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NOVEMBER 1984

VOLUME 2
ISSUE 11

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FOR APPLE COMPUTING

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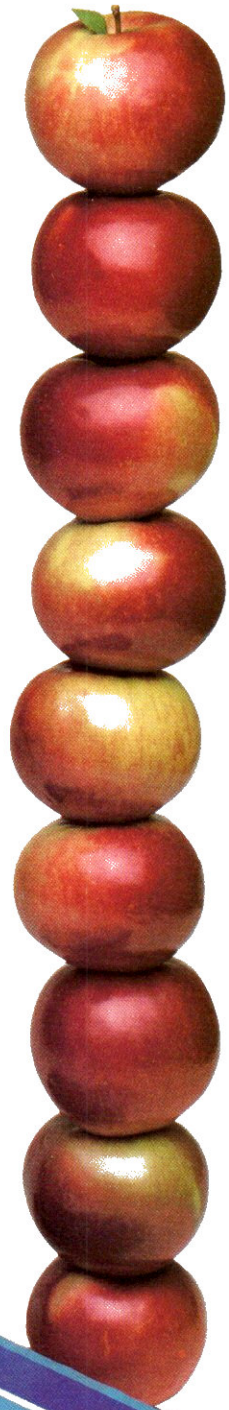

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- **CP/M 68K with C Language**
- UCSD Pascal

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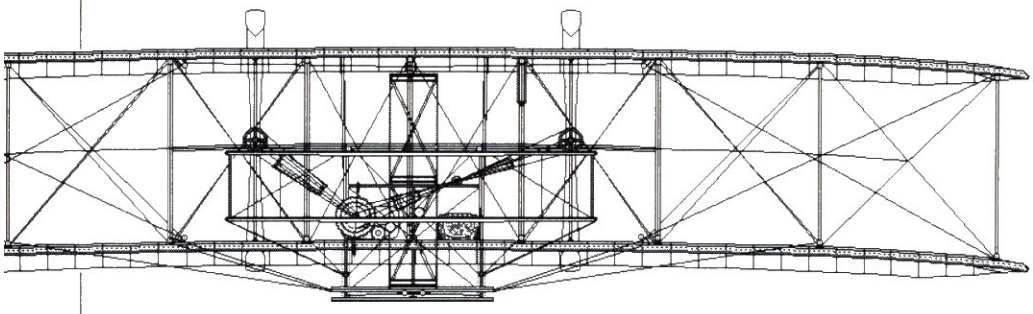
CONTENTS



A+

THE INDEPENDENT GUIDE FOR APPLE COMPUTING

COVER STORY

50 OPENING MUSICAL VISTAS
By Freff
Your Apple music tutor

APPLES AND THE LAW

28 SELF-HELP LAW
By Susan Luttner
The personal computer as personal lawyer

35 COPY-RIGHTS LAW
By Steve Elias
What are your legal rights and responsibilities?

43 HIGH-TECH LAW
By Vanessa Schnatmeier
Apple-packing lawyers lead the legal profession into the computer age.

SOFTWARE

61 ProDOS REVISITED
By W. Charles Doherty
A year after its introduction, we examine how Apple's new operating system has fared.

EDUCATION

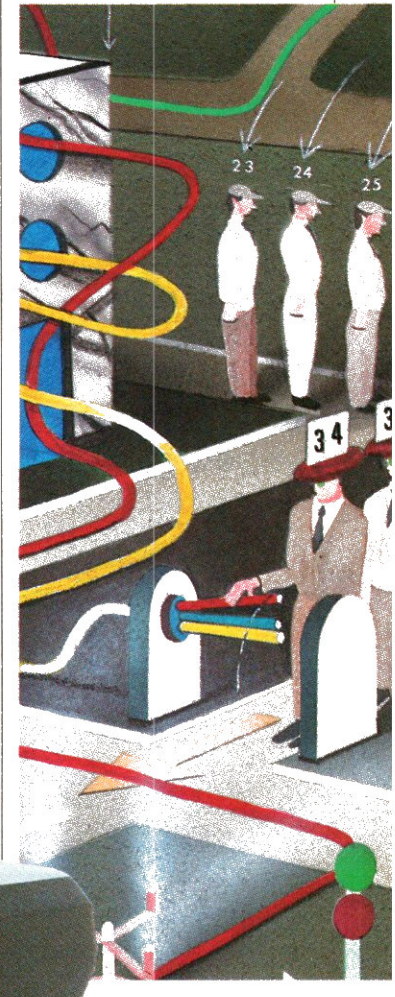
66 SCORING ON THE S.A.T.
By Carolyn J. and Nicholas C. Mullins
Ten programs to help students achieve maximum scores on the college-board exams

INSURANCE

79 INSURE YOUR APPLE, OR ELSE
By Vanessa Schnatmeier
Protecting your computer investment

HARDWARE

86 HOMEBREW HARDWARE
By Peter and Owen Benson
Simple Apple interfacing



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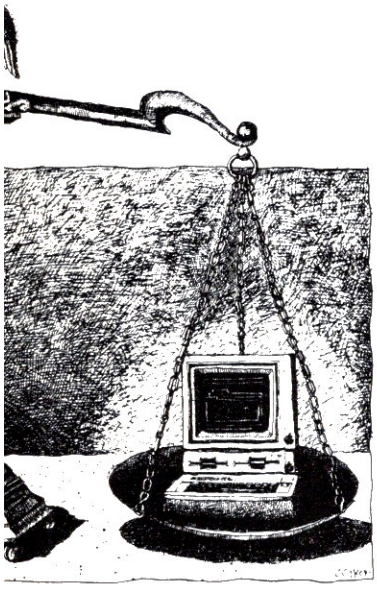


PROGRAMMING

181 A+ PROGRAMMING CONTEST WINNER
Ken Haley
Rabbit Hunt tests your talents at shooting rubber-tipped arrows to scare rabbits away from your garden

TUTORIAL

185 How to dBASE II
By Robert Cowart
Part XIII in a tutorial series on dBASE II

DEPARTMENTS

9 EDITORIAL

11 DISPATCHES
By Vanessa Schnatmeier

17 THOUGHTWARE
By Steve Rosenthal
Electronic justice: Personal computers take their place in law firms and courtrooms.

23 APPLEWORDS
By Steve Rosenthal
A short glossary of copyrights terms

95 ELECTRONIC BRAINSTORMING
By John Unger Zussman
The fantasy of the on-line home

161 MONEY MATTERS
By Kenneth M. Landis
From the Financial Cookbook, a recipe to help ease the cost of a college education

169 THAT'S ENTERTAINMENT
Reviews of Black Belt an Wizardry

197 RESCUE SQUAD
By Frederic E. Davis
Questions from our readers

201 PRODUCT NEWS
By Ruth Ramberg

213 NEWS+
By Frederic E. Davis
Your inside source for developments and trends in the personal-computer industry

223 COMING UP

223 INDEX TO ADVERTISERS

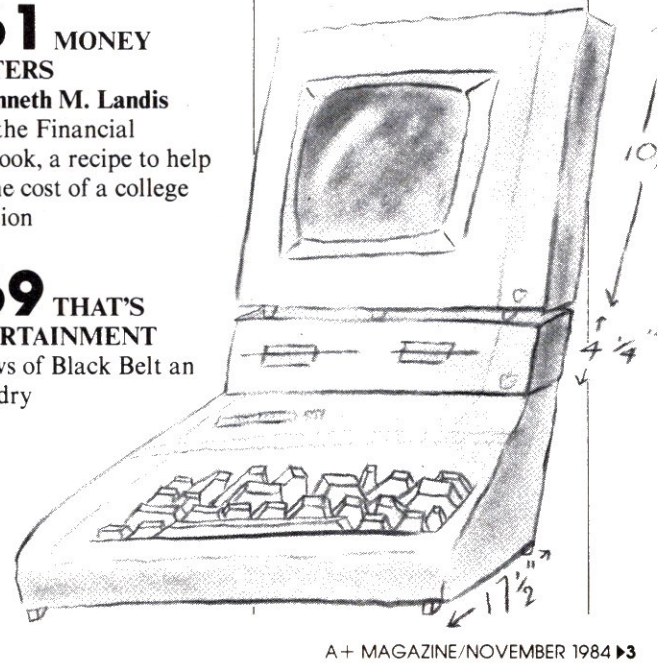
THE *Macintosh* SECTION

102 MACINTOSH PASCAL
By Dennis F. Brothers
A programming language that rivals the significance of the Macintosh itself

114 INSIDE MACDRAW
By Brian Cutter
Drawing and drafting tips

135 BEHIND THE FINDER
By Thom Hogan
Resources and the Macintosh

147 PIPELINE
By Ruth Ramberg
New products for your Macintosh and Lisa



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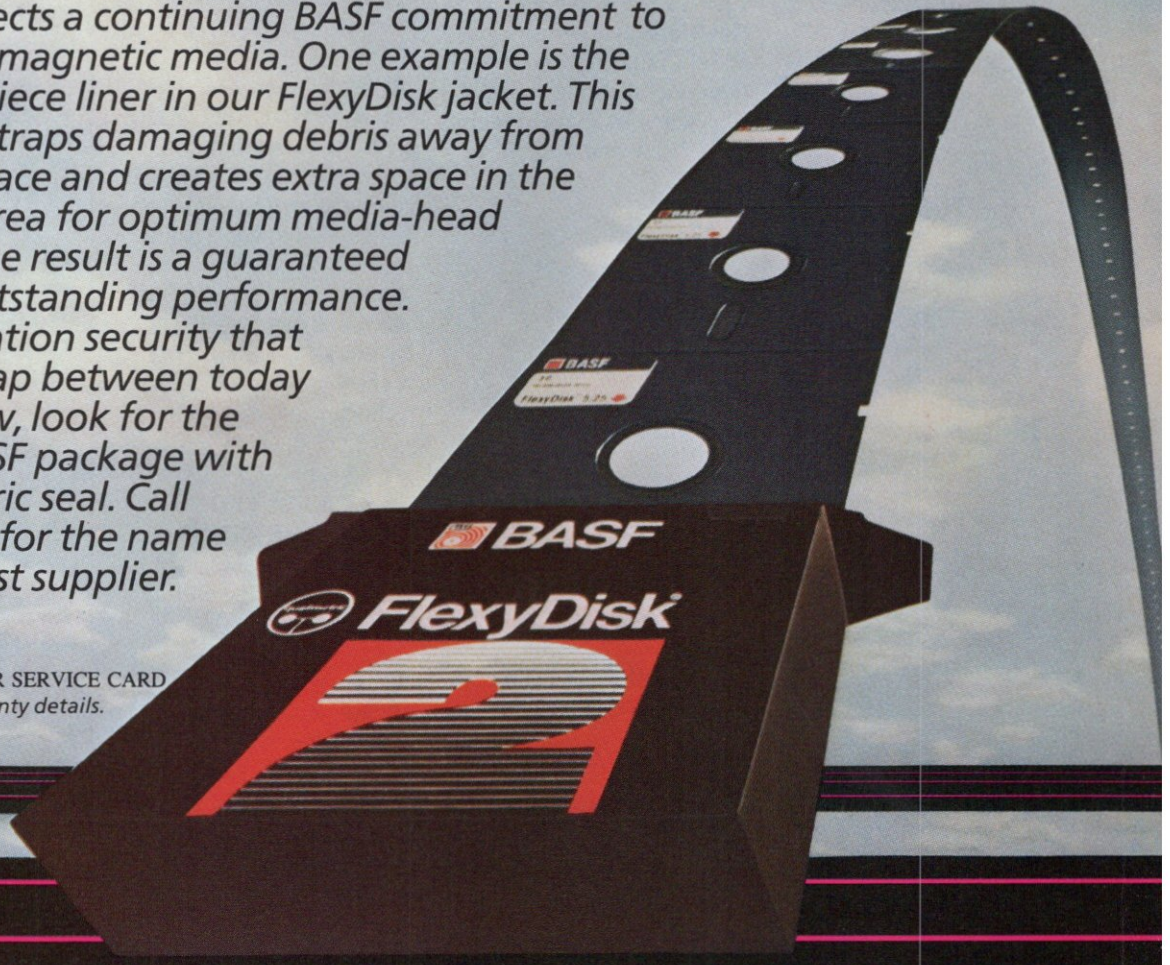

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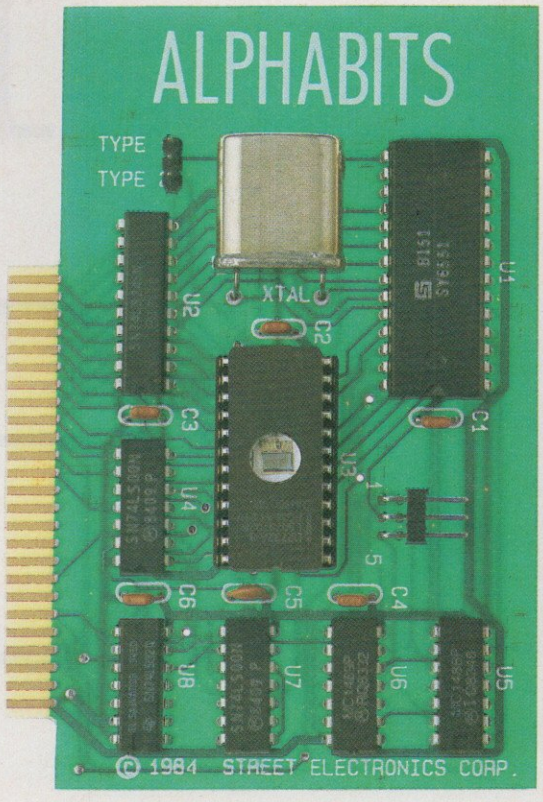

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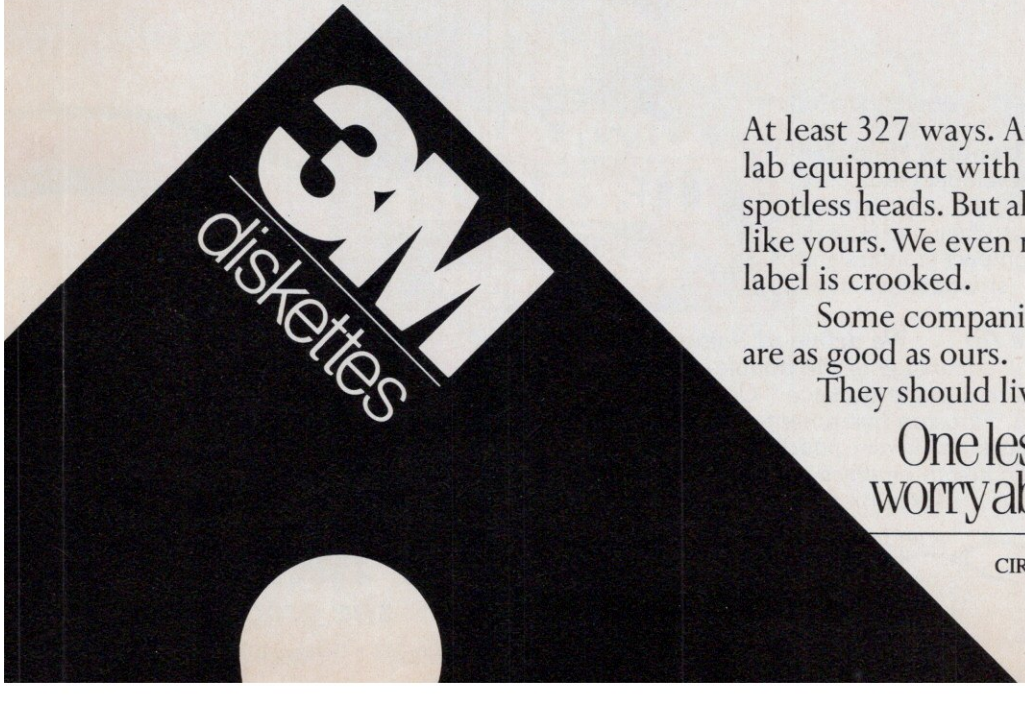

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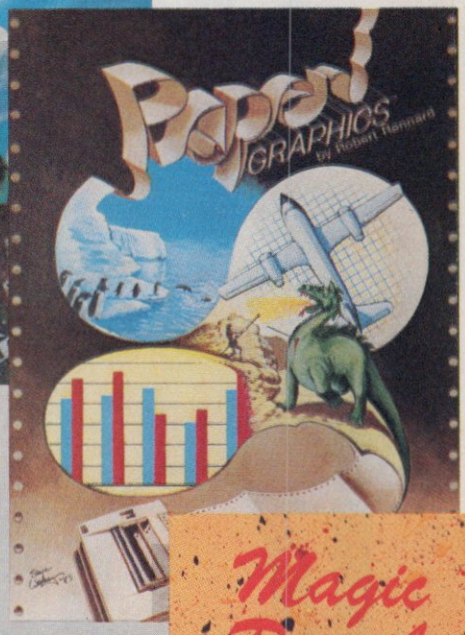

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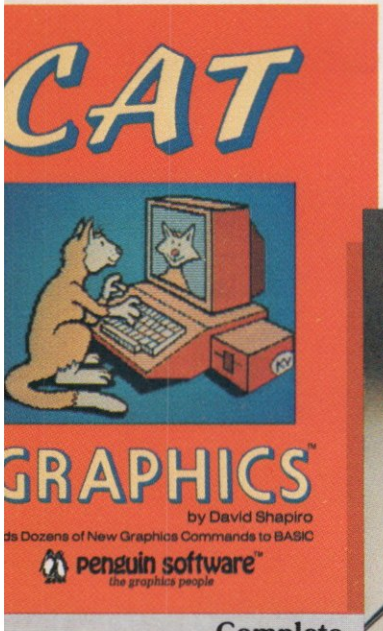

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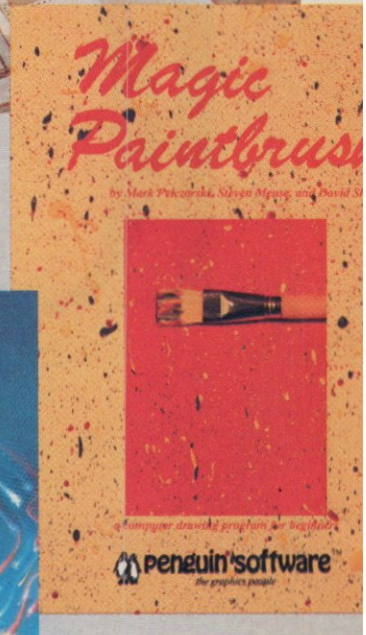

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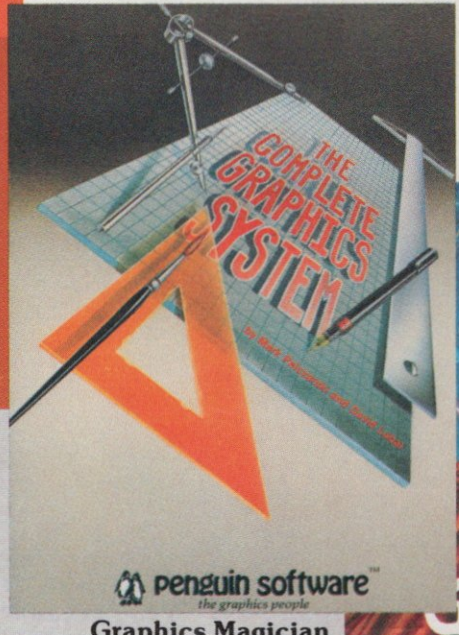

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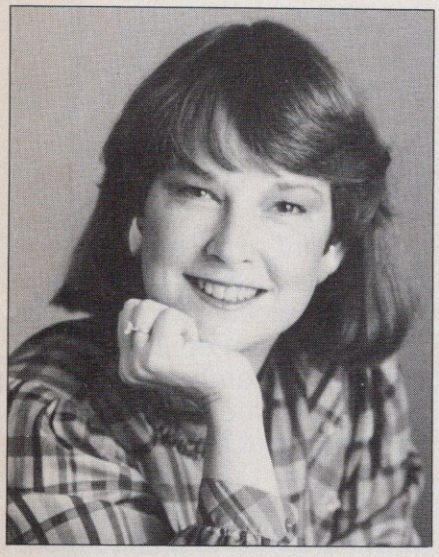
EDITORIAL
A MESSAGE FROM MAGGIE



An old saying asserts that time flies when you're having fun, and I have to admit to a certain astonishment that an entire year has elapsed since we started *A+*. It seems that only a couple of months ago, Leslie Steere and I spent a month in New York working every day from 7:00 A.M. until midnight, pulling the first issue of *A+* together. When I think back on hiring our excellent staff, searching for the best authors, and working constantly to improve *A+*, I realize how the year has sped by.

It really has been fun. The *A+* staff, together with our colleagues at Ziff-Davis in New York City, has made *A+* a successful publication. The highlight of our year was winning the Western Publications Association's Best New Consumer Magazine of 1983 award.

Most of all, we have enjoyed creating *A+* for you, our readers, and I want to thank you all for making *A+* the number 1 magazine for Apple-computer users. As we head into our second year, our goal remains the same: to produce the most interesting, informative, and attractive magazine possible.

Now that I have commemorated our first birthday, here's a quick rundown of the articles you will find in this month's feature section on the legal aspects of computing, from do-it-yourself law to consumer rights.

Writing a will is a subject most of us would happily avoid. Wills remind us of our mortality, force us to plan for the future, and conjure up images of staggering legal bills. There's no getting around it, though—all of us, no matter how little we think we have to leave, should have a current will. You do not, however, have to pay for the services of a law firm to draw up a valid will, because a new generation of self-help legal software you can use with your Apple computer can help you draw up a legal document that will protect your investments and help your family when the time comes. Other self-help software programs for loans, legal guardianship, and real-estate leasing are also available. Read Sue Luttner's article "Self-Help Law" for the details of do-it-yourself law.

Self-help legal software is great for tasks such as preparing a will, but the time may come when you need to consult a lawyer—and lawyers, like so many of us, are being drawn into the world of high technology. Most legal offices have incorporated dedicated word processors for their secretaries, and, slowly but surely, lawyers themselves are starting to use personal computers. Like other professionals, lawyers have been slow to adapt to technology, but personal computers have made some inroads into their domain. Vanessa Schnatmeier, in her article "High-Tech Law," looks at how the legal profession is adjusting to the personal-computer revolution.

Your Apple computer can help you draw up a legal document.

Have you ever wondered about those dire warnings on software packages that either threaten ominous punishments for various actions or disavow any association with the product after you have opened the shrink-wrap? Have you ever bought a software package that was dead on arrival or erased a program the first time you used it and wondered how to get your money back? If you have such concerns about your rights as a consumer, read lawyer Steve Elias' examination of the legality of these warnings and of other legal considerations you should take into account when you purchase software (see page 35).

Let me call your attention also to this month's Macintosh section. We are presenting a special article from our Mac wizard Dennis Brothers. (We are proud to say Dennis was featured in *Time* magazine for his MacTEP program, which we published in our July Macintosh section, pages 93–97.) Dennis was so impressed with Macintosh Pascal that he rushed us an article on it so we could inform you of its numerous benefits to programmers.

As we head toward the end of 1984, we are wrapping up this year's programming contest and we are in the process of planning a new contest for 1985. I'll reveal details about that contest at a later date. Meanwhile, I want to thank all of you who sent in programs and extend our congratulations to the winners. The grand-prize winner will be announced in the near future—good luck to all the entrants (all entries must be in by November 15).

I regret to end this editorial on a sad note, but shortly before we sent this issue to press, George Tate, one of this industry's greats, died of a heart attack at the age of 40. Although George kept a low profile, he was greatly respected and admired for his accomplishments, which, among others, included founding Ashton-Tate (manufacturer of dBASE II, DBASE III, Friday, and Framework), Softeam, and Softwaire Centers. We wish to extend our deepest sympathy to both his family and coworkers. +

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DIGITAL DO-IT-YOURSELF

Not everyone retreats to the safety of the maintenance contract or warranty when the computer (knock on silicon) breaks down. Some people don't even like to take the computer into the shop to be serviced—they'd prefer to slip their battered-but-sturdy screwdriver out of the tool kit and do it themselves.

Nontinkerers may squirm at the thought, but repairing your computer might not be the Herculean labor you imagine. Think of the auto that wouldn't run merely because it needed the crust scraped off its battery connections—but you only discovered that after a $200 trip to the repair shop.

"About 90% or better of all the things that go wrong with technological devices, the average person could fix easily," says Gene B. Williams, author of the new *Repair and Maintenance for the Apple* (Chilton Book Company, $12.95).

Williams says that the most complicated piece of equipment the nonhacker will need is a volt meter. Add the ubiquitous screwdriver and perhaps a pair of needle-nose pliers, and you're ready.

Don't rip at your computer's innards indiscriminately, though. It's harder than you think, and you'll need a delicate hand. Think of the book *Zen and the Art of Motorcycle Maintenance*. Take a deep breath and try to see the whole machine before you start.

Once you're calm, try a few of the basic diagnostic steps Williams recommends:

- Look for the obvious. Is the machine plugged in? Is the CPU plugged in but the monitor switched off? Is there physical damage?
- Don't touch a machine that's under warranty—take it in to the shop. If you tamper with the machine at all (and manufacturers and service bureaus are touchy on this issue), you invalidate the warranty.
- Take notes on what you did just before the program crashed and what you've tried to do to fix it. That will keep you from treading over the same fruitless paths until the machine is fixed and will let you know what to avoid in the future.
- Turn the power off before you lift off the cover or tinker in any way.
- Determine whether you have a hardware or software glitch. Try to run another program on the machine—if it works, you may have a flawed disk, for instance, and not an out-of-kilter disk drive.
- Do periodic checks and preventive maintenance. Buy diagnostic disks if they're available. You needn't reserve them for troubleshooting and problem solving—they can help you spot trouble in the making.

Williams doesn't mention one last step, which so many tinkerers overlook—when all else fails, read the directions. You may not have to use your screwdriver to prove your "manual dexterity."

APPLES ON TRIAL

For the first time in the annals of American law, a computer has taken the witness stand to testify in court.

Computers have aided in analyzing accidents for quite a while, but a quadruple-manslaughter trial in New York City used a computer in the courtroom to display graphs for viewing by judge and jury.

Dr. Arthur Damask and Dr. Arthur Paskin, both physics professors at Queens College, developed animated graphics on the Apple II Plus to reconstruct an accident that occurred in the small hours of March 13, 1983.

Michael McHugh, 18, was the only survivor in a crash that killed his four teenage passengers. With the help of Damask's 16-year-old son, the two professors produced four dynamic graphic displays to show how McHugh's car moved before, during, and after the accident.

McHugh, in whose defense the computer testified, claimed that the accident was caused by a tire explosion stemming from his backing over a roadside manhole which had been left uncovered by city workers.

The prosecution charged that the computer presentation would confuse or unfairly persuade jurors in the Bronx Supreme Court trial. The defense, however, convinced the judge that the computer was not an attention-getting device and that it could present evidence as

CRIS MORTENSEN

satisfactorily as any other method of presenting scientific analysis. The jury acquitted McHugh after an 11-week trial.

According to *Computerworld* magazine, Lawrence Feitell, McHugh's attorney, said that Judge John Collins' decision to admit a computer will serve as an example for courts everywhere. Said Feitell, "Not so long ago there was a controversy over the use of photographs as evidence. Now they are commonplace. I think you will see the use of such computer-graphics evidence become more common now."

A 'SILICON VALLEY' FOR EDUCATORS?

Efforts by companies such as Apple and by school districts across the nation have pushed computers into the classroom, but they're lying fallow because there isn't enough good software. The solution? Form a national educational-software corporation.

That's the idea advanced by educator and computer scientist Joe B. Wyatt, chancellor of Vanderbilt University in Nashville. Wyatt, who has helped draft pending federal legislation on developing computer software for schools, told the newspaper *USA Today* that current disjointed attempts to mobilize commercial support for educational software need a kind of seed—a push, but not control—on the federal level.

Wyatt cited as a model the success of the Massachusetts Technology and Development Corporation. The corporation started with $1.5 million in capital. It has invested $4 million in public funds and generated $33 million in private venture capital, which it has distributed to 22 companies. Said Wyatt, "These companies would not have existed, except for this mechanism. They are now creating jobs, they're paying taxes, and they are creating technology."

As for educational software, Wyatt thinks a similar national corporation could catalyze the generation of venture capital—public and private—that could then be funneled to small businesses to bring state-of-the-art software to school systems.

How much would such an endeavor cost? Initially, about $15 million, he says. Eventually, like the Massachusetts experiment, it would recover the initial investment through a percentage of the proceeds of successful companies. Indeed, says Wyatt, at some point the corporation—unlike many government agencies—might just fade away, its work accomplished.

WOZNIAK, COMPUTER HERO

Yes, there are awards and awards, but this one means more than some.

At the recent Consumer Electronics Show in Chicago, Steve Wozniak, cofounder of Apple Computer, Inc., was named the 1984 recipient of the Gusdorf Computer-Hero Award. The award is a newly established prize that salutes those who have significantly contributed to an improved quality of life through computer technology.

Approximately 1200 users' groups and organizations nationwide contributed nominations; a panel of independent computer journalists and businesspeople rated nominees on scales of humanitarian/public service, educational/academic, and business/commerce achievements. Wozniak scored more than a third higher than any other nominee.

Paul Gusdorf, chairman of the board at Gusdorf Corporation (the national computer-furniture manufacturer sponsoring the award), said Wozniak was being honored for creating and building the first widely available personal computer and for developing Apple's Disk II drive.

Stuart Greenfield, president of the River City Apple Core in Austin, Texas, illuminated the other side of the award: "He is legend in his willingness to share his knowledge and expertise with groups like ours, and especially with schools and educational institutions. He

answers our calls and travels at his own expense to deliver speeches and answer questions. While his invention has made him a very wealthy man, he is totally unfazed by it all."

Wozniak donated the $2000 award to the Children's Museum of San Jose.

Although industry bigwigs received their share of nominations, grass-roots programmers and members of users' groups also scored high. For information on next year's nominations, contact Esther Perman, Gusdorf Computer Hero Award, The Siesel Company, 845 3rd Avenue, New York, NY 10022.

THE GLOBAL JOB SEARCH

Well, maybe the recession isn't over, or maybe it's starting up again—yeah, that's it—and you have all this free time to spend with your computer because you (still) don't have a job.

Do you know that your Apple can figuratively pound the pavements and scan the want ads for you, O hungry job-seeker? An increasing number of computerized job banks can let you get the inside scoop on a variety of positions. Sales, financial, and technical jobs pop up most often in these listings.

You usually access the job data banks through another larger database such as The Source. Listing your own résumé is probably free, but you'll pay anywhere from $5 to $25 per hour to look at the on-line help-wanted ads. You'll pay about $5 to send an electronic inquiry letter to a company; the company shells out $2000–$5000 to participate.

Following are a few contact names and numbers to help you start your electronic job search. Happy hunting!

- CareerSystem, Inc.
  1675 Palm Beach Lakes Blvd.
  West Palm Beach, FL 33401
  (305) 689-3337
  Lists résumés free for four months; then you pay $2 per month.
- Computer Resume and Job Bank
  P.O. Box 3497
  Honolulu, HI 96811
  (808) 595-2365
  Lists résumés and jobs; résumé listing is free. Access is via CompuServe.
- Computer Assisted Recruitment International
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  Schaumburg, IL 60195
  (312) 490-7140
  Lists résumés free. Access is via General Electric Computer Network.
- The Career Network
  1500 Fulgrave Avenue
  Baltimore, MD 21209
  (301) 664-1000
  Lists résumés and jobs; résumé listing is free. Access is via The Source.

COMPUTERS, COMPUTERS, WHO'S GOT THE COMPUTERS?

"More computers in schools. More software!" implore computer educators, students, and (strangely enough) manufacturers. But do you know how and where computers are already doing their classroom duty? Here are a few nibbles of background information from Market Data Retrieval that should give you some book learning on the computer's real situation in our primary and secondary schools.

Apple, you'll be glad to know, is the most popular brand of computer in schools, holding 49% of the total number. Radio Shack runs a distant second with 21%.

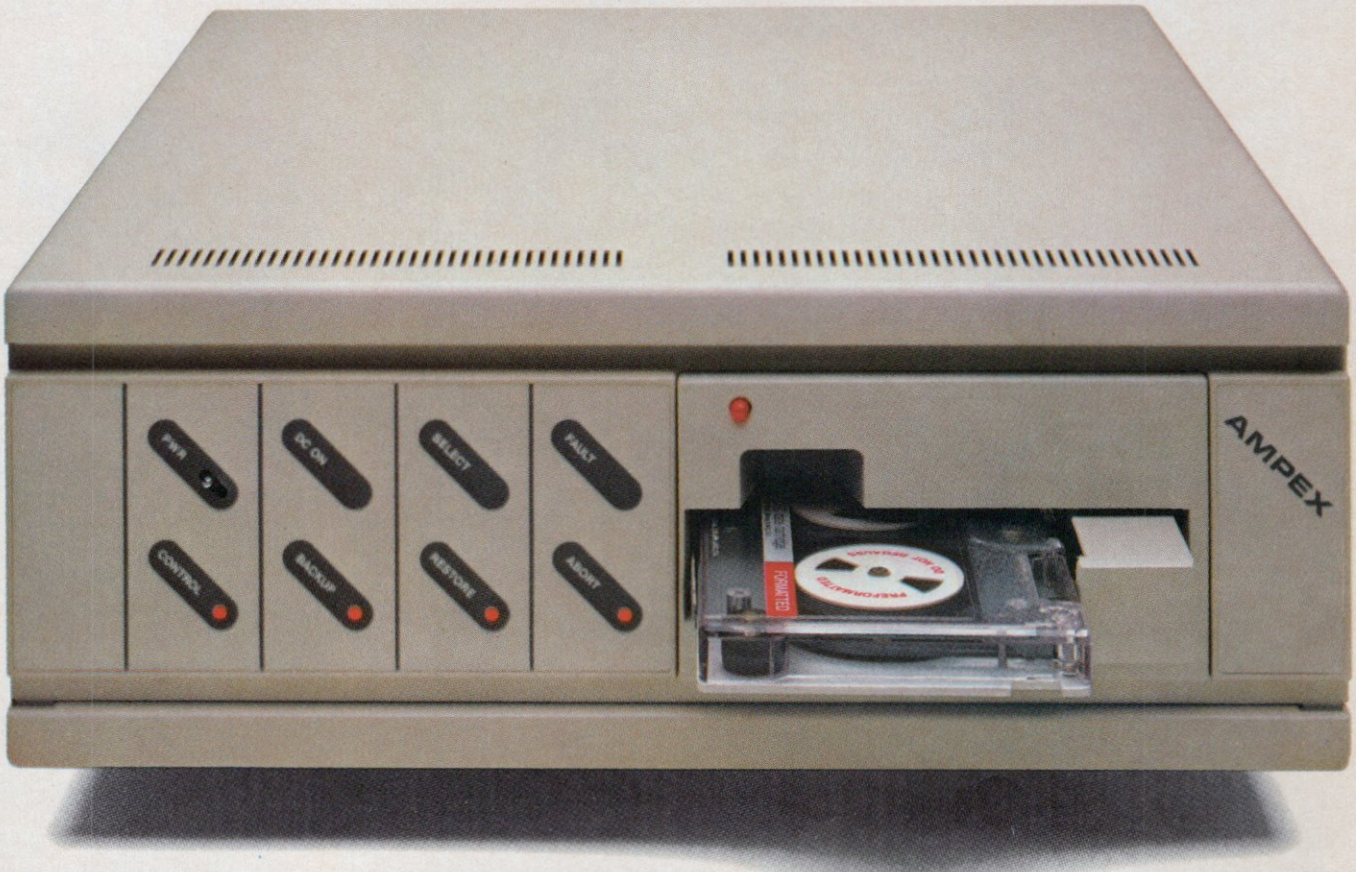
It's true that wealthy schools give their students better exposure to computers: 83% of such schools provide their students with access to computers, whereas only 53% of poorer schools can give their students hands-on experience.

If you want your son or daughter to work with computers, he or she has the best chance at the senior-high-school level. Elementary schools stack up their students at 112 per computer, junior highs have 92, and senior highs have an average of 77 students per computer. The smallest schools do best in this regard, with a computer-to-student ratio of 1 to 25, compared to the 1-to-100 ratio in the largest schools.

Parochial and private schools lose out, though. Although 68% of public schools possess at least one personal computer, only 23% of Catholic schools and 25% of other private schools have machines available for youngsters.

Finally, the best place to live for computer education is in the Midwest, which has the highest number of school computers. The South has the lowest. On a percentage basis, Minnesota and Oregon rank at the top in numbers of schools with computers; Alabama and Mississippi occupy the cellar. +

In the 92 seconds it find any file you need



Ampex 20 MB hard disk with 25 MB tape backup.

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takes to read this ad, on our backup streamer.

In the 1 hour, 4 minutes other streamers take, you could call your broker. Linger over coffee. Wade through the Wall Street Journal. And read this PC Megastore ad too. So take the time. You'll more than make it up with a PC Megastore hard disk and tape hooked to your IBM-PC® or compatible, Apple II or IIe,® because all the files you need–both current and archive–will always be right where you need them. Just a keystroke away. The secret? Only Ampex backs up a 20 MB hard disk with another 25 megabytes* of addressable storage–a unique, bootable streamer with cache memory. That not only means you can address a file in 92 seconds, you can backup files offline just by touching a couple of buttons. Without tying up your computer. Your time. Or a small fortune in floppies. (In fact, our 45 megabytes of available storage cost about half the price per MB of other hard disks.) So consider your time, money and convenience. And our quality. PC Megastore is backed by a full year warranty from Ampex, a company known for manufacturing quality computer peripherals for over 20 years. Take a moment to call us at 800 421-6863, or 213 640-0150 in California. Or write: Ampex Computer Products Division, 200 N. Nash St. MS M-11, El Segundo, CA 90215. We'll give you a dealer's name so you can buy PC Megastore. Then in no time at all, you'll make up for the 92 seconds you spent reading this ad.

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Pensate	39.95	31.95
Transylvania	39.95	31.95
Mark Of Unicorn:		
Mouse Stampede	39.95	31.95
Scarborough:		
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Soft-Life Corp.:		
Mac-Slots	77.77	62.00
Infocom:		
Deadline	59.95	47.95
Zork I	39.95	31.95
Zork II or III	49.95	39.95 ea.
Hayden:		
Sargon III	49.94	39.95
BUSINESS/UTILITIES:		
ATI:		
MacCoach	75.00	60.00
Central Point Software:		
MacTools	39.95	31.95
Continental		
Home Accountant	150.00	120.00
Dow Jones:		
Straight-Talk	79.99	64.00
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Habadex	199.00	155.00
Hayden:		
DaVinci Series	49.95	39.95 ea.
Living VideoText:		
Think-Tank	145.00	116.00
Magnum:		
McPic	49.95	39.95
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Main Street	200.00	150.00
MicroSoft:		
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Chart	125.00	100.00
Monogram:		
Dollars & Sense	150.00	120.00
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Click Art Personal/ Publications	49.95	39.95 ea.
Telos Software:		
FileVision	195.00	155.00
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Amray:		
Media Mate 3½"	14.95	12.95
Assimilation Process:		
Mac Daisy Wheel Connection	99.00	85.00
Kensington:		
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Prometheus:		
Promodem 1200 with MacPack	495.00	395.00

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Millionaire	59.95	47.95
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Lode Runner	34.95	24.95
CBS Software:		
Murder by the Dozen	34.95	24.95
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Home Accountant	74.95	54.95
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Fontrix	75.00	69.95
Font Disk (#'s 1 thru 5)	24.95	18.95 ea.
Electronic Arts:		
Financial Cook Book	49.95	39.95
Funk Software:		
Side Ways	60.00	48.00
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Multiplan (Apple Dos)	195.00	150.00
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G.A.L.E.!	49.95	39.95
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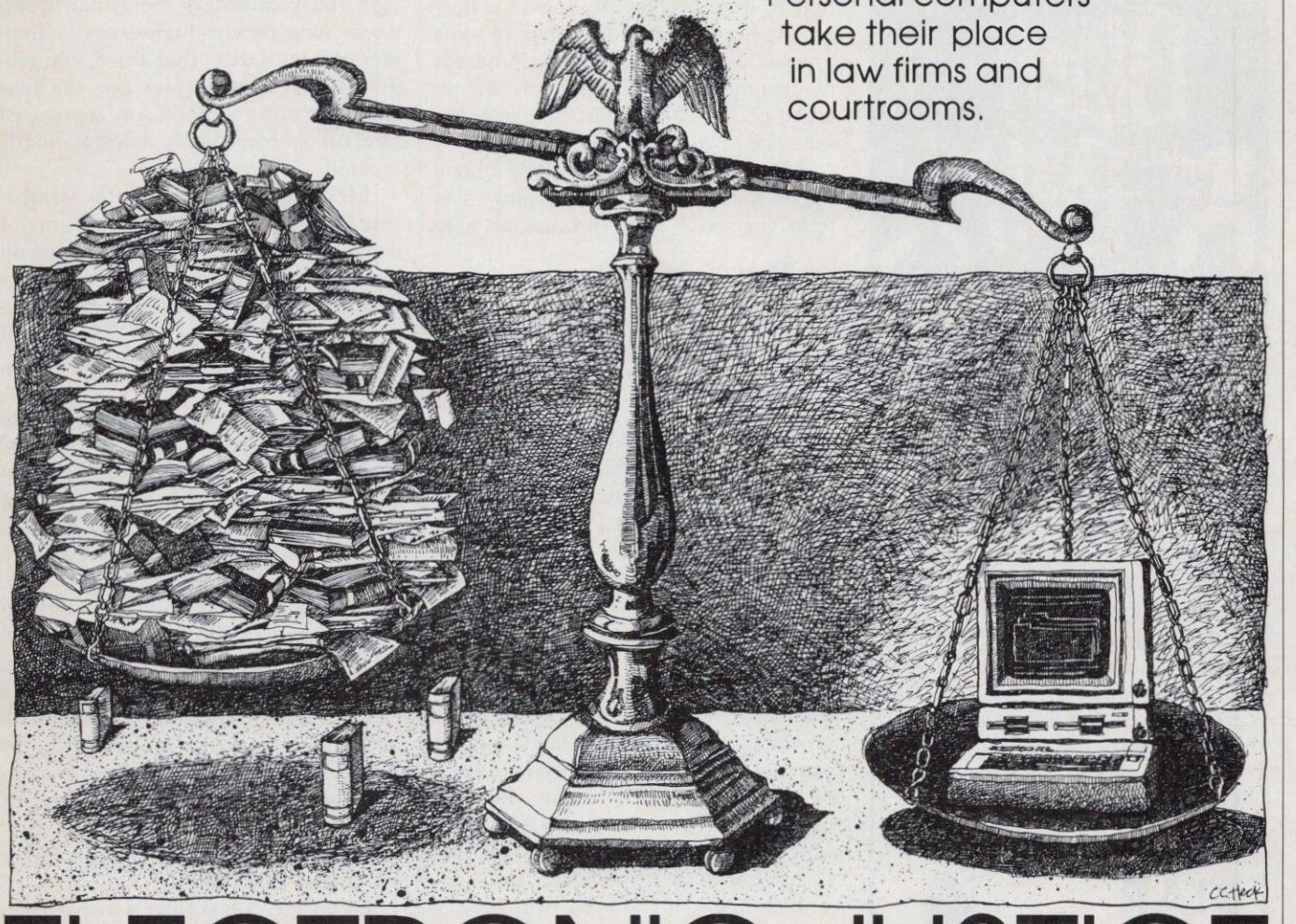
CIRCLE 124 ON READER SERVICE CARD

THOUGHTWARE
BY STEVE ROSENTHAL

Personal computers take their place in law firms and courtrooms.



ELECTRONIC JUSTICE

Personal computers have a long way to go before they can replace the judges, juries, and lawyers of the legal system, but even today's Apples can help make the wheels of justice turn more smoothly. From word processing and billing in the back room to statistical studies and presentation graphics in the courtroom, personal computers can assist with the masses of paperwork, research, filing, and information retrieval that underlie the more dramatic aspects of law.

The practice of law, as any attorney will tell you, deals with a raft of human troubles on a veritable sea of paperwork. Lawyers typically spend far more time in front of a desk than in front of a jury. Even in the more everyday reaches of criminal law, where the defendant usually pleads guilty and most cases are handled by court-appointed counsel, someone still keeps track of names, dates, case numbers, and bills. In civil cases, the volume of information can grow so large that both sides turn to mainframe computers to keep everything organized.

Obviously, Apple-size computers can't fulfill every legal record-keeping requirement, and the best tools are sometimes still a pen and a pad of paper. Nevertheless, for a large range of problems, in both small and large law offices, an accessible desktop computer can provide just the right combination of ease of use, security, power, and cost-effectiveness.

The critical limiting factor is human resistance to change.

Although computers and law are a natural match, we can't always say the same about computers and lawyers. Despite the overwhelming advantages of using automated information processing, not all legal practitioners are ready to change their ways. As in many other new applications of technology, the critical limiting factor is human resistance to change.

Word Processing Leads the Way

By far, the greatest penetration of automation into the law office has been in the area of word processing. Most legal matters require a river of standardized documents, laid out in precise formats and repeated time after time with only slight alteration. A request to approve administration for one estate is likely to be almost identical to a previous request to administer another, or a motion for postponement due to

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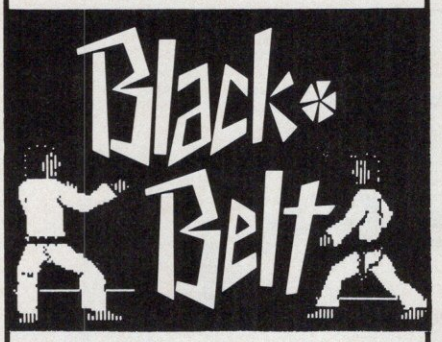

Programming by Kevin Ryan

Black Belt is a challenging arcade game of the martial art, taekwondo. The Mockingboard sound and speech synthesizer, joystick and keyboard combine for both fun and learning. Championship sparring rules and the disk's practice section teach you the forms. Designed with input from professionals, **Black Belt** is a skill game in which brutality and rule infractions affect score.

The one-person game has a built-in artificial I.Q. rather than random generator. Instruction booklet included. Apple][computer, 48K, one disk drive, and joystick required. Mockingboard is optional, but adds exciting dimension. Suitable for ages 9-90.

$29.95.

STAR SEARCH

Pluto star base receives a signal from the direction of Epsilon Eridani (about 10 light years away). The players have their mission — find the origin of the signal. As captain, you must each choose a crew and supplies for your ship. Gather information by flying probes, with your automated telescopes, or by landing a pinnace. You may find alien life forms!

Go into the asteroid belt to conserve fuel but be ready to dodge meteoroids or destroy them with your laser gun. Each game is different and can be saved for re-entry. Win by managing your resources well and making discoveries.

Request educational version on school letterhead. Requires Apple][, 48K.

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CIRCLE 370 ON READER SERVICE CARD

schedule conflict much like the last such motion.

In addition to creating customized instances of standard documents, word processing can be a tremendous advantage in legal proceedings in which documents are refiled or amended. In some types of cases, dozens or even hundreds of documents must commonly be retyped because of a slight change in the schedule or in available information.

Many larger law firms were among the early buyers of "power typing" systems, as early word processors were called. The cost of these machines and their successors, dedicated word processors, kept them confined mostly to the typing pools of larger firms.

The everyday operation of the law depends on details.

Radical Change

The personal-computer explosion has radically changed these economics. A word-processing system based on an Apple, for example, costs only a few thousand dollars and can do much more than just word processing. As a word processor, though, a personal computer can quickly pay its own way in savings on repetitive typing alone. Because most legal firms charge by the hour, time is almost literally money, and saved time is saved money.

Eventually, all lawyers will have a computer or terminal on their desks. So far, as in corporate culture in general, the pattern is that keyboard use declines the further a law-firm employee moves up the legal pyramid. Secretaries and clerks type a great deal, junior partners on occasion, and senior partners almost never. In small offices, lawyers often do type—but rarely in front of visitors. It remains to be seen whether computers such as the Macintosh that are less oriented toward the keyboard can change that pattern.

Keeping Tabs on Time

Another important use for personal computers in legal practices is scheduling. You may have wondered who really uses calendar programs. Lawyers are one major group. Except for those who are working on one of those celebrated corporate cases that drags on for years, most lawyers in private practice handle up to dozens of cases simultaneously, each with deadlines, court dates, client meetings, and research requirements. Keeping an accurate schedule that accommodates all these activities can quickly overtax human patience, if not ability.

Schedule programs for Apples can handle calendars weeks or even years long (busy calendars more than a few weeks long require high-capacity floppies or a hard disk, though). Some programs can actually pick out the first available time slot of any requested size; others record only dates manually entered.

Major projects may involve elaborate preparation like that for a major construction or product-development project. Project-planning programs such as Apple's LisaProject and MacProject can help out with this kind of large-scale, long-range planning effort.

Follow That Dollar

Keeping track of the money is another major area in which Apples and other personal computers can help out the legal system. For firms that bill for staff time plus expenses, charging each client the correct amount becomes a major occupation in itself.

Although almost any good accounting system can theoretically handle a legal office, in practice most users prefer at least a targeted package if not a custom-written one. Several time-and-billing packages are available for the Apple II family of computers, in addition to many others that run under CP/M (using a Z80 CP/M coprocessor card). Several are even written in the dBASE II language.

Of course, a law firm is also a business, needing general books and records, as well as more specialized billing information. An Apple used with word-processing and time-and-billing programs one day can run the weekly or monthly accounts the next. At the end of each week, it can do the payroll, and it can tackle the taxes at the end of the year. For firms with more than a few employees, though, a hard disk will probably be necessary for serious financial record keeping.

Making a Case

Great legal victories are forged on sweeping principles, but the everyday operation of the law depends on details. Keeping good track of all the facts of a complete case can make the difference between defeat and victory.

Database programs have perfect recall, unlimited patience, and the ability to sort through information in dozens of different ways. An Apple with standard disk drives isn't the best computer for saving large numbers of documents (you can get about 70 pages on a stan-

dard Apple II disk), but it will do fine as an index to a large paper-file collection or a set of microfiche records. With a hard disk hooked to an Apple, you can store thousands of pages.

Short of saving the full text of important documents, an Apple-size personal computer can support three different types of databases that may be of help for legal work. Broadly speaking, they are structured databases (most commonly the "relational" type), card-file programs, and free-text databases.

With a structured database, you establish a set of categories and then fill in information about various instances. For example, a lawyer may want to keep track of the name, address, and relationship to the case of all possible witnesses. Most databases for the Apple, including Apple's Quickfile and the database in AppleWorks, are of this type.

With a card-file program, you enter a paragraph or two of text and then give

Database programs have perfect recall, unlimited patience, and the ability to sort through information.

the keywords under which you want this information filed. This type of program is good for applications that previously would have involved a deck of 3 × 5 file cards, such as taking notes during interviews or researching the history of a dispute.

The third type of database, the unstructured or "free-form" type, is relatively new in the personal-computer market. This type of program lets you enter data like a set of notes on a pad and then organize the information or find patterns later. Developers of such programs claim their products are good for brainstorming, general research, and collecting broad categories of information whose eventual use is unknown at the time of collection. One example of this type of product is the recently announced Forethought Fact Finder for the Macintosh.

Finding the Precedent

A legal system based on the rule of law must either argue the meaning of statutes for each case or accept past decisions as indications of how to interpret general legislative statements. American law gives particularly heavy weight to precedent. In addition to cit-

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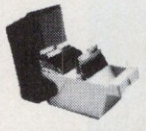

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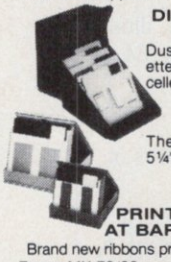

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ing past court rulings that are taken as binding, lawyers even introduce decisions from foreign countries in briefs to support particular arguments.

No one person, of course, can keep track of all past decisions that may be relevant to a case at hand. For that reason, a good law library has always been one of the essential resources for quality legal work, but the volume and pace of new decisions is outstripping the ability of all but the largest or most specialized libraries to keep up.

One solution that is becoming increasingly popular is to turn to a legal information utility, a dial-up legal database. The large general law utilities, such as LEXIS and WESTLAW, number their clients in the thousands. Other databases that focus on particular areas of the law are available from numerous vendors.

Once a firm starts using a legal information utility successfully, the firm's researchers often move on to other computerized information utilities as well. Most of the major general information utilities, such as Dialog and BRS, report that law firms form an important segment of their clientele.

Many of the specialized databases originally required users to access their service with a particular terminal, which meant having an Apple didn't really help that much. Most now accommodate personal computers running either special software or general communications programs, however.

Into the Courtroom

The majority of legal cases never go to trial, but when they do a personal computer can play a supporting role. Starting with jury selection, continuing through exhibit preparation and cross-checking of facts, and ending with presentation graphics for display to the judge and/or jury, a personal computer can continue to give legal aid.

Applying sociological and statistical factors to decide how to use peremptory challenges during jury selection is either a significant advance or a distortion of the legal system, depending on your point of view. In either case, it's an increasingly popular tactic. So are challenges to jury makeup that question the representativeness of the jury compared to the community and the identities of those excluded compared to those selected.

The process of picking whom to exclude or challenging the other side's exclusions now often rests on elaborate statistical analyses, most of which can fall into the personal computer's domain. Analysis often involves custom programs, but standard statistical packages for the Apple can also do the job.

When the time comes to argue the propriety of the process, the results must be presented to a judiciary that is not necessarily conversant with detailed mathematics. That's one application for presentation graphics, charts and graphs that show numerical results in an easy-to-grasp form.

Graphics can also chart evidence, buttress arguments, and summarize financial and other numerical information. With a color plotter from Apple or another company, an Apple II, Lisa, or Macintosh can create striking graphic renditions. LisaDraw and several programs for the Apple II also create large-scale output that consists of sections printed out one by one for later assembly into larger sheets.

Maintaining an Even Hand

Depictions of Justice almost always show her as blindfolded, reminding us that only the relevant facts of a case should enter into the legal balance. The reality is that in many cases one side starts with a decided advantage based on wealth, power, or access to information. A more widespread use of computers in legal affairs can widen that gap if only one side can afford machines and programs.

In many cases one side starts with a decided advantage based on wealth, power, or access to information.

