac and Back include two software diskettes, one for the Mac and another for the IBM PC, and both are available with an RS-232 cable for directly connecting the computers without modems at a transmission speed of up to 9600 bps. With each of these products, the use of the cable is optional; you can use a modem or other communications connection instead.

MacLink not only transfers data between the Macintosh and the IBM PC, but it also translates files from one application running on one machine to a parallel application running on another. MacLink is not designed as an interactive real-time terminal program; rather, it is an intelligent communications link that translates specific files on one machine to run on the other. For example, MacLink provides a link that makes Lotus 1-2-3, VisiCalc, or Multiplan spreadsheets run on the Macintosh's version of Multiplan.

Here's how it works. After connecting a cable between the two machines (you can buy the cable with the product, if necessary), you boot the MacLink application in both of the machines. Whichever machine you boot first displays a message saying that it is waiting for the other machine to be initialized. After you've initialized both machines, a dialog box appears on the Macintosh, asking which IBM disk drive holds the file you want to move. You select the PC drive, and a full PC directory appears on the Macintosh desktop, with each PC file enclosed in a box. With the mouse, you select the transfer file.

Another dialog box then asks you to verify your choice. This box also identifies the type of file you have selected (e.g., 1-2-3 or WordStar). After you approve your selection, a Wait box appears and keeps you informed of the transfer's progress, and when the file transfer is complete, the directory on the Macintosh indicates that you have moved the file.

If it happens to find any inconsistencies between converted programs such as 1-2-3 and Macintosh Multiplan, MacLink will generate equivalent formulas for Multiplan and insert them into the proper cells. In addition, for all cells, format information is passed to make source cells and destination cells match as closely as possible.

In a similar fashion, MacLink can move and translate Multimate and WordStar files to become MacWrite files. You can also transfer BASIC programs saved on the PC in ASCII format to the Macintosh for use with Microsoft BASIC.

MacLink's creators say that bidirectional transfers will be supported.

Another program that comes with companion PC and Macintosh disks is PC to Mac and Back. This product's strength is its dual capability as a reliable file-transfer program and a regular communications program. It can also move files between two Macintoshes and between a Macintosh and an IBM PC with relative ease.

Unlike MacLink, this program is limited in file-translation capability. The only files it can convert are WordStar files. To translate a WordStar file to a MacWrite file with this program, you must first run the PC file through an intermediate conversion utility—a small inconvenience. You can directly port Multiplan files saved in Sylk files on one machine to the other machine's Multiplan, but otherwise you cannot make an easy move of dissimilar application files from one machine to the other. If file conversion is not necessary for you, however, PC to Mac will probably serve a wide range of general purposes well.

Because PC to Mac does double duty as a communications program, it has several on-screen configuration

options such as bps rate and connector and mode choices. We will confine our description to those settings that affect the direct Mac to PC connection. This product supports a mouse on the PC, which lessens the chance of confusion resulting from dissimilar user interfaces.

Transferring files with PC to Mac is easy. Once the PC to Mac software is running on both machines, you select a file from the sending machine. You can rename or use a default command that sends the file, along with its original filename, to the companion machine. PC to Mac sends files in blocks, according to the program's own error-checking routine. It checks each block for errors before and after it is sent. If the program detects an error, it will attempt to resend the block. Should it not succeed, it aborts the transfer and displays an error message describing the fault.

The program works with similar command structures on both the PC and the Macintosh. Because PC to Mac also functions as a regular communications package, with variable terminal settings, you must make sure that both the Mac and the PC programs are running with the same settings. Otherwise, the transfers may be garbled.

AppleTalk, with a speed of more than 230,000 bps, is perhaps the ultimate hardware solution in terms of price vs. performance. See the cover story in this issue (pages 26–32) and "The AppleTalk Personal Network" (pages 35–37) for detailed descriptions of AppleTalk.

Both Apple and Tecmar have signaled their intentions to provide AppleTalk network boards for the IBM PC family of computers. The AppleTalk network will make sharing information between Macintoshes and IBM PCs a simple and sensible office strategy when combined with transfer-utility programs such as MacLink, PC to Mac and Back, and Lotus' Jazz and Symphony—and in view of the growing amount of software that is already compatible with both Macintoshes and PCs. ✚

Fred Davis, an avid computerist for 20 years, is Senior Editor/Technical of A+ *and coauthor of* Hardware for the IBM PC and XT, *published this spring by Simon and Schuster. Keith Thompson is a computer consultant based in Peterborough, New Hampshire.*

PRODUCT INFORMATION

PC to Mac and Back
dilithium
8285 S.W. Nimbus
Suite 151
Beaverton, OR 97005
(800) 547-1842
List Price: $149.95
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Jazz
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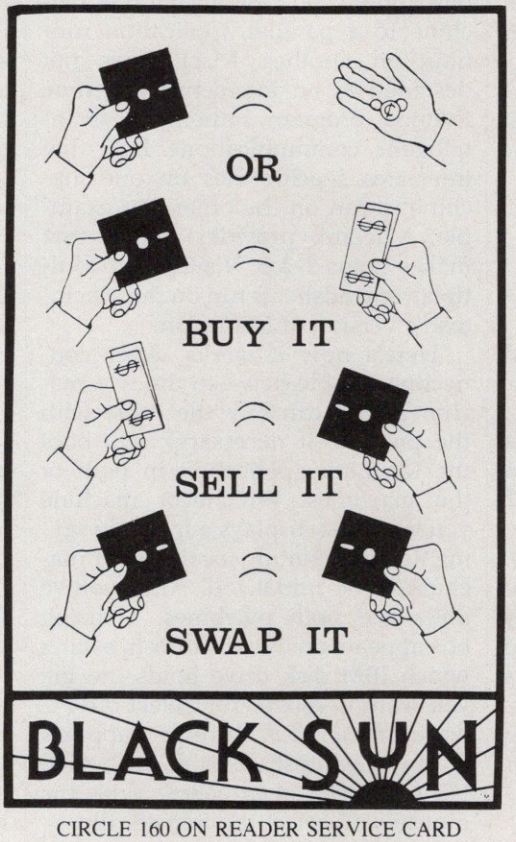

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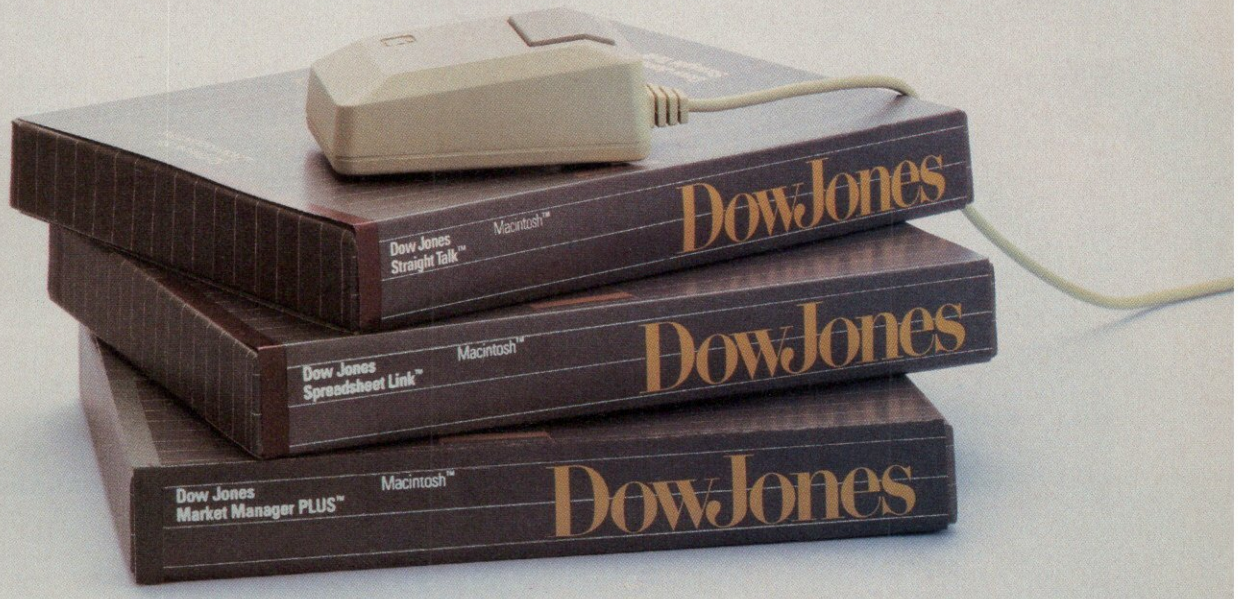

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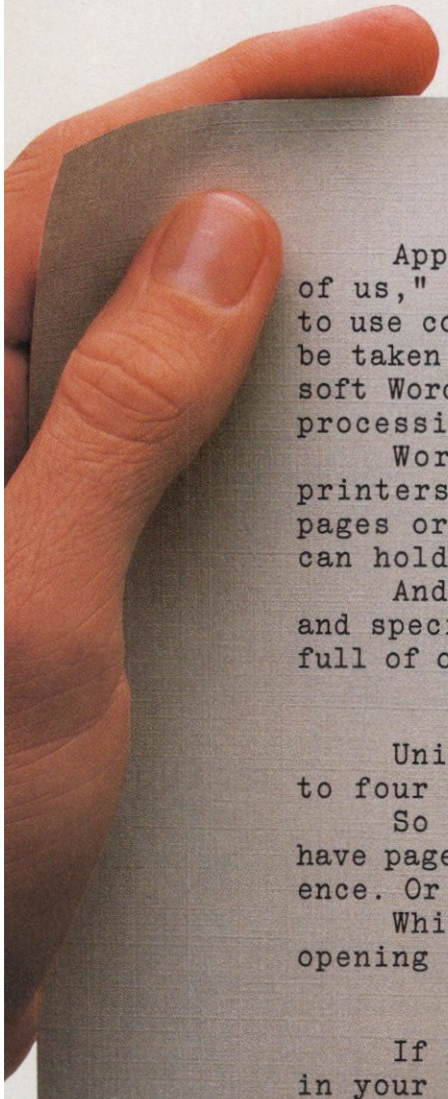

Apple's Macintosh, "the computer for the rest of us," is probably the most advanced and easiest to use computer on earth. But until now, Mac couldn't be taken seriously for word processing. Enter Microsoft Word for the Macintosh. Mac's professional word processing program.

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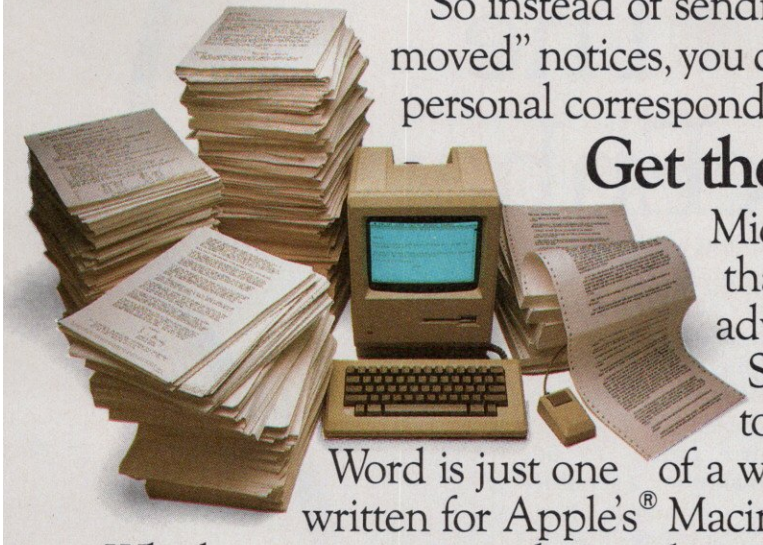

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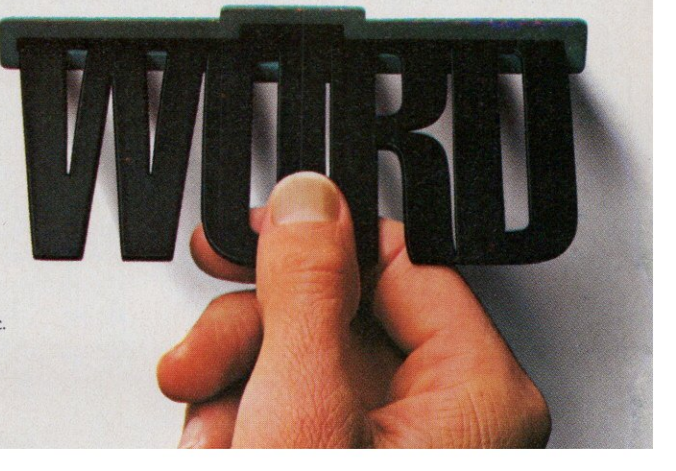

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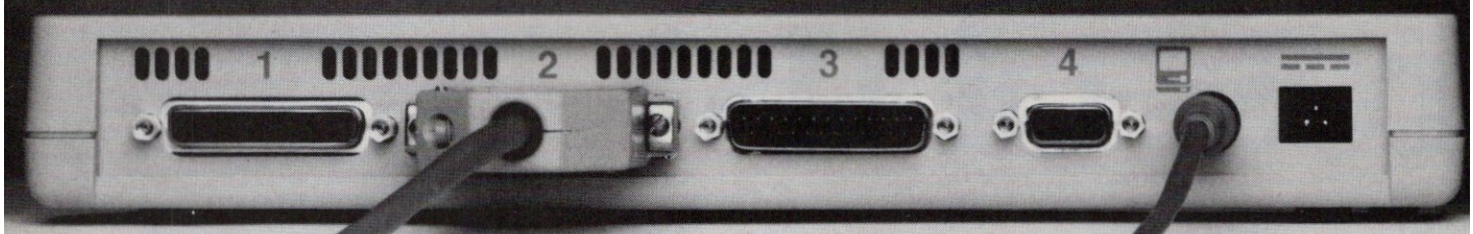

The MacEnhancer

Microsoft's port expander for the Mac

Would you like to use your Macintosh with an assortment of standard peripherals or a variety of printers? If so, Microsoft has a new accessory designed just for you. The Microsoft MacEnhancer lets you turn one of the two serial ports on the back of the Mac into four ports: two industry-standard serial ports, a replacement Macintosh-style serial port, and a parallel IBM PC-style printer port. In addition, the $249 package includes a customized version of the MacTerminal communications program and driver programs for an assortment of printers. Although the result is quite serviceable, it's far from an elegant solution.

Microsoft was still making minor software changes in the MacEnhancer when they made the package available to *A+*. As a result, the released product may differ slightly from what we looked at. According to Microsoft, though, the hardware, screens, basic features, and overall operation should be exactly the same.

The hardware component of the MacEnhancer is a box 11 inches long that contains a four-way electronic T switch. Under software control, the box routes the single connection from the Macintosh serial port to any of two RS-232C ports with 25-pin connectors, an RS-422 port with a 9-pin connector (which is the same as the standard Macintosh port), or a 25-pin connector wired to drive a printer that is configured to work with an IBM PC parallel printer port. The ports are numbered 1, 2, 3, and 4. Correspondingly labeled LEDs light up to show you which one is currently selected.

Note that this box doesn't let you use two or more of these ports at the same time—rather, it lets you make a selection by clicking on your selection in an on-screen desk accessory instead of by constantly rearranging cables. Consequently, it's no substitute for a network, and it won't let you drive more peripherals at the same time than a standard Macintosh does.

You could, for example, connect a parallel dot-matrix printer to one port; a modem to another; a serial-interface letter-quality printer to yet another; and the AppleTalk bus, an Imagewriter, or some other standard Macintosh peripheral to the last. Meanwhile, you might have an external hard disk tying up the other port on the Macintosh. You can't create double output by running both printers at once, or have the printer echo what is arriving or being sent over the modem; but you can switch to each of those devices in turn.

The three non-Macintosh-style added connection points are deliberately set up to emulate the connections between peripherals and the IBM PC. Virtually all personal-computer peripherals come in an IBM PC version, so this approach lets you choose from the widest variety of devices. It does mean that you'll need cables wired up in PC style, howev-

er—the MacEnhancer RS-232C connection points, for example, are male connectors as on the IBM PC, not the female connectors standard on most other equipment.

If you already have a printer or you want to buy a less expensive parallel model (a basic Macintosh requires a serial printer), the chances are the MacEnhancer will let you connect it to your Mac. You can also hook up several different printers, such as a fast dot-matrix printer for draft work and a slower letter-quality machine for final output.

Simply making the electrical connections isn't enough to make a non-Apple printer compatible with a Macintosh. In addition to the MacEnhancer hardware, the complete package includes a disk that contains more than a dozen different printer drivers. You can use these printer drivers in place of the Imagewriter file that normally translates output patterns into the data and commands the printer understands.

Among the printers the prerelease version of the package supported were: Apple Imagewriter, Epson FX-80 and FX-100, Epson MX-80 and MX-100, Hewlett-Packard ThinkJet, IBM Graphics, C. Itoh ProWriter 8510, Okidata 92 and 93, and Toshiba P1340 and P1351.

You can also use this package to add a modem to your Mac. Along with Apple's own series of modems, most standard personal-computer modems work with the MacEnhancer. If you want to use auto-dial features of the MacEnhancer Terminal software, the modem must be Hayes-compatible.

MacEnhancer Software

Microsoft chose to put a minimum amount of hardware in the MacEnhancer, relying instead on software for most of the features. Before you can use the MacEnhancer, you have to run the installation software and transfer the MacEnhancer support code to all your program disks.

The actual setup process is not difficult if you are at all familiar with hardware and the settings needed to connect peripherals to computers. If not, and you want to do more than

link up a common device such as an Imagewriter set for standard configuration, you might want to get a dealer or technical friend to help out.

In essence, the installation program has you pick an icon for each of the expansion ports, pull down a menu to say what kind of device you are connecting, and then check off boxes for any particular settings such as transmission speed or flow-control protocol. To make the MacEnhancer a "run-time package," the installation program selects the needed driver programs and combines them with the code needed to create an added desktop accessory (a menu item under the Apple symbol at the left side of the Macintosh standard menu bar).

You may have noticed that I said *run-time package*—to use the MacEnhancer hardware, the MacEnhancer code must be placed on every disk that houses an application program. If you're using a hard disk, there should be no problem. If not, you

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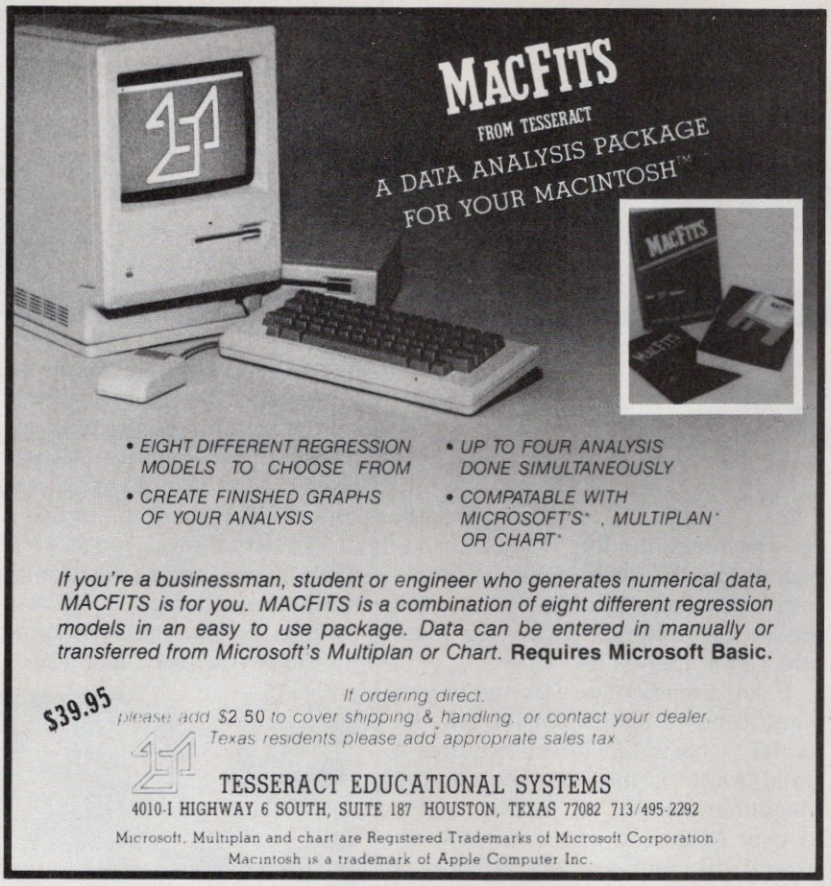

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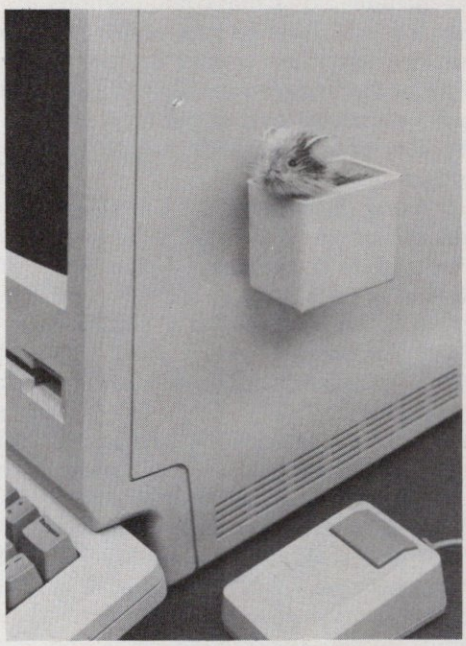

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Once you have the MacEnhancer on your disk, using it is easy.

may wish that Microsoft had put more of the interfacing code inside its box and less on your disks. The MacEnhancer core code takes up about 9K on your disk, and each printer driver takes from 14K to 20K. If you have two printers, you can eat up close to 40K for just the MacEnhancer, before you add the applications.

Once you have the MacEnhancer on your disk, using it is easy. At any point at which you can pull down a desk accessory (usually any time except when you have a dialog box on

Which Port?

The Macintosh has two nearly identical high-speed serial ports, but the way they're accessed by the processor lets one port run faster than the other. The port with the modem icon is the faster of the two, the printer port the less swift.

The Zilog-8530 communications chip that sends and receives serial data for the Mac can run either port at close to a million bits per second. To keep up at this speed, the communications chip needs servicing by the Mac's 68000 CPU chip at a rate sufficient to read the received characters as they become available, and to furnish characters to transmit as soon as the previous ones have been sent.

At the maximum transmission rate, Apple found that running both serial ports takes so much attention from the CPU that it has trouble maintaining the screen, noticing keystrokes, or reading disks. To allow the Mac to keep up with these other processes, the printer port is commonly set up to allow it to claim CPU attention at a maximum of every third opportunity. Consequently, data that arrives at the printer port too quickly to be read at that one-third rate may be lost, and data intended to be sent more quickly will be delayed.

With the MacEnhancer, therefore, you can't expect reliable connections with 1200-bps modems or 9600-bps terminals if you connect the expansion box to the Macintosh printer port. Use the modem port instead.

the screen), you can choose the MacEnhancer menu choice and then pick which of the four devices you want for output. Any program that uses the Macintosh port—to which the MacEnhancer is attached—will then get or send its data to the selected peripheral.

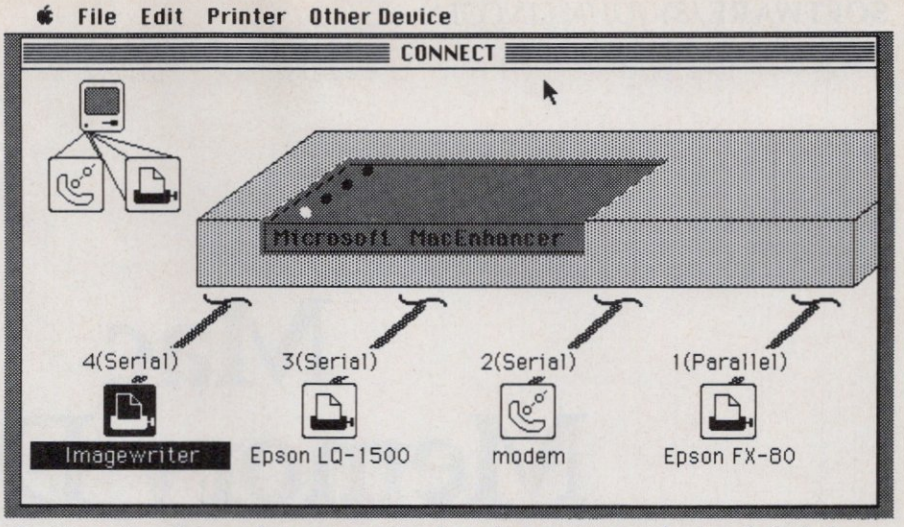
Terminal

The MacEnhancer package also includes a special version of Apple's MacTerminal communications program. Microsoft has added a few features, eliminated the sections concerned with emulating IBM-3270 terminals for mainframes, and tied the program to the MacEnhancer hardware. That last change means that you have to connect the MacEnhancer to your Macintosh in order to use the MacEnhancer Terminal, although you can run the program through one of the MacEnhancer ports or directly from the other Macintosh port to a modem.

Both in its original Apple version and in Microsoft's implementation, MacTerminal is an easy-to-use—but somewhat limited—communications program (see "Three Communications Systems for the Mac" in the February issue of *A+*, pages 112–129, for a comparison of MacTerminal and other communications programs for the Macintosh). It allows you to call up another Macintosh, mainframe computer, or information service; exchange information in the Terminal mode; send and receive text files; and capture received data to store on disk.

The program also includes the XModem protocol, an error-checking method devised by Ward Christensen and others for sending both text and program files between personal computers. If you have a Macintosh at each end of the connection, you can use this mode to send program files as well as text files.

In its Default mode, MacEnhancer Terminal is configured as a "glass Teletype," meaning that it ignores any special formatting characters other than the common carriage return, line feed, backspace, and horizontal tab. If you want to call up a mainframe that supports VT-100 terminals (the most common format for minicomputers and mainframes outside the IBM world), MacEnhancer Terminal also retains the Terminal Emulation mode of its predecessor. If the remote system supports VT-100 terminals, the Macintosh can act as an intelligent terminal with an addressable cursor—which, in turn, makes it possible for software on the remote computer to create formatted screen displays and special on-screen formats.



The Microsoft MacEnhancer lets you turn either the modem or printer serial port on the back of your Macintosh into four ports.

In its version of MacTerminal, Microsoft has improved the menus and added a redial feature, which you can use to tell an auto-dial modem to try again if it doesn't successfully complete a call the first time. The menus are much clearer, with headings such as File, Settings, Phone, and Command. Unfortunately, there's still no automatic log-on capability. You can save a file with the settings for each system you regularly connect to, but you can't have MacEnhancer Terminal automatically dial up, listen for the prompt, and then transmit your log-in information.

Microsoft's version also shares MacTerminal's inability to capture data from formatted screens in the Emulation mode. If you're using the VT-100 setting to make the Macintosh behave like that type of terminal, data sent from most remote systems will erase the screen and repaint it as needed; the MacEnhancer Terminal Save mode captures text only if it scrolls up past the top of the screen, however.

The MacEnhancer is quite workable as a solution to a limited set of problems. If you need multiple printers; a printer, modem, and external hard disk; or a selection of modems, this accessory will do the job.

On the other hand, you may soon feel, as I did, that the list of what you want from a Macintosh expansion box is much more than what this package provides. The software drivers, for example, ought to go in the expansion box once, rather than on each disk. There ought to be at least two Macintosh-style ports, so you have at least a net gain. The physical packaging ought to be better thought-out—for example, it could have been made to fit neatly underneath the Mac instead of being awkwardly taped to the side. You ought to be able to share a printer between two computers (a more common occurrence than two printers to one computer). The terminal program ought to have at least the capability to log on automatically to your favorite network.

Eventually, Microsoft and other firms will come out with better Macintosh expanders. Until then, if you have an immediate need that this package can solve, Microsoft's MacEnhancer is here and working. ✚

Steve Rosenthal is a writer and lexicographer who tries to maintain a perspective on other joys and problems besides those involving personal computers.

PRODUCT INFORMATION

MacEnhancer
Microsoft Corporation
10700 Northup Way
Box 97200
Bellevue, WA 98009
(206) 828-8080
List Price: $249

CIRCLE 657 ON READER SERVICE CARD

Mac Memory Disk Makes a Fat Mac Fast

A new product from Assimilation Process speeds disk access

My Macintosh plays a little tune whenever its drive accesses a disk. It's a doleful little whir, at changing pitches, that comes from the drive's variable-speed motor. It used to sound charming, but lately it's been a dirge. It's my Mac's way of telling me that disk input/output (I/O) is going s-l-o-w-l-y.

Well, I'm going to have to find something else to complain about, because the days of the "Mac Dirge" and the "Slow I/O Blues" are over. An impressive Mac product has arrived on the scene to rescue us "knowledge workers" from slow disk access.

An Indispensable Tool

The product is Mac Memory Disk from Assimilation Process. It's a program on a standard Sony disk that takes the leftover memory of a 512K Mac (or a Lisa 2 running MacWorks) and turns it into a RAM disk—that is, into a volume of memory that looks like and acts like a disk-drive volume, except for one major difference: It is lightning-fast.

A RAM disk is an otherwise unused portion of computer memory that has been programmed to hold a program, data, or both program and data. It's often called a "virtual" disk because, although you can manipulate the material in it exactly as if it were on a real disk, there is no disk.

With a RAM disk, your information is available without the delay caused by a drive head reading from or writing to a disk. The speedup on a "Fat" Mac (sorry, it doesn't work on a 128K Mac) is 4 to 20 times faster than standard disk access (depending on what program you are running and what function you select), because no physical device is involved.

Because a RAM disk is RAM and not an actual disk, it is volatile—its contents will vanish forever when you turn off your computer or if you experience an unexpected power failure. To guard against catastrophe, you can choose to keep only your application program on the RAM disk and your data on a regular, physical disk. Additionally, you can use an uninterruptible power supply on your power line.

For anyone who takes Mac computing seriously enough to indulge in a 512K machine (or a Lisa 2), the disk I/O bottleneck can be a problem. Mac Memory Disk will solve this problem and should be regarded as an outright necessity. It functions smoothly on a single-drive system. And at a retail price of $29, there is no reason not to buy this product.

Is nothing wrong with this product? Well, it may have one flaw, the documentation. You may not learn all you want to know about Mac Memory Disk from reading the instructions that come with the disk.

The publisher seems to expect that if you know what a RAM disk is, you can probably figure everything out for yourself. Maybe so. In any case, the guidelines that follow are to help you make full use of this splendid Macintosh tool.

Start by inserting Mac Memory Disk into your disk drive, selecting the icon, and opening it. This produces a dialog window (see figure 1, next page), offering four choices (only two of which will be available at any time).

"Temporary disk" is the term for the "disk" created from RAM, the RAM disk. After you have chosen which startup option you want and click the OK box, a second dialog window appears (see figure 2).

The "elevator" scale in figure 2 shows the minimum and maximum size of RAM available for use as the RAM disk. You can click your pointer on the elevator and move it up or down to select the size of RAM disk

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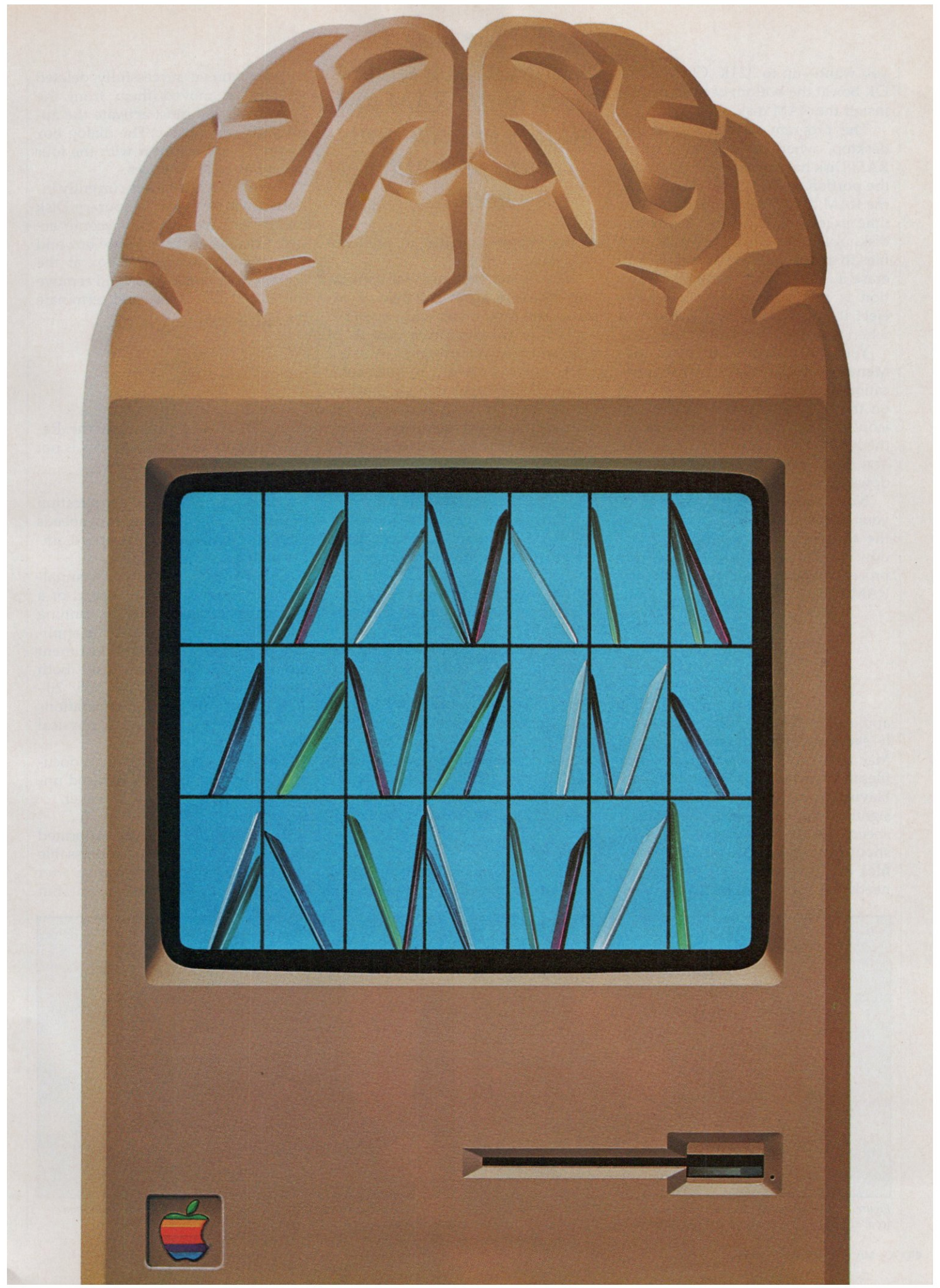

you want—up to 321K. Click on the OK box at the bottom of the screen to install the RAM disk.

The program returns you to the desktop, where a new icon called RAM Disk has appeared. It represents the portion of RAM now allocated as the RAM disk. You can treat this volume exactly as if it were a physical disk. You can open it, copy it, copy files to and from it, rename it, lock it, erase it, and so on. Your only restriction is that you cannot, of course, eject it; the Eject option is dimmed when you select the RAM Disk icon.

Your next step is to eject Mac Memory Disk and insert your application disk, whose disk icon appears on the desktop. Double-click on the icon to open it and double-click on the RAM Disk icon to open it as well. You now have two directory windows open on the Mac desktop.

Now, make active the window for your application program and drag the appropriate icons from this window into the RAM-disk window. This process copies those files onto the RAM disk.

Start with your application-file icon, and, since nearly every application running on the Mac uses the Finder and/or System files in some fashion, move them, too. Having these files on the RAM disk significantly increases execution speed. For the fastest operation, you should also move to the RAM disk all files or documents your application needs for successful execution (such as the Imagewriter file, to print out your data).

For the fastest operation, you should move to the RAM disk all files or documents your application needs.

Next, select your original application-disk icon again and eject it. Insert a data disk, if you wish; open the application program from your RAM disk; and run your program. Watch it react, almost instantly, to your commands. Don't forget, though, that you are dealing not with hardware, but with volatile RAM memory.

You can arrange to have the RAM disk activated immediately on startup. To do so, you have to move the RAM-disk driver and an initialization program to the system-resource file. The RAM-disk application checks to see whether these two resources are currently in the System file. If they are not, then the Create the Temporary Disk at Startup option (see figure 1) is darkened and activated.

To select this option, click on the appropriate box and then click on OK. You can then select the RAM-disk size with the "elevator" dialog box, which is followed by a scrolling list of the files on the boot disk. You can select any combination of files by clicking on the names you want. These files are then copied to the newly created RAM disk at initialization.

Quitting

Before you can remove the RAM disk, you have to erase all the files on it. After you've successfully deleted all files or moved them from the RAM disk, you must activate the application once again. The dialog box (figure 1) will reappear with the four items preceded by boxes.

Since the RAM disk is currently installed, the Remove Temporary Disk option will darken and become active. Clicking in the Remove box and then clicking in the OK box at the bottom of the dialog box will remove the empty RAM disk and terminate the application.

If you select the Remove option, but the RAM disk is not empty, you'll get an alert box.

How Fast Is It?

Although different application programs execute at differing speeds with the RAM disk, the speed improvement is unmistakable.

Using a RAM disk can substantially improve the execution speed of a typical application program running on a 512K Macintosh. With the application, system folder, and document mounted on the RAM disk, both opening and quitting take only 20–25% of the time the same operations require with the files on a physical disk.

The time required to print a document is not significantly reduced under these circumstances, however.

Background

The RAM-disk volume is located in the "high end" of addressable RAM space. Memory remaining after its installation is user-dependent, but

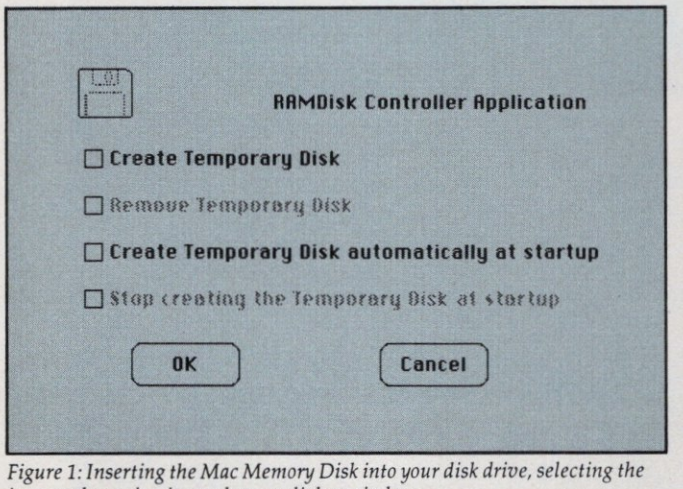

Figure 1: Inserting the Mac Memory Disk into your disk drive, selecting the icon, and opening it, produces a dialog window.

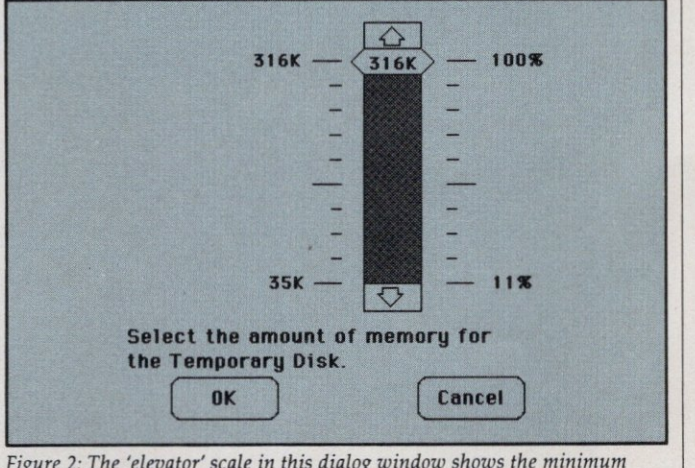

Figure 2: The 'elevator' scale in this dialog window shows the minimum and maximum size of RAM available for use as the RAM disk.

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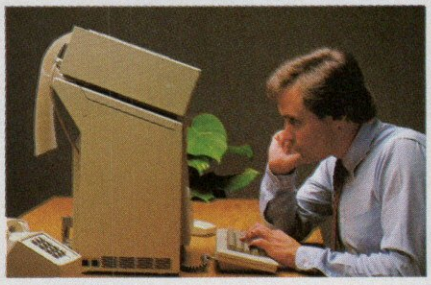

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the RAM disk always leaves sufficient space for a "normal" application (one that runs successfully on a 128K Mac).

In some cases, a RAM disk can greatly increase your system's storage capacity. For example, a RAM disk on a one-megabyte Lisa running MacWorks can contain a volume size of about 1600 blocks—enough space to store the contents of two Sony disks full of applications or data.

Saving Seconds

You can also use a RAM disk as a tool for copying data from one disk to another. Putting your document onto the RAM disk and then saving it on an alternate disk is like always having a second physical disk drive online—except that it's a lot faster.

Gary Croucher, the programmer who headed the development of Mac Memory Disk, says he is excited to have the product in the marketplace, where it can be used and appreciated.

He suggests that certain Mac programs may contain quirks in their copy-protection schemes that prevent their use on a RAM disk, but he hasn't encountered any such problems yet.

A more likely glitch can occur, Croucher says, if a user attempts to copy the contents of a RAM disk directly to a disk in an external drive by dragging the RAM-disk icon onto the top of a secondary disk icon representing a physical drive. *Don't do it.* It just won't work, and it can damage your physical disk. The problem occurs because your RAM disk is usually smaller than the capacity of your physical disk. Your Mac will try to create a physical disk with a RAM-disk directory on it—you don't want that.

If a 512K Mac or Lisa 2 is your idea of a good time, then do yourself a favor. Buy this program.

How to Copy Your RAM

Here's the right way to copy the contents of your RAM disk onto a physical disk: open the icons of both disks. Select the file icons in the RAM-disk that you wish to copy and drag them from one window to the other. It's just that easy.

Mac Memory Disk is supposed to work just fine with hard disks on the Mac. According to Croucher, you can move your System and Finder files from a hard disk straight to your RAM disk—thus turning your hard disk into a kind of data disk.

What you have to understand is that if you put your system files onto it, the RAM disk automatically becomes the default volume. Therefore, if the disk from which you're running your application has a System and Finder on it, then *it* becomes the default, or boot, volume. In that case, unless you eject the application disk, *it* runs the application, and your program's execution takes place at normal speed.

So, which volume is running the show? Get back to your Mac's desktop and look in the upper right corner of the screen. The volume whose icon appears in that location is the startup volume, and *its* System and Finder are in charge of your program's execution.

The Price Is Right

If a 512K Mac or Lisa 2 is your idea of a good time, then do yourself a favor. Buy this program. Software publishers, take note. A great product deserves a great price. +

John Lincoln is president of the Santa Barbara Apple Users' Group and uses Apple computers in his own business. He also enjoys writing about Apples, especially the Macintosh.