In criminal trials, society as a whole pays to make sure that even defendants who cannot afford one get a lawyer. In civil suits, the courts are increasingly empowered to award legal costs to the prevailing party. Prison systems provide inmates with access to law books so they can prepare the best possible appeals.

Perhaps access to computers and legal databases may also become a right. If a case prepared with the help of a computer has a better chance of success, should not the principle of equality before the law dictate that where one side has a computer the other must also have this tool? The court-appointed computer may soon become a reality. ✚

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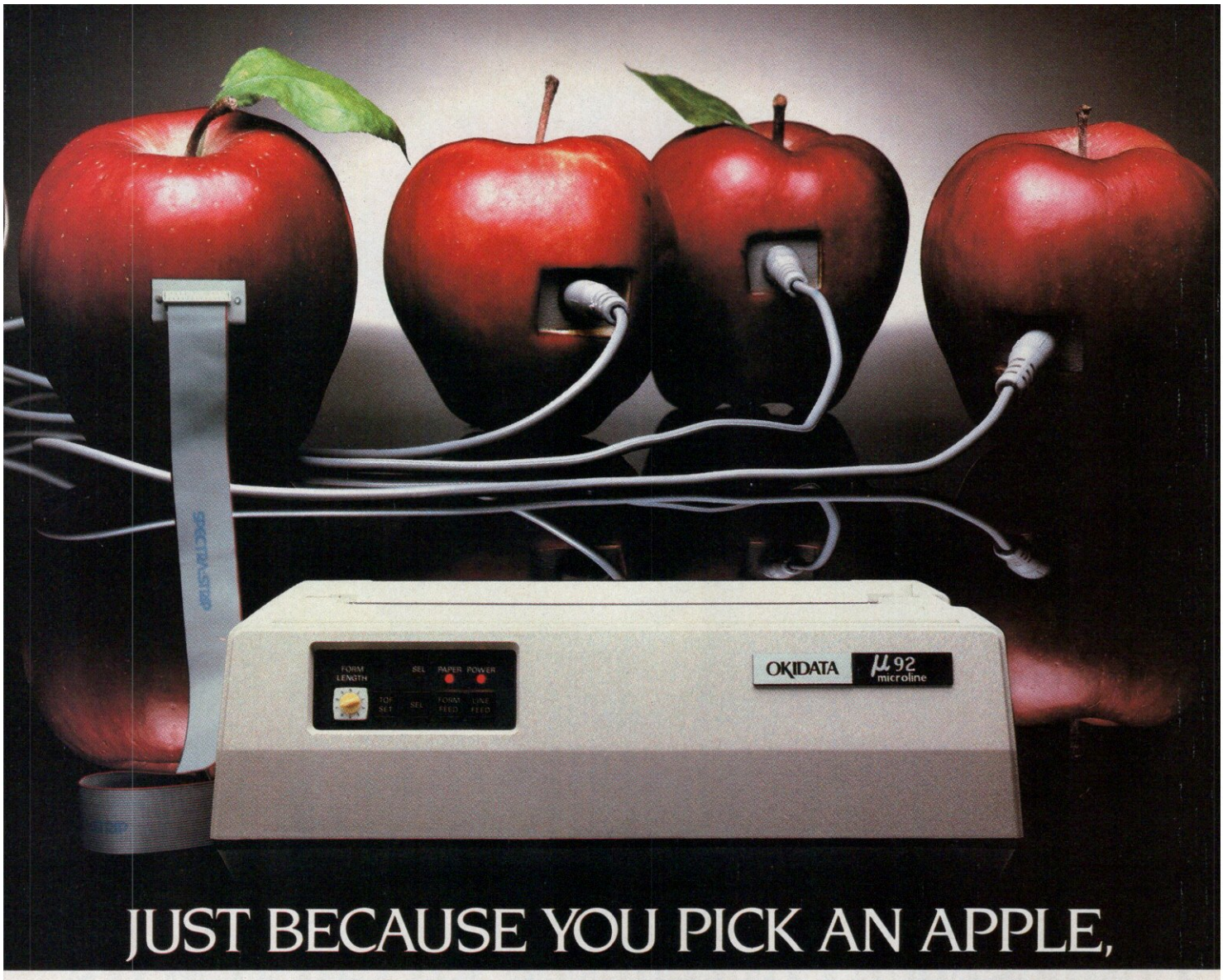

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▶ APPLEWORDS
BY STEVE ROSENTHAL

A short glossary

ALL RIGHTS RESERVED
A legal phrase that must be present in the copyright notice for software and manuals to secure protection in most Latin American countries. In the U.S. and in most of the rest of the world, a simple statement of copyright (including date and copyright owner) achieves full legal protection.

APPLE VS. FRANKLIN
A legal case Apple Computer, Inc., brought against Franklin Computer, in which it accused Franklin of copying the ROM routines from the Apple II. Franklin argued that a monitor ROM was not suitable for copyright protection. The trial court agreed with Franklin, but the appellate court reversed that ruling and sent the case back for a determination of whether Franklin had indeed violated Apple's copyright. At that point Franklin and Apple reached an out-of-court settlement.

Although often cited as proof that ROMs can be protected, the appellate-court ruling is not binding outside of its district, and lawyers are still waiting for a more definitive ruling from the U.S. Supreme Court.

BACKUP COPY
The U.S. Computer Software Copyright Act of 1980 explicitly authorizes the making of backups and adaptations of copyrighted software by users who have a legitimately obtained original. Many lawyers say that this right supersedes any prohibition in a licensing agreement, but not enough suits have been resolved on this question to settle the matter.

COMPUTER SOFTWARE COPYRIGHT ACT OF 1980
A federal law that updated section 117 of the Copyright Act to explicitly include computer programs as material suitable for copyright. It also gave users of legitimately obtained software the right to make backup copies.

COPYRIGHT
A government-sanctioned right to prevent the duplication or adaptation of an original work. Copyright is one of the main legal means to protect software. Copyright protects only the form of expression, not the underlying idea, and does not provide any protection against completely independent development of a similar work. For programs, this means the algorithms (formulas and processing steps) can't be copyrighted, but the actual code used to accomplish those steps can be.

Violation of copyright can lead to both criminal and civil penalties. Copyright in the U.S. is presently codified in the Copyright Act of 1976, contained in 17 USC (Chapter 17 of the United States Code).

DISCLAIMER
A statement made by the vendor of a software package that the software could possibly not do what it claims or not work for a particular application. Courts have increasingly held that disclaimers that are unilaterally imposed are not binding, but the principle is still not established.

EXPRESS WARRANTY
A right to expect certain performance from a product based on explicit promises by the vendor. For example, a statement on a software package that the medium is guaranteed to be free from defects for 90 days following purchase.

INTELLECTUAL PROPERTY
The general term for items that have value because of their information content rather than their physical embodiment. For example, a computer program may be a distinct, valuable possession quite apart from the disk on which it resides. In order to encourage the production of intellectual property, governments offer various forms of patent and copyright protection.

IMPLIED WARRANTY OF FITNESS
A legal responsibility the seller assumes when recommending a product to a customer. For example, if you go into a store and ask for a word-processing program with which to prepare your Ph.D. thesis, you would probably be able to seek legal redress if the program you bought didn't accommodate footnotes and allowed a maximum of only 20 pages. Although some states allow a vendor to disclaim this warranty, courts have increasingly sided with the consumer.

IMPLIED WARRANTY OF MERCHANTABILITY
A legal presumption that a product will actually perform the task normally expected of an item of its type.

For example, a spreadsheet for your Apple ought to add correctly. Again, the instances in which a seller can successfully disclaim this warranty are not legally defined.

NONDISCLOSURE
An agreement to keep a business secret. Hardware vendors, such as Apple, often require nondisclosure agreements from software developers in return for access to unannounced products.

PATENT
A government-sanctioned monopoly for 17 years on the right to produce or sell a specific product or process. Unlike a copyright, a patent protects against others who unknowingly and independently produce a similar item. To be patented, however, a product must be novel and not obvious to other skilled personnel. Mathematical algorithms cannot be patented, so the Patent Office routinely refuses to accept computer software (novel circuits, on the other hand, are eligible for patent protection).

REVERSE ENGINEERING
The practice of figuring out what a product or program is supposed to do and then creating an independent product to accomplish the same result.

It is legal to apply this process to a copyrighted product or to one protected by trade secret (providing the specifications were legitimately obtained), but a patent protects against even completely independent efforts if the result is similar to the item protected. The law considers that disassembling a program—rather than starting from the specifications—amounts to copying, and not reverse engineering.

SHRINK-WRAP LICENSE

An industry term for a license agreement printed on the outside of a software product's packaging or along with a disk or cartridge inside a sealed transparent-plastic film. The agreement generally claims that opening the seal constitutes assent to the terms of the license agreement.

So far, the validity of this view has not been tested in court, but many lawyers feel that reason exists to question that position.

TRADEMARK

An identifying name or symbol used to distinguish a particular product brand. Company names, program titles, and hardware product names cannot be copyrighted, but they can be trademarked.

Most states provide some form of trademark protection, and the federal government protects marks used in interstate or international commerce. Trademarks can be registered—shown by the ® symbol—which gives them stronger protection.

TRADE SECRET

A form of legal protection for software based on state law and contracts between vendor and user. Because a secret must truly exist for this type of protection to be effective, it is normally used only during the developmental stage for mass-market software. Persons who illegally disclose a trade secret can be sued for any resulting loss.

UNIFORM COMMERCIAL CODE (UCC)

A model law for the regulation of business transactions, which most states have adopted in whole or part. The code presumes that a sale of a product such as a computer or software includes certain implied warranties, but it allows the vendor to explicitly disclaim those promises.

UNIVERSAL COPYRIGHT CONVENTION (UCC)

An international treaty that commits each signatory country to provide copyright protection for a work published in any of the several dozen signatory countries that is equal to that accorded to residents of each country. To secure protection, a piece of software must include the copyright symbol, ©, followed by the date of publication and the copyright holder's name. Because countries where Apples are marketed have signed this treaty, copyrighting software in the prescribed form in any country protects it virtually worldwide. +

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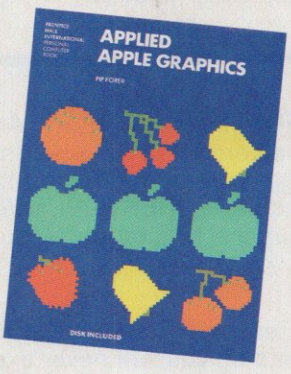

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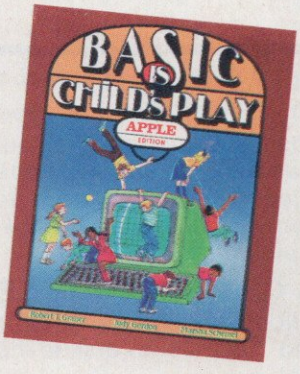

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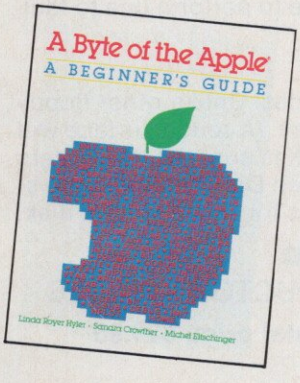

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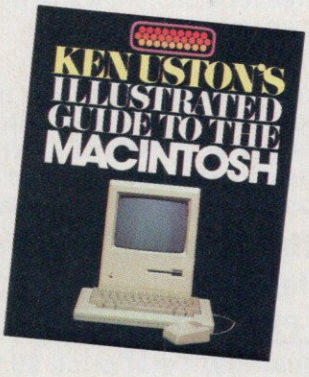

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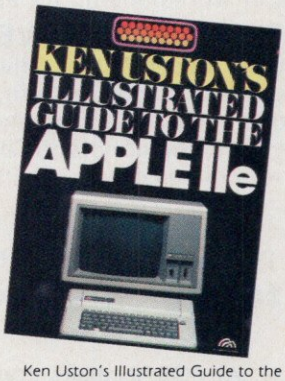

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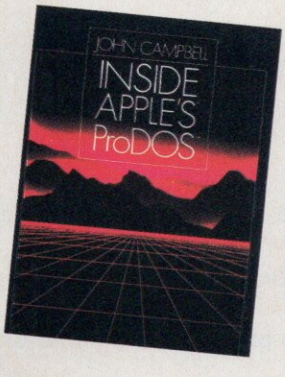

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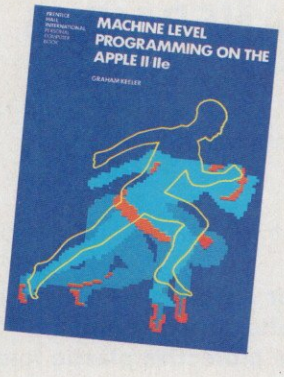

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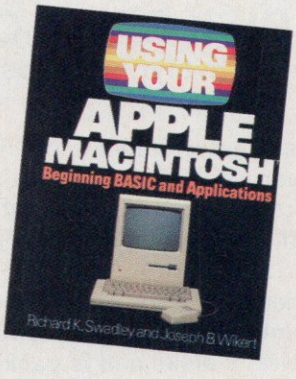

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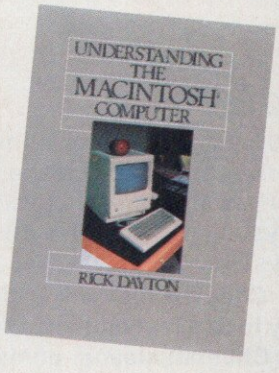

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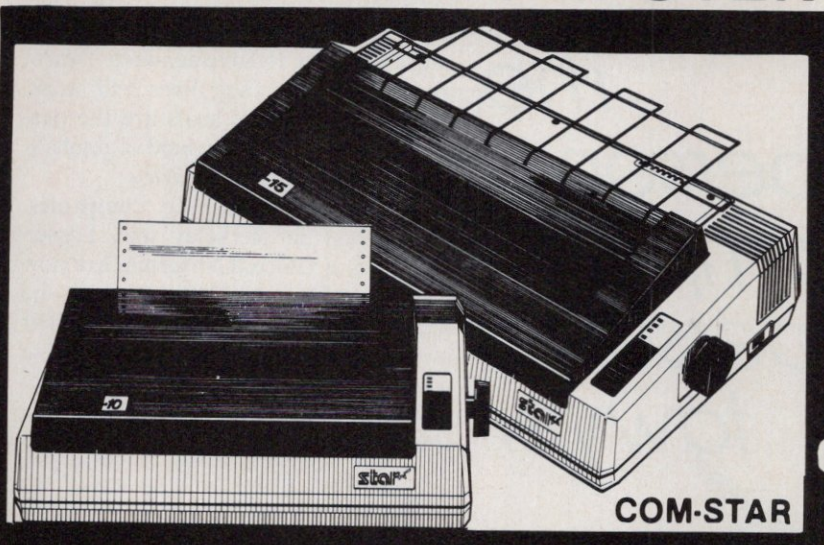

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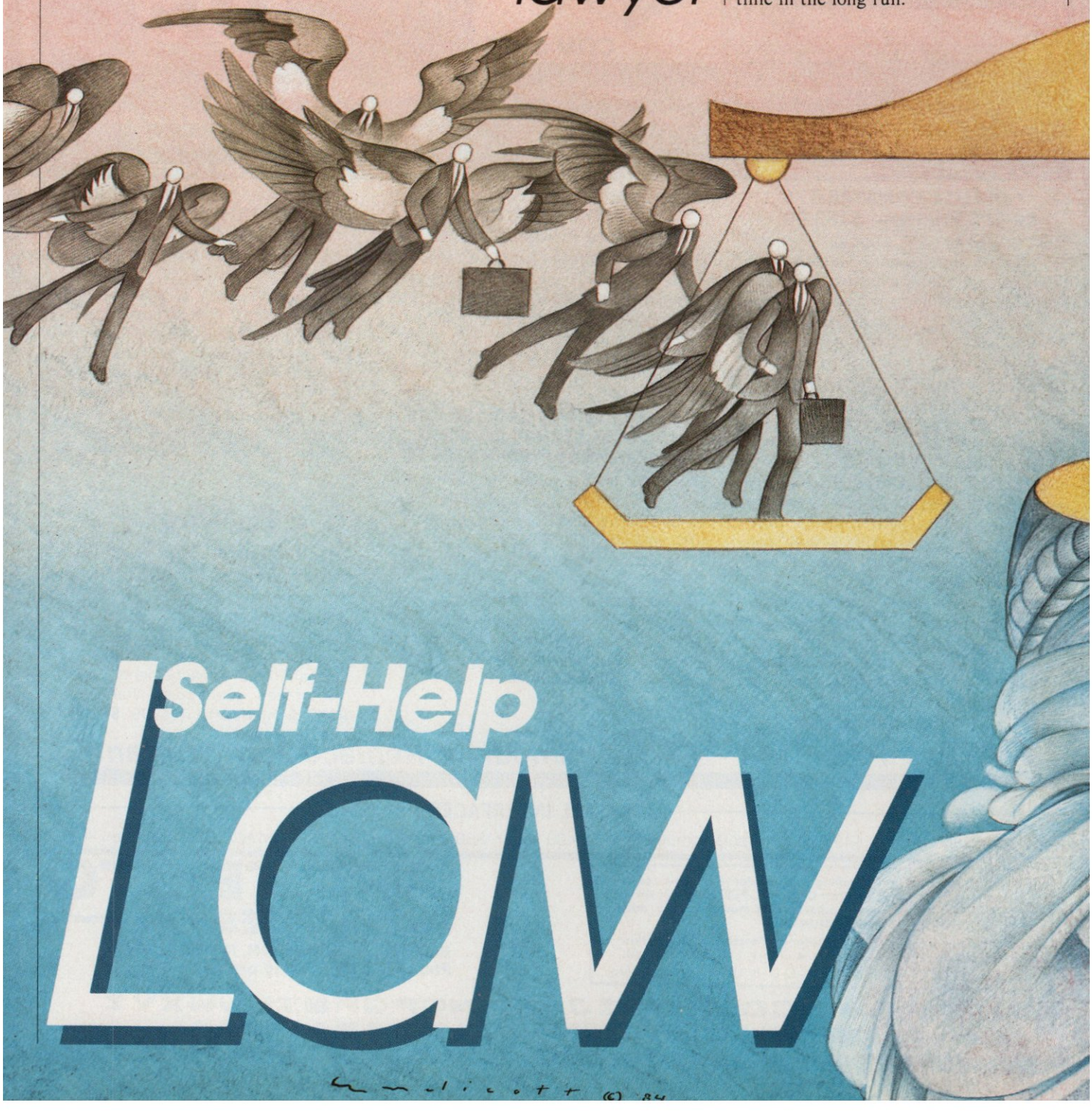
▸ APPLES AND THE LAW
PART I
BY SUSAN LUTTNER

The personal computer as personal lawyer

Personal-computer users are an independent lot. They like computers because they like to have as much control as possible over their lives and work. These self-sufficient souls are the perfect audience for a new kind of publishing: self-help legal software.

Two small publishing companies, Nolo Press in Berkeley and Lassen Software in Chico, California, are now offering software tools for people who prefer taking responsibility for their own legal affairs. As it turns out, a computer can be a reliable, cost-effective attorney that actually saves you time in the long run.



Self-Help Law

Steve Elias of Nolo Press characterizes the trend toward do-it-yourself law as the resurgence of a movement dead for nearly 200 years. After the American Revolution, Elias says, the people who set up the government and the judicial system tried hard to simplify what they saw as a cumbersome and arbitrary set of legal traditions. "There was a lot of emphasis on self-sufficiency and a general distrust of lawyers. The idea was that an educated person should be able to handle his own affairs without relying on an expert," he explains.

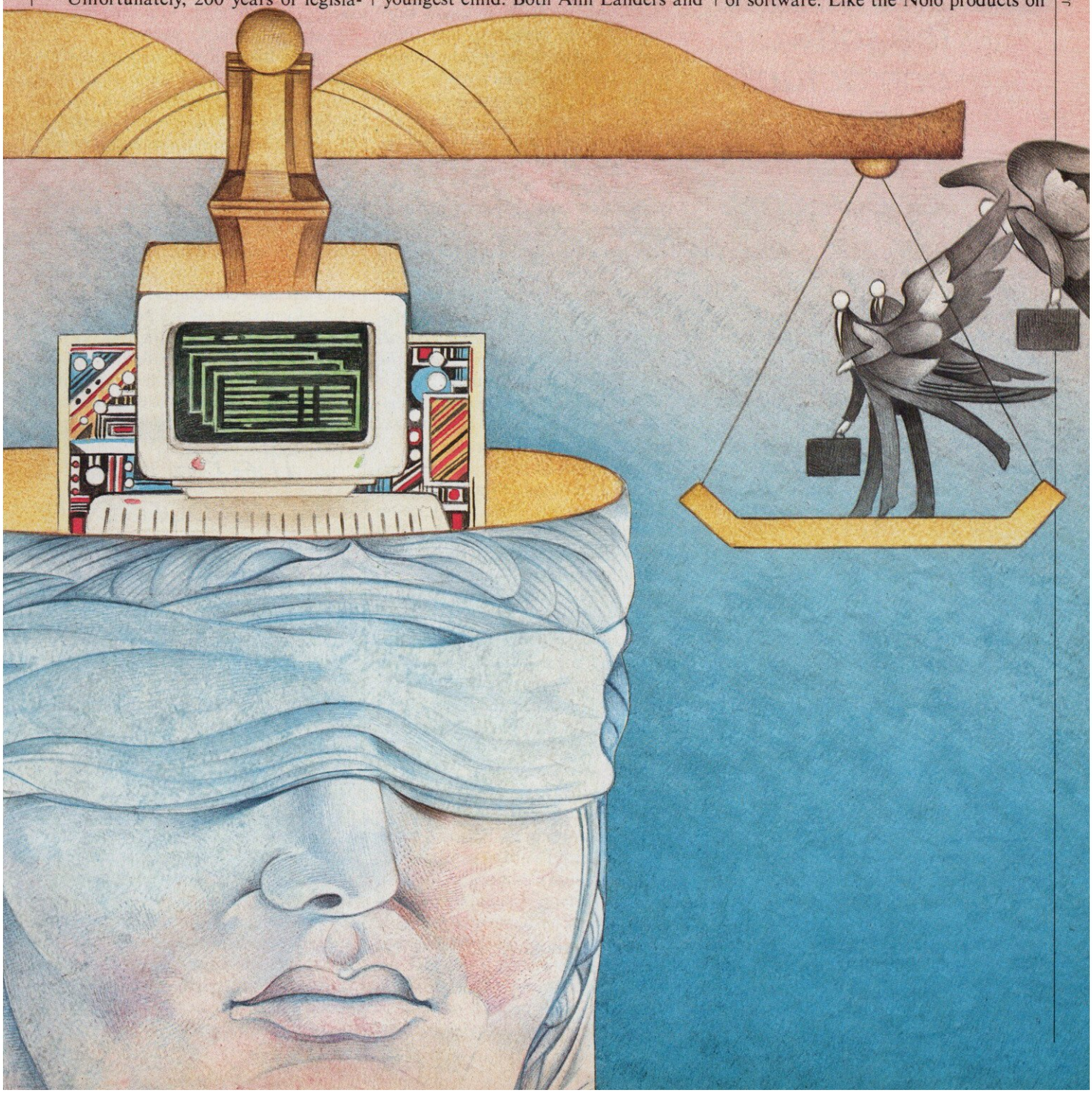
Unfortunately, 200 years of legislation and court decisions have left us with a system even more complex than the one the founding fathers rejected. Most people now assume that the convolutions of the law are beyond them and that they need the advice of an expert. At the very least, most of us would rather pay somebody else to figure out all the details than spend days sorting through self-help books ourselves.

A computer can make a difference, though. Consider your will. You know you ought to have one, but you've never quite gotten around to it, or your will is ten years old and doesn't mention your youngest child. Both Ann Landers and the local bar association are forever reminding us that we are not making adequate provisions for our loved ones.

Now there's an easy answer: Buy a program that lets you do the whole thing in an evening, and once you've done that, you will probably keep your will more current than if you relied on a paid expert. It's easier to turn on the computer after dinner than to visit an attorney during office hours.

From Paperbacks to Software

Nolo Press has been publishing self-help legal paperbacks since the early 1970s, but Will Writer is its first piece of software. Like the Nolo products on



JAMES ENDICOTT

paper, Will Writer is a practical, step-by-step guide to handling your own legal needs. Unlike Nolo's books, however, the software can actually generate the required documents for you, significantly reducing the amount of time you have to spend on the project.

The program starts by asking you a series of basic questions about marital status; dependents; and, because probate laws vary from state to state, legal residence. If you live in Louisiana, you're out of luck. (Louisiana's laws are based on the Napoleonic code, not the British law on which other states base their laws.) The program can handle any other state and the District of Columbia, however.

The software can actually generate the required documents.

Once you've laid the groundwork, Will Writer leads you through the decisions you have to make. The program is menu-driven and well organized. Explicit screen instructions let you find your way around easily without recourse to the manual, but, as the screen messages emphasize, the manual is an essential part of the product. Taking care of your own legal affairs is serious business, and you don't want to make any uninformed decisions.

Fortunately, the manual is well worth reading. Like the Nolo books, it provides concise, practical information in terms any reasonably intelligent person can understand. It uses legal buzzwords only when necessary, and it includes a glossary to help you keep the terminology straight.

Whether you learn the words or not, Will Writer transforms your answers to its simple questions into a series of paragraphs couched in the most proper of legalese, together with all clauses and encumbrances established by probate-court tradition.

The formal language of the output is almost shocking in contrast to the conspiratorial tone of the manual. ("If you have enough money to worry about this subject, you have enough to hire [accountants and lawyers] to help you," it says regarding federal taxes on estates larger than $500,000.) The documentation is a clue to Nolo Press' roots as an organization with a cause.

The company was founded in 1971 by Ralph Warner and Charles Sherman, a pair of Legal Aid attorneys who were looking for alternatives to careers as corporate lawyers. Their experience with providing legal services to the poor had convinced them that the prevailing system put too much emphasis on paying for expert advice and not enough emphasis on educating the participants. They started with the California divorce courts.

They put together *How to Do Your Own Divorce in California*, the first real self-help law book. It was a step-by-step guide to preparing and filing the papers necessary for an uncontested divorce under California's no-fault divorce laws. The forms and procedures were supplemented with insiders' advice on dealing with uncooperative court clerks and warnings about when to call in a lawyer.

Nolo's first effort was an unqualified success, especially after a group of lawyers accused the small publishing house of unauthorized practice of the law, generating a wave of free publicity. Within the next few years, Nolo produced the *California Tenants' Handbook; Sex, Living Together and the Law*; and other books aimed at the growing population of vaguely dissatisfied young adults looking for alternatives. Do-it-yourself law caught on.

Unlike a lot of other experiments that flourished in the 60s and 70s, only to wither in the 80s, Nolo is still going strong. "The people who started this company had a vision of how they wanted a business run. They had moral values and life-style values that seemed more important to them than making a lot of money," reflects associate publisher Carol Pladsen, who has been with Nolo for seven years. "Remarkably enough, we have been successful, even in a field (publishing) not known for easy profits."

Self-Help-Software Pioneer

Lassen Software in Chico is a more conventional software publisher. The company is adapting its Personal Lawyer Series, which has been available for the IBM Personal Computer for a year, for use on the Apple II family of computers. Lassen's product was probably the first self-help legal software, but since the precedent of do-it-yourself law was well established by 1983, the series has met no legal resistance.

The Personal Lawyer Series includes four programs: Wills provides approximately the same features that Nolo's Will Writer does. Promissory Note defines the terms and conditions of a loan. Power of Attorney/Statement of Guardianship is an assortment of tools that you can use when you leave your children with a relative for the summer or when you can't attend a meeting but want a friend to cast your vote. Residential Real Estate Lease produces a legally binding lease.

None of Lassen's wills has been tested in court yet. Lawyers reviewing samples produced by the program have found no flaws, though. Most wills produced by law offices are based on the same standard forms, so no one is questioning the product's validity.

The subject of self-help legal software may still make some of us nervous. Can't we get ourselves in trouble in the tricky world of law and the courts by relying on a computer and a paperback manual? Yes, of course we can. Nolo's experience, however, is that the people interested in using self-help legal tools are usually smart enough and careful enough to do it right.

Occasionally, Elias says, someone calls up and complains, for example, that a form supplied in a Nolo book was rejected by a court clerk. So far, the problem has always resulted from the customer's using a book that was out of date. Nolo's solution is to offer the caller a current edition at a discount. In ten years of publishing, Elias says, "we don't know of anyone who has been harmed by relying on the information in our books."

The publisher's responsibility is to be fanatic about accuracy.

The publisher's responsibility, he says, is to be fanatic about accuracy and timeliness. Nolo updates each book once a year, and slips pamphlets into the front of warehoused volumes when a law changes in midcycle. All books contain conspicuous warnings that they are reliable only in the year of publication, as well as several disclaimers of responsibility. "Of course, nobody knows if the disclaimers are any good," Elias

adds, "because they've never been tested in court."

Frank Holt of Lassen draws a clear line between selling tools for self-help law, which his company does, and offering legal advice, which his company doesn't do. He offers this example: A potential customer, a businessman but not a lawyer, once proposed buying the Wills program and then selling wills for $20 each. "We told him that wouldn't be such a good idea, since selling the wills would amount to practicing law," Holt says.

Lassen has sold the program to life-insurance agents, however, who make it available as a service to their customers. "Insurance agents always want their clients to have wills. It's good business. The agents wouldn't want to do it themselves, but there's no reason they can't let people borrow their computer," he explains.

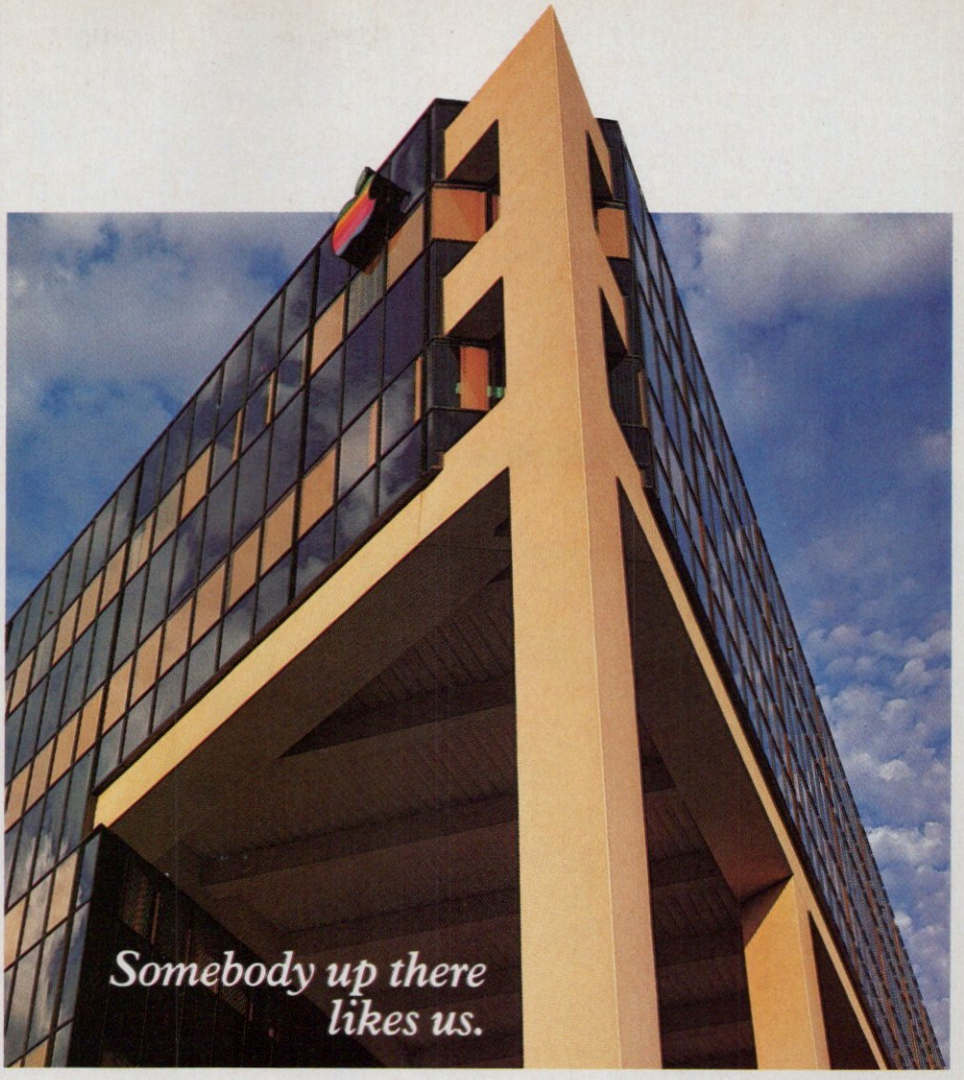
Both publishers emphasize that their will-preparation programs should be used only for relatively small, uncomplicated estates (less than about $500,000). The documentation stresses that if you want to do anything fancy, you should do more research or call in an expert. Nolo recommends that if you have any doubts, you should pay a lawyer to review the document, just to be sure.

In any case, you can't be absolutely sure your will is going to have the effect you want, whether it's written by your lawyer or by your computer. As Nolo's founder Ralph Warner reminds us, "In a society with 630,000 lawyers, no transaction of any significant economic dimension escapes legal notice." +

PRODUCT INFORMATION

Will Writer
Nolo Press
950 Parker Street
Berkeley, CA 94710
(415) 549-1976
List Price: $39.95 (with rebate offer)
Requires: Apple II, II Plus, IIe, or IIc
CIRCLE 410 ON READER SERVICE CARD

Personal Lawyer Series
Lassen Software
P.O. Box 1190
Chico, CA 95926
(916) 891-6957
List Price: Wills ($79.95), Promissory Note ($69.95), Power of Attorney/Statement of Guardianship ($69.95), Residential Real Estate Lease ($99.95)
Requires: Apple II, II Plus, IIe, or IIc
CIRCLE 411 ON READER SERVICE CARD



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.

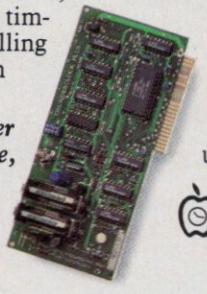
Not surprising, when you consider Thunderclock's long list of useful applications. In the office, the lab and at home. It starts with time and date stamping disk files and just keeps growing. To automatically accessing data bases, sending electronic mail, timing experiments, controlling your sprinklers 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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19G Orinda Way
Orinda, CA 94563
(415) 254-6581

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**ProDOS and APPLEWORKS are trademarks of Apple Computer, Inc.
***WORD JUGGLER IIe is a trademark of Quark Incorporated.

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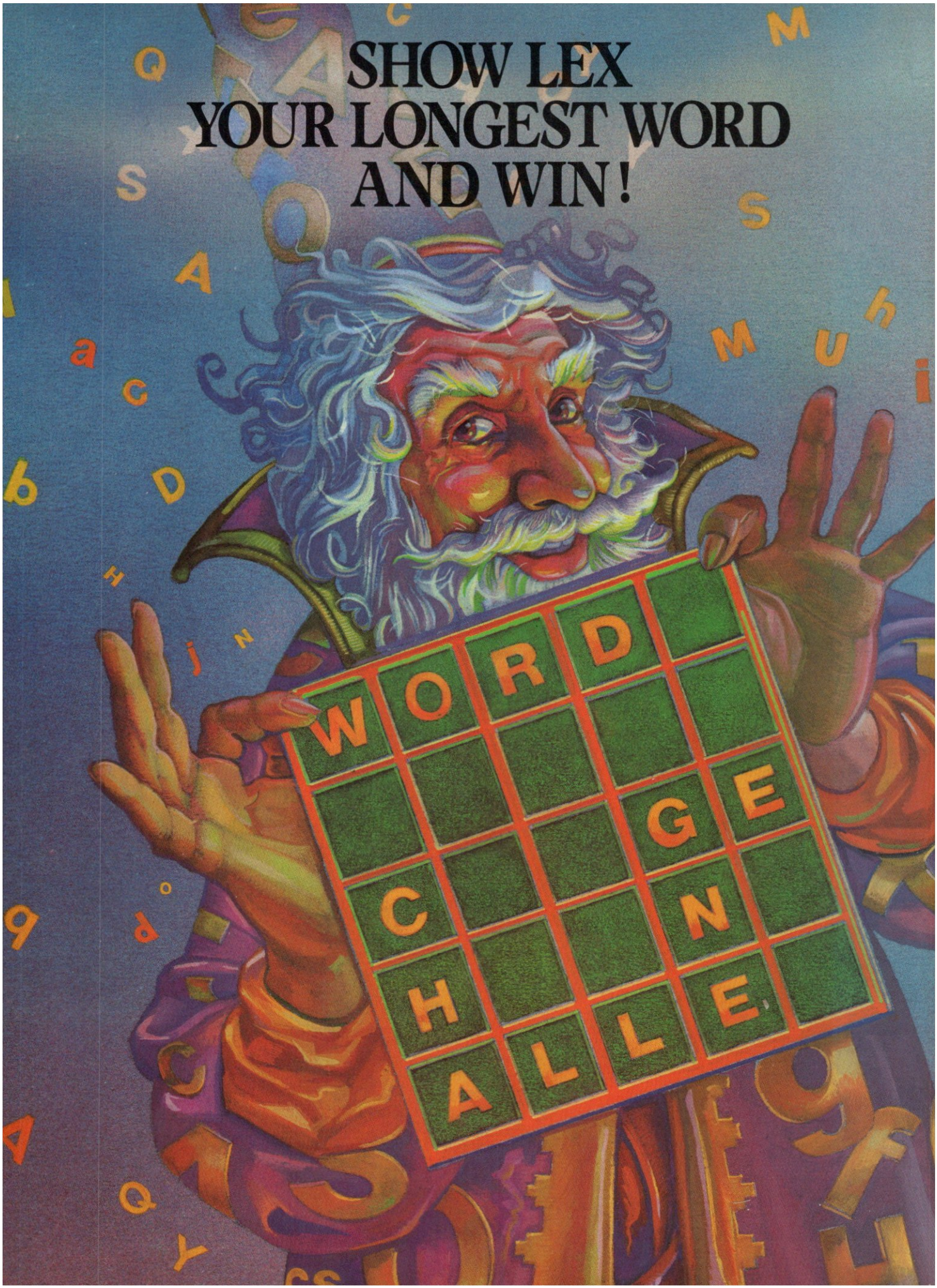
SHOW LEX
YOUR LONGEST WORD
AND WIN!
WORD
CHALLENGE

ENTER THE EXCITING HAYDEN NATIONAL WORD CHALLENGE™ CONTEST.

IF YOU'VE GOT A WINNING WAY WITH WORDS, THIS IS YOUR GAME.

Word Challenge. The mind-boggling game in which you compete head to head against LEX, the mighty Wizard of Words.

Select the size of your playing square, pick from 26 skill levels, set a time limit, and choose from 5 scoring methods. Then see how you stack up against the Wizard and his 90,000 word lexicon. It's a race against the clock.

You and LEX compete to form words by connecting randomly generated letters. Words are legal if their letters touch in sequence on any side or corner. The more words you find, the better your chances of beating LEX.

When your time's up, LEX displays the words you found and the words he found. You score points for every word you made that he didn't. Word Challenge keeps the score.

Word Challenge is based on Proximity linguistic technology. It operates on Apple™ II +, IIe, IIc, IBM PC,™ PC jr.™ and popular compatibles. Available soon for Macintosh™ and Commodore 64.™

Play Word Challenge alone or with a group. See if your family or friends together are wordy enough to bring LEX to his knees.

TO WIN OUR CONTEST, GIVE US THE GOOD WORD.

It's easy to play. First buy Word Challenge. Then follow the rules as described on the official Entry Form available only inside specially marked Word Challenge packages. Fill in the letters on the official contest grid to construct the longest possible word. Show your word to LEX. If he has it in his vocabulary, send it in.

First prize for the longest word is $10,000 cash.

Second prize is $3,000 cash.

The top 200 finishers will receive Word Challenge polo shirts.

Be one of the first 5,000 to buy Word Challenge and enter the contest, and we'll send you a free Word Challenge T-shirt.

Enter now. The contest expires October 31, 1984. Purchase of Word Challenge is required. Contest void where prohibited.

JOIN OUR WORD ASSOCIATION. THE RIGHT WORD COULD BE WORTH $10,000.

To purchase your copy of Word Challenge, see your local software dealer, or contact Hayden Software, 600 Suffolk Street, Lowell, MA 01854, or phone toll-free 800-343-1218.

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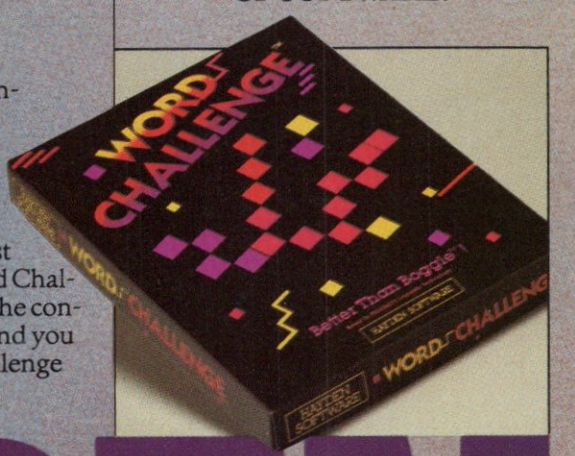
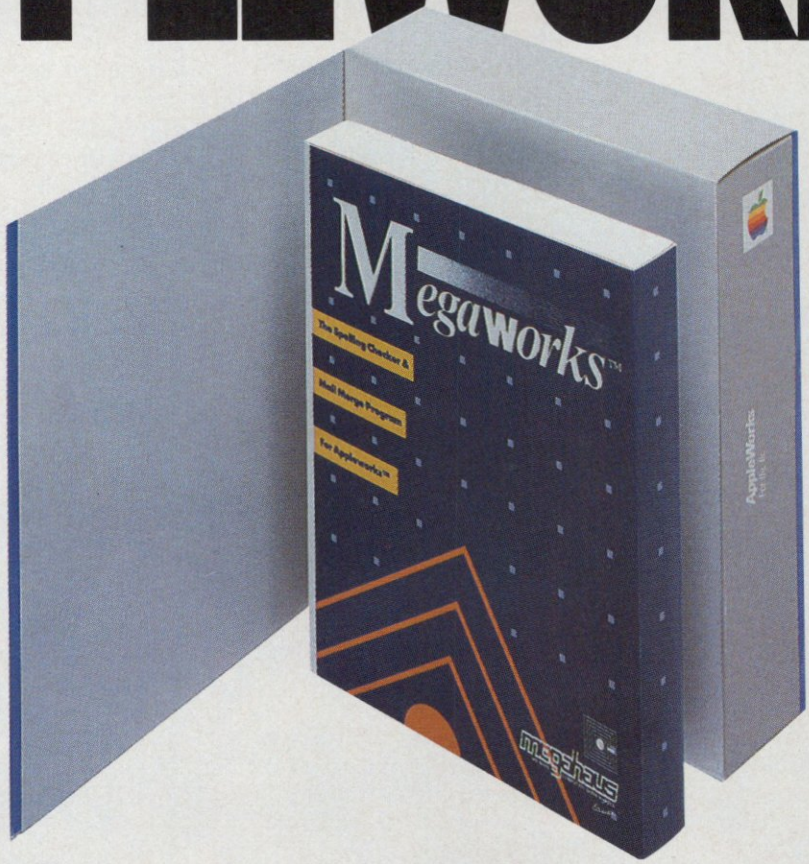


HAYDEN

CIRCLE 367 ON READER SERVICE CARD

MEGAWORKS™ WITH APPLEWORKS™.



You already know AppleWorks™ is the powerful program that combines the three most popular applications for your Apple //e and //c. Its only drawback is the absence of two key functions.

That's why Megaworks with AppleWorks.

Megaworks is the mail merge and spelling correction program designed exclusively to complete the AppleWorks package. Your knowledge of AppleWorks makes Megaworks simple to use. Mail merge lets you print form letters, mailing labels and envelopes from a single master letter and list. The spelling checker corrects misspelled words in documents and "word wrap" retains its original format, a function unavailable in many popular programs. The dictionary allows you to personalize your work with the addition of 10,000 words to its 40,000 word library.

Megaworks completes AppleWorks. See the complete works for your Apple //e and //c today at a dealer near you. Or send for our free, no obligation brochure.

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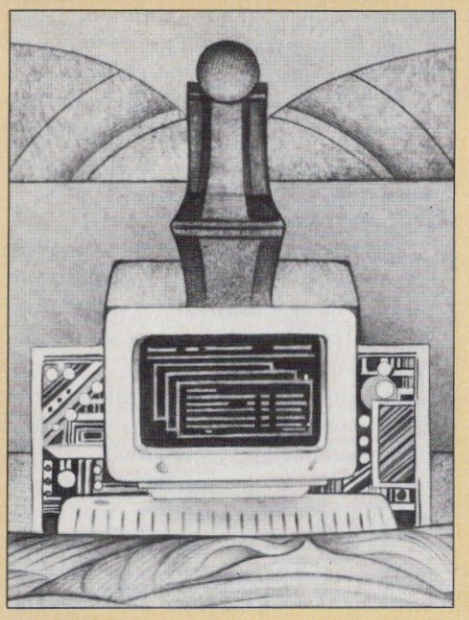


▶ APPLES AND THE LAW
PART TWO
BY STEVE ELIAS

Copy-Rights LAW

What are your legal rights and responsibilities?

Generations of Americans have grown up wondering what would happen if they ripped that warning tag off the mattress or pillow. Would they really go straight to jail and pay a $10,000 fine in the bargain?

The current generation has a new question: "Can I actually go to jail and pay a $10,000 fine for making an unauthorized copy of that new game program I just bought at the corner store?"

What are your legal rights as a consumer when you purchase software (in a retail context) for your computer? Can you legally

- make copies and share them with friends and family,
- make one copy for your home and another for your business,
- make backup copies,
- use your copy on a multiuser or network system for educational or business purposes,
- modify your original copy to make it perform better on your computer, or
- sell your original copy to someone else when you want to replace it with a new or different version?

Any attempt to answer these questions must begin with an examination of the Copyright Act of 1976.

The Copyright Act

Applicable to all original works of expression created after January 1, 1978, this law offers protection to almost all microcomputer software currently on the market. Copyright protects the expression of the software (i.e., the source or object code, the screens, the documentation, and so on) rather than the ideas inherent in it. Thus, the specific form in which an adventure-game program is cast (i.e., the expression) is protected, but the essential idea of the adventure is not.

Similarly, the copyright law does not protect the physical medium in which the expression is fixed, but only the expression itself. When you receive a disk, therefore, you physically own the disk even though the programmer or developer owns the copyright to the program on the disk.

The central idea of the copyright act is to encourage authors to be creative. It does so by giving them the exclusive right to display, perform, distribute, make copies of, and prepare derivative works (i.e., adaptations) from their original works of authorship. In exchange, the public is supposed to benefit from the resulting spread of ideas. What this concept means in practice is that no copies or modifications of a protected work can be made without the author's permission. Incidentally, the term *author* does apply to computer programmers and software developers.

Copyright protection attaches to any original work the minute the author creates it. If the work is published, however, the author must place a correct copyright notice on it to maintain the copyright. The typical copyright notice includes the symbol © and/or the word *copyright* (or *copyr.*), the name of the author or other copyright claimant, and the date of publication. If you see this notice on a work, you'll know it's protected by copyright. Notices on software programs often appear both on the package and on the introductory screen.

Programmers own copyright to their program unless, as an employee, they wrote it in the course of their employment. In such a case, the program belongs to the employer. Also, programmers often sign away all their rights to their publisher or distributor, in advance of development.

Although the copyright act prohibits the copying or modification of the original work without the copyright owner's permission, many exceptions exist.

Exceptions

The first exception (to the copyright owner's exclusive right to make copies and alterations) entitles the owner of a copy of a copyrighted work to sell or otherwise dispose of that particular copy without the author's permission.

The second and third exceptions are computer-specific. One allows the owner of software to make backup copies (quaintly referred to as archival copies). The other allows users to adapt the software for their own personal use. Under these exceptions, if a user transfers the original copy to another person, the backup copies must either be transferred along with the original or destroyed. Users cannot transfer an adapted copy and must destroy such a copy upon transfer of the original. These exceptions are found in Title 17 of the United States Code, Section 117.

The fourth exception is called "fair use." This concept is really a defense against a charge of copyright violation,

the accused stating, "I didn't violate your copyright; I only engaged in fair use." Incapable of precise definition, fair use of a copyrighted work occurs when the use is noncommercial in nature; involves educational, scientific, historical, legislative, journalistic, or academic pursuits; and does not unreasonably alter the copyright owner's reasonable expectation of income.

For example, photocopying an entire textbook for distribution in a class would not be fair use (since textbooks are meant to be sold to individual students), but copying a few pages from a textbook for one specific lesson probably would be.

The court cases and commentaries that have resulted in formulation of the fair-use rule chiefly involve the printed word. Ways in which the rule applies to software use are still not settled, but here are some possibilities:

- Making a copy of the software for friends or other users to use for a specific, limited period of time and with a specific purpose—as in a lending library.
- Using a program in both home and office if you are the only user.
- Publishing the screens from a program for the purposes of journalistic review and comment.
- Making copies of the program for use in a computer class when the purpose of the class is incidental to the purpose of the software. Using multiple copies of a word-processing program to teach word processing may not be allowable, but using them to teach "computer literacy" may be.

Ways in which the rule applies to software use are still not settled.

Copyright Infringement

Infringement of the copyright occurs when users exercise, without permission, the copyright owner's exclusive rights, in situations not covered by one of these exceptions. Infringement of the copyright owner's exclusive right to make copies is what we commonly call "illegal copying" or "piracy."

What can happen to you for infringing a copyright? If your act is willful (i.e., you knew, or should have known, you were infringing a copyright), the copyright act allows for criminal prosecution in addition to civil-infringement suits. Unless the copying was for a commercial purpose involving large sums of money (i.e., piracy in a big way), however, you will almost certainly not face criminal prosecution.

You are unlikely to encounter a civil-infringement suit, either, unless your copying has caused the copyright owner to experience significant loss of revenue. Rather, if your violation of the copyright is for an innocent and noncommercial purpose, the only consequence you are ever likely to face is the receipt of a letter asking you not to do it again.

If you are successfully sued, however, the copyright owner can recover any money damages actually incurred and can also prevent you from continuing your infringing activity. Further, if the copyright owner registered the copyright with the U.S. Copyright Office in a timely manner, you may be subject to "statutory damages" (i.e., the court can award damages even though the other side doesn't prove damages), and you may have to pay the other side's attorneys' fees. Despite the improbability of such results in a minor infringement case, obeying the law is always the wiser course. The copyright law is no exception.

The Real World

Now that you know your rights and responsibilities under the copyright act, how do they apply in the real world? Assume that Mike Enduser is starting a new small business, and he resolves to use computers right from the beginning. After weeks of research, Mike decides to buy an Apple IIe because of the amount and variety of software available. Next, Mike visits his neighborhood software store and selects a number of well-known business and game programs. The store owner adds up the cost, takes Mike's money, and gives him the software in a bag with the receipt enclosed.

When Mike gets home and inspects the shrink-wrapped software packages more closely, he learns that by opening the package he will be entering into a contract aptly known as a "shrink-wrapped license." This contract gives Mike permission to use the software as long as he conforms to the conditions specified in the package. These conditions prohibit users from transferring, copying, or altering the software and from using it on more than a single computer. In other words, most of the rights available to a software purchaser under the copyright act are taken away in these licenses.

Before we discuss the legality of this arrangement, let's see why software isn't purchased outright, as most other consumer items are.

Past and Present

Before microcomputers arrived, software for mainframes and minicomputers was generally very expensive and was distributed on a personalized and specific-transaction basis. That is, through a face-to-face bargaining process, consumers agreed to pay a certain sum of money and comply with certain restrictions on the software's dissemination and use in exchange for its use on a specific machine. Through this marketing and distribution method, software developers were able to maintain better control over their product than what would have been the case in an outright sale. As we have seen, "license" is the term for this type of conditional contractual arrangement, which falls somewhere between a sale and a lease.

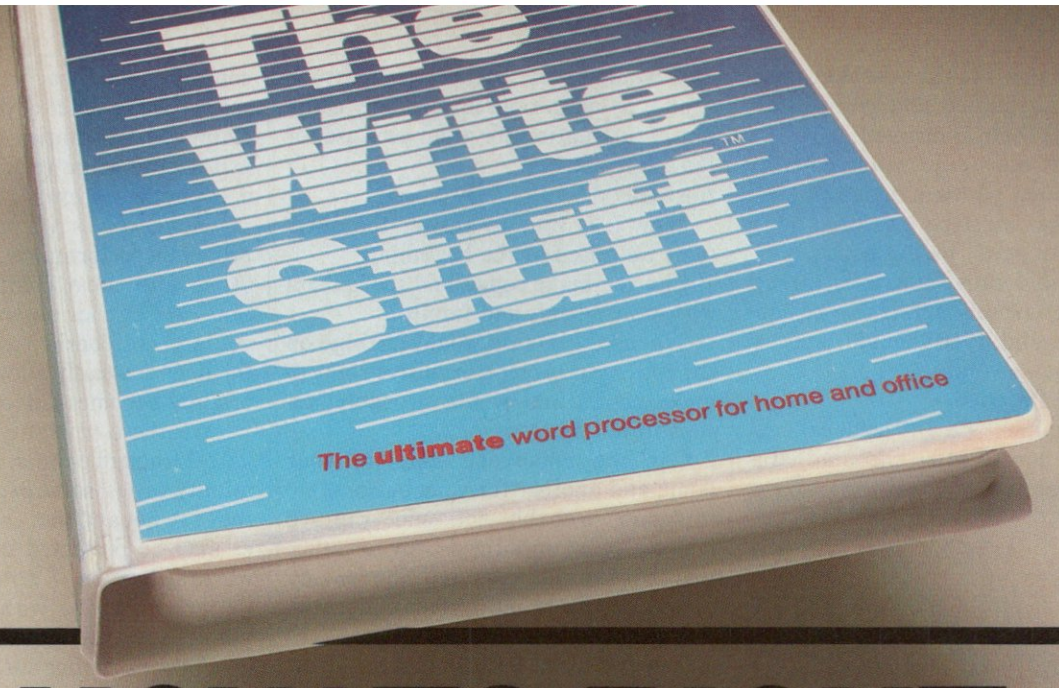
Although microcomputer software is now generally marketed over the counter in a purely retail and nonpersonalized mode, the traditional licensing techniques are still applicable. Assuming they were legal during that former time, are they still legal today? My opinion is that they aren't, but judges in future court cases will have to decide.