PRODUCT INFORMATION

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Requires: 512K Macintosh or Lisa 2 running MacWorks

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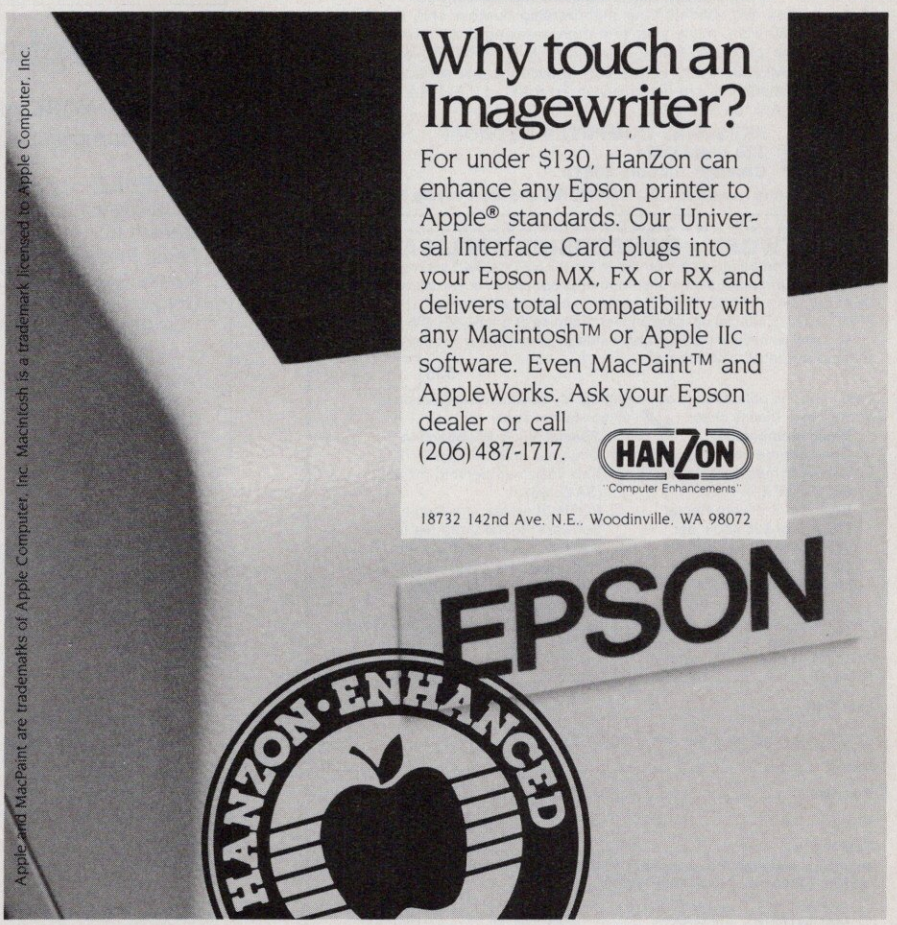

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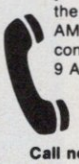

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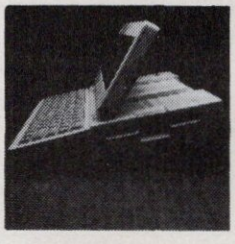

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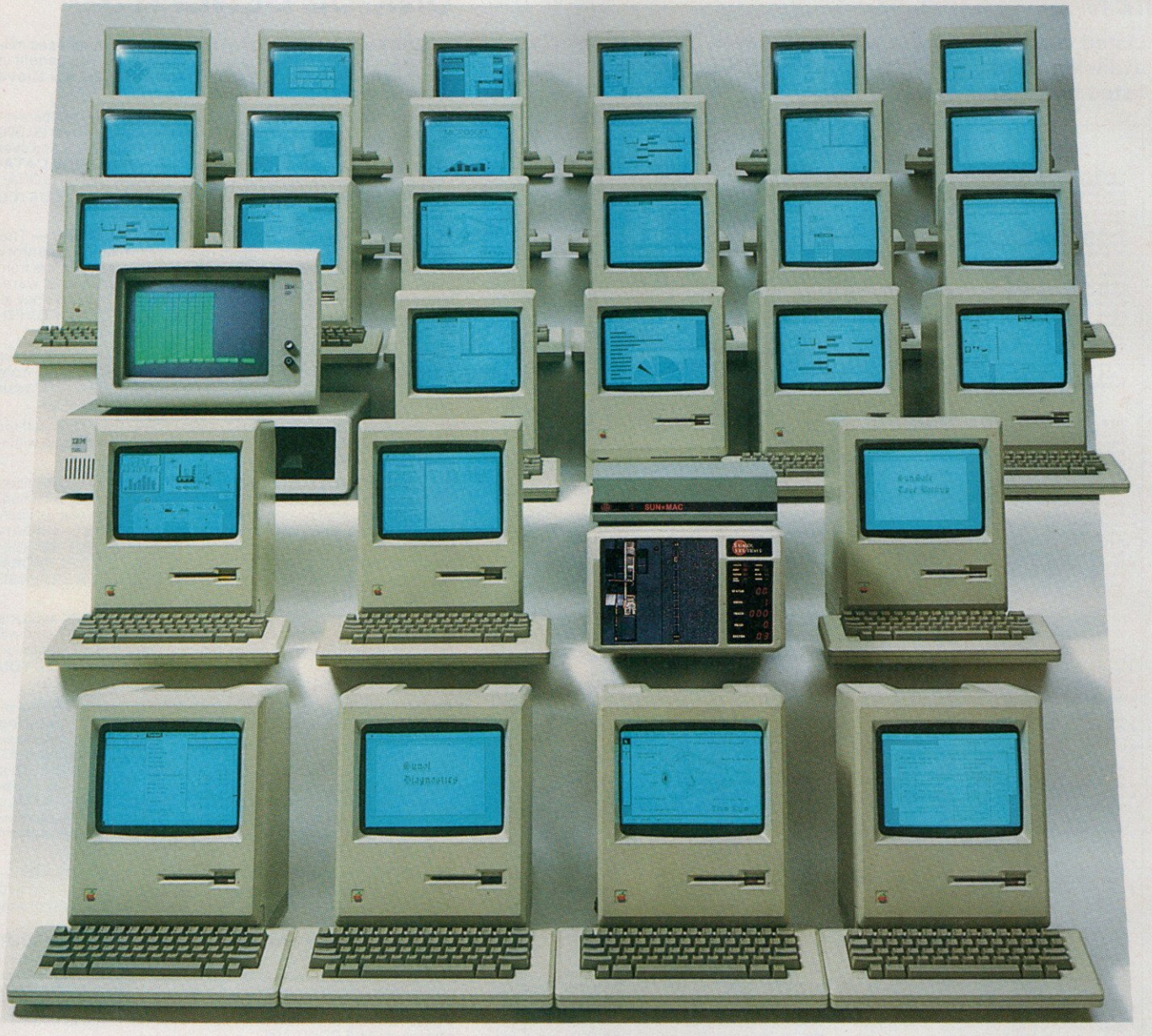

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Macintosh *Pascal Primer* Part I

"Your First Pascal Program" is excerpted from the Macintosh Pascal Primer *by Dan Shafer, which is being published by Plume/Waite this spring. This book is a complete hands-on overview of the Macintosh Pascal programming language. The first chapters of the book teach beginners how to start using Macintosh Pascal, and the later chapters teach advanced techniques.*

Macintosh Pascal is an exciting product; our contributing editor Dennis Brothers has hailed it as "... a revolutionary product, almost as significant as the Macintosh itself..." and as "... the best programming environment I've ever encountered" (see A+ November 1984, pages 103–109 for more of Brothers' remarks about Macintosh Pascal).

In this excerpt, which is taken from chapter 2 of the book, Dan Shafer will teach you how to write a simple Pascal program. Next month we will present an excerpt from one of the later chapters, which will introduce you to some of the more advanced features of Macintosh Pascal.

This chapter will take you step by step through the process of creating a Pascal program on the Macintosh. We'll use an intriguing little program that draws some shapes on your screen. You'll have a chance to enter the program into the Mac's memory, run it, save it on the diskette, list it, change it, and load it back into the computer. The chapter will, therefore, leave you with a program to show your friends and also with a good understanding of how programming with Macintosh Pascal works.

The program in this chapter is short, but the *process* of program creation is the same, regardless of program size. Rather than explaining the process first and then applying it to this program, we'll first show you the program, letting you see the process in action, and then summarize the steps so you can put them to work in other Pascal programs that you'll create later.

If you follow the steps listed below *exactly* as presented, the program will run the first time you try it. Later we'll talk about ways to modify the program—without knowing a single Pascal statement or programming technique!

1. Be sure your Pascal screen display is set up.

Your screen should look like the screen in figure 1. If necessary, move the windows around and resize them, or turn off the machine and restart.

2. Move the pointer to the word Untitled in the Program window.

This is the Untitled following the word program in boldface type inside the window labeled Untitled. The window name will change automatically later. Choose the word by dragging across it or by positioning the pointer anywhere inside the word and double-clicking. You'll know you're successful when the background changes so that all the text in the Program window is black on white and the word Untitled is reversed—that is, white type on a black background.

When you've become more accomplished at Pascal programming, you may choose to simply press the

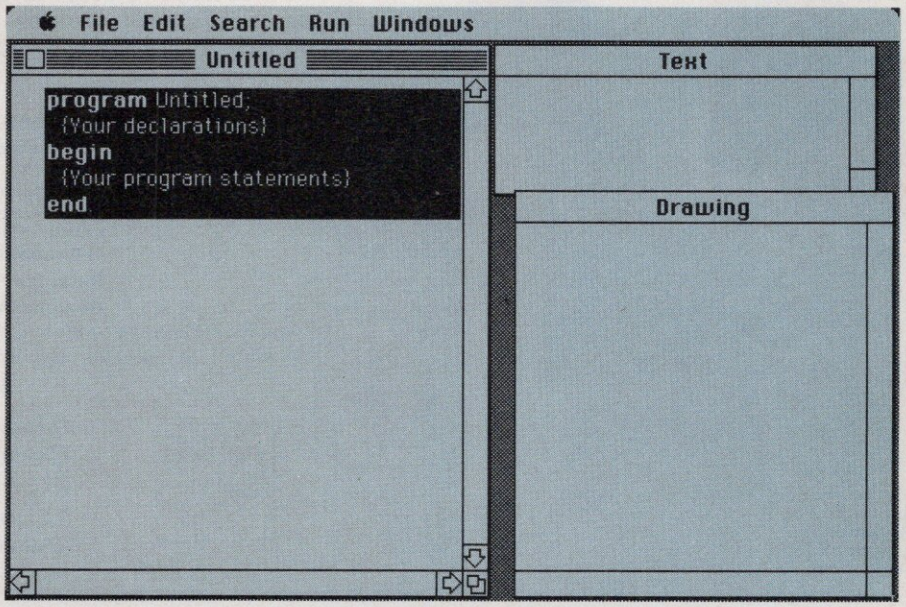

Figure 1: To begin the program, make sure that your Pascal screen display is set up.

backspace key once when the main Pascal display screen appears. That will delete all of the beginning framework provided by Macintosh Pascal. But for now, you'll probably find this framework quite helpful.

3. Type the word First.

We're going to call our first program, logically enough, First. Notice that the word Untitled disappears as soon as you type the first letter of the program name. If you've used MacWrite, you won't be surprised by this editing shortcut. When you finish typing the title, *don't press the Return key!* (If you do so, use Backspace to get the semicolon at the end of the line back up where it belongs.) When typing in Macintosh Pascal, you may use any combination of uppercase and lowercase letters. You can, for example, call a program First, first, FIRST, or even fIrSt. Mac Pascal ignores case.

4. Delete the entire line that says {Your declarations}.

This line doesn't do anything. The curly brackets at the ends of the line tell Pascal that the line is just a comment about the program for people who are reading the code. These extra doodads clutter up the program, so let's take out the entire line.

Three ways to delete a line in Pascal are similar to those used in MacWrite: click at the beginning, drag to the end, and then press Backspace; click anywhere in the line three times quickly and then press Backspace; or click at the beginning, move the pointer to the end of the line without dragging, hold down the Shift key while clicking, then press Backspace. Of course, you could also use the Cut option from the Edit menu to delete the selected material, but that's usually slower than using Backspace when you're editing a program because you're already using the keyboard.

5. Type the first program lines.

Type the partial word var on the line immediately following the line where you named the program, and then press Return. No semicolon is needed here because this is just a kind of attention-getter that lets Pascal know that you're about to declare a variable. Don't worry about understanding variables or declaration at this point; we'll get into all that soon enough. Now type the following line between the line you just typed (which now says var in boldface type) and the boldfaced word begin. That line should look like this:

```
x:integer;
```

When you type the semicolon, if you look quickly, you'll see a little "jump" in the screen display of this line. Pascal looks at the line and adjusts its position and spacing slightly.

A computer wag has suggested—only partly tongue-in-cheek—that the Pascal language was *not* really named for a famous mathematician. Rather, he says, it is an acronym for Placing All SemiColons is A Labor.

Semicolons are an important part of the structure of a Pascal program, whether on the Mac or on any other computer. Almost every line of a Pascal program must end with a semicolon. This punctuation mark is Pascal's way of saying to the computer, "Okay, I'm finished with that line now, you can go on to the next one." But you'll notice that we said *almost* every line ends with a semicolon—and therein lies the rub.

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Pascal statements are divided into two groups for this purpose: simple and compound. A compound Pascal statement consists of more than one line of Pascal programming code. In some cases, the lines contained within such a group may optionally omit the semicolon; in other cases, semicolons *must* be eliminated. Just remember the basic rule: Each statement must end with a semicolon. In most cases, that means every line ends with a semicolon.

6. Delete the entire line that says {Your program statements}.

Use the same method as in step 4 to delete the second comment line.

7. Type in the rest of your program.

By now, you're probably getting the hang of this. Type the rest of the program statements as shown in figure 2. All the lines should appear on the screen between the begin and end statements. Watch for semicolons (and the absence of semicolons!). Don't forget to press Return after you enter each line, and don't forget the colon before the equal sign.

```
program First;

  var
    x : integer;

begin
  while x <= 190 do

    begin
      FrameRect(0, 0, x, x);
      x := x + 5;
    end;

end.
```

Figure 2: Your program should look like this.

As you enter these lines, watch the Macintosh display. Notice how it prints some of your words in boldface type and shifts lines as you finish typing them so they line up neatly.

Proofread the program to be sure it looks *exactly* like figure 2.

If the program you typed doesn't look this way, correct the mistakes with the same editing techniques you use for MacWrite. Once you're sure the program is entered correctly, move to the next step.

8. Check the program for correctness.

This step may sound like what you just did, but it isn't. Move the pointer to the Run menu and select the Check option (the first one on the list). The disk drive will activate (probably), and (if all is well) nothing will appear on the screen. If there *is* a problem, a down-pointing thumb and an Alert box will appear and tell you where the mistake is and what went wrong.

The Check feature ensures that a program is syntactically correct and will not fail because of a typographical error. (Remember, though, that it does *not* guarantee that the program will do what you want it to do!)

Sometimes the thumbs-down pointer will point to a line *following* that in which the error occurs. For example, if the semicolon is left out after the word integer in our program, the hand will point to begin instead of integer. This is because of the importance of semicolons in Pascal. If the hand points to a line that seems to be all right, check the preceding line and make sure it ends with a semicolon if it's supposed to.

9. Run the program.

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There are two ways to run a Macintosh Pascal program (not counting single-stepping procedures). You can either pull down the Run menu and select the Go option or hold down ⌘ and the G (for *Go*) key together. The latter is a shortcut you'll probably find preferable as time goes on. You'll sometimes find it more convenient to use the mouse, however. Run the program now.

You should see a series of increasingly smaller rectangles nested inside each other in the Drawing window, as shown in figure 3.

Now you know why QuickDraw graphics used from within Pascal sometimes works better than MacPaint. You saw how quickly the program put those boxes on the screen. Imagine how difficult it would be—and how long it would take—to draw those by hand, even with MacPaint, as fast as it is!

By the way, a fascinating thing about windows in Macintosh Pascal is that their position on the screen doesn't affect the appearance of program output. For example, move the Drawing window around on the screen. Now reset the First program and run it again. The window in its new position looks the same as before, doesn't it? (Except, of course, for size, if you changed the size of the window.) This may not seem like a

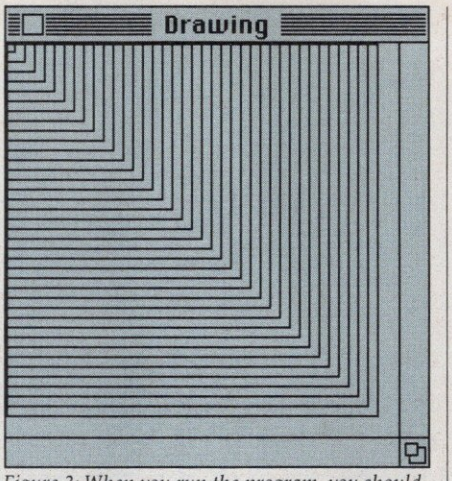

Figure 3: When you run the program, you should see a series of rectangles in the Drawing window.

big deal, but on most computers you have to be *very* careful about precisely where on the screen your graphics are displayed, or terrible things happen to the program. The Mac is designed so that once you have the program working in the Drawing window, you can move the window without affecting program output.

When the program is running, a new menu-bar item labeled Pause appears. This option lets you do two things: temporarily pause or permanently halt the program. Neither of these options is useful with the First program because it runs so fast, but you can interrupt longer programs while they're running. Positioning the pointer over the Pause menu item and clicking while holding down the mouse causes the program to pause until you release the button. Dragging down on the menu reveals the Halt option, which causes the program to stop running and the Pause option to disappear. We'll use this feature fairly often, especially when we write a program that never stops running (an error that programmers call an "infinite loop").

When writing longer and more complex programs, you'll want to save your work. Always save a copy of your program once it's been checked and found to be OK. It may still not be correct (remember, the Check option finds only certain kinds of mistakes), but save it anyway, because there's always a possibility it will "blow up" and destroy itself when you try to run it.

1. Pull down the File menu and drag to the Save As . . . option.
2. A dialog box will appear (figure 4).
3. Type in the name of the program as you want to save it (in this case, type First).
4. Either click on the Save button in the Dialog box or simply press Return.
5. The program is now saved on the Macintosh Pascal disk.

After you've saved the program on the disk, you may notice something new about the Program box. Instead of being labeled Untitled, it is now called First.

Now that Macintosh Pascal knows the program's name, you can use the Save option on the File menu to save new copies of the program after you make changes, rather than using the Save As . . . option. The Save option assumes you want to use the same name over again and doesn't ask you for a name.

It's good programming practice to save a "hard copy" of programs. You can display all the lines of the First program on the screen at one time (it's only ten lines long, after all!), but you won't be able to see the longer programs you will be writing in the future. The printed copy will help you see your longer programs at a glance. Also, if a program should ever get "lost" or damaged on the disk, having a printed copy makes it much easier to type it back in.

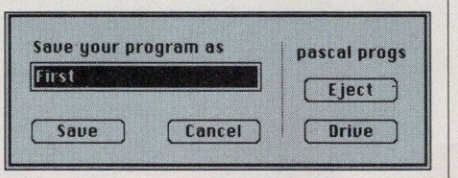

Figure 4: Saving the program on disk.

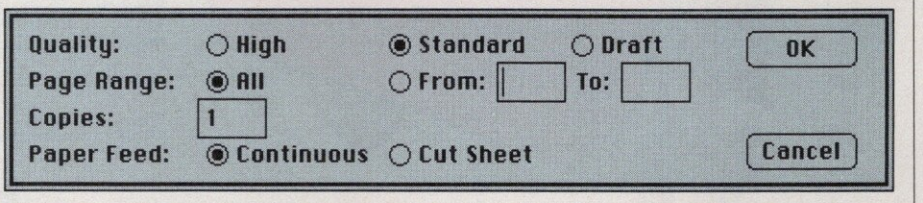

Figure 5: The dialog box for printing your program is basically the same dialog box you've seen in MacWrite.

Mac-r-cises

1. Experiment with the five semicolons in the First program. Try removing them one at a time. Which one(s) can you eliminate without causing an error condition? What do the results tell you about the statements involved, in view of what we said about times when semicolons are required and when they are optional?
2. Move the Drawing window so that it occupies the entire screen display. Now experiment with the upper limit of *x* in the statement that begins with the word *while*. What's the largest value you can put in without making the rectangles disappear off the edge of the window? (Hint: After each run, click on the upper left corner of the Drawing window to make it disappear and then use the Windows option to make it reappear when you need it. You can also simply use the Size box to reduce the Drawing window so you can see the Program window, then reenlarge it.)

To print a copy of a program, drag down the File menu, choose the Print . . . option, then click on the OK button in the dialog box that shows the format, pages, and so on. The dialog box (shown in figure 5) is basically the same dialog box you've seen in MacWrite. The program will print out on the Imagewriter printer. By the way, you can obtain the best printout results by using the Standard Quality mode for the printer. High Quality is quite slow, and Draft Quality doesn't supply the indentations and spacing that make a Macintosh Pascal program easier to read and understand.

Running a Program

You may want to show your spouse, friend, kids, or boss this program. It is, after all, quite an accomplishment that you can already type in and run a Pascal program that creates an interesting visual image on the screen. How do you run a program more than once? That depends on whether it's stored in memory or on the disk.

To run a program more than once, drag down the Run menu and choose the Reset option to clear the Drawing window after each execution (*execute* is simply a fancy word for *run*). This Reset step is not necessary, but it's nice to start each run of a program with a clean Drawing window and an empty Text window. Once that's done, use the ⌘ G combination or the Run menu Go option to run the program again.

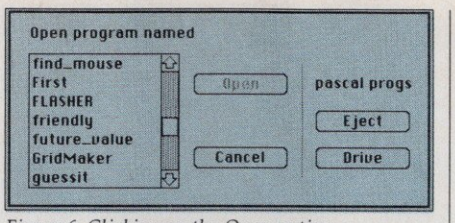

Figure 6: Clicking on the Open option

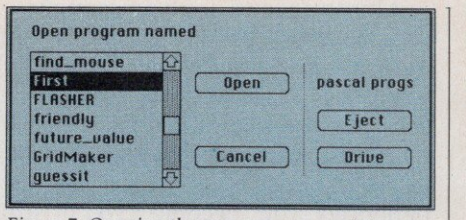

Figure 7: Opening the program you want to run

Once you turn off the machine, your program is no longer in the Mac's memory. If it's stored on the disk, open it and move it from the disk into memory. This requires two steps:

First, if there is a program now in the Programming window, eliminate it by pulling down the File menu and clicking on the Close option. You'll be asked if you want to save or discard the changes; click on the Discard button (assuming the program is either already saved or is one you don't want to save), and the Program window will disappear.

The second step is to pull down the File menu and click on the Open option. Following a pause, a new dialog box like that shown in figure 6 will appear. (Of course, the files shown in the little box inside the dialog box will be different from those in the figure.) Use the scroll bar on the right side of the little catalog box, if necessary, to bring the program to be opened into the window; then move the pointer to the program's name. You can now open this program (that is, bring it into the Mac's memory for use), either by double-clicking on its name or by single-clicking. If you choose the latter route, the program's name will be highlighted (see figure 7) and you can then move the pointer to the Open button in the window and click once. The program will load into the Mac's memory and will be displayed in the Program window.

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Murphy's laws apply unerringly to programming. In fact, people in the industry sometimes claim Murphy wrote his laws just for computers. (Murphy would probably deny this, if he weren't too busy scraping dust off his jelly bread.) No matter how experienced you become, you'll still spend a substantial part of your programming time "debugging" your programs.

One of the most useful tools for debugging programs on the Macintosh is the ability to single-step through a program. You can execute a single line of the program and then have the program stop so you can see exactly what the line did. This is a luxury not available to most Pascal programmers.

Drag down the Run menu and select the Reset option. Now drag it down again and select the Step option. After a pause, the program will stop. A little hand will appear at the left edge of the screen, pointing at the line that will be carried out next (see figure 8). The Mac is waiting to be told what to do next. Hold down ⌘ and press S once; then release both keys. The hand will move down one line, and the program will wait again.

```
First
program First;

  var
    x : integer;

begin
  while x <= 190 do

    begin
      FrameRect(0, 0, x, x);
      x := x + 5;
    end;

end.
```

Figure 8: When you single-step through a program, a hand appears at the left of the screen, pointing at the next line to be carried out.

Do this for a dozen steps. You'll notice rectangles building up in the Drawing window one at a time. Perhaps it will begin to be apparent how the program works. That kind of intuitive insight is one of the great fringe benefits of stepping through a program. For continuous stepping, just keep ⌘ and S pressed down.

If you get tired of the one-step-at-a-time approach to running a program, just use the ⌘-G combination to restart the Go option. The program will then run on its own.

When you are tired of looking at nested rectangles, change the program by trying one or both of the following:

1. Use the usual editing techniques to change the value of the number 190 in the fifth line of the program. Smaller values will create fewer rectangles and end them closer to the middle or upper left corner of the screen. Larger values will create more rectangles and end them closer to the lower right corner of the screen. A value larger than about 200 will cause the program to run out of room in the Drawing window.
2. Change the value of the number 5 on the eighth line of the program. A number larger than 5 will increase the distance between the rectangles; a smaller number will decrease it. A number less than 1 won't work.

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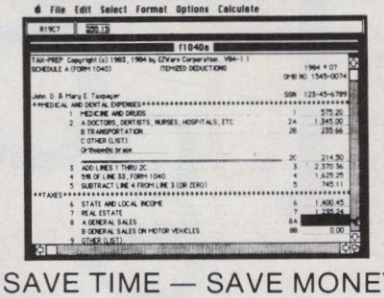

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the File menu and choose the Revert option. This will retrieve the original, saved copy of your First program. There will be many times in your Pascal adventure when you'll be very grateful for this feature!

The Programming Process

We promised at the beginning of this chapter to discuss the *process* involved in implementing a program in Macintosh Pascal. Actually, the following information applies to all computer programs on all types of machines in all languages.

The beginning of the programming process takes place before we sit down at the keyboard and type in a program. Much of the programming task takes place on paper and in our heads.

The first step in writing a computer program is to define the problem. In our First program, the problem was trivial—to find a simple way to draw rectangles and other shapes on the screen.

Identification of the problem leads to the second step, a statement of a solution in general terms. For example, the solution to our problem might have been stated as follows: "Write a program that is easy to type and draws increasingly larger rectangles in the Drawing window." In real programming situations, the solution statement is refined many times before the program is finished.

Step-by-Step Planning

Next, the general statement is translated into a step-by-step plan for achieving the solution. For our sample program, the step-by-step solution might have looked something like this:

1. Draw a very small rectangle, using a counter to permit increase or decrease in sizes and spacing.
2. Draw a larger rectangle around the first.
3. Continue to draw slightly larger rectangles until the Drawing window is filled.
4. Quit.

You have outlined a solution. The next step is to translate it into the programming language you have chosen.

Next, you type the program into the computer and save it on a disk. (As we mentioned earlier, putting programs on a disk before fooling around with them is a very good idea. Things sometimes go wrong, even on the Macintosh!)

The next step in the programming process is to run the program and see what happens. Did it work as expected? Did it run as fast as you wanted? Did unexpected things, good or bad, happen? Do you see ways to make the program faster, more interesting, more useful, or more understandable?

The next step is not a single step; it is a cycle, involving debugging the program, modifying it, saving it, running it, debugging it again, modifying it again, and so on. People who manage professional programmers will tell you that this process *never* stops. Don't believe them! I've never completely finished a program myself, but I knew a woman who said she had a program that she didn't want to change.

The final step in the process is the most important one: using the program to solve whatever problem you identified in step one.

In a nutshell, that is what programming a computer is all about! ✚

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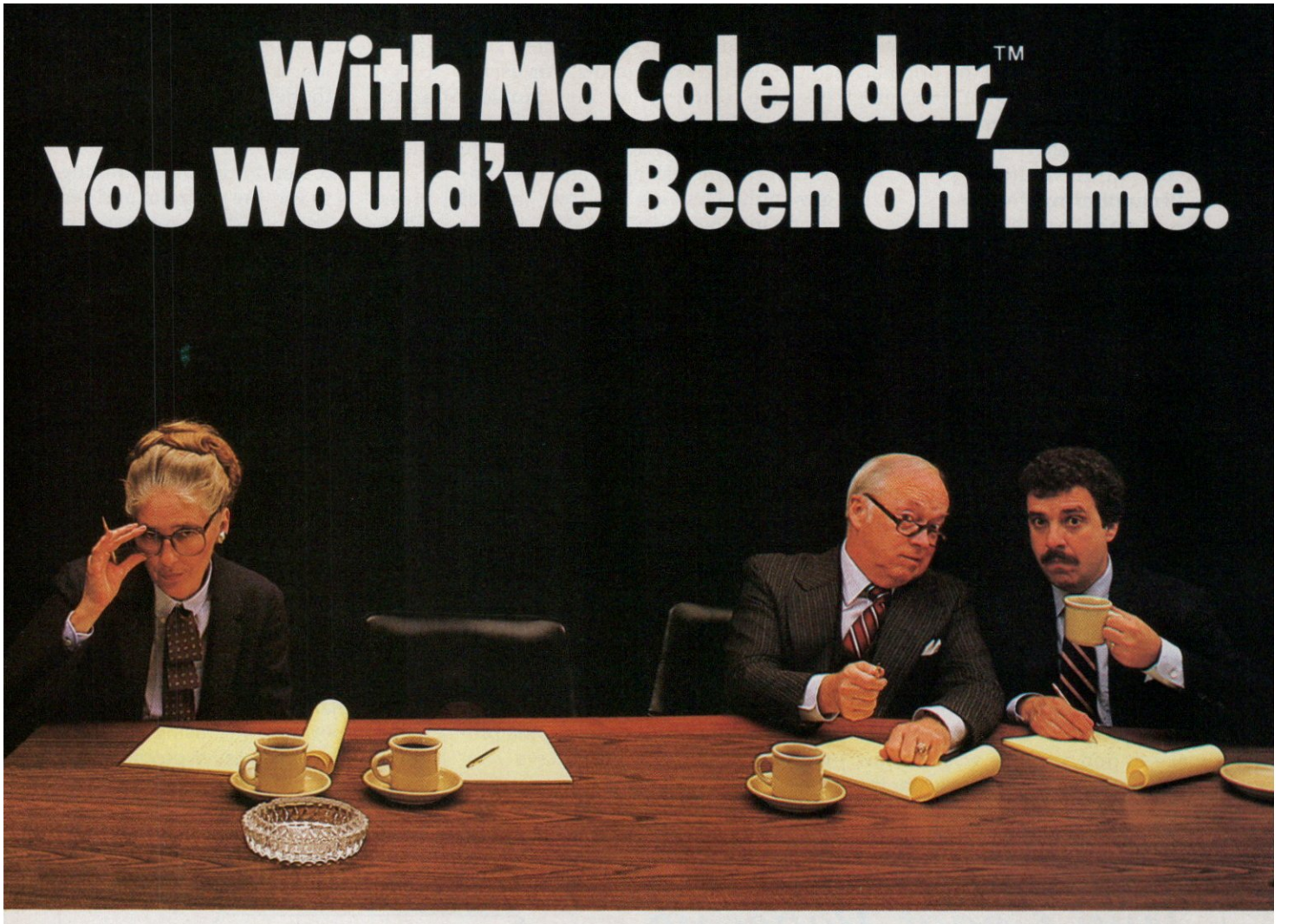

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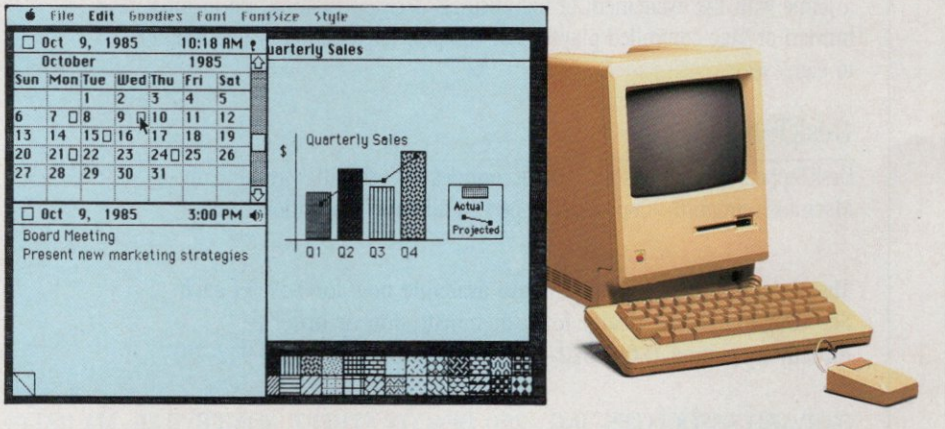

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Getting Our Hands Dirty

Delving further into assembly-language programming on the Mac

We've been fiddling around with the Macintosh assembler during the last few issues. Mostly, we've worked with the resource compiler and done a few initializations in assembly-language code. This month, we'll look more closely at a few key sequences that use Macintosh ROM routines.

Unfortunately, I'm still running into one small problem: The Macintosh assembler still hasn't appeared on the market, and the latest version of it that I've gotten ahold of has a few nasty changes in it, most notably several toolkit trap names that are different. Late changes are one problem with working with prerelease versions of software and writing about them in magazines. Since *A+* has a three-month lead time, what I write about today may have been slightly modified by the time the product gets into your hands. Therefore, carefully check all of the toolkit trap names in any example presented here against the names that appear in the final Macintosh assembler. In many cases, Apple has simply added an *s* to the end of a name to imply manipulation of multiple things, as opposed to a single one. In other cases, however, the name has changed more drastically.

Those of you who have prerelease assemblers because you bought a programming language (such as C) that came with a copy should also check the trap names. If you get an assembler error on a ROM routine call and the error message is illegal line, the trap name has probably been changed.

Despite this minor annoyance, we'll tackle the subject at hand with our usual zest. In particular, we'll examine three key toolkit calling sequences this month. First we'll look at how to get our menus displayed, next we'll look at how to get our dialog box on the screen, and then we'll examine some code that handles the mouse and other events (such as key down, key up, and so on).

What's on the Menu?

Last month we initialized all the managers and opened our resource file. Now we'll initialize our menu. The proper sequence for putting a menu into the menu bar is as follows:

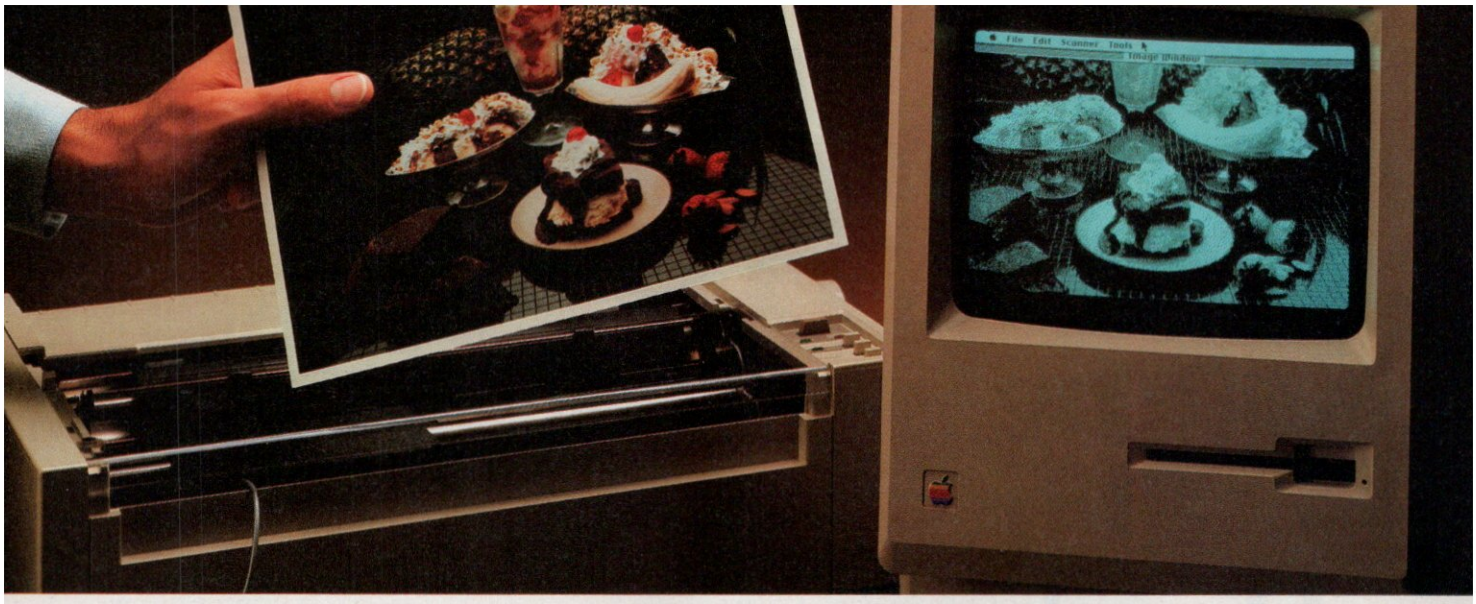
1. Set up resource ID and other parameters on the stack; then call _GetRMenu to get the handle for that menu.
2. Use _InsertMenu to put the new menu into the menu list the Finder keeps.
3. If this is the Apple menu, add the desk accessories.
4. Draw the menu bar.

The code to do all these steps looks like figure 1.

An easier method of accomplishing the same thing exists, but I've left

```
SetUpMenu
        CLR.L   -(SP)           ;space for Handle
        MOVE    #1,-(SP)        ;we want menu #1, the Apple menu
        _GetRMenu               ;get it!
        CLR     -(SP)
        _InsertMenu             ;and insert it after all others in menu list
        CLR.L   -(SP)           ;space for Handle
        MOVE    #1,-(SP)        ;we want menu #1 again
        _GetRmenu               ;get it!
        MOVE.L #'DRVR',-(SP) ;add drivers to menu list
        _AddResMenu             ;and do it
        _DrawMenu               ;now draw the menu bar
```

Figure 1: The code for putting a menu into the menu bar



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this code quite literal (to correspond to the *Inside Macintosh* documentation), so that you can see each step. For instance, we didn't need to get the handle for the menu the second time; we could have made a copy of the handle and used that instead of the second call to _GetRMenu.

We haven't added any other menus in our example, but let's do so now. In our resource file, add the following statements:

```
Type MENU
  ,256
Edit
  (Undo/Z
'-
Cut/X
Copy/C
Paste/V
Clear
```

This code creates a new menu item called Edit, which contains six entries. The first is Undo; the second a disabled line of hyphens to form a graphic division; the third Cut; and then come Copy, Paste, and Clear. The slashes and letters that follow indicate that the ⌘ option can be used, and that the menu is to display the cloverleaf (⌘) with the letter you assign. The parenthesis preceding the Undo option indicates it is disabled for our purposes in creating the dialog box.

Now, let's add some code to our example to add this menu to the Finder's list. Immediately after you add the desk accessories, but just before the _DrawMenu statement, add this code:

```
CLR.L   -(SP)
MOVE    #256,-(SP)
_GetRMenu
CLR.W -(SP)
_InsertMenu
```

That's all there is to it. Note how this code closely resembles what we used to create the Apple menu last month.

Now let's turn our attention to the display of a dialog box. Remember, two types of dialog boxes exist in Macintoshdom, the modal and nonmodal dialog boxes. A modal dialog box waits for a response by the user and stays on the display until the user has made an appropriate response.

The code in figure 2 creates and displays our dialog. The resource file must be open before we use this code.

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First we set up the stack with information about our dialog and then call _GetNewDialog. If we were creating a modal dialog, we'd go on to make the dialog a port (active screen portion) of its own. Last, we'd activate the _ModalDialog routine and have it wait for the user to make an appropriate response. After the user responds and the program goes on to the _CloseDialog routine, set the port back to its original state, and you're through.

Again, notice how simple it is to do something that, on another computer, might take a great deal of code. The dialog box, remember, is a window and can contain many other things, including static text, buttons, and areas for the users to enter text.

It's an Event to Remember

Event handling can be simple or complex. For now, let's concentrate on the simple.

The general method of handling events is to set up a table in which the ROM event routines can fill in data and then call _GetNextEvent. Once you have the event data back from the ROM routine, you examine it to find out what kind of event it was. The type of event determines the next action you take.

First we wait for an event to happen and examine what type of event it was. In the case of a mouse event, we look to see which window, if any, it was in. In the case of a menu event, we find out which menu it was in and then continue processing the event to see which item within the menu is being activated.

Let's look at some simple code for some of these actions. Figure 3 shows what we need to get an event.

Again, the ROM routines simplify the code. Basically, all we have is a simple loop that calls the _GetNextEvent routine. Now let's handle a mouse-button-down request.

If the mouse button is down, we need to find out where the mouse is to proceed to. In our simple example, it could be in a dialog window, a system window (desk accessory), or a menu. So, our first action is to find out in which window the action took place (see figure 4).

If the mouse is in a menu bar, we have to process further to find out which menu bar it is in. To do so, we use the _MenuSelect function.

Rather than continuing to look at individual routines, let's just put everything together into one big sample program. The program listing on the following pages shows the assembly-language source code for the simple program we started two columns ago. I've rearranged a few things to make it a bit more elegant, but most of the code should be recognizable from the discussions we've had about it.

Once you've mastered this simple example, go a few steps further and try adding new menus, additional dialog boxes, and perhaps a text window or two. Everything you need to know is in *Inside Macintosh*, though it will take some searching to find the appropriate routines the first time.

We'll return to assembly language in a later column, but for the next two columns I want to take a close look at three of the C compilers that have appeared in the marketplace for the Mac. C is a natural language for the Mac, and you'll find that it simplifies your programming (at least compared to the assembly language we've been trying to master). Till next month, have a binary good time. ✚

```
SetUpDialog
        CLR.L   -(SP)           ;space for Handle
        MOVE    #256,-(SP)      ;identify which dialog
        PEA     DialogStore     ;point to some dialog storage area
        MOVE.L  #-1,-(SP)       ;dialog is to go on top of all else
        _GetNewDialog           ;and do it
```

Figure 2: The code for creating and displaying our dialog

```
GetAnEvent
        CLR     -(SP)           ;clear space for resulting event
        MOVE    #-1,-(SP)       ;accept all events for now
        PEA     Record          ;point to event record data storage
        _GetNextEvent           ;invoke the ROM routine
        MOVE    (SP)+,D0        ;put result in D0 for examination
        CMP     #0,D0           ;was there an event?
        BEQ     GetAnEvent      ;nope, so go back until we get one
;do event processing here <--
Record
Type    DC      0               ;type of event
Message DC.L    0               ;event message
Time    DC.L    0               ;when event occurred
Point   DC.L    0               ;coordinates where event occurred
Modify  DC      0               ;key and button states
EvWindow DC.L   0               ;window for event
```

Figure 3: The code necessary for getting an event

```
MouseIsDown
        CLR     -(SP)           ;space for result
        MOVE.L  Point,-(SP)     ;mouse position gets on stack
        PEA     EvWindow        ;window pointer on stack
        _FindWindow             ;and find where mouse down occurred
        MOVE    (SP)+,D0        ;get result into register to check
        CMP     #1,D0           ;is it in a menu bar?
        BEQ     MouseInMenu     ;yes, go to MouseInMenu routine
        CMP     #2,D0           ;is it in system window?
        BEQ     MouseInSystem   ;yes, go to MouseInSystem routine
        JMP     GetAnEvent      ;go back for another event
```

Figure 4: Finding out in which window the action took place

Thom Hogan, the editor-in-chief of Business Software, *has written many computer books, including* InfoWorld's Essential Guide to the Apple II.

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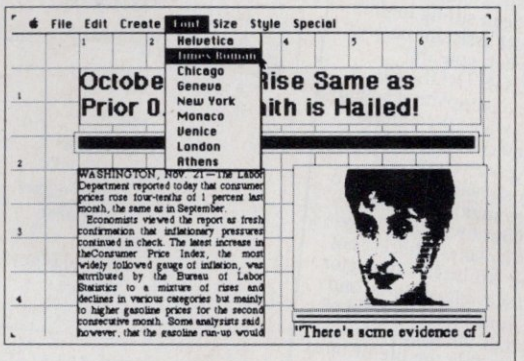

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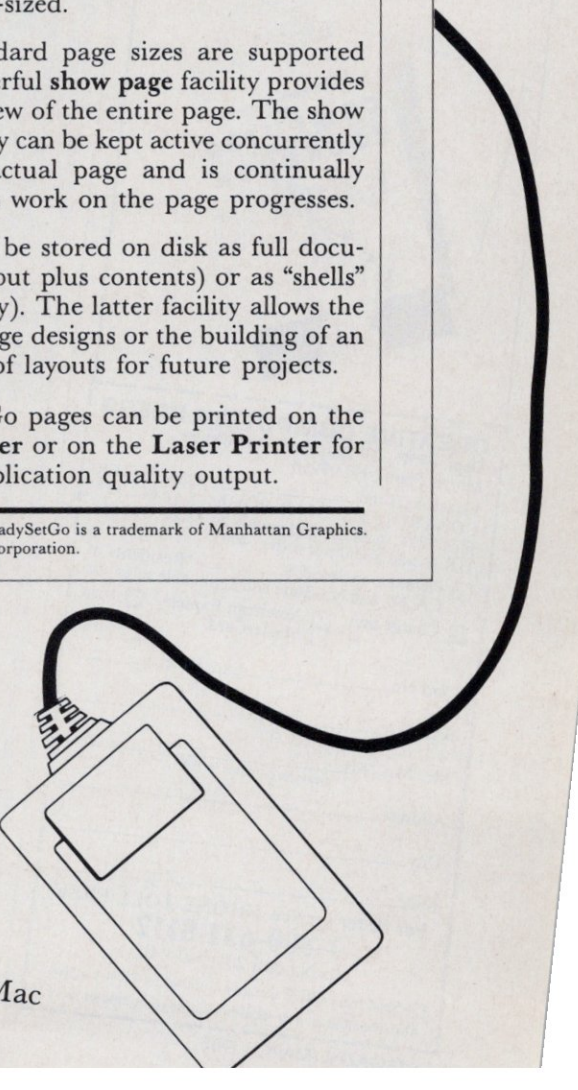

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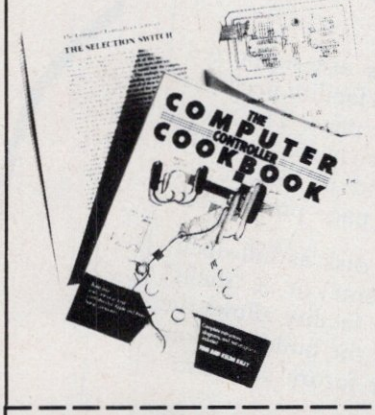

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Sample Assembly Language Program

```
*-------------------------------------------
* A+.ASM        A sample assembly language program.
*               Thanks to Apple and Mark Benioff
*               for the basic program structure.
* 12.24.84      Assembled with beta-test version
*               of the MacAssembler
*-------------------------------------------
*
* We need the equates and ROM trap routines
*
Include  MacTraps.D
Include  ToolEqu.D
*
*-------------------------------------------
* Initializations
*
        PEA             -4(A5)  ;global variables area
        _InitGraf               ;initialize QuickDraw
        _InitFonts              ;initialize Font Manager
        _InitWindows            ;initialize Window Manager
        _InitMenus              ;initialize Menu Manager
        CLR.L           -(SP)   ;0=no restart procedure
        _InitDialogs            ;initialize Dialog Manager
        _TEInit                 ;initialize Text Edit
*
*-------------------------------------------
* Open the resource file
*
        CLR             -(SP)           ;space for result
        PEA             'A+.Rsrc'       ;resource file name
        _OpenResFile                    ;open resource file
        MOVE            (SP)+,D0        ;take result off stack
*
*-------------------------------------------
* Set up menus
*
        CLR.L           -(SP)           ;space for menu Handle
        MOVE            #1,-(SP)        ;specify menu #1
        _GetRMenu                       ;get Handle for menu #1
        CLR             -(SP)           ;space for result
        _InsertMenu                     ;insert menu #1 after all others
        CLR.L           -(SP)           ;space for menu Handle
        MOVE            #2,-(SP)        ;specify menu #2
        _GetRMenu                       ;get Handle for menu #2
        CLR             -(SP)           ;space for result
        _InsertMenu                     ;insert menu #2 after all others
*
*-------------------------------------------
* Add desk accessories to the Apple menu
*
        CLR.L           -(SP)           ;space for menu Handle
        MOVE            #1,-(SP)        ;specify menu #1
        _GetRMenu                       ;get Handle for menu #1
        MOVE.L          #'DRVR',-(SP)   ;specify all DRVR type items
        _AddResMenu                     ;and add them to menu #1
*
*-------------------------------------------
* And perform the remaining initialization routines
*
        _DrawMenuBar                    ;show the finished menu bar
        MOVE.L          #$0000FFFF,D0   ;flush all events from buffer
        _FlushEvents
        _InitCursor                     ;and show the arrow cursor
*
*-------------------------------------------
* Main program loop
*
MainLoop
        _SystemTask                     ;update all system registers
        CLR             -(SP)           ;space for event result
        MOVE            #-1,-(SP)       ;-1 = all events accepted
        PEA             EventRecord     ;point to event data storage
        _GetNextEvent                   ;and get an event
```

```
        MOVE            (SP)+,D0        ;move result to D0 for comparison
        CMP             #0,D0           ;was there an event?
        BEQ             MainLoop        ;...no, loop again
        MOVE            What,D0         ;...yes, move type to D0
        CMP             #1,D0           ;.....was it a mouse down event?
        BEQ             MouseDown       ;.........yes, process it
        BRA             MainLoop        ;.........no, loop again
*
*-----------------------------------------------
* Mouse down activity
*
MouseDown
        CLR             -(SP)           ;space for window result
        MOVE.L          Point,-(SP)     ;mouse position on stack
        PEA             WWindow         ;window of event on stack
        _FindWindow                     ;get window result
        MOVE            (SP)+,D0        ;put result in D0 for comparison
        CMP             #InMenuBar,D0   ;was it in menu bar?
        BEQ             InMenu          ;...yes, process it
        CMP             #InSysWindow,D0 ;...no, was it in system window?
        BEQ             SystemEvent     ;.....yes, process it
        BRA             MainLoop        ;.....no, loop again
*
InMenu
        CLR.L           -(SP)           ;space for menu result
        MOVE.L          Point,-(SP)     ;mouse position on stack
        _MenuSelect                     ;find which menu was it in
        LEA             MenuNumber,A0   ;put menu number in A0
        MOVE.L          (SP)+,(A0)      ;  and in D6 for indirect
        MOVE            MenuNumber,D0   ;  and in D0 for comparison
        CMP             #1,D0           ;was it in menu #1?
        BEQ             InMenu1         ;...yes, process it
        CMP             #2,D0           ;...no, was it in menu #2?
        BEQ             InMenu2         ;.....yes, process it
        BRA             MainLoop        ;.....no, loop again
*
InMenu2
        MOVE            MenuItem,D0     ;get item number into D0
        CMP             #1,D0           ;was it Quit?
        BEQ             Return          ;...yes, so go to Finder
        BRA             MainLoop        ;...no, loop again
*
InMenu1
        MOVE            MenuItem,D0     ;get item number into D0
        CMP             #1,D0           ;was it About A+?
        BEQ             AboutAPlus      ;...yes, so process it
                                        ;...no, it must be a desk acc.
        CLR.L           -(SP)           ;space for menu Handle
        MOVE            #1,-(SP)        ;we want menu #1
        _GetRMenu                       ;get menu #1 Handle
        MOVE            MenuItem,-(SP)  ;put item number on stack
        PEA             DeskAccName     ;put accessory name storage on stack
        _GetItem                        ;find out which accessory
        CLR             -(SP)           ;space for result
        PEA             DeskAccName     ;point to accessory name
        _OpenDeskAcc                    ;and open it for use
        MOVE            (SP)+,D0        ;get result off stack
        CLR             -(SP)           ;0 = all menus
        _HiLiteMenu                     ;unhighlight all menus
        BRA             MainLoop        ;and loop again
*
Return
        CLR             -(SP)           ;0 = all menus
        _HiLiteMenu                     ;unhighlight all menus
        RTS                             ;return to the Finder
*
SystemEvent
        PEA             EventRecord     ;put event data storage area on stack
        MOVE.L          WWindow,-(SP)   ;put which window storage on stack
        _SystemClick                    ;and give system its turn
        BRA             MainLoop        ;and loop again
*
```

Continued on page 110

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Continued from page 109

```
*-------------------------------------------
* About A+
*
AboutAPlus
        CLR.L           -(SP)           ;space for dialog result
        MOVE            #1,-(SP)        ;we want dialog number 1
        PEA             DStorage        ;point to some storage area
        MOVE.L          #-1,-(SP)       ;-1 = put it on top of all windows
        _GetNewDialog                   ;and get the dialog
        MOVE.L          (SP)+,D6        ;get result off stack
        MOVE.L          D6,-(SP)        ;and put it back on for SetPort
        _SetPort                        ;change current port to dialog
        CLR.L           -(SP)           ;space for dialog result
        PEA             ItemHit         ;point to storage area
        _ModalDialog                    ;perform modal dialog
        MOVE.L          D6,-(SP)        ;get that dialog Handle on stack
        _CloseDialog                    ;and close the dialog
        CLR             -(SP)           ;0 = all menus
        _HiLiteMenu                     ;unhighlight all menus
        BRA             MainLoop        ;and loop again
*
*-------------------------------------------
* Data storage area
*
ItemHit         DC      0
DStorage        DCB.W   DWindLen,0      ;window storage for dialog
DeskAccName     DCB.W   16,0            ;desk accessory name
EventRecord
What            DC      0       ;type of event
Message         DC.L    0
When            DC.L    0
Point           DC.L    0       ;mouse position
Modify          DC      0
WWindow         DC.L    0       ;window result
MenuNumber      DC      0
MenuItem        DC      0
END
```


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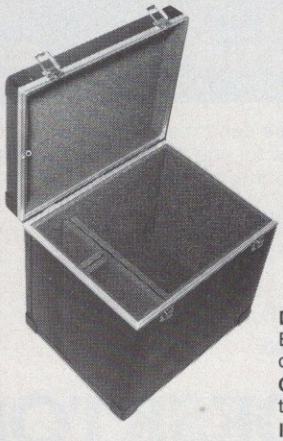

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MacTips

Suggestions from our readers

MACSILENT

I often work on my Macintosh late at night when family members are sleeping nearby. The whir of the disk drive does not often disturb their slumber, but the bing of loading a disk or the bong when the Macintosh thinks you are about to pull a boo-boo are certified eye-openers.

Actually, my youngest child solved the problem by asking me, "Why don't you plug up the Macintosh?"

Hence, my advice to put a 3.55mm plug into the audio output on the back of your Macintosh, which silences the Macintosh for as long as the plug is in place. Sony Walkman earphones have the correct size plug, or you can buy a plug at your local electronics store.

J.M. Durkin
Venice, CA

SAVING SPACE ON WORK DISKS

If you need many different fonts and font sizes on a MacPaint or MacWrite application work disk (assuming that you save the documents created by the application on a separate data disk), but keep getting out of space, delete some documents messages, it is possible to actually delete the Finder from the work disk. First, start up the Mac with another disk in its drive. Then eject the first disk, insert the work disk, and select the application on it. Choose Set Startup from the Special menu, and click the OK button. Next, delete the Finder from the work disk by putting it in the trash can and choosing Empty Trash. Finally, eject the work disk. Whenever you want to use that application, you can turn on the Mac with the work disk in the drive, and it will automatically be loaded. The only drawback to this scheme is that once you try to quit the application, a bomb message appears, indicating a system error. Don't worry about this. Just click on the Restart button and hold the mouse button down while Mac restarts, thus ejecting the disk. This procedure saves around 41K on each disk, and it is worth the extra trouble of not being able to quit.

Christopher W. Cowell
Portland, OR

FAST FOOTWORK

When printing draft copies of documents with MacWrite on continuous paper, I have found it convenient to use footers rather than headers for page numbering. This strategy saves the Imagewriter from returning to the top after printing the whole page, which sometimes creates problems with repeated forward/backward tractor-feed movements. Also, by including the document name in the footers (for example, High Tech 1/ page #), I can easily identify the document on the desktop. Footers may be dropped and replaced by headers after the manuscript is edited and you wish to print your final copy.

Search and Replace

To avoid typing recurring expressions and long or complicated terms, I substitute & or * or another appropriate character. Later, I replace the characters with my desired words or phrases using MacWrite's Change option in the Search menu.

Julio Angel Juncal
Washington, DC

ICON NOT NEEDED

The Imagewriter icon is not needed with either MacPaint or Microsoft BASIC version 1.00 or 1.01. Removing the Imagewriter icon frees more storage for your MacPaint or BASIC files.

To provide as much storage as possible, use separate disks for MacPaint, Microsoft BASIC, and MacWrite.

Wiley Sanders
Dallas, TX

PRINTING SPREADSHEETS

Those of you who have or can get copies of Microsoft Chart will find that Multiplan can now have 120 columns in the wide print mode instead of 80, a 9-point type style instead of 12 points, and 70 columns on the screen instead of 60.

Make a copy of Multiplan on a new disk; then trash the system icon on the new disk. Turn off the machine and reboot with the Microsoft Chart disk. Copy the Microsoft Chart system icon to the new disk as a replacement for the Multiplan version. Finally, turn off the machine and reboot with the Multiplan disk.

Another technique involves using Font Mover and the 9-point New York font. Using the Microsoft Chart method, however, gives you more rows for the Multiplan screen.

John Biele
Oroville, WA

A DIFFERENT CREATOR

Often you can open a document file using an application program that did not create the file. To do this, select the desired document with a single click of the mouse. Then hold down the Shift key and select the application with one mouse click. Choosing the Open command from the File menu causes the document to be opened with the chosen application, rather than with the application used originally to create the document. This process does not work with all combinations of documents and applications, so experiment carefully.

Stephen W. Martin
Broomfield, CO

DISK RECOVERY

Occasionally a good Mac disk becomes unbootable and the Mac will not allow you to initialize the disk because it still contains data. The usual culprit is an invisible file—existing on

MacTips

y Mac disk—called the DeskTop. file tells the Finder what files are he disk. When the DeskTop gets royed, the Finder gets confused cannot read the disk, even gh the rest of the files may still ntact. To remedy the situation, the disk while holding down the ⌘ and the Option keys un- e disk boots. This action tells the r that there is no DeskTop file e disk and forces it to create a one. This remedy may not al- work, but it has saved me from some precious data.

Stephen W. Martin
Broomfield, CO

PAINT MULTIFONT LINES

you're typing a line of text in int, changing the font, font r font style affects all the text typed since the last time you an insertion point. This situa- akes it awkward to use more ne font on a single line of type. n trick MacPaint into thinking chosen a new insertion point, n. When you want to change t, just press the Enter key. The on point does not move, but n now choose a new font with- ecting the previous characters.

Glen Goodrich
Bothell, WA

TTE STORAGE

ne years, I have purchased var- oxes, racks, and other devices ring my disk libraries. The conomical and handy system has been to purchase photo al- with plastic filler sheets. These s can be obtained for less than th a dozen fillers. In the case of 2-inch Macintosh diskettes, for size 126 film is just right. um holds 12 filled sheets, and eet holds six diskettes.

album I use is the Model H- d the filler is Model #WH-86, anufactured by 20th Century s, P.O. Box 51003, Los Angeles, 051. I have been using this sys- various computers for seven vithout a disk being damaged method of storage.

Fred B. Gleeson
Louisville, KY

How to use computers to teach math!

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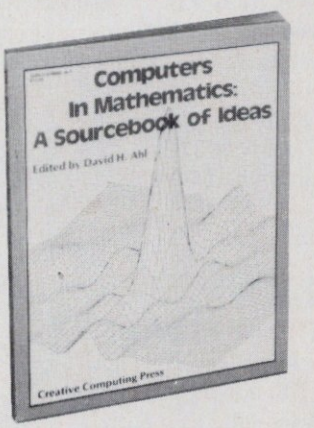

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A+ pipeline

II SERIES

▸ SERIAL-TO-PARALLEL PRINTER-PORT ADAPTER FOR THE IIC

A new serial-to-parallel printer-port adapter available from Discwasher enables owners of the Apple IIc to convert the computer's serial printer port to a more common parallel port. According to Discwasher, the adapter is convenient and easy to install. *(List Price: $129.95)*

Requires: Apple IIc

Discwasher
1407 North Providence Road
P.O. Box 6021
Columbia, MO 65205
(314) 449-0941

CIRCLE READER SERVICE NO. **900**

MAC

▸ P1340 PRINTER

Toshiba America's new P1340 dot-matrix printer allows enhanced output from Macintosh computers. Using the company's printer-control software driver, which is free at Toshiba dealers and retail outlets, the 80-column-wide P1340 with 24-pin printhead prints drafts at 144 characters per second (cps) and at 120 dots per inch. It also produces letter-quality text at 54 cps and with 360-dot-per-inch resolution and graphics at 180 dots per inch. Software-selectable fonts, pitches, and line and proportional spacing are also standard. The P1340 has a built-in parallel printer port. *(List Price: $995)*

Requires: Macintosh

Toshiba America, Inc.
2441 Michelle Drive
Tustin, CA 92680
(714) 730-5000

CIRCLE READER SERVICE NO. **901**

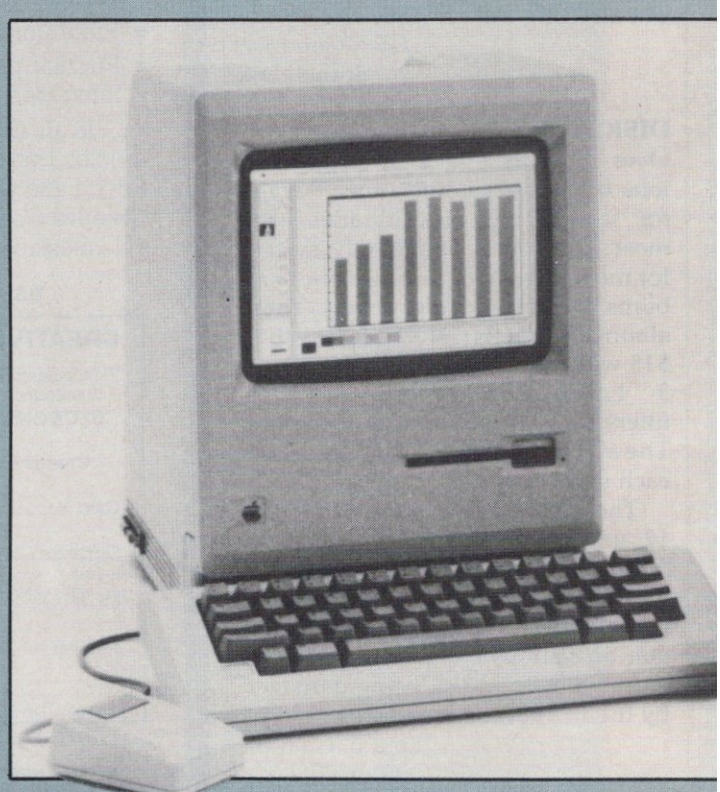
II SERIES

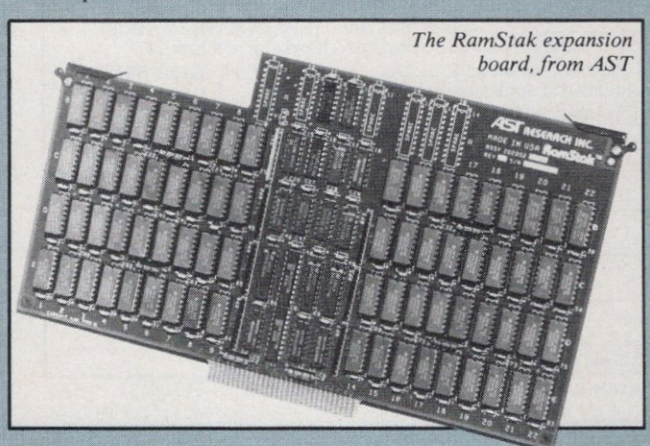
▸ THE NOTABLE PHANTOM

The Notable Phantom, a musical educational game, is designed to teach children ages 5 to 10 the basics of piano playing. Children learn keyboard and note-reading skills as they compete against a slew of specters, spiders, and a music-loving phantom. The program uses a durable keyboard overlay that contains more than an octave and a half of black and white keys and comes with a songbook of favorite tunes that children can use to learn to read music. A special feature of the program allows budding composers to save their own song creations and play them back later. *(List Price: $49.95)*

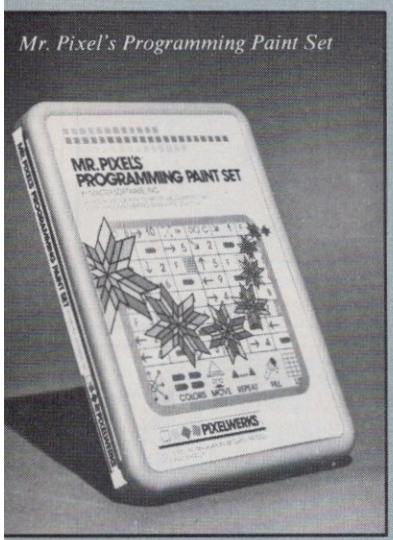
Requires: Apple II, II Plus, IIe, or IIc

MacTilt, an ergonomic stand for the Macintosh from Ergotron, Inc.





The RamStak expansion board, from AST



Mr. Pixel's Programming Paint Set

DesignWare
185 Berry Street
San Francisco, CA 94107
(415) 546-1866
CIRCLE READER SERVICE NO. **902**

LISA

▸ RAMSTAK

Designed to occupy one of the two expansion-board slots that are provided within the Lisa's enclosure for memory hardware, the RamStak is an expansion board that allows users to add up to 2 megabytes of RAM to the Lisa's addressable memory. The RamStak offers several configuration options—512 kilobytes or 1, 1.5, or 2 megabytes. Memory-expansion kits for upgrading the minimum-configured product in 512K increments are also available. *(List Price: 512K board, $1395; expansion kit, $1000)*

Requires: Lisa

AST Research, Inc.
2121 Alton Avenue
Irvine, CA 92714
(714) 863-1333
CIRCLE READER SERVICE NO. **903**

Design Ware's Notable Phantom musical education game

II SERIES

▸ MR. PIXEL'S PROGRAMMING PAINT SET

A new program in Mindscape's Pixelwerks product line designed for children ages 8 and over, Mr. Pixel's Programming Paint Set allows children to draw on the computer screen in color and/or use a picture-based programming approach to create drawings. The program is designed to develop creative skills and provide an understanding of programming concepts and can be used with other Mr. Pixel programs to produce animated cartoons and games. *(List Price: $34.95)*

Requires: Apple II, II Plus, or IIe

Mindscape, Inc.
3444 Dundee Road
Northbrook, IL 60062
(312) 480-7667
CIRCLE READER SERVICE NO. **904**

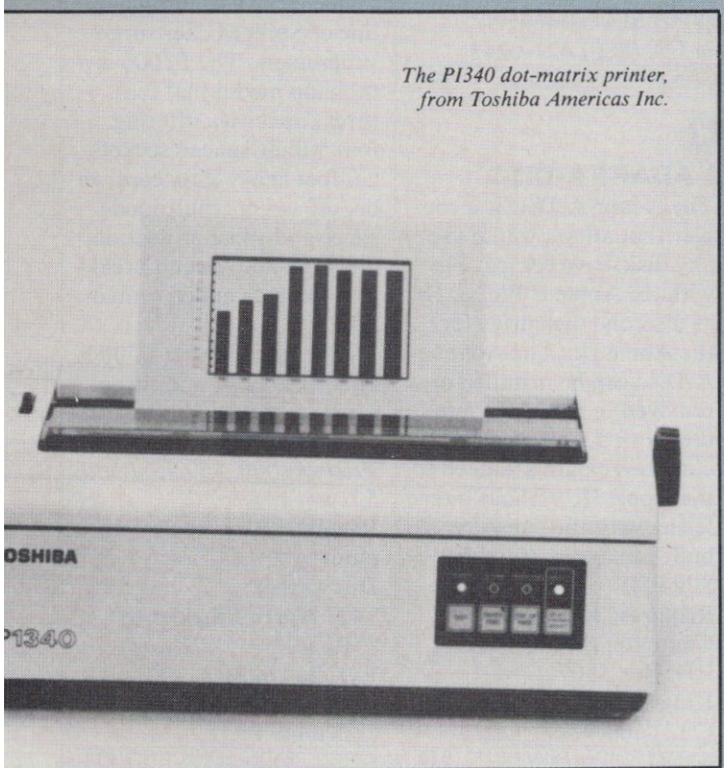
MAC

▸ MACTILT

This ergonomic stand for the Macintosh can help relieve operator stress, reduce glare, and improve viewing comfort. MacTilt features ±15 degrees tilt and 360 degrees rotation. The position of the Macintosh can be adjusted at the touch of a finger, and it stays where you put it. The Macintosh sets directly on the MacTilt, to be lifted off when you use it as a portable. *(List Price: $99.95)*

Requires: Macintosh

Ergotron, Inc.
5637 Woodlawn Blvd.
Minneapolis, MN 55417
(612) 724-4952
CIRCLE READER SERVICE NO. **905**



The PI340 dot-matrix printer, from Toshiba Americas Inc.

The Discwasher Serial-to-Parallel Printer Port Adapter for the Apple IIc

▶HARDWARE

II SERIES

▶KAMELEON PRINTER INTERFACE

The Kameleon printer interface provides an interface between the Apple IIc and most letter-quality or dot-matrix parallel-port printers. The interface is simple to use—a 5-pin DIN plug connects to the IIc, and a 36-pin Centronics-type plug goes to the printer. Kameleon comes with K-Graphics, a high-resolution-graphics screen dump that works with MousePaint. *(List Price: $99.95)*

Requires: Apple IIc

Intronics, Inc.
P.O. Box 13723
Edwardsville, KS 66113
(913) 422-2094

CIRCLE READER SERVICE NO. **906**

II SERIES

▶CALLING FOUR II

Discwasher has developed a new version of its Calling Four Game Port Expander for Apple IIe and IIc computers. Called the Calling Four II Controller Port Expander, the device gives users immediate access to a mouse or any one of three other controllers—joysticks, paddles, or graphics tablets, for example. The updated model uses a 9-pin controller port and features a new button that allows users to access any of its four controller ports instantly. *(List Price: $79.95)*

Requires: Apple IIc or IIe

Discwasher
1407 North Providence Road
P.O. Box 6021
Columbia, MO 65205
(314) 449-0941

CIRCLE READER SERVICE NO. **907**

II SERIES III MAC LISA

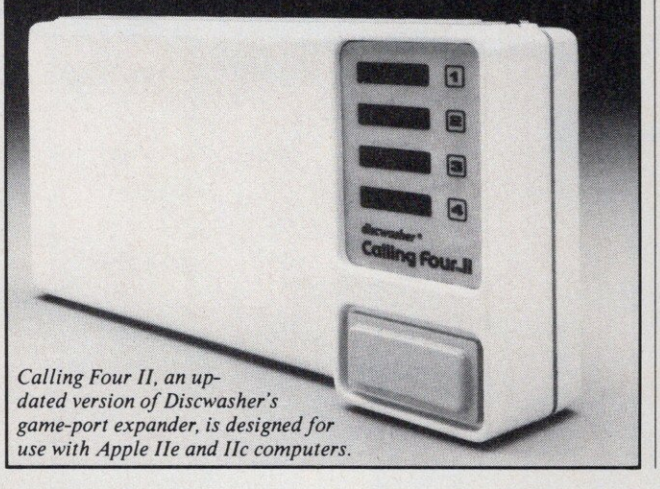
▶STAR SB-10 DOT-MATRIX PRINTER

A new letter-quality dot-matrix printer, the SB-10 is capable of producing high-resolution graphics in conjunction with text. Text can be produced at two speed and quality settings—letter quality at 60 characters per second (cps) and draft quality at 120 cps. The SB-10 is compatible with almost any computer with a serial interface. *(List Price: $995)*

Requires: Any Apple computer with a serial interface

Star Micronics, Inc.
200 Park Avenue
New York, NY 10166
(212) 986-6770

CIRCLE READER SERVICE NO. **908**



Calling Four II, an updated version of Discwasher's game-port expander, is designed for use with Apple IIe and IIc computers.

MAC

▶MAC TURBO TOUCH

A high-speed direct-input device for the Macintosh, the Mac Turbo Touch enables you to move around the screen faster than you can when you use a mouse, thereby greatly reducing the time you take to edit documents. The device contains a gyroscopic ball that you use to position the cursor on the screen. Mac Turbo Touch plugs into the computer's mouse port, takes up one-fourth the desk space of the mouse, and can reside on either side of the keyboard. You can keep both the mouse and the Mac Turbo Touch connected to your Macintosh and use them interchangeably. *(List Price: $129)*

Requires: Macintosh

Assimilation Process
20833 Stevens Creek Blvd.
Suite 101
Cupertino, CA 95014
(800) MAC-5464
in CA (800) 421-0243

CIRCLE READER SERVICE NO. **909**

II SERIES

▶ADAPT-A-DISC

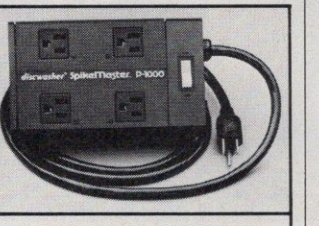
The Adapt-A-Disc is a coupler that allows you to use any disk drive compatible with the Apple II Plus or IIe as a second disk drive for the Apple IIc. The Adapt-A-Disc can be installed or removed in just three minutes with a screwdriver. It can also remain attached to the Apple IIc without interfering with the computer's built-in handle. *(List Price: $29.95)*

Requires: Apple IIc

Computer Accents, Inc.
P.O. Box 5307
Kingwood, TX 77325
(713) 664-9727

CIRCLE READER SERVICE NO. **910**

Discwasher's P500 in-line spike and surge protector.



The SpikeMaster P1000 tabletop model, with multimode surge and spike protection and a 15-amp circuit breaker.

II SERIES III MAC LISA

▶SPIKEMASTER P1000 and P500 SURGE SUPPRESSORS

With the introduction of two new products, the P1000 and the P500, Discwasher is now offering a full line of SpikeMaster surge suppressors. The P1000 is a tabletop model that features capacitive filtering, four widely spaced sockets, a 6-foot heavy-duty cord, an on/off switch; multimode surge and spike protection, and a 15-amp circuit breaker to provide added protection.

The single-outlet P500 is an in-line spike and surge suppressor that also has capacitive filtering. *(List Price: P1000, $59.95; P500, $21.95)*

Requires: Any Apple computer

Discwasher
1407 North Providence Road
P.O. Box 6021
Columbia, MO 65205
(314) 449-0941

CIRCLE READER SERVICE NO. **911**

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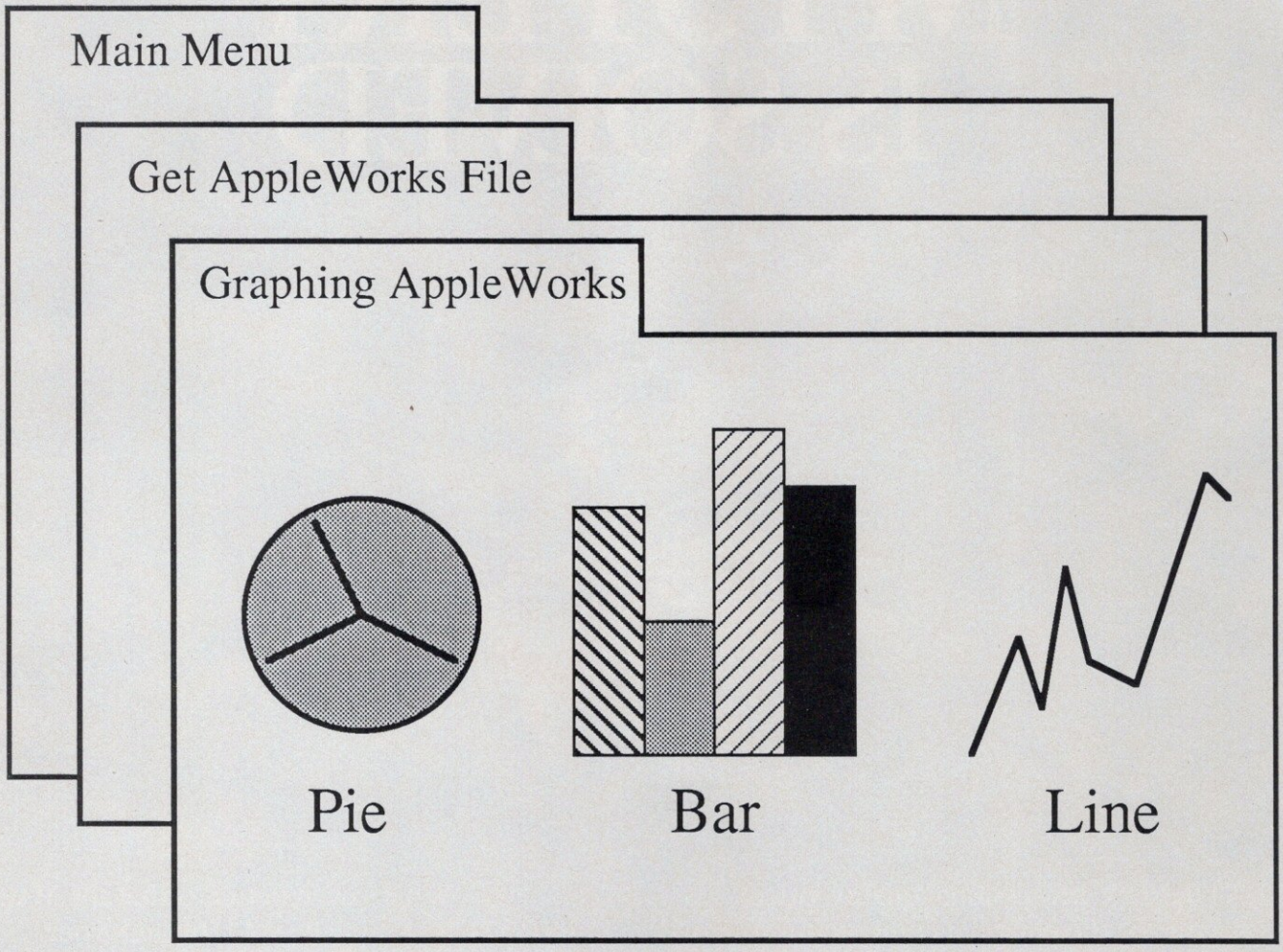

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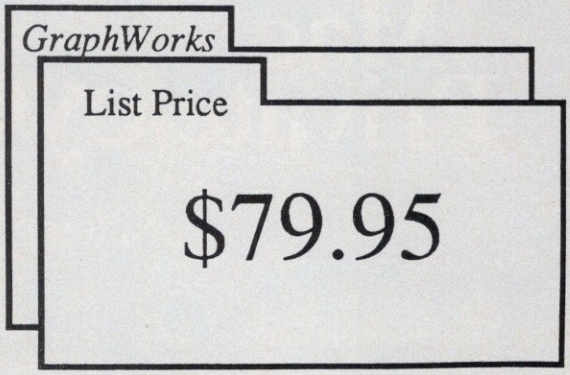

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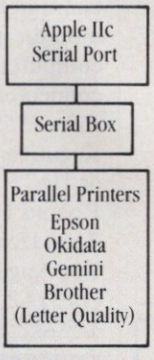


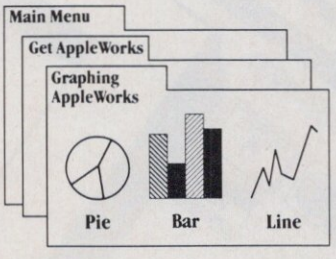
Add a parallel printer to your IIc

Here's a low cost serial to parallel adapter that comes complete with everything you need to connect your Apple's serial printer port to a standard parallel printer. This unit also allows you to print Epson Graphics. Please specify printer type.

A Serial Box for the Macintosh™ will soon be available. Call for details.

Serial Box for the IIc $89.95

★*Serial Box*



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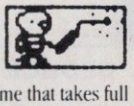

The game for the Macintosh™

Feathers & Space is an arcade-like game that takes full advantage of the graphics and sounds of the Macintosh. Attacking birds stress the defense capabilities of your mother ship and the space outpost. Protect the space outpost or get eaten alive. Mouse ship movements, click activated firing power and keyboard smart bombs. This game also offers defense from discovery; one click and your boss can't walk in and smart bomb you if you're defending your outpost at work.

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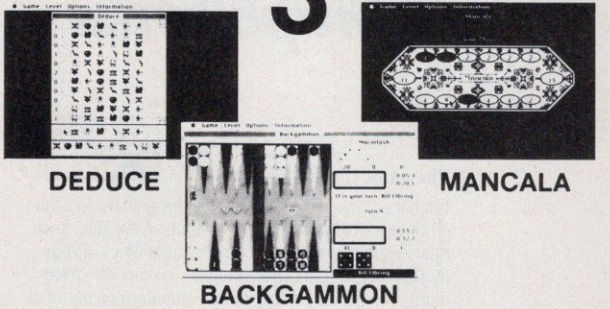
CIRCLE 242 ON READER SERVICE CARD

MACINTOSH 3 GREAT games



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IIGS SERIES

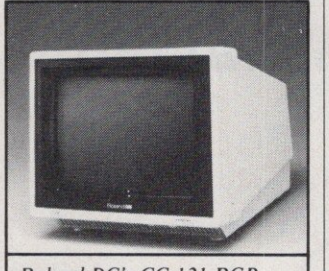
▸ CC-121 RGB COLOR MONITOR

Roland DG has introduced the CC-121 RGB Color Monitor, which has a 12-inch diagonal screen and a noninterlaced resolution of 640 dots by 200 lines. The 0.37mm dot pitch, coupled with a black-tint CRT, enables the monitor to produce crisp black-and-white characters and colors. The monitor attaches to your computer via a square 8-pin connector at its rear. *(List Price: $599)*

Requires: Apple II, II Plus, or IIe

Roland DG
7200 Dominion Circle
Los Angeles, CA 90040
(213) 685-5141

CIRCLE READER SERVICE NO. **912**



Roland DG's CC-121 RGB Color Monitor

MAC

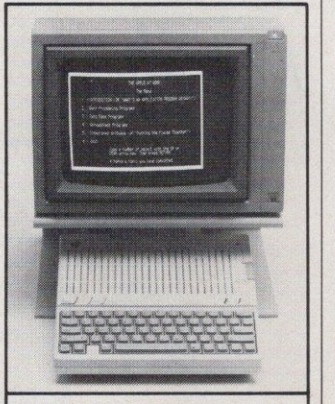
▸ MENTAURIS COMPOSITE VIDEO ADAPTER

A solid-state, compressed-circuitry, video-output device, the Mentauris Composite Video Adapter (C.V.A.) provides a high-quality, composite-video signal and output port for the Macintosh computer. Because of the company's Mac-Spansion Slot Technology, the unit is easy to install inside the computer. Because it can provide the Macintosh with an interface to a variety of large-screen video projectors and monitors, the Mentauris C.V.A. is ideal for business, educational, and promotional applications. *(List Price: $199.95)*

Requires: Macintosh

Mentauris Technologies
P.O. Box 1467
San Marcos, TX 78666
(512) 396-1565

CIRCLE READER SERVICE NO. **913**



The IIc Monitor Mate

IIGS SERIES

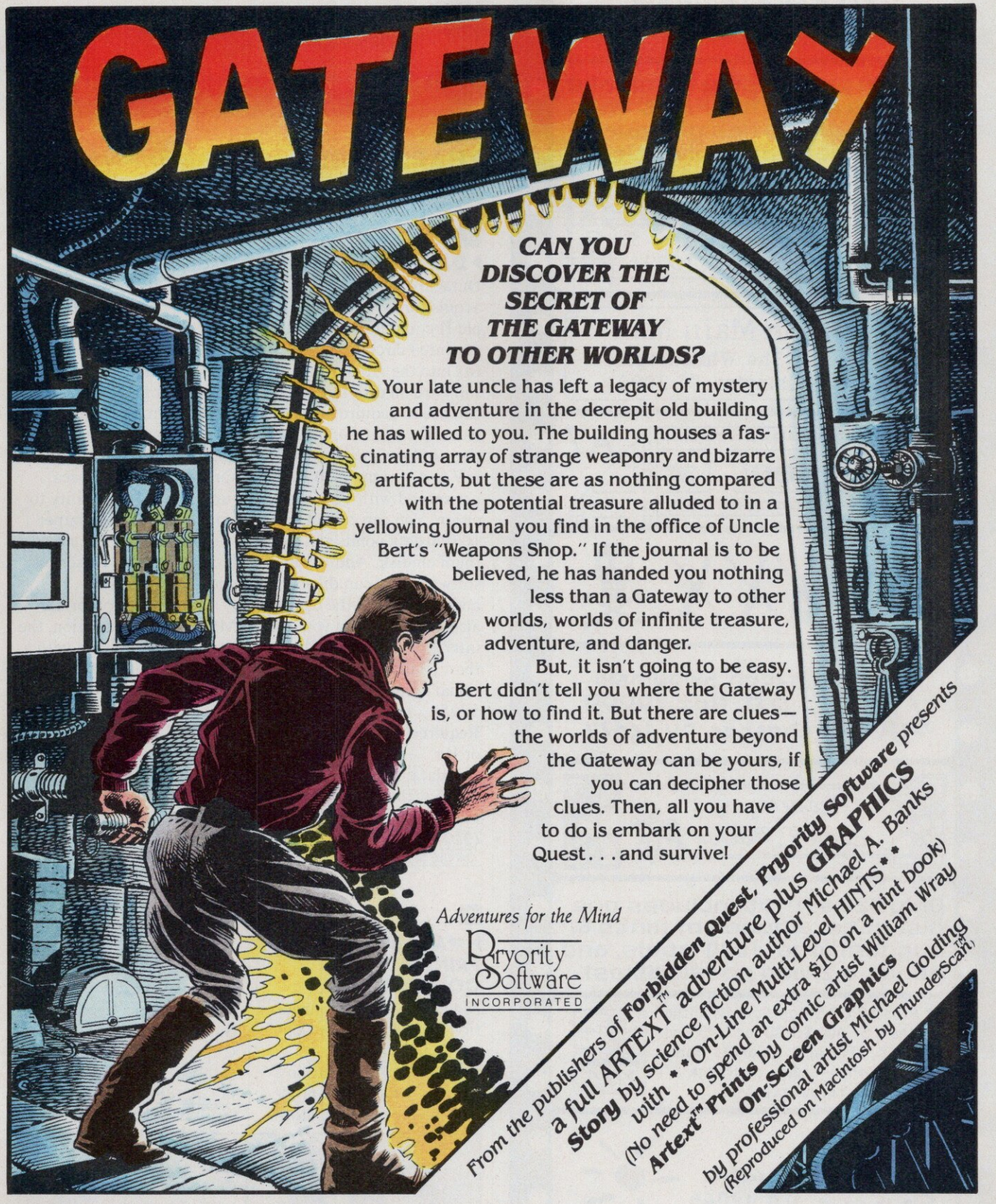
▸ THE IIC MONITOR MATE

The IIc Monitor Mate is a monitor platform that allows Apple IIc users to use monitors that are 12 inches or larger with their computers. Because you can store and use the computer from within the platform, the IIc Monitor Mate also saves you desk space. Two versions of the platform are available—a standard model, which offers an easily adjustable tilt, and a swivel-base model that has all the features of the standard model and can be turned 360 degrees. *(List Price: standard model, $39.95; swivel-base model, $49.95)*

Requires: Apple IIc

SOS Marketing
362 South La Brea Avenue
Los Angeles, CA 90036
(213) 857-0371

CIRCLE READER SERVICE NO. **914**



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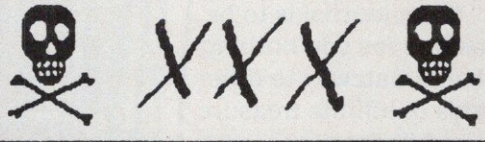
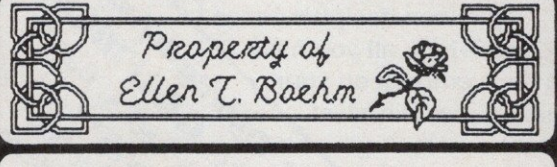
Washington, DC 20001



Jean Skibumski
P.O. Box 29999
Rochester, NY 14627



Only $29.95!* Kit includes one diskette, a bunch of hints & suggestions, 1000 labels, and about a zillion possibilities!