Who Owns What?

When Mike walked out of the store with his software, he thought he owned it. He was not aware that he had made an agreement. As we saw earlier, the copyright act gives owners (purchasers) of the actual software (as opposed to the owners of the copyright in the software) the right to make backup copies, to transfer the software, and to adapt it for their own use. Does Mike then own the software for the purpose of exercising these rights? Probably yes, since the entire context in which he bought the software suggested the transaction was a purchase rather than a license.

Licenses are contracts, and contract-law principles determine whether or not they are valid, and thus enforceable. Under the laws of most states, contracts are only valid and enforceable if certain requirements are met. For a contract to be valid,

- the parties must actually agree to its terms;
- the parties must each receive some-



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There's virtually no word processing function THE WRITE STUFF can't perform. As well as options you only find in programs costing five times as much: word count, complete cursor control, variable speed scrolling, undo any change in one step, on-screen underline and **boldface**, automatic save, and more.

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THE WRITE STUFF is from Harper & Row, one of the world's leading publishers. We've been recognizing great writing for more than 150 years, even before Mark Twain brought us Huck Finn. We think you'll find THE WRITE STUFF right in his league.

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CIRCLE 101 ON READER SERVICE CARD

thing of value (called consideration), which is negotiated and given in exchange for their agreement;
- the parties must enjoy some equality of bargaining position; and
- the contract must be legal and not a violation of some public policy. Further, specific provisions in contracts that are extremely unfair can be considered invalid, even though the overall contract is valid.

Misleading Practice

In the opinion of many legal experts, the type of license Mike encountered is not valid or enforceable. No negotiation took place; the license was offered on a "take it or leave it" basis by a large company to individual users; and the users receive no benefit in exchange for giving up their rights under the copyright act. Although Mike supposedly agreed to the license arrangement when he opened the package, many legal experts believe that agreements obtained in this form do not constitute what is required to make a valid contract.

Violating a license has nothing to do with violating copyright law.

Even if the license turns out to be valid, however, not much can happen if Mike decides to ignore it and stand on the copyright act. It is extremely important to understand that violating a license has nothing to do with violating the copyright law and is therefore not illegal. The potential penalties for copyright violation do not apply to license violations. Many software distributors muddle their license restrictions and the potential penalties for violating the copyright act together in one statement and then say users are subject to criminal prosecution and a $10,000 fine if they don't behave. This practice is highly misleading and wrong.

In fact, the only likely result of a license violation is that you may have to return the software and pay for any lost sales your breach of the license may have caused. If your acts that breached the license were in compliance with the copyright act, however, no such damages would ensue, because your breach would, by definition, involve only copying or adaptation for your own use, or for a fair use.

Answers

Now it is time to answer the questions we raised at the beginning:

1. Can you make copies and share them with your friends and family?

No, as this action would infringe on the copyright owner's exclusive right to make copies and would probably not constitute fair use.

2. Can you make one copy for your home and another for your business?

Again, probably not, since you are making an unauthorized copy for other than backup purposes and not for any of the purposes permitted under the fair-use doctrine.

3. Can you make backup copies?

Emphatically yes, at least under the copyright act. If you are dealing with a shrink-wrapped license that prohibits it, there is a good chance the license is invalid and not much for you to worry about.

4. Can you use your copy on a multiuser or network system for educational or business purposes?

You probably can for educational purposes, under the fair-use doctrine. Also, if you have only one copy in your multiuser or networked computer, you are probably not infringing the copyright by allowing multiple-user access on a time-sharing basis. This activity would violate most shrink-wrapped licenses, however, again with little probable consequence.

5. Can you modify your original copy to make it perform better on your computer?

Yes, under the copyright act; no, under many licenses. What can we say?

6. Can you sell your original copy to someone else when you want to replace it with a new or different version?

This is specifically permitted by the copyright act and specifically prohibited by most licenses. Again, let your own judgment be your guide.

Warranties

Another important issue present in the computer world involves the computer industry's failure to stand behind its products. When you buy a washing machine, television, or car, you may need a wheelbarrow to carry out the warranties. When you buy computer hardware, though, you are generally given a three-month parts warranty—period.

Although federal and state laws provide some automatic warranties for consumer goods such as computers and software, the seller of the goods can disclaim the warranties by using certain express language (e.g., "this merchandise purchased *as is*") and by not making any express warranties as to the product's performance. This is the situation with most computer purchases. Software carries no warranty, because you are not considered the owner; but the license usually allows a return if the original becomes defective.

Are these warranty disclaimers legal? Although opinion in the legal community varies, some experts believe that they are not and that the computer buyer may be protected by the automatic warranties even if no express warranties are made. As with other issues involving software, however, we will have to wait for clarification from the courts before we know for sure.

Better Consumer Relations

We have been discussing the computer industry's attempt to limit rights otherwise provided by federal law. Many believe this effort reflects a general industry attitude toward microcomputer users that has fostered an atmosphere of distrust and disrespect and accordingly led to more illegal software copying than would otherwise be the case.

Maybe so, but a bright side is emerging. In recent months some software developers have begun to recognize the need for better relations with the users of their products. To this end, they are beginning to relax licensing restrictions and are attempting to provide better support through users' groups and customer-service facilities. At least one computer manufacturer is now expanding its warranty, extending it to a full year.

Matching these industry changes, software consumers are becoming more sophisticated about where the responsibility for product failures should lie and are increasingly asserting their rights in court. As this sophistication grows, the industry will find that warranties, service contracts, leniency in respect to how software can be used, and even access to the source code so that meaningful adaptations can be made, will all provide a competitive advantage to the companies that offer them.

As the computer and software industries "get their act together," consumers may respect the software companies more and avoid such practices as the unauthorized copying of software. Only then will the circle of distrust be broken at last. +

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The compass is a simple tool that has always helped people do sophisticated things. Like turn complex information into precise drawings, graphs, even maps.

PFS:GRAPH is a software program that's sophisticated enough to meet your business graphics and data analysis needs.

Yet, it too, is surprisingly simple to learn and use.

GRAPH was designed for people without computer experience. So all instructions are easy to understand. And you can be productive quickly.

Now you can create presentation quality bar, line and pie charts on most printers and plotters. In full color. In just minutes.

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Since GRAPH is integrated with the PFS Family of Software, it also allows you to turn the extensive data stored on PFS:FILE into easy-to-understand graphs. And you can reproduce graphs in the body of any document created with PFS:WRITE.

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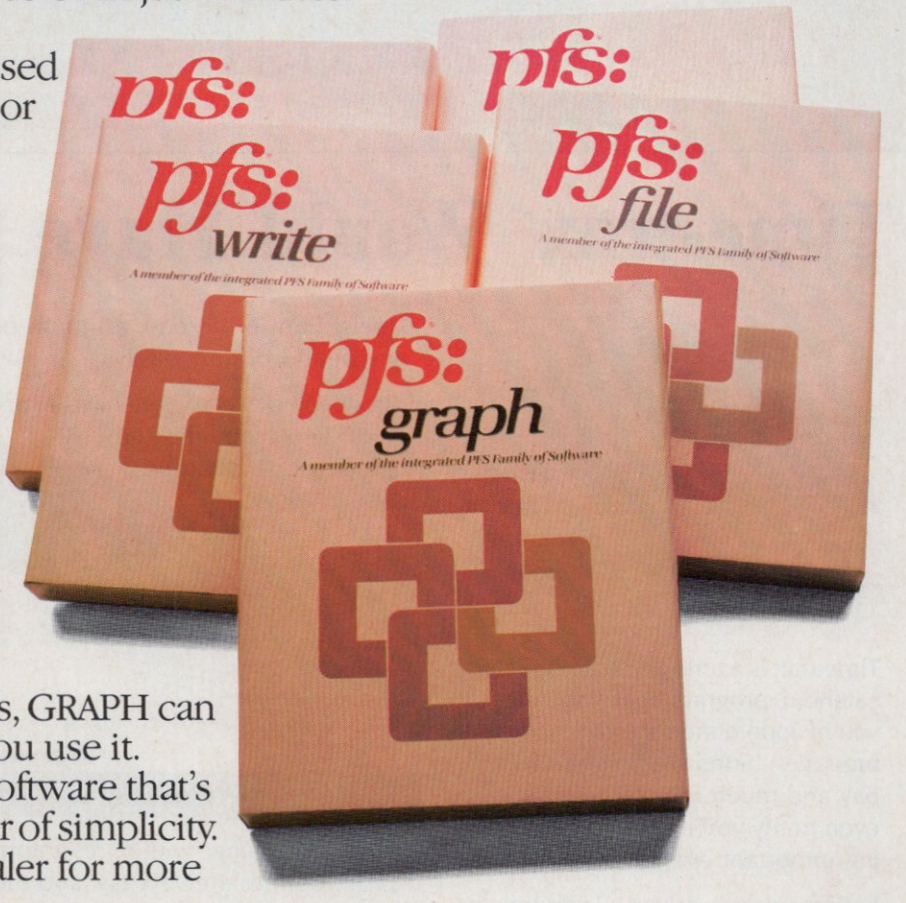
And compared to the cost of hand drawn graphics, GRAPH can pay for itself the first time you use it.

PFS: It's the powerful software that's simple to learn. It's the power of simplicity.

See your computer dealer for more details.



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. . .Meeting With The Boss.

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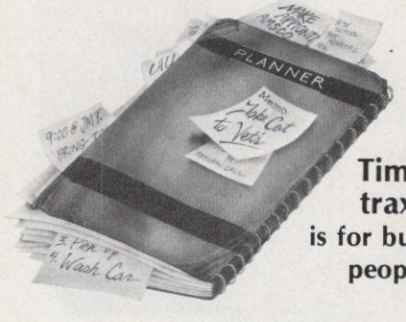
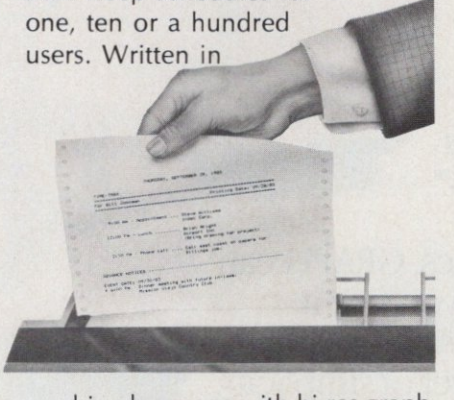


Time-trax™ is for busy people.

Time-trax is a time and date oriented calendar program that will remind you of appointments, errands, phone messages, birthdays, holidays, bills to pay and much more. Time-trax can even notify you in advance of pending important events.

Entirely menu driven, Time-trax is very easy to use. With a simple keystroke you can make, review and edit entries or search for any entry from past, present or future months. Customize Time-trax entries with your own, meaningful category labels. Print out a day, a month or any period of time easily.

Busy people everywhere need Time-trax. Keep schedules for one, ten or a hundred users. Written in



machine language with hi-res graphics all routines are very fast and the display is extremely sharp.

CPU
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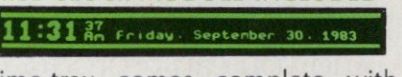
FREE CLOCK MODULE INCLUDED*



Time-trax comes complete with clock module. Two AA batteries provide up to two years of back up power. Complete information and sub-routines are included for programming.

Time-trax is written for 48K Apple® *** II, II Plus and IIE.

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Create motion picture shows.

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Write, produce, and direct your own computer movies. No programming skills are needed to create superb full-color animation. With easy to use TAKE-1, you define animation shapes and movements, "shoot" scenes frame-by-frame, add text at any time, and then combine the scenes to make a complete movie. Perfect for presentations and demos.

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$59.95 Requires 64K

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Includes these integrated features:

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using simple keystroke commands.

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allows up to 128 shapes placed anywhere in table.

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Uses standard hi-res picture and Applesoft shape table files which are compatible with other graphics utilities.

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Catch Trivia Fever™

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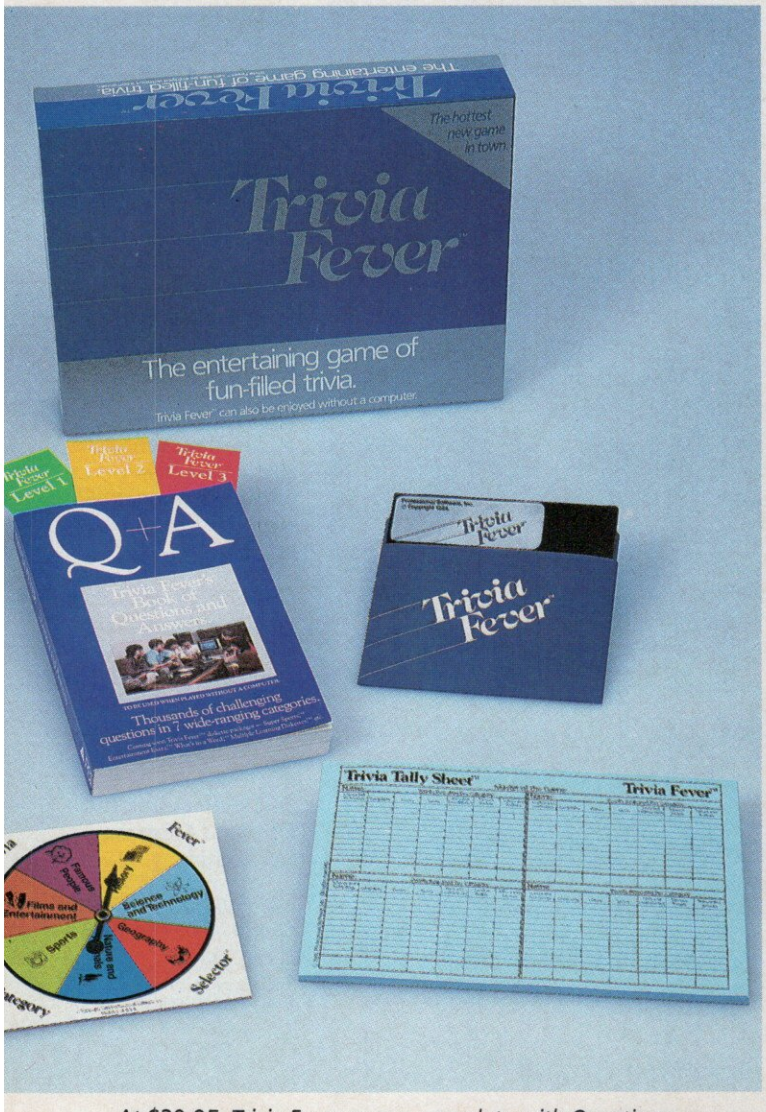

Trivia Fever is absolutely unique — it's the only software entertainment package that can be enjoyed ***with*** or ***without*** a home computer! When played on your home computer, Trivia Fever is a refreshing alternative to all those shoot'em up games. An elected "Master of the Game" uses the computer to randomly select subject categories, handicap players, generate questions and answers, keep score automatically, and more! Instructive by its very nature, Trivia Fever can be enjoyed by up to 8 individuals or teams. And when played without a computer, Trivia Fever has all the best features of the "popular" trivia games plus more — all without the cumbersome board, cards, and little game pieces. You can play in a car, on vacation, anytime, anywhere! And Trivia Fever is by far the best Trivia game available anywhere. Here's why:

Trivia Fever offers thousands of challenging questions in 7 interesting categories, so there's something for everyone. Each category has questions with 3 levels of difficulty, which score comparable points. What's more, Trivia Fever allows players to HANDICAP all those so-called "trivia experts" three different ways, giving everyone a chance to win. And players can easily control the length of play from quick thirty minute games to multi-hour party marathons!

Trivia Fever is unique, entertaining, educational, and most of all FUN. And at $39.95, Trivia Fever is destined to quickly become the best selling software entertainment package of all time. There's even a $5 rebate available to any non-computer users who return the computer diskette.

Trivia Fever can be enjoyed on the Commodore 64, IBM PC & PCjr and compatibles, Apple II series, and others. So don't delay. Catch Trivia Fever at your favorite software retailer today!

For additional information call 617-444-5224, or write to:

At $39.95, Trivia Fever comes complete with Question and Answer Book, Category Selector, and Tally Sheets to be used when played without a computer.

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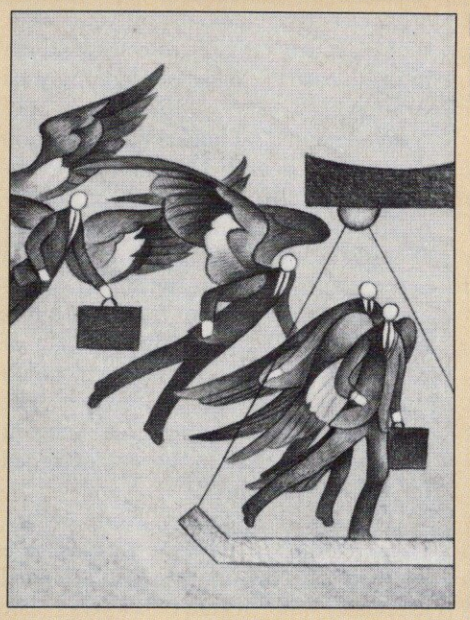


▶ **APPLES AND THE LAW**
PART THREE
BY VANESSA SCHNATMEIER

High-Tech LAW

Apple-packing lawyers lead the profession into the computer age.

Although the legal profession has taken its time warming up to computers—for a host of reasons ranging from lack of time to pure cantankerousness—microcomputers have finally penetrated the legal consciousness. Apple computers, once perceived as mainly home-oriented, are attracting a lively interest. It's safe to say that as vendors and educators get a better bead on the legal market, and as the Macintosh and Lisa establish themselves more firmly, the microcomputer will become as common a sight on a lawyer's desk as a stack of briefs.

Why Lawyers Don't Program (Yet)

Most observers agree that despite the legal profession's clear and present need for computers, the two fields are ill-matched in many respects. For instance, lawyers are steeped in centuries of conservative tradition and time-honored, often outmoded methods of doing business. "Of all the professions, the legal profession is the most resistant to change," says Richard P. Roggia, of computer law specialists Aguilar & Roggia in San Jose, California. "There's a lot to be said for the fact that we're used to looking things up in books." Compare this conservatism to the world of computers, a field that by definition always looks to the leading edge.

Robert P. Wilkins, a pioneer in combining law and computers, says, "The problem is that lawyers are busy. They don't understand computer technology in most cases, they know what they want in frequent cases, they don't talk computers, and computer people don't talk lawyer." Richard P. Stevens, managing attorney at the California Continuing Education of the Bar and head of its electronic systems and services department, concurs: "To become familiar enough with computers to be able to make meaningful judgments about buying is an education, and that shouldn't be underestimated. It is a whole new area of expertise that a lawyer's going to have to develop."

But They Use Computers Anyway

Sheer economics, and the realization that those staunch word processors in so many legal offices are actually a kind of computer, have given lawyers strong incentive to master computers.

When the American Bar Association's section on the Economics of Law Practice surveyed its membership last year, it discovered that 98% of large law firms and 67% of private practitioners have dedicated word processors with screen display. Among the firms surveyed, IBM, Wang, CPT, Lanier, NBL, and Exxon have the largest portion of the market.

Personal computers have become a staple in legal offices as well. IBM, Apple, Digital Equipment Corporation, Tandy/Radio Shack, and Wang are the most common choices. Apple and Radio Shack were the computers most used by respondents in smaller firms (note that 70% of lawyers are engaged in private practice, and that 75% of lawyers surveyed above belong to firms with fewer than 18 lawyers).

Computers and computer-aided instruction receive the warmest reception from members of large law firms and from lawyers under 30, the survey revealed. This information would seem to indicate that time alone will be enough to bring lawyers into the fold of experienced computer users.

Some people aren't waiting for the wheels of time to turn. Rothenberg Systems in Palo Alto, California, and Foresight Computer Systems in New York specialize in tailoring turnkey computer systems to the needs of a particular law office.

Richard Roggia had just purchased a system from Rothenberg. He reasoned that "most of us are afraid of these damn things to begin with. It's great to have somebody come in and say, 'Don't worry about it, we'll just set it up, it's not magical, we're going to train you at your convenience, and it's going to improve your efficiency.' "

Others, such as Robert Wilkins, actively take the message of computer literacy to their fellow lawyers. Wilkins has worked with word processors since the early 1960s, but he didn't buy his own computer until 1981. After he bought it, he found that nobody was writing anything to help lawyers understand computers—so he started his own newsletters. The first one, called *The Lawyer's Microcomputer* and aimed at Radio Shack users, hit the U.S. mails in April 1982. He later branched out into a newsletter for IBM PC owners, called *The Lawyer's PC.*

Wilkins formed his own R.P.W. Publishing Company, based in Lexington, South Carolina, to publish the newsletters and now plans to publish his own book entitled *What a Lawyer Needs to Know to Buy and Use a Computer.*

We've probably all heard the advice that you should buy your software first, then your hardware; but Wilkins modifies that advice for lawyers. That's because "from a software standpoint you should be able to find software to do what most lawyers want to do. Now my advice is to find the software you want to start with, then buy hardware from a manufacturer you think will be producing the product three years from now." Avoid nonmainstream operating systems, he counsels, and stick with PC-DOS (MS-DOS), CP/M, TRSDOS, and DOS 3.3, because that's where the off-the-shelf software is.

The computer's capacity for global searches is invaluable to lawyers.

What Do Lawyers Want?

The software that lawyers look for these days falls into several general categories:

Word Processing—Most law firms use some form of word-processing system already for the preparation of correspondence, long documents, and documents frequently used. The last use is one of the most important, since a great deal of a lawyer's business revolves around common transactions such as wills, incorporation papers, marriage dissolutions, and trust agreements.

Drafting systems, a subset of these programs, consist of data files of master documents for frequent transactions, which allow lawyers to "fill in the blanks."

Richard Stevens, who wrote Will Master for California Continuing Education of the Bar, extols the virtues of these systems. "Do you realize how many times you have to type a client's name from the time you begin drafting a will to the time you complete the decree of distribution out of the probate estate?" The computer's capacity for global searches is invaluable to lawyers.

Timekeeping and Billing—These systems take up most of the advertising space in *Legal Economics*, the magazine of the ABA's Economics of Law Practice section. Lawyers, who usually bill by the hour, get good mileage out of anything that lets them escape those easily misplaced billing slips. Other number-oriented uses of the computer include payroll, tax calculation, and other financial accounting.

Information Management—Here we are referring to areas such as "litigation support"—organizing your cases with a spreadsheet and recording case numbers, judges, witnesses, and exhibits for an upcoming trial. This category also encompasses calendaring and docketing. Database managers help lawyers keep track of documents that might otherwise sink into the swamp of paper that constitutes a law office.

On-Line Databases—Next to word processing, many lawyers are probably most familiar with this form of computing. Lexis, Westlaw, and Juris are among the most frequently used legal databases. These on-line legal libraries give access to full texts of cases, state case law, citation searches, the Federal Register, or even other databases. The two problems that can crop up with these databases (mostly accessible via your Apple computer) is, first, their expense, which many small law firms find prohibitive, and the question of knowing the right keywords. If you don't know the correct keyword for the subject you're looking up, the search may come up fruitless.

Software for Apples

Apple doesn't have the highest market penetration among lawyers, but there are still packages out there to aid Apple-packing lawyers. Adventurous lawyers can do a lot with just the basic Apple III package—most of these programs are modified spreadsheets or word processors in the first place, so you could very well construct your own billing software if you had the time.

Aha, but we've already established that you *don't* have the time! That being so, let me direct your attention to these exhibits.

Micro Craft, Inc., in Huntsville, Alabama, produces a series of legal billing software for the IIe: Verdict, a billing system for up to 25 attorneys, and a companion program called Audit, which produces time-distribution reports and must be used with Verdict. Docket accomplishes an office's calendaring and account reports, and Litigator is a litigation support system that organizes the elements of your case, such as court, judge, witnesses, and exhibits to ease the tasks of planning your strategy.

Professional Timekeeping System (Versions 2.0 and 3.1-C) from Computer Consulting Services in Clearwater, Florida, prints out items in any client's file, permits changes to be made before the lawyer bills the client, generates reviews of clients' files, and gives month- and year-to-date reviews of each lawyer's (or other professional's) time spent on particular activities. The same firm produces a Trust Account Management System; all are designed for the Apple II or IIe.

The Legal Assistant, from Micro-Legal Design in Eureka, Kansas, is a package of drafting systems designed especially for Kansas lawyers. The lucky lawyers in Kansas may draw on forms in probate, domestic law, property law, wills and trusts, corporations, collections, and general civil and criminal practice. This package is available for the Apple II, IIe, or III.

Compu-Law, a "total management system" from Compu-Law in Culver City, California, wraps up all the management needs of a law office in one big ball of software—client management, time billing, calendaring, and docketing. This package is best suited for big law firms, since it's priced at about $12,000. The version for the Apple III should be joined by Macintosh and Lisa versions sometime in the fourth quarter of 1984.

An unusual software product, so far alone in the market, is the Art of Negotiation, by Experience in Software, Berkeley, California. This program doesn't merely record numbers and dates; instead, it teaches the skill of negotiating—with the goal of solving a problem in a way satisfactory to both parties in a negotiation without taking a we-they stance. Written in a proprietary "authoring language" developed for how-to programs, The Art of Negotiation is available for the Apple III.

If you're trying to ferret out software and not having much luck, you might spend $35 for a copy of *Legal Software Review*, a publication from Lawyer's Library in Florissant, Missouri. This thick softcover book lists scores of law-oriented programs for all kinds of hardware. It's not organized by hardware type, though, so you'll have to page through it to find Apple software.

Legal Users' Groups

Other professions started their own

["Hi, we're from Europe. Where's the gold?"]

A SECOND CHANCE *to* GET *the* NEW WORLD RIGHT.

IF COLUMBUS HAD LANDED IN NEW JERSEY; if Cortez had been nicer to Montezuma; if Pizarro had been a more generous soul, would the world today be any different?

If you've ever wondered about things like that, you'll like *Seven Cities of Gold* very much indeed.

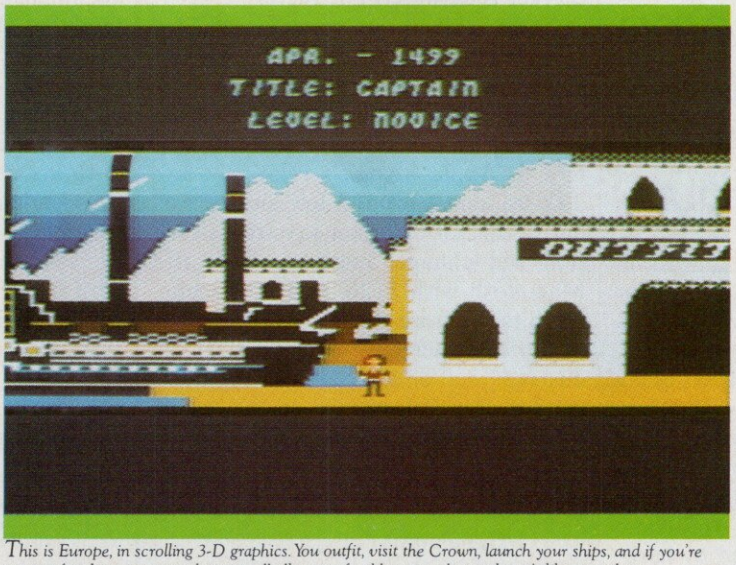
It's a kind of adventure. An unusually rich and technically impressive one with new continents to explore, natives to encounter, resources to manage and trade routes to establish. But beyond all the neat stuff *Seven Cities* throws up on the screen, there's something else happening here.

It feels quite odd to look at the map and see nothing. Of course you have to explore the more than 2800 screen new world in order to map it. But the way the natives act, the way you get older, the way seasons change and your men behave, and the way your reputation preceeds you gives you a sort of feeling that's unexpected in computer games. It's deeper. Maybe a little disquieting. It plays as much in your head as it does inside your computer.

Seven Cities does all this with the real world or, better still (since the "new" world really isn't anymore), it will construct any number of completely detailed hemispheres for you to try your hand with.

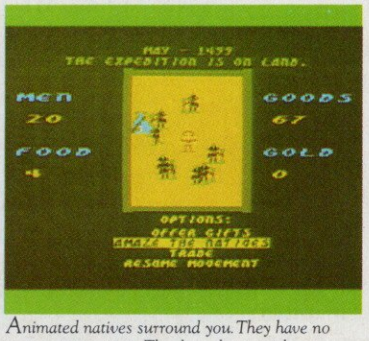
Designed by Ozark Softscape (the people who made M.U.L.E., *Infoworld's* "Strategy Game of 1983"), *Seven Cities* is about as near a recreation of history as has ever been accomplished, with or without a computer.

Find it. Stomp around in it. See if you can't do a better job than all the celebrated figures who got us into the mess we have to deal with today.

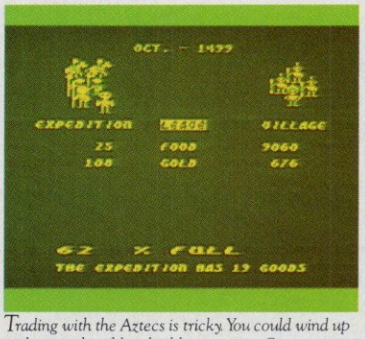


This is Europe, in scrolling 3-D graphics. You outfit, visit the Crown, launch your ships, and if you're cut out for this, you return later to tell all sorts of wild stories about what it's like over there.

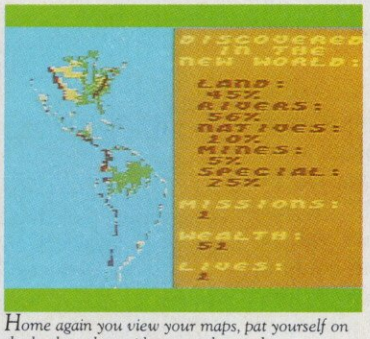
There are over 2800 screens to explore in the new world. As you scroll through them, seasons change.



Animated natives surround you. They have no reason to trust you. The drum beat quickens.



Trading with the Aztecs is tricky. You could wind up with enough gold to build an empire. Or as soup.



Home again you view your maps, pat yourself on the back, and consider your place in history.

SEVEN CITIES *of* GOLD™

from ELECTRONIC ARTS.™

MACHINE REQUIREMENTS: *Seven Cities of Gold* is available for the Apple II, II+, IIe & IIc, Commodore 64 and Atari home computers.

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users' groups years ago, but users' groups for lawyers have been scattered and sporadic. Check your local computer papers for possible leads and for subgroups within larger users' organizations. The ABA, however, through the Computer Committee of its Economics of Law Practice section, has formed its own batch of users' groups.

An Apple II Plus became the first computer to testify in court.

Computer Committee chair Betsy Turner says that 12 users' groups, including one for Apple (billed by then group chair John Kreitler as one of the top four), exist at this writing, with the likelihood of an increase to 16. These users' groups aren't organized by hardware or software type alone, but also by function. Hence the Time and Billing group and the group for Integrated Systems. The Apple users' group had been working with Apple Computer on putting together a list of software that runs on Apple computers; now that Apple is no longer promoting the III, however, those arrangements are being held in abeyance.

Network, the umbrella users' group newsletter, informs group members about the activities of other groups, lists software reviews by members, and keeps members up to date on committee projects.

Another section project, according to section chair Roberta Ramos, is the newly formed Legal Technology Advisory Council. "It's *not* the *Good Housekeeping* Seal of Approval," Ramos emphasizes, but a group that will review software for lawyers and come up with performance standards against which legal software will be measured, "more like Consumer Reports."

Finally, the ABA has set up a network especially for lawyers called ABA/net. This network for ABA members "lets lawyers in ABA do their work infinitely more efficiently," says Ramos. It also helps them get their hands on the keyboard, which is another primary goal, she adds.

Apple Computer, Inc., hasn't forgotten the legal market by any means, but not many available products for lawyers specifically target Apple users. Some of this lack stems from buyers perceiving that Apple's promotion is aimed at the home user, rather than the business user. The advent of the Macintosh and the Lisa have reportedly sparked much greater business interest. Lawyers do use Apples, notes Roy Nierenberg; the market is definitely out there.

Dave Stalker, vice president of Text Sciences Corporation in Santa Monica, California, says his company found another problem when it thought about adapting its legal-text-compressing system to Apple—Apple's relatively low disk-storage space and low amounts of native memory. Stalker says this situation will change, however, when the Macintosh with 512K of RAM memory hits the store shelves.

No one questions that the legal industry is well on the road to computerization. An "electronic court" won't appear this century, but computers have still found their way into the courtroom. Earlier this year, an Apple II Plus became the first computer to testify in court when two Queens College professors produced video graphics of an auto accident. Roberta Ramos recounts the story of how a Lisa helped a firm win a pollution case by marshaling documents. "The judge appreciated the fact that it was there to organize all that paper," says Ramos.

Finally, computers will undoubtedly change the entire underlying structure of law-office operations, to say nothing of future developments in how-to packages such as The Art of Negotiation.

As everything from correspondence, to legal research, to communications with fellow lawyers, goes in and out of an Apple, it remains to lawyers to see that the law goes on-line smoothly. Computers are already the top lawyers' competitive advantage. +

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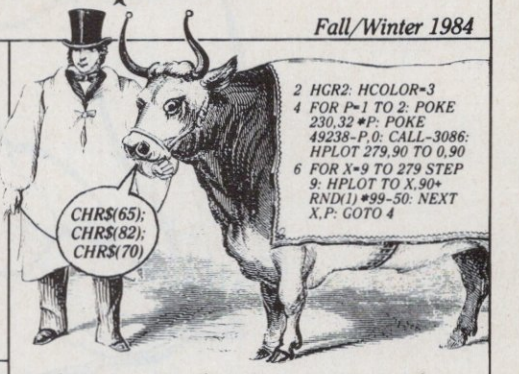
BEAGLE BROS, THE UTILITY LEADERS: Beagle Bros' low-priced unprotected disks dominate the Apple Utility bestseller lists. And Beagle disks were recently voted to **FOUR of the TOP-24** spots in *Softalk's* "Most Popular" poll— that's against *all* Apple software publishers in *all* categories.

APPLE SECRETS REVEALED: Since 1980, our authors have been on the lookout for tips and techniques that can be shared with our customers. From our inspectable programs to our informative instructions and Apple Tip Books, you will learn from the experts. Here's a tip you probably won't find in any of Apple's manuals—To reveal the hi-res screen without erasing it, simply type *CALL-3100* instead of the awkward "POKE-16297,0: POKE-16304,0: POKE-16300,0". A secret technique? Not any more.



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GLOBAL PROGRAM LINE EDITOR

$49.95 (DOS 3.3 *and* ProDOS™, compatible with any version of Apple II)

GPLE makes editing Applesoft program lines a breeze—INSERT & DELETE characters and commands just as you would with a word processor. No more awkward time-consuming "cursor-tracing" to make changes to your Applesoft programs.

SEARCH & REPLACE finds every occurrence of a string or variable in a program. Or change any word to any other. For example, change all X variables to ABC, or all "Horse" strings to "Cow".

GPLE makes every key a "function key". For example, ESC-N can type your name, ESC-1 can Catalog Drive 1; ESC-P can execute a PR#1, etc.

DISKQUIK™

"IN MEMORY" DISK DRIVE

$29.50 (DOS 3.3, requires Apple IIc or 128K IIe)

DiskQuik makes your IIc or 128K IIe think it has an extra drive connected to Slot 3. It's just like using a super-fast (hard-disk speed), silent drive. Catalog with "CATALOG,S3", and save & load all kinds of files to and from RAM with normal commands. (holds about *half* the data of a disk.)

DiskQuik has many uses. For example, load often-used files into memory when you boot up, so they are always available when you need them.

```
5 INVERSE: PRINT SPC(7): A=A+1-3*(A=3)
8 POKE 2053,A+156: B=B+1: IF B<143 THEN 5
```

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APPLESOFT ENHANCER

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Beagle Basic loads Applesoft into RAM and enhances it by replacing unused cassette commands (Shload, etc.) with *new commands* like ELSE—

IF X=2 THEN PRINT "YES": *ELSE* PRINT "NO"

Plus **HSCRN** reads the color of a hi-res dot for collision testing, **SWAP** exchanges variable values, **TONE** writes music without messy Pokes or Calls, **SCRL** scrolls text in *either* direction.

GOTO and GOSUB may precede variables, as in "GOSUB FIX" or "GOTO 10+X". Replace awkward graphics screen pokes with one-word commands, change your ctrl-G Beep to any tone you want...

Rename Applesoft commands & error messages to anything. For clarification, encryption-protection or even foreign translation. For example:

```
10 POUR X=1 TO 3: ECRIVEZ "BONJOUR": ENSUITE
```

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2-WAY SCROLL/MULTI-UTILITY

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BETTER LIST FORMAT: Each Applesoft program statement lists on a new line for *FAST* program tracing & de-bugging. Printer-compatible in any column-width—Great for archive printouts.

```
A$="Dogfood"  ←VARIABLE-DISPLAY: prints
X=3.14159       all of a program's strings &
Y=255           variables with current values.

A$: 5 10 150  ←CROSS-REFERENCE: Sorts
X: 10 20 3000   & displays line numbers of
Y: 5 40 55 60   each variable & string.
```

Plus **AUTO-LINE-NUMBER**, hex-dec converter, better renumber-append, program stats, eliminate or redefine the cursor, free space-on-disk...

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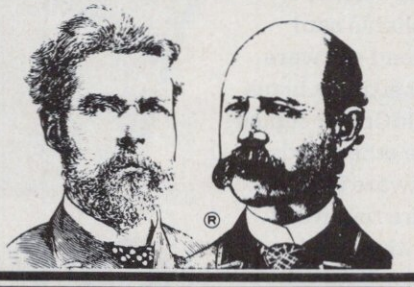

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The Beagle Bros Catalog

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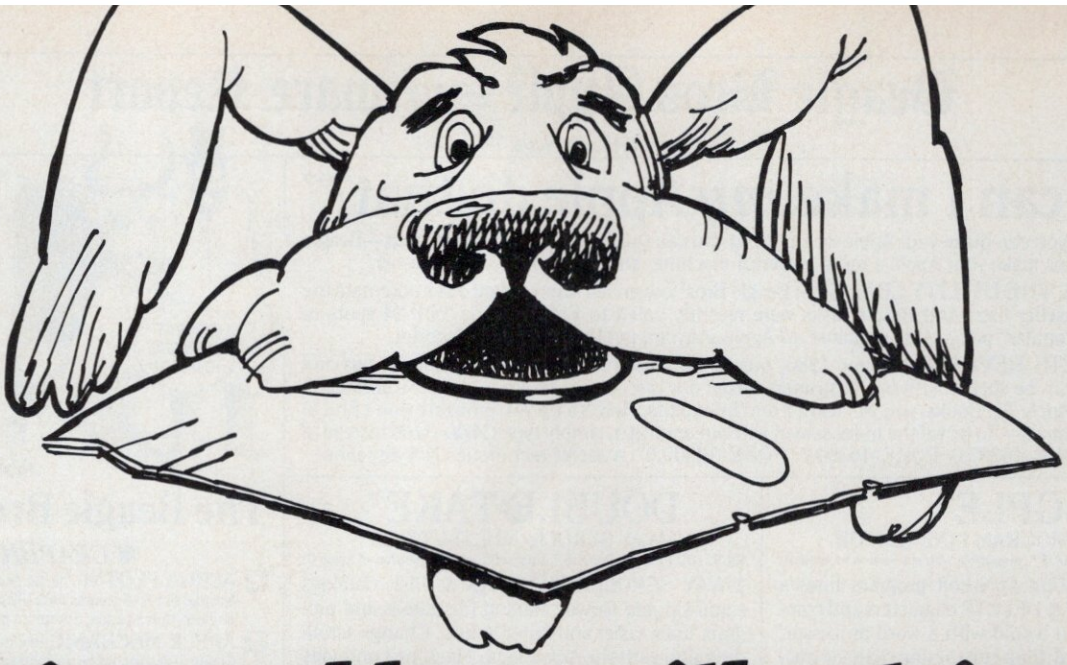

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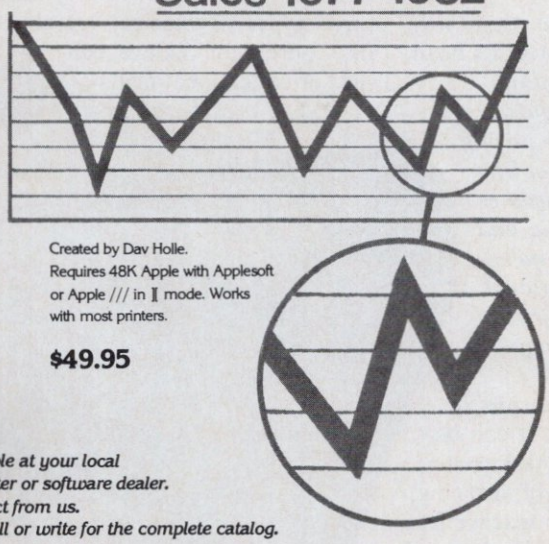

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CIRCLE 244 ON READER SERVICE CARD

OPENING MUSICAL VISTAS

YOUR APPLE MUSIC TUTOR

Here's a little experiment in deductive reasoning. Given proposition A: *Making music is a lot of fun*, and proposition B: *Most human beings like to have a lot of fun*, what's the natural conclusion? None other than C, of course: *Most human beings make music.*

What a world that would be! But unfortunately for all of us, I left a major mitigating factor out of the equation.

It's called practice.

You remember practice. Endless, numbing daily half hours on the piano, or guitar, or clarinet, or whatever other instrument you devoted your efforts to. Rote repetition of scales. Exercises that were either insipidly cute or stultifyingly dry. During your brief weekly music lesson, you'd spend nearly all of the precious time playing that week's lesson, playing it badly because practice had been so dull that you'd lost interest (and certainly any kind of useful, focused concentration).

The terrible thing about practice when you're learning music is that it is robotic, repetitious, revolting—and absolutely required. There's no avoiding it. Humans aren't born with the analytical ear of a Stokowski or the manual dexterity of a Van Cliburn or Van Halen; these attributes must be learned. But to just sit and grind away at lessons, over and over and over again, is dehumanizing to music student and music teacher alike, driving a wedge between them. It creates distance where there should be none, turning the pleasure of music into pain, making the simple hard and the hard simply impossible.

In short, it's bad news. Small wonder that the closest contact many of us have with music is the on/off switch on our radios.

It doesn't have to be that way, though. Stand the problem on its head, and you get a possible solution:

A: *To learn music requires machinelike repetition.* B: *Requiring students and teachers to act like machines automatically negates emotion, killing the music and leaving behind a corpse of meaningless notes and emotional blocks.* Therefore, C: *Return the personal element by bringing a machine into the process.*

Your computer, to be precise. With the proper software, it can become the perfect musical taskmaster for the repetitive aspect of learning, leaving both you and your teacher free to concentrate on communication and expression.

I don't mean to imply that a computer, all by itself, can replace a human instructor, but it can be a valuable aid for most music students (and for those who have had battered musical childhoods, a painless way to heal old wounds and get a new start).

Interested? Feel the tug of a tune, the call of a concerto, the urge to orchestrate? Read on, then, and learn just what kind of a music teacher your Apple might be.

A computer is particularly suited for three types of musical training: The first, purely for the eye, consists of educational drills

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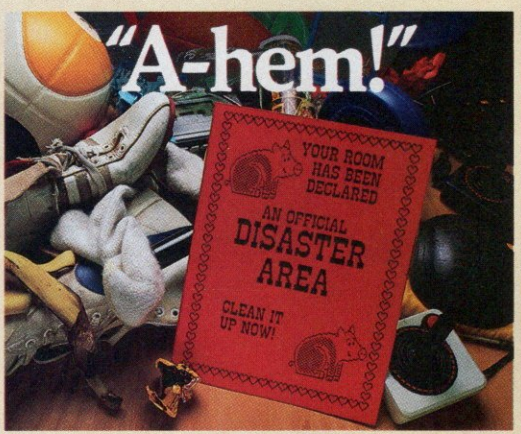

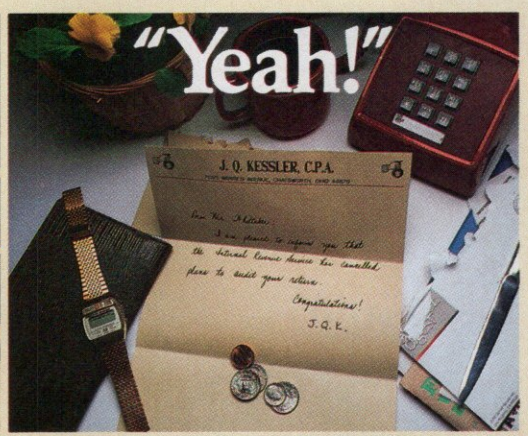

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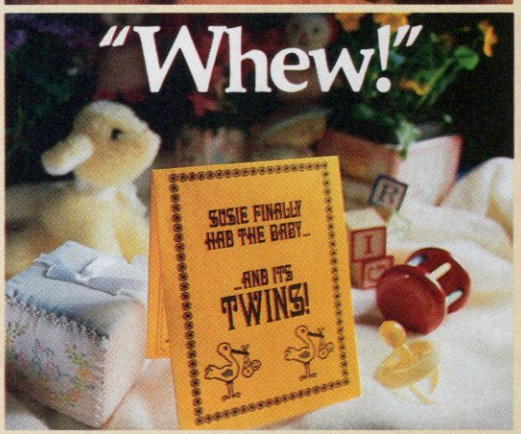

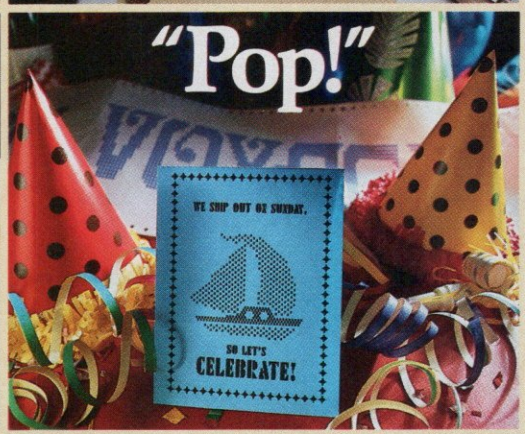

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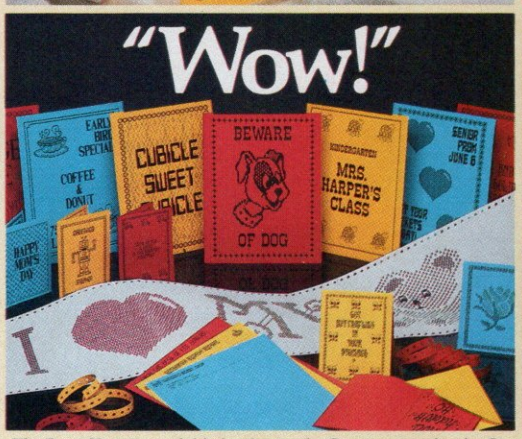

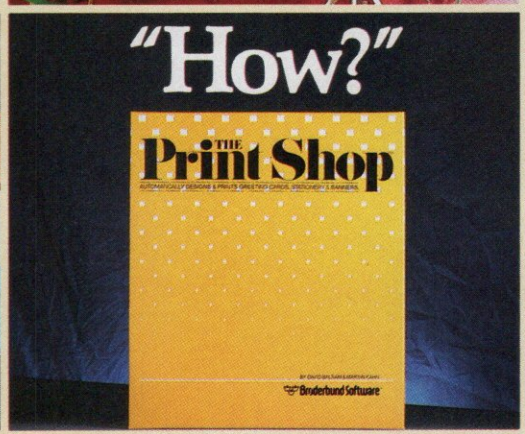

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CIRCLE 392 ON READER SERVICE CARD

on recognizing, understanding, and writing music notation. The second involves hand/eye coordination, what we usually think of as practicing—actually using an instrument to play a piece. The third is commonly called "ear training," but that name is something of a misnomer. What ear training really is is *mind* training: teaching your brain how to automatically analyze and understand the music it hears in terms of that music's rhythmic, melodic, and harmonic structures.

Just how much your Apple will help you in these three types of drill depends, of course, on the software you choose, but it also depends on what hardware you have.

For eye training in notational skills, any Apple II, II Plus, or IIe should do fine, as long as you use the right monitor for your teaching program. Monochrome monitors are more precise than color monitors, making music notation much clearer. On the other hand, some software packages use color to augment and clarify their examples, so you'll need a reasonable color monitor (or RF modulator for your color TV) if you want to use these programs.

If you want to practice the hand/eye coordination of playing written music with an instrument, you'll need a combined hardware and software system, such as the Soundchaser or the Syntauri, that includes a piano-style keyboard. You can, of course, just take your guitar or Casiotone and play the notes you see on the computer screen, but what's the point? Sheet music is a lot cheaper.

Last, if you want to seriously work on ear training, you'll have to invest in

IF YOU WANT TO SERIOUSLY WORK ON EAR TRAINING, YOU'LL HAVE TO INVEST IN A SOUND-GENERATING CARD.

one of the several sound-generating peripheral cards that are available for the Apple. Choose carefully, and base your choice on the software you like best. Most ear-training software is designed to run with one specific card.

If you don't want to spend the extra money on a peripheral card, some programs are on the market that make the Apple's speaker play musical notes. These programs are severely limited, though. They can't play chords, and, more important, the pitches of the notes they *do* play may actually be off by as much as a half step (the musical interval between adjacent keys on a piano). Ear training won't do you a whole lot of good if the standard you train to isn't accurate.

THE PROGRAMS

We'll begin our survey with a not-so-stern taskmaster.

Music Construction Set

Music Construction Set, from Electronic Arts, is a cross between an educational program and a computer game. Instead of grading your performance in responding to a series of structured questions, it gives you a chance to get a grasp on the structures themselves—albeit a simple grasp—and on just how they are used. It is the only software I'll be discussing in this article that works on the Apple IIc, as well as the II, II Plus, and IIe.

It presents, in a box that fills most of the screen, a grand staff—the treble and bass clefs together. On that staff you can write music, using a joystick, a KoalaPad, or keyboard commands to move an icon of a pointing hand and

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		$ 110	$ 49
Rana	Elite 1, 163K, 40 Track	$ 379	$ 239
	Elite 2, 326K, 80 Track	$ 649	$ 389
	Elite 3, 652K, 160 Track	$ 849	$ 499
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pick up your choice of notes from the menu at the screen's lower left, placing them on the staff wherever you like. With Music Construction Set, you can also play back what you have done, immediately hearing everything that's right or wrong about it.

It is an excellent way to learn the rudiments of musical notation. In addition, it offers insight into composition through two other features—a set of already stored pieces that you can call up to play, examine, or alter as you wish; and a facility for rearranging the measures in a piece.

Music Construction Set is, basically, fun. It isn't trying to be a major educational venture (in scope or price), so you should be able to forgive its errors, such as its inaccuracies in changing the notation on the screen if you transpose the key of a piece of music.

Get it for what it can do, and you will be pleased. One note before you do: Running on an unaltered Apple, the program can manage only two fairly tinny simultaneous notes. To hear music in up to six parts, with considerably greater audio quality, you should buy a Mockingboard and hook that peripheral's output jack to your home stereo.

If you choose the grand staff, the notes you play will appear, as small, open circles, on the appropriate line. (If the note you are playing is on a black key, the circle will appear with a flat or sharp sign next to it.) If you choose the keyboard, whose white keys are labeled, then small, rectangle-shaped indicators will flash on the screen's keys to correspond to the real keys you are playing.

MUSIC CONSTRUCTION SET IS, BASICALLY, FUN. IT ISN'T TRYING TO BE A MAJOR EDUCATIONAL VENTURE.

In terms of the visual aspect of training, this feature is wonderful. It teaches an identification between notes as they exist in the mind, as a concept, and the way they translate into a location, either on the keyboard itself or in music notation. (One slight flaw: In the grand-staff graphic, pressing two notes a half step apart, such as G and G-sharp, creates a screen image identical to a G-sharp by itself.)

Simply Music

Simply Music, from the Syntauri Corporation, is an excellent compromise between function and education. It is based on the Syntauri hardware/software package, which means that you'll need to buy Mountain Computer MusicSystem digital oscillator cards, a keyboard interface card, and the Syntauri keyboard itself. All this equipment adds up to a fairly hefty investment, but it's well worth it.

To get a quick impression of what's special about Simply Music, all you have to do is play a chord and watch the screen. You choose between two principal nonmenu displays. One shows a grand staff, with the names of all the notes running in vertical columns on both of its sides, and the other shows a four-octave keyboard as seen from above.