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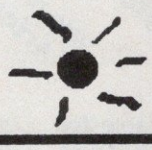
VISA


Black Sun
411 State Road
Emmaus, PA 18049

or call
(215) 967-1126

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CIRCLE 473 ON READER SERVICE CARD

A+ pipeline

▸HARDWARE/ SOFTWARE

II SERIES

▸DATACARD

Datacard, a low-cost data-acquisition system for Apple II computers, comprises a printed circuit board that fits into the Apple II and software on disk that you can use to acquire and store data. The system can digitize analog signals from 10 mV to 4 V at up to 20 points per second with 12-bit precision. You can collect up to 10,000 data points and store them on disk. Additional software that can display and manipulate the data is also available, and you can interface signals smaller than 10 mV by using an optional amplifier. *(List Price: $295)*

Requires: Apple II, II Plus, or IIe

Anadata, Inc.
516 North Main Street
Glen Ellyn, IL 60137
(312) 858-9606

CIRCLE READER SERVICE NO. **915**

MAC

▸MACMANIA PRINTER CONNECTIONS

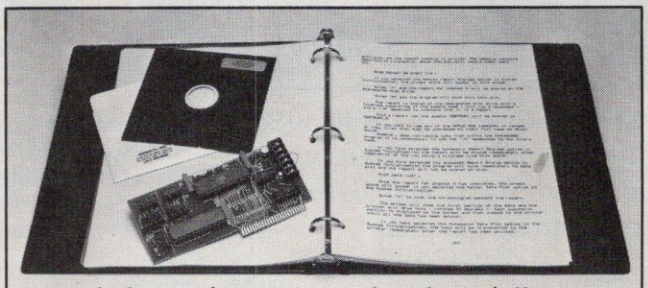
Mac Daisywheel Connection and Mac Epson Connection are two new products in Assimilation Process' MacMania product line for the Macintosh. Both products comprise a program disk, a start-up guide, and an interface cable. The Mac Daisywheel Connection enables the Macintosh to print with any popular daisy-wheel letter-quality printer. The application program supports 10, 12, and 15 pitch and proportional print wheels of various font styles and is ideal for producing business correspondence, reports, legal documents, and even spreadsheets. Other features include the ability to print a full 15-inch paper width and to produce boldface, underline, subscripts, and superscripts.

Using the appropriate Mac Epson Connection, the Macintosh can print with a variety of Epson dot-matrix printers. The software driver is quick and easy to use and enables you to produce print at speeds of up to 160 characters per second. The product is compatible with any software that runs between the Macintosh and the Imagewriter printer. *(List Price: Mac Daisywheel Connection, $99; Mac Epson Connection, $89)*

Requires: Macintosh

Assimilation Process
20833 Stevens Creek Blvd.
Suite 101
Cupertino, CA 95014
(800) MAC-5464
in CA (800) 421-0243

CIRCLE READER SERVICE NO. **916**



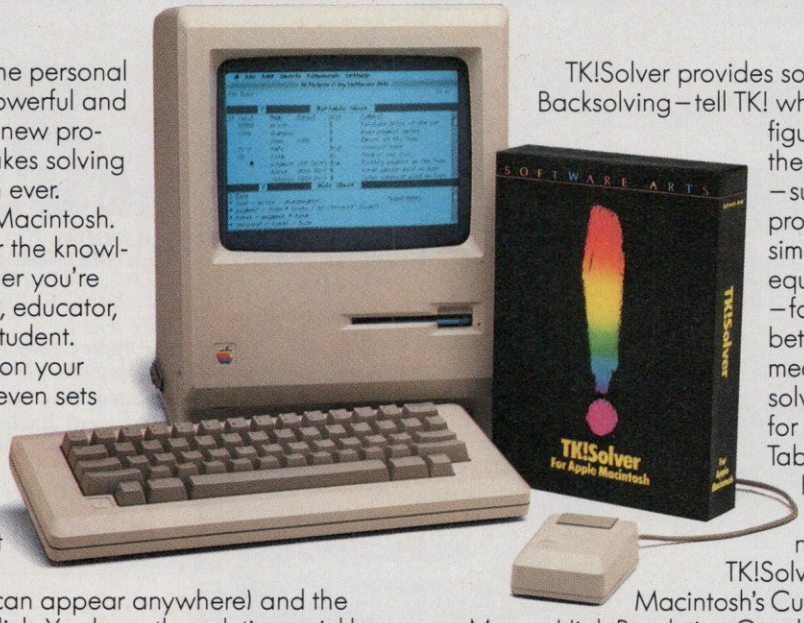
Datacard, a low-cost data-acquisition scheme for Apple II computers

MAKE SHORT WORK OF LONG EQUATIONS

Introducing TK!Solver® for Apple® Macintosh™. An equation processing program that helps students and professionals solve even their most difficult problems.

For those who own the personal computer that's so powerful and easy to use, here's a new productivity tool that makes solving problems easier than ever. TK!Solver for Apple Macintosh. The complete tool for the knowledge worker—whether you're an engineer, scientist, educator, financial analyst or student.

Let TK!Solver take on your toughest problems—even sets of simultaneous non-linear equations. No matter how you're used to solving problems, just enter the equations (unknown variables can appear anywhere) and the known values. And click. You have the solution quickly. Without programming.



TK!Solver provides sophisticated features like Backsolving—tell TK! what you know, and it figures out the way to solve the problem. Iterative Solving—successfully attack even problems involving sets of simultaneous non-linear equations. Unit Conversions—for automatic conversions between different units of measurement. List Solving—solving a model repeatedly for lists of input values. Tables and High Resolution Plots—produce plots using symbols, lines or a combination of both.

TK!Solver takes full advantage of Macintosh's Cutting and Pasting, Pull-Down Menus, High Resolution Graphics, and also provides a friendly Help and Error Diagnosis System.

TK!Solver®
By Software Arts™

27 Mica Lane, Wellesley, Massachusetts 02181

CIRCLE 334 ON READER SERVICE CARD

WRITE YOUR OWN APPLE GAMES

Includes 40 exciting pre-programmed games to get you started!

Write Your Own Apple Games is your ticket to thousands of hours of solid game fun.

But it's more than just a game book.

While you're enjoying more than 40 exciting new programs, you'll be learning—quickly and easily—the most advanced techniques of computer game design.

In ***Write Your Own Apple Games,*** Stuart Anstis explains each game to you in logical, step-by-step subroutines. You'll see crucial game graphics exactly as they should appear on your screen.

Then you'll learn how to rearrange the basic subroutines to create countless game variations.

If you know BASIC, you're ready to learn state-of-the-art game techniques, including how to:

- Create smooth, flicker-free screen movement
- Generate flashing "neon-sign" graphics
- Keep game scores
- Use random number in game design—and make your computer come alive as an opponent
- Zero in on random time delays—a challenge to even the most sophisticated arcade player

And much more.

Write Your Own Apple Games gives you all the skills you need to start designing your own original computer games for fun—and profit!

And because writing your own games gives you greater control of your Apple's numerical and graphic capabilities, you'll be opening the door to fantastic new possibilities for using your computer.

Write Your Own Apple Games should sell for over $1,000—the cost of 40 prepackaged games.

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Tank • Sprint • Bomber
Wait For It • Painting
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Target • Helicopter
Tiddler • Pingpong
Diddle • Space Zapper
Craps • Cross Porpoises

Strategy Games
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Tictactoe • Turnover
Chomp

Word Games
Hangman • What's My Word? • Birthdaywish
What's Your Name?
Any Messages?

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Guess A Number
Buried Treasure
Jumpers • Peggy

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Arrow • Random Walk
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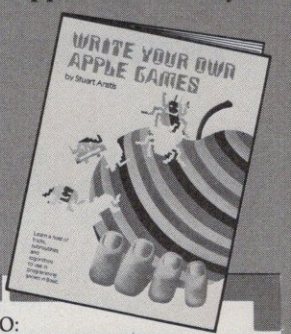
Magic Squares

But you can get ***Write Your Own Apple Games*** for only $12.95. That's less than 32 cents a game—and every game you write yourself is virtually free!

Start having some serious fun with your Apple computer. Send for your copy of ***Write Your Own Apple Games*** today.

Also available in your local bookstore or computer store.



MAIL TODAY TO:
CREATIVE COMPUTING PRESS
Dept.FL6F , 39 East Hanover Avenue
Morris Plains, N.J. 07950

Please send me ____ copies of ***Write Your Own Apple Games*** for only $12.95 each, plus $2.00 shipping & handling per book. #2W.

Total amount $_____

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(In NJ only: 201-540-0445)

▶ SOFTWARE

II SERIES

▶ GRAPHICS TOOL KIT

The Graphics Tool Kit comprises both hardware and software that work together to give Apple II computers the graphics capabilities of the Macintosh and a 40% greater screen resolution. The kit's hardware is an SHG-640 high-resolution, monochrome graphics board that matches the computer monitor's screen resolution to that of a dot-matrix printer operating in an 80-dot-per-inch mode.

The kit's menu-driven software consists of the Graphics Editor, the Font (block) Maker/Editor, and the Vector Shape Maker/Editor. The kit also contains some demonstration pictures, font and shape tables, and Applesoft programs with which you can generate grids. *(List Price: $495)*

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

Demco Electronics
10516 Grevillea Avenue
Inglewood, CA 90304
(213) 677-0801

CIRCLE READER SERVICE NO. **917**

II SERIES

▶ TERRAPIN LOGO—UTILITIES II

A second utilities disk—Utilities II—is now available for use with Terrapin Logo. The package contains 29 new programs that include a driver for the Apple Color Plotter, a picture-printing program for the Imagewriter, a program that produces keyboard characters on the turtle screen, an Apple Logo procedure interpreter, low-resolution-graphics tools, and base-number conversion routines. In addition, the package includes several games that demonstrate Terrapin Logo's word and list capabilities. *(List Price: $19.95)*

Requires: Apple II, II Plus, IIe, or IIc; 64K RAM; one disk drive

Terrapin, Inc.
222 Third Street
Cambridge, MA 02142
(617) 492-8816

CIRCLE READER SERVICE NO. **918**

MAC

▶ MACINTOSH VERSION OF TYPING TUTOR III

A Macintosh version of Typing Tutor III, an advanced touch-typing instruction program, is now available. This version takes full advantage of the Macintosh's high-speed processor and bit-mapped graphics and uses icons, which you can select with either the mouse or keyboard, to indicate menu choices. When you use the program, an image of the keyboard appears on the screen along with explanatory prompts, on-demand help screens, and progress test results that appear in the form of bar charts. The bar charts show your improvement in speed and accuracy for each key. The program also includes a fast-action, arcade-style game called Letter Invaders. *(List Price: $59.95)*

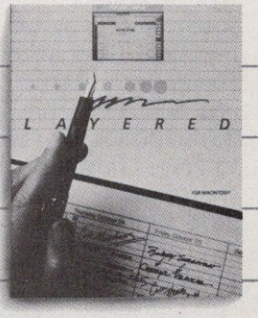
Requires: Macintosh

Simon & Schuster Electronic Publishing Group
Simon & Schuster Building
1230 Avenue of the Americas
New York, NY 10020
(212) 245-6400

CIRCLE READER SERVICE NO. **919**

Now there's a better way for health clubs to sort their courts.

NOW THERE'S FRONT DESK™



It will schedule time use of your facilities, your equipment, and your staff faster than an overhead slam. Then give you a picture of how profitably that time was used. Just push a button to see how much money you're making per court. Or per sport.

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Now there's a better way for contractors to keep their backlogs from getting backlogged.

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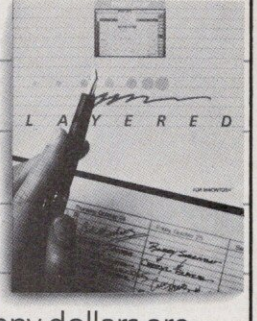

Front Desk will keep schedules for all your equipment. Or your workers. Where they need to be. What they're supposed to do. And what they cost per hour. Then it creates reports showing how many hours are spent—and how many dollars are made—on each type of work. It can help you build a better business.

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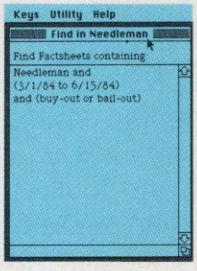
It's easy with Factfinder.™ Because Factfinder is a kind of electronic "desk-drawer" where you can just toss information without worrying about how it should be arranged or how you might want to use it. There are no fields to define, no formats to set up.

When you need to find all the clients you have who hate olives or live in Denver; when you want to collect your notes on pasta merchandising; when you need the name and number of that guy who's looking for leveraged buyouts, it's yours in a few seconds, at your index fingertip.



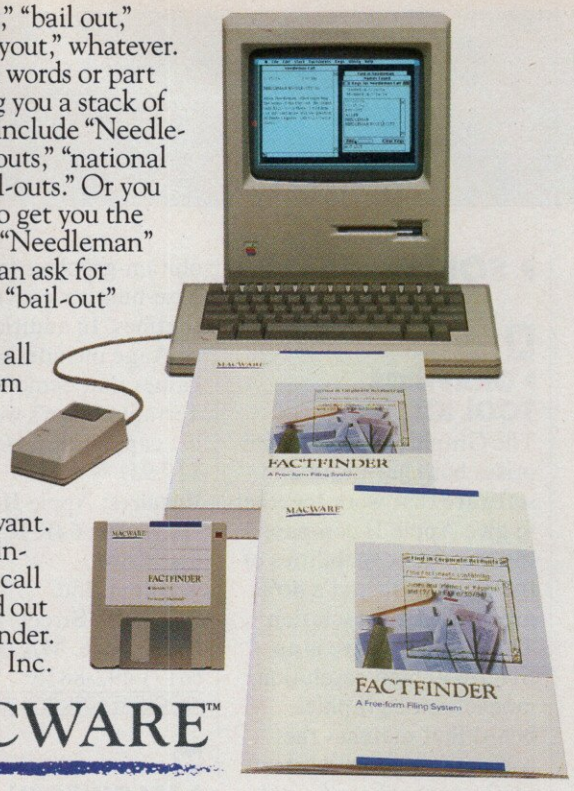
You just key in your notes on the Needleman Plan (or Needleman vs. Nardoff or the Needleman Noodles campaign) in any length you want, and click the mouse on a few key words—"fallout," "bail out," "roll-out," "leveraged buyout," whatever.

Then, any of those words or part of those words will bring you a stack of notes you've made that include "Needleman," or "leveraged buyouts," "national rollouts" or miracle "bail-outs." Or you can request Factfinder to get you the Factsheet that contains "Needleman" *and* "bail-out." Or you can ask for anything that mentions "bail-out" *or* "Needleman."

And Factfinder has all kinds of features like zoom and automatic wrap to help you manipulate the heck out of your data, and make it whatever size and shape you want.

Contact your Macintosh™ software dealer, or call 1 800 MACWARE to find out where you can get Factfinder.

From Forethought, Inc.



MACWARE™

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How to find a Needleman in a haystack.

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II SERIES

▸ COMPUBRIDGE

Compiled from Shirley Silverman's *Five Card Bridge Teacher's Manual*, Compubridge comprises ten chapters of text and eight corresponding quiz sections with which novices can learn to play the card game bridge. The program randomly generates an unlimited number of practice hands corresponding to the different chapters and evaluates your actions as you play, correcting mistakes or weak moves and suggesting alternative strategies. *(List Price: $24.95)*

Requires: Apple II, II Plus, or IIe

Artworx Software Company, Inc.
150 North Main Street
Fairport, NY 14450
(800) 828-6573
in NY (716) 425-2833

CIRCLE READER SERVICE NO. **923**

MAC

▸ MITE/MAC COMMUNICATIONS PACKAGE

The Mite/Mac communications software system for the Macintosh features automatic log-on, auto-dial and auto-answer, pull-down menus, and icons. Mite/Mac allows you to access information services such as The Source, CompuServe, Dow Jones, and corporate or university data centers. You can also use Mite/Mac to transfer text and binary files between the Mac and other computers. *(List Price: $195)*

Requires: Macintosh

Mycroft Labs, Inc.
P.O. Box 6045
Tallahassee, FL 32314
(904) 385-1141

CIRCLE READER SERVICE NO. **924**

MAC

▸ ULTRAFONTS

A disk of new type styles for the Macintosh, UltraFonts includes more than 20 type styles that run the gamut from traditional serif to modern sans serif, and the font sizes range from 9 points to 36 points. The disk also includes fonts for making international symbols, borders, and boxes, which eliminates the need to paste those items from MacPaint. *(List Price: $19.95)*

Requires: Macintosh

Malon Products, Inc.
2306 Cotner Avenue
Los Angeles, CA 90064
(213) 829-4436

CIRCLE READER SERVICE NO. **925**

MAC

▸ SPREADSHEET LINK

Dow Jones Software has released Spreadsheet Link, a program that allows Macintosh computer users to download information into a Multiplan spreadsheet and print it. Designed for use by personal investors, credit managers, or financial analysts, the software eliminates the need for manual keying of data and thus ensures accuracy. Spreadsheet Link must be used with Dow Jones Straight Talk, a communications program that allows users to place information from Dow Jones News/Retrieval directly into the Mac's desk accessories, notepad, and scrapbook. *(List Price: Spreadsheet Link, $99; Straight Talk, $79)*

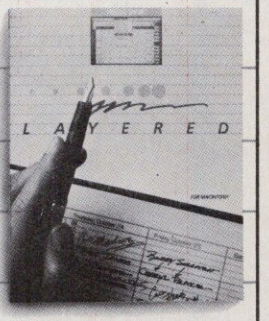
Requires: Macintosh

Dow Jones Software
P.O. Box 300
Princeton, NJ 08540
(609) 452-2000

CIRCLE READER SERVICE NO. **926**

Now there's a better way for accounting firms to keep account of their CPA's.

NOW THERE'S FRONT DESK™



While your staff is using Front Desk™ to keep track of when they're doing what for whom, it keeps track of their time use in terms of hours spent and dollars generated per service. It's the resource scheduling software that understands time is money.

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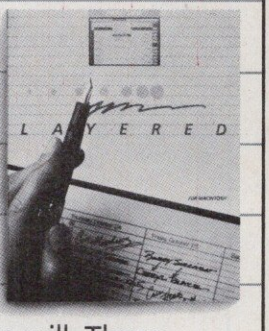
Front Desk will schedule appointments for an office full of psychiatrists. Then analyze them.

NOW THERE'S FRONT DESK™



If the way Front Desk schedules appointments for your doctors and your facilities doesn't excite your neurons, the way it analyzes time use in terms of hours spent and dollars generated per service will. These reports can help you modify your office's behavior for the better.

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HIPPO-LOCK™

The Business Data Security System

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- Useful for protecting confidential information such as business plans, sales projections, employee reviews, payroll information, management proposals, grades, etc. . . .
- Allows you to choose between three levels of security.
- Uses the DES Data Encryption Standard, used widely by major corporations and the U.S. Government.
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CIRCLE 396 ON READER SERVICE CARD

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II SERIES

▸ BOULDER DASH

The hit game Boulder Dash is now available in a version that can run on all Apple II computers. In the game, players are aided by Boulder Dash's starring character Rockford as they search 16 caves in order to collect as many sparkling jewels as possible before time runs out. As boulders crash down all around, Rockford digs frantically through the magical caves, battling deadly fireflies, colorful butterflies, and the ominous amoeba. The game offers five levels of difficulty and features authentic two-way scrolling. *(List Price: $40)*

Requires: Apple II, II Plus, or IIe; joystick
Microlab, Inc.
2699 Skokie Valley Road
Highland Park, IL 60035
(312) 433-7550
CIRCLE READER SERVICE NO. **920**

MAC

▸ TYPING INTRIGUE

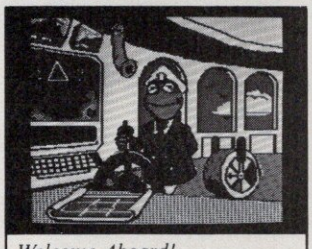
The second product in Forethought's Macware software line for users of the Macintosh computer, Typing Intrigue is a typing course designed both for beginners and for typists who want to improve their speed. The program uses a text-based mystery—The Case of the Missing Bathtub—to hold users' attention as they work through the instructional portion of the program. Users gain points based on their speed, accuracy, and progress and can then use these points to buy clues to help them solve the mystery. The program also includes an arcade-style game called Rain, which uses typing skills developed during the program's drills and exercises. *(List Price: $49.95)*

Requires: Macintosh
Forethought, Inc.
1973 Landings Drive
Mountain View, CA 94043
(415) 961-4720
CIRCLE READER SERVICE NO. **921**

II SERIES

▸ WELCOME ABOARD! A MUPPET GUIDE TO COMPUTER LITERACY

In Welcome Aboard! the Muppets lead new computer owners on an exploration of five major computer applications—word processing, electronic mail, database management, programming, and computer-aided design. The program takes you to sea aboard the *SS Microship* with Captain Kermit the Frog, who gives you navigation lessons that involve computer programming. In the Message Center, under Scooter's direction, you use word processing and electronic mail to send messages, and in the Salon de Beaute, you use computer-aided design to help Gonzo select Miss Piggy's outfit and hairdo. Finally, in the Joke Library, you and Fozzie Bear search his database for awful after-dinner jokes. *(List Price: $39.95)*



Welcome Aboard!

Requires: Apple IIe or IIc
Brøderbund Software
17 Paul Drive
San Rafael, CA 94903
(415) 479-1170
CIRCLE READER SERVICE NO. **922**

Front Desk. The better way to manage your most precious natural resource.

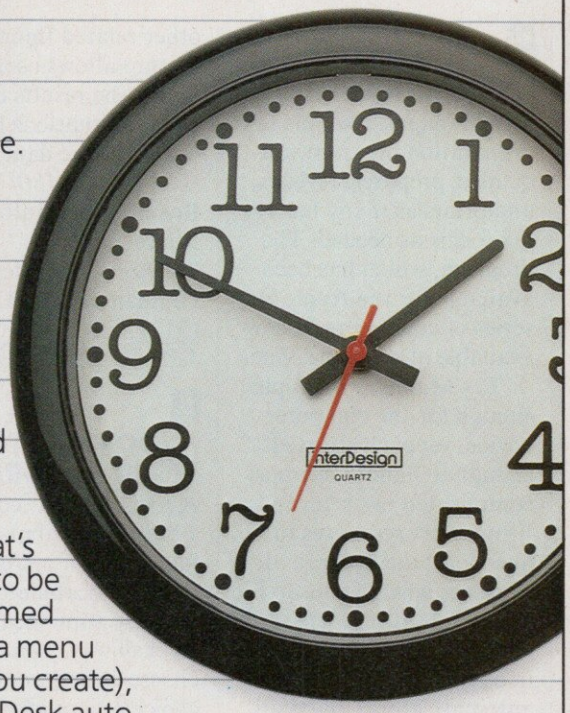
Front Desk™ is a time and resource manager for Macintosh™ that understands a simple fact.

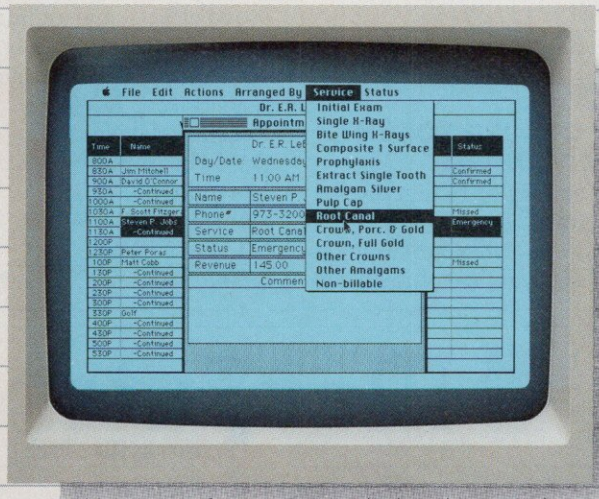
Time is money.

It'll help you coordinate the time use of lots of people. Or schedule facilities. Or loan out equipment. Or plan projects. Or track a sales staff's sales. Or whatever. For a major company. Or a one-man-show.

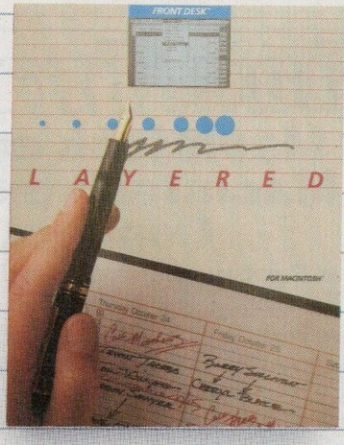
At first glance, it looks like a snazzy electronic appointment book. But Front Desk is no mere calendar. Not only does it organize *how* time is spent, it analyzes how *well* time is spent.

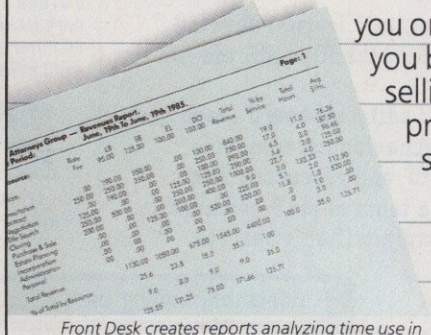
When you click open the simple appointment entry form and select the service that's going to be performed (from a menu that you create), Front Desk automatically calculates the proper fee or rate. Then at any time you can print out an analysis report for last month showing how many hours you or your staff spent—or how many dollars you brought in—by holding consultations, or selling wickets, or playing golf. And you can project how much you'll bring in on those services in the coming weeks or months.





Front Desk lets you zoom from one person's calendar to the next. Or zip from a monthly view to a weekly view to a single day view. For one person or everyone.





Front Desk creates reports analyzing time use in terms of hours spent—and dollars generated—per person, per service.

This lets you see where your profits are coming from. Where your time is going. You can spot trends. Nip unprofitable ventures in the bud. And decide who gets bigger Christmas bonuses. In short, you'll get more done. In less time.

So dash down to your local computer store today for a look at Front Desk. And buy yourself some valuable time.

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MAC

▸ TAX MANAGER

Tax Manager, a simple tax-preparation program, calculates, prepares, reviews, and prints as many federal tax forms as needed. The program, which has been available for the Apple II series of computers, is now available also for the Mac.

Tax Manager is simple enough for the computer novice, yet sophisticated enough to handle the most complicated tax return. From short responses to questions, the program determines which forms to file with the 1040 and which deductions to claim. A change in one figure on the return automatically changes all other related figures. This feature allows users to examine the results of different tax situations by simply changing the data entered. *(List Price: $180)*

Requires: Macintosh

MicroLab
2699 Skokie Valley Road
Highland Park, IL 60035
(312) 433-7550

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II SERIES

▸ VOCABULATOR WORD PROGRAM

A program that comes with a built-in vocabulary with four levels of increasing difficulty, Vocabulator lets you increase your vocabulary in an easy way. You can choose either a multiple-choice or a quick flash-card method of testing. Nearly 1000 key words are available in the program, although you can also add words to a personal vocabulary list that you can save on disk. *(List Price: $29.95)*

Requires: Apple II Plus, IIe, or IIc; 64K RAM; one disk drive

Zephyr Services
306 South Homewood Avenue
Pittsburgh, PA 15208
(412) 247-5915

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MAC

▸ CYBORG FOR THE MACINTOSH

The science-fiction text game Cyborg is now available in a version that takes full advantage of the Macintosh's features. In the game you play the role of a cyborg, a being who is half human, half computer. You must communicate with your computer side constantly in order to overcome obstacles and unravel mysteries.

Compared to earlier versions of the game, the Macintosh version features higher screen resolution, faster game response time, sound effects, and an interactive control panel that you can use with the mouse. *(List Price: $39.95)*

Requires: Macintosh

Brøderbund Software
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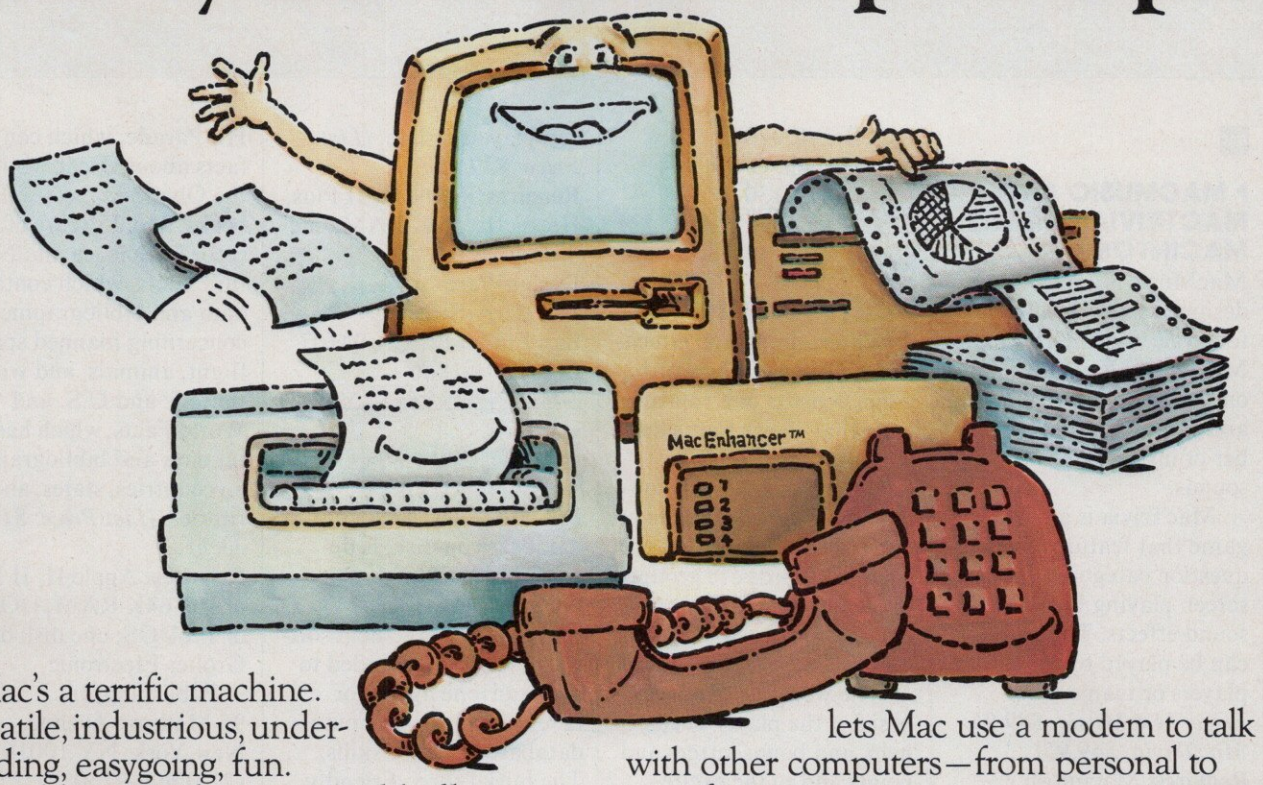
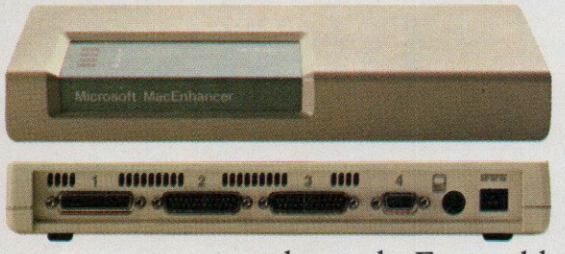


Mac's a terrific machine. Versatile, industrious, understanding, easygoing, fun.

Trouble is, Mac lives in a world of his own. He doesn't communicate well with his coworkers. Doesn't work well with them.

Now there's help.

The Microsoft® MacEnhancer™ expansion system can get him out of his shell. It'll open



his communications channels. Expand his horizons.

MacEnhancer simply plugs into Mac's communication port. It lets you keep that original port while adding an IBM®-type parallel connector for your printer and two IBM-type serial connectors.

So now Mac can hobnob with even the finest letter quality printers. Cope with hyperactive dot-matrix printers.

And it comes with MacEnhancer terminal software. A communications program that lets Mac use a modem to talk with other computers—from personal to mainframes.

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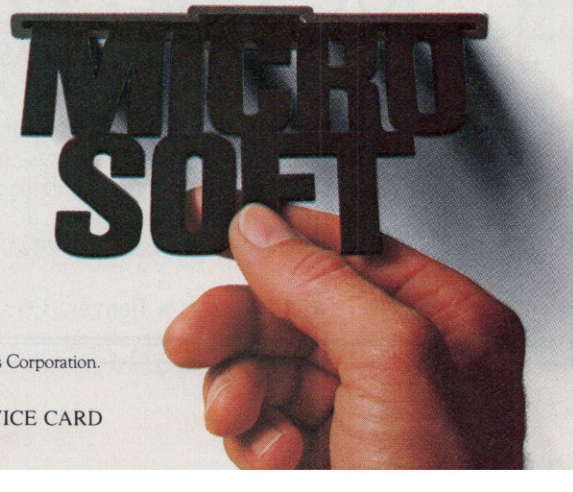

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MAC

▸ MACMUSIC AND MACTRIVIA FOR THE MACINTOSH

MacMusic is a music editor designed to work with the four-voice synthesizer in the Macintosh. You enter notes on the staff with the mouse, and you can define a number of instruments or sounds.

MacTrivia is a trivia game that features five question categories, an on-screen playing board, and sound effects. The game can be played by up to four players or teams. *(List Price: MacMusic, $89.95; MacTrivia, $69.95)*

Requires: Macintosh

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II SERIES

▸ CRYPTO CUBE

An entertaining and educational Crypto Cube word game consists of a rotating cube that shows four sides with squares similar to crossword puzzles. The object of the game is to uncover words hidden behind the squares. Words are grouped into categories such as animals, countries, and food groups.

The word list can be exposed if the player needs help, and bonus letters and points add to the excitement. One or two players can play at a time. *(List Price: $39.95)*

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

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185 Berry Street
San Francisco, CA 94107
(415) 546-1866
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▸ FRIENDLY FILES

Friendly Files, a series of databases on disk, is designed to work with Grolier's Friendly Files database-management software, which is intended to allow anyone aged 8 or older to develop computer-database research skills. The initial three Friendly Files offerings are: Trivia Hit Parade, which contains facts about Oscar winners, the Olympics, best-selling books, and 25 years of hit records; Science and Nature Facts, which contains data and bibliographies concerning manned spaceflight, animals, and wildflowers; and U.S. and World Facts, which has useful data and bibliographies on countries, states, and territories. *(List Price: $14.95 each)*

Requires: Apple II, II Plus, or IIe; 64K RAM; DOS 3.3 or ProDOS; one disk drive

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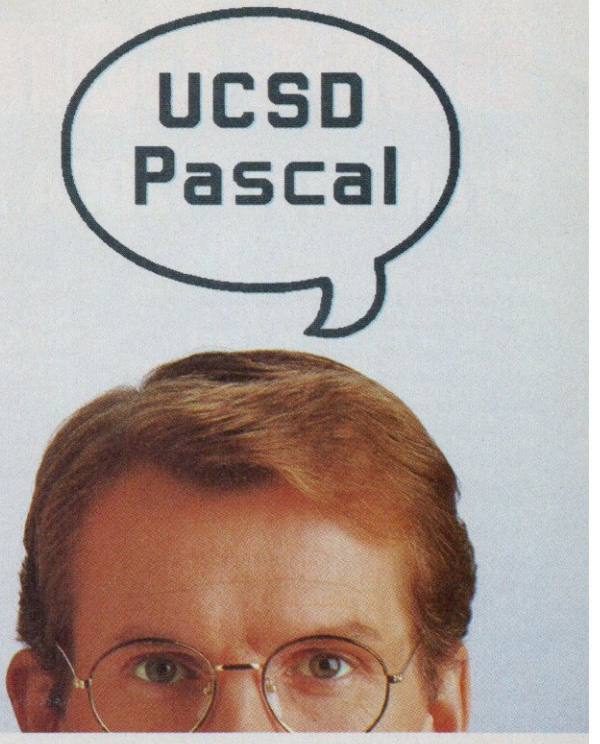

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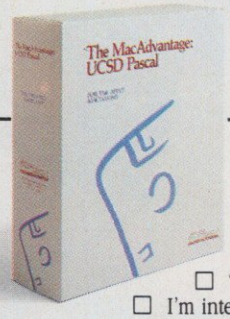

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(4) Communications Software
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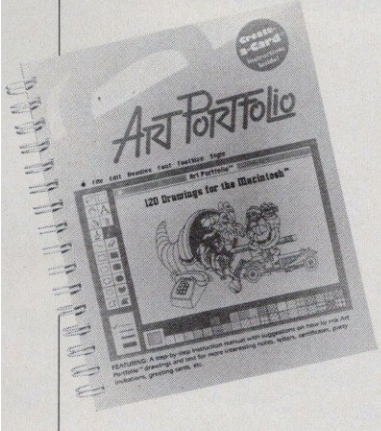

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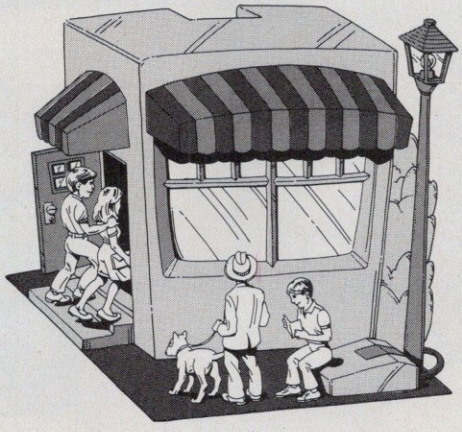

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MacMatch™
$49.95

This is one of the first of a new breed: Native Macintosh games. Our software gamemakers have taken their inspiration from the tv game show, Concentration,™ and have built it on the Mac's quickness and graphics power. When you match two squares, you get clues about the hidden puzzle. It comes with puzzles, but the real beauty is that you can make up your own, as complex or simple as you like. You'll never get bored. And think what party puzzles might look like…

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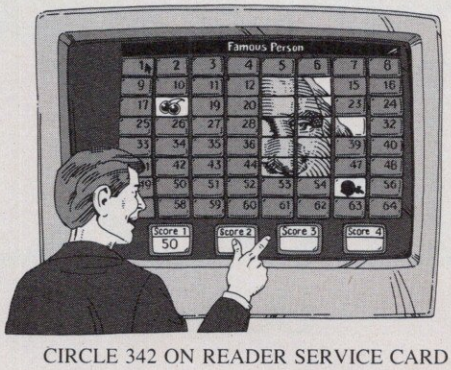
We put Mac's considerable graphics skills through the loops to develop an eye-popper for Mac's first mouse game. You will zoom an animated mouse through a maze-like environment avoiding a bad kitty cat intent on supper. There are plenty of perils and rewards for the skillful. MouseTracks shows everyone how much fun Macintosh can be.



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MAC

▶ THE SOLAR SYSTEM AND HALLEY'S COMET

The first release in Millet Software's Learn About Series of educational software for the Macintosh, The Solar System and Halley's Comet features real-time graphic simulations of the nine planets of our solar system rotating around the sun.

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Requires: Macintosh

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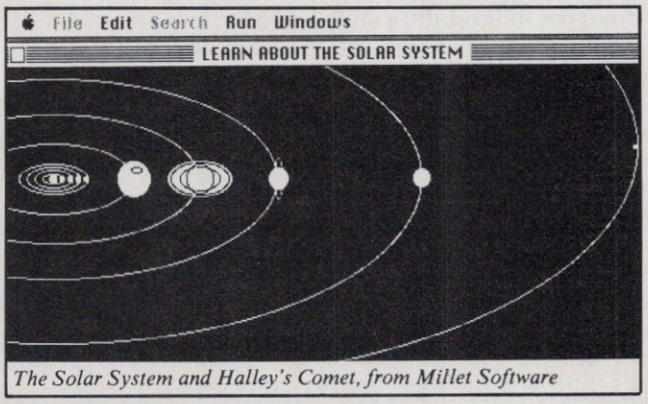

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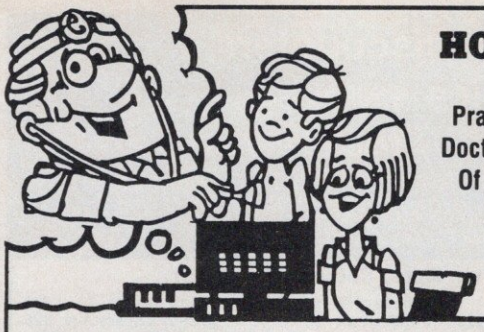

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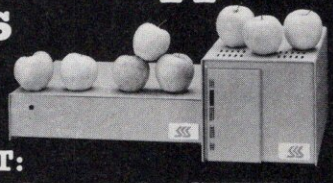
CIRCLE 474 ON READER SERVICE CARD

Memo to Apple® users



SUBJECT:
Put 8 Apples on the CUBE and take 42 big (mega) bytes

METHOD:
Using the NEW SCS PRODUCTS illustrated.

RELEVANT DATA:

- SCS Microcube mass storage system for Apple II, IIe and III's hold 5, 10, 21, and 42 MB. 21 MB system is qualified as Apple part #A3M0108. Uses RODIME 5¼" Winchester hard disk drives.
- SCS Micro-Multiplexer for Apple II, IIe, and Apple III. Supports 8 Apples — 16 with additional channel card. Apple #A3M0109.
- SCS Transport high speed tape streamer backup stores 42 MB on tape in 9½ minutes.

CONCLUSION:
Order through Apple dealer or get more information by enclosing business card with this memo and send to:

Space Coast Systems, Inc.
301 S. Washington Ave., P.O. Drawer 2767 AP
Titusville, FL 32796
305-268-0872 • Telex 701506

CIRCLE 454 ON READER SERVICE CARD

II SERIES

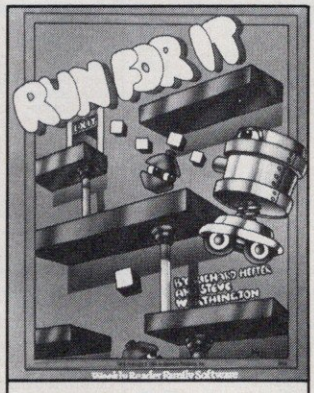
▸ RUN FOR IT

Orbit the robot is the central character in Run for It, a new computer game from Weekly Reader Family Software. Designed for one player at a time, the game features 3-D color effects and a scoring-point system. In the game, you help Orbit escape from his bad-robot pursuers through 72 maze-like rooms. Each room contains ledges that are increasingly harder to climb. The package includes a program disk, a full-color poster that shows all 72 rooms, and a users' guide. *(List Price: $39.95)*

Requires: Apple II, II Plus, or IIe

Weekly Reader Family Software
Xerox Education Publications
245 Long Hill Road
Middletown, CT 06457
(203) 347-7251

CIRCLE READER SERVICE NO. **939**



Run for It, a new game, stars Orbit, a 1-inch tall robot.

MAC

▸ THE INVESTOR

The first in a series of programs for the Macintosh designed for professional users, The Investor is an easy-to-use, flexible, and fast portfolio-management program. The program can handle stocks, bonds, funds, options, short sales, and margins and can produce reports such as Portfolio Status, Capital Gains/Losses, Interest Income, and Dividend Income. The Investor also updates security quotes automatically, via the Dow Jones News/Retrieval Service. *(List Price: $150)*

Requires: Macintosh

P Cubed, Inc.
949 Parklane Center
Wichita, KS 67218
(316) 686-2000

CIRCLE READER SERVICE NO. **940**

LISA

▸ SILENT PARTNER GENERAL LEDGER

The first module in an integrated accounting system for the Lisa, Silent Partner General Ledger is a powerful, mouse-based program that has an on-line tutorial and comes with clear documentation. The program provides complete balance checking, can deal with up to 9999 accounts, and allows you to edit transaction entries either individually or in groups. General Ledger can also generate reports, including Income Statement, Balance Sheet, Trial Balance, Cross-Reference, and edit- and audit-trail reports for various files. The program runs in the 7/7 version of the Lisa Office System in the Environments window, although a desktop version will soon be available as an upgrade and will cost $50. *(List Price: $495)*

Requires: Lisa 2/5

Interlobal Systems, Inc.
1050 Turnpike Street
Stoughton, MA 02072
(617) 341-1856

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RAMWORKS™—A card that plugs into the Apple IIe auxiliary slot and functions EXACTLY like Apple's extended 80 column card (in fact, a 128K RAMWORKS™ actually costs less than Apple's 64K extended card) but with RAMWORKS™ you get more memory, 80 column text, a 3-year warranty and most importantly, room to grow without using more slots. A design so advanced there's a patent pending on it. If you have a IIc or an IBM, we suggest you do what everybody does, trade it in on a IIe.

You can utilize this RAM memory to expand Apple Works, VisiCalc, and many others. The RAMWORKS™ card will automatically expand Apple Works to 55K, VisiCalc IIe to 95K, Advanced VisiCalc IIe to 78K. Optional low-cost software is available from Applied Engineering to increase the storage capacity of these popular programs EVEN HIGHER! RAMWORKS™ is the only product capable of expanding Apple Works beyond 55K or Advanced VisiCalc IIe beyond 78K. With the Optional RAMDRIVE™ software RAMWORKS™ can also be used as an ultra high speed RAM disk. Depending on the memory size of the RAMWORKS™ card, you can emulate up to 4 disk drives with one RAMWORKS™ card. All at about 20 times faster than mechanical floppy drives and about 5 times faster than a hard disk.

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RAMWORKS™ saves you time, money, slots and hassle. You'll have additional memory NOW and in the future.

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Ramworks™ with 128K Installed	$249
Ramworks™ with 256K Installed	$399
Ramworks™ with 512K Installed	$649
Ramworks™ with 1 MEG Installed	$1199
RGB Option (can be added later)	$129

VIEWMASTER 80

There used to be about a dozen 80 column cards for the Apple, now there's only ONE.

- TOTALLY Videx Compatible.
- 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 connectors.
- Both upper and lower case characters are standard.
- 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.

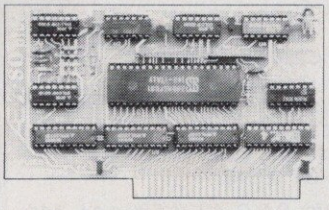
	PRICE	BUILT-IN SOFTSWITCH	SHIFT KEY SUPPORT	LOW POWER DESIGN	80 COLUMN HOME	7X9 DOT MATRIX	LIGHT PEN INPUTS	40 COLUMN OVERRIDE	INVERSE CHARACTERS
VIEWMASTER	159	YES	YES	YES	YES	YES	YES	YES	YES
SUPRTERM	MORE	NO	YES	NO	NO	NO	NO	YES	YES
WIZARD 80	MORE	NO	NO	NO	NO	YES	NO	YES	YES
VISION 80	MORE	YES	YES	NO	NO	YES	NO	NO	NO
OMNIVISION	MORE	NO	YES	NO	NO	NO	NO	YES	YES
VIEWMAX 80	MORE	YES	YES	NO	NO	YES	NO	NO	YES
SMARTERM	MORE	YES	YES	NO	NO	NO	YES	YES	NO
VIDEX	MORE	NO	YES	YES	NO	YES	YES	NO	YES

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

PRICE $159

Z-80 PLUS
NOW INCLUDES NEW CP/AM 4.0™

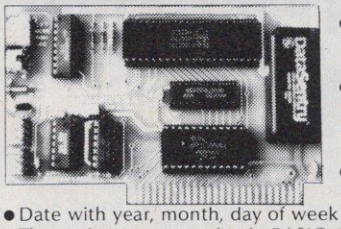
Enter the CP/M world with the new Z-80 Plus card from Applied Engineering and introduce your Apple to thousands of new programs. Only the Z-80 Plus comes standard with the new 4.0 software, the most advanced system for running CP/M programs ever. Only CP/AM 4.0™ has advanced features like built-in disk 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. If you already own the Z-80 Plus, you can upgrade to the 4.0 software for only $29. The Z-80 Plus runs older CP/M programs too, down to Version 2.1 (2.2 is the most popular). With the Z-80 Plus you can run the largest body of software in existence. 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.
- 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 WORD STAR, 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 thru CP/M programs at a very low power level. (We use the Z-80A at fast 4MHZ.)
- Does EVERYTHING the other Z-80 boards do, plus Z-80 interrupts.

PRICE $139

THE NEW 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.
- The easiest programming in BASIC. The only clock read by AWIIe.
- Eight software controlled interrupts so you can run two programs at the same time (many examples are included).
- Compatible with ALL of Apple's languages. Includes over 35 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.
- Rechargeable nickel-cadmium battery will last over 20 years.
- Two BSR/serial ports for future expansion.

Full emulation of all other clocks. 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.

	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	NO	YES	NO

The Timemaster II H.O. will automatically emulate the correct clock card for the software you're using. You can also give the H.O. a simple command to tell it which clock to emulate.

Of course, most programs will use the Timemaster II H.O. in its native mode, but it's comforting to know that you can use programs written for other products without any modification. **PRICE $129**

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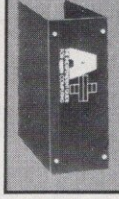

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Race Timing Systems provides a computerized, professional way for you to time road races. The package is easy to use and enables you to time more than 1500 participants in up to 15 different events easily and accurately.

A second program from DB Software, Performance Race Running, acts as a personal coach for runners. The program predicts your times in various long-distance events and gives you tips for improving your performance. Performance Race Running also has graphing capabilities that you can use to evaluate your achievements quickly and that show you in which areas you need to practice. *(List Price: Race Timing Systems, $600; Performance Race Running, $49.95)*

Requries: Apple II Plus or IIe (Race Timing Systems); Apple IIe or IIc (Performance Race Running)

DB Software Services
P.O. Box 20628
Albuquerque, NM 87154
(505) 293-2268

CIRCLE READER SERVICE NO. **942**

MR. BOSTON OFFICIAL MICRO BARTENDER'S GUIDE

Concept Development Associates and Glenmore Distilleries have joined forces to produce the first computerized version of the *Mr. Boston Official Bartender's Guide.*

Available as a three-disk set, the program contains more than 1000 drink recipes with mixing directions, complete beer and wine sections, and a liquor dictionary that describes popular liquors, liqueurs, and professional serving techniques. You can select drinks by using any combination of 21 search items that include ingredients, personal preference, occasion, season, temperature, mood, and more. You can also resize recipes to suit 1–999 servings, and a useful party-planning feature enables you to produce a printout of recipes and required ingredients and glassware. *(List Price: $49.95)*

Requires: Apple II, II Plus, IIe, IIc, or III in Emulation mode; 48K RAM; one disk drive

Concept Development Associates, Inc.
7960 Old Georgetown Road, Suite 2D
Bethesda, MD 20814
(301) 951-0997

CIRCLE READER SERVICE NO. **943**

BOOKS

THE BROWN BOOK PRICING GUIDE

Designed to meet the information needs of companies and individuals who are involved in the financial evaluation of microcomputer products, *The Brown Book* is a pricing guide for CPUs, printers, and monitors. The book, which is issued quarterly, lists the suggested retail, average advertised, and "Brown Book" values of more than 600 products from 200 equipment manufacturers. *(Subscription Price: $375 for 18 months)*

The Brown Book, Inc.
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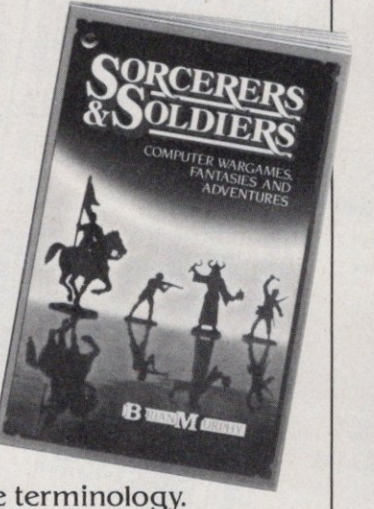

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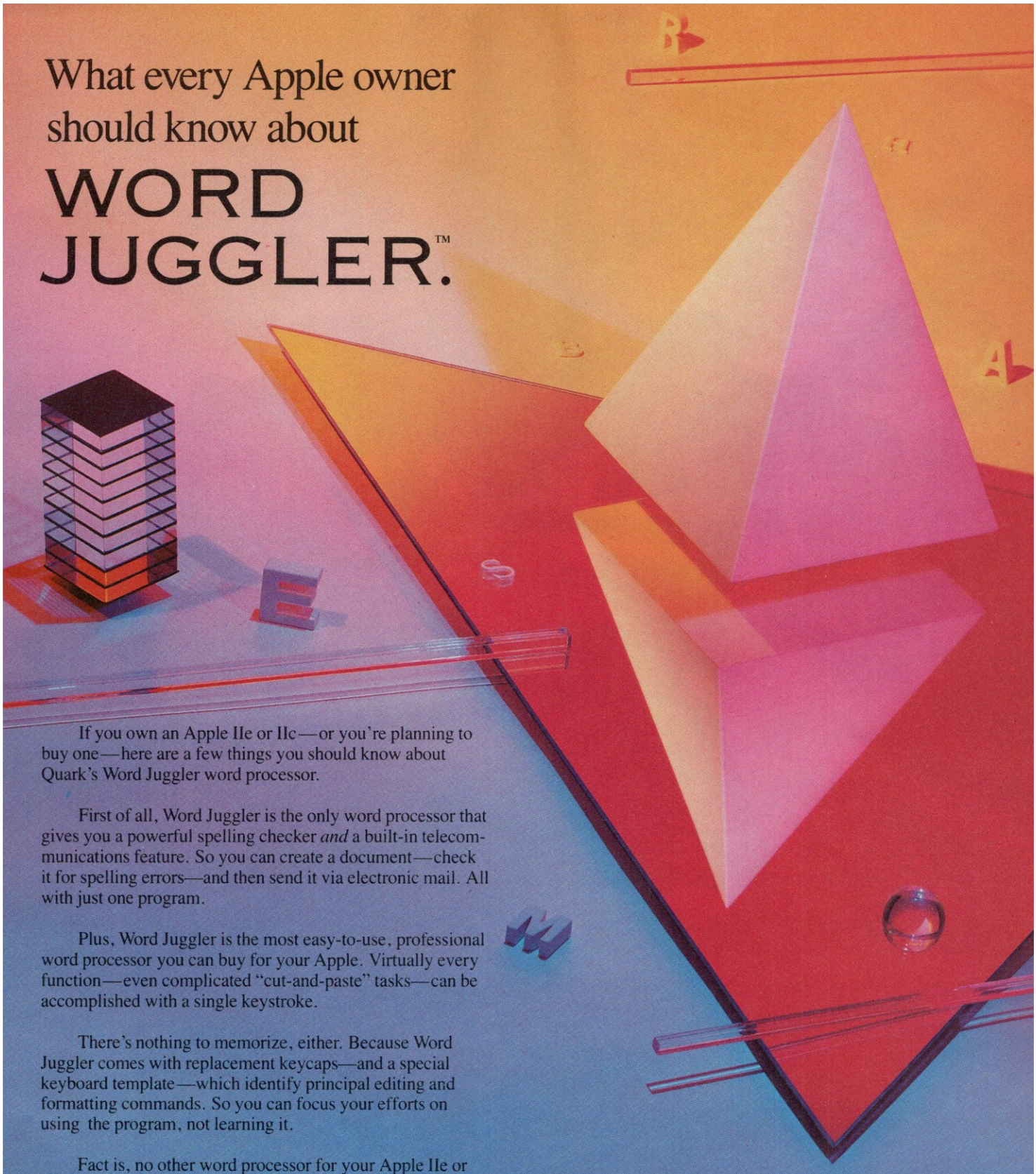

If you own an Apple IIe or IIc—or you're planning to buy one—here are a few things you should know about Quark's Word Juggler word processor.

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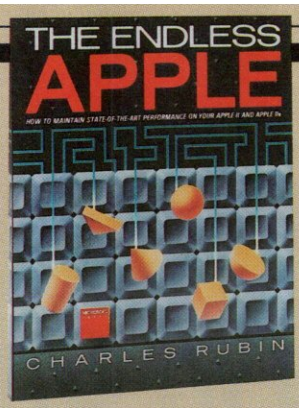
The Endless Apple is a new book from Microsoft Press that tells you how to maintain state-of-the-art performance on your Apple II-series computer. Charlie Rubin, the book's author, is an avid Apple enthusiast who explains how to get more power out of your Apple by taking advantage of new developments in hardware and software. The book covers word processing, spreadsheets, databases, communications, integrated software, games, and more. This month we wrap up our two-part excerpt of *The Endless Apple*. Part two begins where we left off in the last issue, in the middle of the chapter entitled "Superior Spreadsheets." The author has also provided an update of the information in the chapter (see "The Latest Enhancements," page 154).



▶ **BOOK EXCERPT/BY CHARLES RUBIN**

the endless APPLE

In 1979, as business applications such as spreadsheets and word processors became available for the Apple II, people began to want a display that showed more than 40 characters on a line. Radio Shack and Commodore were expanding the display capabilities of their products, but Apple had its hands full just making enough computers and disk drives to go around. The market was wide open for the first major hardware enhancement product for the Apple II: the 80-column video display card. The first product to fill this golden void was the Sup 'R' Term card from M&R Enterprises in 1980. Sup 'R' Term was followed within weeks by the Video Term card from Videx, which has since captured the lion's share of the 80-column card business in a field of perhaps a dozen competitors.

Apple's Own

When it introduced the Apple IIe in January 1983, Apple began offering its own 80-column display cards: one with display only, and another with display and an additional 64K of RAM. Most IIe systems have one or the other of the Apple cards, because they are usually bundled in with the systems when they are sold. But the cards fit a special slot that exists only in the IIe—Apple II or II+ owners must go to other vendors for bigger displays.

The 80-Column Derby

Manufacturers of 80-column cards either scramble for the remaining II or II+ owners who have yet to upgrade their displays, or they compete with Apple for the IIe business, by offering lower prices or more features. If you don't have an 80-column display card, there are a lot of different sources and a lot of different prices to choose from. If you already have an 80-column card, you might want to read on anyway. You may find reasons to make a switch.

The obvious advantage of creating a spreadsheet on an 80-column display is that you can see more on the screen at one time. You not only see more columns across the spreadsheet, you can see more of what you're typing in. The latter is particularly important when you're entering long formulas. It's frustrating to see only part of a formula on the screen, and often, writing the whole formula down on paper is the only way to make sure you haven't made a mistake. If you are using an Apple II or II+, an 80-column

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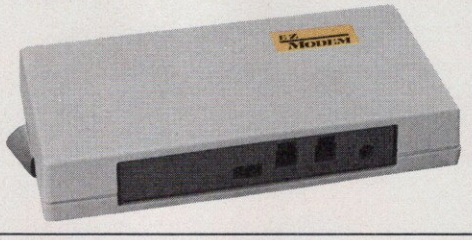

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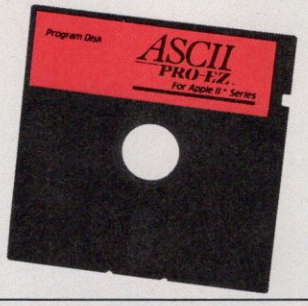

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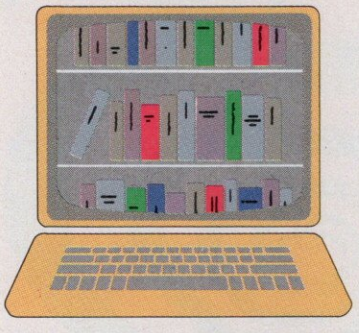

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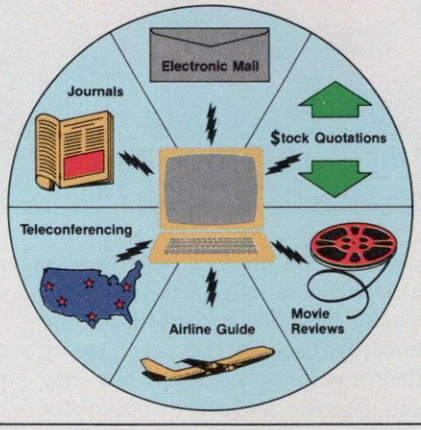

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card will enable your computer to display lowercase letters for the first time.

It would be nice if you could simply plug in an 80-column card and get an instant, 80-column display with every software package you use, but this isn't the case. As with RAM cards, your programs must be made aware of the 80-column card and must know how to take advantage of it. In the early 80-column days, no one was writing software that used an 80-column display, because the standard was 40 columns. Now, most software supports both display widths, and generally, when you first run a program, it asks how you'd like everything displayed. You make the choice once, and the program knows from then on how to display itself and your data.

It's nice to have an 80-column display card for most applications, and while there may be some programs—children's educational software, perhaps—with which you'll want to use the Apple's 40-column display, it's better to have a choice. Several different companies offer 80-column display cards, at prices ranging from about $150 to $300. In some cases, you can find these prices discounted by up to 50 percent. What you get for different prices are varying levels of quality, performance, and support.

Videx's VideoTerm card is considered to be the industry standard. When other manufacturers boast about their cards, they say, "It's Videx compatible." Here's what they mean: Not all video cards handle character display in the same way, so software manufacturers must have a certain type of display card in mind when designing their programs. Software companies generally support from three to five different cards, and because Videx's is the best-known card, software manufacturers that offer 80-column display options always support the Videx card. They guarantee that their software will work fine with a VideoTerm. Naturally, you're a lot better off if your card is one of the more popular ones, but you'll probably pay a little more for a popular card than for a lesser-known one.

There's also the question of quality to consider when choosing an 80-column display card. A bad batch of chips or a design flaw could result in intermittent flickering or an inability to display characters as quickly as you'd like. Videx, M&R, Titan, ALS (Advanced Logic Systems), and other major manufacturers have been around a long time and stand behind their products.

Videx's VideoTerm card is considered to be the industry standard.

Whatever bugs the products once had have long since been ironed out, and you can trust such companies to support you if something does go wrong.

If you own a IIe, there's a special auxiliary slot into which Apple's own 80-column card fits, leaving the other seven expansion slots free. Some manufacturers (Titan's Neptune cards come to mind) make special versions of their cards that also fit the IIe's auxiliary slot, so you can keep all the regular slots available with these cards, as well. Many third-party, 80-column cards,

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however, will fit only in one of the seven regular slots, in effect making you use two slots to get an 80-column display: The auxiliary slot won't hold anything other than a display card, so you have to use a regular slot to get the display you want.

If you're planning to use a lot of other cards for printers, modem boards, sound synthesizers, graphics boards—the list is quite long—you'll want to consider a display card that helps you economize on your use of the regular slots.

If you want the absolute best display there is, you should feel especially fortunate in owning an Apple. Videx, which has felt increasing pressure from Apple Computer and third-party manufacturers during the past few years, has overstepped its competition by producing UltraTerm, a display card that positively rewrites the rules for quality and performance.

UltraTerm uses a technique called interlacing to improve the readability of screen characters. Interlacing instructs the screen to display a second set of dots, slightly offset from the first, to fill in the vertical black lines and produce fully formed characters. The difference is striking—it's like looking at text produced on a daisy-wheel printer next to text produced on a cheap dot-matrix printer.

An interlace display is the finest you can have in terms of readability, but it only works if you have a slow-phosphor display monitor. So before rushing off to get an UltraTerm, make sure your monitor will handle it. Videx recommends the Amdek 300A (the A is for amber), or the Apple Monitor III. The Apple Monitor II will also work, as will the USI P3.

UltraTerm positively rewrites the rules for quality.

Slow-phosphor monitors use a light-emitting phosphor that lingers on the screen a little longer than the phosphor in fast-phosphor monitors, and the lingering is important to the effect of interlacing. What actually happens during the interlacing is that the first set of dots is displayed, and then the second set is displayed one-thirtieth of a second later. That doesn't seem like much of a time difference, but if you use a fast-phosphor monitor, the first set of dots will have begun to fade before the second set of dots is displayed. The result will be a flickering image.

The UltraTerm can show you up to 128 characters across the screen. It features nine different display modes, including a standard 80 columns by 24 lines, 80 by 24 interlaced, 128 by 32, 80 by 48, and others. With 128 columns across a 12-inch monitor, the individual characters are pretty small, but UltraTerm's interlace mode produces fully formed, dot-free characters that are easy to read, in spite of the reduced size.

Like any other display-enhancement product, UltraTerm is only as good as your software's ability to recognize and take advantage of it. But, as a product that's almost two years old, UltraTerm is being recognized by a growing number of software developers. Videx sells a pre-boot diskette for VisiCalc that lets the program display up to 128 characters across. UltraPlan, as the Videx spreadsheet program, makes it easy to take advantage of the UltraTerm's capabilities. MAGICALC will also use

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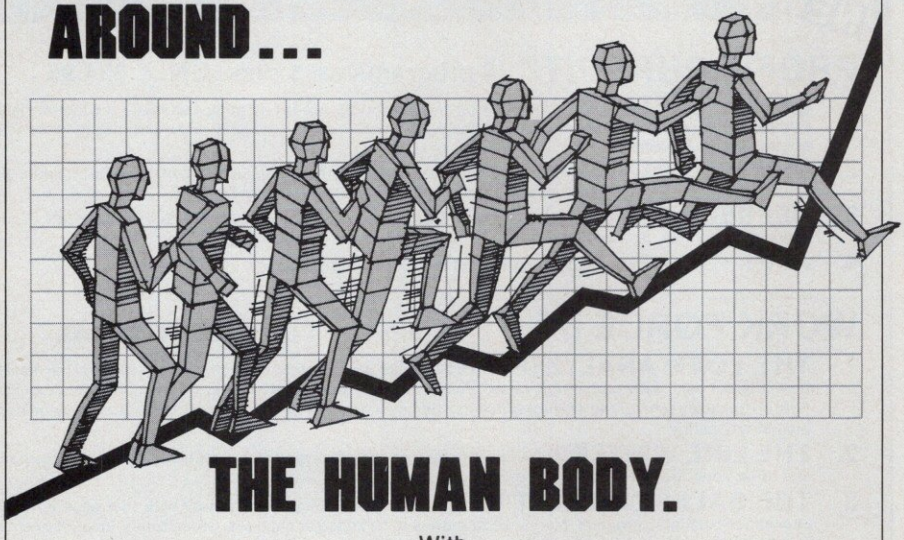

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UltraTerm without a pre-boot diskette if you use its special Videx video-display option. Multiplan is now, or soon will be, available in a version that uses UltraTerm, as well.

The UltraTerm should be fairly trouble free in use. The programs that can handle it will be a delight to use, and the programs that don't support it will still display 40 or 80 columns as they always did. The UltraTerm retails for $379, but you should be able to chop at least $100 off that price if you shop around. You may feel this is a lot to

Multiplan is now, or soon will be, available in a version that uses UltraTerm.

spend on improving a display that you've gotten used to. On the other hand, you may feel it's worth the price, because the larger display would cut down a lot on having to move around your spreadsheets, and because the UltraTerm could also reduce eyestrain.

Two-Fers

If you're in the market for a better display and extra RAM, you could save money by buying a card that offers both. Apple's IIe-only video card is available with or without an extra 64K of RAM; Titan's IIe-only Neptune card comes with 64K, 128K, or 192K of RAM. Generally, you get the 80-column capability for nothing with cards like these—what you're really paying for is the RAM.

COPROCESSORS: A Faster 6502

The simplest, least disruptive way to get faster spreadsheet recalculations and other processing is to install a faster version of your Apple's own 6502 processor. The standard processor in Apples is the 6502A, but you can buy a card that contains a 6502C processor instead. The 6502C uses the same instruction set as the 6502A, so it will run the same software. But the 6502C has a clock speed of 3.6 MHz, which makes it exactly 3.6 times as fast as the Apple's normal processor. With a 6502C installed, your spreadsheets will be recalculated 3.6 times faster than they were before; your data will be sorted 3.6 times faster; your display will change 3.6 times faster. Your Apple will, in effect, be as fast as a standard IBM PC—

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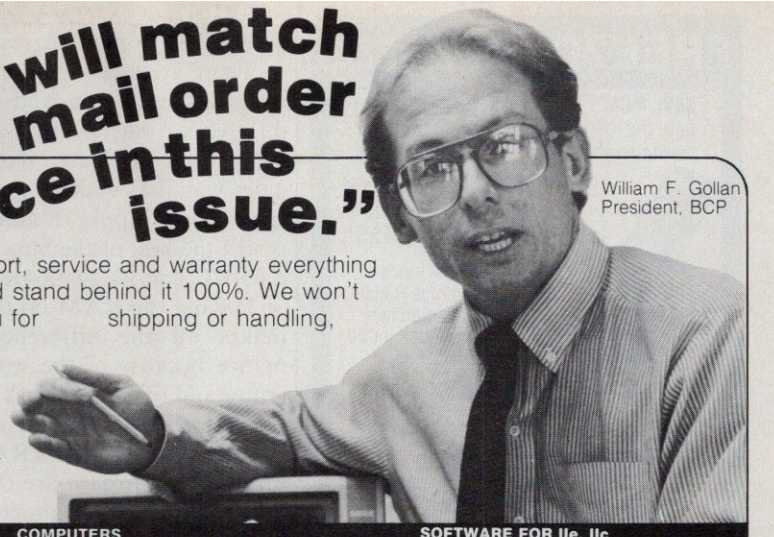

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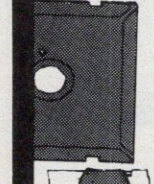

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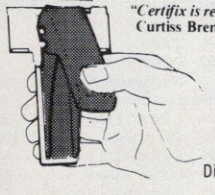

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even faster, in many cases.

There are a few different companies making these cards, and there are big differences in performance among competing products. Titan Technologies was first with its Accelerator IIe card for the Apple II, and this product is still the best of the bunch. It features a 6502C and its own 64K of RAM.

Having the RAM on the same card makes all the difference in performance because of the way the Accelerator and the Apple work. Without the Accelerator, the program you start up is loaded into the Apple's RAM. The program and your data are then passed to and from the 6502 processor through its input/output pathway, or I/O bus. All of this activity happens at 1 MHz, because the input/output speed is the same as the processor's clock speed. Titan's Accelerator card features its own RAM and I/O bus that run at 3.6 MHz to match the 6502C's speed. The result is that all computing and all input and output occur at 3.6 MHz.

The ease with which you can use the Accelerator card will depend on the type of program you're working with. Spreadsheet programs are usually written in the computer's own machine language, and they can be run on the Accelerator without modification. If a program is written in Applesoft BASIC, you have to use a pre-boot disk to transfer the Applesoft language from the Apple's built-in ROM (where it's inaccessible to the Accelerator) to an area in the Accelerator's own RAM. If you're using a program written in Pascal, you also need to use a pre-boot disk to prepare a special area in the Accelerator's RAM to store the Pascal from your program disk. If you're using a program that simply won't run at 3.6 times normal speed (arcade games, for example), there are pre-boots to slow the Accelerator or to turn it off and return control to your standard processor.

All this potential pre-booting sounds sort of scary, but the chances are your software will use either the Pascal preboot or no pre-boot at all. If you're working with spreadsheets and doing any kind of recalculating, the time you spend pre-booting your software (if necessary) will be amply repaid in reduced waiting time. The Tital Accelerator retails for $599, but you can find it for at least $100 less.

There are competing speed-up cards for the Apple that feature 6502C processors. They sell for half of what Titan's card costs, but they don't have their own RAM on the card, so they're forced to use the Apple's standard RAM and I/O bus. Thus, data can be processed at 3.6 MHz, but it can only be moved to and from the processor at 1 MHz. You end up with an Apple that technically processes data 3.6 times faster (as the ads for these cards proudly claim), but that actually delivers much slower overall performance. The moral is that in choosing a fast 6502 coprocessor, make sure it has its own RAM on board.

Z-80 Cards

The nice thing about computers is that their designs are flexible enough to allow us to change or add processors. The beautiful thing about the Apple II

There's no question that having a CP/M card will enhance the capabilities of your Apple.

is that it makes this sort of thing easy with its expansion slots—just plug in a board and you've got a whole new computer. The Z-80 SoftCard, introduced by Microsoft in 1980, was the first coprocessor for the Apple II. This card made a lot of sense, because the Z-80 had been around at least as long as the 6502, and had become the "standard" processor in 8-bit microcomputers.

The SoftCard was an almost instant success. It would let an Apple run any CP/M program, provided there was a version of that program available in the Apple's Disk II format. Disk drives on CP/M systems at the time used everything from 100K, 5¼-inch diskettes to 500K, 8-inch diskettes, but they definitely didn't use Apple's 143K diskettes. The burden was on software companies to produce special versions of their programs for the Apple's disk format. Most companies were more than happy to oblige, because the Apple had the largest installed base of any computer back then. Having a CP/M card gave Apple owners the best of both worlds: access to thousands of programs in the businesslike CP/M environment, and the best in color graphics under Apple's DOS.

There's no question that having a CP/M card will enhance the capabilities of your Apple. What you should

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consider is whether it will add functions that you will use often enough to make them worth the expense. Here are the main pros and cons:

The Good News: On top of this wide range of software, you'll be getting some extra capabilities in the CP/M operating system itself. CP/M is much more flexible than DOS 3.3 in terms of its interactions with peripheral equipment. With CP/M, you can specify, via the application program you run, the type of printer, the number of disk drives, the presence of a RAM-disk and its capacity, and the type of video display you're using. Thus, software that can be set up in these ways will take advantage of 80-column cards, the Ultra-Term card, and add-RAM cards without pre-boot software. You specify the capabilities of your system once, and then the program is ready to go after that.

CP/M has evolved considerably since it was introduced; newer versions, such as CP/M 3.0, also offer time-and-date labeling of disk files, faster directory searches, an on-line help facility that explains system commands, and automated RAM-disk caching. Some Z-80 cards, such as the Premium Soft-Card IIe from Microsoft and the CP/M Gold Card from the Digital Research, include an 80-column display and up to 192K of RAM on the same card, so they end up saving you slots in your Apple and, generally, money in your pocket (see the December 1984 issue of *A+*, pages 72 to 77, for an in-depth look at the CP/M Gold Card).

CP/M is much more flexible than DOS 3.3 in terms of its interactions with peripheral equipment.

▸ THE LATEST ENHANCEMENTS

Since I completed the manuscript for *The Endless Apple*, there have been several new developments in spreadsheeting hardware and software. Indeed, between the time I submitted the text for this feature and the time you read it, there will likely be a few more. Here's an update on the latest in superior Apple spreadsheeting, along with some projections for the near future.

Software

After a much-publicized court battle, the various lawsuits between VisiCorp and Software Arts have been settled, affecting the status of VisiCalc. VisiCalc is now being sold by its creator, Software Arts. For $179, Software Arts is now offering The VisiCalc Package, which includes the original VisiCalc program, as well as VisiCalc Advanced Version. Software Arts recently began offering customers a choice of either DOS 3.3 or ProDOS versions of The VisiCalc Package. The VisiCorp name, once one of the leading lights of the software industry, has vanished entirely, because of a merger with Paladin Software. Paladin will continue to sell FlashCalc.

The hottest spreadsheet program currently selling for the Apple is AppleWorks, which combines word-processing and database programs with a spreadsheet on one disk. The AppleWorks spreadsheet features variable column widths, sorting, and some of the other goodies VisiCalc lacks, but it falls into the same general level of power. What it gains in more flexible formatting and sorting, it loses in a lack of trigonometric functions, for example. Nevertheless, the AppleWorks spreadsheet is easier to use than VisiCalc, and it has a maximum capacity of more than 126,000 cells, which makes it four times the size of VisiCalc or Multiplan.

The practical limitation of AppleWorks spreadsheets on a 128K Apple is about 6000 cells, but Applied Engineering of Dallas, Texas, and Legend Industries of Pontiac, Michigan, have developed "patch" programs for AppleWorks that allow it to take advantage of the RAM expansion cards the companies manufacture. The software permanently alters a copy of the AppleWorks start-up disk. Currently, the Applied Engineering software works with its 128K Memory Master IIe RAM card to increase the size of individual AppleWorks files to 101K. Legend Industries' software works with its line of S' Cards to increase the AppleWorks file size to 256K. Both developers are working on new versions of the patch software that will enable AppleWorks to use far more RAM (perhaps as much as 1 megabyte), but the design of the program itself is making such an upgrade difficult.

Hardware

RAM cards for the Apple are getting bigger all the time. Legend Industries and Applied Engineering, as mentioned above, are offering more RAM on a single board. The Legend S' Card is now available in sizes ranging from 64K ($349) to 1024K ($1799). You can either purchase the card in a specific configuration or upgrade it yourself by adding RAM chips. Applied Engineering, which has offered 128K cards for some time, has an 800K RAM card in the works.

For those interested in running Lotus 1-2-3 or SuperCalc3 on an Apple IIe, the Rana 8086/2 is here at last, after delays caused by Rana's attempts to make the 8086/2's ROM chips as compatible with the IBM world as possible.

The product comes with a keyboard template that shows all the keystroke combinations you need to issue commands that the function keys or the Alt key on an IBM keyboard typically handle. A command you issue with F1 on the IBM, for example, is handled on the Apple IIe with the combination of the open apple and the number 1 key on the top row of the Apple keyboard. It would be nice to see the 8086/2 selling for less than $1000, but even at $1895, it's the least painful upgrade path for long-time Apple owners.

Another development that has affected the 8086/2 is the delay in the release of Microsoft Windows, which is now scheduled to appear in June of this year.

When it comes to speeding recalculation time with a 6502C processor board, some clarifications are due about the difference between cards with and without on-board RAM. Titan's Accelerator II and IIe cards ($599) do contain 64K of RAM on board, and they are by far the best-selling 6502C coprocessors.

The major competitor to the Titan products is the McT SpeeDemon, which sells for $295 and does not contain 64K of RAM on board. The SpeeDemon does, however, use 4K of on-board cache memory, which moves small amounts of data to and from the 6502C processor at its own speed. This cache has the effect of buffering the data flow to and from the Apple's

And speaking of saving slots, Microsoft's Premium SoftCard IIe fits in the IIe's auxiliary slot, leaving all seven of the standard slots available for other uses.

The Z-80 processor has also evolved, and is now available as the Z-80A and Z-80B, which run at 4 MHz and 6 MHz, respectively. When used with CP/M 3.0 and the right software, a Z-80B is a very fast processor—certainly faster than a 6502.

The Bad News: You'll have to spend a fair amount of time (several hours, anyway) learning the new operating system and application software, and transferring your spreadsheet files to the new environment. Upgrades notwithstanding, CP/M is a more complex, less friendly operating system than DOS 3.3 or ProDOS. The ability to describe specific peripherals to the software you use isn't an option—it's a necessity. These configuration, or install, routines can be tiresome and frustrating, as they often require the entry of control-character strings. Compared with DOS 3.3 or ProDOS, CP/M is user-hostile.

You'll also have to spend a minimum of $500—probably more—for the coprocessor and just one decent application program. And while CP/M is a lot more powerful than DOS 3.3 in some areas, many of the inequalities have been reduced by ProDOS, particularly in the areas of speed and access to storage devices.

Lastly, you have to consider software. If you're trying to upgrade spreadsheeting alone, the benefits are questionable. VisiCalc, Multiplan, MAGICALC, FlashCalc, and UltraPlan are all respectable products. SuperCalc and Microplan do a few things better, but not better enough in my opinion to justify the upheaval of switching to CP/M. The real breakthroughs in spreadsheet software are in the MS-DOS environment discussed in the next section.

If you need to go with CP/M for another application, or if you're already familiar with CP/M applications and want to run some old favorites on your Apple, a Z-80 coprocessor may well be worth getting. You'll have more flexibility in using peripheral equipment and somewhat faster recalculations of your spreadsheets, too. But if you're only looking for ways to improve your spreadsheet work, you should look elsewhere.

8086/8088 Processors

Since it's a lot of work to change processors and learn a new operating system and application programs, you should expect a lot of improvements in your spreadsheets and other applications.

The most significant strides in software development during the past couple of years have been in products that run on the 8088 and 8086 processors under the MS-DOS operating system. IBM's choice of the 8088 and MS-DOS in its PC have caused just about every other computer and software company to jump on these bandwagons. Lotus Development's 1-2-3 and Symphony, Microsoft's Windows, Framework, Ovation, Open Access, SuperCalc3, VisiCalc Version IV, and Context MBA—all are third-generation products that supposedly leave standard Apple software in the dust.

This generation gap between MS-DOS software and standard Apple software isn't wholly imaginary, but it's not as all-encompassing as it might seem. The ability of 16-bit processors to access more than 64K of memory at a time has enabled software companies to produce larger, more powerful programs. Most software developers find it less time-consuming to put lots of features in large programs than it is to work out ways to improve the functionality of small programs.

Apple Computer has publicly ignored the MS/DOS revolution for years, and even now doesn't embrace it explicitly.

But many MS-DOS programs, even today, are basically CP/M or Apple products that have been converted to run under the more recently popular MS-DOS. Examples include WordStar, dBASE II, Microplan (a spreadsheet program from Chang Labs), Home Accountant, and Advanced Version DB Master. Such converted programs may be a little more convenient because they can spread out in a PC's large RAM and not have to access a program disk as often, but they're functionally very similar.

Where the generation gap looms largest is with so-called "integrated" programs that combine spreadsheets, graphics, word processing, or other applications, or that are a good deal more powerful in themselves. A spreadsheet case in point is Lotus 1-2-3, which was the most popular application program in 1983, and which offers a much larger spreadsheet area than, say, VisiCalc, and a number of advanced features.

Unquestioned winners such as 1-2-3 notwithstanding, Apple Computer has publicly ignored the MS-DOS revolution for years, and even now doesn't embrace it explicitly. Nevertheless, the Apple II's tried-and-true flexibility has enabled other geniuses to make MS-

slower 1-MHz main memory, and does much to overcome the 1-MHz–3.5-MHz transfer bottleneck. The result is that the McT card is only slightly slower than the Accelerator II or IIe in most cases and is actually faster in others. Another advantage to the SpeeDemon, besides it lower price, is that it doesn't need preboot software, because it continues to use the Apple's RAM for storage. If you're worried about power consumption, however, you should also know that the SpeeDemon draws twice the wattage of the Accelerator cards.

Finally, we have the lingering question of the 65802 and 65816 processors. This subject is still shrouded in conjecture. Apple says the so-called IIx project (a redesigned version of the IIe with a 65816 processor in it) has been shelved, but Apple cofounder Steve Wozniak has been quoted as saying development of the machine is proceeding. Other sources report that more than one major software developer is readying versions of its MS-DOS business software for the 65802/65816 environment.

The indications are that some of these developers will produce versions of their software for the 65802 and simply sell the chip, which is pin-compatible with the Apple's 6502, along with the software. The chip will be inexpensive enough in wholesale quantities to retail for less than $50. Once 65802 versions of the software are done, it will be a fairly simple matter to upgrade them to run on the 65816. What seems most likely is that some third-party developer will be out with a 65816 card for the Apple II well before Apple is.

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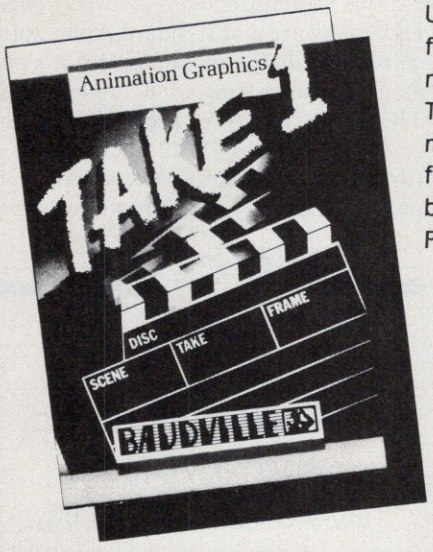

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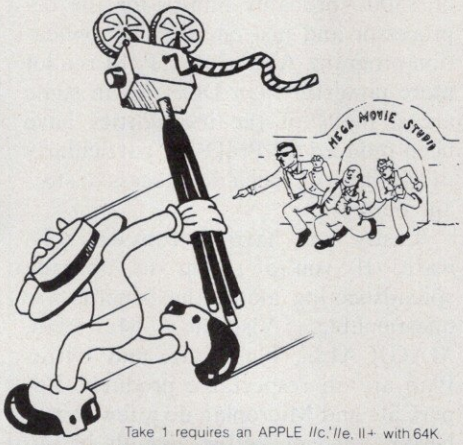

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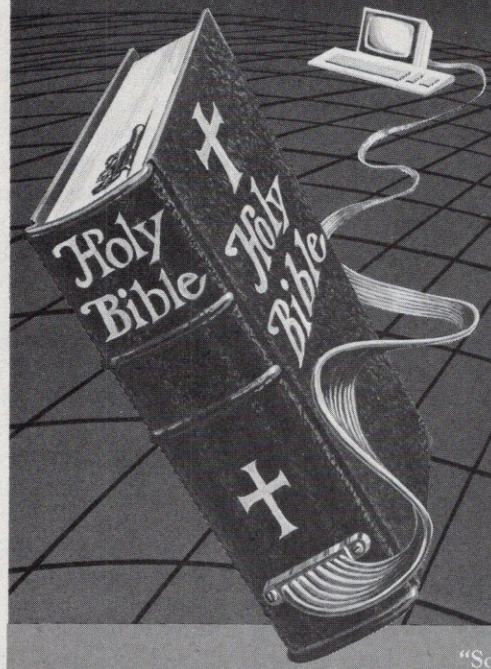

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DOS coprocessors available, so you can enjoy the same software spoils as the IBM tribe without defecting. Spreadsheet-wise, this means you can now run huge, lightning-fast programs like 1-2-3 on your own little Apple.

Using MS-DOS software on an Apple II involves the processor, extra RAM, and the disk-drive formats. An 8088 or 8086 processor will run MS-DOS, but it must have access to enough RAM to store both MS-DOS and the application program you want to run (the minimum for most high-powered applications is 256K). But even if you could stick in an 8088 board and stuff enough RAM into your Apple, you'd still need a way to get MS-DOS and the application software into the computer. Your Apple's standard disk drives use a unique format that allows a maximum of 143K of storage per disk, while MS-DOS-compatible computers use a 320K-or 360K-capacity disk format.

You'll never find MS-DOS application software in the Apple's 143K format. You will have wasted your money.

I point out these problems because you can, if you like, go out and buy a plain-vanilla 8088 board for your Apple. You can even get an Apple-formatted MS-DOS system disk to go with it. But you'll never find any MS-DOS application software in the Apple's 143K format. You will have wasted your money, unless your goal is to develop application programs yourself. If you really want to run MS-DOS programs on your Apple, you will have to change the processor, add RAM, and change your disk drives.