With Simply Music, your computer can actually guide your hands as you play. This program is actually a slightly modified version of Syntauri's professional multitrack recording software. Therefore, you can use it to record and play back compositions with up to 16 tracks and 8 simultaneous notes. You

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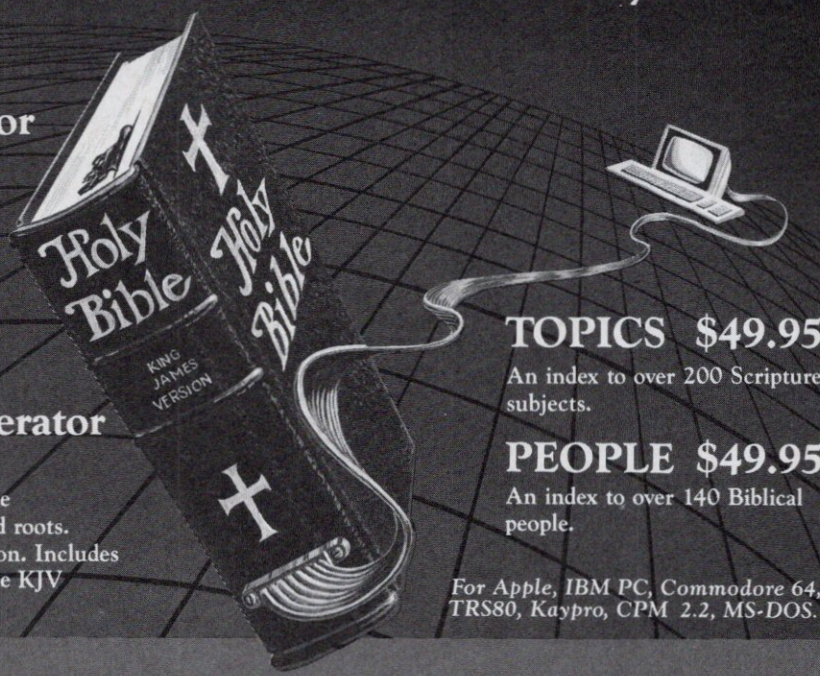

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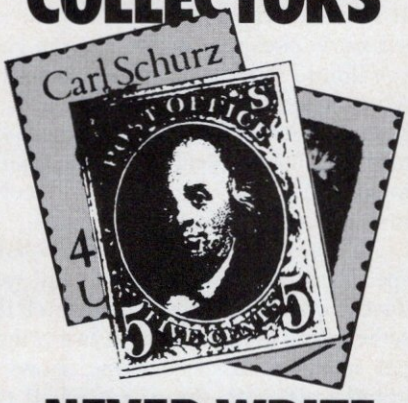

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can learn any one of those tracks by playing along with it as you listen to it and watch it on the screen.

In fact, in one beginners' mode, the recorded music advances to the next note only after you have successfully found and played the note that just sounded. Keeping up with a piece is a halting, hesitant project at first, but the fingers quickly learn where they are supposed to go.

The limits of this program as a hand/eye trainer come mostly from the guide music you are working from. Even there you have room for increasing the challenge, though, because you can increase the playback tempo to well beyond the original rate, always testing your ability to keep up.

This program also teaches a great deal about orchestration, composition, and arranging—not by rote or routine, but by personal experience and example, with its choice of more than 150 instrumental sounds and the flexibility of 16 tracks to record any 10 of them at a time.

Syntauri's Simply Music system has another advantage: It enjoys third-party software support. Medley Way, developed by Hal Leonard Publishing, is a combination of textbooks and diskettes designed for young people and other beginners. The Nelson Varon Adventures in Music is a series of courses that teaches you how to read and play popular music on the keyboard. The lessons focus on teaching single-note melodies and feature music by popular artists such as John Denver and Kenny Rogers.

The Simply Music Improvisation Series is designed for the more advanced learner; it consists of rock, jazz, and blues improvisational progressions with exercises on disk that help you learn bass, rhythm, and lead parts. Contributors to the Improvisation Series include Tom Darter, Dominic Milano, Bob Doerschuk, and Greg Armbruster.

Musicland

Musicland is also from Syntauri, though it's hard to believe that it comes from the same company that brings you Simply Music. If Simply Music was designed to teach you how to play keyboards better and coordinate your hands with your eyes and ears—all traditional elements of musical training—Musicland seems to have been designed to teach you to throw all that classical garbage away, get loose, have some fun—and think of music in terms of patterns behind the wall of our Western musical tradition. It's like finger painting for the ears—almost literally. For this program you don't need the piano-style keyboard, though you do need the MusicSystem cards.

The program has four parts: Music Doodles, Timbre Painting, Music Blocks, and Sound Factory. Each one gives you a graphic way to create music with a joystick or KoalaPad. In Music Doodles you draw whatever you like on the musical staff—a clown face, your signature, the skyline of Ottumwa, Iowa—and then the program converts this (literally) sketchy data into a string of pitches and time values. Your options become more varied at this point, because you can divide this sequence into motifs that you can move anywhere on the screen, lengthen, shorten, or even make into mirror images of themselves. When you're satisfied with the "structure" of the music you've just created, you can take it over to the Timbre Painting program and "paint" each note with one of several high-res colors. Each color represents one of four available timbres. If orange is an angry buzz, for example, then all of the notes that you've painted orange on the hi-res screen will emit that angry, buzzy timbre when you play your piece back.

MUSICLAND SEEMS TO HAVE BEEN DESIGNED TO TEACH YOU TO THROW AWAY ALL THAT CLASSICAL GARBAGE, GET LOOSE, HAVE SOME FUN.

After Music Doodles and Timbre Painting come Sound Factory and Music Blocks. Sound Factory is where you make your own sounds for the instrument's timbre, by adjusting the volume of a note's bass tone and those of its harmonics. Music Blocks is also just what its name implies. You take five separate chunks of music you've created and arrange or rearrange them by stringing together up to 15 of them.

Kids love this program. It doesn't have any scores or grades or drills—just the creation of interesting patterns. Adults don't miss the scores, grades, and drills, either. The program brings back to life a little of their childhood, when rules didn't matter and the basic stuff of music was close at hand.

The Soundchaser Educator System

The other Apple synthesizer system originally based on the Mountain Computer Music System is the Soundchaser from Passport Designs. Passport has become strikingly active on the software front, and the company offers a well-designed group of programs that use the MusicSystem cards—or Passport's own MX-5 oscillator single-slot card—plus Passport's keyboard and keyboard interface card. This combination of components, like Syntauri's, comes to a fairly big initial investment. The system has plenty of room to grow, though, and is definitely worth investigating.

Incidentally, Passport's music-education software has recently become available in a version that works with any MIDI (Musical Instrument Digital Interface) keyboard (you'll need Passport's Apple IIe MIDI Interface to be able to use it).

The music-education packages Passport offers include Melodic Games, Ear Teacher, Matching and Tuning, Intervals, and Chords. Melodic Games is the simplest, requiring only the computer keyboard for responses to "Simon says"-type drills. As it gives no music notation, only large-lettered flashes of do, re, mi, and so forth, it is clearly for children.

At the opposite end of the scale, Chords is more challenging and sufficiently complex to tax even a well-trained set of ears. It plays four-note chords, from a menu that includes all

EAR TEACHER IS AN EAR-TRAINING AID DESIGNED FOR MUSIC TEACHERS, RATHER THAN STUDENTS.

four triad types and all eight seventh chords (plus inversions), and you have to correctly play the chord with only its root note for a clue—which, in the case of some of the inversions, is so misleading that it's worse than no clue at all.

Ear Teacher is an ear-training aid designed for music teachers, rather than students. It is meant to work with the other Passport packages, including Intervals, so that teachers can extensively monitor student progress and control just what drills students will have access to at a given point in their development. It also allows teachers to

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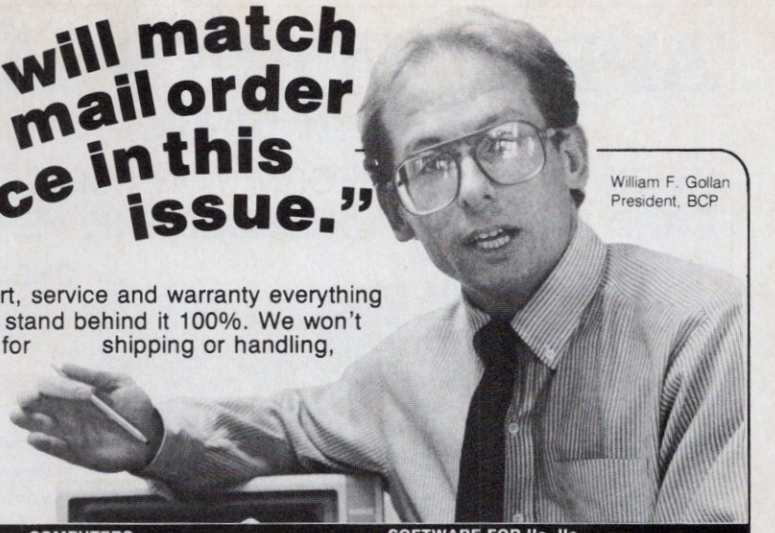

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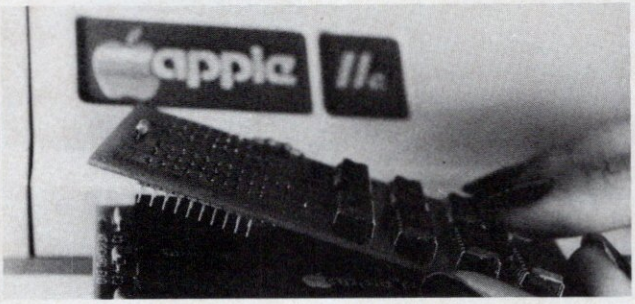

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vary the drills so students can't "beat the system" by memorizing it, instead of the concepts it is trying to teach.

For true ear training, though, the ticket is the Matching and Tuning program, which has two exercises. In one, the computer plays two tones, one after the other, and not only do you have to figure out how far apart they are in pitch, and in what direction, but you also have to bring them into unison by adjusting them in small increments. At the seventh, and highest, level of difficulty, you'll be dealing with pitch variations as small as a quarter of a semitone. The second drill is, if anything, even tougher. You get to choose one of four types of triads to start. Then the Soundchaser plays that triad to you out of tune, and you have to adjust the middle and upper notes until the triad reaches the correct tuning. This procedure is especially tricky because the system is looking for equal temperament, the compromise at the base of all Western music, in which every note is ever so slightly—but equally—out of tune with every other note. It's fairly easy to miss that subtle distinction and tune the triad so that it is actually too correct—and therefore wrong.

The Micro Music Library

I've saved the most wide-ranging, and arguably the best (in terms of traditional ear training), for last. You probably haven't heard of the Micro Music series, from Temporal Acuity Products. The company has never actively pursued the consumer market, but it's in the school market with a vengeance, offering a range of more than 40 music-education packages, graded from age 3 to college level.

It's an extensive, intense, well-documented, well-designed, and fairly expensive set—a lot like music lessons have always been, come to think of it.

To use all but one of the Micro Music packages, you need a Micro Music DAC board. It isn't a digital-oscillator card, like the other peripheral cards I've mentioned so far in this article, but a straight digital-to-analog converter that puts out up to four simultaneous notes and some fairly simple waveforms. The range of timbre is small, but intonation is perfect, which is quite critical in the more demanding programs.

The series is too extensive to cover in detail, so I'll simply try to give you an idea of its scope, using the company's own categories. Under Fundamentals, there are six programs: Key Signature Drills, Pitch Drills with Fundamentals,

Pitch Drills without Fundamentals, Mode Drills, Catch the Key, and Pick the Pitch. For Harmonic Dictation, there are five: Harmonious Dictator, Jazz Dictator, Interval Mania, Harmony Drills Set One, and Chord Mania. Under Error Detection . . . well, you get the general picture.

You'll find everything here, from the relative simplicity of a child's game/teaching program called Toney Listens to Music (clear enough for children too young to read to use on their own) all the way up to a 17-disk, college-level series called Music in Theory and Practice—Benward. The series even includes tutorials for people who play brass instruments such as trumpets and French horns. The Valve Assembly Simulator, for instance, plugs into the Apple's game port so that you can monitor your fingering drills.

I'd call that pretty thorough. Wouldn't you?

PRACTICE MAKES PERFECT

Of course, in the end, the computer can help you learn only if you—here's that awful word again—practice, but with time and increasingly sophisticated teaching software, *practice* may come to mean the glory of true learning, as it should, instead of the agonies of musical frustration.

In one of his last films, Charlie Chaplin's character (an aging vaudevillian seeking to make a comeback) says to his partner, played by Buster Keaton, "We're all of us beginners. We don't live long enough to ever be anything else."

So go on, then, young or old. If you feel the urge to learn more about music, and you've got your trusty Apple at your side, find the software that suits you—and begin. ✚

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Apple IIe MIDI Interface
Passport Designs
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Syntauri Hardware/Software System
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ProDOS REVISITED

A YEAR AFTER ITS INTRODUCTION, WE EXAMINE HOW APPLE'S NEW OPERATING SYSTEM HAS FARED

It has been about a year since Apple introduced the ProDOS disk-operating system for the Apple II series of personal computers. (*A+* first looked at this product in the January 1984 issue, pages 154–157.) Now that some of the smoke has cleared, just how much of an impact has ProDOS had on Apple users and software developers?

ProDOS, the older DOS 3.3, and all other disk-operating systems control the flow of information to and from disk drives and keep track of data on the disks themselves. Any command that involves the disk, such as Catalog, Load, and Store, uses DOS to do the actual work.

Every computer that uses disk drives has some form of DOS. Each has its own particular method of handling data and may or may not do the job efficiently. Most of these systems are not compatible with any of the others. In other words, a disk that one DOS can read probably cannot be processed by another.

The Need for ProDOS

Many significant advances in computer hardware and programming techniques have taken place since Apple introduced DOS 3.3. In some cases, program designers found themselves painted into a corner by the disk-operating system's limitations. They had sophisticated new hardware at their disposal but were unable to use it efficiently. Apple developed ProDOS to allow utilization of relatively advanced application programs with Apples and to keep the Apple II series up to date, compared to other machines.

ProDOS also lets the computers in the Apple II and Apple III lines communicate with each other for the first time. Since ProDOS can read disks from Apple III's SOS (Sophisticated Operating System), owners of that machine can now transfer data to and from Apple IIs.

Perhaps the most noticeable improvement over DOS 3.3 is the reduction in disk-access time. A BASIC program that takes 11 seconds to load under DOS 3.3 does the job in less than 3 seconds with ProDOS. Database programs, for example, can search and sort more quickly with the new system, processing larger records in less time. This increase in speed also lets software designers make more efficient use of disk files and use features that were impractical under the older system.

Since ProDOS supports files as large as 16 megabytes, it is also a perfect choice for use with mass-storage devices. Apple's ProFile hard-disk system, with ProDOS, provides a full 5 megabytes of on-line storage (equivalent to the capacity of 35 disk drives).

Using mass storage with DOS 3.3, on the other hand, is clumsy and difficult. The older DOS can work with files no larger than 140 kilobytes each—the capacity of a single diskette. So, with DOS 3.3, you have to treat a hard disk as if it were many smaller disks, instead of one large storage medium.

Who Can Use ProDOS?

In order to use ProDOS, you must have an Apple II Plus, IIe, or IIc with a minimum of 64K RAM. If you are using a II Plus, you must also have Applesoft available in ROM. You need at least one Disk II drive and controller, although you can add other storage devices easily.

If you purchase an Apple IIc or a IIe with a disk drive and controller, Apple will include ProDOS as part of the package.

ProDOS Drawbacks

ProDOS is a more advanced operating system than DOS 3.3 and requires more memory in order to operate. Consequently, it leaves less room within the computer for users' programs.

Disks you use under one system are not directly compatible with those of the other. Apple provides a DOS/ProDOS conversion program on the ProDOS users' disk, but not all programs can be transferred successfully. Most commercial programs are unconvertible since they commonly use machine-language routines within the DOS itself (which vary considerably from one system to the other). If a program uses only BASIC and DOS commands and is relatively free of PEEKs and POKEs, it will probably work under either DOS. Generally, you cannot convert programs you buy, but you can convert those you write yourself.

Early releases of ProDOS had several bugs, as do most new products. If you were using an affected version, you probably only encountered problems during fairly exotic programming. The errors primarily involved ProDOS's method of processing interrupts and

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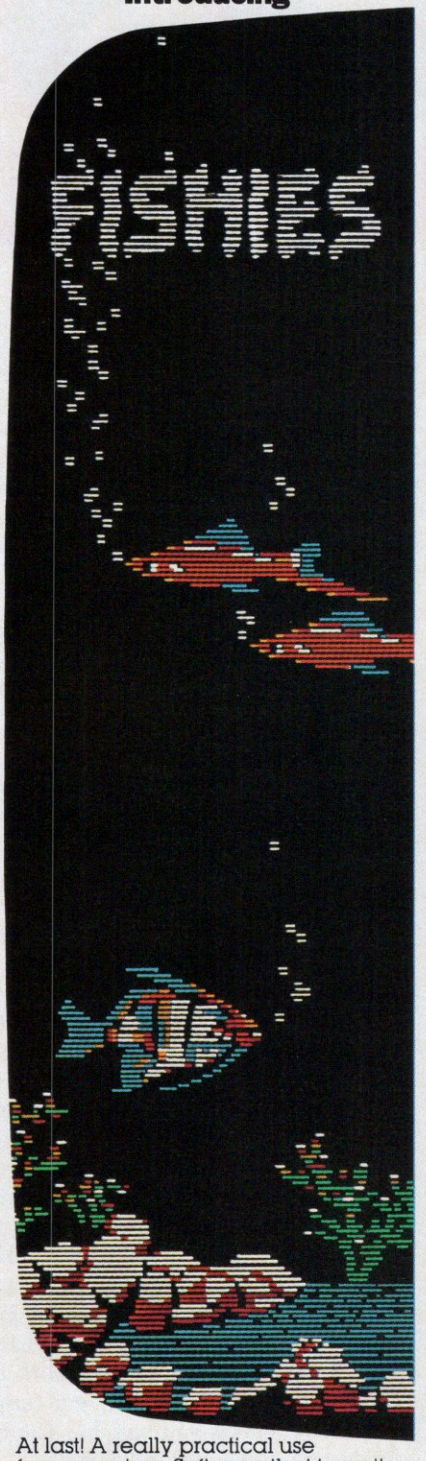

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have since been corrected. Newer versions of ProDOS are also more forgiving of disk-speed fluctuations than were earlier copies.

The structured directory system of ProDOS is a two-edged sword. It makes management of a large quantity of files and programs easy, but it can be a bit difficult to learn. Once you do master the system, though, you will wonder how you got by without it.

Who Is Using ProDOS?

Many software designers have already incorporated ProDOS into their new products. Software Arts, the company behind VisiCalc, has developed a ProDOS-enhanced version of that popular electronic spreadsheet, but it is not discontinuing its DOS 3.3 versions. "There are a number of trade-offs. Each system has advantages and disadvantages of its own," says Bob Frankston, the executive vice president of Software Arts. "ProDOS is faster and more flexible, but it's also larger, leaving less room for the spreadsheet itself."

Frankston believes that many users will need the larger internal storage DOS 3.3 offers, and others will require the speed and hard-disk support of the ProDOS version.

ProDOS also shows up in BPI's new accounting system; in an enhanced version of Microsoft's Multiplan; and in Apple's integrated word processor, spreadsheet, and file-management package, AppleWorks.

Beagle Bros., best known for its utility programs, is planning to release a ProDOS/DOS disk-catalog program that compiles a master listing of all your programs and is capable of reading catalogs from both operating systems. The company is also considering selling programs on a dual-format disk, with DOS 3.3 on one side and ProDOS on the other.

In all, more than 700 companies have registered with Apple to become licensed software developers with plans to use ProDOS in their products.

Choosing the Right System

ProDOS is available in four configurations. The ProDOS User's Kit, which includes a manual and a utility disk, retails for $40. The ProDOS BASIC Programmer's Kit is a $30 package with manual and several disk-based routines focused on programming. Advanced programmers may want to consider the $25 ProDOS Technical Reference package or the ProDOS Assembler Tools, which include an editor/assembler/debugger on disk along with a manual for $50.

Is ProDOS for You?

You don't have to purchase ProDOS separately in order to use programs based on that system. If you buy AppleWorks, for example, you'll automatically get the benefits of ProDOS.

In fact, if you use nothing but off-the-shelf programs in your Apple, you may not wish to purchase ProDOS at all. The programs that use it provide it, and those that don't cannot successfully convert to the system. Of course, if you take this route, you won't have access to utility programs that can back up your data disks or convert older files.

If, on the other hand, you write your own software, you are sure to appreciate ProDOS.

"Anyone who programs will want to convert. ProDOS is a much nicer environment in which to work," says Bill Schjelderup, Apple's marketing manager for ProDOS.

The ProDOS BASIC Programming Examples disk, packaged with the ProDOS BASIC Programmer's Kit, includes several utility programs that are helpful to every BASIC programmer. An example is APA, or the Applesoft Programmer's Assistant. APA enhances Applesoft with goodies such as automatic line numbering, hex-to-decimal conversion routines, a cross-reference of BASIC variables, and a versatile renumbering feature. You may find the Applesoft Programmer's Assistant alone to be worth the price of the entire ProDOS package.

Documentation

All of the ProDOS manuals are beautifully designed. Experienced users and novices alike will appreciate the straightforward way in which the information is organized. Apple's new series of documentation is perhaps easier to follow than any other computer manual.

As advanced as ProDOS is, it is also reasonably priced. The ProDOS User's Kit has everything you need to put the system to work—for less than the price of many game programs.

Whether you upgrade to ProDOS or not, the benefits it offers are bound to find their way into your computer system eventually. The next time you purchase a program and notice an improvement in performance over older software, you probably have ProDOS to thank. +

▶ HIDDEN FEATURES OF ProDOS

If you are using ProDOS on an Apple IIe equipped with an extended (64K) 80-column card, one of the program's best features is right under your nose, but you probably don't know it's there. For some reason, the ProDOS User's Manual contains no mention of the system's ability to use an extended 80-column card as an additional "disk drive."

When ProDOS detects extended memory, it causes the extra RAM to emulate another drive. You can access this RAM disk easily—it behaves as though it were in slot 3, drive 2, and has the volume name /RAM. To see what is there, enter CATALOG/RAM, and ProDOS will display the names of any files present, as well as the amount of available space.

This new "drive" works just like a real disk drive, except it's much faster. You can load, save, lock, delete, or use any other standard disk function. Operation is so fast that files that take 10 or 15 seconds to load from a floppy disk move on and off the RAM disk before you can get your finger off Return.

Any procedure, such as using a database program, that is affected by disk-access time will benefit from the RAM disk. Sort and search routines take a fraction of the time they normally require.

The RAM disk can also speed up disk-copy functions. Load the data to be copied onto the RAM disk and then download it to the floppy. When you're making multiple copies, this approach can cut the time in half.

The RAM disk does have a few limitations. Since only 64K is available on an extended 80-column card, the RAM disk can store only about half as much data as a physical disk can. Also, any information the RAM disk holds is volatile—shut the computer off, and it is gone forever. You must remember to move valuable data onto a real floppy at the end of every computing session.

One other quirk: Since the RAM disk feature was a late addition to ProDOS, some of the volume commands do not recognize the RAM disk as a valid drive. You have to move files to and from the RAM disk individually, rather than as complete volumes.

Utility programs that provide nothing but disk emulation can cost as much as the complete ProDOS package and aren't always compatible with other software. Features such as this help make ProDOS a superb value.

Most DOS 3.3 commands work fine under ProDOS, but you should be aware of differences. In addition to some changed commands, ProDOS has several completely new commands and has eliminated a few others altogether:

Say Good-bye to . . .

FP, INT, MON, INIT, MAXFILES, and NOMON.

Because of improvements in ProDOS, these DOS commands are no longer necessary and may cause an error if you use them in your programs.

Say Hello to . . .

CAT, CREATE, FLUSH, STORE, RESTORE, PREFIX, - (dash), and FRE.

These new DOS commands make system operation and programming much less of a chore. For example, - (dash) can now serve as an "all-purpose" Run command. Instead of RUN, BRUN, or EXEC, simply type -filename, and ProDOS will do the rest.

Programmers will appreciate STORE and RESTORE, which let you place the names and current values of a BASIC program's variables into a file and recall them later.

Look for Improvements with . . .

APPEND, BLOAD, BRUN, BSAVE, CATALOG, CHAIN, CLOSE, IN#, PR#, OPEN, POSITION, READ, RUN, and WRITE.

You can still use each of these commands as you did under DOS, but they now have new options and improvements. CATALOG, for example, now shows much more information about each file than did the same command under DOS 3.3, and RUN lets you specify an optional line number as a starting point.

Altered Applesoft Commands

HIMEM, HGR, HGR2, INPUT, IN#, PR#, TEXT, TRACE, NOTRACE, and FRE.

ProDOS is a little fussier than DOS regarding the way you set HIMEM. You must now specify the value in 256-byte ($100) chunks only.

In many cases, you won't even know that these commands are altered or enhanced, since ProDOS does most of the work. The only difference you may notice is that they work better. INPUT, for instance, now accepts any sequence of characters, including commas and colons.

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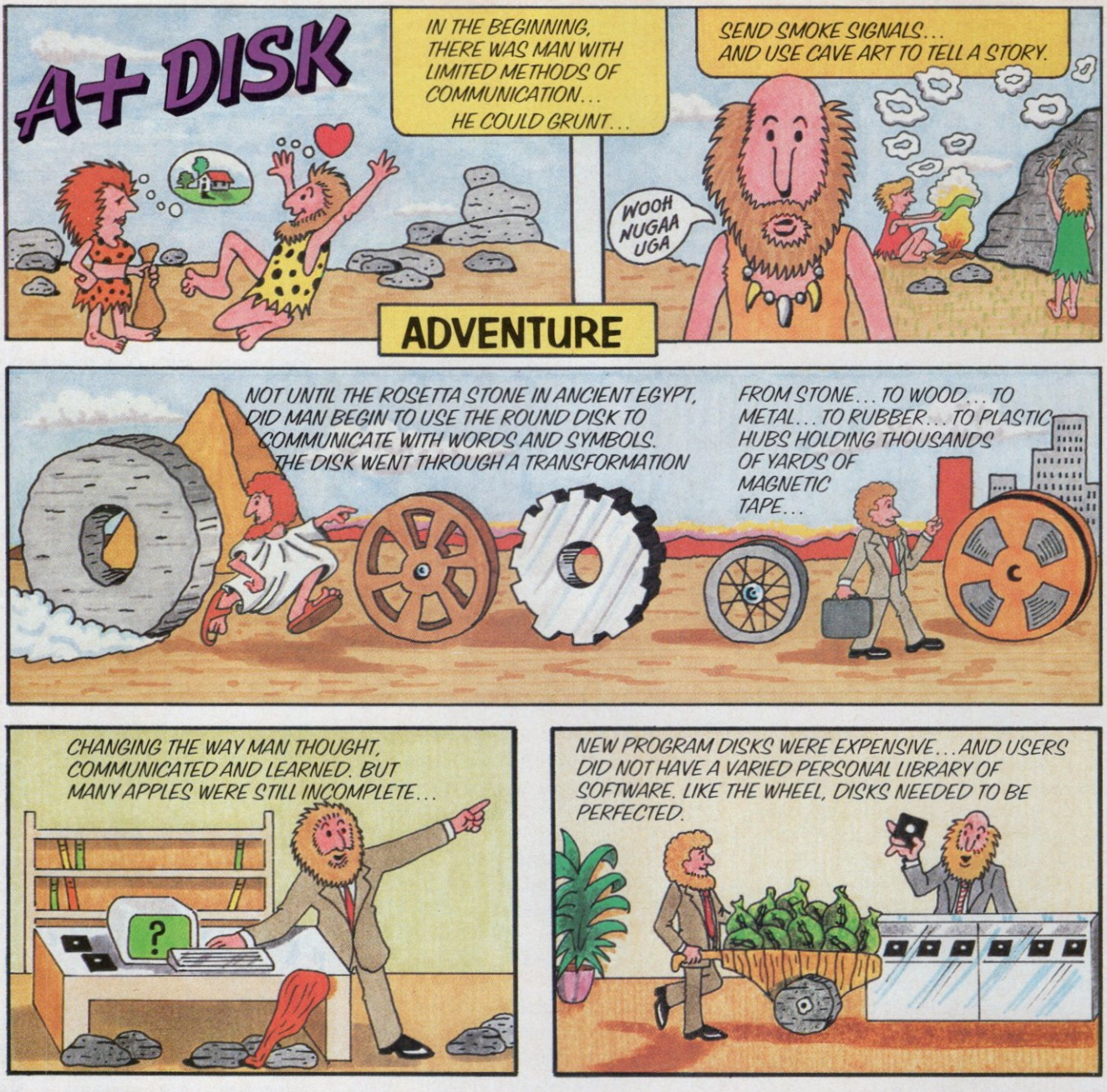

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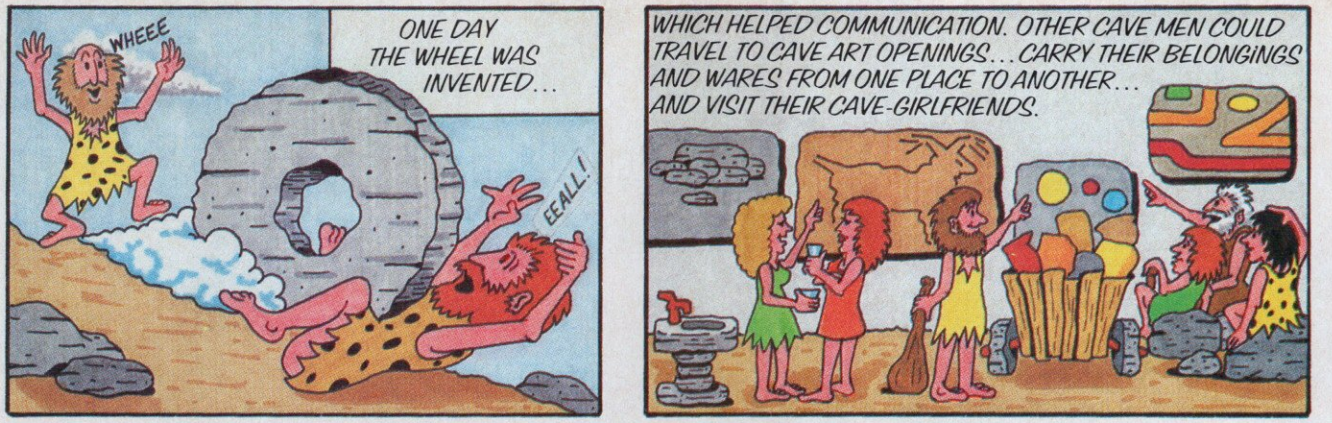

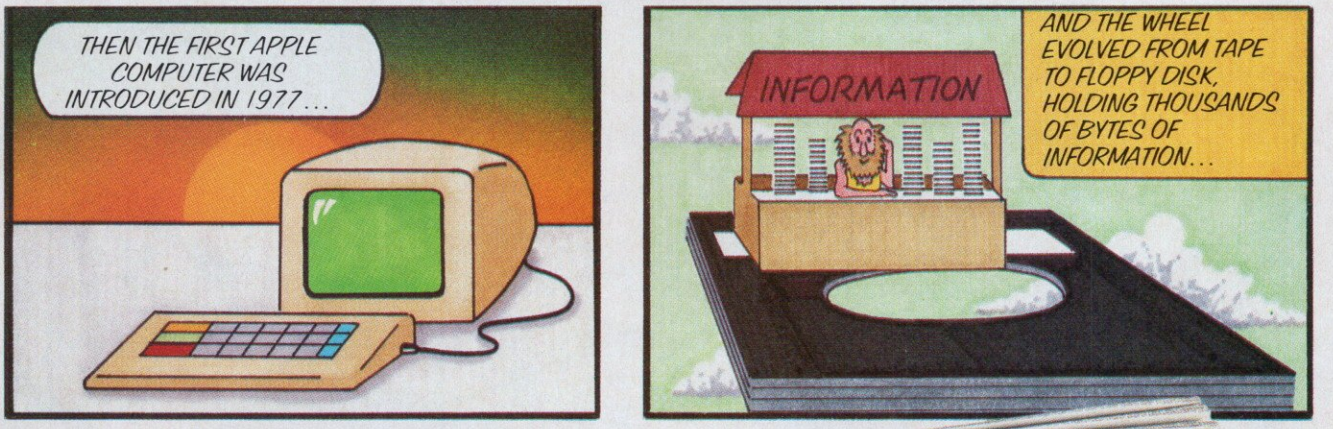

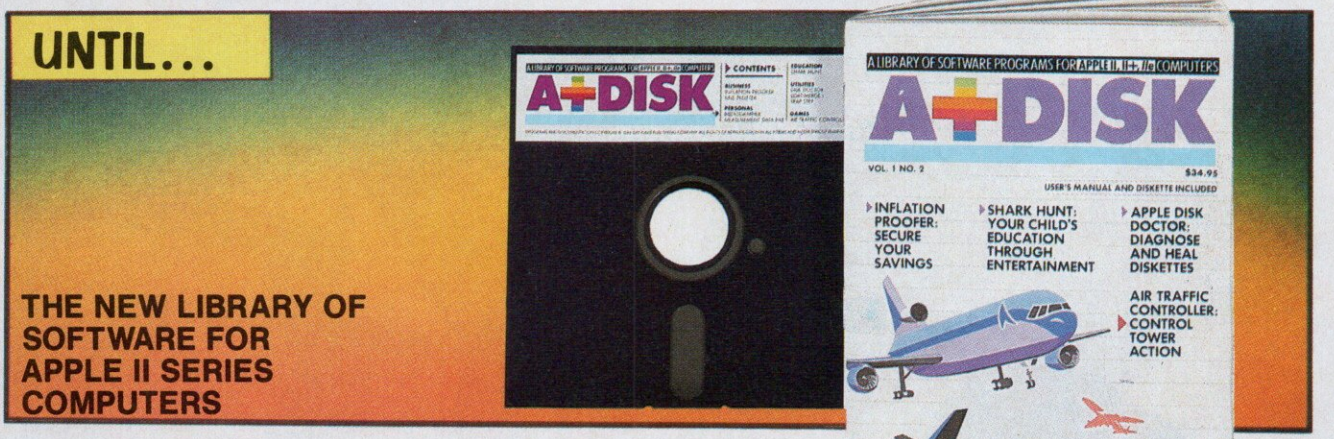

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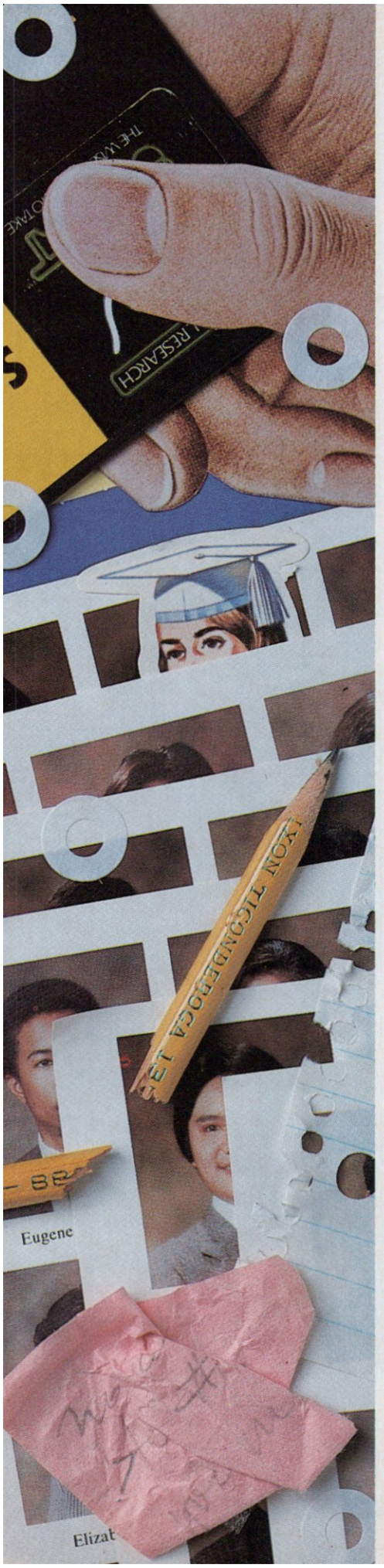

TEN PROGRAMS TO HELP STUDENTS ACHIEVE MAXIMUM SCORES ON THE COLLEGE-BOARD EXAMS

SCORING ON THE S.A.T.

High scores on college-board tests help students get into the college of their choice. The Scholastic Aptitude Tests (SATs) don't measure knowledge, motivation, social skills, or maturity, but admissions staffs pay close attention to the scores because they reflect general knowledge of math, English, and vocabulary.

Software to prepare students for the tests offers an alternative to tutoring and books. Educators still debate whether software is better, but many of today's video-oriented teens prefer computers to books. With that attitude, chances are they'll study harder with a computer. So here's a review of ten popular preparatory programs.

These programs, costing $30 to $300, offer many advantages over alternatives. One program can serve several students, saving money on tutoring costs while making drill and practice tolerable, if not fun. Some programs analyze wrong answers, diagnose ability level, and provide individual study plans. Immediate scoring, explanations, and rewards reinforce learning and hold the attention even of students who won't give a book the time of day. As a bonus, some programs teach subject matter and thinking skills that help students in their classes.

Different Approaches

We tested the programs on an Apple IIe with two drives (only one was necessary) and a color monitor. We didn't include achievement-test software.

All vendors offer a warranty for replacement of faulty media. Even though all except CBS and Digital Research copy-protect their diskettes, all the firms replace media that fails after the warranty period, for a nominal fee and the old media.

The instructions range from adequate to very good. Few programs use graphics, and not many use sound. Most work with reasonable speed, and most are crashproof.

Several programs design individual learning plans, which can make study more efficient and help students who don't know what their weaknesses are. Many can "manage" (store results for) more than one student at a time, a crucial feature for schools and for families with more than one teenager.

Some programs time responses, but answering time depends partly on how

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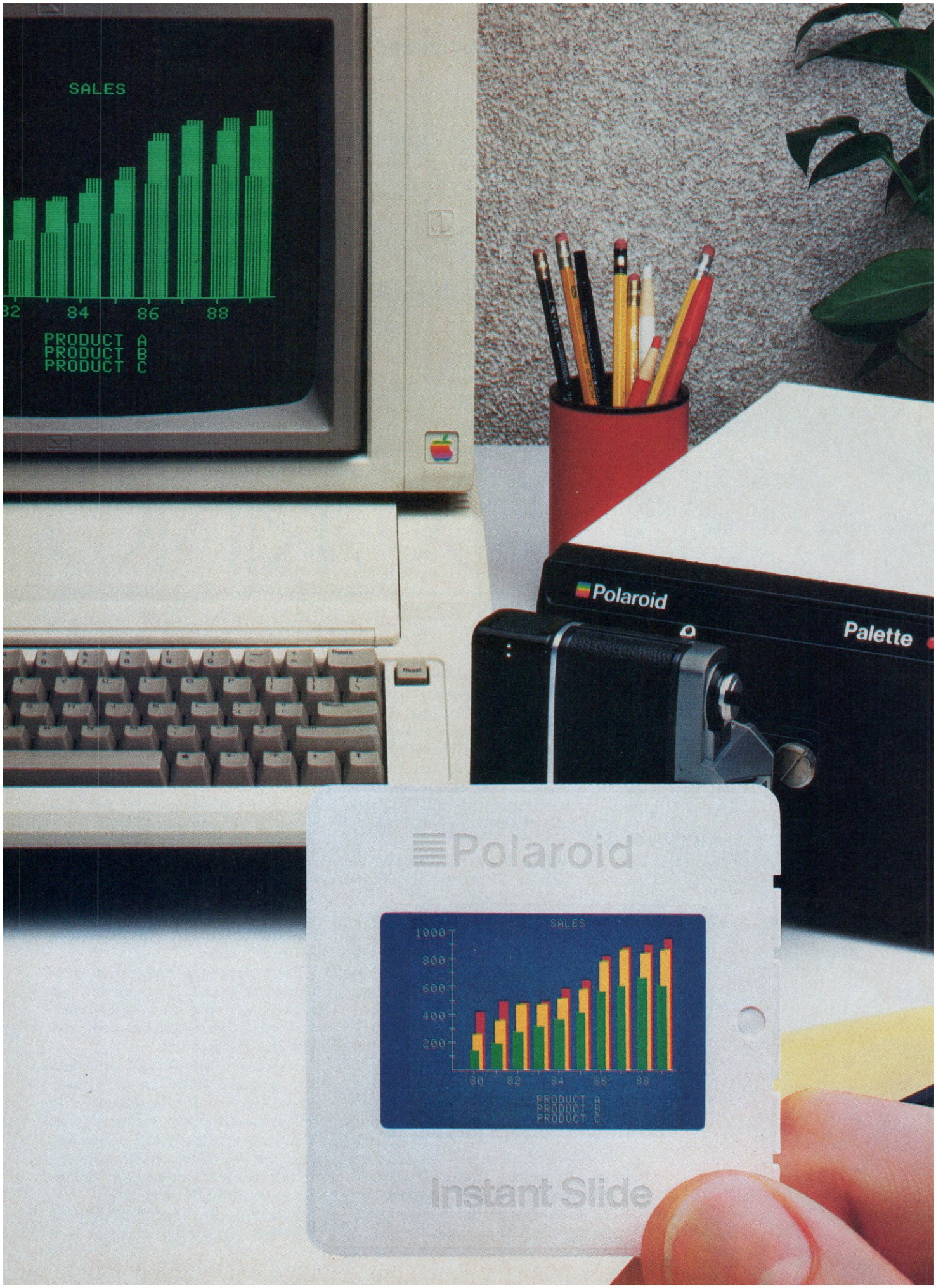
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well you know the keyboard and whether you have sharp reflexes. Also, as one company points out, a learner's time improves with practice, so why track time at all? Learning to respond under time pressure may be valuable training, but don't take time estimates too seriously.

Some programs use all uppercase letters, and others have a combination of uppercase and lowercase. We prefer all uppercase, and we also vote for black-and-white letters over mixed colors. Answering by number seems better than responding by letter, because the numbers are in order at the top of the keyboard. Screen layout is another important consideration—some screens are more crowded than others, which affects readability.

Some programs let you choose the question you want to start on; others remember where you stopped, so you can start there the next time you practice. You need one of these features to prevent unwanted repetition.

Let's take a look now at the ten major college-board-preparation programs. We present the programs in alphabetical order by company name to coincide with the accompanying chart.

● Computer Study Program for the SAT (Barron's)

Barron's program starts by testing students' strengths and weaknesses. The results aid in designing a personalized study program. The questions come from a book, not a disk, though clues and responses are on the disk. Scores are given in detail. The verbal section, for instance, provides scores for reading comprehension, antonyms, and sentence completion, among others. Users also get a scaled SAT score based on performance.

Students can take four full-length practice tests in either the Question mode, where they get feedback on each question, or the Test mode, in which the program times the test but gives no feedback. Correct answers get responses that vary from Nice Work to Right, Yes, Good Work, and so forth. Wrong answers get an Oops and other such responses. The explanations to the answers are clear, with key parts in inverse video.

Given the careful design and reasonable price of the program, it's a shame that every question comes from the book, not the disk. We found the procedure fussy, and some students may get confused in switching from one part of the test to another.

PUT THESE PROGRAMS TO THE TEST

PACKAGE	COMPANY	SUBJECT				
		MATH	VERBAL	TWSE[1]	PSAT	ACHIEV.
Computer Study Program for SAT	Barron's	●	●	●		
Mastering the SAT	CBS Software	●	●	●		
Owlcat SAT Preparatory Course	Digital Research					
15-Hour Course		●	●	●		
60-Hour Course		●	●	●		
PSAT Pretest		●	●	●	●	
PSAT/SAT Analogies	EduWare		●		●	
Math Attack		●			●	
Word Attack			●		●	
Computer SAT	Harcourt Brace Jovanovich	●	●	●		
College Board SAT	Krell Software	●	●	●		
SAT English I-III	MicroLab		●			
SAT Math I		●				
Improving College Admissions Test Scores	NASSP	●	●	●		
Preparing for the SAT	Program Design	●	●	●		
ACT/SAT Review	Quality Input	●	●	●		●

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.

● Mastering the SAT (CBS)

Designed with support from the National Association of Secondary School Principals (NASSP), the CBS program contains two full-length practice SATs—one for pretest and diagnosis and the other for use as a posttest. Unlike Barron's program, this software has its questions appear on the screen—a definite plus. After testing, the program analyzes performance (you can print the results if you wish) and reviews answers and explanations.

Each question is on a single screen with enough open space to separate the question from the answer and make both question and answer easy to read. A band of color separates the answers from general information and enhances readability.

This thoughtfully designed, reasonably priced program offers excellent tests, and its manual reviews test-taking strategies.

● Owlcat (Digital Research)

The Owlcat SAT Preparatory Course program offers conventional testing with a few novel twists. Students can choose to use the program in one of three modes: Learning (with or without cheers for right answers, as you wish); Drill (questions and answers only); or Review (questions, answers, explanations, and a dictionary). The program even has a game mode that lets two people play.

Our review copy had problems that arose during mechanical translation from IBM to Apple format. Beth Newberger of Digital assured us that those problems were being corrected, but our replacement copy of the program didn't arrive in time for retesting. Without the problems we encountered, Owlcat will be an excellent educational as well as SAT preparation program. Krell's College Board SAT has led this field, but Owlcat costs less, even in its most expensive version, and offers many of Krell's advantages.

The game module should work especially well for students who need a gentle shove to get them to study.

● SAT Programs (EduWare)

EduWare offers separate math- and verbal-skills programs called Math Attack, Word Attack, and PSAT/SAT Analogies.

The accompanying booklets give little guidance about test taking, and the tutorials on the screen repeat the

NUMBER OF DISKS	SUPPLEMENTARY MATERIALS	PRICE	SCHOOL VERSION[2]	SYSTEM REQUIREMENTS II	II+	IIe	IIc	III[3]	CARD #
3	2 workbooks 1 textbook 1 manual	$ 90		●	●	●			451
4	workbook/manual	150			●	●	●		452
4	1 manual	90			●	●			453
9	4 manuals	250			●	●			454
1	1 manual	20			●	●			455
1	1 manual	49		●	●	●			456
1	1 manual	49		●	●	●			457
1	1 manual	49		●	●	●			458
2	1 workbook 1 manual	80	●	●	●	●		●	459
6	1 manual	300	●	●	●	●		●	460
1	1 manual	30		●	●	●			461
1	1 manual	30		●	●	●			462
6	1 manual	184	●	●	●	●			463
6	1 workbook 1 manual audio tape	120		●	●	●			464
3	1 manual	180	●	●	●	●			465

1. TSWE = Test of Standard Written English 2. A more costly, more powerful school version exists. 3. Apple III requires emulation

instructions in the books.

The programs' slow response may handicap students who are fleet of finger from years of video games. If a student types an answer before the program is ready, the program marks the answer wrong. Typing an answer and then another stray character, which can easily happen with sloppy fingering, also counts as an incorrect response.

Drawbacks aside, though, these programs offer rich payoffs. Word Attack's cumulative approach to roots and prefixes, with words from early lessons reappearing later, helps students to grasp not only the specific words practiced but also other words with those roots and suffixes.

These programs offer cost-effective help for students who need only verbal practice or only math practice.

● Computer SAT (Harcourt Brace Jovanovich)

Harcourt Brace Jovanovich's package comes with 4 full-length exams; 540 drill items; and 1000 electronic, vocabulary-building flash cards. As with the Barron's program, students start by taking the tests printed in the workbook and typing the answers into the computer. The program records answers and time spent. Students can answer questions in any order and even go back and change answers. Unlike Barron's program, however, HBJ's doesn't offer hints and can't store data for more than one student at a time. At the end of the test, the computer figures a score, shows the "graded" answer sheet, and designs a personal study plan.

Compared to the instant responses of other programs, this part of this program nearly put us to sleep. The flash cards don't supply much pizzazz either—they're mostly explanations that students could get from a book. The drills supply good responses and explanations. The program as a whole offers a comprehensive, efficient way to study at an affordable price, but don't buy it for students who need strong encouragement to buckle down.

Coronado Publishers, a subdivision of HBJ, publishes a $435 version for schools, with more disks and books, and it can manage more than one student.

● College Board SAT (Krell)

First released in the summer of 1980, Krell's was the first program of this type on the market, and the company guarantees satisfaction. If students use the program for at least six hours and do improve total SAT results at least 70 points over the previous score, buyers can get their money back by presenting the results of both tests. Krell claims that many users report increases of 150 points or more.

Randomization enhances the program's value. When students repeat a lesson, the questions appear in a different order, and the problems change slightly. For instance, the first time we tried the standard English section, this sentence appeared: "Running along the beach, the hat blew into the water." The error is the misplaced modifier at the beginning; "running" doesn't describe the hat. When we repeated this section, the sentence became, "While I was running along the beach, my hat blew into the water." The correct choice is E, "no error in this sentence." Several other sentences had also changed.

An automatic learning feature tracks progress and concentrates on students' particular problems. Students save their results under a filename that they specify when they start using the program. A network license is available for classes.

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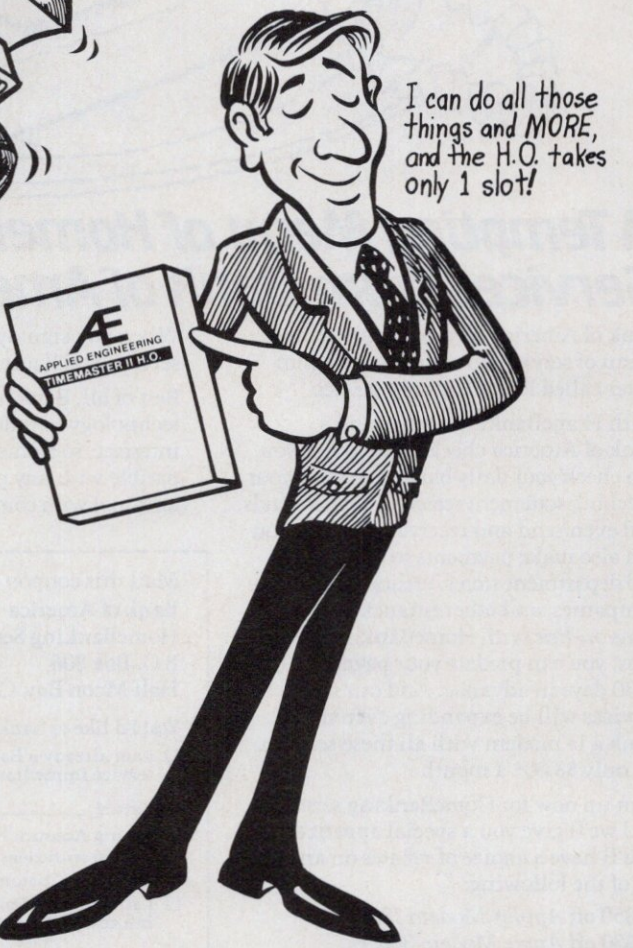

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The TIMEMASTER II H.O., H.O. for short, has ALL the features of all the competition combined, including leap year, year (not just in PRO-DOS) month, date, day of week, hours, minutes, seconds and milliseconds. The H.O. is TOTALLY PRO-DOS, DOS 3.3, PASCAL and CP/M compatible. And yes, it works great with APPLEWORKS.

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*Obviously, by ANY, we mean clock cards that are advertised and sold, not necessarily a clock card that your cousin Ralph built in his basement.

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This program is excellent for schools and for families with more than one child. College Board SAT costs more than any of the other programs we tested, but its combination of features makes it unusually effective.

● SAT Programs (MicroLab Learning Center)

MicroLab's SAT English I–III and SAT Math I supply both drills and tests. The program reinforces right answers and supplies hints on wrong ones, so students who make a lucky guess learn why their answers are correct.

Correct answers on the verbal section get responses that start with correct and range to oh such brilliance and this person should be the course leader. (One of our testers found these answers annoying.) Problems include slow response time and duplication between drills and tests; you can easily memorize answers. Most serious, some of the grammar questions contain poor sample sentences, so we can't recommend the English program.

The math program responds more rapidly and provides helpful graphics and excellent hints. It also reinforces right answers by repeating principles. Consider this reasonably priced program for students who need only math help.

● Improving College Admissions Test Scores (NASSP)

The NASSP wanted to provide a long-term learning experience that would become part of students' regular education. Thus, this program offers detailed hints and explanations.

The screens in the verbal sections look crowded because so much information is crammed in, though inverse video on key words makes the screen more readable. Students get immediate feedback for correct answers—the word Correct flashing across the screen. Wrong answers result in an explanation as well as a clue to help users figure out answers for themselves.

In the math section, problems and answers come with helpful graphics. For instance, one question plots a path across two chunks of land with different heights. The question comes with sketches to show what parts are what heights and simple graphs that plot possible answers. Pick a wrong graph, and the program tells why it's wrong. The illustrations make the math section easy to use. We could start a problem without a clue to the answer and gradually find it by ourselves. The detailed explanations might bore impatient students, but they do enable intensive practice without adult help, and they encourage independent problem solving.

We highly recommend the program.

● Preparing for the SAT (Program Design, Inc.)

PDI's Preparing for the SAT program comes with an audiotape that explains the SATs and tells how to take tests but is nearly impossible to use. Different tones signal when to touch Return (to get a new screen) and when to stop or start the audio. Some students will have trouble telling the two tones apart. The biggest problem, though, is needing to have hands in more than two places at once.

The sample test was very hard to take and was even harder to stop taking after we got lost. Nothing worked—Escape, Return, or the space bar. The drills are fairly conventional. Some sections lack hints and explanations that are in the books, and students have to

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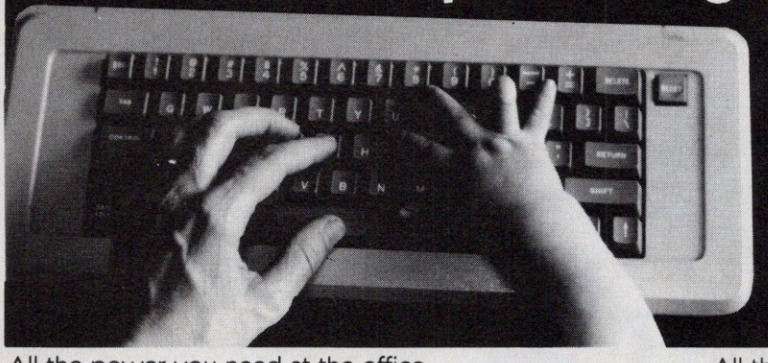

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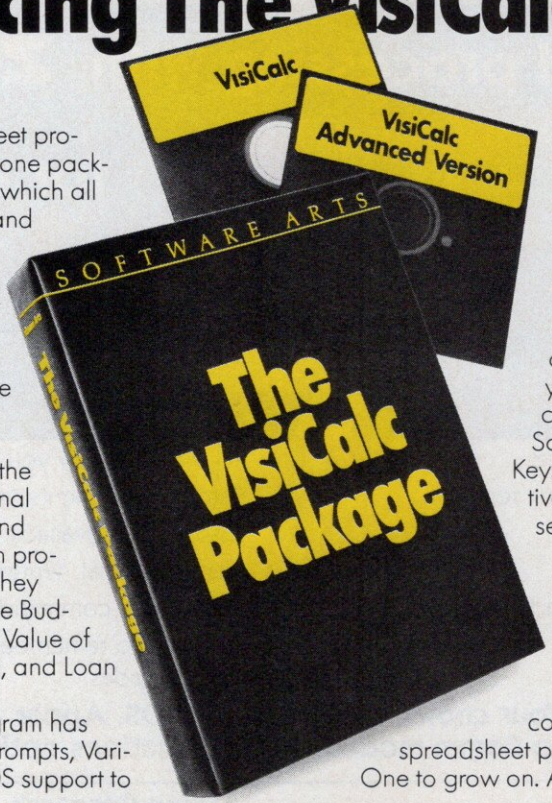

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VisiCalc Advanced Version is an advanced spreadsheet program for dual disk-drive systems. It contains sophisticated commands and functions to handle more demanding applications. Plus, an on line Introductory Guide to help you easily understand the program's capabilities.