The neatest solution to this problem is the 8086/2 coprocessor and disk drive unit from Rana Systems. It retails for $1895 and houses an 8086 coprocessor, 256K of RAM (that can be expanded to 512K), and two high-capacity disk drives that will read either Apple or MS-DOS disks. The disk drives and processor automatically sense which kind of disk is being load-

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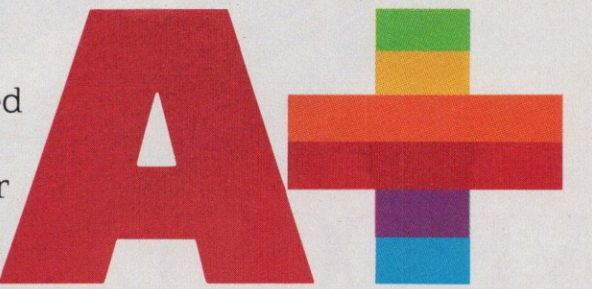

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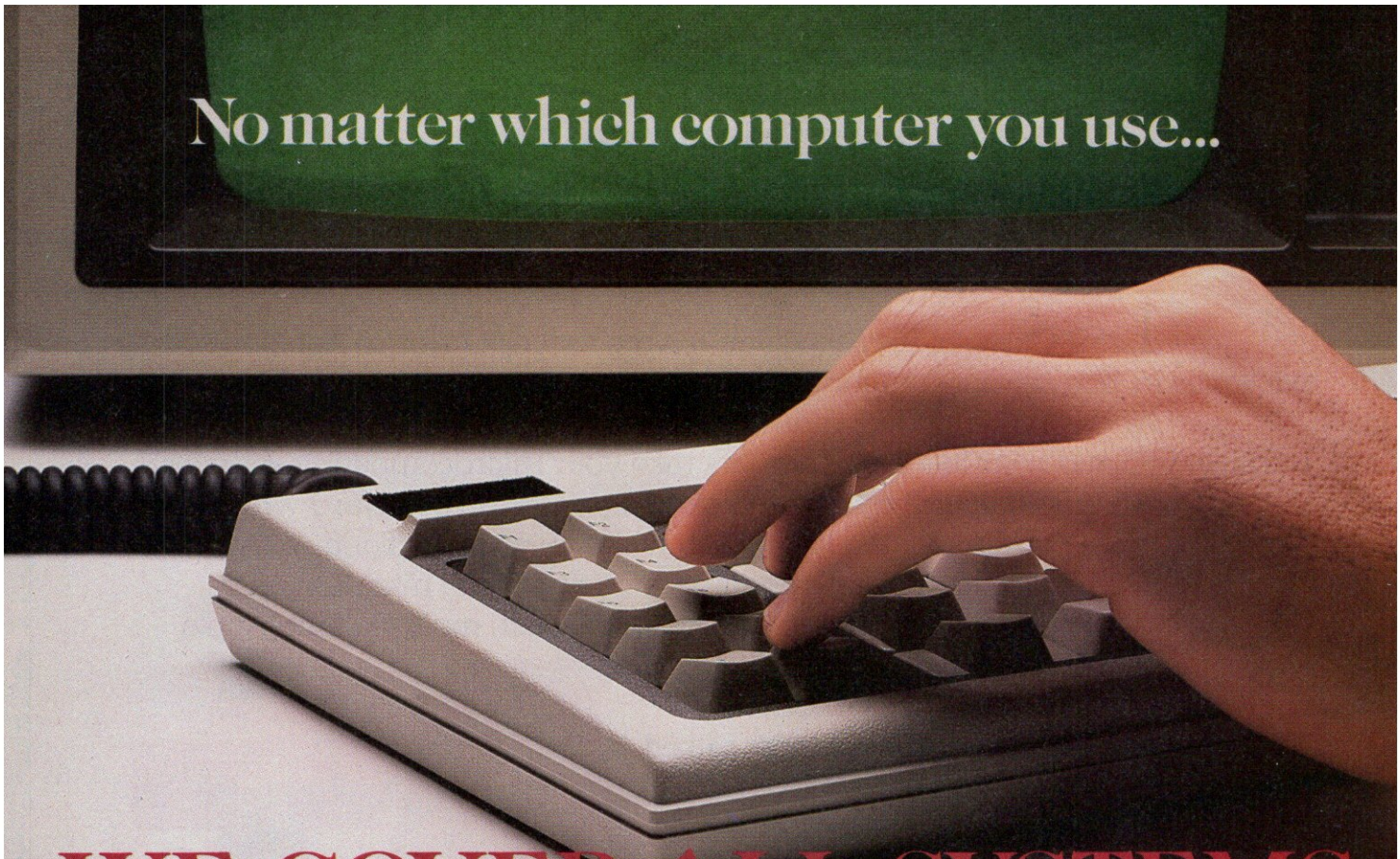

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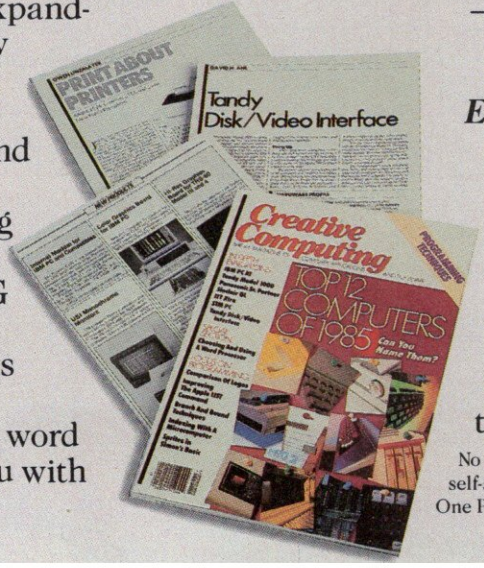

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ed. If it's an Apple disk, the Rana system turns the processing over to your Apple; if it's an MS-DOS disk, the 8086 processor takes over. The Rana unit also generates its own display when running MS-DOS programs, and has the ability to produce either monochrome or color displays if you have the right monitor.

When you're running ProDOS programs on the Apple's processor, you'll also be able to take advantage of the Rana higher-capacity disk drives. Under ProDOS, Apple disks can store 320K of data instead of the old 143K. As an extra bonus, you'll be able to use the Rana system's 256K of RAM as a RAM-disk under ProDOS, which will let you load several Apple files into RAM and have immediate access to them.

MS-DOS computers don't necessarily run the same versions of the same application software, but the 8086/2 has a fairly high degree of compatibility with software that runs on the IBM PC. In the spreadsheet area, the IBM versions of integrated spreadsheet/graphics packages such as SuperCalc3 and Lotus 1-2-3 will run on the Rana system. Major software houses, such as

More and more MS-DOS software offers levels of performance not currently available to users of Apple software.

MicroPro (developers of WordStar), Microsoft, Ashton-Tate (developers of dBASE II), and Lotus Development, have also specifically announced their support for the Rana device, so software availability shouldn't be a problem.

But even if the Rana system lets you run any sort of MS-DOS software on your Apple whenever you want to, will it be worthwhile to have that capability?

On the Plus Side: The Rana 8086/2 has a lot to offer. It lets you run 1-2-3 and other advanced spreadsheet programs. You'll get the ability to make larger models (1-2-3 can theoretically create spreadsheets containing up to 500,000 cells). Thanks to the 8086 processor, which has a 16-bit data bus, as well as a 16-bit processor (as opposed to the IBM PC's 8088, which has an 8-bit data bus), you'll get faster processing speed than you have with a standard Apple or an IBM PC. And because of the high-quality RGB (Red-Green-Blue) color output, you'll be able to use integrated spreadsheet/graphics programs that produce nice, color business graphics from your spreadsheets (this also requires an expensive RGB color monitor, though).

To sweeten the deal, the Rana system offers higher-capacity disk storage and 256K of RAM that can work as a RAM-disk under ProDOS, both of which are nice features if you haven't acquired them in other ways already.

On the Minus Side: There's the price, for one thing. $1895 is a lot of change. It's probably more than you paid for your Apple. (But it's a lot less than you'd pay for any other comparably equipped MS-DOS computer.) There's also the question of getting up to speed with MS-DOS and the new software. Lotus 1-2-3 isn't the world's easiest program to learn. VisiCalc and Multiplan, both of which you can use without the Rana system, are far easier to learn. Nevertheless, there is all that extra power: instructions you define and then use at the touch of a keystroke, online help, graphics, 500,000 cells, and more.

The Rana 8086/2 is certainly not the cheapest solution to improving the spreadsheet capabilities of your Apple. If it's solely spreadsheet improvement you're looking for, this isn't the most cost-effective solution, unless you've decided you can't live without 1-2-3. On the other hand, more and more MS-DOS software offers levels of performance not currently available to users of Apple software, and the chances are that this gap won't narrow for a year or so.

Future Coprocessors

If you can wait awhile, there are a few more coprocessor options for the Apple that will significantly improve your spreadsheet performance. You can probably go out and buy either one of these processors right now, but both of them will have to wait for operating-system and application software before they can do you much good.

The older of the two is the Motorola MC68000, which is a 32-bit processor (with a 16-bit data bus) that Apple uses in its Macintosh and Lisa computers. The MC68000 has plenty of horsepower—its clock speed is 10 MHz—and it will address several million bytes of RAM, compared to the sixty-four thousand bytes a standard Apple will handle. You can find advertisements for MC68000 boards in *A+*, but at this point they're only good for software development.

A newer and more promising processor for the Apple II is the 65816, which

The MC68000 will address several million bytes of RAM.

was designed by the same company that developed the original 6502. Apple is showing a lot of interest in this processor, because it offers the potential for upgrading the Apple II to a 16-bit computer, while allowing it to continue running its old, 8-bit software. The 65816, like the 8088, uses a 16-bit processor with an 8-bit data bus. It offers a high degree of compatibility with existing Apple software and access to much more RAM. Software developers are now, or soon will be, working on applications for this new processor, and programs, when they appear, should be functionally on the order of anything that's been seen in the MS-DOS world.

A less functional version of the 65816, called the 65802, has the advantage of being pin-compatible with the Apple's 6502—in other words, you could simply unplug your Apple's existing processor and replace it with the newer one. The 65802 has the same limit as the 6502 on the amount of RAM it can address (64K), but it processes data 16 bits at a time and should deliver processing speed similar to that of a true 16-bit computer.

Input Devices

Serious number-crunchers have long decried the Apple's lack of a numeric keypad for data entry. Many hardcore spreadsheet users know a ten-key numeric pad by touch, and they have to slow down their pace considerably to enter numbers by using the top row of a standard Apple keyboard. The numeric keypad has been deliberately omitted from the Apple II series because it was, and continues to be, Apple Computer's belief that computers with lots of keys are less friendly looking than comput-

ers with fewer keys. In keeping with this philosophy, the new Apple IIc, which is aimed at the first-time user, doesn't even have an optional numeric keypad.

Fortunately for business users, though, the Apple II, II+, and IIe all handle an optional numeric keypad with ease. There are several on the market to choose from. Apple itself sells a numeric keypad for $99. Others are available from $75 on up. If you're going to get an external keypad, be sure to get the one that fits your Apple—the II and II+ have a different hookup for a numeric keypad than does the IIe.

If you want to go beyond a simple numeric keypad, a company called Creative Computers produces a line of auxiliary keyboards that (depending on the model) contain either preprogrammed or user-definable function keys. The keyboards, called Keywiz, contain from 20 to 30 keys, each of which is or can be programmed with up to eight characters. The keys on the keyboards can be used with a kind of shift key, too, to give you up to 248 different keystroke possibilities. If you do a lot of repetitive, multi-keystroke spreadsheet operations, you could program a few keys and store the keystroke sequences (technically called macros) under one

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key each. This would give you a keystroke macro capability similar to that of Lotus 1-2-3. The Keywiz keyboards come in three different models ranging in price from $289 to $369. One model, the Keywiz 83, offers a numeric keypad, along with 30 preprogrammed function keys. The keyboards come with pre-labeled key templates (if the board is preprogrammed) or with blank templates you can label yourself. +

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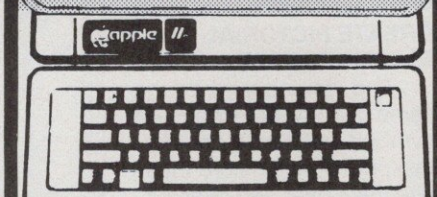

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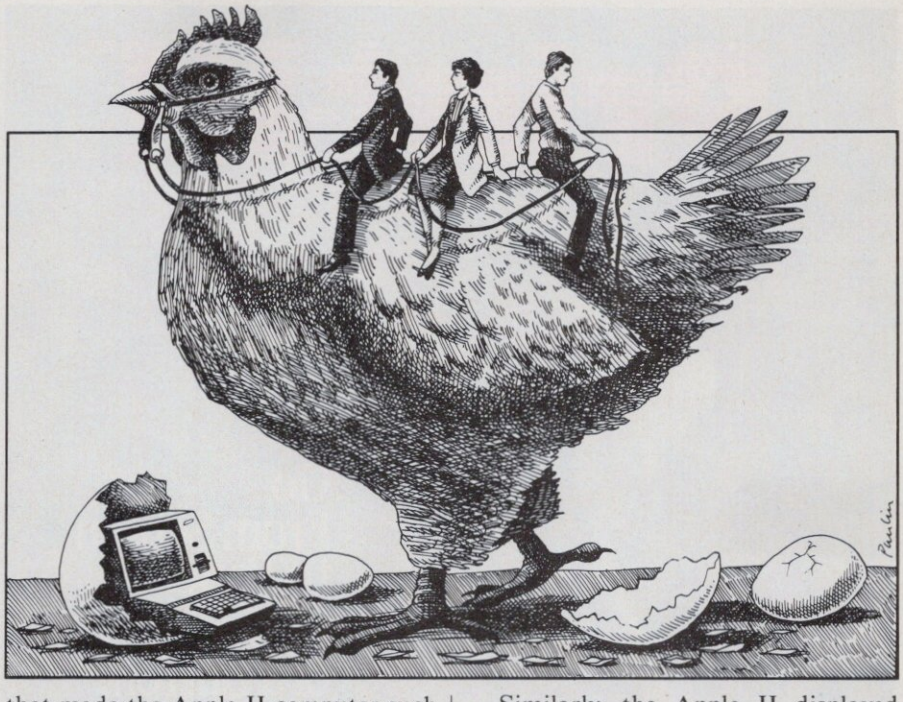
ELECTRONIC BRAINSTORMING

BY JOHN UNGER ZUSSMAN

Design and marketing decisions in the personal-computer world

USERS LAST?



OK, everybody, it's survey time again. How many of you bought the original version of Multiplan for the Macintosh? You know, the one that Microsoft sheepishly recalled after it unpredictably destroyed entire spreadsheets? Raise your hands high, please; I'm trying to get an accurate count.

If you bought Mac Multiplan 1.0—or even if you didn't, since every personal-computer user has had a comparable experience—you know what it's like to be disappointed by the design of a product. You may have been maddened by a program with a fatal bug, or even with a merely exasperating one. You may have been frustrated trying to run VisiCalc on the Apple II, with its two (too few) arrow keys. You may simply have cursed a product that cost more than you thought it was worth. But, at one time or another, you've rolled your eyes skyward and implored, "How did they *design* this product?"

On the other hand, you may have been astonished by the elegance and simplicity of a system or program—well, maybe. If so, you wondered silently, with admiration, "How *did* they design this product?"

I know it's a rhetorical question, but I'm going to try to answer it away.

Design Decisions

Some products are the culmination of a smooth process of creative brainstorming, complete specifications, extensive market testing, careful planning, and flawless execution.

Most aren't.

Most products are compromises between armchair philosophy, technical feasibility, market pressure, tradition, expediency, coincidence, hidden agendas, stubborn arguments, and tough compromises.

For example, some of the features that made the Apple II computer such a wild success were its capacities for sound, color, and game paddles. Did the early Apple execs huddle in conference and decide that that was what the market wanted?

No. According to Michael Moritz's history of Apple, *The Little Kingdom*, Steve Wozniak built in the appropriate circuitry because he wanted the machine to play Breakout, a game he and Steve Jobs had designed for Atari.

Some of the machine's limitations resulted from similar factors. The Apple II keyboard was limited to capital letters because Jobs and Wozniak thought lowercase characters were unnecessary. They expected their computer to be used primarily for playing games and writing BASIC programs. Jef Raskin, a charter employee who wrote the first Apple manuals, argued unsuccessfully for lowercase characters. Today Raskin grins, "That's one argument I bet they wish they'd lost."

Similarly, the Apple II displayed only 40 characters on a line because that was the maximum resolution of a television screen. Most computers now display 80 characters per line because that is the capacity of a punch card.

Tradition and technical constraints are often responsible for the way a product is designed. When WordStar, MicroPro International's best-selling word-processing program, was developed, not all computer keyboards had arrow keys for cursor control. So WordStar used control keys (Control-E, Control-D, and so on) to move the cursor and did not work with arrow keys even on computers that had them.

Similarly, some computers were not fast enough to allow WordStar to continuously reformat text to maintain even margins as characters were inserted or deleted. So, when you change a paragraph, WordStar leaves it unformatted until you press Control-B to reformat it. MicroPro maintained this

DOUG PAULIN

requirement, even on faster computers, until it released its revised (and more expensive) WordStar 2000 recently.

Even when you build a program from the ground up, you encounter hard choices for which there are no ideal solutions. Compromises are always necessary.

For example, when you develop a word-processing program, you must decide whether to offer both Insert and Replace modes, or just Insert. If a program has both modes, users sometimes replace when they mean to insert, inadvertently typing over text they want to keep. This confusion isn't a problem for programs without a Replace mode, but replacing text requires two steps (insert, then delete), instead of only one.

Most developers take the easy way out and include both modes. This solution actually results in more user frustration arising from those accidental deletions, but users don't seem to dislike the program for fostering them. Instead, they blame themselves for not remembering that they were in the Replace mode.

CIRCLE 283 ON READER SERVICE CARD

Many design and marketing decisions are made with dealers, distributors, reviewers, and venture capitalists—rather than users—in mind. These priorities may sound reprehensible, but they're just common sense. The only way most software developers can sell a product to consumers is to sell it first to a hidden *intermediate market* that includes distribution, promotion, and financial channels.

Dealers Can Dictate

Dealers can often dictate the terms in these transactions because they control a limited, necessary resource: shelf space. Of the many products available, a dealer can stock only a few in each category.

Another resource is even scarcer, according to Tandy executive Ed Juge: "mind space," the "number of products a retail sales team can demonstrate and support in a professional manner." One reason for WordStar's unparalleled success is that, awkward as it may be for users, dealers have learned to demonstrate and support it. They are sometimes reluctant to repeat the learning process for other products.

The catch is that the needs of the intermediate market are not always synonymous with those of users.

Hardware and software vendors must compete aggressively for these favored positions or not get sold. Consider Axlon, which publishes Art Portfolio, a "clip art" program for the Macintosh. Art Portfolio retails for $60, which is $10 higher than its best-known competitor, T/Maker's Click Art. For 45 days, Axlon offered to give dealers copies of Art Portfolio in even exchange for copies of Click Art. In essence, Axlon paid dealers a $10 bonus for replacing Click Art on their shelves with Art Portfolio. Axlon sold 5000 copies in 90 days.

Opposing Needs

The catch is that the needs of the intermediate market are not always synonymous with those of users—sometimes they're diametrically opposed to them. For example, users generally want the price of a product to be as low as possible, but dealers make a greater profit if the price is high. Again, WordStar is a good example. Its high ($495) retail price allows dealers

to make a comfortable profit even when they offer attractive discounts.

"Dealers like products when they're priced high," says Heidi Wolf, senior vice president of New Venture/Ketchum Communications, a high-tech public-relations firm. Wolf recently helped Forethought Corporation price its line of Macware (software for the Macintosh).

Normally a software publisher uses existing products as a pricing gauge, but there's not yet enough Macintosh software to make valid comparisons. So the publisher must approach the price from different angles. "You find the minimum a dealer will accept," reports Wolf, "and hope it's not more than the maximum a customer will accept."

Besides a decent margin, dealers want other things from a vendor. First, they want advertising to attract users into their stores to ask for the product.

When dealers were recently asked which software publisher had the best advertising and promotion, Lotus Development Corporation was the top choice. Now, Lotus' advertising, although competent, is not known for its creativity or cleverness. It *is* known for its abundance, however. Lotus spent more than $1 million to launch its first integrated program, 1-2-3. Figures for its follow-up, Symphony, are not yet available but were expected to reach $2 million.

Dealers also want a vendor strong enough to stick around and *support* the product. "The only thing I worry about is support," says Sonia Mendoza, owner of Alamo Electronics, a Silicon Valley dealership. "I want products from companies that won't go out of business and leave people hanging."

These factors make it difficult for low-priced products to succeed. The levels of vendor advertising and support that dealers require must ultimately be financed from the price of the product.

Bugs

Everybody's got a favorite bug story. Mine is about the spelling checker whose manual contained numerous spelling errors. I also like the BASIC compiler that had trouble calculating with negative numbers and the Apple II data-management program that thought 14 divided by 0 was 14.

No major software publisher has proven itself immune to bugs. What's surprising is the number of serious, even fatal, bugs that find their way into commercial products.

When you find bugs in a released product, there's a simple reason: insufficient testing. Somewhere, somehow, somebody forgot to check how the product performed under real-life, combat conditions—such as trying to save a file to a full disk.

This simple answer is too simple, though. Imagining all the ways people might use a product is impossible, and no amount of testing can ever prove that a program is bug-free. So if you're a software developer, how do you decide when you've done enough testing?

No amount of testing can ever prove that a program is bug-free.

Bugs are elusive, and correcting them often creates new bugs. According to Weinberg's Second Precious Programming Principle, "There's always one more bug—even after that one is removed."

The problem is compounded by the incredible diversity of hardware configurations. Every user's system is a little bit different from the next.

For example, on the IBM Personal Computer, the operating-system command to format a system disk works fine—as long as you have less than 480K of working memory. The programmers apparently didn't anticipate that anyone would have more. If you do, you get this paradoxical error message: Insufficient memory for system transfer.

Faced with this dilemma, most software developers forge a compromise among thorough testing, time, and money. Program development is a time-consuming process that often takes longer than anticipated. Development costs are large and are incurred far in advanced of revenue from sales.

Because of cash-flow problems, software houses invariably find themselves under intense pressure to release the product *now*. The temptation to shortcut the testing process and push the product onto the market is extreme.

With all these pressures and compromises, I'm sometimes amazed that we have usable products at all, but we do. On the other hand, I'm also amazed at what people will put up with to use these marvelous machines. +

John Zussman is president of Logical Arts, a software-documentation and -design firm based in Palo Alto, California. He is the author of several users' manuals and numerous articles on personal computing.

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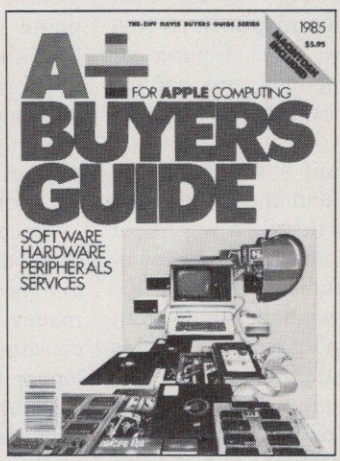

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▸ REPAIR/BY MICHAEL K. NADELMAN AND CHIP CARMAN

PART I

FIRST AID FOR DISK DRIVES

A GUIDE FOR DO-IT-YOURSELFERS

The Apple Disk II drive, developed in 1978 for the Apple II, was the first low-cost microcomputer disk drive. Although many other types of disk drives are available, the Disk II (and other Apple-II-compatible disk drives) remains a reliable storage device. With more than two million Apple IIs in use, the Disk II is the most widely used computer-disk subsystem.

The data and programs stored on your diskettes are the heart of your computer system. Thus, keeping your disk drive or drives in good working order is of primary importance to the operation of your computer. If you're the type of person who likes to tinker and you enjoy taking an active role in servicing your own system, then read on. This article will assist you in the maintenance and repair of your Apple's disk drives.

Be careful when you perform any of the procedures detailed here. *A+* is not responsible for any damage to your equipment if you repair it improperly, nor are the authors. If your system is still under warranty, we strongly recommend that you see your dealer before attempting to fix it

PACIFIC HORIZONS

yourself. If something has burned inside the disk drive, chances are that your warranty is void—a burned drive usually means that it has been plugged in incorrectly. Your dealer may give you the benefit of the doubt the first time, however.

TURN OFF THE POWER FIRST

WARNING! Always turn off the computer's power before you insert or remove anything. If you don't follow this rule, you will probably have to repair your entire system. Inserting or removing a disk-controller card (or any other card) may damage your controller, system, or both if the power is on.

CHECK THE OBVIOUS

Before you suspect any specific problem with your disk drive, check for the obvious. Is the plug firmly inserted into the wall outlet? You may have connected the disk-drive cable backwards or connected the cable with the plug shifted one pin forward or backward, or offset an entire row away from the card (see figure 1). Next, check whether the diskette has been damaged or is not bootable. To do so, make copies of your DOS diskette to serve as bootable test diskettes. Then try to boot your system with the test backup diskette.

Warning: A bad disk drive can write to diskettes even if you've write-protected them! You may ruin several diskettes before you realize what has happened. So make sure you have made copies of your disks, and use only the copies for testing.

DISK-DRIVE COMPONENTS

A disk drive has four functional components: a disk-drive controller card (see figure 2), a drive cable, the drive mechanism, and an analog circuit board (see figure 3).

WHERE'S THE PROBLEM?

The next thing to figure out is whether the problem is in the disk drive, the disk-drive cable, the disk controller, or the computer.

If you have smelled smoke from the drive, you should open it and check for burned components. Otherwise, if the problem is more subtle, the best diagnostic approach is to try substituting a good disk drive for the bad one. If you don't have a second disk drive, perhaps you can borrow one briefly from a friend. If the good disk drive works, then you know the problem is with the suspect drive or the cable to the drive. If you are not able to boot the system with either disk drive, however, you may have a bad disk-controller card or a bad system (mother) board. Test for a bad disk controller by substituting another disk-controller card for it.

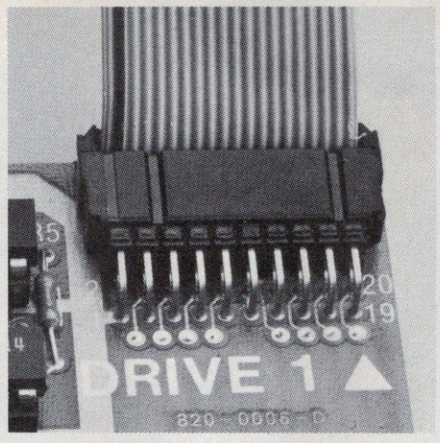


Figure 1: The disk-drive cable connector correctly aligned to the two rows of pins on the controller card. Check carefully that you do not incorrectly position the cable by an entire row of pins and/or a single pin.

If the system is at fault, you must start with the basics of system repair, which is beyond the scope of this article, but you can find helpful sources at the end of the article (see also "Home Repair Guide" in the June–August 1984 issues of *A+*).

The remainder of this article covers common problems associated with cables and the controller card. The disk drive itself will be covered in Part 2. Problems with the controller card or the disk drive usually involve replacing chips, so make sure you follow the precautions in the sections that deal with methods of handling and replacing chips.

COMMON CABLE PROBLEMS

The disk-drive grounding straps and clamps (found on the Apple IIe) may short out if they are clamped too tightly, or, if they are loose and not isolated, they may short out the disk-controller card or even other cards. The grounding-strap clamps Apple supplies have always been a problem if they are overtightened. Since the Federal Communications Commission (FCC) requires grounded cables in computer equipment, the grounded flat cable is the simplest solution. The Apple IIc, the Macintosh, and Duodisk have an industry-standard DB connector, which eliminates the danger of overclamping the cable.

Taping the grounding strap with in-

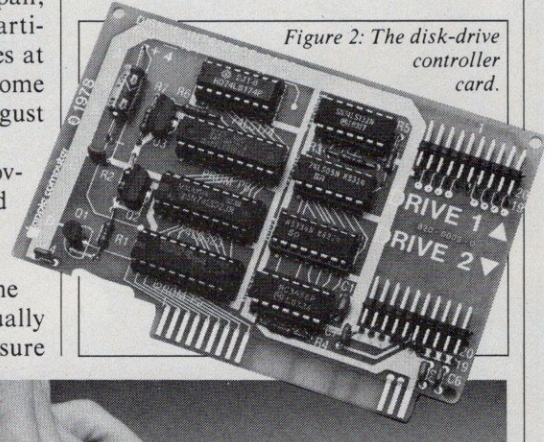


Figure 2: The disk-drive controller card.

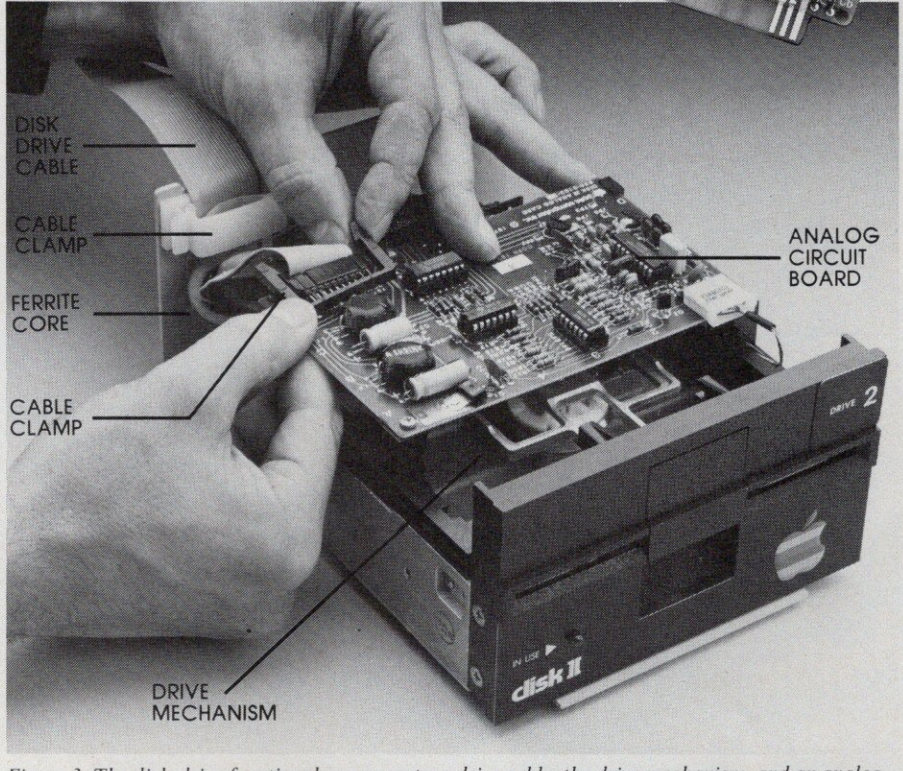


Figure 3: The disk-drive functional components: a drive cable, the drive mechanism, and an analog circuit board. You connect one or two disk drives to the card by attaching a cable between the card's cable header and the disk drive's cable header. You connect the disk-drive controller card to the computer by inserting the contacts or "piano keys" into a peripheral slot.

sulating tape and not using the clamp at all will solve this problem. Don't worry, the cable itself also contains a ground, so the disk drive will still be grounded.

Incorrectly Inserted Cable

Another common mistake that causes major problems is inserting a disk-drive cable improperly so that it is shifted from its correct position by an entire row of pins and/or a single pin (see figure 1). Incorrect insertion usually burns out some components. If you should make this mistake and find that your power light won't go on or that the drive won't boot, turn off the system immediately to avoid additional damage. Sometimes a quick reaction to this error averts the need for costly repair.

Bad Cables

A bad cable is another common problem. You can isolate a cable by substituting a good one for the suspected bad one.

Loop the new cable through the ferrite cores, and attach the plastic clamps as illustrated (see figure 3 and 4). These ferrite cores help reduce radio-frequency interference (RFI) and internal interference. Make certain the new cable is attached with the correct orientation. Pin 1 should always line up with the marking on the cable connector, the color-coded wire on the cable, the connector on the disk-drive analog board, and the connector on the controller card. You can purchase replacement cables at most electronics stores.

HANDLING CHIPS

When troubleshooting your disk drive or controller card by removing and replacing integrated-circuit (IC) chips, you should keep in mind that static electricity can damage integrated circuits. The static electricity that builds up in your body and transfers to a chip when you touch its pins usually damages the chip.

Always keep your system grounded while you're working on it. Make sure the power switch is off, but keep the power cord plugged into the wall outlet to provide a grounded connection from the power cord's "third wire" to the computer's power-supply case. In addition, before handling any chips, ground yourself by touching the computer's power-supply case, and leave chips in their protective packing material until you are ready to use them.

REPLACING CHIPS

To remove an IC chip, you need an IC-removing tool or "chip puller," so that you do not bend any pins on the chip when you remove it. A small, flat screwdriver may also help you remove a tight-fitting chip if you pry the chip up a little from each side first.

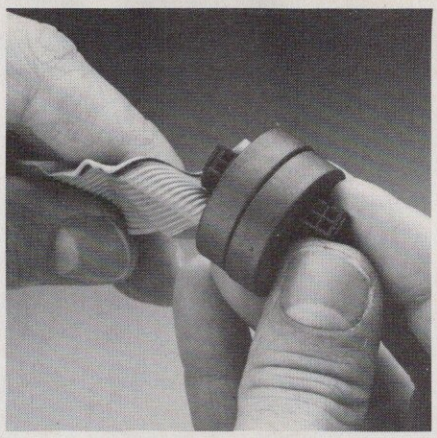


Figure 4: To replace the disk-drive cable, loop the new 20-conductor flat-ribbon cable through the ferrite cores. The ferrite cores help reduce radio-frequency interference (RFI).

Use small, colored dots (available from most stationery stores) to label the suspected bad chips you've removed.

Inserting a new chip can be difficult, unless you use an insertion tool or press the chip's pin into alignment on a flat surface first, in order to align both sets of pins to the socket. To reinsert a chip, place the chip's pin into the socket holes and make sure that they are properly aligned; then gently press both ends of the chip simultaneously until the chip is firmly seated in the socket.

If you insert a chip backwards, it will usually suffer damage when you turn the power on. Pin 1 on the chip must correspond to socket hole 1. A half-moon, elliptical, or rectangular notch on a chip indicates the end nearest to pin 1 on the chip (see figure 5). Some chips have a small circle or white dot on the chip near pin 1. Make sure you do not confuse molding marks with pin 1 markings. Often you can find an outline drawing on the circuit board showing which direction the notch should face, or you may find a white dot on the circuit board indicating socket hole 1.

COMMON CONTROLLER-CARD PROBLEMS

The disk-controller card tells a drive to turn its motor on or off and handles the input and output of data to and from the drive. The ROMs on the controller contain programs that tell the drive to find and read track 0 on the diskette. The data it reads from track 0 tells the system when to start reading other data. When you turn the computer on, the disk-operating system loads into the computer's memory—the booting process. After the system boots, control of the disk drives returns to the user. The chips that fail most frequently on the controller are numbered 9334 or

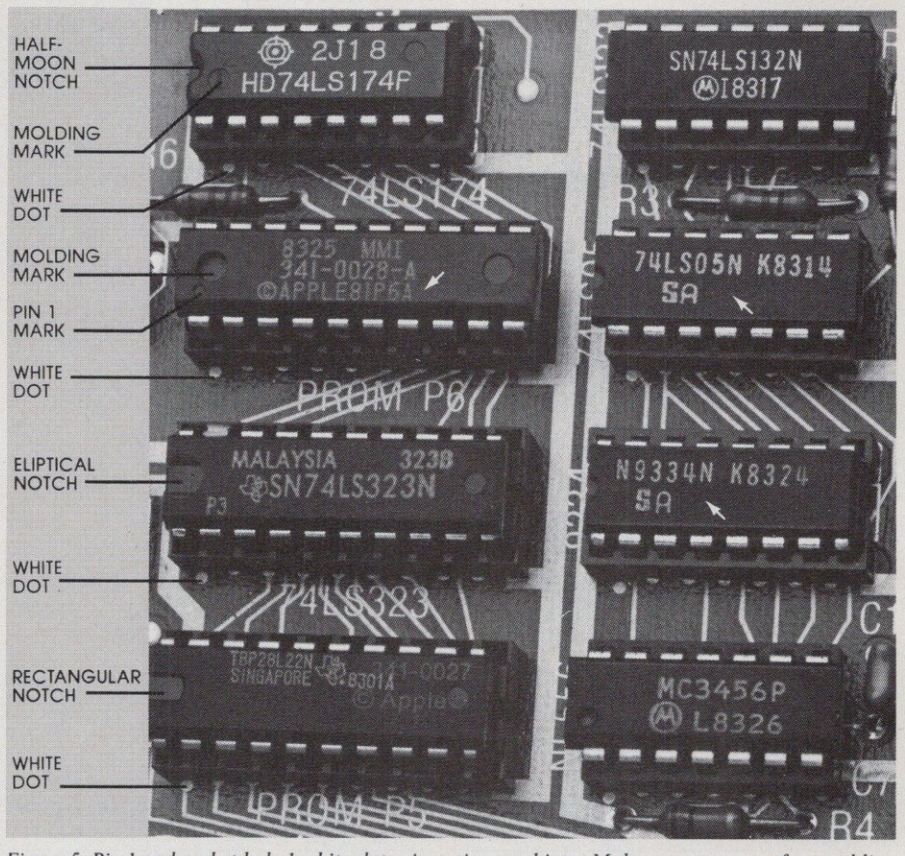


Figure 5: Pin 1 and socket hole 1 white-dot orientation markings. Make sure not to confuse molding marks with pin 1 marks.

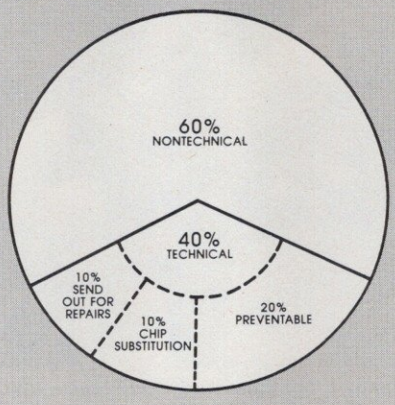
74LS259 (the motor-enable and stepper-control circuits), 74LS05 (the inverter bank), and P6 or P6A ROM (boot/load routine) (see figure 5).

WHAT'S AHEAD

That's it for this month. Next month, part 2 concludes this article by covering common disk-drive problems, replacement of analog-card parts, mechanical adjustments, and preventive maintenance. ✚

Michael Nadelman is president and founder of Apex Information Systems, a microcomputer service/specialty company, and has worked with computers at the component level since 1966. Chip Carman, based in San Francisco, has six years' experience with Apple computers. Carman does consulting for various insurance companies, doctors, and retail outlets throughout California and develops and customizes software.

▸ TYPES OF MICROCOMPUTER REPAIRS



An analysis of microcomputer-repair records by the CASCIO School of Computer Technology showed that 60% of all repairs were nontechnical and capable of being performed by anyone, 50% of all repairs requiring technical expertise could easily have been prevented, and 10% of all repairs that were technical and not preventable could have been accomplished by chip substitution.

Better than 75% of computer repairs can be accomplished without the use of expensive test equipment. The basic test procedures are relatively simple and fall into the semitechnical category. Some of the procedures are

1. Testing cables for continuity.
2. Cleaning contacts that become oxidized. Oxidation happens to integrated circuits (chips) that are socketed and at plugs, jacks, and interface ports (slots).
3. Grounding yourself before working on the insides of the computer.
4. Substituting socket chips (chips not directly soldered to the printed circuit board) with good chips.
5. Performing preventive maintenance.

▸ PRODUCT INFORMATION

HARDWARE

Disk II Kit, Apple II/II Plus Mother board Chip Kit, Combination Motherboard and Disk II
Apple-Dayton, Inc.
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CIRCLE 632 ON READER SERVICE CARD

Apex Disk Drive Service Kit, 18″ disk-drive cable, and Shugart Mechanical Assembly
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Locksmith Version 5.0, rev. F
Alpha Logic Business Systems
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ADDITIONAL INFORMATION

The Plain English Repair and Maintenance Guide for Home Computers
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The Apple II Circuit Description
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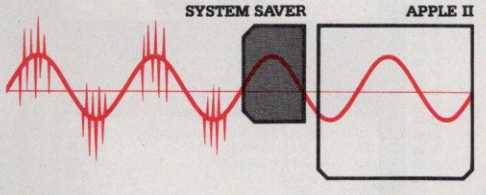

System Saver makes your Apple more convenient to use.

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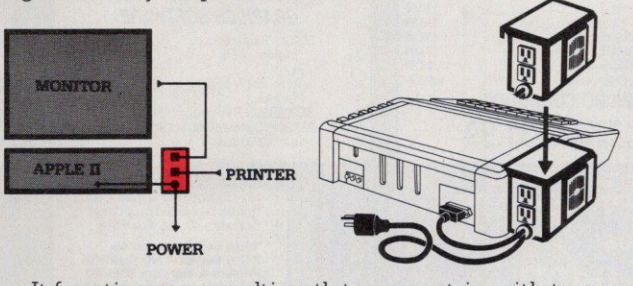

It functions as a multi-outlet power strip with two switched outlets. Plus System Saver offers the ultimate convenience; a front mounted power switch for fingertip control of your entire system.

System Saver lets your Apple keep its cool.

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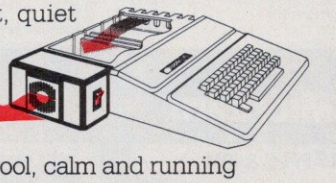

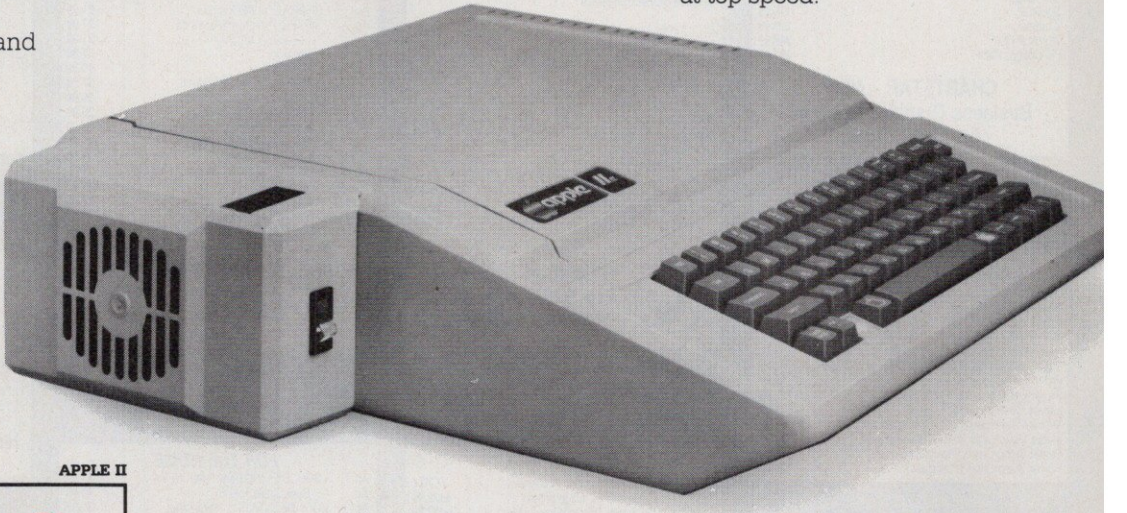

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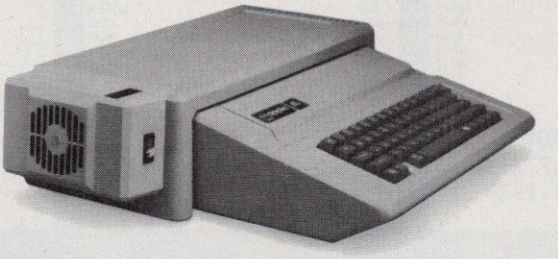
Compatible with Apple stand



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*PC Magazine: March 1983.