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decide for themselves when to move to a new level of difficulty.

On quizzes, students don't find out right away whether an answer is right or wrong. At the end they get a summary of scores and a list of the question numbers with errors marked. By that time, though, they've forgotten which question goes with what number.

Overall, in the same price range, either Barron's or CBS's program will suit students better.

● ACT (Quality Input)

ACT, which helps students prepare for the American College Testing Program Test (ACT), differs from the other programs. The company argues that test simulations aren't accurate and may not help learning. The program presents normal errors in a review section that includes examples. After the review, questions start, with correct answers getting a visual CORRECT and positive audio.

Each module finishes by returning to the main menu, which divides topics finely. For instance, "math" divides into basic algebra, geometry, problems, and the like; "geometry" divides into angles/lines, perimeter/areas, polygon/circles, volume, and the Pythagorean Theorem. This strategy lets students work on particular problems without wasting time on areas they've already mastered. The program doesn't store results, so students have to remember what they did last.

Don't overlook this program for students who aren't taking the ACT. It can do a fine job of knocking summer's rust off skills, and it is the only program to offer some achievement testing. More important, as with the Owlcat and the NASSP programs, solid educational principles undergird it.

Should You Buy One?

Experts debate whether these programs work better than other ways to prepare for the SATs. None of the programs offers the fun of arcade games, but SAT software adds the novelty of computers to an otherwise dull endeavor.

Over the long term, the programs from Krell, CBS, NASSP, and Digital Research will probably hold students' attention the longest. These four, plus Quality Input's program, probably earn the highest marks for intrinsic learning value. Consider EduWare's programs or MicroLab's math program for students who need help on some skills but not on others. ✚

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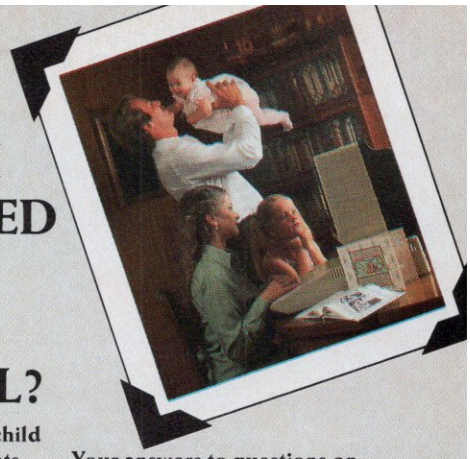


HAVE YOU DISCOVERED YOUR CHILD'S POTENTIAL?

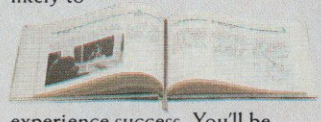
There is a remarkable new child development tool for parents with computers. You can use it to discover and develop your child's special talents, encourage creativity, foster self-esteem, and obtain help from professionals as you need it.

"DISCOVER YOUR BABY" and "DISCOVER YOUR CHILD" are more than child development books, although each Discovery Portfolio includes a child development activity book. And, they are more than software diskettes that simply "test" your child.

The Discovery Portfolios are computer-assisted child development guides. They were lovingly developed by a group of child psychologists, educators, and microcomputer specialists—all of whom are parents themselves—as an answer for parents who want to provide the best developmental guidance they can by using the new, exciting capabilities of the computer as well as the time-tested attributes of the printed word—along with their natural parenting instincts.

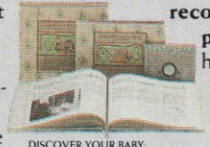
You use your computer to answer questions about your child's progress in four key areas of development: moving, feeling, thinking, and talking. After you spend a few minutes each month responding to questions on the Discovery Diskette, you will see your child's Development Profile. The broad bars represent your child's progress from month to month. The narrow line is a reference point, showing the range for "average" children, as determined by standard assessment tests.

Your answers to questions on the Discovery Diskette determine the specific activities in the Discovery Book the computer will recommend you do with your child. Since you will be introducing activities at a time when your child is most receptive to them, your child will be more likely to



experience success. You'll be making an investment in your child's self-esteem with every new activity you enjoy together.

Because the professionals who developed this program are all parents, they know how important it is to keep accurate records of a child's progress, medical history, family history, immunizations, and birth . . . as well as the special memories that make parenting such a joy. So a complete "electronic journal" for all of these records has been included on the Discovery Diskette along with colorful growth charts to keep track of your child's weight and height. Of course, all of these treasures can be printed out to share and save.



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TWO THROUGH FIVE YEARS

For parents who want the best for their children, who want the best for themselves, and are more comfortable following their own instincts than following formulas, the Discovery Portfolios extend the limits of exploration for both parent and child.

The Discovery Portfolios are currently available on Apple II® series computers at a suggested retail price of **$69.95**

Ask for DISCOVER YOUR BABY and DISCOVER YOUR CHILD at your computer store, software store, or department store. To order your Portfolio direct, call our number collect. Of course, each Discovery Portfolio has a 30 day money-back guarantee.

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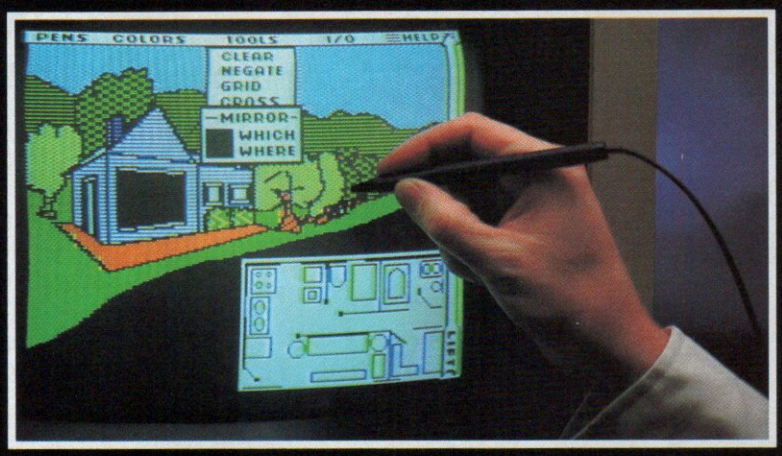

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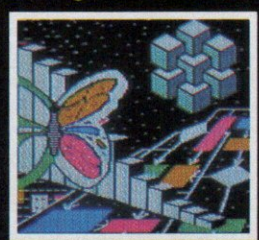

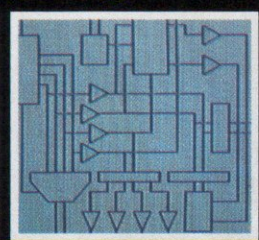

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He's waiting for you as you stagger out of the store with your new computer and assorted peripherals. He's wearing a black suit, a white tie, and a self-assured smile. As the printer begins to slide off the top of your stack, he reaches out and stops its fall with his free hand.

"You'd better be careful with those things," he warns you gruffly. "Accidents can happen real easy. Don't you think you oughta look into some . . . insurance?"

Protecting Your Investment

Computer dealers report that almost none of their customers ask them about insurance for their hardware, software, or peripherals. But the state-of-the-art technology that brought you compact and powerful microcomputers has also opened the gates to theft, accident, and damaged disks.

Speaking of the 100% upswing in thefts of computers over the past two years, Los Angeles Police Department Lieutenant Dan Cooke told the *Los Angeles Times*, "If it can be carried away, there will be someone willing to buy it off the back of a pickup truck on the assumption that it is hot and worth several hundred dollars more than is being asked for it."

So how are you going to protect your $3000 investment? The simplest and cheapest method of protecting your equipment is some kind of property insurance.

PROTECTING YOUR COMPUTER INVESTMENT

Before you insure your computer, you need to determine whether you use your computer only for your household and personal needs, or whether it comes in handy for your business.

This distinction is important, because any kind of computer, from a Timex/Sinclair to a Lisa, is a "home computer" for insurance purposes if you use it only for household and hobbies. Your home-owner's or renter's policy can usually cover your home-computer system.

If you utilize your computer in your work at all, however, most home-owner's policies put the computer into the realm of "business machines or supplies," an entirely different ball game. Not only that, but even policies that cover the tools of your trade may not pay you back the full replacement value. The insurance company will pay off, but at the *depreciated* value of your computer.

As John Layne of MPA Insurance Services in San Mateo, California, says, the depreciation rate for computers is tremendous because the technology advances so quickly. After about a year and a half, he points out, "If you go out to sell it, you'll find that it's got the resale value of a used toothbrush." Other insurance agents say a computer's life span, financially speaking, is no more than three years.

Layne adds that insurance companies never pay less than 25% of your cost, since anything you keep around must have some value, but you reach that level much faster with computer equipment than with other household items.

Remember, policies vary, so comb through your own fine print to discover what you can expect from your current insurance.

You may be able to have coverage for your home computer added as an "endorsement," "rider," or "floater" (agencies differ on terminology) to your current policy. Floaters incorporate coverage for specific items into an insurance contract. You declare the value of the item, and the company levies an appropriate increase in your annual premium. Some insurance companies now write floaters specifically for computers and software, but you can also use a general floater form. Premiums

vary from company to company—70¢ for every $100 of value is standard.

Getting the Business

Microcomputers you use mostly for your business won't be covered under your home-owner's or renter's insurance. If you use a computer for only some business purposes, your insurance company may try to figure out whether it was primarily a business or pleasure machine, or it may prorate the payment in case of a loss.

If you use the computer mainly or entirely for business, you have two options: pay for coverage as part of your general business-insurance package or search for a special policy for small-business computers.

The standard business owner's package typically insures against loss or damage to office equipment, which can include computers, and provides coverage for general liability.

More and more insurance companies now offer special policies for small-business computers, a kind of "multiperil" policy that addresses most of the issues involved in computer insurance. Kemper, Fireman's Fund, Unigard, Safeco, United Pacific Reliance, Hanover, Ohio Casualty, and Hartford are a few of the major firms that provide such insurance contracts.

Ohio Casualty Insurance Company, for instance, has a special policy that covers computers, peripherals, terminals, word processors, data, and storage media.

Business-computer premiums are often linked to the published fire rate for your particular location, one major index of risk. One firm quoted 25% of the fire rate as a rule of thumb for estimating premiums.

Joe Ahearn, underwriting supervisor for Ohio Casualty in Fullerton, California, says you can also get coverage for computers in transit, from home to office or from office to office (for a small extra fee).

Soft on Software and Data

Check your policy carefully, this time for what it says about software and data. Most insurance companies have few qualms about insuring your purchased software, but your own data or programs you've written yourself may receive short shrift.

Many companies won't insure you for what you claim as the value of data stored on your floppy disks. After all, says a spokeswoman for Maring Knapp, a program you wrote may be worth $500 or $5000, but who's to judge? A fair number of firms *will* reimburse you for the cost of the floppy disks and for the cost of reentering the data, however.

Ahearn notes that his company's policy specifically excludes businesses that sell, rent, or lease data processing to others—computer consultants—from eligibility. "We want to stay on the retail end," says Ahearn, expressing doubt that insurers can ever really keep track of what programmers are doing.

One bright spot for programmers is that at least one insurance firm, the Chubb Group, gives programmers the equivalent of malpractice insurance. Under this contract, material loss resulting from errors in a program or omission of data can be included in an insurance package as part of the programmer's liability coverage.

Some insurance companies cater specifically to microcomputer users.

First on our list is the program Apple Computer itself has arranged for, a special "all-risk" policy called AppleCare. Underwritten by the Chubb Group and available through Emett & Chandler, Inc., the policy covers your Apple system (hardware, software, and accessories) anywhere in the world.

This policy includes earthquakes,

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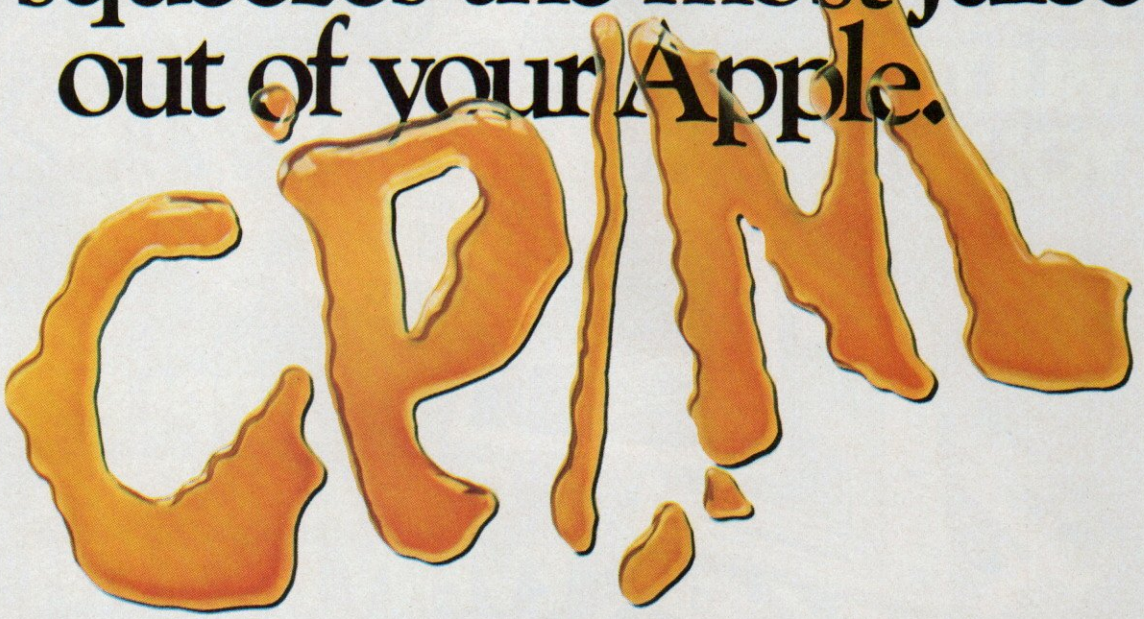

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floods, and electrical and mechanical breakdowns in its coverage, though programming error and data erasure by magnet or electricity don't count.

Chubb's policy carries a $100 deductible. When you pay your premium—$25 to protect a system worth up to $5000, with $50 purchasing coverage up to a $25,000 limit—any equipment and software you buy "is automatically covered up to the $25,000 limit at no additional cost." You can obtain an application for this insurance from an authorized Apple dealer.

Safeware, a program that used to be part of the Columbia National General Agency, now stands alone. As with the AppleCare program, policyholders buy categories of coverage, not machine-specific plans. The Columbus, Ohio, firm's minimum premium is $35, and the price increases by $15 increments for every extra $3000 worth of coverage; there's a $50 deductible. Safeware's standard policy won't insure the cost of replacing your data, but a beefed-up version called "Big Mike" will pay for the cost of replacing data, up to $5000. Safeware has recently begun a program of discounts for university students at schools that have a computer-use requirement and/or a large volume of computer sales to students. The discount program is available only at schools that have officially authorized it.

The Personal Computer Insurance Agency, of San Jose, California, provides similar category-based coverage for a slightly higher premium, but with no deductible. One thing this agency covers that many don't is corrosion or damage due to air conditioning—other contracts tend to specifically deny claims based on damage from dampness of atmosphere or extremes of temperature. For $10 extra per month, policyholders get a "business interruption" option that provides up to $2500 per month in case their machine goes down at a crucial moment.

Another firm specializing in stand-alone-computer insurance, Data Security Insurance Agency, could not be contacted by press time.

Before you rush out and buy that policy, ask yourself if you have the two kinds of coverage that most agents recommend you purchase, whatever insurance you possess: surge protectors and hard-copy backups of your data.

One salesperson at the Computer Store of Oakland in California says that surge protection is "the best short-term insurance" against fried circuit boards and garbled data. "Very few people, maybe 5%, ask about insurance," says Bill Gandy, "but when I tell people they need to get surge protectors, they think I'm just trying to sell them something."

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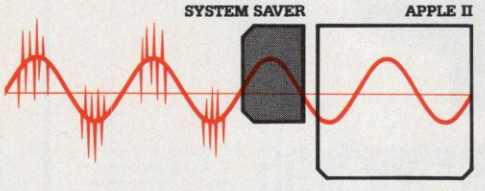

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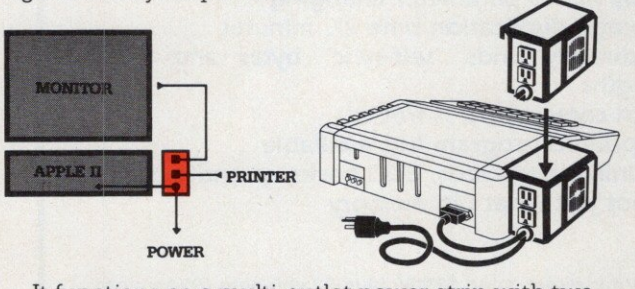

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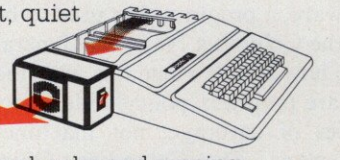

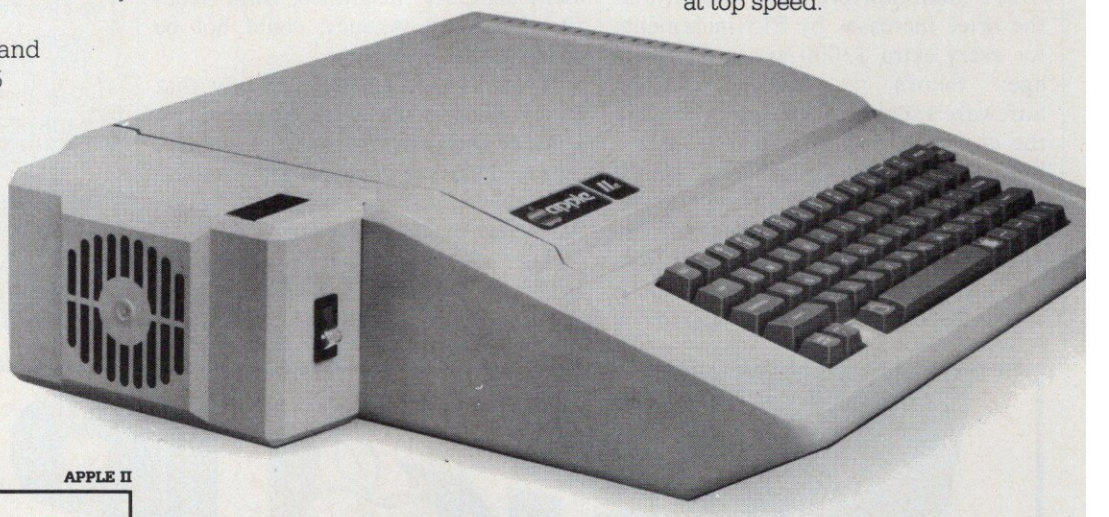

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HOMEBREW HARDWARE

SIMPLE APPLE INTERFACING

This article will tell you how you can make your Apple II, II Plus, IIe, or IIc interact with the rest of the world, using simple techniques and low-cost equipment plugged into the game socket (or game connector, in the case of the IIc).

Most people who have developed some skill in writing BASIC programs—and even those who can write machine code—are reluctant to use their Apples to measure or control outside events. The cost and complexity of analog-to-digital converters and the apparent need for advanced programming knowledge put them off. If this description fits your situation, read on.

Every Apple II comes equipped with the simplest possible interface, which can easily provide an open door to all sorts of monitoring and control. It is the game-paddle input, which contains a built-in A/D converter. Each game paddle consists of a variable resistor. The computer can check the current value of this resistance. The Applesoft BASIC command PRINT PDL(0) puts on the screen a number between 0 (zero resistance) and 255 (maximum resistance). If the paddle is near its midpoint, the number will be 127 or 128. When the paddle is used in a game, this number does not print, but it is used to move something on the screen.

SETH JABEN

This division of the full resistance range into 256 parts limits the accuracy you can attain with the game input; professional A/D converters provide greater precision. For most uses, however, 256-bit accuracy is as much as you can use. Incidentally, it matches fairly closely the built-in resolution of the Apple high-resolution screen, which has 280 × 160 points.

Program 1:

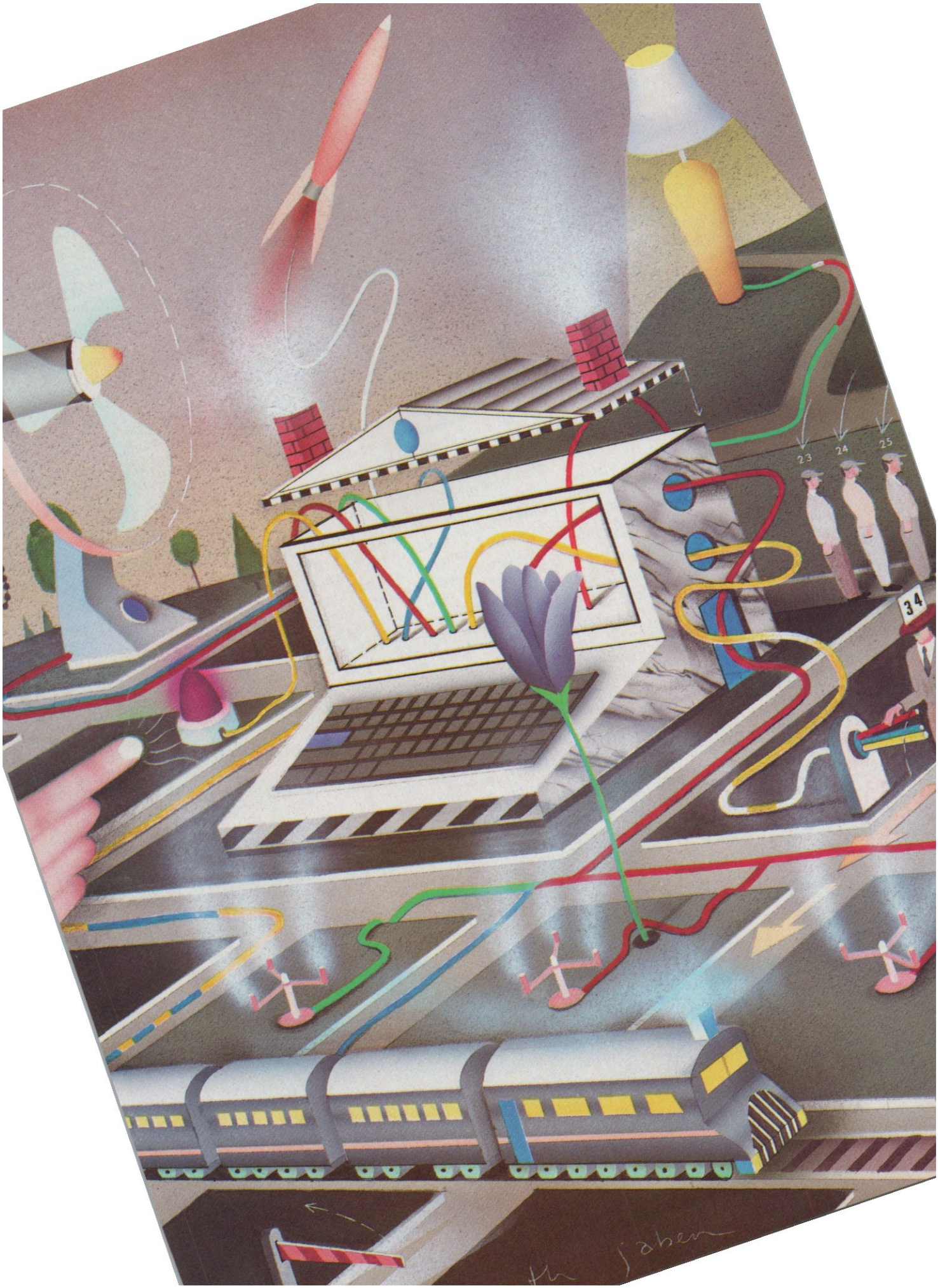
```
100  INPUT "HOW MANY
     READINGS? "; A
110  INPUT  "INTERVAL  BETWEEN
     READINGS IN SECONDS? "; B
120  C = 720*B : REM - USE FOR
     TIME DELAY
130  HGR : HCOLOR = 2
140  REM - DRAW GRAPH AXES
150  HPLOT 10,10 TO 10,150
160  HPLOT TO 270,150
170  HCOLOR = 5
180  HPLOT 0,PDL(0)
190  FOR D = 1 TO A : REM - NUMBER
     OF READINGS
200  E = PDL(0)
210  F = E* 150/255 : REM -
     CONVERT TO FIT SCREEN
220  HPLOT TO D*270/A,F
230  FOR G = 1 TO C : NEXT G : REM -
     DELAY FOR B SECS
240  NEXT D
```

The Apple has no means of knowing what kind of resistor is connected to the game socket, and many resistive devices can substitute for the game paddle. For a dollar or two, you can purchase at Radio Shack and similar stores sensors that change their resistance with their temperature (thermistors), with light (photoresistors), or with pressure (carbon microphone).

Temperature Sensing

Your Apple can use a thermistor to measure temperatures and graph the data immediately, process the figures, or store them. You can use these values as triggers, so that the computer can switch heaters, fans, or warning devices on and off at preset temperatures. Program 1 (left) is a program that you can use to investigate the way the temperature changes over a period of time. It is well suited for a greenhouse, for example, where it can determine how you should set the night thermostats.

Thermistors come in a variety of types, and you can buy them to increase or decrease in resistance as the temperature rises. The important thing is to choose one whose resistance at room temperature is about 80,000 ohms (80 kΩ), since this is the middle of Apple's measuring range. For many purposes the arbitrary units of program 1 are ad-


23
24
25
34

equate, but if the computer is to give temperatures in Celsius (°C) or Fahrenheit (°F), you'll have to calibrate the thermistor.

To do so, place the thermistor in a funnel of crushed, melting ice; connect it to the game input (see figure 5); and record the computer's reading (A) after a few minutes. Next, place the thermistor next to a household thermometer under a reading lamp or other heat source and record the new value (B) when it settles, along with the reading of the thermometer. You can then add a program step to convert any reading into conventional degrees, using the calibration figures, A and B, together with the known temperatures.

Since the Apple provides for four game paddles (or two joysticks that each contain two variable resistors), you can connect your computer to up to four thermistors, reading their resistances with PDL (0), PDL (1), PDL (2), and PDL (3).

Using two thermistors, for instance, you can record outside and inside temperatures or monitor two chemical baths in a darkroom, controlling heaters as necessary.

With a "Wheatstone Bridge," you can do additional calibration and fine-tuning (see figure 1). Two matching resistors and a potentiometer will help you adjust the input and sensitivity of the circuit.

Maximum and Minimum Temperatures

Thermistors respond much more quickly than regular thermometers do, and since you can program a computer to select and retain any specific data, the combination makes an excellent setup for recording the maximum and minimum temperatures over a period of time, as shown in program 2.

Light Sensing

We have gone into some detail concerning the possible uses of thermistors to indicate what can be achieved by such a simple device, but many other sensors are available that can work with your Apple. An equally simple (and cheap) device is a photoresistor, the resistance of which depends on how much light hits it.

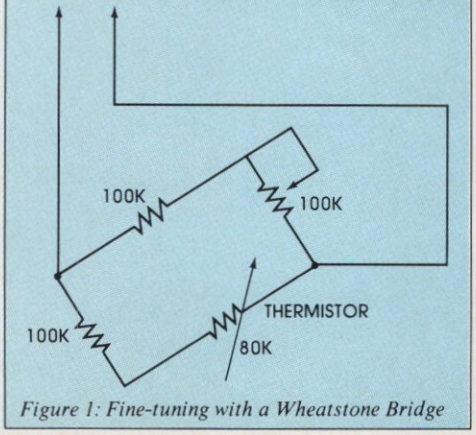


Figure 1: Fine-tuning with a Wheatstone Bridge

Program 2:

```
100  MX = 0 : MN = 1000 : REM -
     INITIALIZE
110  C = PDL(0) : REM - READ
     THERMISTOR
120  IF C >MX THEN MX = C : REM -
     RETAIN HIGHEST TEMP
130  IF C <MN THEN MN = C : REM -
     LOWEST TEMP
140  PRINT "MAX = "MX, "MIN =
     "MN
150  GOTO 110
```

Photoresistors cost about a dollar, and you should choose one with a resistance of about 80 kΩ, though other values usually work too. With a photoresistor you can monitor light levels and turn on different lamps at different stages of dusk or control operations in the darkroom. Because its resistance changes fairly quickly with light changes, a photoresistor comes in handy for tasks such as counting events and calculating the speed of an object. The photoresistor does not respond instantly, but it is quick enough to be useful for events that happen up to about 100 times per minute.

You can use a photoresistor to measure the speed of a model train or a similar object by using program 3. The computer starts counting when the light is first interrupted and stops when the light hits the photoresistor again. By converting the count value into seconds and dividing the length of the object by the calculated time, you can get a fairly accurate measurement of its speed. The system uses only one low-cost sensor and a light source, which can even be a window.

Voltage and Current Sensors

The versatility of the photoresistor lets you use it to measure other changes that are not in themselves resistive. For example, you can use a voltage that you want to monitor to drive a flashlight bulb or light-emitting diode (LED) that shines onto the photoresistor. For convenience, you can tape them together to exclude outside light. This method gives you a direct optical link between the voltage under test and the computer input—without any electrical connection.

As the voltage varies, the light intensity changes accordingly, and the photoresistor communicates these changes to the computer. You won't know the actual voltage unless you run a calibration, but this step is usually unnecessary. You can use the same setup to monitor changes in current or electrical frequency, both of which can control the brilliance of an LED.

Push-button Inputs

Of all the game inputs, those designated for push-button use, PB(0), PB(1), and PB(2), are the easiest to use. The push buttons are normally open, and the connection is made when you push the button. As with the paddle inputs, it makes no difference to the Apple what kind of switch is connected to these inputs. The computer can tell the state of any switch connected between PB(0) and the +5v power supply. You can use the instruction IF PEEK (-16287)>127 THEN . . . for many purposes other than firing missiles at marauding aliens.

One handy interfacing technique allows the computer to count events—e.g., people passing through a turnstile—while doing something else entirely. Suppose the turnstile has a small magnet attached to it and a magnetic reed-switch is close by. Every time the magnet moves past the reed-switch—i.e., a person goes through the turnstile—the computer counts the impulse. If the Apple is busy with other monitoring tasks, all you have to do is add to the other program the instruction IF PEEK (-16287)>127 THEN N = N + 1.

PRINT N gives you the number of customers, an output that you can have

Program 3:

```
100  PRINT "HOW LONG IS THE OB-
     JECT, IN CMS";
110  INPUT A : HOME
120  B = A/100 : REM - CONVERT
     LENGTH TO METERS
130  C = PDL(0) : REM - ESTAB-
     LISH NORMAL LIGHT INTENSI-
     TY
140  IF PDL(0) <1.2*C THEN GOTO
     140
150  D = D + 1
160  IF PDL(0) >1.2*C THEN GOTO
     150
170  E = D/67 : REM - CONVERT
     COUNT INTO SECONDS
180  PRINT : PRINT "LENGTH OF
     OBJECT = "A" METERS"
190  PRINT : PRINT "TIME TAKEN =
     "E" SECONDS"
200  F = INT( 100*B/E +0.5)/100
     : REM - CALC & ROUND OFF
     SPEED
210  PRINT : PRINT "SPEED = "F"
     M/SEC"
```

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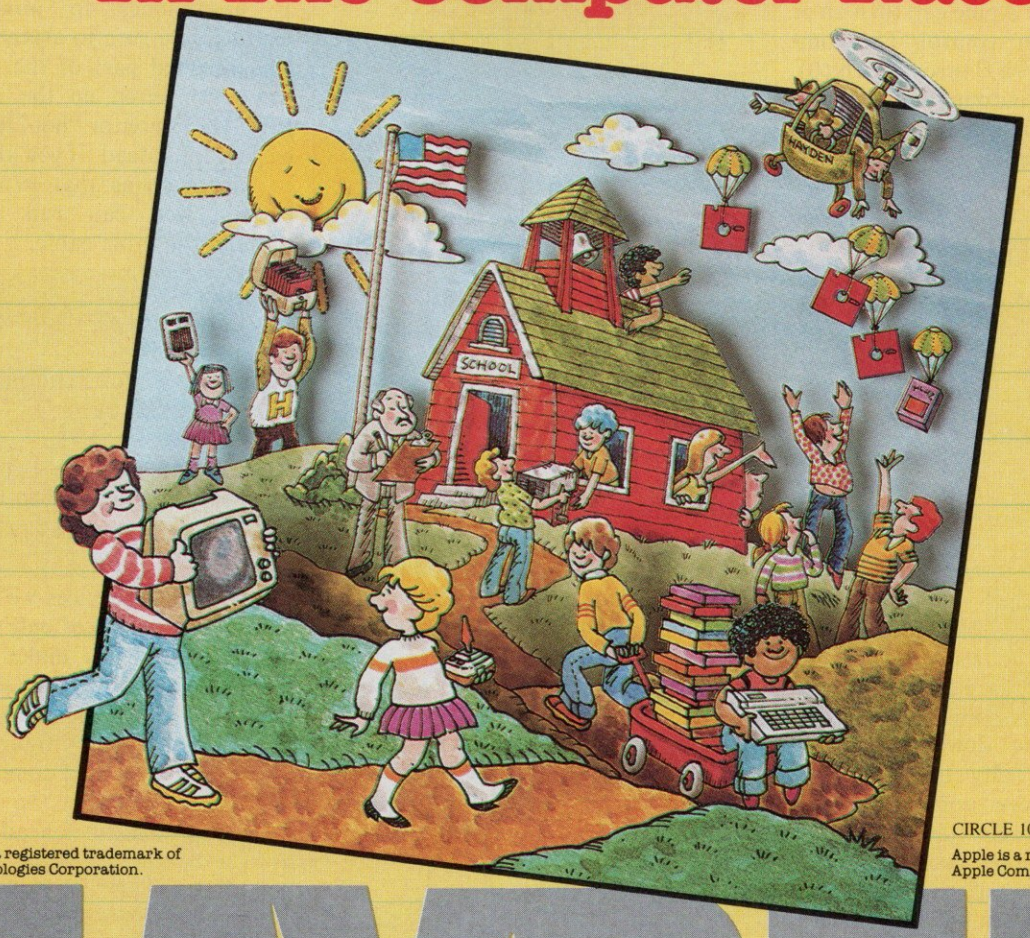

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displayed in one corner of the screen set aside for unconnected information. To keep count of the number of people actually in an area at any given time, you can include a second reed-switch, operated by the exit turnstile and connected to PB(1). IF PEEK (-16288)>127 THEN N = N - 1 then takes account of people leaving, so that N always represents the number in the room.

Apple in Control

Earlier we mentioned that you could use an Apple to control electrical devices. In conjunction with the above measuring techniques, you can take advantage of this ability to control a variety of equipment, from lights to heaters or sprinklers.

In the game socket are four outputs—the annunciators, labeled AN (0)-(3)—that the Apple can turn on or off under program control. The command POKE -16295,0 turns on AN(0), which makes the output (pin 15) go to +5v (previously 0v); it stays at this level until the instruction POKE -16296,0 turns it off. You can use this change (0v to +5v) in several ways to switch electrical equipment on and off. In figure 2 the annunciator output switches an NPN transistor (type 2N2222, for example); and the transistor, in turn, controls a relay.

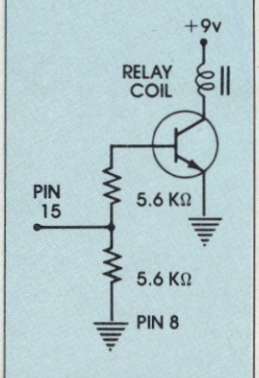

Figure 2: Annunciator output switches an NPN transistor, and the transistor controls a relay.

When the base of the transistor goes to +5v, the transistor conducts, allowing current to flow through the relay coil. The relay thus activated switches on whatever appliance is connected to its contacts (just make sure the appliance current does not exceed the rated capacity of the relay contacts). The computer has only to provide sufficient power to switch the transistor—the relay power comes from a 6-9-volt battery.

If you follow figure 3, you can achieve complete electrical isolation by using an opto-isolator system, in which the annunciator output drives an LED that illuminates a photoresistor in the control circuit of a transistor. The Apple can easily supply enough current for the LED, and the optical coupling prevents any unfortunate electrical connections between the computer and the apparatus it is controlling.

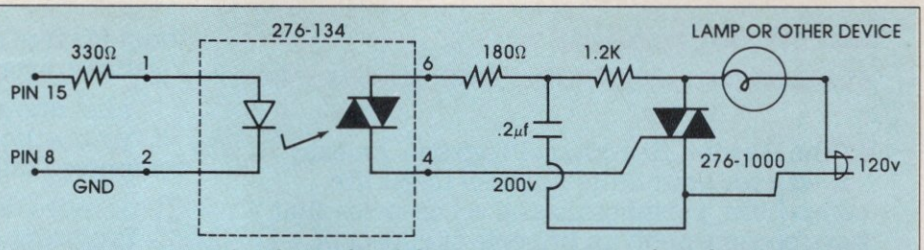

Figure 4: You can control appliances directly by connecting an optocoupler with a triac output.

A device available at most Radio Shack stores is an optocoupler with a triac output (catalog number 276-134). You can use it to control lamps and other appliances directly, provided that they do not exceed the ratings of the triac you're using. Connect the optocoupler as in figure 4 and use a high-power triac (Radio Shack #276-1000 or equivalent).

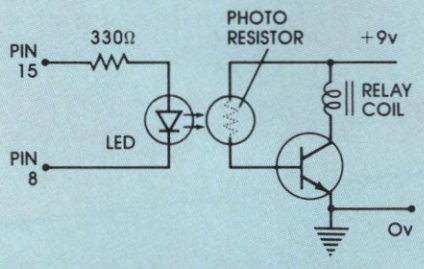

Figure 3: Complete electrical isolation with an opto-isolation system

This method of interfacing eliminates the need for costly relays and makes the entire circuit truly "solid state." A high-power triac is quieter and much more efficient than a noisy relay for controlling a light bulb or other appliance. Make sure you don't exceed the ratings of the triac that you're using. (The Radio Shack 276-1000 has a rating of 6 amps at 400 volts, which amounts to 700 watts at 120 volts.)

You can use program 5 to switch on a fan and give a warning sound if the temperature rises too high. (Note: You have to modify the value 200 in line 100 to suit the particular thermistor and switch-on temperature you've selected.)

Making the Connection

The Apple uses monostable multivibrators to sense the resistance present at the game-paddle inputs. Monostable multivibrators, often called one-shots, are somewhat unstable, so engineers don't use them much anymore. If your wires from the Apple are very long, you may experience some instability due to interference and capacitance created by unstable oscillators.

To help solve this problem, use shielded wire—the kind in stereo cables or headphones—to minimize false readings. Be sure to attach the ground (the shielded part of the wire) to the +5v connection on the Apple game port. The center or "hot" lead will then be your input lead. If you are using stereo wire such as that in stereo headphones, you can run two signals through the same cable.

Program 5:

```
100  IF PDL(0)<200 THEN GOTO
     100
110  REM - CONTINUOUS LOOP TO
     MONITOR TEMP
120  POKE -16295,0 : REM -
     SWITCH ON THE RELAY
130  FOR SOUND = 1 TO 40
140  S = PEEK (-16336)
150  NEXT SOUND
```

Most of the devices we've discussed require connection of only two wires to the computer. You make the connections into the game I/O socket, inside the Apple, at the back on the right (see figure 5). The connector is a "16 pin DIP header," which you can get at Radio Shack and similar stores, and it is small, so we recommend thin, stranded wire. You have to solder the wires into the header plug with a small soldering iron, being careful not to form any solder bridges that could connect one pin to another inside the plug. Wires about two feet long, terminated in insulated alligator clips or soldered directly to the thermistor or photoresistor leads, are adequate

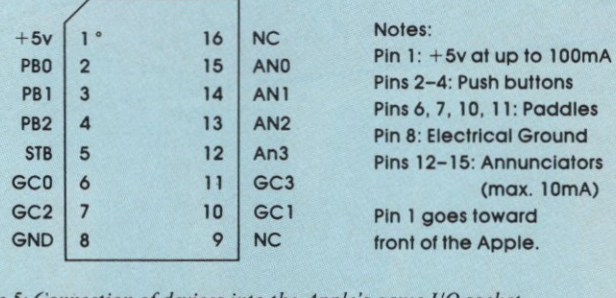

Figure 5: Connection of devices into the Apple's game I/O socket

Before

After

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CIRCLE 187 ON READER SERVICE CARD

ing. Thermistors vary in resistance and type, and you may have to modify programs to get the best results with various photoresistors. Once you've grasped the basic ideas, however, you can easily extend them. For instance, you can use your computer to control the watering of plants. Two copper wires sunk close to each other in the soil will act as sensors, for the resistance of the soil between them will vary with the amount of moisture in the soil.

Since the sample rate may be unstable because of the inherent instability of the one-shot circuit in the Apple, we recommend that you average the number of samples you take and use shielded wire whenever possible.

After some initial experimentation to ascertain the most suitable values for the degree of moisture required, sensor spacing, and the like, you can write a program to turn on the sprinklers when the resistance value rises above the threshold you've chosen (increased resistance results from shortage of moisture in the soil).

To store data for future analysis, you can modify the maximum and minimum program (program 2) to write to disk all values that exceed a certain preselected limit and store the approximate time at which the computer counted each value, as determined by a simple counting routine in the program.

You can also employ other sensing devices, such as a carbon microphone, which changes its resistance in response to changes in sound level or other pressures. It could act as a pressure transducer, to respond to changes of weight, pressure, or sound level.

Since this article is only an introduction to the subject of Apple interfacing, we have considered only fairly straightforward examples. You'll realize the full potential of the Apple if you combine two or more different sensors. Using the methods presented here, you can write a little program, for instance, that uses the inputs from three different sensors to determine whether some electrical equipment should be switched on. The possibilities are limited only by your imagination. ✚

FURTHER READING

The Apple Connection by James W. Coffron (Sybex, $14)

Interface Projects for the Apple II by Richard C. Hallgren (Prentice-Hall, $16.85)

Apple Interfacing by Titus, Larsen, and Titus (Howard W. Sams, $14.25)

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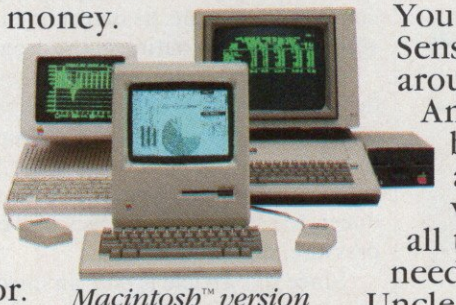

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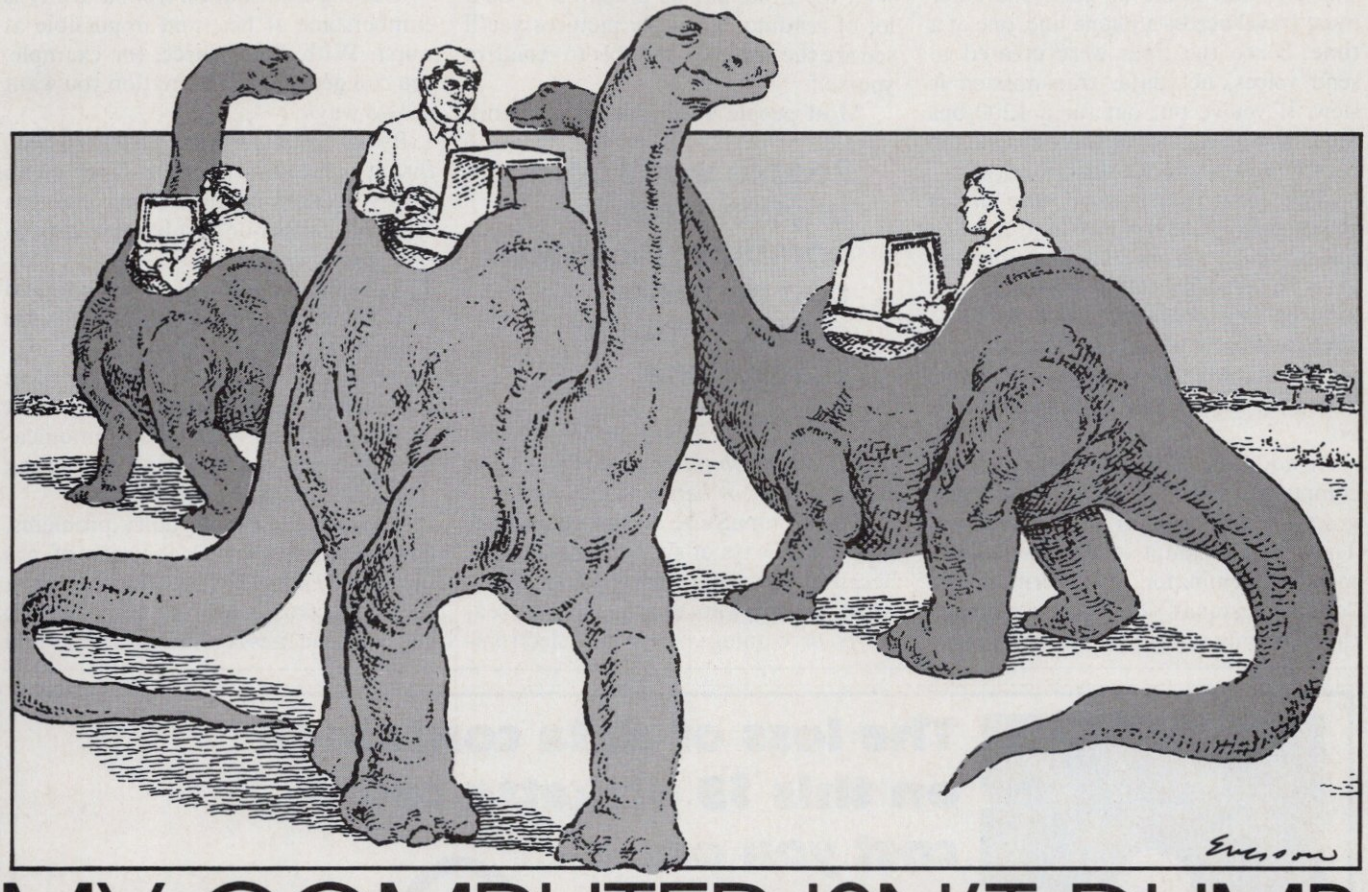
ELECTRONIC BRAINSTORMING
BY JOHN UNGER ZUSSMAN
The fantasy of the on-line home



MY COMPUTER ISN'T DUMB

IT JUST ACTS THAT WAY

Suppose you've got an urge to go to a movie, but not just any movie—a Bogart movie. Instead of perusing your newspaper, turn on your home computer.

Hook into the community resource network and ask for *movies*. Search by star and type *Bogie*. Well, *Casablanca's* at the local art theater, but you've seen it so many times already you know "La Marseillaise" by heart. But wait—*Treasure of the Sierra Madre* is playing downtown.

Hold on—that's the flick you always confuse with *High Sierra*. Is it the one where he's a prospector or the one where he's an outlaw? Ask for a preview. In seconds, Bogart appears on the computer screen, sunburned and windblown. "Fred C. Dobbs ain't a guy who likes bein' taken advantage of," he slurs. Ah, the prospector—great flick. Go ahead, reserve two tickets at 9:00. The network will debit your electronic account at the bank.

Now, how to get there? Ask for *transportation*. . .

The Network Fantasy

This is fantasy, of course, but it's a common fantasy. For years we've been hearing about the personal computer as the home-information center of the future. It always seems just around the corner.

But it's not. My last column (in the September issue) began with a discussion of the home-computer revolution and why it isn't here yet. After examining home-finance software, I formulated a principle: *People won't do anything with a computer that they didn't do without one.*

My principle explains why few people buy home computers to work out their household budget.

The information center idea is different, though. If there's one thing people do—with or without a computer—it's communicate information. Computers could make this activity faster, more efficient, and more enjoyable.

But they don't—yet—which explains why few people buy home computers to serve as a home-telecommunications center.

If you've got a computer and a modem, you can dial up numerous information utilities, from electronic banking services and library databases to broad-based services such as The

CELESTE ERICSSON

Source and CompuServe. The ones I've seen suffer from three common drawbacks, though.

Performance

Most information utilities have severe performance and usability problems. They are slow and offer no graphics or screen formatting.

The problem is really one of method. The bits that make up each character must travel across a phone line, one at a time. Since the lines were created to send voices, not data, transmission is slow. If you've put out for a 1200-bps modem, it takes two or three seconds to fill the screen. At 300-bps, it crawls.

This slow transmission rate drives people crazy. Charles Bartling, the editor of *Bank Marketing*, complained that "it actually takes longer to pay bills on the computer than to write checks. Much of the wasted time is spent watching the names of merchants fill up the screen each time I pay a new bill."

In addition, although many personal computers can handle sophisticated graphics, information utilities cannot. They have to adapt to the lowest common denominator of terminal—a "dumb terminal" or "glass teletype" that can only send, receive, and display ASCII characters. That's why your computer, however intelligent, must "emulate" a dumb terminal when communicating with an information utility.

So you want to shop from the CompuStore catalog or The Source? (I'll use The Source as an example here, not because it's any better or worse than other utilities, but because I'm familiar with it.) Fine, but be prepared to do a lot of reading. The only pictures you'll see are the ones you are able to visualize yourself.

Most people won't put up with this.

People won't do anything with a computer that they can do faster, easier, or better without one.

That's because: *People won't do anything with a computer that they can do faster, easier, or better without one.*

The CompuStore is less convenient than other ways of shopping, not more, because you can't really *shop* there. Most people who use it shop in real stores or catalogs, then buy electronically only if the price is right.

Remember what people are accustomed to getting from a video screen—color, pictures, flashy graphics, and sound. If they're going to spend hours in front of a computer, they'll demand the same from it. The medium is still the message.

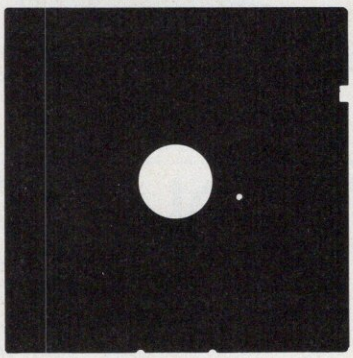
Usability

Getting information from a utility is cumbersome at best and impossible at worst. With The Source, for example, you can get to the information you want in two ways:

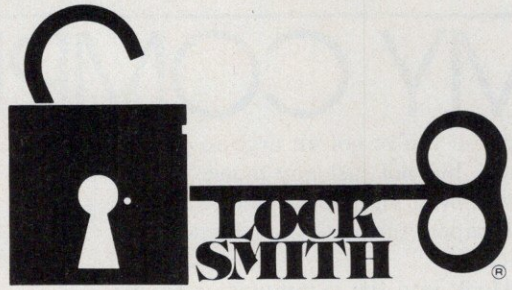
1. By navigating a menu system so deep that it seems interminable. Each menu slowly appears on the screen, and you type the number or first letter of the option you want.
2. By typing commands on a command line. Of course, you have to know the commands to type.

With real software, both of these methods were obsolete by 1981. But they're necessary in telecommunications because your computer is acting like a dumb terminal, remember?

There are some usability problems, however, that aren't a function of bps rate. For example, The Source has a useful electronic-mail system. With it you can send messages to associates and



The loss of data contained on this $3 diskette could cost you or your company $$thousands$$.



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friends—if you can find out their ID number.

Why not look them up in the Member Directory? Three reasons: First, listing is voluntary, and not everyone is listed. Second, people often list themselves by nickname, not by real name. Third, even when someone is listed by name, you can't search the directory by last name. To find me, you'd have to look under JOHN, not ZUSSMAN—*if* I listed myself there, and *if* I used my real name.

So, if you want to send me a message, your best bet is to call me first and get my ID number. Sure.

Cost

Information utilities also tend to cost too much. For example, Bartling has calculated that home banking "usually costs the customer more than paying bills the traditional way."

In contrast, other information resources are free or cheap.

As I write this, The Source has a connect charge of $7 to $21 per hour depending on the time of day. For file storage and 1200-bps service, there's a surcharge. To access stock analyses, the Official Airline Guide, and other special services, there are substantial additional charges. Other utilities' rates are similar.

In contrast, other information resources—such as TV, radio, and newspapers—are free or cheap, most of their costs borne indirectly by commercials, taxes, or contributions. Where direct costs are higher (such as HBO), so is perceived value. Electronic-information utilities have to compete with these other sources of information.

Vicious Cycle

In short, the home-telecommunications fantasy won't become reality until information utilities offer:

1. Speed and graphics (and maybe sound, but that's another story). This means bypassing the phone lines, probably in favor of cable. It also means using the home computer's processing power to relieve the burden from the host computer.
2. True ease of use. At the very least, it means full-screen pointing and editing. We need to get rid of the archaic teletype interface.
3. Lower cost. This means commercial, public, and private support.

Until these features show up, most people won't see telecommunications as a reason to buy a home computer.

There's a vicious cycle here, because these improvements won't be available until most people already have a home computer. They require a huge capital investment, which won't be forthcoming until the market justifies it. No market, no features. No features, no market.

When the market justifies it, the telecommunications revolution will hit.

Which is why telecommunications, like home finance, won't be the key to the home-computer revolution. In fact, I doubt if there will be any single key. Instead, computers will trickle into homes for a variety of reasons—taking work home from the office, operating a home business, educating the children, playing games—taking years, perhaps decades. Finally, when the market justifies it, the telecommunications revolution will hit.

Until then, does anybody know where *Key Largo* is playing? +

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FRANKLIN	**Ace 1000, 1200 (rev. B)**	***Monochrome Ace 1000,100**	**Price**
ColorMaster	VCB8-EF		$169.00
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CIRCLE 353 ON READER SERVICE CARD

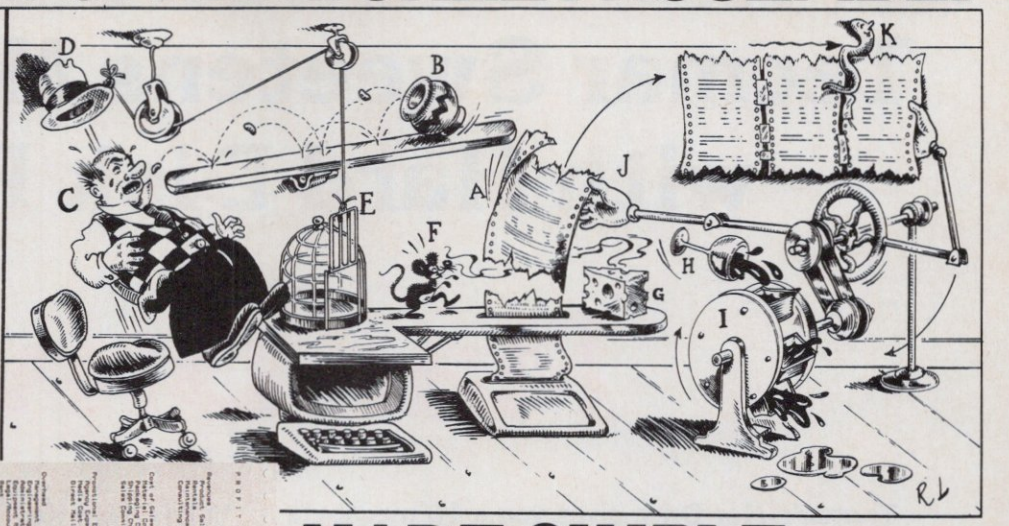
SIMPLIFIED SPREADSHEET ASSEMBLY

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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FEATURING THE APPLE 32 LINE

MACINTOSH Pascal

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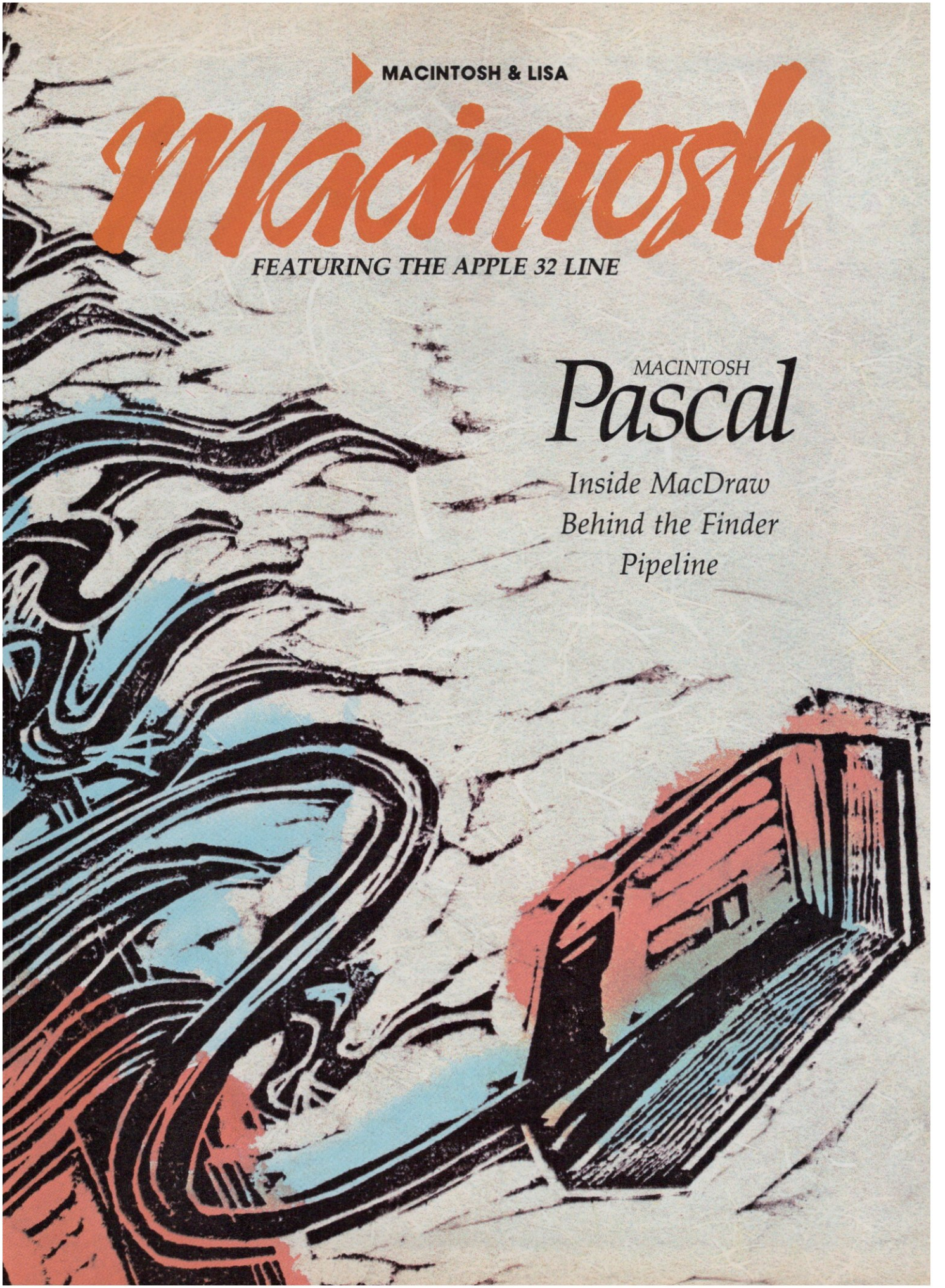

Macintosh Pascal

A programming language that rivals the significance of the Macintosh itself

Macintosh Pascal is an "insanely great" programming system that is a perfect complement to that "insanely great" computer, the Macintosh. After working with it for a month, I'm convinced that it is the best programming environment I've encountered in nearly 20 years as a computer professional. It provides an unheard-of combination of simplicity and power that results in an ideal learning environment for beginners as well as a powerful development tool for experienced programmers.

The Macintosh Pascal system is pure Macintosh, with all the familiar Mac user-interface features—windows, scroll bars, point-and-click editing, and all the rest. Unlike some of the "rushed to market" Macintosh software products that have appeared, this one has no oddball deviations from the Macintosh user-interface standard.

A tour of the menu bar will highlight some of the unique features of this system. The familiar Apple menu has the standard desk accessories, along with a selection called About Macintosh Pascal, which displays the version number, gives well-deserved credit to the authors, and provides a summary of memory usage and availability. You use the File menu to load, save, and print Pascal programs. This menu holds no surprises, offering essentially the same set of choices as MacWrite and MacPaint do. The Edit menu is another old friend, providing the standard set of cut, copy, and paste operations for moving text between the active window and the clipboard. The Search menu is similar to the one in MacWrite, although this version seems more awkward—you must set up your search (and optional replace) text with What to find before actually searching or replacing.

We'll skip over the Run menu until after we've looked at Windows. The Windows menu and the windows it controls break new ground for a programming system, giving you a highly detailed view of your Macintosh Pascal programs while you're developing and testing them. When you start up Macintosh Pascal, you see three windows: a program window (either untitled or bearing the name of your program) in which the text of your Pascal program appears; a text window, which shows text output from your program; and a drawing window, which shows any graphic output (the program can easily write text to the drawing window). These windows and the others I'll discuss later have all the standard features—close boxes, size boxes, scroll bars,

Blaise Pascal (1623–1662) was a French scientist best known for Pascal's Law of the Pressure of Liquids; his development of the theory of probability; and his design of a calculating machine, an early precursor of the computer. Niklaus Wirth, developing Pascal in the late 1960s, chose to name the programming language after his much-admired hero.

CARLOS AGUIRRE

and the like. You can size them and position them anywhere you wish on the Macintosh desktop.

You create and edit your Pascal programs in the program window, using the same point-and-click editing techniques as in MacWrite. One of the nicest features of Macintosh Pascal is that it automatically formats your program as you enter it, complete with proper indentations and boldfaced keywords. This formatting gives beginners a feel for the language and provides instant feedback to professionals on errors in structure and misspelled keywords. If you stop the program or make it pause, a little hand points to the next statement to be executed. Any syntax or run-time errors are indicated in the program window by a thumbs-down symbol next to the line that has the error.

The Windows menu gives you control over these three windows in addition to a window showing the clipboard and two more windows called Instant and Observe.

These latter two windows reflect the revolutionary nature of Macintosh Pascal—you can use them to explore the innards of a Pascal program, experiment with different values and parameters, and (perhaps most important) debug faulty programs with unprecedented ease. The Instant window lets you execute any valid Pascal statement anytime—even if your program is stopped in the middle of execution. You can also examine variables, change them, and call procedures, among other things.

The Observe window lets you key in a series of expressions (usually variable names), and whenever the program stops, the current values of these expressions appear in the window, giving you instant feedback about what's happening in the program.

You use the Run-menu selections to control the execution of your program. The first choice is Check, which tells the system to scan your entire program for syntax errors (without running it). Next is Reset, which simply positions the execution pointer back at the top of your program. Following these choices are four different ways to run your program: The Go option starts your program (from wherever it last left off), which then runs until it encounters a stop, reaches the end, or detects an error. Go-Go is like Go, except that when your program reaches a stop, it stops only briefly, updates the Observe window, and starts running again. The Step option causes the next Pascal statement to be executed, after which the program stops and updates the Observe window. Step-Step does the same thing repeatedly.

The language comes with a broad library of built-in functions and procedures—everything you'd expect in ANS Standard Pascal.

While this is happening, the little hand moves through your program, and the Observe window shows the changing values of any expressions you've specified—a truly impressive display that puts BASIC's TRACE statement to shame. Never again will you have to sprinkle Writeln statements throughout your new checkbook-balancing program in order to figure out why it insists you have a negative balance bigger than the national debt.

The final item on the Run menu is Stops In, which opens up a column on the left side of the program window where you can click in small "stop signs" next to selected lines of your program. When a running program reaches one of these lines, it stops (albeit briefly if you are in the Go-Go or Step-Step mode). Using these stop signs is a convenient way to select exactly where in your program the Observe window will be updated.

The Language

Macintosh Pascal strives for and, in every significant respect, achieves, full compatibility with American National Standard Pascal (ANS Pascal). It essentially has no restrictions and offers several useful extensions: You can use an Otherwise clause in a Case statement; files may be accessed by name; random-access files are supported; "Lazy I/O" permits interactive (console) input/output with standard Pascal Read and Write procedures; the language includes extra numeric types, including long (32-bit) integers and double-precision and extended real numbers (with precisions up to 20 decimal digits); and it supports IEEE-Standard numeric computation. In addition, it offers comprehensive support for string types, including automatic type conversion between strings and character variables, the ability of a function to return a string as its value, and a variety of string-manipulation procedures and functions. Macintosh Pascal is not a "toy" language.

The language comes with a broad library of built-in functions and procedures—everything you'd expect in ANS Standard Pascal, plus many additional abilities. It has library routines for invoking a wide range of Macintosh ROM Toolbox functions, including QuickDraw graphics, the Event Manager, and the Window Manager. You'll also find built-in procedures and functions for many low-level ROM functions, such as sound, memory management, and time and date access.

Serious programmers who want to wring the maximum out of the Macintosh with Macintosh Pascal will appreciate the functions and procedures that give total access to the Mac's ROM. A set of three functions and one procedure lets you call any Toolbox routine, and another procedure provides access to the low-level ROM Operating System functions. Because these routines are "dangerous" (incorrect use can damage your Pascal disk), they are not documented in the manuals that come with Macintosh Pascal. Information on their use will be made available, through not-yet-deter-

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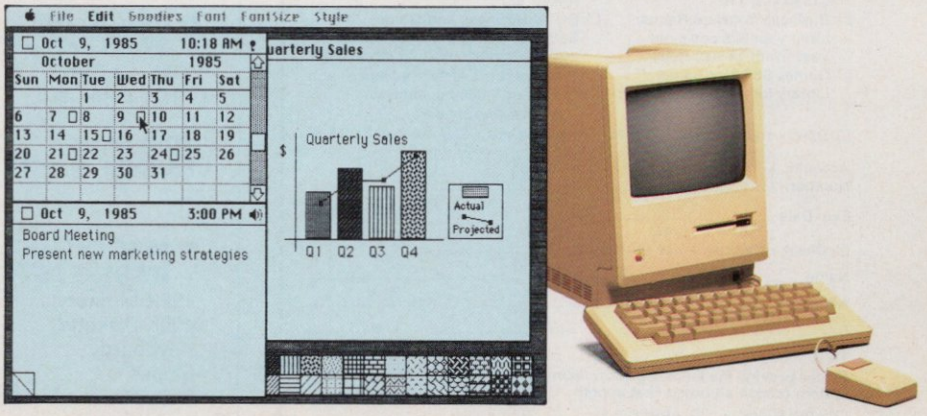

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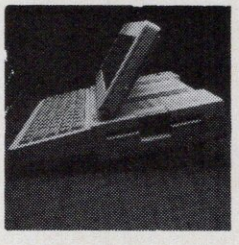

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mined channels (I'll be presenting examples here in *A+* in my Under the Desktop column).

Macintosh Pascal comes with two manuals, the *Macintosh Pascal User's Guide* and the *Macintosh Pascal Reference Manual*. The user's guide is similar to the guides for other Macintosh software products. It has three sections ("Learning Macintosh Pascal," "Using Macintosh Pascal," and "Reference"), and resembles the MacWrite manual stylistically. It focuses on the mechanics of using the Macintosh Pascal system and says almost nothing about the Pascal language per se. The reference manual is just that—a manual that people who already know Pascal will use as a reference to the Macintosh Pascal version of the language. It is complete, with a huge technical appendix that contains, among other things, more information on QuickDraw graphics than I've seen anywhere outside of *Inside Macintosh* (the technical manual for Macintosh software developers).

The Macintosh Pascal reference manual is at least as readable as any of the other Pascal reference manuals

This is the best programming environment I've ever encountered.

I've encountered, but it makes no pretense of being a tutorial on the Pascal language.

To provide beginners with an introduction to the Pascal language, Think Technologies (the company that developed Macintosh Pascal for Apple Computer) has commissioned a book called *An Introduction to Computer Programming with Macintosh Pascal*, by Robert Moll and Rachel Folsom (with consultant Mary Elting), which will be published soon by Houghton Mifflin. I've seen the first nine chapters in draft form, and I think this book will be a valuable contribution to the educational literature on Pascal. It's very readable and fun without being condescending, and it takes good advantage of the unique features of Macintosh Pascal.

By now, you've probably guessed that I like Macintosh Pascal a lot. I'll repeat what I said earlier: This is the best programming environment I've ever encountered. As with all things in the real world, however, Macintosh Pascal has its flaws. In increasing order of importance, they are speed, program size, and copy protection.

Macintosh Pascal is interpreted, as BASIC is, which means that your program is analyzed and translated while it's executing, rather than beforehand. This on-the-fly interpretation slows down the execution of the program. Macintosh Pascal runs at roughly the same speed as Microsoft BASIC on the Macintosh, which is not noted for being speedy. This limitation will affect mostly heavy-duty "production"-type applications. The system is fast enough for the kind of graphics and utility programming I've been doing with it.

Program size may be a more serious limitation, at least until 512K Macintoshes are available. In a 128K Mac, Think Technologies estimates, programs of up to 500 lines of Pascal are feasible, compared to 10,000 lines estimated for a 512K Mac.

The worst problem with Macin-

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tosh Pascal, in my view, is that the disk is copy-protected (two identical copies are supplied). You have to use this original distribution disk for all your work with Macintosh Pascal—you can't even make a copy to use after initially booting with the distribution disk. Worse yet, you have to write-enable the disk to be able to print anything out. This sort of approach is anathema to professional programmers. I learned early in my career that the only thing you did with a distribution disk or tape was make a copy of it, before putting it away for safekeeping. If Macintosh Pascal weren't such a superb product in almost all other respects, I would probably not use it, because of the copy-protection.

The people at Think Technologies say that they see schools as a large part of the market for Macintosh Pascal and that they (and their investors) are concerned about rampant software copying that goes on in schools. I find this point hard to argue with, but I wish some alternative to copy-protection could be found.

Think Technologies is not resting on its laurels—it has plans for several

Macintosh Pascal is a revolutionary product, almost as significant as the Macintosh itself.

significant new products. Among them is an upgrade to Macintosh Pascal that will turn it into a serious developers' tool, using a true compiler to generate Macintosh applications that can run independently of the Macintosh Pascal system. This product will be a boon to all the "Mom and Pop" software developers who can't afford to buy a Lisa 2 to use for Macintosh software (see "Software Development with the Macintosh," *A+*, September 1984, page 85). Included in the enhancements will be the ability to break a large program into segments, not all of which will need to be in memory at the same time. The upgrade should be available in the first quarter of 1985.

Another new product, one I think will have a significant impact on the way programming is taught in schools, is a version of Macintosh Pascal for the Apple II family. It will use the double-hi-res graphics of the Apple IIe and IIc to provide most of the windowing capability of the Macintosh version (take a look at the MousePaint program, if you doubt this is possible). The II version will require 128K of memory, and a mouse will be optional (the cursor keys and one of the Apple buttons will be able to substitute for the mouse, and you may be able to use a joystick or graphic pad). Initial field testing of this product should be going on as you read this.

Macintosh Pascal is a revolutionary product, almost as significant as the Macintosh itself. I urge any Macintosh owner with the slightest interest in programming to buy it. ✚

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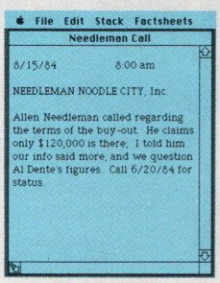

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Needleman

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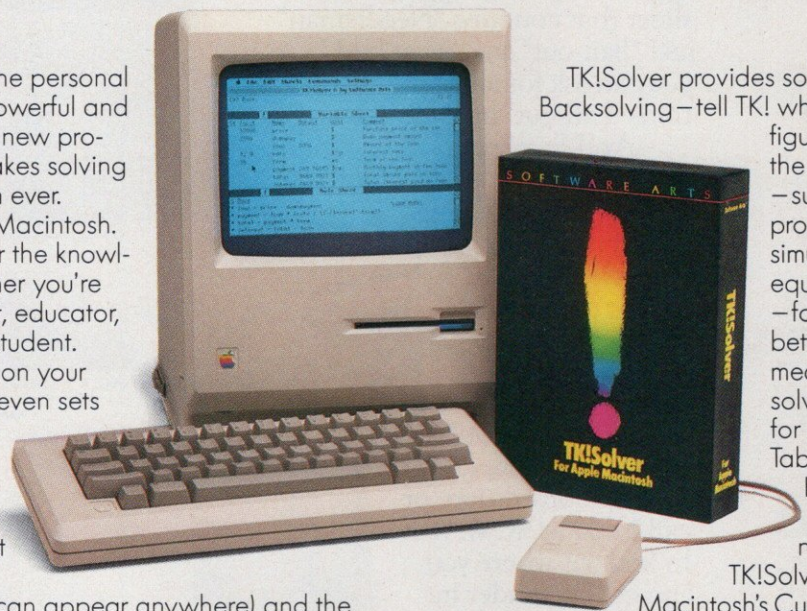

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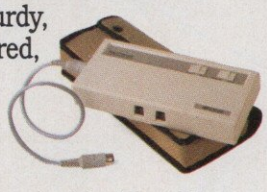

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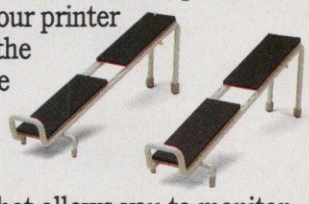

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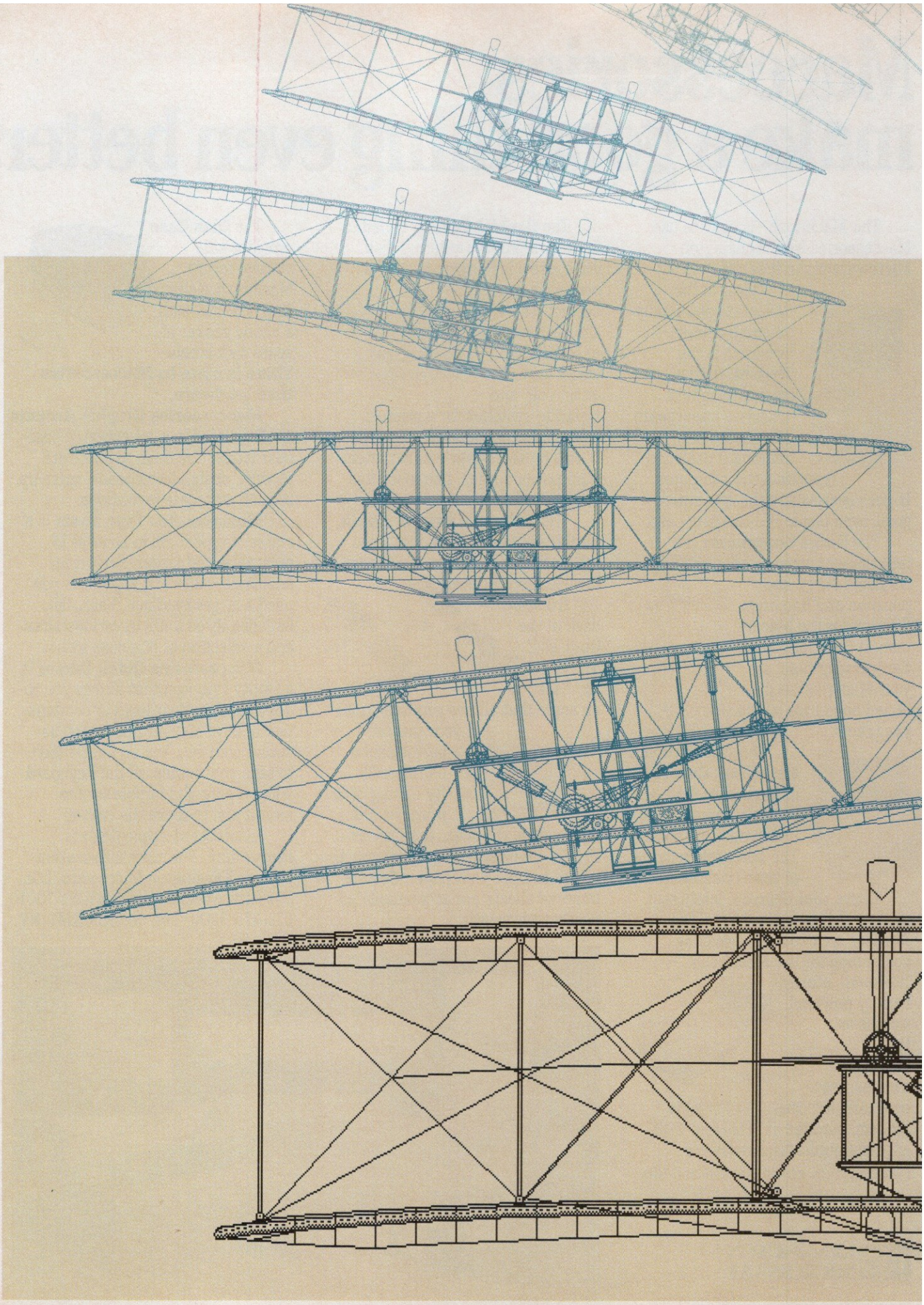
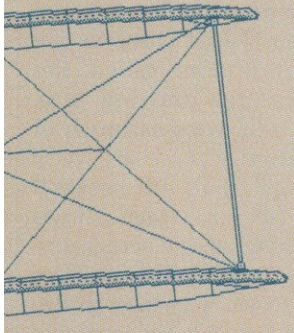


Launching into MacDraw

Apple's powerful new graphics editor

What word processing does for words, MacDraw, Apple's powerful new structured graphics editor, does for graphics. With it you can draw and edit a variety of graphic shapes including lines, squares/rectangles, rounded-corner rectangles, circles/ovals, arcs, freehand drawings, polygons, and text. It breathes life into shapes, allowing you to shrink, stretch, fill, flip, rotate, dissolve, stack, distort, and duplicate them.



In other words, your Mac's mouse becomes a simple electronic combination of ruler, compass, and French curve, and your Mac's screen becomes a 4 × 8-foot drawing board.

Comparisons are bound to arise between MacDraw and Apple's other Macintosh graphics program, MacPaint. Although it's similar in appearance, MacPaint fills a different niche. To oversimplify a bit, MacPaint will appeal to your free-spirited, painterly inspirations, and MacDraw will bring out the draftsperson in you. MacPaint tends to inspire the right, or intuitive, hemisphere of the brain and MacDraw the left, or analytic, side.

If you are familiar with MacPaint, you know it too can manipulate shapes up to a point. When you finish creating a shape, the only further adjustments you can make is to individual dots (pixels) in the drawing. In MacDraw, finishing a shape is just the beginning, because you can go on to edit and manipulate it independently of the rest of a drawing.

Many options, such as reducing a drawing and then working on it, are unique to MacDraw. Others are available in MacPaint and not in MacDraw, most notably the eraser.

Learning the best ways to use all of these options takes practice, but here are a few tips that will help you make the best use of this program.

The Magic

First, let's change your ideas about drawing with the Macintosh, especially if you've been used to MacPaint. A simple MacDraw shape is a good model for how you should approach your MacDraw designs—i.e., it is an independent object that is easily improvable. Don't draw a circle or a rounded rectangle and think of it as permanent and immovable. Regard it, instead, as the first step in a refinement process. Don't draw a floor plan for your dream condo in an

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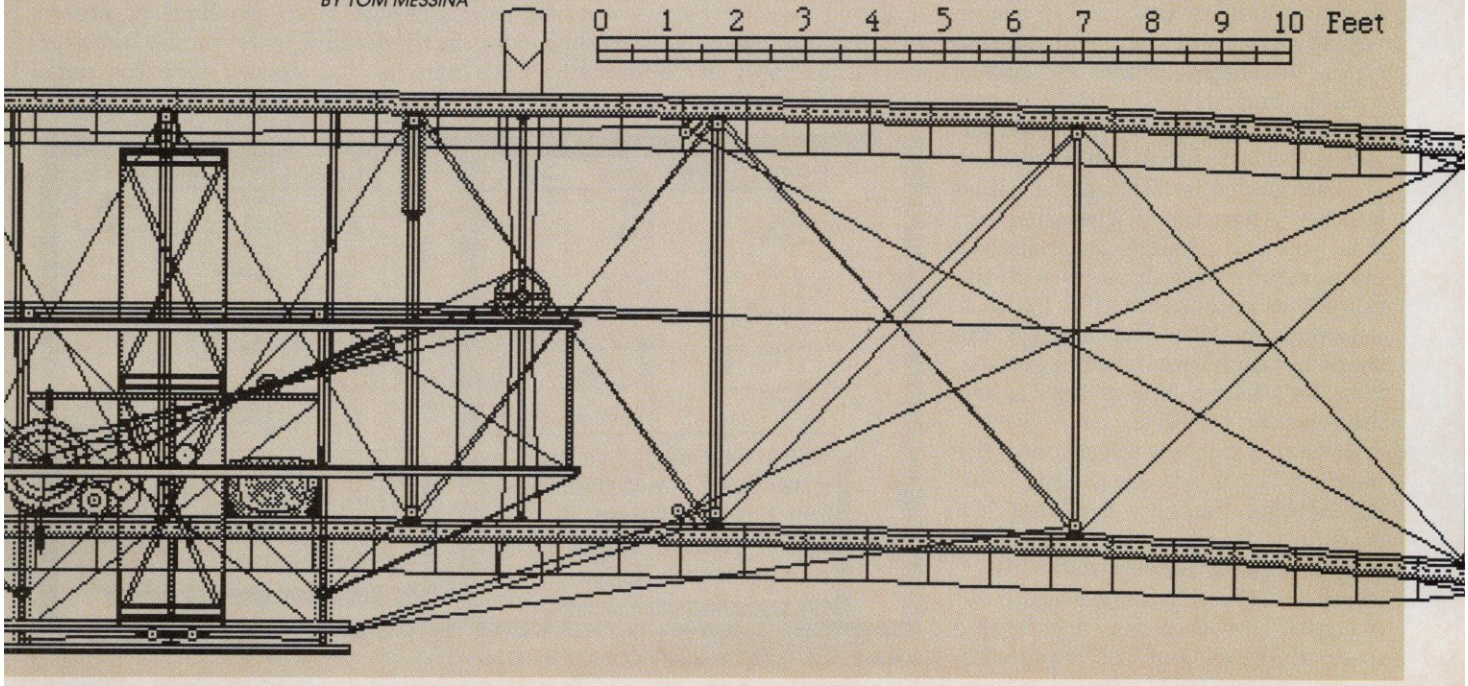

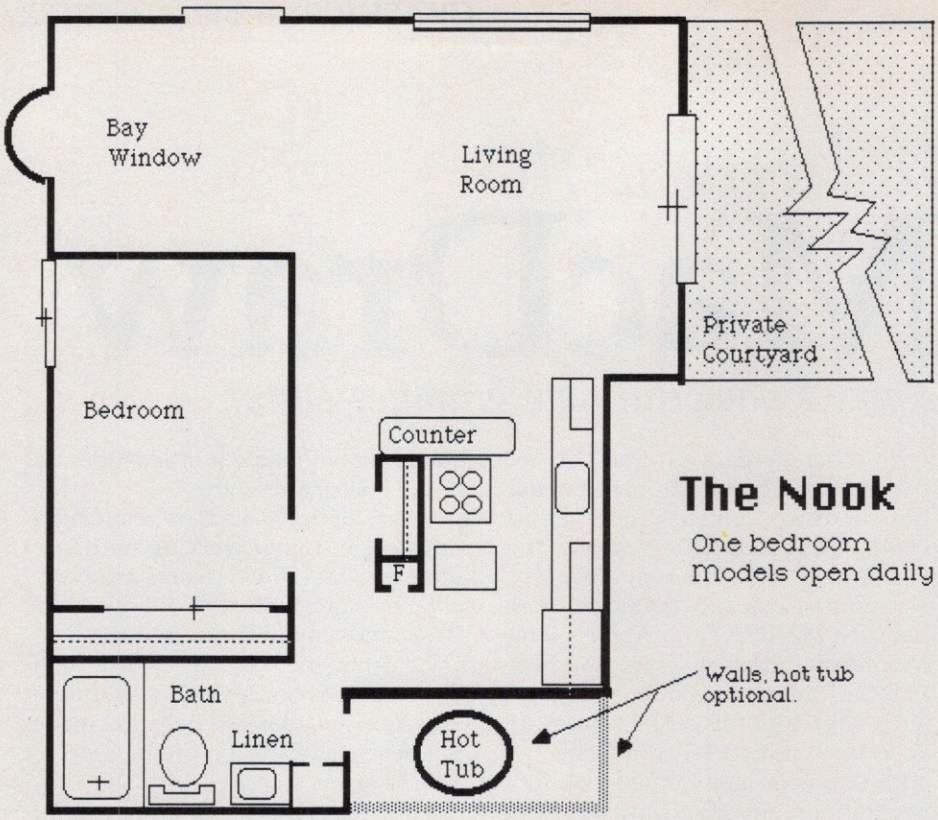

Figure 1: Floor plan created with MacDraw

hour and then turn your Macintosh off. Instead, spend a few more minutes to make the floor plan more attractive—add text, fill patterns, or a hot-tub option (see figure 1). Look for ways to improve your designs and remain flexible, which will do more for your MacDraw designs than all of these mechanical hints combined.

How MacDraw Works

All of MacDraw's tools, except the freehand tool, are designed to enable you to draw and then edit specific types of shapes, such as circles, squares, and arcs. To edit an object, select it by clicking on it. Selected objects are easy to identify because they are surrounded by black boxes called handles. After you've selected an object, you can change its shape by manipulating these handles with the pointer, as demonstrated in figure 2. Alternatively, you can change the shape by using various menu options. First, let's take a look at how to use the selection handles.

If you want to affect only the height of an object, use the top, middle handle, the only one that can quickly and accurately increase the height without inadvertently affecting the width (that's one handle out of eight). The others may also be able to do the trick, but you'll probably end up adjusting and readjusting, which is inefficient and sloppy.

On the other hand, using the corner handles is the only quick way to affect both dimensions. Leave the ruler's increments as coarse as possible—⅛ inch is good for many jobs. Don't look at the shape, but keep your eye on the handle and the target and pull swiftly. Notice how the corner or line opposite to the one you're dragging doesn't move, and imagine that the opposite side is feeding out extra line length, like a fireman feeds out a hose.

The Grid and the Grid Lines

Fight the temptation to use the Turn Off Grid option on the Layout menu. Occasionally, to move a shape over just a smidgen, say $^1/_{16}$ rather than $^1/_8$ inch, you'll want to use Turn Off Grid. Whenever you do, turn the grid back on immediately after every adjustment; otherwise you'll forget, and your drawing, especially if it takes up more than one screen, may get further and further out of alignment.

Also avoid using the Layout option, called Hide Grid Lines. You may think grid lines are a nuisance for, say, complex freehand drawings, but even Ansel Adams, the world's greatest photographer, used a grid pattern on the ground glass of his view camera to better align his photographs, and I can't think of a more complex freehand than California's Yosemite Valley, his favorite subject. Grid lines are always helpful, so leave them on.

Reduce and Reduce to Fit

If you have a drawing that is larger than one screen, you'll want to use another Layout option, called Reduce. It halves the drawing size, which lets you see twice as much of your drawing at once.

For drawings that fill several pages, Reduce to Fit, which shows the whole drawing as one screen image, comes in handy. The Reduce mode is easier to work in than in Reduce to Fit, but not as easy as in the normal dimensions.

Design large drawings or posters in the Reduce to Fit mode, but alternate to the normal size for detail work. Use rectangles and the fattest

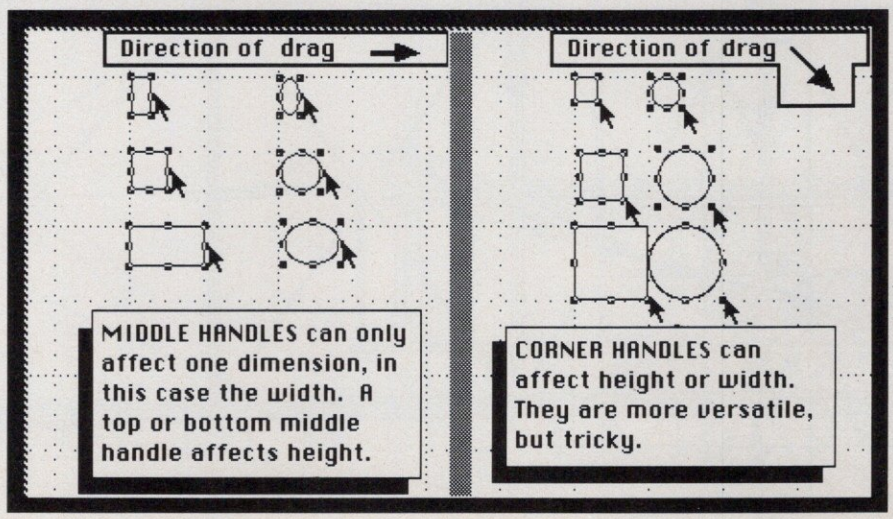

Figure 2: MacDraw's handles are the key to manipulating objects.

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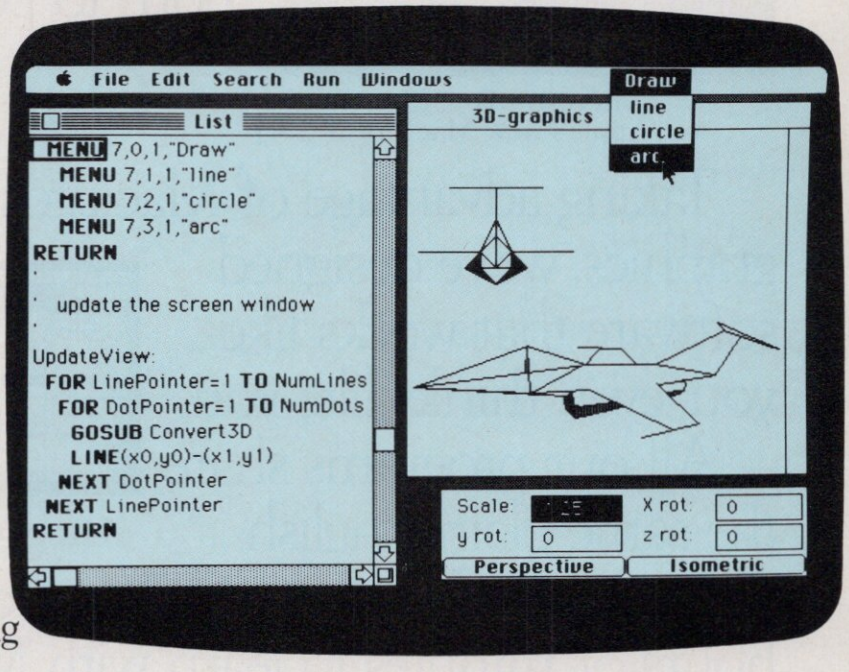

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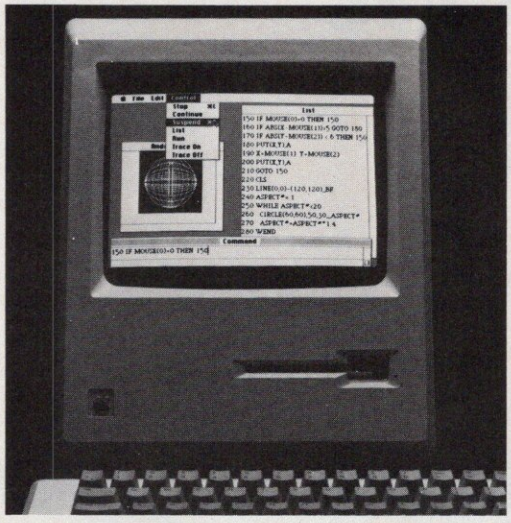

Microsoft BASIC
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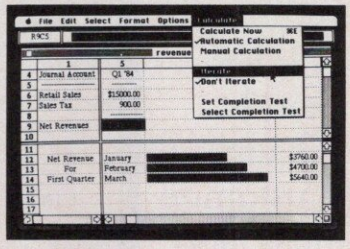

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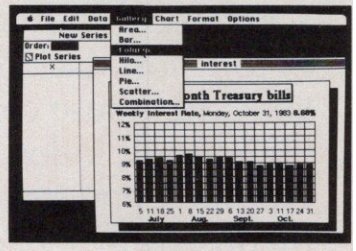

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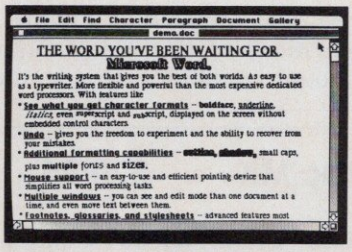

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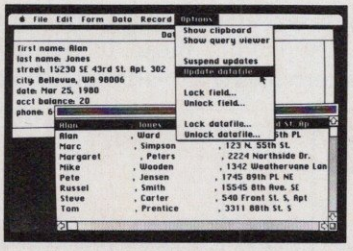

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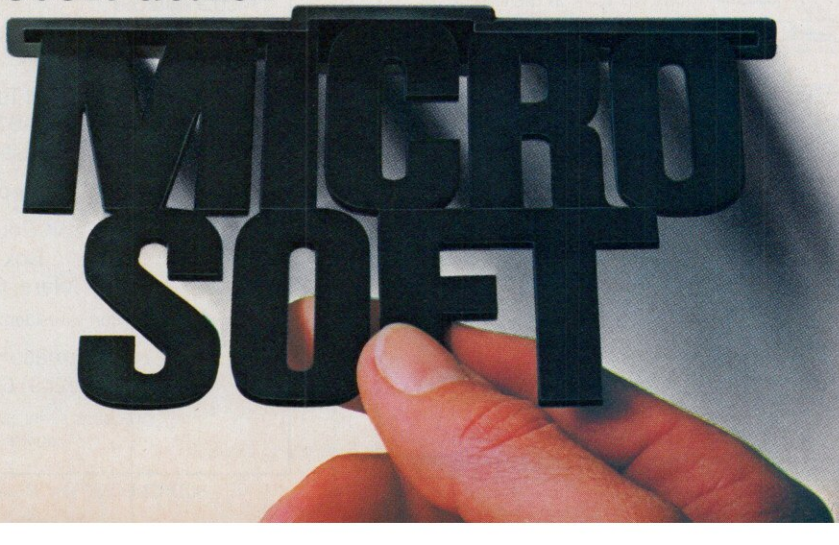

choice on the Line menu in Reduce to Fit for large lettering like that for posters. The fat lines are easier on your eyes, and, after you've completed the drawing, you can always select all the lines at once to try different line thicknesses.

To illustrate various ways of selecting several shapes at once, let's continue talking about poster-size letters. We'll assume you're working on a 6 × 8-inch letter *H*, using two fat-line vertical rectangles eight inches long and one six-inch fat-line, horizontal rectangle across the middle to form the crossbar of the *H*. Suppose you've finished drawing the *H* and are ready to fill in the three fat-line rectangles. There are three different ways to select several shapes at once, in this case for filling: (1) Select one rectangle and hold down the Shift key, to keep the selected objects selected, while you click on the other two. (2) Circle the entire letter with the selection rectangle. (3) Choose Select All on the Edit menu. If any of these methods happens to select objects you don't want, just hold down the Shift key while you unselect (by clicking on) whatever you don't want to fill.

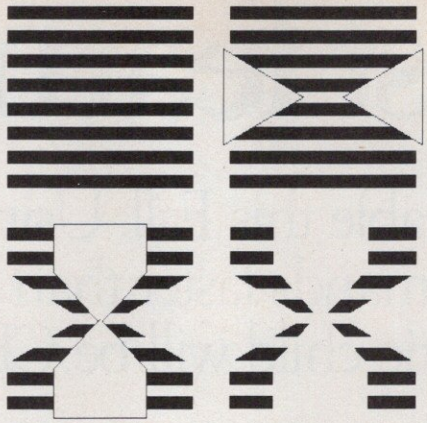

Figure 3: Erasing is possible in MacDraw. Just overlay any area you want erased with white objects and then choose None on the Pen menu to remove the perimeters.

Now that you've selected the shapes you want to fill, pick a nice pattern from the Fill menu and try it. The main advantage for filling several shapes at once is to see how each design fits into the entire drawing. After you've filled in the shapes (they still should be selected), look for a complementary pen design and line size for the perimeter of the shape. By complementary, I don't mean using the same pattern as the fill, although that technique can be interesting. Rather, try a bold pattern if the fill is subtle, or vice-versa. Just don't overuse patterns, or you'll get an overly busy result.

Erasing in MacDraw

No, you can't zip over to the tool palette and grab an eraser, but don't think that you can't get the same effect. To get the effect of erasure, you cover black areas with white. Figure 3, which is made up of eight horizontal bars and several white polygons, illustrates this technique. After you position the white areas, select them all and then choose None for the pen pattern. The boundaries disappear, and your erasure is complete. It helps if you think of the screen as three-dimensional, since you are actually stacking and unstacking objects.

As you create drawings with MacDraw, you will gather a collection of different designs and symbols. If you're an architect, a designer, or anyone who uses standard figures over and over, you should take an afternoon to combine and refine representations of like objects into a storehouse or library. Divide them

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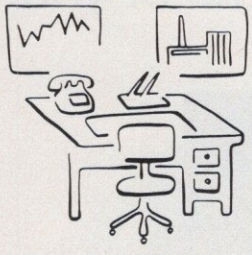

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into files by categories appropriate to your profession. In fact, just as MacPaint spawned a mini-industry of prefabricated drawings (clip-art diskettes), MacDraw will surely generate similar products.

Figure 4 represents some possibilities of such a collection for a building designer. The symbol for the women's rest room consists of three polygons, three fat lines, and a circle. I filled all of the shapes with white before laying them on a black rounded-corner (extra rounded with the Round Corners option on the Edit menu) rectangle. After you develop your symbols, you can take advantage of the Macintosh's ability to open more than one screen at a time and then copy the relevant designs onto the clipboard for pasting into your drawings.

Complex Drawings

Design complex drawings in a large size, and then shrink them down when they are completed. It's a lot easier that way. I used this technique to produce the wheelchair symbol in figure 4. If you want to shrink everything down at once, first go into the Reduce or Reduce to Fit mode and place a rectangle around the whole drawing. Then send the rectangle to the back, using the appropriate Arrange option, so you can see everything. Now choose Select All, an Edit option. Finally, grab a corner of the rectangle that surrounds everything and push inward to shrink the drawing. If you're shrinking part of a drawing, be sure to shrink it in proportion to the rest of the drawing, or you'll distort the shapes.

Figure 4: Save your best MacDraw designs and start a library for your different needs.

Arcs

Drawing arcs of a circle is easy. The arcs in the bay window in figure 1 are arcs of circles. Just click on the arc tool, click anywhere on the drawing board, drag the mouse in one direction for distance *x* (watch the grid lines or the ruler), and then drag perpendicular to that direction for *x* distance. Release and you've got an arc that's a quarter of a circle. Select Reshape Arc on the Edit menu, and you can pull either of the two ends of the arc to any arbitrary portion of a circle—great for pie charts.

The difficult arcs to draw are arcs of ovals. Here's one trick that, frankly, doesn't always work if the curve is too severe (in which case practice makes perfect). To draw a specific arc of an oval, draw the oval first, because the circle/oval tool is so easy to use, and then trace over the oval with the arc tool. If the curve of the oval is severe, try this: Imagine the oval is a compass. North is up. Begin at the northernmost point and then head due east, going off the compass quite a distance in that direction. Move only a short distance due south before you head back toward the west and finally south again. Try to get the shape to conform to the previously drawn oval. Release when the two images match, and then choose Reshape Arc for any manipulations.

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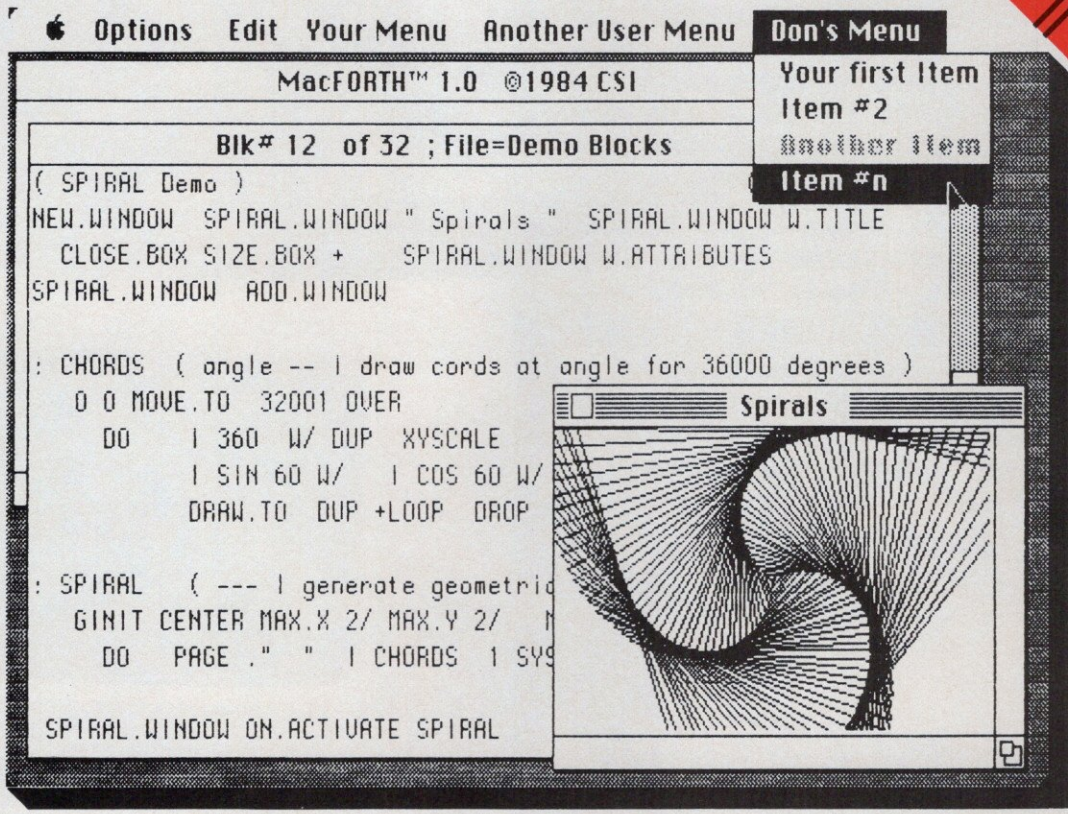

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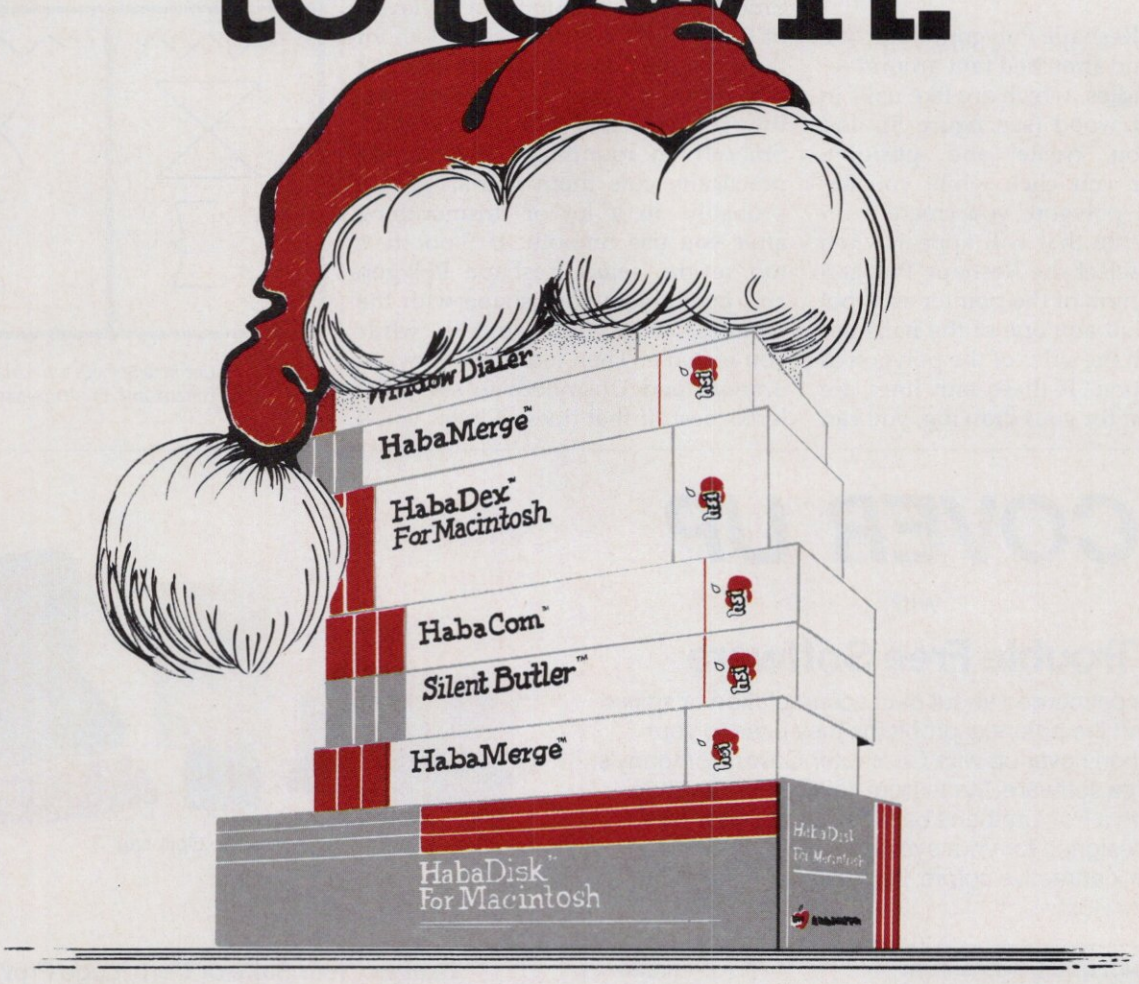

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Reshape Polygon

Once, when visiting Apple's Lisa building, I was treated to the sight of a mathematician/artist working with LisaDraw, the precursor to MacDraw. With quick movements of the mouse, he was subtly manipulating the silhouette of a man. He'd barely move one handle at the corner of the mouth and another at the corner of the eye, and the man would instantly become ugly, happy, or stoic. He was making all of these adjustments with Reshape Polygon, the most versatile Edit function.

To use Reshape Polygon, think of a rubber band stretched taut around reshape handles, which are like nails in a piece of wood (see figure 5), and which you create and position. (Wherever you click while you are creating a polygon, you create a reshape handle that will appear when you later select the Reshape Polygon option.) Think of the pointer as a tool that can pull any one of the nails out and stretch the sides of the polygon in any direction. If these taut lines are too straight for your drawing, you can always choose the Smooth option.

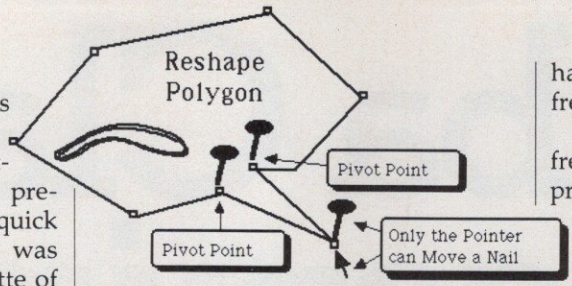

Figure 5: Reshaping a polygon is like manipulating a rubber band around some nails. The pointer is the manipulator, and the sides remain taut.