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

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SPEAKING OF GRAPHICS

BY ROBERTA SCHWARTZ AND MICHAEL CALLERY

What to look for in a graphics package, what's new on the market, and what's coming up

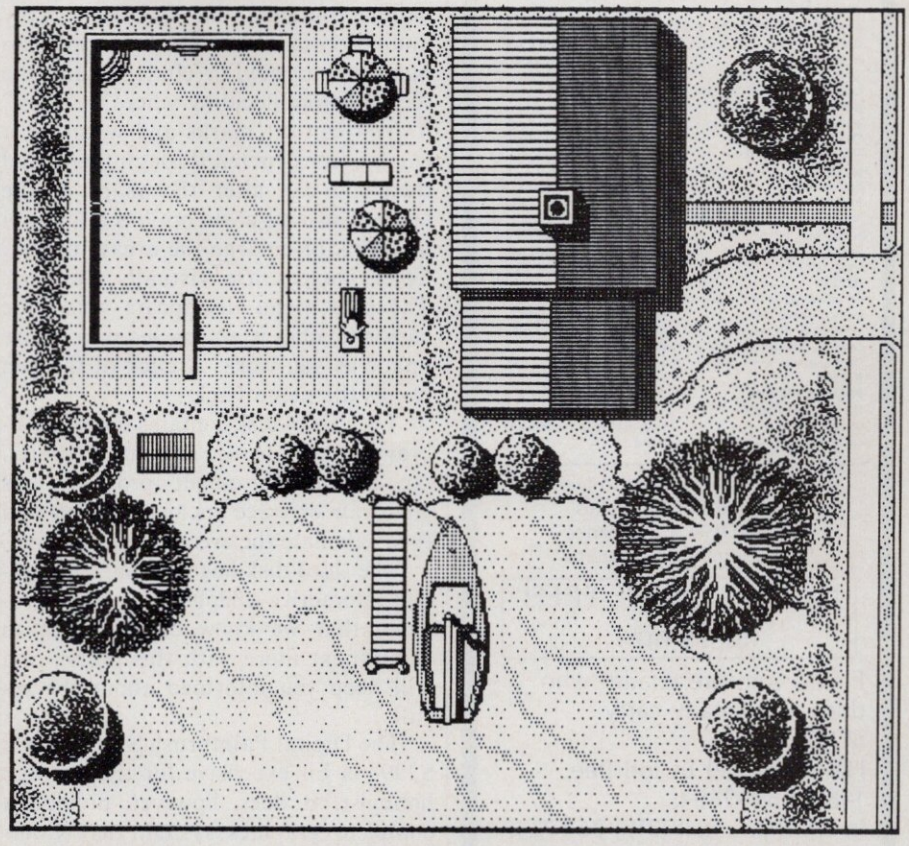
GRIPES, PRODUCTS, AND POKING AROUND

The difference between good and bad graphics software is often a matter of program options rather than graphics options. Here are some things to watch out for when you're buying a graphics package.

Graphics Gripes

1. The program doesn't include a quit option. It forces you to reboot the system by resetting the computer—or worse, by turning the computer off.
2. The program doesn't let you see the entire image as you're working, a situation that is occurring frequently as programmers try to emulate the Macintosh display.
3. The program forces you to go back and forth from input devices (such as a joystick or touchpad) to keyboard—for example, Press P to see palette.
4. The program clears the screen after one key press, without requesting verification from you. Good-bye, hours of work.
5. The program appends suffixes or prefixes to your filenames, won't load a file that doesn't have this suffix or prefix, and doesn't offer a rename-file option.
6. The program comes copy-protected without a backup disk, and/or the publisher demands unreasonable licensing fees to use the routines commercially.
7. ProDOS is ignored, even though ProDOS is the Apple operating system. The last half-million Apples (give or take a few thousand) have been sold with ProDOS only. Utility software must support ProDOS or, even better, both ProDOS and DOS 3.3 during this transition period.

The difference between good and bad graphics software is often a matter of program options



The 'Vacation Yard,' above, is from Hayden Software's DaVinci series of Macintosh clip art.

The Digital Paintbrush System

The designers at Computer Colorworks believe that the only natural way for people to draw is with pen on paper. So they designed a new input device—the digital paintbrush—and bundled it with software to create The Digital Paintbrush System. The 8 × 11½-inch plastic box has a pen that is attached by two dacron strings to a wheel inside the housing. The unit plugs into the paddle port. You slip paper under a clip at the foot of the box. As you draw with the pen, you activate a switch in the tip of the pen, which is read by the software. You can use the pen on any drawing surface, so you can trace images from books, cloth, and other sources. If you don't want to mark up the original, you can replace the pen with the plastic stylus the system includes. The maximum drawing area is 10½ × 7¾ inches.

When we first saw this system, we were sure that drawing with a pen attached to strings would be restricting,

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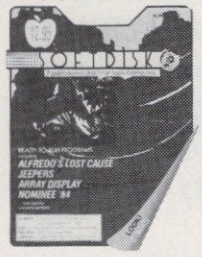

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but after a few minutes we were drawing quite comfortably. To support the paper, the box must rest on a table (preferably at the foot of the computer). The box would be easier to use if its base extended to support the paper, like a clipboard, allowing you to prop it on your lap.

The Digital Paintbrush System comes with three disks and backups of the two program disks. The main program disk contains the Graphic Design Program, a Text Screen Editor, a Presentation Program, and a Printer Dump Program (the Fontrix dump, licensed from Data Transforms).

Unique Options

The Graphics Design Program's response is slow compared to that of other paint programs, but it offers many unique options. For example, you can move a line, box, or circle around the screen before deciding where to "tack" it. You can set marks and watch as a curve is constructed through them, and then you can alter the shape of the curve. Cut-and-paste options allow you to shrink or enlarge the areas you cut. Color choices are virtually limitless. The side menu disappears when the cursor touches it, so you see your entire image as you work. A click of the pen brings the menu back.

The utility disk contains fonts and library images to use in your graphics. An area-measurement program lets you draw or trace enclosed shapes and then calculate the areas of these shapes.

The third disk has the only commercial interactive telephone-drawing program that we know of. We plan to experiment more with this option and will keep you informed about the results.

The Digital Paintbrush System costs $299—a bit expensive for the average hobbyist. It does, however, provide a complete graphics system that Computer Colorworks asserts is popular with engineers and other professionals who need precision drawings.

Update: Macintosh Clip Art

From T/Maker Graphics, for the Macintosh, ClickArt Volume II–Publications and ClickArt Volume III–Letters show significant improvement over that company's first offering. The images and fonts are great for creating fliers or newsletters.

Axlon's Art Portfolio clip-art package for the Macintosh has nothing special to offer (do you know anyone who needs a picture of a cockroach?). The images are similar to those found in packages that have appeared previously, and the quality of the graphics is not good.

Macinshots Photo Album #1, from Design Loft, Inc., has excellent-quality digitized images. The beginning of the manual warns that Macinshots contains "certain images of recognizable people . . . consult your attorney before using any such image . . . " If we can't use the art freely, it isn't clip art.

The Hayden DaVinci series consists of excellent architectural and interior-design renderings drawn to scale (see example, page 175). Hayden is adver-

T/Maker Graphics' ClickArt Volume II-Publications and Volume III-Letters show significant improvement over that company's first offering.

tising these packages as a tool for architects and designers, but we don't think the variety and scale of the drawings are extensive enough to be of true value to professionals.

Looking Ahead

We're anxiously awaiting Data Transforms Macintosh fonts. Its Fontrix fonts are superb (even if a couple were created by one of the authors of this column).

Good news from Penguin Software, which is bundling the regular and double-hi-res versions of Graphics Magician. You'll get both versions on one disk. Currently, only the picture-painter utility supports double hi-res.

Watch for an *A+* article on animation and animation software for the Apple II, which will cover Baudville's Take 1, Reston's Movie Maker, and more.

Solutions

A bane of new graphics programmers is dealing with memory addresses and storing information in the Apple computer's memory.

The Apple requires two bytes of RAM to hold an address. The first byte holds the low byte (or the remainder after the address has been divided by 256), and the second byte holds the high byte (or page).

When would you need to store an address? If you want to work with Applesoft shapes, you'll have to load in a shape table. A short shape table of 206 bytes or less can be placed at hexadecimal address $300 or 768 decimal (to

load a short table, type in BLOAD SHAPETABLE,A768) and long tables at hexadecimal $6000 or 24576 decimal (to load a long table, type BLOAD SHAPETABLE,A24576). Before Applesoft can draw a shape, you must tell it where the shape table is stored.

Before Applesoft can draw a shape, you must tell it where the shape table is stored.

plesoft can draw a shape, you must tell it where the shape table is stored, by entering the address using the Poke command. For shape tables, use the Poke command to place the low byte of the address at location 232 and the high byte at location 233. The following program will do it all:

```
10 ADR=24576:REM Address to
   hold table
20 HA=ADR/256:REM Hi Byte of
   address
30 LA=ADR-(HA*256):REM Low
   Byte of address
40 POKE 232,LA:POKE 233,HA
50 F$="NAME":REM Shape table
   filename
60 PRINT CHR$(4)"BLOAD";F$;
65 PRINT ",A";ADR
70 REM Shapetable commands
   . . . rest of program
```

Poking Around

Do you ever wonder how professional software loads graphics on the screen without their looking like venetian blinds? You can't BLOAD a picture and then use the commands HGR or HGR2, because these commands clear the screen, erasing the picture you just loaded. The key is in the Apple I/O soft switches.

Think of these switches as on/off switches. Any attempt to write to (POKE) or read from (PEEK) them throws the switch. Eight of these switches control which part of memory is to be displayed. (A ninth switch was added for double hi-res on 128K Apple IIe or Apple IIc computers.) When you throw the correct combination of switches, the Apple moves from one display to another.

Type in POKE -16304,0 or POKE 49232,0 (either will work), and the screen will switch instantly from text to graphics. You may get low-res or hi-res graphics, depending on what you were doing previously.

Try this program. Be sure to change name in line 35 to the name of your picture file.

```
10 TEXT: HOME
20 VTAB 10:HTAB 12:PRINT
   ". . . ONE MOMENT. . ."
30 CM$=CHR$(4)+"BLOAD"
35 PRINT CM$;"name,A8192"
40 POKE -16297,0:POKE-16300,0
50 POKE -16302,0:POKE-16304,0
```

We're looking forward to your comments, questions, and suggestions. Write to us c/o *A+*, 11 Davis Drive, Belmont, CA 94002. +

Roberta Schwartz and Michael Callery teach computer graphics at the New School in New York City. They have collaborated on several educational software projects and are writing a book on Apple graphics for Prentice-Hall.

PRODUCT INFORMATION

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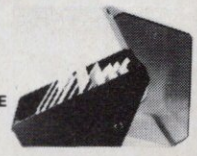

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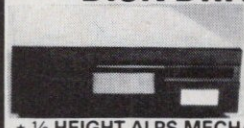

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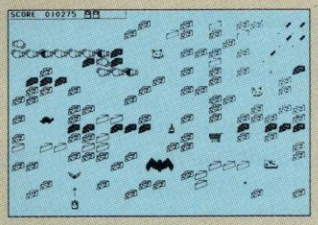


You accumulate points by zapping a stampeding herd of ravenous mice, a cheese-eating bat, flying knives, and falling shopping carts.

MICE AS MOVING TARGETS ON THE MAC

Computer-game programmers frequently come up with unique ways to "kill" the players, but have you ever been painted to death or crushed by a shopping cart full of cheese?

No matter. These hazards aren't the real threats in Mouse Stampede, a game for the Mac, but they add to the growing tension the game creates as you accumulate points by zapping

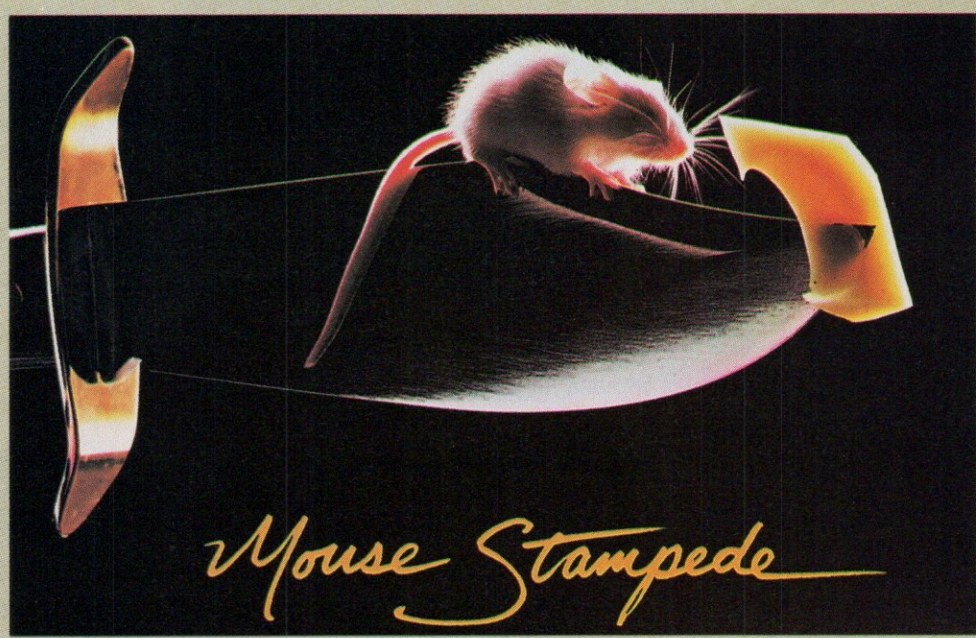
- A stampeding herd of ravenous mice,
- A cheese-eating bat,
- Flies that randomly flit across the screen,
- A cheese-stomping sneaker that can be a direct threat to you,
- Flying knives,
- Paintbrushes that turn healthy cheese into moldy cheese (if the mice find moldy cheese they become even more vicious),
- Falling shopping carts, and
- A poky turtle (he's so easy you feel guilty removing him).

Of course, the whole idea is to get them before they get you.

Cats are your allies. Hit them any time to wake them up, for 800 points—or better yet, hit them when the mouse herd is near and they eat their fill, which adds to your score.

You do all of this by roaming around the bottom quarter of the screen, using the Mac mouse to move and the button on the mouse as the firing button. It's relatively easy to hit the mice when little else is on the screen. They travel back and forth at a steady pace, reversing direction when they collide with a piece of cheese. (The cheese is mostly a nuisance because it blocks your shots, though you can chip away at it.)

The game gets more difficult when the bat flutters up and down, clearing out cheese that is near the "floor," but the bat's patterns are easy to decipher. The sneaker adds a new element—stomped cheese can't be chipped out of the way. It's an impenetrable barrier. If you get stomped, you lose one of your three



TEKNIKA MJ-22

...the only color monitor that can show a clear 80-column display with or without an RGB interface board because it is equipped with separated video.

YOU'LL SAVE UP TO $250 ON THE COST OF AN RGB BOARD!

1 Compare colors. The MJ-22 gives you 16 true colors of unsurpassed brilliance. And unlike many other monitors, all colors are accurate. Brown is brown, yellow is yellow, light red is light red—there are no approximations.

2 Compare readability. The .5mm fine slot pitch of the CRT produces clearer, more legible text, especially in the 80-column mode. And, because of the precise slot convergence, you get a clear, sharp image instead of the usual multi-color fuzziness.

3 Compare the gray scale. You get four shades of gray on the MJ-22—not just two or three that other monitors produce.

4 Compare linearity. There's hardly any distortion on the MJ-22. You get more accurate charts because verticals are vertical, horizontals are horizontal, circles are circles.

5 Compare versatility. No matter what Apple you own now, or step up to in the future, the MJ-22 will produce 16 vivid colors, high resolution graphics and 2,000 clearly legible characters.

6 Compare sound. The MJ-22 has a built-in speaker and amplifier right up front for the highest quality sound.

7 Compare screen size. The MJ-22 has a full inch more usable space than other 13" monitors.

8 Compare cost. Dollar for dollar, the MJ-22 will outperform any other monitor in its price range—and many costing far more.

For the Apple II, II+ or IIe, Teknika's MA-RGB7 color board will enhance resolution and sharpen graphics. Or, you may use the MJ-22 in composite/separated video to start with, then step up to RGB in the future.

The Apple IIc can be used in the composite/separated video mode to start with. Then you can step up to RGB when the RGB interface box becomes available.

Apple III has a built-in RGB board. All you need is Teknika's interface cable, MA-23.

Visit your nearest Apple dealer and ask for a demonstration.

TEKNIKA

A SUBSIDIARY OF THE GENERAL CORP., JAPAN

Teknika Electronics Corp. · 353 Route 46W, Fairfield, NJ 07006 · (201) 575-0380 · Computer Peripheral Dept.

CIRCLE 169 ON READER SERVICE CARD

lives. Add other random elements, and you sometimes find that while dodging a falling shopping cart you run smack into that slow-moving turtle.

The beginner can run through the allotted three lives in just a few minutes. As your skill grows, the game gets longer. I couldn't discover a way to freeze the action when the phone rang; if the feature is provided, it's not documented. Music and sound effects add an entertainment element and can be turned off if you like. An additional provision allows two players to alternate turns. Scoring is automatic, and the game has one of the fastest Quit sequences I've ever seen. When you click on the Quit button, the screen goes blank and the disk ejects in less than two seconds.

If Mouse Stampede sounds like a pretty standard shoot-'em-up (such as Centipede and Bug Attack), that's because it is. That doesn't detract from the fun of playing it, however. You can accept Mouse Stampede as an unpretentious game that achieves what it sets out to do—with a certain flair and a lively sense of humor.

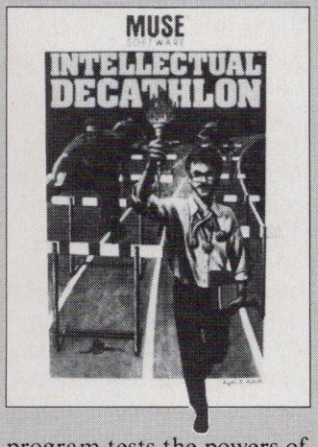
Is Mouse Stampede fun? Yes. Is it well done? Yes. Is it the best commercial arcade game we will see for the Macintosh? Let's hope not.

Greg Stone

Mouse Stampede
Mark of the Unicorn
222 Third Street
Cambridge, MA 02142
List Price: $39.95
Requires: Macintosh
CIRCLE READER SERVICE NO. **700**

A DECATHLON FOR THE MIND

Intellectual Decathlon, a highly challenging set of ten brain teasers, transforms your Apple into an Olympic stadium for the mind. The



program tests the powers of deduction, concentration, and memorization of up to six contestants. As in the real decathlon, the gold-medal winner is the person who nets the most points.

Because you need practice to reach the Olympic level of competition, an option—appropriately called Practice—allows you to play all ten contests individually, without worrying about scoring or playing a full decathlon.

The ten contests—Numberstretcher, Note the Notes, Safecracker, Mazerace, Apple Derby, Lying Digits, Matchmaker, Brainblender, Instant Replay, and Abstrajig—are played in order, and each player's cumulative score is saved on disk after each contest. Most contests place you under some sort of time pressure.

Numberstretcher

Numberstretcher requires you to memorize a string of digits within five

SOLVE THE PUZZLE AND WIN $10,000!!

Who wouldn't like to win $10,000 in cash? Well, here's your chance. No this isn't another one of those sweepstakes where your name is thrown in a hat for a drawing. This is a skill contest called THE COMPUZZLE. It's a computer software puzzle that runs on any of the Apple II Computer Series (II, II+, IIe, & IIc).

If you solve the puzzle or come closest to solving it, you could win the $10,000 prize. Enough money to buy a new car, a boat or make a down payment on a house. And don't worry if you're a minor. If you win the prize, it will be awarded in the name of your parent or guardian. Just so no one gets worried about the winner getting his money, $10,000 has been deposited in an escrow account with The American Bank And Trust Company of New Orleans. The money can only be paid to the winner of the contest. The puzzle solution is locked in a bank vault until the contest ends on May 1, 1985. At that time a winner will be selected by Marden-Kane, Inc., an independent judging organization. If there is a tie, Marden-Kane will handle a tie-breaking contest.

The Compuzzle

What's more, this software package will cost you only $29.95. I'm so sure that you'll like it, I'm going to make you a most unusual guarantee. I won't even cash your check or money order for 31 days **after** I've sent you the package. When you get it, try it out on your computer. If you're not completely satisfied, send it back. Your uncashed check will be returned to you immediately. Of course, if you return the package, you can't enter the contest.

Almost anyone can have hours of fun with THE COMPUZZLE. You don't have to be a computer genius to use it. To solve the puzzle you form words in a pattern on the computer screen. Clues are provided to help you in your quest for the solution. When you think you have a puzzle solution, fill out the contest entry form in the package and send it in.

Don't waste another minute, send for your copy of THE COMPUZZLE today. This could be one of the smartest investments you'll ever make — it could make you $10,000 richer.

OFFICIAL CERTIFICATION:

This is to certify that the sum of $10,000 cash has been deposited in an escrow account for the sole purpose of guarantying the payment of the prize to be awarded to the winner of THE COMPUZZLE CONTEST... This bank ...is in no way connected with the contest... and assumes no responsibility...except the delivery of the prize to the winner.

Jerome B. Glynn
Senior Vice President & Trust Officer
American Bank & Trust Company

George Wayne
3701 Division Street, Suite 194 , Metairie, LA 70002

George, I'm enclosing $29.95 for THE COMPUZZLE, but don't cash my check or money order for 31 days after it has been sent. If I return the package - for any reason during that time, return my uncashed check or money order to me.

NAME _____

ADDRESS _____

CITY _____ STATE _____

ZIP _____ ©1985 PROSPECTIVE SOFTWARE

CIRCLE 467 ON READER SERVICE CARD

seconds and then type them back into the computer. The contest starts with a string of six numbers. Each time you type in the sequence of

Intellectual Decathlon, a set of ten brain teasers, transforms your Apple into an Olympic stadium.

numbers correctly, you gain points, and the string increases by one digit. The contest ends if you enter the wrong string three times consecutively or you successfully enter a 19-digit string.

This contest really presses your short-term memory. According to a psychology text, short-term memory stores and retrieves from five to nine items. If you can enter 19 digits successfully, you can probably call yourself a genius. I managed to input only 11 digits successfully—one more than an area code and telephone number.

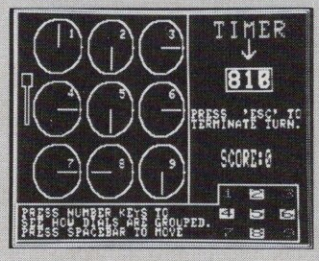
Note the Notes

In this contest, you must memorize a short tune comprising seven to ten notes. The computer then plays approximately 60 random notes, and you've got to pick out the tune from among them. You have the option of seeing your tune—as well as the 60 or so notes—displayed on the screen, but this reduces your scoring by half.

Note the Notes is difficult, especially for people with little musical training. Displaying the notes on a staff may help a musician identify the tune, but such notation is Greek to me. If you can play Name That Tune, you'll do well on Note the Notes.

Safecracker

This particular safe must hold the plans for a



top-secret project. Players align the hands of nine dials—to the 12-o'clock position. Each turn of the dial rotates the hands a quarter of the way around. The problem is that you move three, four, or five dials at a time.

The beauty of Safecracker lies in its simplicity. Every time you try to change one dial, the others change too. The trick is trying to figure out the sequence.

I managed to align eight out of the nine dials, but that last one would just not fall into place. Rubik's Cube enthusiasts will thoroughly enjoy this contest.

Mazerace

As the name suggests, this contest makes you pick your way through a maze while under time pressure. A devious maze, complete with twisty passages and dead ends, fills the screen. You start at one corner and try to move to the opposite corner. The faster you do it, the higher your score.

Two contestants can play

TELEMAX, INC. ENHANCEMENT PRODUCTS

WE turn Apples and Franklins into gold, with a little alchemy and lots of engineering.

RGB COLOR BOARDS

Apple II, II +, II e; Franklin ACE 1000, 1200, 100 (color or monochrome)

The Color Master VCB-8

The new video board that provides RGB (red/green/blue) video signals for crisp, vivid displays of color graphics and text, with exceptional resolution and color quality, is now available.

Can be used with 80 column text, so both color graphics and text are displayed on **one** RGB monitor. **Text can be displayed in anyone of 8 colors, software selectable.** A text **mode enhancement circuit improves resolution and readibility.** Board plugs into **slot 7** and comes with 4' cable for signal output. **Optional monitor connector,** wired to cable is available (specify RGB monitor make and model).

For the Apple II or II +, the optional **VSS-80 softswitch or VSP-80 switchplate** can be used to interface **Videx Videoterm or Ultraterm** or other similar boards. For **Franklin** computers, the **VSP-80** is available to implement this feature.

The Kaleidoscope VCB-24

Has the same specs. as the COLOR MASTER, with the following added features:

Each text line of 24 lines of text can be independently set to any one of 8 colors, on any one of 8 colors of background. Software provided.

Signal output: RED, GREEN, BLUE, Sync., both composite and H&V. Levels are TTL, both + and −; other outputs: ± 5VDC, +12 VDC. Signals are American Standard. European version is available. Universal RGB monitor compatibility.

ORDERING INFORMATION: (board model nos.)

APPLE	II, II +	II e	Price
ColorMaster	VCB-8+	VCB-8e	$139.00
Softswitch	VSS-80	don't need	45.00
SwitchPlate	VSP-80	don't need	30.00
Kaleidoscope	VCB-24+	VCB-24E	199.00
FRANKLIN	**Ace 1000, 1200 (rev. B)**	***Monochrome Ace 1000,100**	**Price**
ColorMaster	VCB8-EF		$169.00
ColorMaster		VCB-8F	139.00
Kaleidoscope	VCB-24EF	VCB-24F	219.00
SwitchPlate	VSP-80	VSP-80	30.00

(*earlier models that did not have color)

Monitor connector, wired to cable: $20.00

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For further information contact your computer dealer/ distributor or:

TELEMAX, INC.
Computer and Video Products
P.O. Box 339
Warrington, PA 18976
(215) 343-3000

RGB - APPLE IIC

The Colormaster IIC RGB Video Interface. Enjoy the brillant, crisp, vivid displays of color graphics and text that are obtainable from the Apple IIC Computer when used with the Telemax Colormaster IIC. **Features:** A stand alone module, one end plugs into the Apple IIC Video Port, the other end plugs into your RGB Monitor. 14 combinations of foreground and background colors in text mode are user selectable. Text mode enhancement circuits improve resolution and readability of 80 column displays. Operation is software independent. A 3.5 ft. monitor cable is supplied. Comes ready to operate, with complete instructions. (Specify make and model monitor.)

$199.

IC Tester Interface card. MOD. ICT-2. Tests 14, 16, 18, 20 pin devices, Displays results on video monitor. Card plugs into any slot. Comes with test socket, software diskette, instructions. **$229.00**

Subject to change without notice.

CIRCLE 353 ON READER SERVICE CARD

CONNECT WITH THE SCOOTER® Ø-FORCE TWIN-PORT.

SAVE WEAR AND TEAR ON APPLE I/O GAME PORTS AND ACCESSORIES.

Now, plugging into any Apple I/O game port is faster, safer and more convenient with Scooter's Ø-Force Twin-Port.

With Scooter's two zero-force sockets, you just place the plug pins in position, then flip the levers for a secure connection.

Now you can alternate access between port A and port B at the flick of a switch.

With its pressure sensitive backing and two-foot cable, you can mount the Twin-Port wherever it's most convenient.

Also available: Scooter Ø-Force X-Port, external game port with a single zero-force socket.

Both the Twin-Port and the X-Port come with simple instructions and the cable is color-coded with a red stripe for quick identification of correct pin alignment.

Scooter Ø-Force Twin-Port: **$38.50**
Scooter Ø-Force X-Port: **$22.50**

MAKE YOUR DISC DRIVE CONNECTIONS EASY WITH THE SCOOTER DDX-3.

Scooter's DDX-3 extends your Apple disc drive connection three feet outside the computer for convenient external connect or disconnect.

Scooter DDX-3: **$19.95**

All prices suggested retail.
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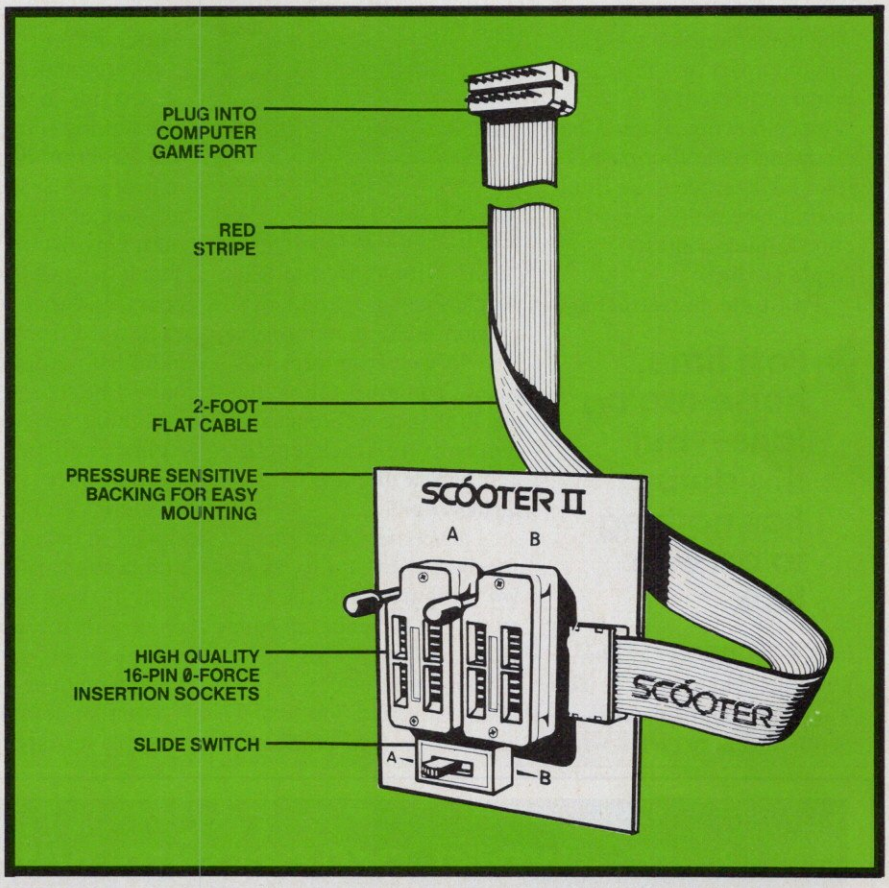
Scooter is a registered trademark of ohm/electronics.



Like all Scooter's cable/connector products, the Twin-Port, X-Port and DDX-3 disc drive extension are 100% factory tested before packaging.

So for reliable cable products, see your computer dealer and connect with Scooter.

SCOOTER®
High Grade Cable Assemblies

ohm/electronics
P.O. Box 368
746 Vermont—Palatine, IL 60067
1-312-359-6040

CIRCLE 173 ON READER SERVICE CARD

SEE YOUR DEALER OR USE THIS COUPON.

If your dealer doesn't carry these Scooter products yet, you can order by indicating your choices and quantities below and sending this coupon to: ohm/electronics, P.O. Box 368, 746 Vermont, Palatine, IL 60067. (Illinois residents add 7% sales tax.)

___Ø-Force Twin-Port (ZF2) **$38.50**
___Ø-Force X-Port (ZF1) **$22.50**
___Apple/Disc Drive Extension (DDX-3) **$19.95**

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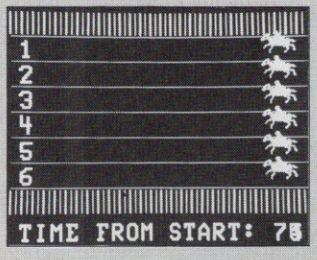
the maze at once, which really gives you a feeling of head-to-head competition. The movement keys are far enough apart on the keyboard to prevent unintentional elbowing. Intentional elbowing is another case. I found Mazerace to be Intellectual Decathlon's most entertaining contest.

Apple Derby

Post time, horse-racing

Post time, horse-racing fans—but this derby has nothing to do with luck.

fans—but this derby has nothing to do with luck. You wager your hard-earned points trying to pick a winner from six horses—Floppy Ears, Random Access,



Nasty Nibble, Byting Bill, Apple Pleasure, and Compulsion—based on information derived from previous races. You must take into account such influences as temperature, track length, and jockey quality.

Lying Digits

This contest tests your mathematical agility as you try to figure out if the answers to a series of ten equations are true or false. Most of them are division problems, requiring you to divide a four-digit number by a two-digit number. Two contestants can play this math quiz at the same time.

Matchmaker

Matchmaker gives you 30 seconds to memorize ten pairs of unrelated words. The program displays two lists of words—one on the left side of the screen and a matching list on the right. The left-hand list disappears, and then, one by one, each word from the left-hand list reappears. You have nine seconds to find its matching word from the right-hand list.

Brainblender

Here, contestants are assigned individual symbols and, using various combinations of three letters, try to move a frame across a six-square-by-six-square board to land on their own symbol. To further complicate matters, players are not allowed to use the same three-letter combination more than once.

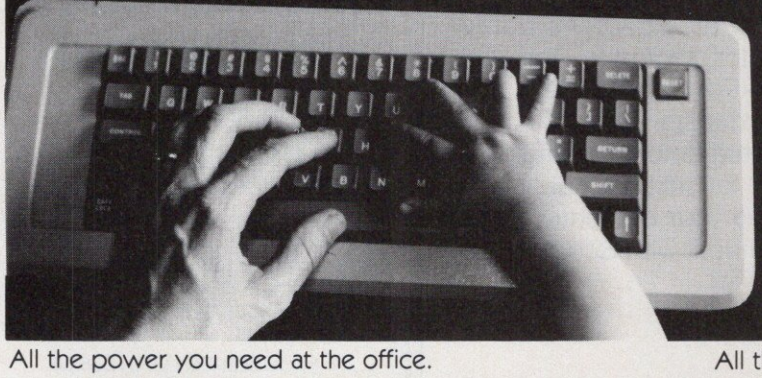
Each letter possesses the value +1 or −1. The trick is to figure out the value of a small pool of letters and then use those combinations to move the frame. Brainblender relies heavily on pattern recognition and deductive reasoning, which makes it Intellectual Decathlon's toughest contest.

You must take into account such influences as temperature, track length, and jockey.

Instant Replay

In Instant Replay, you compare two pictures and

word processing with zardax



for old hands . . . or new

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CIRCLE 172 ON READER SERVICE CARD

Beagle Bros Apple® Software Report

Ad Number 201 — *"All the News That Fits"* — *Spring 1985*

Utilities

D CODE™ NEW!

$39.95 (Compatible with any version of Apple II/DOS 3.3 *and* ProDOS™)

PROGRAM PACKER: D CODE squeezes every wasted and unused byte out of your programs to save valuable memory space and increase program speed and efficiency. Combine lines, shorten variables and/or remove REMarks. Also locate wasted code that can't possibly be executed.

PROGRAM PROOFREADER: Errors are caught as you type. Scan entire programs to uncover potential crashes.

SUPER TRACERS: When your program stops or crashes, ask to see the last 10 (or up to 10,000) statements that were executed, giving you an instant *history* of your program. "Live" tracing too, with each executing statement and current variable values printed in a sealed-off text window.

MORE: Set up de-bugging "breakpoints" so your program stops when you want. Search for strings and variables, *fast*—Almost any program can be searched in about 2 seconds!

GPLE™

$49.95 (Compatible with any version of Apple II/DOS 3.3 *and* ProDOS™)

GPLE is Beagle Bros' "GLOBAL PROGRAM LINE EDITOR". It works like a word processor for your Applesoft program lines:

INSERT AND DELETE characters and words in your programs. No more awkward "cursor-tracing" to make changes.

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 "Horses" to "Cows".

FUNCTION KEYS: Define your own Apple "function keys". ESC-1 can Catalog drive 1, ESC-N can type your name, etc.

DOUBLE-TAKE™

$34.95 (Compatible with any version of Apple II/DOS 3.3 *and* ProDOS™)

2-WAY SCROLLING: Listings and disk Catalogs scroll up *and* down, making file names and program lines easier and faster to find. Change scroll-direction with the Arrow keys. Machine language listings and Hex-Ascii dumps scroll two-ways too.

BETTER LIST FORMAT: Each Applesoft program statement lists on a new line for *fast* program tracing and de-bugging.

A$="ABC" ← **VARIABLE-DISPLAY:** Instantly prints all
X=3.14159 of your program's variables in the order
Y=255 used, with their current values

A$: 5 10 150 ← **CROSS-REFERENCE:** Alphabetizes every
X: 10 20 3000 variable your program uses, and displays
Y: 5 40 55 60 them with their line numbers

Plus **AUTO-LINE-NUMBER**, new improved Re-Number, Hex-Dec Converter, Program Stats, eliminate or re-define the cursor...

```
10 TEXT: ? CHR$(21): HOME:
   POKE 33,7: REM Replace the
   periods in line 20 with spaces.
20 PRINT ".@@@@@.@@...
   @@@.O.O.@@..^..@
   (.....-.....=.../.....\
   . ASCII . . ANNIE"
30 C=C=0: N=N+1: POKE 1539,
   173+16*C: FOR X=1 TO 9:
   POKE 1542+X, N+X: S=PEEK
   (49193+X): NEXT
40 IF N-246 THEN 30
```

10 TEXT: HOME: FOR P=0 TO 255: VTAB 1: NORMAL: PRINT "POKE 243,";P: POKE 243,P: LIST: NEXT: REM *Try replacing the 243's with 50's*

BEAGLE BASIC™

$34.95 (Compatible with Apple IIe or 64K II+/DOS 3.3)

BETTER APPLE BASIC: Put Applesoft in RAM so you can change it. Adds new commands like *Else, Swap, Tone...*

DOS BOSS™

$24.00 (Compatible with any version of Apple II/DOS 3.3)

CHANGE DOS: Change *Catalog* command to *Cat*, or *"Syntax Error"* to *"Oops!"*, or anything you want. ***Protect your programs:*** An unauthorized Save-attempt can print "Not Copyable". List Prevention, other useful tips and fascinating experiments. DOS Boss will teach you a *ton* about Apple programming!

SILICON SALAD™

$24.95 (Compatible with any version of Apple II/DOS 3.3)

100+ PROGRAMS: ***Program Splitter*** makes room for hi-res in big programs, ***Disk Scanner*** finds bad sectors, ***DOS-Killer*** adds 2 disk tracks, ***2-Track Cat*** doubles number of files, ***Text Imprinter*** converts text to hi-res...

UTILITY CITY™

$29.50 (Compatible with any version of Apple II/DOS 3.3)

21 UTILITIES: List-formatter puts each statement on a new line, create multi-column catalogs, invisible/trick file names, etc. For the Applesoft programmer; very educational.

Graphics

ALPHA PLOT™

$39.50 (Compatible with any version of Apple II/DOS 3.3)

HI-RES DRAWING & TYPING (6 colors, 280x192 pixels) on both hi-res pages. Draw and manipulate all kinds of images and store on disk. Compress pix to 1/3 disk space.

APPLE MECHANIC™

$29.50 (Compatible with any version of Apple II/DOS 3.3)

SHAPE ANIMATION: Your drawings are converted into hi-res "shape tables" so your programs can perform animation with Apple's built-in DRAW & XDRAW commands. *List and Learn* disk demos teach you hi-res programming.

FANCY TYPE: Six proportionally-spaced large and small fonts are on the Apple Mechanic disk, with 26 more on our *Apple Mechanic Typefaces*™ disk (sold separately: $20.00).

BEAGLE GRAPHICS™

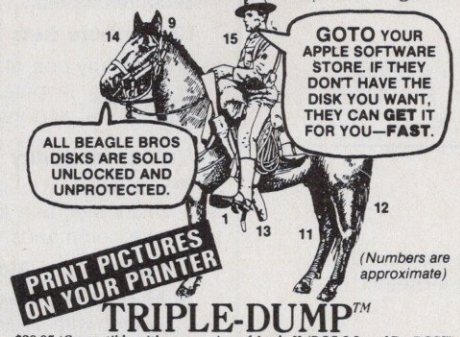
$59.95 (Compatible with Apple IIc or 128K IIe/DOS 3.3 *and* ProDOS™)

DOUBLE HI-RES! 16 hi-res colors and 192 x 560 pixels (double resolution) on your Apple IIc or 128K Apple IIe.

AS AN ARTIST, you can draw, fill and label double hi-res pictures using just the keyboard, *or* your AppleMouse™, joystick, Koala Pad™ or Graphics Tablet. Easy-to-use icon-assisted *cut & paste* features make graphic manipulations easy. Any image section may be altered or re-located.

OR, AS A PROGRAMMER, you get 33 new commands for drawing, filling and manipulating double-res images. You can convert normal programs and pictures to double-res, save and load any image section, compress picture data to 1/3 disk space, produce double-res "slide shows" and more.

EXCELLENT REVIEWS—see Jan-85 *A-Plus* Magazine.



TRIPLE-DUMP™

$39.95 (Compatible with any version of Apple II/DOS 3.3 *and* ProDOS™)

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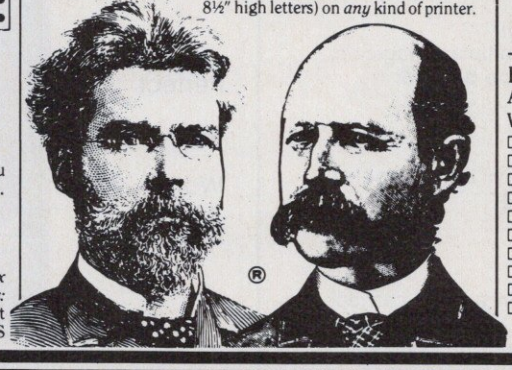

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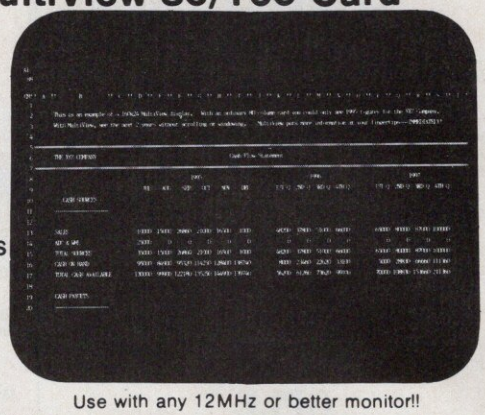

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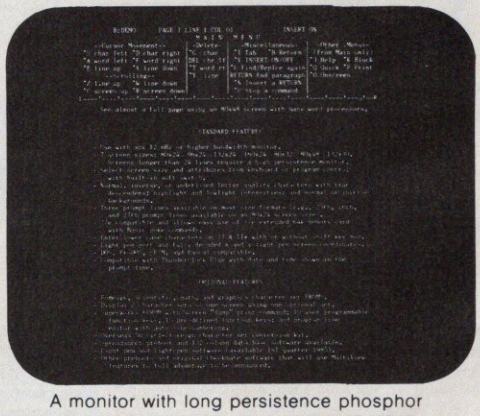

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CIRCLE 128 ON READER SERVICE CARD

decide whether or not they are the same. The pictures contain a number of drawings, including stick figures, boats, mountains, tanks, Godzillas, and houses. You start out with six objects in the picture. Each time you answer correctly, the picture changes and the number of objects in the picture increases by one. As more

Abstrajig is the most colorful of the contests, as if the computer went wild with a color palette.

and more objects appear in the picture, you start going a little crazy as you try to memorize what and where everything is. Meanwhile, the timer mercilessly ticks off the seconds.

Abstrajig

The final contest creates a multicolored work of abstract art and divides it into a 16-piece jigsaw puzzle. Your task is to reassemble the perfectly square pieces to form the original artwork. You may include a border around the picture, but that reduces your scoring.

Abstrajig is the most colorful of all the contests, as if the computer went wild with a color palette. The usual orange, purple, blue, and green colors mix with deep reds, lime greens, pinks, and grays. The artwork, which could hang in the Hirshhorn Gallery of Modern Art in Washington, D.C., can be difficult to reassemble—especially without borders.

Olympic Colors

Intellectual Decathlon's graphics range from passable, in the case of Instant

Intellectual Decathlon wins the gold medal for brainteasers.

Replay, to dazzling, in the cases of Abstrajig and Mazerace. In all contests, the layout of the scores, timers, and keyboard instructions are prominent enough to read easily—but subdued enough not to break your concentration.

The sound effects are as marvelous as the graphics. Most contests are introduced with a short tune. During play, each contest also provides some sort of aural feedback, whether it's a happy little tune for answering a question correctly or a harsh buzz indicating a wrong answer.

A Winner

Intellectual Decathlon wins the gold medal for brainteasers. Its collection of ten simple, yet highly challenging, contests provides excellent recreation for the mind.

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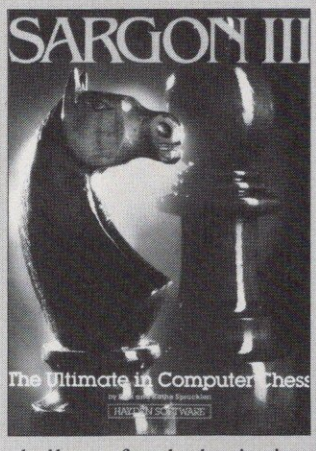
CHESS WITH THAT UNIQUE MACINTOSH FLAVOR

Sargon III is an excellent chess-playing—and teaching—program on the Apple II series of computers. It's a *great* program on the Macintosh.

Sargon III has beaten many highly rated chess masters, yet it's willing to play less gifted players. Each of the nine different levels of play provides two degrees of competition, depending upon whether or not you've chosen Easy Play. (Actually, you can handicap Sargon III even more by canceling its library of 68,000 opening moves.)

Even in a weakened state, however, Sargon III still provides a significant



challenge for the beginning or very casual player. If you're one of those players who knows how the pieces move, but sort of glides along waiting for your opponent to blunder, prepare for a learning experience. Sargon III makes mistakes, but it won't casually throw its queen onto a square covered by your knight. You learn to take your chess seriously; and if you begin to plan ahead, you can win—but more important, you can learn.

Learn As You Play

In fact, learning is one of the nicest features about Sargon III. It has a host of tools built in to help players at any level. Blunder, for example, and you can back up as far as you want and try again. If you're at a loss for a move, ask for a hint. Sargon III isn't going to think as hard for you as it does for its own play, but frequently the move it suggests is a good one. If you become really frustrated, switch sides and see how Sargon III would play in your position. Finally, save any game you find valuable. (The first one I found valuable was the one I finally won!) You can then have Sargon automatically replay the game, pausing whenever you wish to study the situation.

I found that all these features added to the instructional value of the program, without my having to open the manual (which includes a guide for beginners) or

Sargon III has beaten many highly rated chess masters, yet it's willing to play less gifted players.

use the disk examples that allow you to study, one move at a time, 107 classic chess games.

For a complete description of all the features of Sargon III, see the review of the Apple II version in the

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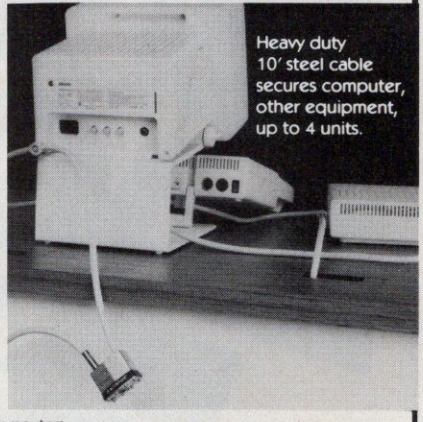

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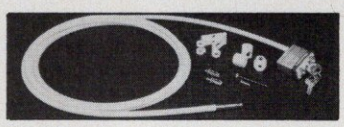

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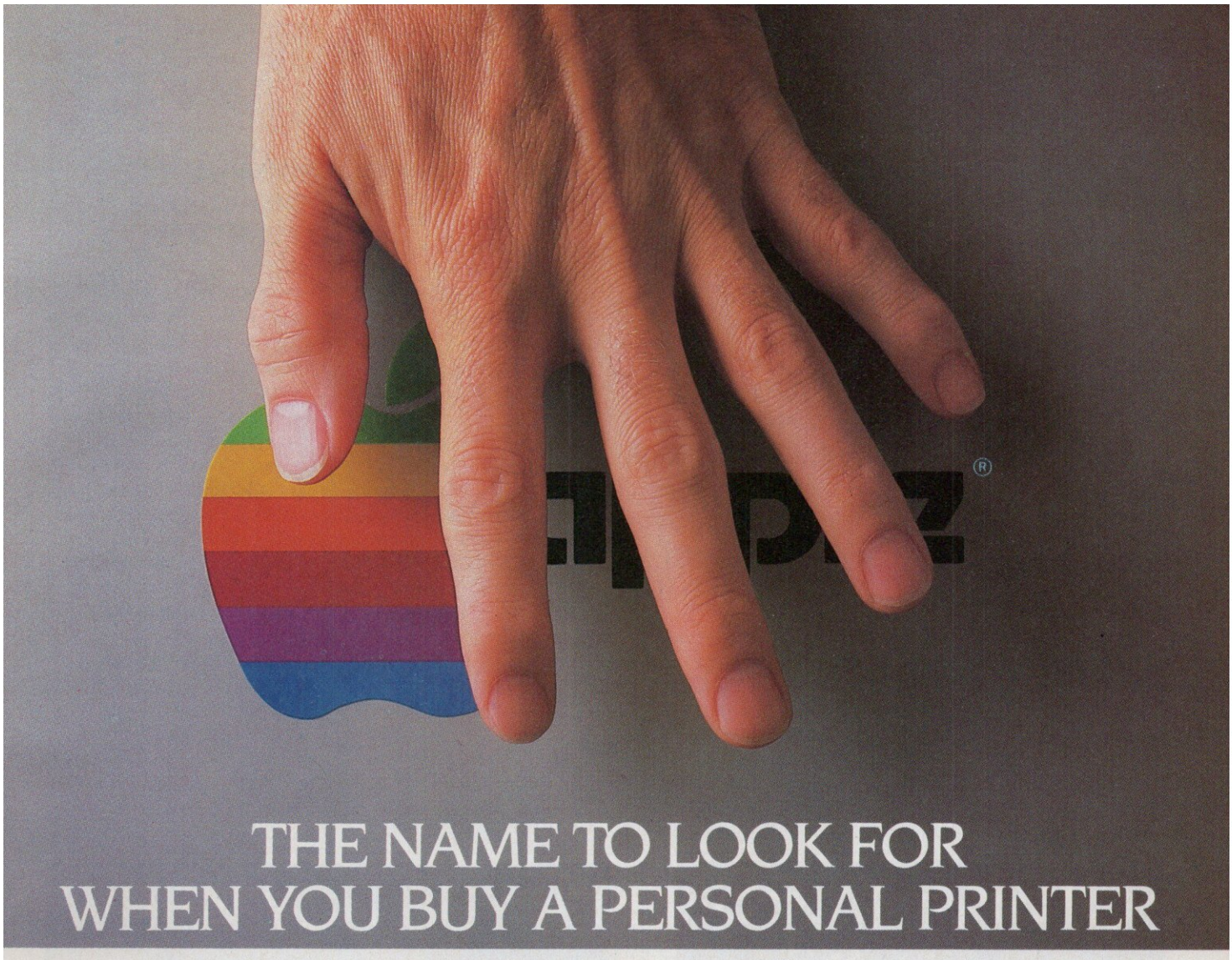

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CIRCLE 240 ON READER SERVICE CARD

June issue of *A+*, pages 95–100. All of the features of the Apple II version are in the Mac version, but some big differences are also present.

Important Differences

Gone are the host of control-key functions you'll find in the Apple II version. In their place are the familiar pull-down menus. You make moves, of course, with the mouse, and three windows are open on the screen at once. One window shows the playing board, another the list of moves, and the third gives you an insight into what Sargon III is doing—as well as whether or not it feels it's winning. The larger capacity of the Mac disk means that the 107 historical games and the 45 classic chess problems built into Sargon III are available without disk changing.

Finally, by simultaneously pressing ⌘-Shift-4, you can print any active window, including the game board. When you conquer the beast, print out a picture of your checkmate and frame it. Better yet—take a snapshot of the screen, using ⌘-Shift-3; load the picture into MacPaint, and adorn it with appropriate arrows, notes, or headlines; and paste the whole thing into a letter to a friend.

When you conquer the the beast, print out a picture of your checkmate and frame it.

Playing chess against a computer doesn't arouse the same ego involvement that playing a human opponent does. Also, I don't feel guilty about treating it as a learning experience and taking back stupid moves—something I could never do against a human opponent. Perhaps that's one of the reasons I enjoy Sargon III so much.

Sargon III is a tremendous program. As configured for the Mac, it is one of the most value-packed pieces of microcomputer software I've seen.

Greg Stone

Sargon III
Hayden Software Company
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PROBING YOUR KNOWLEDGE INVENTORY

You secluded souls who have managed to pass through the past few years without succumbing to the lure of at least one game of Trivial Pursuit should be apprised that the purpose of trivia games is to test players' knowledge of insignificant, obscure, or little-known facts—generally in a variety of categories.

It should come as no surprise to discover that trivia games have entered the computer age.

In Trivia Fever, you use your computer to compete—individually or in teams—in seven trivia categories: Science and Technology, Geography, History, Sports, Film and Entertainment, Famous People, and

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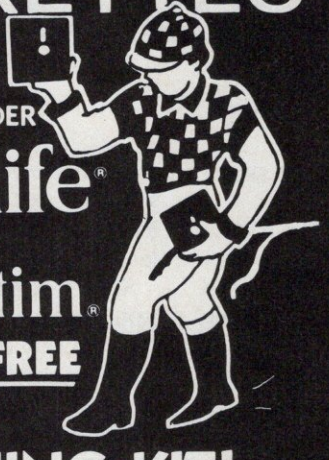

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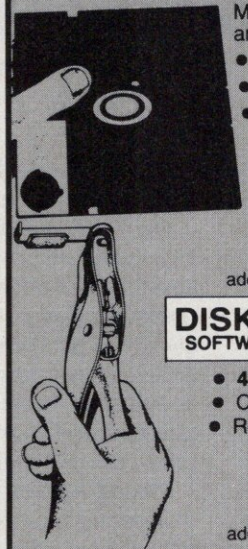

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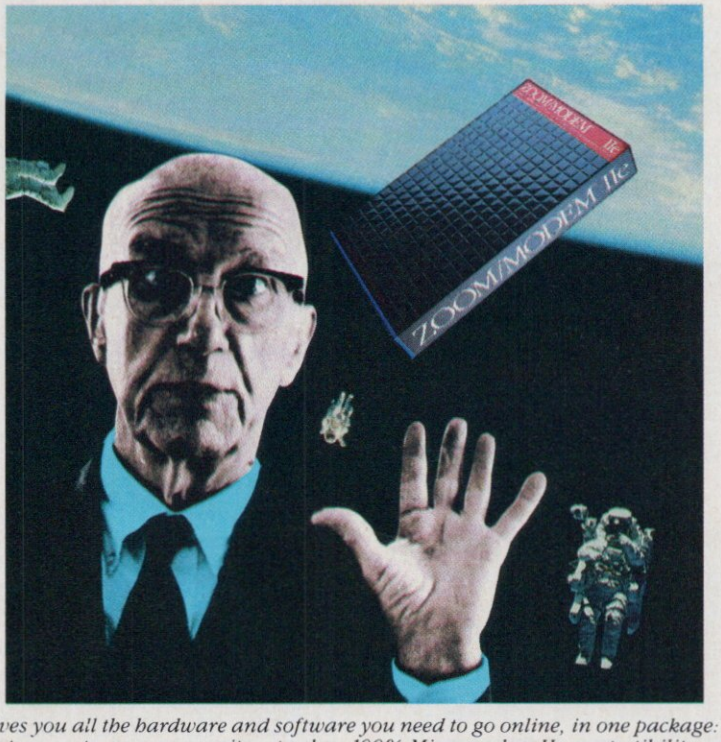
ZOOM

When Bucky Fuller talked about doing more with less, he didn't mean less information. ■ Quite the contrary: he thought there was far too much guessing going on, and precious little finding out. His idea was to find out everything possible about a subject, every fact from every conceivable point of view, and then make sense out of it. ■ He abhorred the time-honored practice of making decisions with half baked information. Bucky saw this clearly: if you have the wrong information . . . you will solve the wrong problem. Or you will create a new problem. Or you will blow the whole thing. The trick is to have the information. ■ More not less. ■ That's what the computer age is all about—fast abundant information. ■ Most of us just keep using computers as turbo typewriters or calculators, though, and never think once about information power. ■ Only 20% of the people with Apples even have modems. (It's enough to make Bucky stir in his grave.) ■ Computers talk very fast to other computers. They talk on the phone through modems. Most of the important and/or rare information in the world is in a computer somewhere, and you can reach it from your desk. ■ The question is: why do you sit there missing it . . . when you could be Zooming into it?

R. BUCKMINSTER FULLER, Architect, Inventor, Author, Educator and Early Data Freak.



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CIRCLE 194 ON READER SERVICE CARD

HEAD

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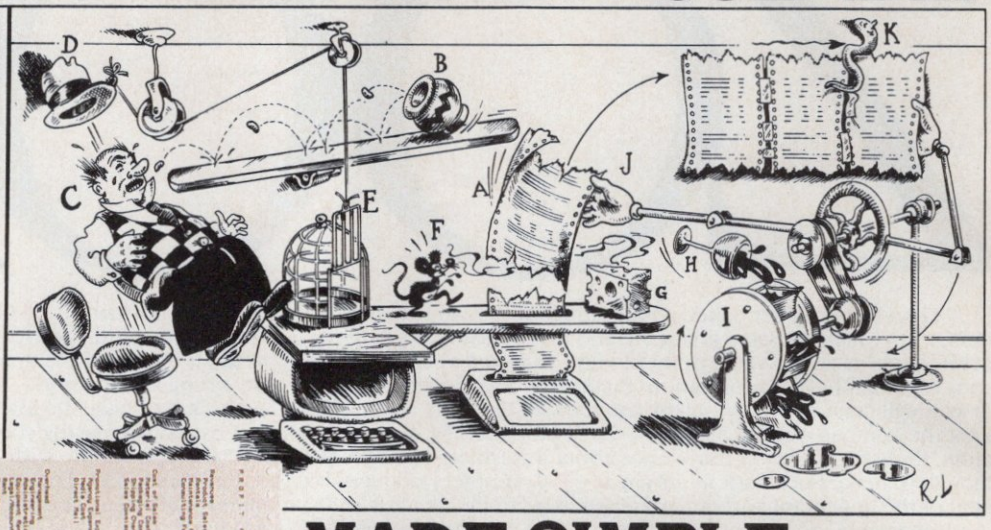
SIMPLIFIED SPREADSHEET ASSEMBLY

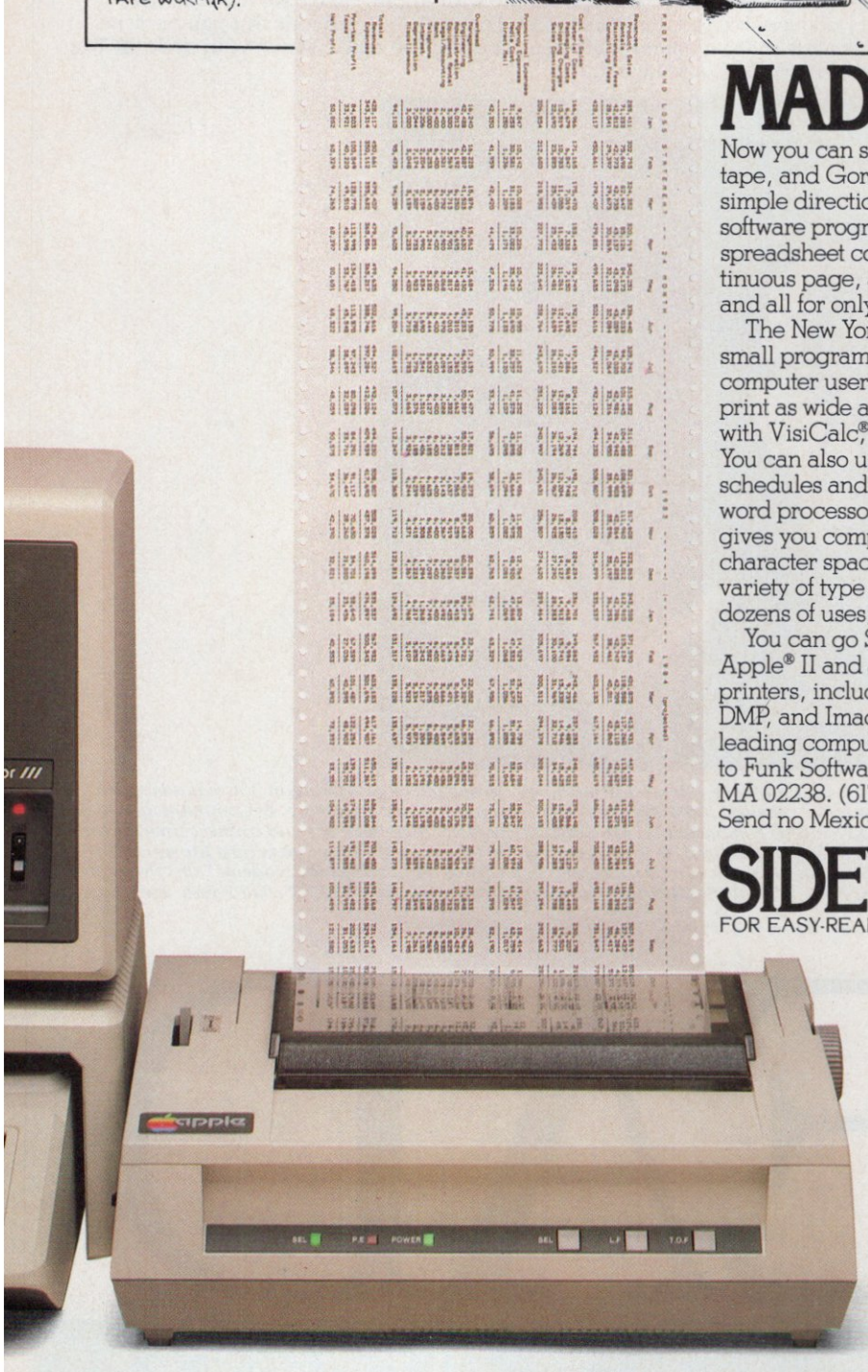
RISING SPREADSHEET (A) KNOCKS MEXICAN JUMPING BEANS (B) INTO MOUTH OF NEUROTIC MAN (C) WHO IS SO DISCOMBOBULATED THAT HIS HAIR STANDS ON END, DISLODGING HAT (D) WHICH OPENS CAGE (E) AND RELEASES EPICUREAN MOUSE (F).

MOUSE, INSPIRED BY SCENT OF PERFECTLY AGED CAMEMBERT CHEESE, GNAWS THROUGH SPREADSHEET, ONLY TO DISCOVER HE HAS BEEN FOOLED BY AROMA OF OVER-RIPE GORGONZOLA (G).

IN A FIT OF PIQUE HE SPILLS VINTAGE WINE (H) INTO WATER-WHEEL (I) WHICH TURNS PULLEY THAT CAUSES GLOVE (J) TO GRASP SPREADSHEET AND MOVE IT TO TAPING AREA.

SHEET IS TAPED SECURELY IN PLACE BY TRAINED ADHESIVE TAPE WORM (K).





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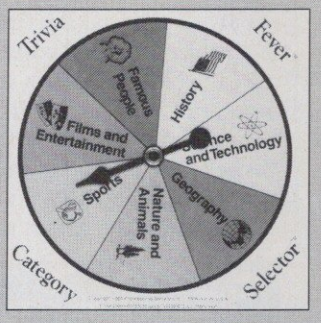
CIRCLE 154 ON READER SERVICE CARD

Nature and Animals. The computer takes on the functions of questioner, clock, and scorekeeper. On your instruction, it can also act as handicapper, using any of the three previously mentioned functions to try to equalize players' chances of winning.

Most trivia games have a strong familial resemblance; Trivia Fever has at least two unusual features, however. The first is its time factor. Players can set a limit of 10 to 60 seconds on the available answer time. The second is the existence of three levels of difficulty. According to the game's documentation, "Level-1 questions are easiest, while Level-3 questions almost require a Ph.D. in Triviology."

In addition, Trivia Fever can do something that no



board game can do: react to the players. Each player response—right or wrong—elicits a screen wisecrack, such as "That was my worst subject, too" or "Gee, you must be smarter than you look," along with short musical interludes ranging from "I'm Looking Over a Four-Leaf Clover" to "The 1812 Overture."

Trivia Fever also offers you the rare thrill of being right when it is wrong—and on a gratifyingly effete intellectual question too. I don't want to give anything away, but take my advice, and don't believe the answer on the "Name the two characters waiting for Godot" question—look it up.

The game's major, and virtually only, drawback probably stems from limitations in computer memory. There are simply not enough questions, which means that questions recur too frequently. After only four games, I was beginning to recognize several; and, in the course of one longer game, at least one question made three appearances. Even taking the advice of the rules and disallowing those questions was not enough to prevent this flaw from producing serious irritation on the part of the players.

In spite of this one drawback, the two "triviologists" I inveigled into playing with me—in order to be able to make a panel judgment—declared that the game's advantages far outweigh its drawbacks. As veterans of

Don't believe the answer on the 'Name the two characters waiting for Godot' question—look it up.

all-night Trivial Pursuit encounters, they particularly appreciated Trivia Fever's time-limit approach, as well as the high percentage of "genuine trivia," facts that they were actually interested in learning—or proud of knowing. Though definitely not "computer people" and

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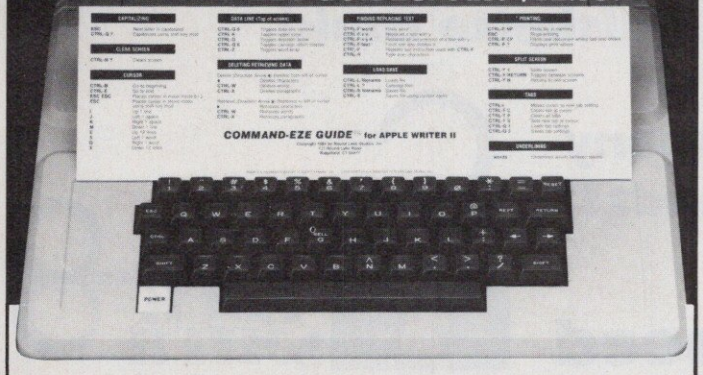

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initially skeptical of the whole idea of computer trivia gaming, my trivia panel heartily endorsed Trivia Fever after a few games.

A final note: The game claims to be designed for ages 12–adult, but the number of answers that I dredged up out of memories of high-school biology and 60s entertainment leads me to suspect that a 12-year-old would have a pretty hard time of it.

Anne Kaplan Neher

Trivia Fever
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CIRCLE READER SERVICE NO. **703**

ADVENTURES IN NARNIA

Often compared to *The Lord of the Rings* (and vice versa), the *Chronicles of Narnia* (first published in England in the 1950s) is a very special set of books. Written by C.S. Lewis, these extraordinarily readable, interwoven fantasy stories portray the essential tenets and values of Christianity. The characters in these books are children, and the books are aimed at children, but the writing is of such quality that many adults begin reading the books aloud at story time, only to become totally immersed themselves.

Not Up to the Original

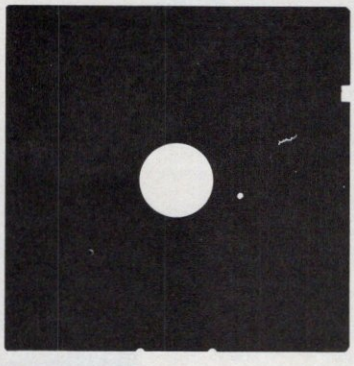
Unfortunately, Word Publishing's Narnia computer game, based on Lewis' *The Lion, the Witch, and the Wardrobe* and the first of a projected series covering each of Lewis' seven volumes, falls far short of its heritage. Any resemblance between the book and the game is slight at best, limited entirely to the names and

natures of the characters. One player summed it up neatly: "If Narnia is based on *The Lion, the Witch, and the Wardrobe*, then Space Invaders is based on *War and Peace*."

Narnia's documentation boasts of "an entirely new kind of computer game experience," called an "interface" game. Reading on, you discover that the distinction of an "interface" game is its partial dependence on human input, through the incorporation of such traditional game mainstays as cards and dice. It also boasts that, unlike "regular computer games where your only goal is to see how many 'aliens' you can kill," interface games foster such positive traits as resisting temptation and learning to make difficult choices.

These sentiments are laudable and, to some extent, all true. The inherent limitations of the game, however, manage to make any moral lessons one might gather along the way seem unimportant.

Narnia, aimed at "ages eight and up," essentially offers two arcade-style



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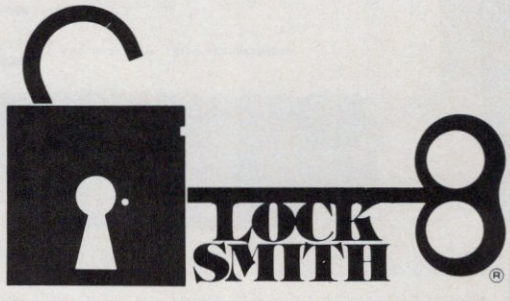

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CIRCLE 259 ON READER SERVICE CARD

mazes: The Bushes and The Ice Maze. Both feature rather rudimentary graphics, including things (such as flowers and beavers)

Whether you play with keyboard or joystick, your character's response time is rather slow.

whose touch gives you points and "evil" entities whose touch you are to avoid. Unfortunately, whether you play with keyboard or joystick, your character's response time is rather slow. This situation, coupled with the fact that the opposing entities (dwarfs in The Bushes, crystals in The Ice Maze) move unpredictably and quite rapidly, makes both maze portions of the game rather unsuitably (and unenjoyably) difficult for children.

In addition, the two major game divisions contain a number of "subadventures" involving either dice (The Bushes) or cards and dice (The Ice Maze). These subadventures consist of contests that pit players against a variety of characters (a dwarf; Jadis, the witch; Fenris Ulf, the wolf) in games of chance. Depending on the contest, the goal is to "beat the number," "roll odds," "roll doubles," and so on. The encounters are structured so that you are risking either points or strength and can only realize your profits when you refuse to take further risks.

Undoubtedly, a moral lesson emerges. The lesson I would expect any red-blooded kid to learn, however, is that the whole thing is

dependent on honesty—after you roll the dice, you are free to type in any number you wish. Whether the result would be a move toward honesty (because it is very dull simply to win all the time) or a landslide of cheating is hard to tell. I can predict one response with a high degree of certainty, though—boredom.

Still, Narnia is not without its saving graces. A section, For Parents and Teachers, offers suggestions for enrichment exercises surrounding both the game and the book. These suggestions evince a thoughtful approach that the entire game could have profited from.

Best of all, the game package contains a copy of Lewis' *The Lion, the Witch, and the Wardrobe*, which, I am glad to report, is every bit as wonderful as I remembered its being.

Anne Kaplan-Neher

Narnia
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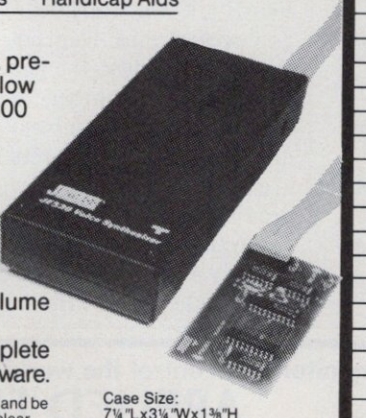

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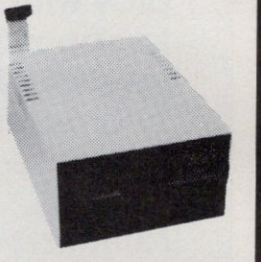

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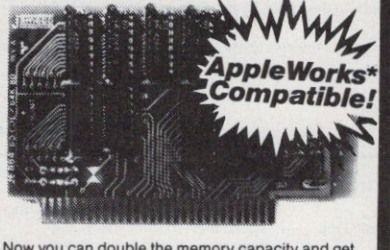

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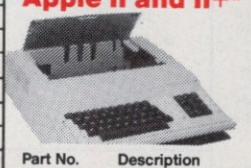

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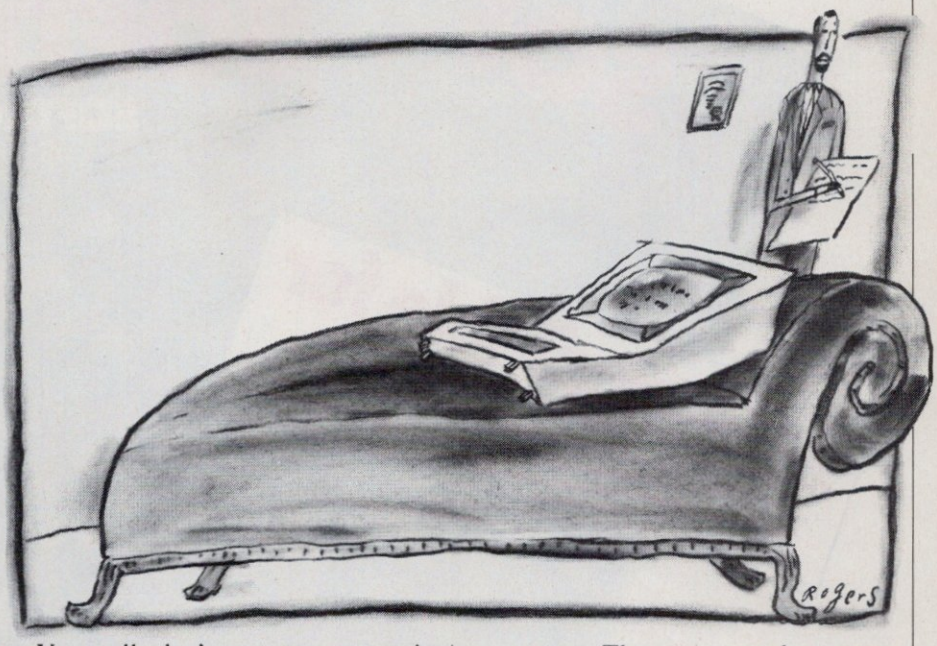

▸ LABEL PERFECT

Q. *When using AppleWorks, I am unable to print certain kinds of labels correctly. AppleWorks prints two spaces when a blank category is the first category on a line. For example, the format HON <FIRST <LAST, in which HON is blank, prints:*

John Smith
123 Maple St.
instead of
John Smith
123 Maple St.

How can I print labels correctly?

A. First, create a duplicate of the label format and eliminate the HON category from the format. Then create a selection rule for the new format that will select only those records in which HON is blank. Next, alter the selection rule for the original format so that it selects only those records in which HON is *not* blank. You'll have to print your labels in two sessions, but the unwanted space will be gone.

▸ LEARNING ASSEMBLY LANGUAGE

Q. *I am bored with Applesoft's low speed and power and would like to learn machine language. I have no experience with machine language, but I have mastered Applesoft. How do I get started?*

A. To begin, you should reconsider Applesoft. Commercial programs are available that amplify Applesoft when speed or power is especially critical. If you are interested in programming for programming's sake, I recommend learning Apple Pascal. Although it is only a bit faster than Applesoft, Pascal offers insights into programming that can only be suggested in BASIC. If you really need the speed—for graphics, perhaps—Pascal is not the answer, though.

You really don't want to program in machine language. Machine language is the native language of the central processing unit of the computer and consists of a series of 1s and 0s, which programmers represent as numbers from 0 to 255. Even the most diehard programmers would rather work with something more meaningful. Assembly language uses mnemonics to represent these numbers—JMP $2000 rather than 00 20. A program, called an assembler, translates these mnemonics into machine language.

Programming in assembly language can be quite satisfying, with a sense of really being in control of the computer and able to accomplish some pretty amazing things. To program in assembly language, you need a text editor to create the source code (the JMPs, BCSs, and ADCs), and the assembler itself to translate the source code to object code (the 20s, 80s, and 69s). Most popular assemblers also include a text editor, and each offers special features that make it attractive to certain programmers. The most popular assemblers are Merlin from Roger Wagner Software, ORCA/M from Hayden, LISA from Lazer, and the Toolkit Assembler from Apple (in the Applesoft Toolkit for DOS 3.3 and the ProDOS Assembler Tools for ProDOS). Any of these are good choices, although, as you gain experience, you may want to sample the others to find the one that best supports your programming style and needs.

▸ APPLEWORKS GRAPHICS

Q. *AppleWorks is a terrific program, but occasionally I need to depict spreadsheet results graphically. Can you recommend a graphics program that interfaces with AppleWorks?*

A. We are not aware of any program that directly interfaces with AppleWorks for graphics. AppleWorks can create DIF files, however, and can, therefore, provide a solution. DIF (Data-Interchange Format) files were invented by the developers of VisiCalc to provide an easy means to move data

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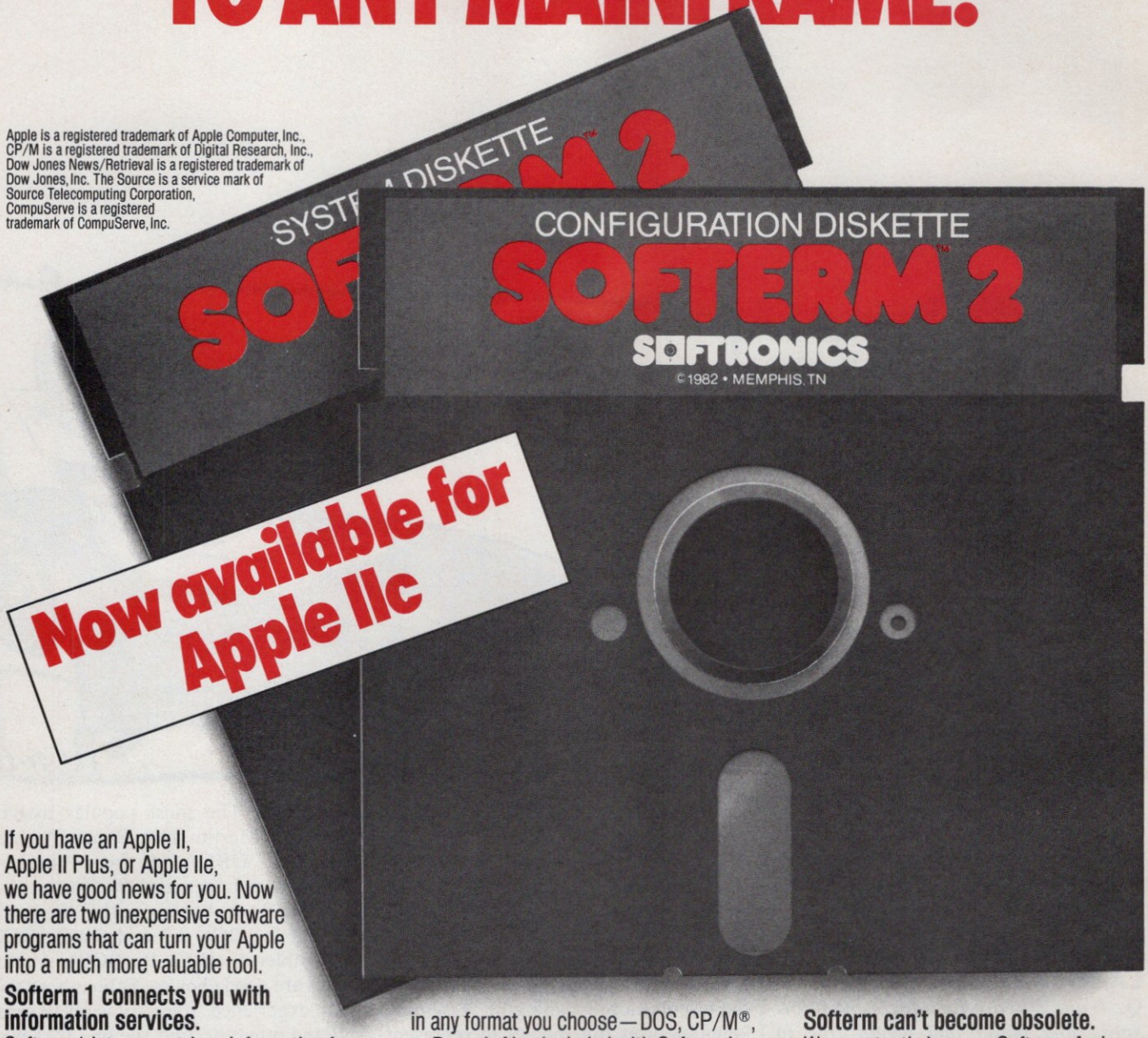

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Softerm 2 connects you with your company's computer.
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from VisiCalc to other programs. Most spreadsheets can create DIF files, and most business-graphics programs accept them.

From the Print (open-apple-P) menu in AppleWorks, choose option 5. You'll be asked for the DIF order. The order makes a difference only if your graphics program requires a specific order—by row or by column. Most graphics programs let you read either format. You're then asked for a pathname. If you are saving material to the disk in drive 2, be sure to specify a full path-name; this segment of the program appears to forget your current ProDOS data-disk prefix. The DIF file can now be used by Apple Business Graphics, The Graphics Department, PFS Graph, and most other business-graphics programs.

There's a catch, though. AppleWorks operates under ProDOS, and most business-graphics programs are DOS 3.3-based. Therefore, you'll have to convert the DIF file from ProDOS to DOS 3.3 using the Convert utility on the ProDOS users' disk. Even as you read this column, several software developers are working on ProDOS-based graphics programs. When a graphics program that reads DIF files becomes available under ProDOS, you can eliminate the conversion.

When selecting a business-graphics program, be sure that the program works with your printer and printer-interface card. Many of the daisy-wheel printers found in business environments do not support graphics, and those that do produce crude renderings.

▸ HI-RES CHARACTER GENERATOR

Q. *I am in the process of writing a program in Applesoft and must print text on the hi-res-graphics screen. I've only been able to print the four-line text window at the bottom of the screen. How can I print text on the screen?*

A. Unfortunately, no easy way exists for you to print text on the hi-res screen. The screen is organized in terms of individual graphic dots, or pixels, rather than the blocks of pixels you need to print text. Fortunately, there are many commercial programs to help you.

If your text is static, as on a title page, most hi-res drawing programs offer a Text mode for labeling. When you type your message on the screen, it becomes part of the picture and will be saved when you save your picture. If your text is interactive—if it must

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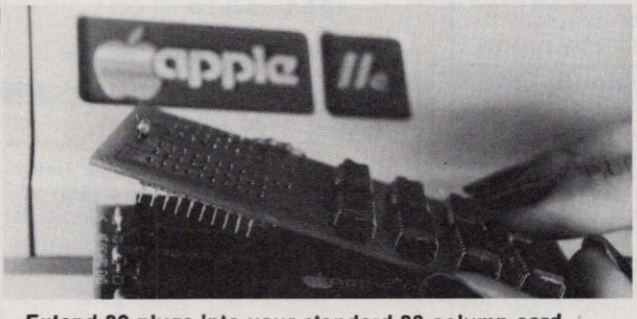

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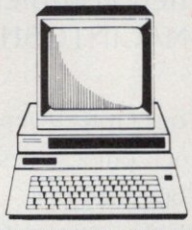

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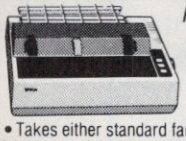

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change as the program runs—you'll need to use a character generator.

Character generators are programs that paint characters on the screen. These programs allow you to display lowercase characters on an unmodified Apple II or Apple II Plus and provide you with a variety of fonts or character styles. Macintosh, move over!

The simplest generators use Apple shape tables (with shapes in the form of letters) and draw the characters on the screen. The Apple Mechanic from Beagle Bros. contains what may be the most popular shape program. To use this type of generator, you'll need to modify your program considerably.

If you want to use the normal Apple text commands (PRINT, VTAB, HTAB, and so on), you'll want a block-style character generator such as HGR6 (in the DOS Toolkit package) or Higher Text from Call A.P.P.L.E. You won't have to modify your program very much to use these block-style character generators. (For more information on this, read "Seeing Double" by Roberta Schwartz in the January 1985 issue of *A+*, page 62.) ✚

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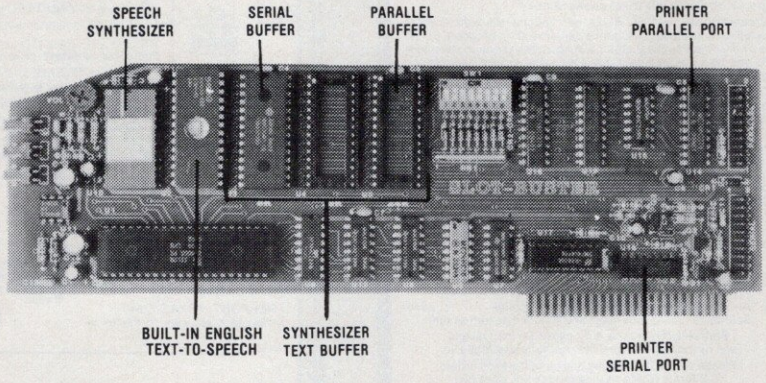

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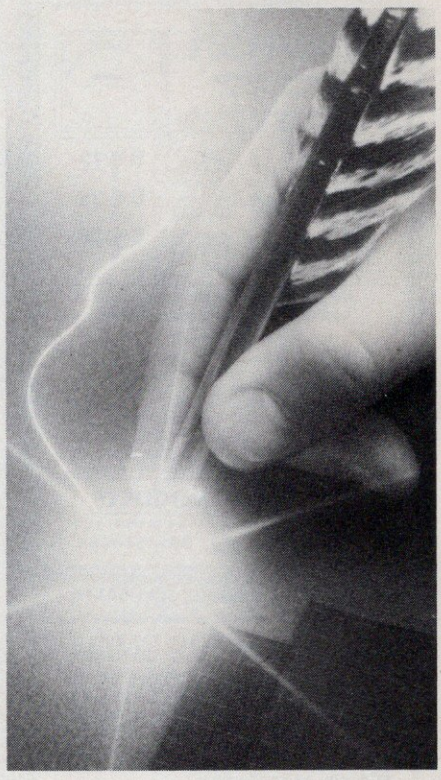

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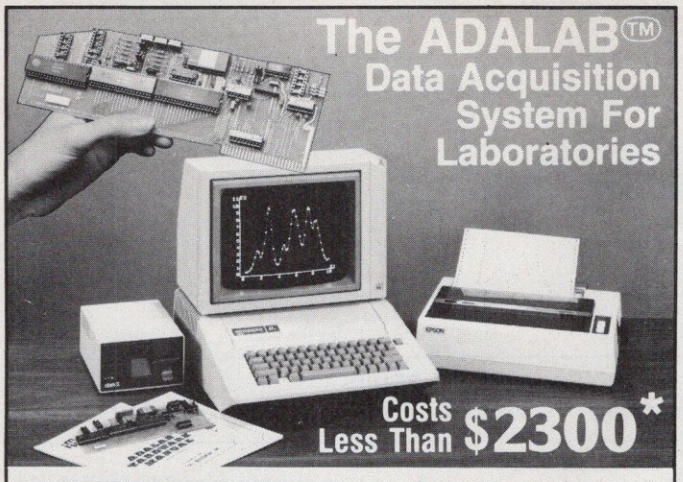

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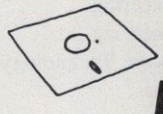

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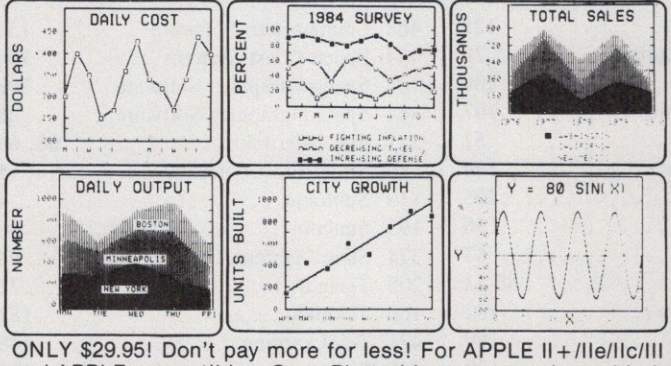

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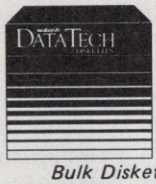

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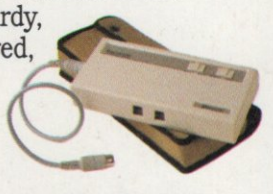

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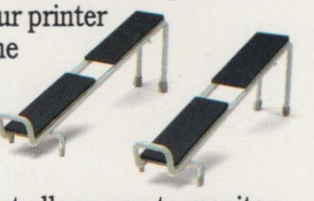

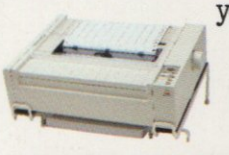

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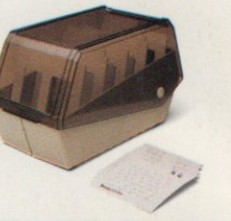

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