Smooth and Unsmooth

You'll have to experiment with Smooth and Unsmooth on a variety of shapes and angles to get a feel for them. Figure 6 gives you some idea of what they do, but, as you can see, they're drastic and difficult to predict. Smooth, in rounding some angles, practically cuts them in half. You'll probably do a lot of unsmoothing after you use Smooth. If Smooth is too severe, select Reshape Polygon and manipulate your shape with the handles, which will smooth while you reshape. Then alternate between Smooth and Unsmooth to see what looks best. If that doesn't help, you'll have to delete your image and use the freehand tool.

If you can draw, you'll love the freehand tool; if you can't, you'll probably find most of your drawings use the regular shapes that the other tools provide. In any case, here are a couple of ways to improve your freehand drawings. First, check to see if the shape you're attempting to draw can be roughly approximated with any of the regular shapes from the tool palette. If it can,

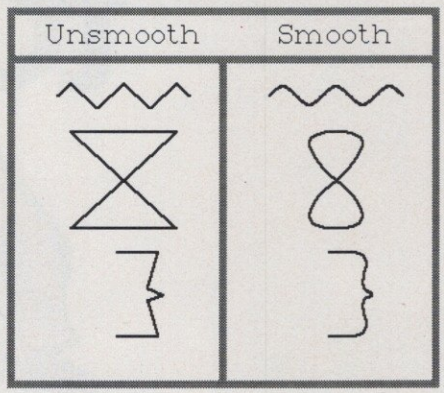

Figure 6: Notice how Smooth and Unsmooth affect angles. Experiment with these options on a variety of shapes.

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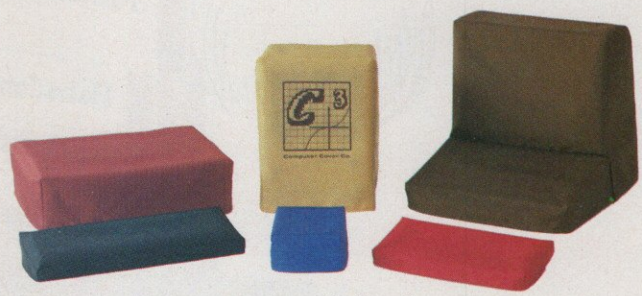

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use the appropriate tool and then trace over these shapes with the freehand tool to give it the human touch. Finally, delete the regular shapes by selecting them and pressing the backspace key, which is what you do to delete any selected object.

After you've drawn a shape with the freehand tool, you may want to edit it. Be sure it's selected, and drag down the Edit menu. You'll notice that the Reshape Polygon option appears in light-gray type. You can't use it to change your selected object unless you continue down the Edit menu and release on Smooth or Unsmooth, which turns the freehand object into a polygon. Now you can choose Reshape Polygon, grab a handle, and clean up your mistakes. Finally, if you're as hopeless at freehand drawing as I am, you'll find that you're more likely to be forgiven for lousy freehand efforts if you use the fattest line.

If you've used MacWrite, you already understand many of the text options. MacDraw has one unique addition that utilizes its shape-manipulating abilities though: You can actually manipulate text margins with a rectangle. Select a rectangle, ignore the text tool, and just begin typing. The text will mold itself to the selected shape. In other words, when Left Justify is on, the left margin will start at the left side of the shape and the right will end or wrap around automatically when you've reached the right edge of the shape.

Once you've written the text inside a shape like this, you can reshape it even if you delete the box. Treat it as you would a rectangle—select it, grab a handle, and pull. It'll automatically expand or contract to fill the boundaries. You can't manipulate text you start with the text-symbol tool this way, so *always* enter your text within a shape to give yourself the option of reshaping it later.

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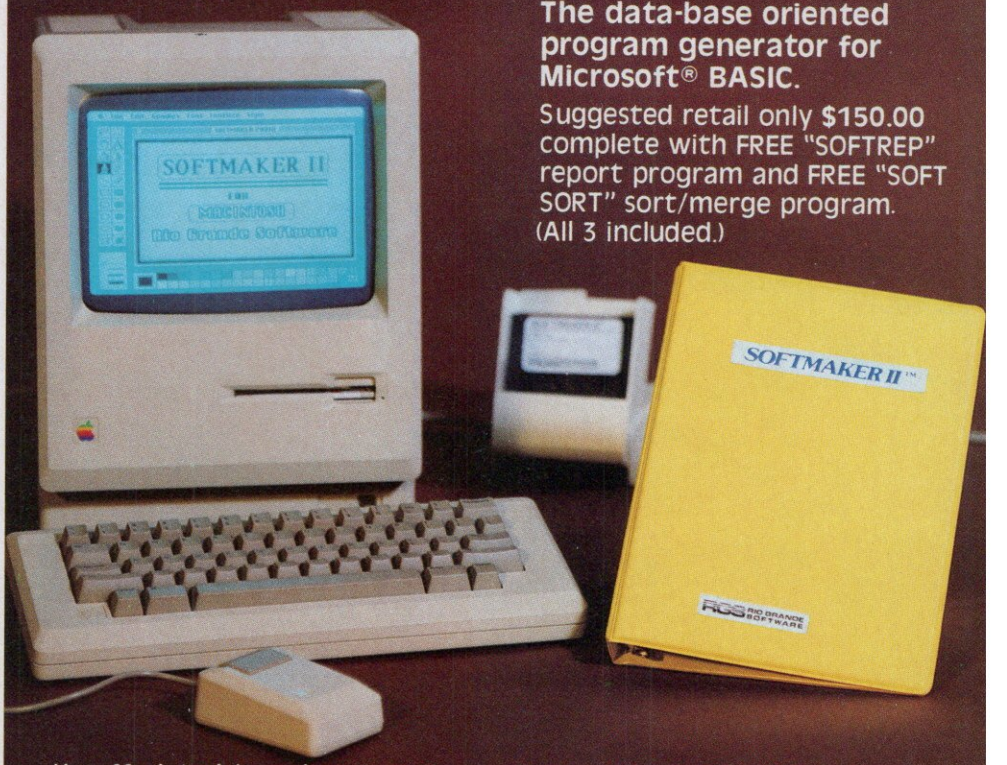

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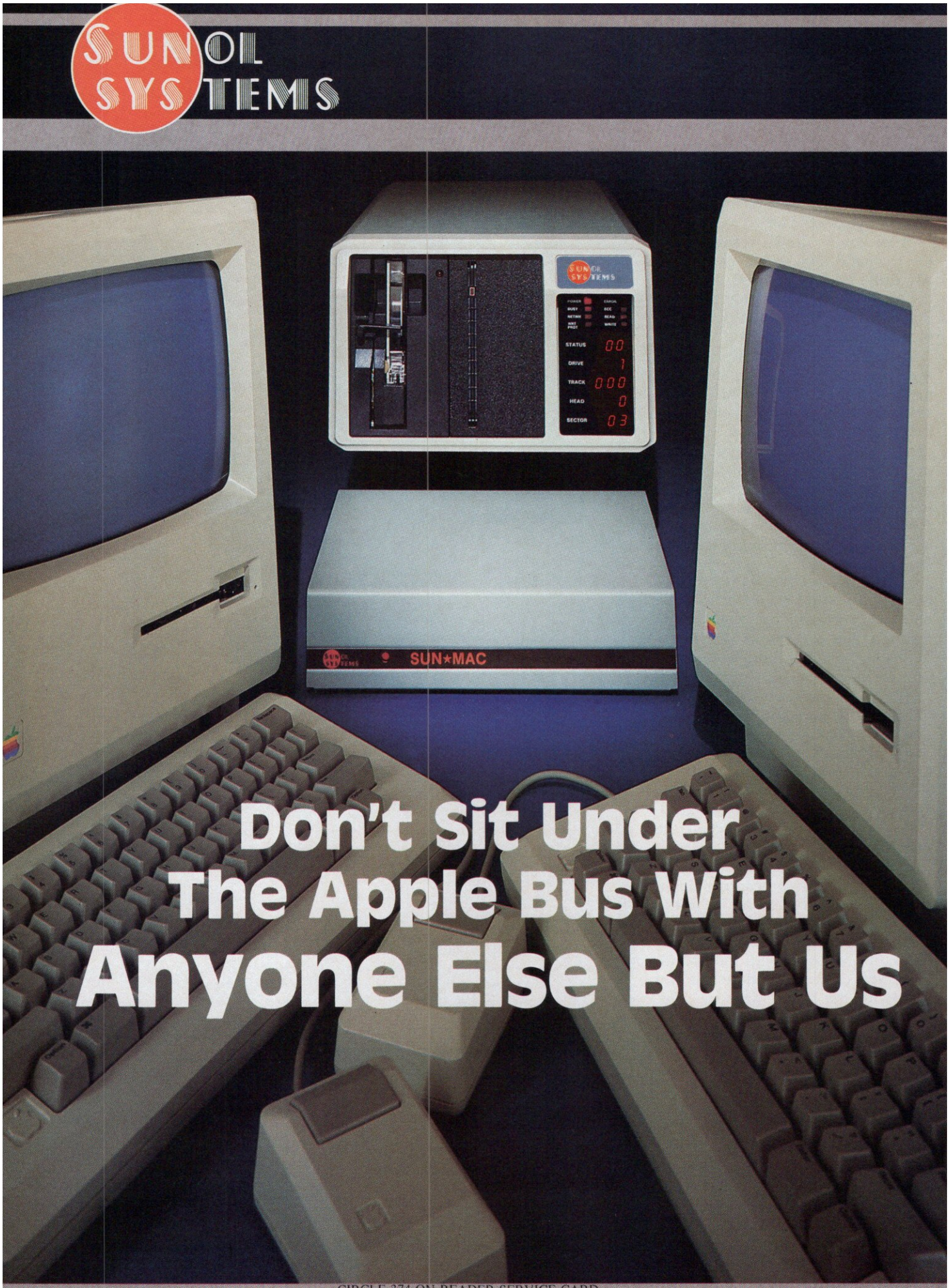

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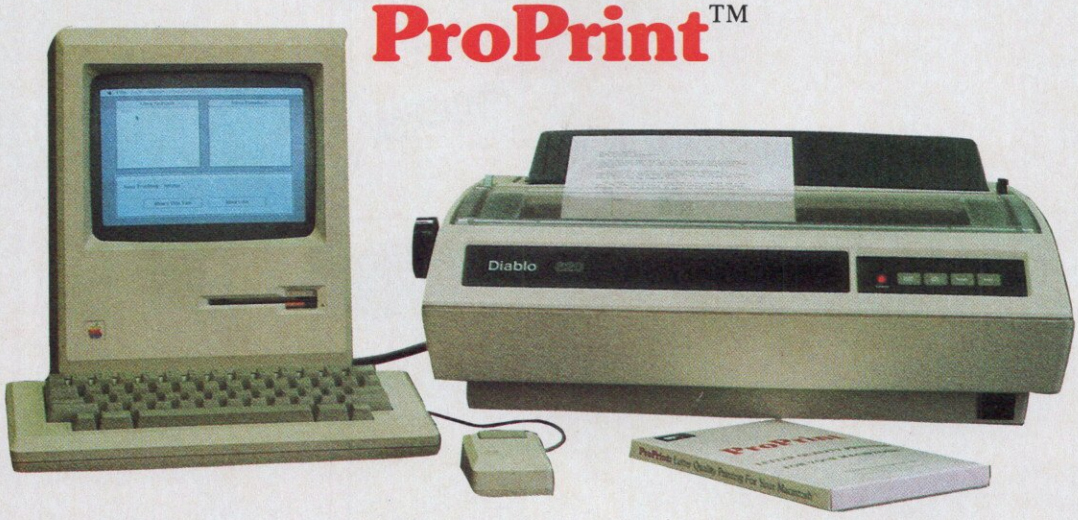

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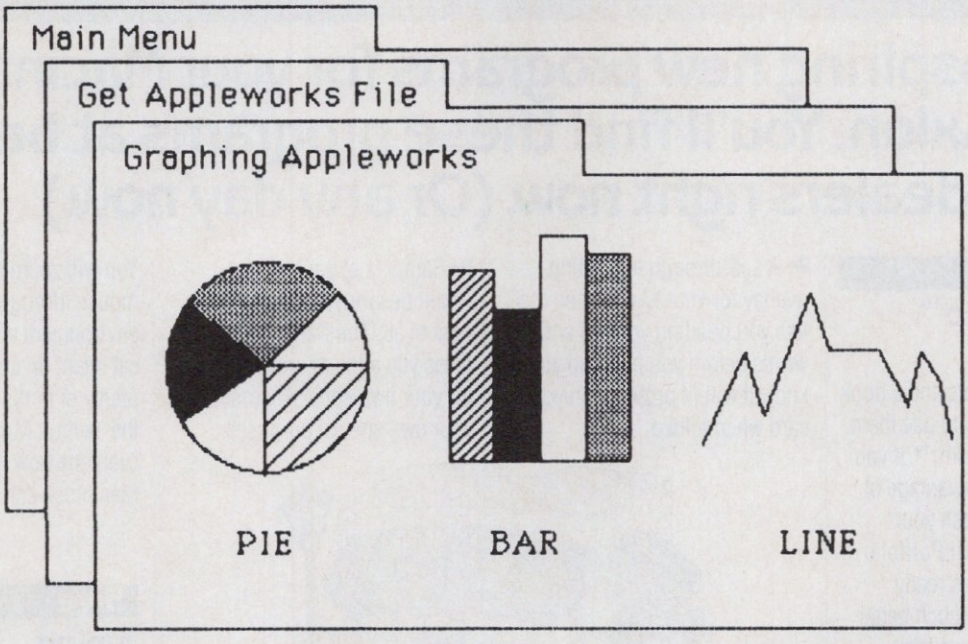

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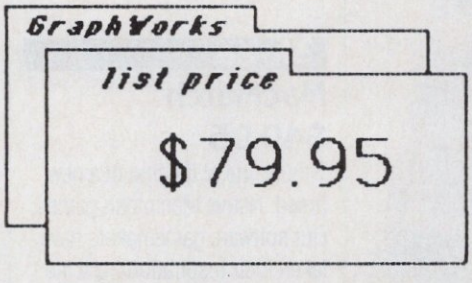

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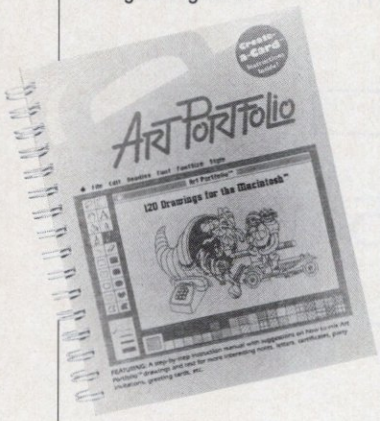

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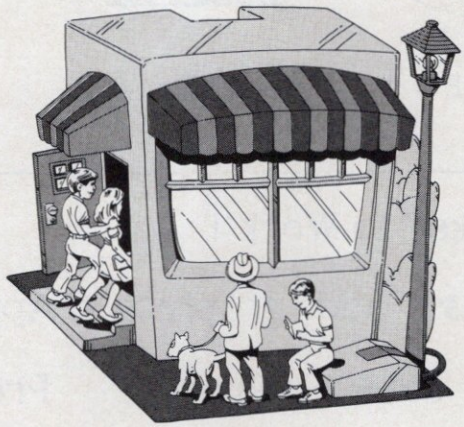

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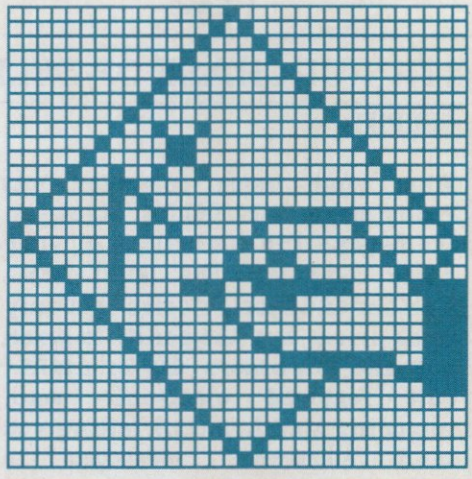

Behind the Finder

Resources and the Macintosh

As I write this column, the assembler Apple promised for the Macintosh last March has yet to make its appearance (I'm writing in late August).

A consequence is that I can't check out any assembly programming code I write for the column, since I've been writing Macintosh programs with a Lisa and the prototype development software Apple provided developers for the Lisa.

Although my programs may work fine assembled on the Lisa, I suspect that the final Macintosh assembler will have a few important differences that would render any samples I provided here meaningless.

We'll still be digging deeply into the Macintosh in this month's column—we just won't be doing any assembly-language coding yet.

If you followed my advice in the last column, you've equipped yourself with a copy of *Inside Macintosh*, a loose-leaf assortment of documentation on the Macintosh operating software, and have also acquired the *Macintosh Supplemental Software*. (Both items are available from Apple at 467 Sarasota Avenue #621, Cupertino, CA 95014. *Inside Macintosh* is $150 and *Software Supplement* $100).

Inside Macintosh is overwhelming to even the most experienced programmers, so don't despair if you don't understand a lot of it. Apple has done an excellent job of providing information, but it's done a pretty poor job of relating contextual information and providing overviews of how everything relates.

Probably the first stumbling block the *Inside Macintosh* reader encounters is the Pascal-based approach to the operating system and ROM routines as procedures and functions. The next problem is usually understanding the constant use of "pointers" and "pointers to pointers" within the arguments that pass to and from the operating-system routines.

The preference for Pascal-based functions and procedures is easily explained by Apple's in-house use of Pascal as a development language. Whenever someone needed a small set of software to accomplish a single function, such as displaying an icon, the Apple programmers simply created a Pascal procedure to perform the action. They later recoded much of the Pascal code into assembly language, but the original structure remains.

The difference between a procedure and a function is simple: Both are a single set of instructions for performing one action, but functions return a value as a result of the action, and procedures do not. Displaying an icon on the screen is a procedure; finding out if a disk is write-protected is a function (since it returns a number indicating the status of the disk).

Pointers

OK, where did all those pointers come from?

A pointer is a variable that stores the address of another variable (it "points" to the data stored at the indicated address). Thus, if you have my name stored at 100 hex in memory, you can get a pointer to the name data by creating a variable that stores 100 hex in it:

variable address	variable data	explanation
0100	54 48 4F 4D	(THOM in hex)
0200	63	(100 decimal = 63 hex)

Big deal, you say? Consider, however, a computer in which almost everything that goes into memory can move around from place to place, depending on what's happening at any given time. That description perfectly fits the Macintosh memory. Programs and data are constantly moving about in memory, as pieces of the operating system or "resources" (more on that in a minute) are shuffled from disk to memory and back.

You may store something at 100 hex, but it shouldn't stay there if you want to use the Macintosh software efficiently. Therefore you keep pointers to the locations of your data in

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memory at any time. The pointers can't move around, unless you have pointers to pointers—Apple calls these "handles." Handles are protected from the data shuffling, so you'll find that many of the Macintosh ROM routines use or return handles to information.

Rather than get bogged down in a detailed explanation of why handles and pointers are necessary for the complex software functions Macintosh requires (it has to do with the possible absence of certain information from memory, which means pointers can't refer to it yet), let's just accept them as they are for now and move on to the next subject that catches most non-Apple programmers off guard.

Resources

As I mentioned in an earlier column, the Macintosh Finder has a module devoted to "resource handling." Just what is a resource, anyway?

A resource is a set of information (it can be data or program code) to which the Finder can provide access. Resources are designed to be brought into memory only when you use them. This system is beneficial in that it allows the Macintosh to perform as if it had far more memory than it does.

For example, have you ever wondered why other computers don't have multiple fonts available in multiple sizes? Among other reasons is that information for creating a font requires an enormous amount of memory. On the Macintosh, the standard fonts that accompany the machine take more than 150K of disk space, which would overwhelm the machine's 128K of RAM memory.

Fonts are resources, so only the fonts necessary to perform current actions reside in memory. If you are using MacWrite, for instance, the system fonts (Chicago 12 and Geneva 10) and the font in which you are currently typing are the only ones present in memory. If you change fonts by pulling down the Fonts menu, the font you were using remains in memory only until the information for the new one overwrites it. In other words, the system reuses its memory space to load a new resource, the font you requested.

One aspect of resource swapping that some people find annoying is that it often entails disk swapping. If you take out your MacWrite disk, save information on another disk, and then try to change fonts, the resource manager in the Finder will tell you to reinsert the MacWrite disk into the system, since that's where it expects to find the new font you requested.

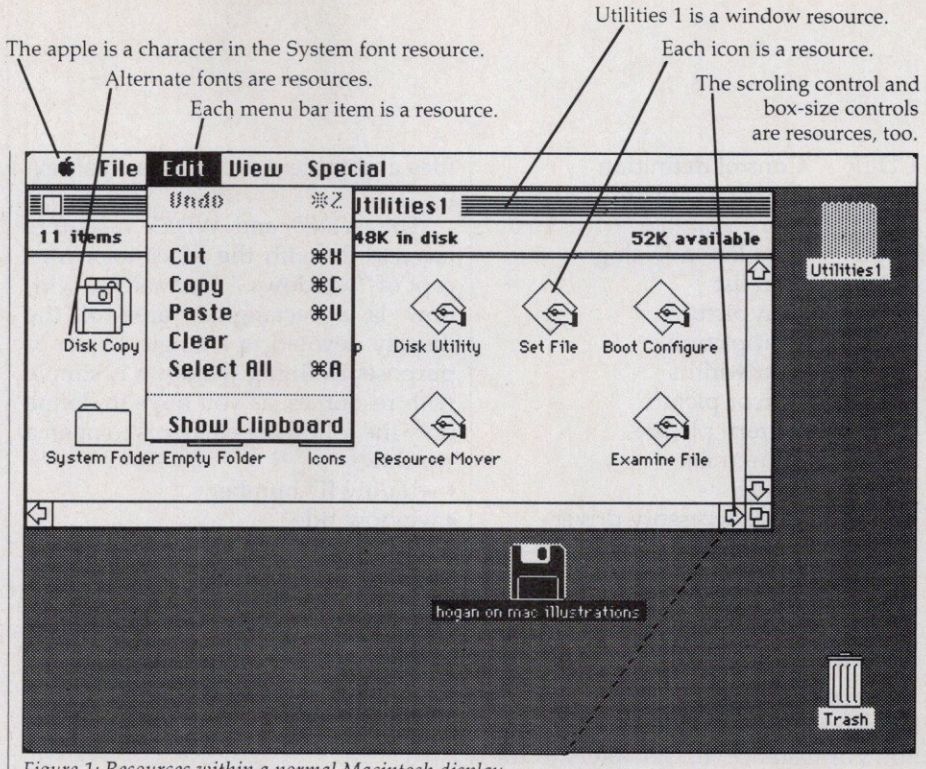

Figure 1: Resources within a normal Macintosh display

More than Memory Savings

Saving memory space is not all that resources are good for. Consider figure 1. Within that typical screen we find evidence of many different resources, each of which you can change independently without affecting the program code in any way. That's right, without affecting the program code.

This last point illustrates the true value of resources. From Apple's viewpoint, resources allow the company to provide foreign-language versions of the Macintosh without having to rewrite one single byte of program code. All Apple's people do is translate the information in menus and strings that are stored as resources, reconfigure the keyboard resource, and, voilà, a foreign Macintosh is born.

From the casual programmer's standpoint, resources allow for tinkering with the "look" of a finished product without rewriting the program itself.

Better yet, resources provide shortcuts to many of the normal functions programs must provide to be fully operative (such as menus, as we'll soon see).

Let's take a closer look at these resources and see what each does.

Apple identifies resources with a four-character name that can be in uppercase or lowercase letters (the Finder distinguishes between the two: so *WIND* and *wind*, for instance, indicate two different types of resources). Apple has predefined many resource types:

CODE	Application-program code
WIND	Window template
WDEF	Window definition
MENU	Menu list
MDEF	Menu definition
MBAR	Menu bar
CNTL	Control template

CDEF	Control definition
DLOG	Dialog template
ALRT	Alert template
DITL	Item list in Dialog
ICN#	Icon list
ICON	Icon picture
FONT	Font picture
FWID	Font widths
CURS	Cursor picture
PAT	Pattern picture
PAT#	Pattern list
STR	String
DRVR	Desk-accessory driver
KEYC	Keyboard configuration
PACK	Package
ANYB	Any group of bytes
FREF	File reference

Some of these resources will be familiar to Macintosh users; others will not. For instance, ICON refers to the 32-bit × 32-bit drawings that represent programs or data files on the desktop.

Icons are stored as 128 consecutive bytes of data, with each group of four bytes representing the 32 bits in a single line of an icon. Figure 2 shows an icon and its hexadecimal representation. (For you novices, the hexadecimal conversion involves the following steps: convert the icon image into a series of 1's and 0's, with 1's representing displayed bits and 0's standing for undisplayed bits, and take each group of eight bits and convert the binary value—00010101, for example—into the hexadecimal number base.)

Inside Macintosh covers most of the resource types Apple currently defines, so we'll just look at a few of the more popular ones.

CODE is a resource that refers to segments of program code. Why would part of a program need to be a resource?

Perhaps the program is larger than the Mac's 128K memory can accommodate and must thus be split into several code segments. Furthermore, storing the code in the resource file means you have to create only one file for a program (otherwise, you could end up with separate files for each resource, in addition to one for the code), conserving precious directory space (if you have a hard disk, you'll run up against the limit of 128 files and folders sooner than you expect).

The WIND and WDEF resources have to do with the Macintosh concept of "windows." Normally, a window is a rectangular area of the display devoted to a single action or purpose. Defining windows is simple with resources, as you have to define only the following elements to open a window:

- window ID number
- window title
- window location (upper left point, lower right point)
- type (visible/invisible, removable/not removable)
- window definition (window-resource ID number, if any)

Window "definition" usually refers to any extra paraphernalia that accompanies the window, such as the horizontal or vertical scroll bars and size boxes located on the sides. Once you've created it, you can manipulate a window like you do any other window on the Macintosh desktop (i.e., you do not have to write program code that directly moves the window, closes it, and so on).

MENU refers to the menu selections on the top line of the screen. For instance, the Edit menu, which you activate by clicking the mouse until the cursor is pointing to Edit, reveals the Cut, Copy, Paste, and Clear options (among others). Menu resources have a menu name (e.g., Edit) and menu selections (e.g., Cut, Copy, Paste, and Clear).

Apple has provided for other goodies to appear on menus. Among the additional elements you can program to show up on a menu are check marks (to indicate current setting), currently disabled items, alternate control characters to use instead of menus, and even icons (see figure 3).

Dialogs (DLOG) and Alerts (ALRT) are among the other resources. Although they are similar in concept, dialog and alert boxes have different functions. Alerts report errors or warnings; dialogs are for changing settings or providing advice about current conditions. The DLOG and ALRT resources are templates of the appearance of dialog or alert boxes and contain at least the following information:

- resource ID
- location of the box (upper left corner, lower right corner)
- type (visible/invisible, removable/nonremovable)
- the ID of the resource that contains a list of things that appear within the dialog or alert box
- title to display on box

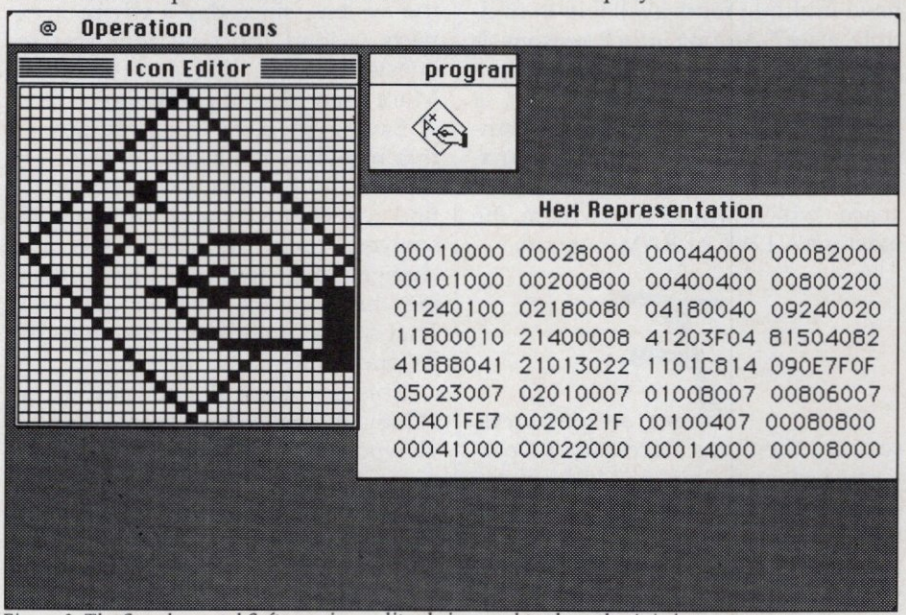

Figure 2: The Supplemental Software icon editor being used to show the A+ icon.

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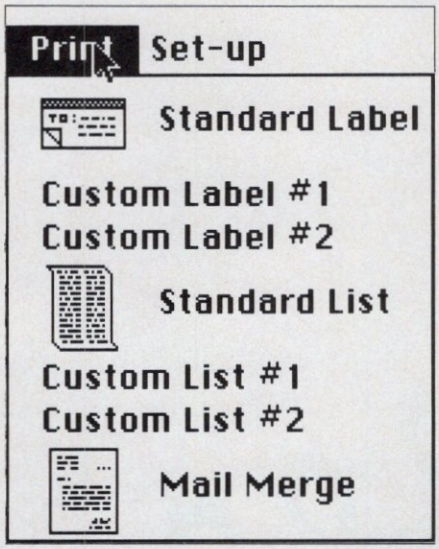


Figure 3: An example of icons used in a menu from the Habadex program

Normally, you use a DITL resource to define what items appear within the dialog or alert box (text, check boxes, icons, and so on).

You use the CURS resource to store the current cursor position. Cursors consist of 16-bit × 16-bit squares, so they can be stored in 32 consecutive bytes of information. Actually, that's oversimplifying, since cursor resources have four components:

- resource ID
- data representing the cursor image
- data that represents the "mask" indicating which portions of the image should actually be displayed
- a "hot spot" that corresponds to the actual dot position of the mouse

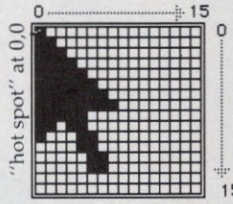
The standard Macintosh cursor is either an up-arrow, a text bar, a wait (wristwatch) indicator, or a crosshatch. Most of the time the Finder controls what the cursor looks like, but you can also control the cursor's appearance from within a program. An up-arrow cursor appears at the right.

Note that the mask of the standard cursor is the same as the cursor's image, meaning that the "white portions" of the cursor (i.e., those that don't constitute a portion of the arrow) do not cover up what is beneath them on the desktop.

The correspondence between image and mask bits is somewhat more complicated than you might first expect:

image	mask	screen image
0	1	white dot
1	1	black dot
0	0	same as dot on desktop underneath cursor
1	0	inverse (opposite) of dot on desktop underneath cursor

To see what is underneath the cursor, choose a mask that is all 0's.



The hot spot of a cursor represents the precise position of the mouse within the cursor's 16×16-bit field. For our arrow here, the hot spot is 0,0 (counting starts with 0 in the top left corner and increases as you go down and right in the Macintosh coordinate system). Hot spots are defined in two

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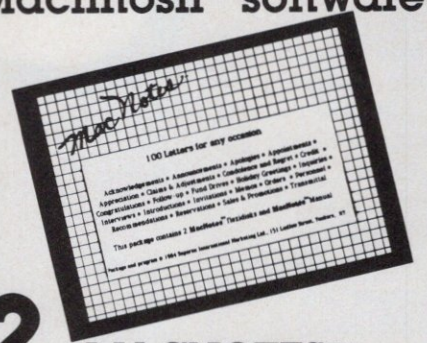

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consecutive two-byte numbers at the end of the cursor definition. The full definition for the arrow cursor, therefore, looks like this:

```
01                                  ID number
80 00 C0 00 E0 00 F0 00 Image
F8 00 FC 00 FE 00 FF 00
F8 00 F8 00 CC00 8C 00
06 00 06 00 03 00 03 00
80 00 C0 00 E0 00 F0 00 Mask
F8 00 FC 00 FE 00 FF 00
F8 00 F8 00 CC00 8C 00
06 00 06 00 03 00 03 00
00 00 00 00                         Hot spot
```

Creating Resources

Now that you know what many of the resources are, we'll take a look at how you create them.

That's where the *Macintosh Supplemental Software* comes in (at least for the present). Developers create resources by writing crude textual definitions of them and then running the text file through a program called RMAKER on the Lisa. RMAKER can also grab Lisa-created program code and put it into the resource file.

At present, you can create resources for the Macintosh on the Macintosh, but no simple method of getting them all into one file with your program code exists. The introduction of the assembler should cure this problem, since it's supposed to be accompanied by a program Apple calls the Resource Editor.

Nevertheless, if you purchased the *Macintosh Supplemental Software*, you can begin creating and working with individual resources in anticipation of combining them with your program code into finished program files. On the three supplemental software disks, you'll find the Font Editor, Font Mover, Dialog Editor, Icon Editor, and Resource Mover. Unfortunately, no real documentation has been developed for these programs, so you'll have to explore a bit in order to use them (watch out for fatal bugs—save your work often).

Here's a sample session of creating and using a resource, a new font in this case:

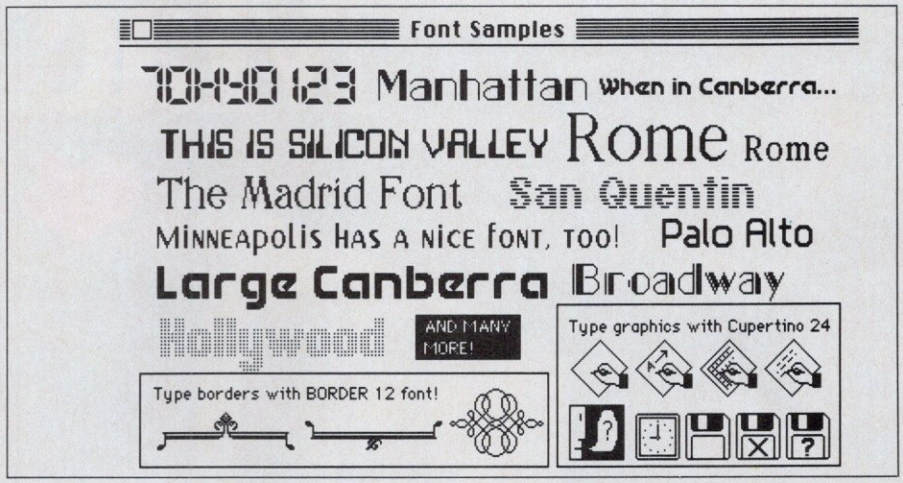

Figure 4: Sample new fonts (from Fontasy™)

1. Run the Font Editor program. In response to the dialog box that appears asking for a file to edit, press the Return key. Pull down the File menu and select Load from Resource. Provide the name SYSTEM in response to the dialog box (avoid using the mouse to move around in the dialog box, since this software seems to have some mouse-dependent bugs). Just for the fun of it, select a current size of 12 and a new size of 24. (You're going to create a new system font with a point size of 24).
2. Use the mouse just as you do in Fat Bits to manipulate the individual bits in the letters at the top of the screen. The bottom of the screen shows you the final result in its real size. To get to a new character, click on the image of the character you wish to edit, either in the top or bottom display (another bug-filled process, particularly when characters are missing). When you've finished editing your new font, use the Edit menu to save the font and then use the Edit menu again to "load" the font (preparing it for use by Font Mover).
3. Exit from Font Editor and run Set File. Choose the file named Fonts and set its file type to FFIL and its file creator to FMOV (both are all capital letters). Make sure you click on the SET IT box after you've typed the changes. Notice that when you leave Set File, the Fonts file has a font icon instead of the default data icon; if it doesn't, you did something wrong—go back and try this step again.
4. Run Font Mover by clicking on the Fonts file you just created. You should see your new file on the right side (Fonts file side) and the standard fonts on the left side. Copy the new font to the system for use (Bug note: After fighting the Finder for weeks, I've discovered that it gets lost if you try to copy too many files of the same point size in one setting. Avoid creating dozens of fonts and loading them into the system file all at once, since you'll most likely end up with several different fonts with the same name.)

If you'd like a disk of new fonts I've created (see figure 4), send $23 (my cost), which includes shipping (California residents add tax). Address your order to me, Thom Hogan, c/o *A+*, 11 Davis Drive, Belmont, CA 94002.

You can use the font data on this disk along with the Supplemental Software, as a starting place for creating new fonts of your own. A fuller set of instructions accompanies the diskette (space doesn't allow me to completely document the font-editing process in this column).

Until the next column, work on learning about resources and create a few with the Font Editor and Icon Editor. In our next installment, we'll start putting resources to work in some simple program samples. ✚

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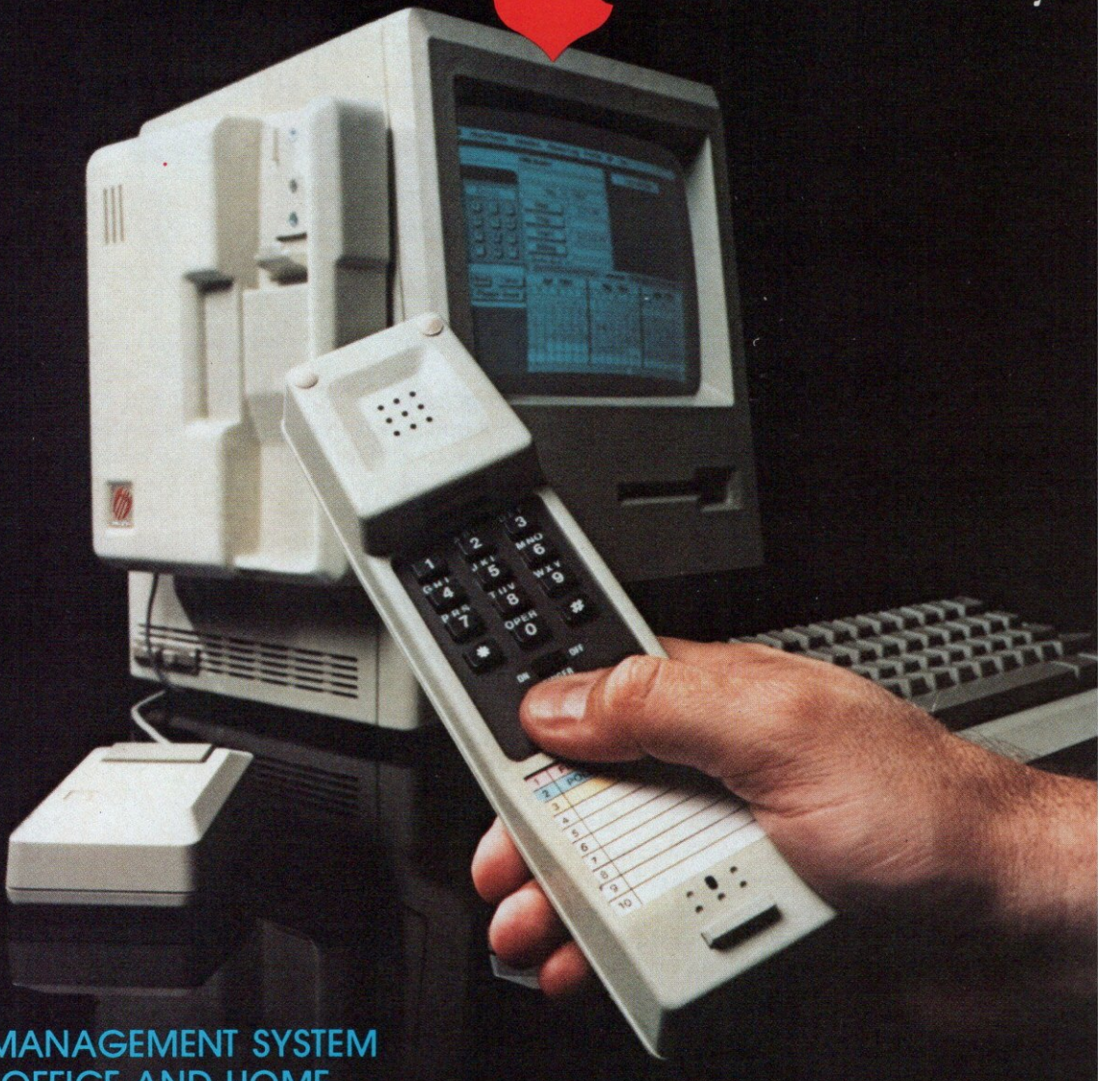

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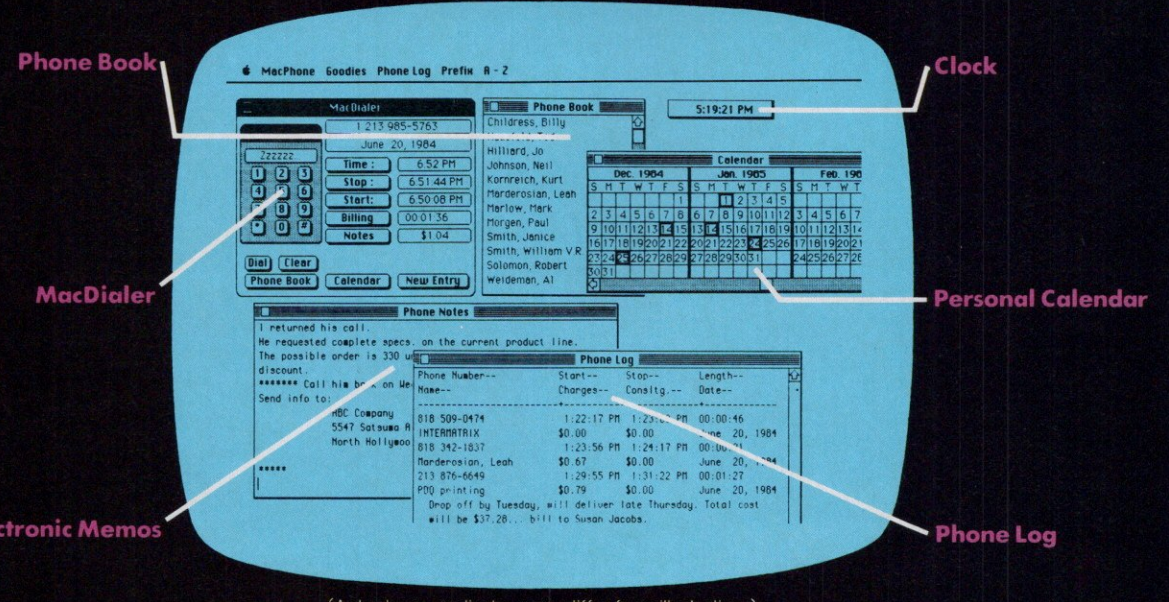

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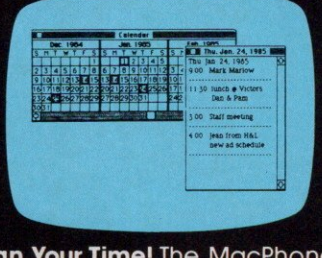

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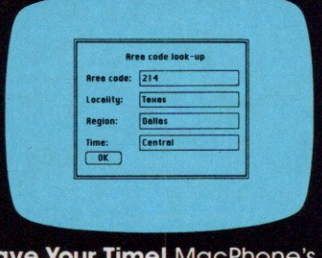

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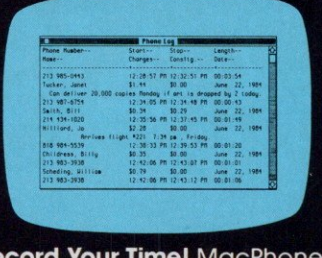

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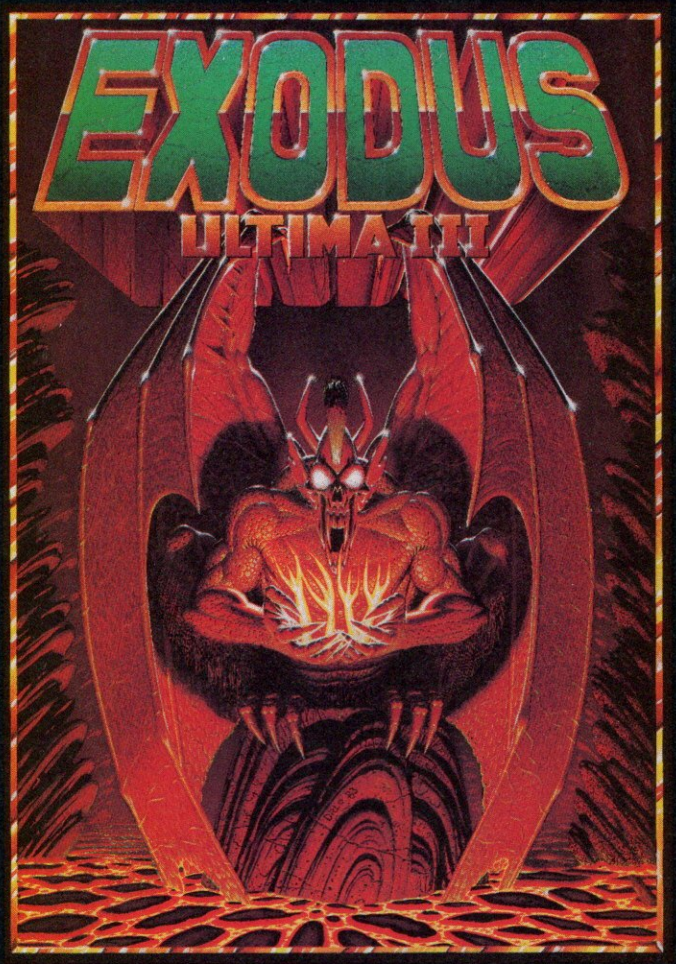

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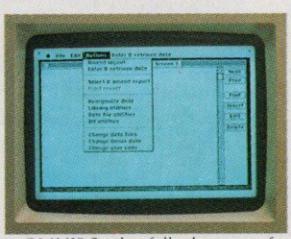

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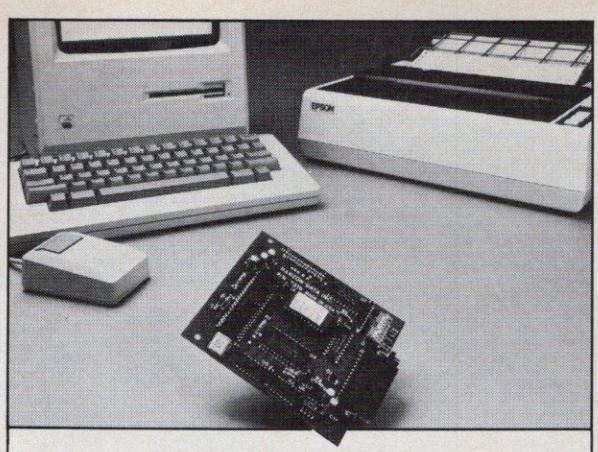

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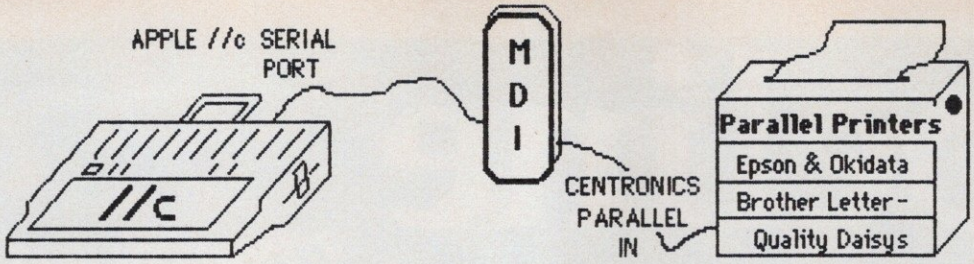

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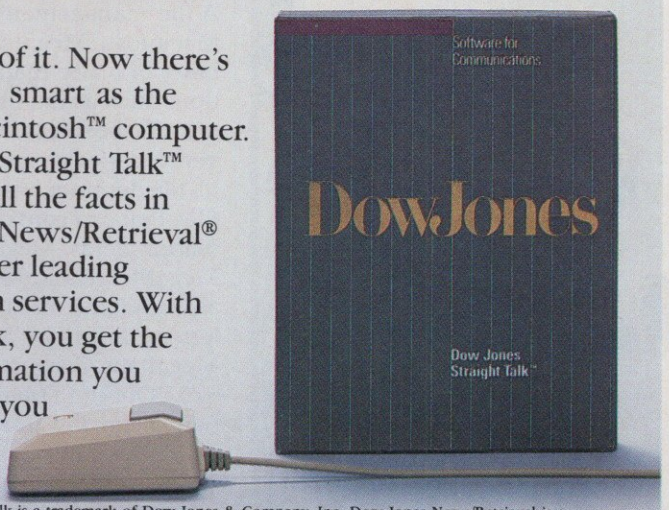
IOtech's MAC488 bus controller

Cinemac
Now you can attach an external monitor to your Macintosh, thanks to MicroGraphic Images. This company offers a modified Macintosh called Cinemac that has a built-in video-output jack. MicroGraphic Images also offers upgrade kits that upgrade regular Macintosh computers to Cinemacs. The Cinemac's additional video-output connector can connect to one of several high-speed monochromatic monitors, which are available in a variety of sizes from different manufacturers, including Electrohome, Kratos, NEC, and Conrac. *(List Price: complete system, $3134; upgrade kit, $195)*
MicroGraphic Images Corporation
19612 Kingsbury Street
Chatsworth, CA 91311
(818) 368-3482
CIRCLE 605 ON READER SERVICE CARD

Introducing Dow Jones Straight Talk™

Now there's smart software™ for the Macintosh.

Think of it. Now there's software as smart as the Apple® Macintosh™ computer. Dow Jones Straight Talk™ offers you all the facts in Dow Jones News/Retrieval® and the other leading information services. With Straight Talk, you get the exact information you need when you need it.



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CIRCLE 109 ON READER SERVICE CARD

Apropos Investment Planning Series
Available from Bonsu Computer Group, this series for the Macintosh includes five financial analyses. To begin working with these templates, users must load Multiplan for the Macintosh and then load the desired investment-planning analysis. Only a basic understanding of Multiplan is needed to use the series.

The Stock Portfolio Planner tracks individual stock investments and evaluates their performance and risk.

Real-estate investors can organize their own investments with the Real Estate Investment Planner, a five-year tax-shelter analysis.

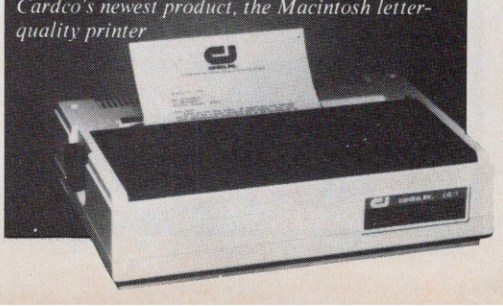
Designed to evaluate investment portfolios and keep accurate records of investment yields, the Investment Planner determines how investments are doing; identifies concentrated areas of investment; and analyzes future investment opportunities.

The Loan Planner enumerates the interest, principal, and balance due on regular bank loans and forecasts the actual monthly payments.

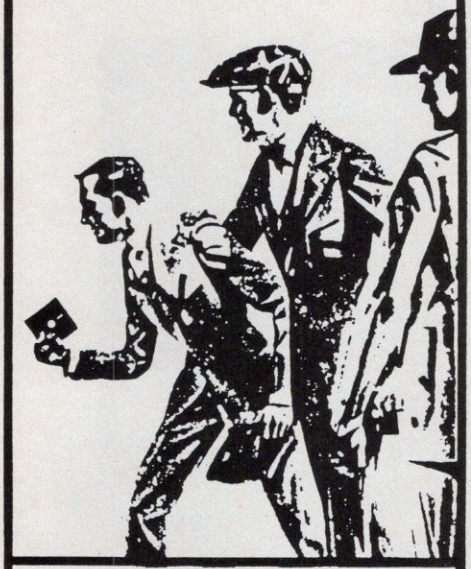
The IRA vs. CD Planner demonstrates the special tax laws that apply to an IRA and its advantages and disadvantages. *(List Price: $95)*
Requires: Multiplan
Bonsu Computer Group
151 Buckingham Drive, Suite 227
Santa Clara, CA 95051
(408) 985-7688
CIRCLE 606 ON READER SERVICE CARD

MLQ/1 Macintosh Daisy-Wheel Letter-Quality Printer
This printer interfaces directly with the Macintosh. Its features include standard friction feed, optional tractor feed, complete built-in Centronic parallel and Macintosh interface, 14 characters per second, and use of standard daisy wheel and ribbon cartridge. *(List Price: $649.95)*
Cardco, Inc.
300 South Topeka
Wichita, KS 67202
(316) 267-6525
CIRCLE 607 ON READER SERVICE CARD

Cardco's newest product, the Macintosh letter-quality printer



RENT
SOFTWARE



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Black Sun Program Exchange
P. O. Box 406 Emmaus, PA 18049

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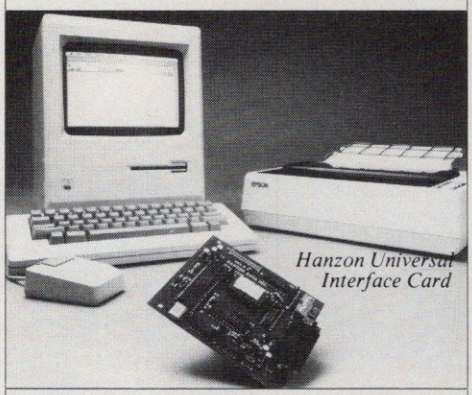
Pipeline

MegaFiler
A file-management program for the Macintosh, MegaFiler comes with a library of ready-made files for applications such as mailing lists, sales records, business inventory, home inventory, stocks, and customer orders. Its file designer lets you create custom files that can contain unlimited information fields. MegaFiler works with MegaMerge and MacWrite to create alphabetized mailing lists and form letters. *(List Price: $195)*
Megahaus Corporation
5703 Oberlin Drive
San Diego, CA 92121
(619) 450-1230
CIRCLE 608 ON READER SERVICE CARD

The Macintosh Bag
This custom-fit, fully padded transport bag for the Macintosh is made with a highly-protective, rigid material called Cellular Armor. It is large enough to hold the Macintosh's CPU/monitor, keyboard, mouse, cables, extra disk drive, and a modem, and is available with a zip-on compartment for the Imagewriter printer. *(List Price: Macintosh Bag, $129.95; Macintosh Bag with zip-on printer bag, $199.95)*
Kiwi
6721 N.W. 36th Avenue
Miami, FL 33147
(305) 835-8228
CIRCLE 609 ON READER SERVICE CARD

The Macintosh Bag, from Kiwi

Hanzon Universal Interface Card
The Hanzon Model 12319 Universal Card is an intelligent serial interface that allows you to use Epson RX and FX series printers as direct replacements for the Apple Imagewriter printer. It can be used with any Apple computer including the IIc, Macintosh, and Lisa. *(List Price: $129.50)*
Hanzon Data, Inc.
18732 142nd Avenue N.E.
Woodinville, WA 98072
(206) 487-1717
CIRCLE 610 ON READER SERVICE CARD



Hanzon Universal Interface Card

Print a File
This printer-driver program for the Macintosh allows you to print on standard serial-interface printers. The driver prints MacWrite files that are saved as text-only files and ASCII-type files. The package includes diagrams for the necessary special cable, a 3½-inch disk, and a manual. *(List Price: $8)*
Nathaniel Hawthorn
21115 Devonshire Street
Chatsworth, CA 91311
CIRCLE 611 ON READER SERVICE CARD

Mac-Jack
With Mac-Jack, a new Blackjack game for the Macintosh, you can use the mouse to stack chips, slide cards, and order cocktails. Mac-Jack features animated graphics, a 52-card deck, and Las Vegas rules. *(List Price: $39.95)*
DataPak Software, Inc.
14755 Ventura Blvd. #1-774
Sherman Oaks, CA 91403
(818) 905-6419
CIRCLE 612 ON READER SERVICE CARD

Alphacom Cable Interface
Alphacom has introduced an intelligent cable interface that links its 80-column, dot-matrix Alphacom 81 printer to the Macintosh computer and to any other computers that have RS-232 or Centronics ports. The Alphacom 81 uses advanced thermal technology to print 100 characters per second. *(List Price: cable, $49.95; Alphacom 81, $169.95)*
Alphacom, Inc.
2323 South Bascom Avenue
Campbell, CA 95008
(408) 559-8000
CIRCLE 613 ON READER SERVICE CARD

MACpac
The MACpac printer system contains the TTX 1014 letter-quality daisy-wheel printer; MACbuf, a 64K buffer; and a printer/buffer cable. An optional accessory, the TTX Sheet Feeder, is also available. The MACpac buffer connects to the Macintosh's serial port to provide switch selection of either parallel or serial output so that you can use either the TTX 1014 parallel-interface printer or the serial-interface Apple Imagewriter. The TTX 1014 printer offers bidirectional printing, a pin-feed forms guide, and variable pitch and line spacing, and it has a print speed of 14 characters per second. *(List Price: MACpac, $895; TTX Sheet Feeder, $399)*
TTX, Inc.
3420 East Third Avenue
Foster City, CA 94404
(415) 341-1300
CIRCLE 614 ON READER SERVICE CARD

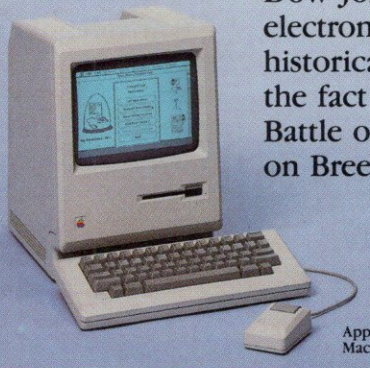
The MACpac letter-quality, daisy-wheel-printer system includes the TTX 1014 printer, the MACbuf 64K buffer, and a printer/buffer cable.

Get an "A" on your Paper.

It's one o'clock in the morning. Your term paper on the American Revolution is due at 8 a.m. Where was the misnamed Battle of Bunker Hill *really* fought? It could be the difference between an "A" and a "B".

Now there's smart software™ for the Macintosh™ computer.

With Straight Talk, the smart software from Dow Jones, you can use an electronic encyclopedia to find the historical fact you need. Even if it's the fact that on June 17, 1776 the Battle of Bunker Hill was fought on Breed's Hill.



Dow Jones Straight Talk™

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CIRCLE 107 ON READER SERVICE CARD

ATTENTION

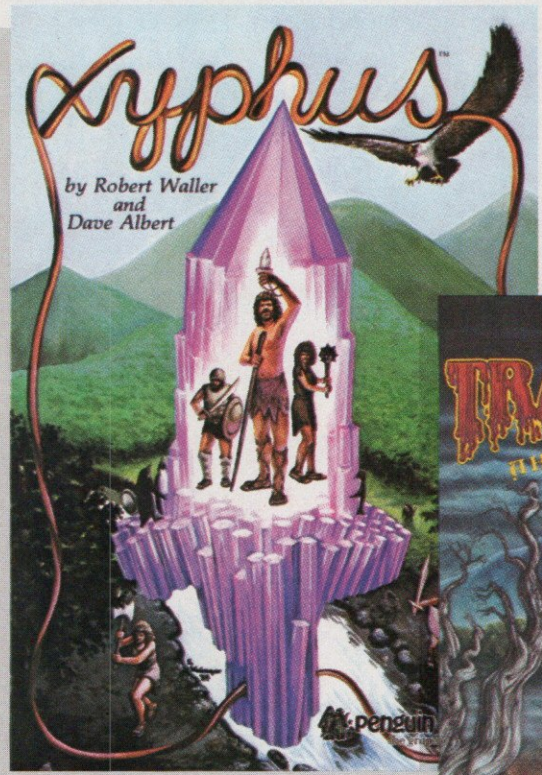
Macintosh Aficionados

A+ would appreciate receiving any tips, hints, shortcuts, or suggestions that you have for using the Macintosh computer. We would like to publish these pearls in our MacTips feature in our Macintosh section. You'll receive credit in the magazine, and we'll pay $50 for each MacTip that we use.

Send your tips to:
MacTips
A+ Magazine
ATTN: Fred Davis
11 Davis Drive
Belmont, CA 94002

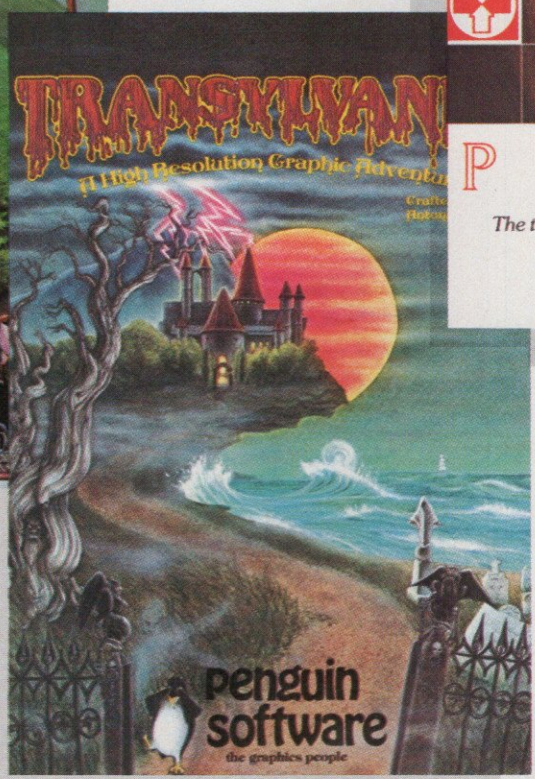
ADVENTURE
STRATEGY
FANTASY

We cover the spectrum for Macintosh™ entertainment.



Xyphus—Enter the Lost Continent of Arroya in search of Xyphus, Lord of Demons. Six increasingly difficult scenarios, four-player independent movement, plus a wide variety of spells and weapons make this fantasy role-playing game like no other you've ever seen.

Transylvania—You have until dawn to save a kidnapped princess from a land haunted by werewolves, goblins, vampires, and wizards in this award-winning graphics adventure.



PENSATE™

The thinking game by John Besnard and Robert Hardy

penguin software™ *the graphics people*

Pensate—Outwit the computer's legions of pieces as you make your way across the playfield. Ten distinct types of opposing pieces and nine levels of difficulty provide endless variety and challenge in this game of strategy and thought.

All Macintosh versions by Robert Hardy.
Write or call for a free catalog.

penguin software
the graphics people

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CIRCLE 255 ON READER SERVICE CARD

Pipeline

Thoroughbred Accounting Software
Designed for small and medium-size businesses, the complete line of Thoroughbred Accounting Software is now available for the Apple Lisa 2. The software comprises seven modules: Accounts Payable, Accounts Receivable, General Ledger, Order Processing/Inventory Control, Purchase Orders, Payroll, and Fixed Assets. You can use the modules separately or as an integrated system, and you can also use them with a companion database product, Thoroughbred IDOL, which also has an easy-to-use report writer. *(List Price: Accounts Payable, Accounts Receivable, Order Processing/Inventory Control, Payroll, Fixed Assets, and General Ledger—$595 per module; Purchase Orders, $395)*
Requires: Apple Lisa 2
Science Management Corporation
1011 Route 22
P.O. Box 6800
Bridgewater, NJ 08807
(201) 685-9000
CIRCLE 615 ON READER SERVICE CARD

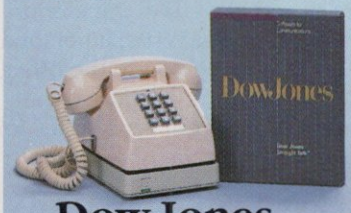
SUN*MAC
Using the Macintosh's RS-422 port, SUN*MAC allows up to 32 Macintosh computers to intercommunicate and share a single Sunol SUN*DISK drive through a twisted-pair cable and over distances of up to 1000 feet. The interface implements the Apple Bus networking protocol and connects directly to SUN*DISK to give the Macintosh usable disk-storage capacities of 8, 16, 25, 40, 65, and 92 megabytes.

SUN*MAC has a data-transfer rate of 230,000 bits per second and can handle queuing of drive requests from up to eight Apple Bus users simultaneously. All utilities are written using standard Macintosh pull-down menus and dialog windows. *(List Price: $695)*
Sunol Systems
1072 Serpentine Lane
P.O. Box 1777
Pleasanton, CA 94566
(415) 484-3322
CIRCLE 616 ON READER SERVICE CARD

Play it Smart.
Play the Information Game™ and get $60 off Dow Jones Straight Talk™ and Apple® Modem 1200.

Play the Information Game at your authorized Apple® dealer. Answer five questions on the Macintosh™ computer using Straight Talk. Show us how smart *you* are.

Play the Information Game and buy Straight Talk and we'll give you $10 off Straight Talk and $50 off Apple Modem 1200*. It's a deal smart people can appreciate. One that will make you a winner — whatever your information game.



Dow Jones Straight Talk™

For a free brochure on Dow Jones Straight Talk, call: **1-800-345-8500 ext. 272**
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*Rebated from Dow Jones and Apple with proof of purchase while supplies last.
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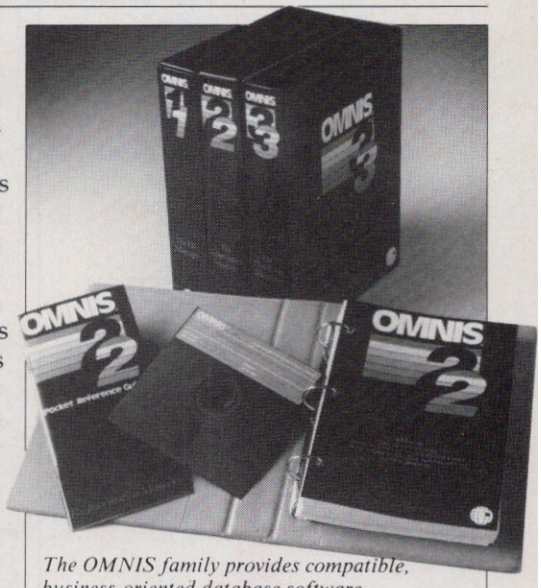
CIRCLE 153 ON READER SERVICE CARD

Omnis Software
Omnis 1, Omnis 2, and Omnis 3, which comprise a family of powerful business-oriented database software, are now available for Apple II Plus, IIe, IIc, III, and Lisa computers. Omnis 2 and Omnis 3 are available for the Macintosh, and these versions support several hard-disk systems. Omnis 1 is a file manager, Omnis 2 is an information manager, and Omnis 3 is a database manager. Each program is fully file- and data-compatible with the others, and all programs are simple to use and have flexible screen and report formatting, comprehensive documentation, and menu-driven operation.

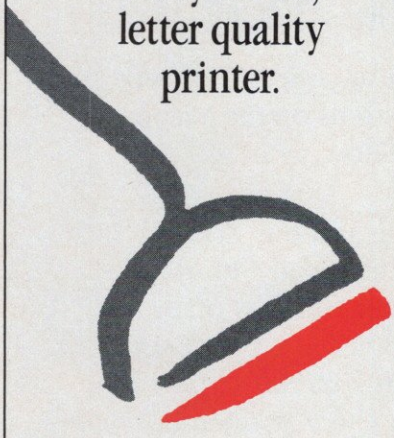
The Omnis family supports local-area networks on Omninet with up to 64 stations. *(List Price: Omnis 1, $95; Omnis 2, $195; Omnis 3, $295)*
Organizational Software Corporation
2655 Campus Drive, Suite 150
San Mateo, CA 94403
(415) 571-0222
CIRCLE 617 ON READER SERVICE CARD



The OMNIS family provides compatible, business-oriented database software.

Megamax C Compiler
This software-development package for the Macintosh consists of a full-scale C compiler, linker, librarian, standard C library, ROM-routines library, and documentation. The compiler supports overlays allowing optimal use of available memory. *(List Price: $299.95)*
Megamax, Inc.
Dept. Z
Box 6015
Waco, TX 76706
(214) 987-4931
CIRCLE 618 ON READER SERVICE CARD

How to get your Macintosh™ to print with a daisywheel, letter quality printer.



From the team who wrote MacWrite™ comes a powerful application program that allows you to print your text with any popular daisywheel, letter quality printer. Mac·Daisywheel·Connection comes with the interface cable you'll need, the software program, and a quick start-up guide. The application program is straightforward and maintains the visual fidelity of your file even when you mix text and graphics. The Mac·Daisywheel Connection supports MacWrite and Multiplan™ and other Macintosh software products.

The Mac·Daisywheel·Connection is now available through your local Apple Computer Dealer. List price $99.

Other quality products available from Assimilation Process:
• Mac·Spell·Right spelling checker
• Mac·Turbo·Touch. Available next month
• Ten-Pack of blank 3½" diskettes

Assimilation Process™

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CIRCLE 212 ON READER SERVICE CARD

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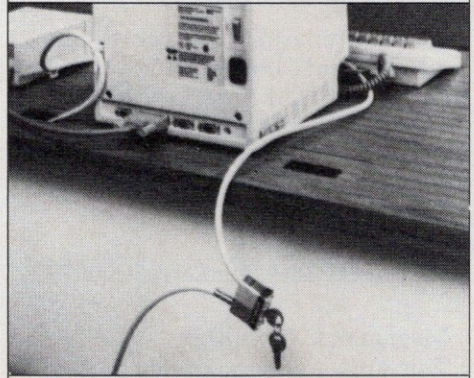
DeskTop Calendar for the Lisa
An easy-to-use tool for the Lisa Office System 3.0, the DeskTop Calendar provides fast reference to dates, notes, and calendars. As important appointment times come up, the DeskTop Calendar flashes a message on the Lisa screen, even when other DeskTop tools are in use. Additional features include no limit on the number of notes stored each day; transfer of text to and from LisaWrite; a personal calendar for each person in the office; and, for highlighting purposes, the availability of different type styles for each line of text on the notepad. *(List Price: $295)*
Videx, Inc.
Corvallis, OR 97330
(503) 758-0521
CIRCLE 619 ON READER SERVICE CARD

MacKablit
Designed especially for use with the Macintosh and Apple II, II Plus, IIe, and IIc computers, MacKablit is capable of securing multiple desktop units. An important part of the system is a proprietary fastener that attaches to existing screws on desk or table. A 10-foot plastic-coated steel cable loops through the equipment and locks with a key. Typical installation takes about ten minutes and does not require drilling or gluing. *(List Price: $50)*
Secure-It, Inc.
10 Center Square
East Longmeadow, MA 01028
(413) 525-7039
CIRCLE 620 ON READER SERVICE CARD

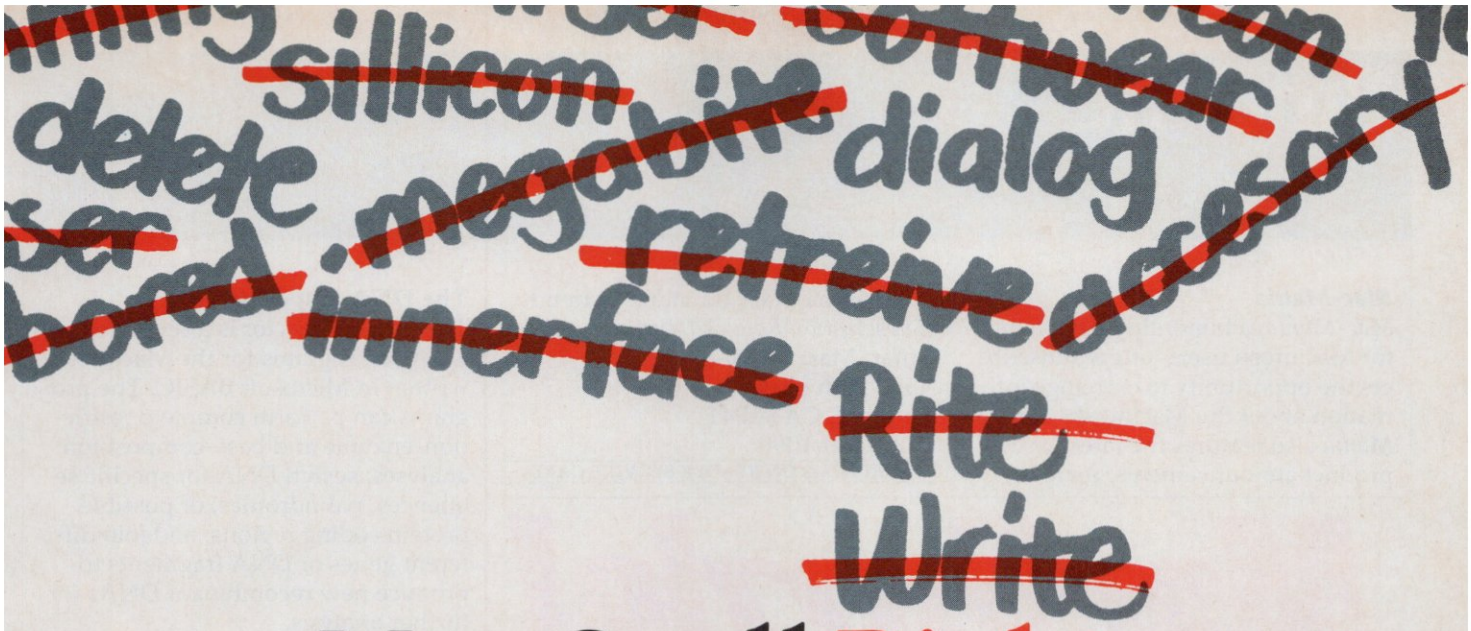


MacKablit, an antitheft device from Secure-It

Symbfile Hard Disk
The Symbfile hard disk complements the Macintosh's portability with mass storage of up to 21 megabytes. A special interface box forms a link between the Symbfile and the Macintosh. (This interface also works with the Apple IIc for the same purpose.) The Symbiotic Adaptor connects to the Macintosh through the second floppy-disk port.
Symbiotic Computer Systems, Inc.
P.O. Box 1431
Fairfield, CT 06430
(203) 374-5910
CIRCLE 621 ON READER SERVICE CARD

The Symbfile hard disk, from Symbiotic Computer Systems

Factfinder
With this free-form filing system, Macintosh users can store information in a fact-sheet window, whose size is limited only by the computer's memory. You can enter and edit text from the keyboard, cut and paste from the Macintosh clipboard, or load text from MacWrite or MacTerminal text files. Other features of Factfinder include pull-down menus and task-specific windows. Factfinder is compatible with the Apple Lisa, models 2/5 and 2/10 with MacWorks. It interfaces with the Tecmar MacDrive and Davong Systems' Mac Disk. *(List Price: $150)*
Forethought, Inc.
1973 Landings Drive
Mountain View, CA 94043
(415) 961-4720
CIRCLE 622 ON READER SERVICE CARD



Mac·Spell·Right™

Now your Macintosh™ can even correct your spelling for you!

From the team who wrote MacWrite™ comes Mac·Spell·Right™, a powerful new application program that *automatically* checks and corrects your spelling. And, it gives you alternate word choices as well. Mac·Spell·Right puts the power of Webster's Dictionary and Roget's Thesaurus into every MacWrite document you create.

Drastically reduce the time you spend checking and editing your documents. Mac·Spell·Right works directly within MacWrite, and runs transparently while you work. You don't have to be bothered switching back and forth between disks and programs. Mac·Spell·Right adds "Spell ✓" to the MacWrite menu. Just click "Spell ✓" from the MacWrite menu bar to check a specific word or the entire document. Improve your productivity on Macintosh. Put Mac·Spell·Right to work for you.

Mac·Spell·Right is available now through your local Apple Computer dealer. List price $89. Or, call toll-free: **1·800·MAC·5464**. In California, toll free: **1·800·421·0243**. Or dial direct: **408·446·0797**.

Other quality products from Assimilation Process:
Mac·Daisywheel·Connection™, a software driver and printer cable that allows you to print from any popular letter quality, daisywheel printer. Available now.
Ten-Pack of blank 3½" diskettes — Certified Media — for your Macintosh. Available now.
Mac·Turbo·Touch™, a high speed input device for your Macintosh. Available next month.

Assimilation Process™

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Mac • Daisywheel • Connection, Mac • Spell • Right and Mac • Turbo • Touch are trademarks of Assimilation Process.

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Pipeline

Mac-Mania
Mac-Mania, a bimonthly newsletter for Macintosh users, offers subscribers the opportunity to exchange information about the Macintosh. *Mac-Mania* also features the latest news, product announcements, reviews, and commentary on industry trends. *(Subscription Rate: $20/yr)*
Smart Mart Press
4589 70th Street
La Mesa, CA 92041
(619) 469-1090
CIRCLE 623 ON READER SERVICE CARD

MacPuzzle!™

TRANSFORM YOUR MACPAINT PICTURES INTO COUNTLESS CHALLENGING PUZZLES!

MacPuzzle is an innovative jigsaw puzzle program. It breaks any picture drawn with MacPaint into puzzle pieces and scatters them at random. Like snowflakes, pieces are never shaped the same.
The goal is to lock matching pieces together with the mouse. You select the number of pieces and difficulty level via a control panel. Groups of pieces can be assembled and moved at will — in clumps. Partially completed puzzles may be saved for later use. You can give up at any time and have MacPuzzle automatically reassemble the puzzle.

MacPuzzle is personal, educational and fun!

To order, call 617-235-5080
(MasterCard and VISA accepted)
or detach coupon and mail to:
Industrial Computations, Inc.
40 Washington St.
Wellesley, MA 02181

*YES, please send me _____ copy/copies of MacPuzzle at $47.50 each.**

Payment enclosed: ☐ Check ☐ Money Order
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Signature _____
(All credit card orders must have signature)

Name _____
Address _____
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** Massachusetts residents add 5% sales tax*

CIRCLE 117 ON READER SERVICE CARD

The DNA Inspector
The DNA Inspector is a set of gene-analysis programs for the Macintosh written in Microsoft BASIC. The programs can perform complete restriction-enzyme and base-composition analyses; search DNA for specific sequences, palindromes, or possible protein coding regions; and join different genes or DNA fragments to produce new recombinant DNAs for further analysis.

The package includes The DNA Inspector programs (MS-BASIC not included), the DNA sequence of several recombinant vectors, and instructions. *(List Price: $109)*
Textco
27 Gilson Road
West Lebanon, NH 03784
(603) 646-2059
CIRCLE 624 ON READER SERVICE CARD

Mach 1 Monitor and Mach 2 Video-Projection System
Two video systems from Professional Data Systems reproduce a Macintosh CRT display on a 23-inch high-resolution monitor or on a giant screen up to ten feet across.

The Mach 1 is a 23-inch hi-res monitor available in either white or green long-persistence phosphors. Operating at Mac's relatively high-horizontal-scan frequency of 22 KHz, Mach 1 produces a hi-res picture averaging 800 × 400 pixels. Mach 1 monitors can also be "daisy chained" in series to provide for multiple-video-display requirements.

The Mach 2 giant-screen-video-projection system produces an average 850 × 500 hi-res picture that is projected on a flat or curved screen measuring up to ten feet across.

Both Mach series video systems require users to ship their Macintosh computers to Professional Data's video labs to install the video card and integrate the system. Prices include installation and a 90-day warranty on parts and labor.
Professional Data Systems
20 Sunnyside Avenue
Mill Valley, CA 94941
(415) 383-5537
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announces . . . . . Three new Macintosh™ programs!

Avoid embarrassing spelling mistakes

with

MacSpell+™

Now you can spell check your Macintosh™ documents with the click of a mouse.

MacSpell is an advanced program for the MAC that lets you proof documents, enter synonyms and hyphenate words in the proper place. You are in contril of your word processing function; and all at the click of the mouse!

Select one:
Control
Controller
Controlling
Contrite
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Add to Dictionary **Continue**

MacSpell+ . . .

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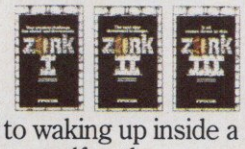

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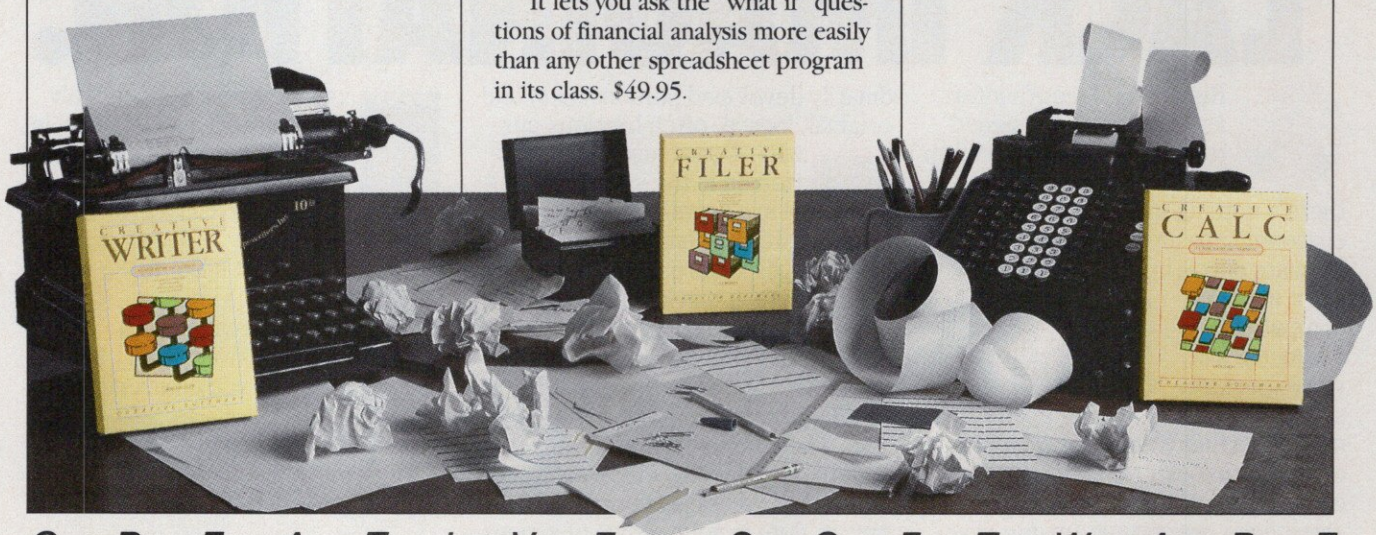

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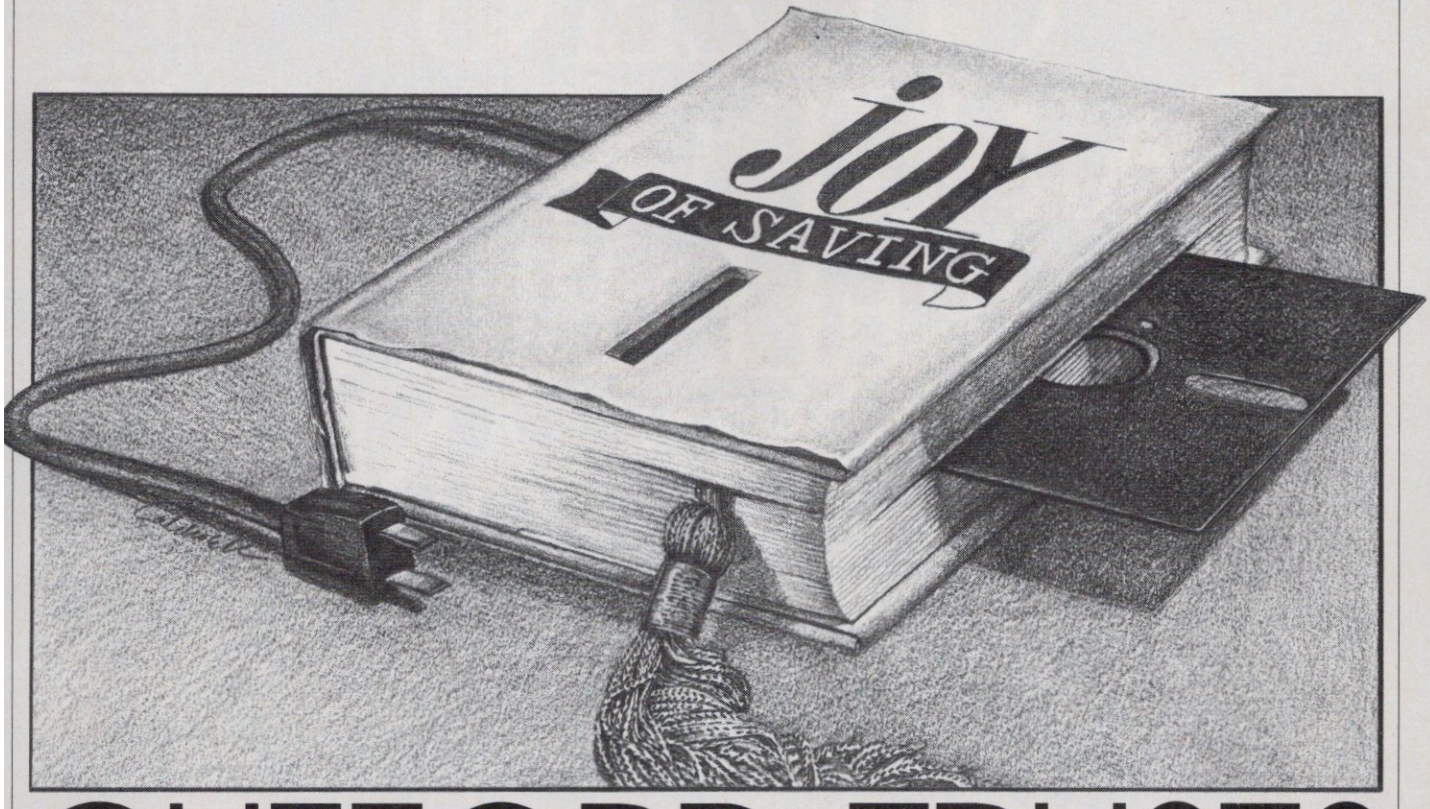
CIRCLE 199 ON READER SERVICE CARD

MONEY MATTERS
BY KENNETH M. LANDIS

From the Financial Cookbook, a recipe to help ease the cost of a college education



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If you are a parent, odds are you're wondering how you are going to pay for the education of your offspring. The cost of sending a child to college today can easily amount to more than $6000 a year. Imagine what it will cost tomorrow.

With this sobering thought in mind, let's discuss some aspects of the complex world of tax planning as a means of providing for your children's education. The keys to success are knowledge and "crunching numbers." We'll provide the knowledge; your computer will crunch the numbers.

Unless you've inherited "old money" or qualify as nouveau riche, you're going to have trouble paying for your children's college education. Alternatively, maybe your plan is to let *them* pay for it. Surprise, surprise—according to a recent court case, you may be obligated by law to pay for the college education of your children.

Frederick and Marjorie Braun reside in New Jersey. In 1973 the Brauns established two identical Clifford trusts (more on these trusts later) to pay for private-school and college expenses for their six children.

The creators of the Clifford trust intended it to function as a legal vehicle for parents to put assets in their children's names. Such an arrangement would have enabled the Brauns to transfer the income to their children, thus lowering their own tax liability. Because the assets were in the children's names, the income from them could be left off the Brauns' tax return and taxed at the children's presumably lower tax rate. Consequently, the Brauns would save money on their taxes, which they could then use for school costs.

Be nice to your kids—you never know when they might sue you for their tuition.

As we all know, however, even the most honorable intentions can fall short. The United States Tax Court said no. Citing a New Jersey Supreme Court case, the tax court held that the Brauns had a "legal support obligation" to provide their children, even as adults, with an education. In the end, the Brauns were ordered to pay $11,715 in back taxes.

Even if you don't live in New Jersey this ruling could eventually affect you; but for the moment, you're safe. Be nice to your kids, though—you never know when they might sue you for their tuition.

Although in the Braun case, the court "pierced" the Clifford trust, Clifford trusts are today one of the most

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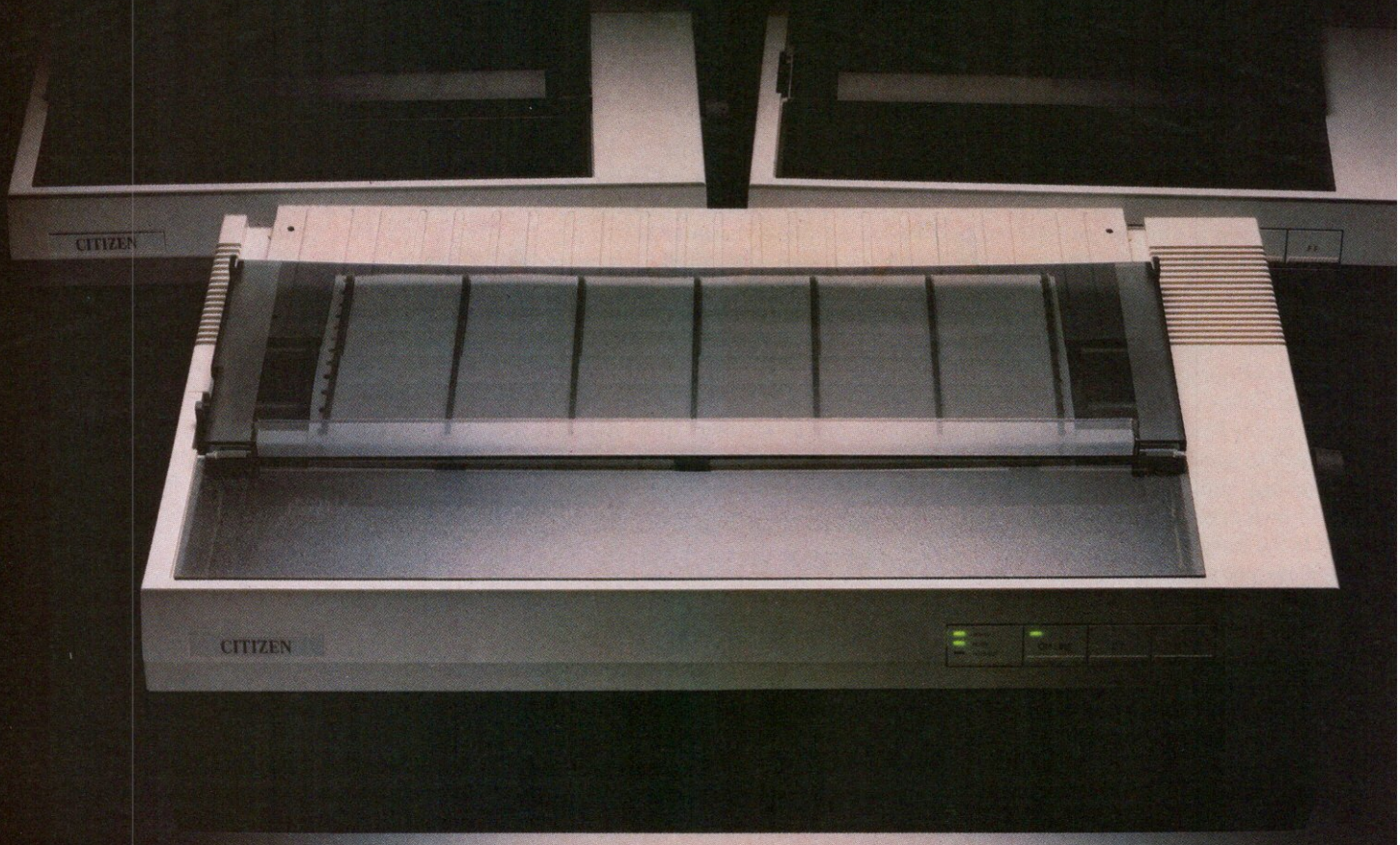

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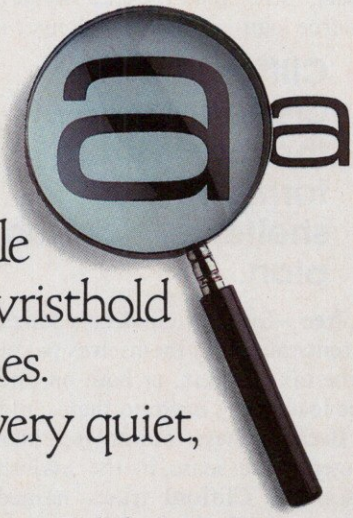

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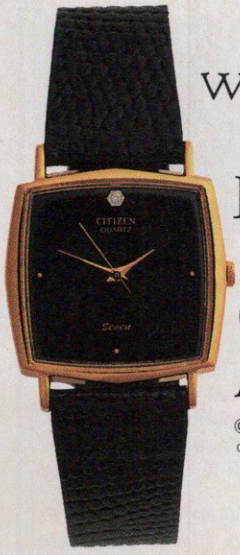

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CIRCLE 221 ON READER SERVICE CARD

viable forms of tax-shelter/education plan. Because of changes in the new tax law, financial planners have been advising their clients to set up Clifford trusts, rather than the traditional interest-free loan—which is no longer interest free—for their children's education. Parents may find themselves paying income tax, gift tax, or both on interest-free loans they make to their children.

Clifford trusts are today one of the most viable forms of tax-shelter/education plan.

Because these interest-free loans no longer make sense in the majority of cases, the Clifford trust—named for George Clifford, the man who first tried this technique—has found new popularity.

To start a Clifford trust, you shift control of the assets in question to one or more of your children for at least ten years and a day. The advantage of a Clifford trust is that the transfer does not have to be perpetual, but to be effective, the transfer must be irrevocable. Once the trust is established, the income is taxed at the child's (beneficiary's) tax rate.

But beware, the IRS has rules concerning the amount of money that parents can give their children gift-tax free every year. If you're considering giving your children more than $10,000 per year, definitely consult your tax advisor.

Open-Ended Trusts

If you and your children are lucky enough to have to worry about exceeding the gift-tax limits, you should consider setting up a series of trusts, or the trust should be set up as open-ended. An open-ended trust includes a provision that money added during the life of the trust extends the life of the trust itself to ten years and one day after the final contribution. The open-ended feature lengthens the period of time investment income will be generated within the trust, thus increasing the trust's coverage.

If the income from the trust is reinvested by the trustees until the child is ready to go to college, the income should probably be deposited into a custodial account to avoid having the income taxed at the parents' higher income-tax rate.

Now that you have seen the advantages and the potential problems that are associated with a Clifford trust, how do you determine whether or not one is right for you?

Financial Cookbook

To help you decide, we are going to do an analysis using the Financial Cookbook from Electronic Arts. Why the Cookbook? It's a fast, inexpensive way to compute your marginal tax rate. If you know how to calculate it already, you could do it on a calculator. In addition to calculating your marginal tax rate, however, the Cookbook calculates the percentage of your income that you paid in taxes last year. What's more, you can use the results of this calculation in the other Cookbook recipes that can do just about everything—from evaluating whether you should buy a house or rent, to IRAs, to leasing a car.

Parents may find themselves paying income tax, gift tax, or both on interest-free loans they make to their children.

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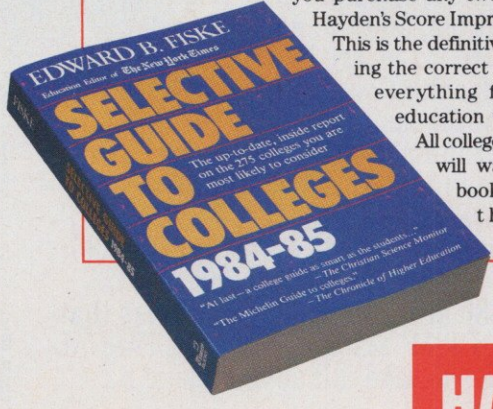

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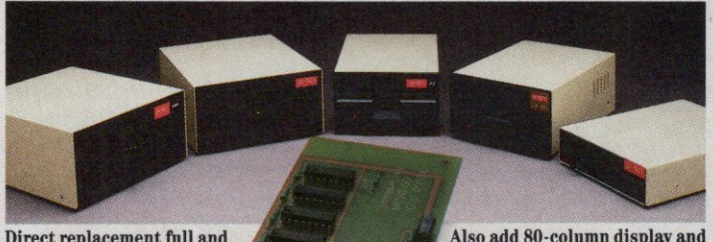

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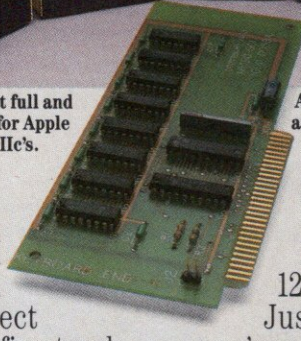

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To analyze Clifford trusts, we will use the recipe (program) that helps you understand the marginal tax rate.

Throughout our discussion of Clifford trusts, we have stressed that their advantage is that they lower the tax rate at which income is taxed. The question we have to answer is: How much lower, and what does that mean to you?

When Financial Cookbook's Understanding your Marginal Tax Rate recipe starts, it asks you six questions: What was your taxable income last year? How much federal income tax did you pay last year? How much state income tax did you pay last year? What is your federal marginal tax rate? Finally, did you itemize last year?

The majority of the information is entered directly from your last tax return. Financial Cookbook tells you how to compute your marginal rate from tax-rate schedules. The computations are easy, and they are a learning experience; but what is it that you are learning?

Your marginal tax rate tells you how much money in taxes you will pay for each additional dollar you earn. For example, if your marginal tax rate is 32%, then for every additional dollar you earn you will have to pay 32 cents in taxes.

Because, in the majority of cases, state income taxes are deductible on a federal income tax return, your state taxes will affect your marginal tax rate—they will lower it. That's the principal calculation that Financial Cookbook does for you.

To analyze the dollar savings of a Clifford trust, first compute your marginal tax rate, then that of your child. The difference between the two represents the dollar-for-dollar savings of a Clifford trust.

For example, assume that your neighbors, Mr. and Mrs. Noisemaker, have a taxable income of $60,000. Last year, if they filed a joint return, they paid $16,014 in federal income tax. Let's assume that the state they live in has an across-the-board 5% income tax. If so, they paid $3000 in state taxes.

After plugging these numbers into the Financial Cookbook, we find that the Noisemakers, after allowing for the state-tax deduction, had a marginal tax rate of 46.8%. For every extra dollar they earn (until they move into another tax bracket) they will end up paying almost 47 cents in taxes.

From listening to their screaming battles at midnight, you know the Noisemakers have a piece of rental property that yields $7000 a year in income. Mrs. Noisemaker wants to transfer the property into a Clifford trust for their oldest boy, Razz, but she doesn't know how much money they will save.

Razz, who works as a hawker in a traveling show, made $8000 last year. Assuming that his parents do set up the trust, the Financial Cookbook tells us that Razz will have a marginal tax rate of approximately 20%.

Because, in the majority of cases, state income taxes are deductible on a federal income tax return, your state taxes will affect your marginal tax rate—they will lower it.

Deduct Razz's 20% marginal tax rate from his parents' 46.8% marginal tax rate, and the difference—26.8% or $1876—is the amount of money the Noisemakers will save in income taxes on the $7000 in income. They can use the savings to help Razz get an education that is more formal than the one he is getting in the traveling show.

If transferring the assets to Razz put the Noisemakers into a lower tax bracket, they would have an additional savings. If the new income elevated Razz into another bracket, it would raise his tax liability, which would partially offset the tax savings resulting from the trust.

Consult Your Attorney

Calculating the amount of money you can save, and thus provide for your children, through a Clifford trust is easy to do, but don't try to set up one alone. Consult your attorney. A Clifford trust is a legal document. As you have seen, Clifford trusts can help you save the money you need to put your children through school.

On the matter of "having" to put them through school, only you can resolve that. Someday, though, you could be saying: "But, your honor, we set up a Clifford trust for our daughter and sent her to an Ivy League school. She got a degree in Biochemicalphysical Lanyard Weaving, but now she wants to be an aerobics teacher. And you say we *have* to pay for it?" +

This

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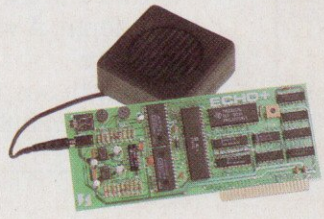

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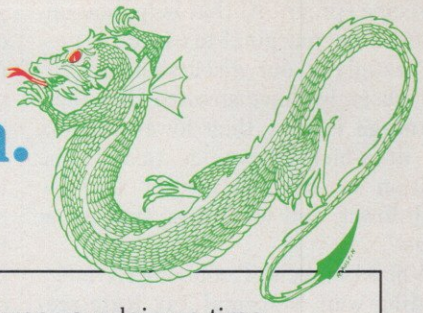
CIRCLE 182 ON READER SERVICE CARD

Big Game Hunting? Try Baggin' Our Dragon.



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Our dragon, of course, is Wizardry—that unique series of computer recreation programs designed for Apple users who are seeking the ultimate "big game" challenge.

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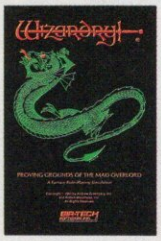

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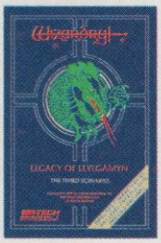

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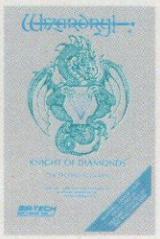

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This classic journey should only be attempted with those Wizardry heroes who have attained the 13th level of ability in PROVING GROUNDS. Their challenge—and yours—to adventure through a six-level maze and become the Knight of Diamonds. First-rate fantasy!

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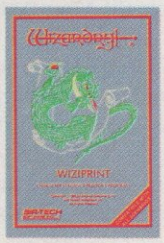

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CIRCLE 502 ON READER SERVICE CARD

Tae Kwon Do, the national sport of Korea, is the art of fighting using hands and feet. Black Belt, which is based on Tae Kwon Do, is an intriguing arcade game that will appeal to martial artists and arcade-game enthusiasts alike.

In this entertaining and educational game, you will learn the basic blocks, punches, and kicks used in Tae Kwon Do and go on to employ these techniques in realistic sparring matches against human- or computer-controlled opponents.

You control the movements of these cartoon-style sparring partners with keyboard or joystick. For example, if you push the joystick to the right, your contestant advances on his opponent. Push the joystick button, and he throws a punch. Each movement has a specific joystick or keyboard position associated with it.

The graphics and sound are excellent, and all of the techniques are executed in near-perfect form.

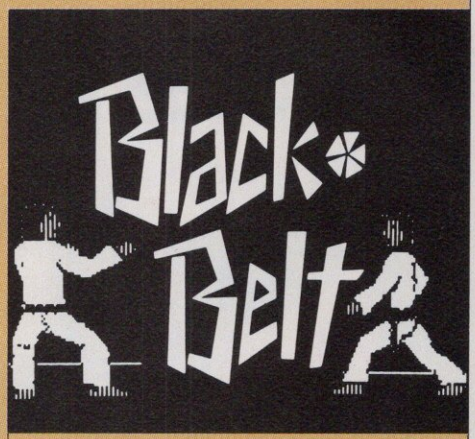
You can also opt to see a demonstration match between two computer-controlled Tae Kwon Do experts, choose a practice session to improve your technique, or display your current rankings and those of your opponents. The graphics and sound are excellent, and all of the techniques are executed in near-perfect form.

A real Tae Kwon Do class shows students the basic techniques before asking them to engage in a sparring match. Similarly, Black Belt offers a practice session, a menu option you can select after loading the program disk.

The practice session gives you a chance to see some of the kicks and punches that are used in competition. When you select a specific technique, it is demonstrated three times. Oddly enough, no blocks are included in the practice session, although they are the most important moves to have under your control.

One-Step Sparring

Before actually taking part in a sparring match, every student of Tae Kwon Do should practice the basic techniques on a stationary partner—a phase known as one-step sparring. Black Belt doesn't make any allowances for this, but you can simulate it by choosing the Sparring Match option from the main menu, selecting a two-player match, and simply not moving the second player. You then get used to controlling your player—with the keyboard or joystick—by trying out some kicks, punches, and blocks and, in the process, learn about some of the competition sparring rules from the ever-vigilant referee. Some one-step sparring is essential before trying to face an opponent on the computer—or in real life.



Competition Sparring

After viewing some practice sessions and developing your technique through one-step sparring, you are ready for a competition sparring match against an opponent who can fight back. Again, select the Sparring Match option and then choose either the Two-Player Game, where you face a human opponent, or the Player vs. Computer option, where you spar against the computer.

Black Belt supplies white-, yellow-, green-, blue-, red-, and black-belt computer opponents. The white belt is the easiest to spar against, and the black belt is the most difficult. You start out as a white belt and are promoted to the level of any opponent that you defeat in a sparring match.

When you spar against a computer opponent, the skill level is that of the computer opponent. If you choose to spar against a human opponent, the skill level is that of the more advanced of the two players. Skill level affects factors such as your speed, the techniques available to you, how quickly you get tired, and the intelligence of a com-

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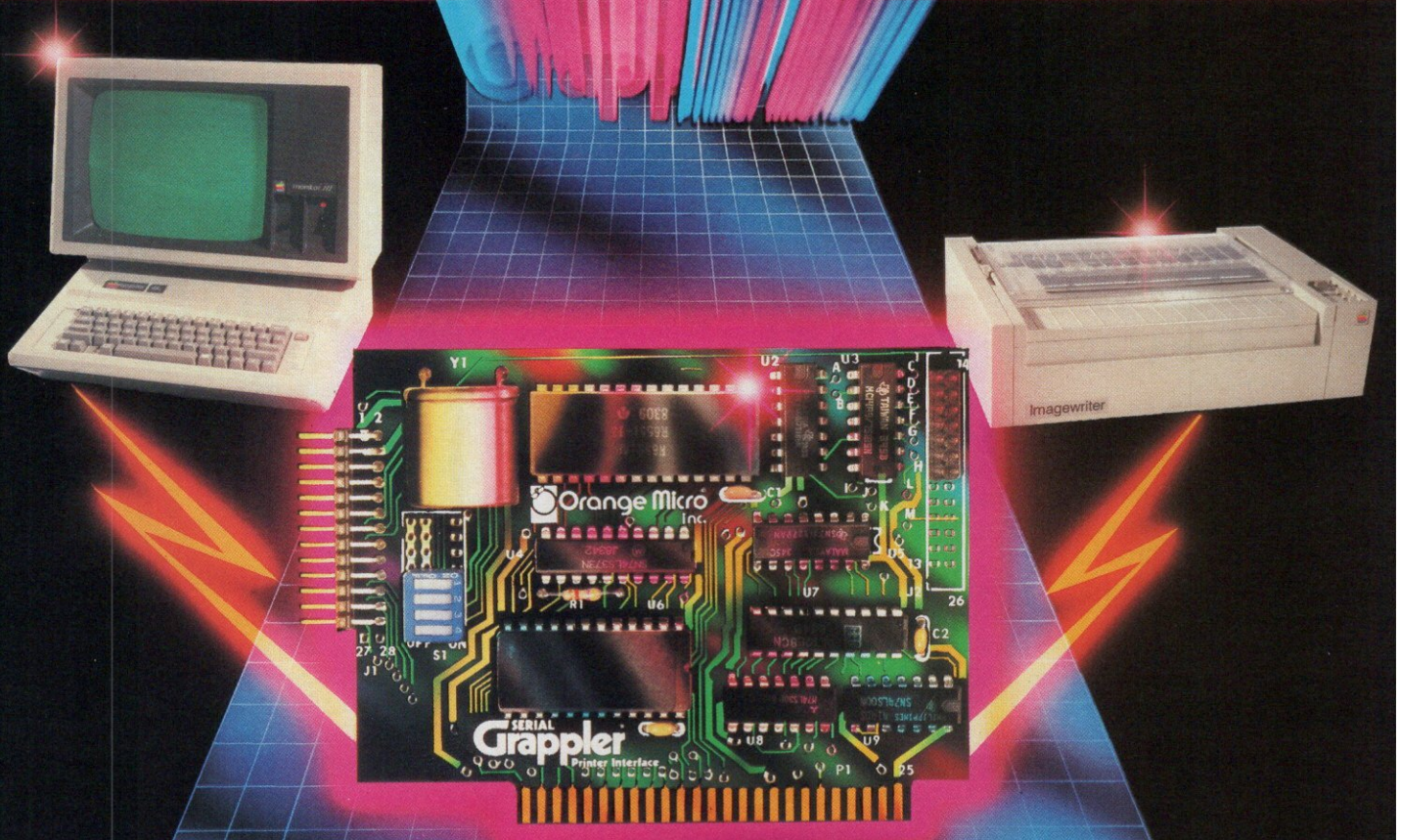

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puter-controlled opponent. For example, while sparring at the white-belt level, you may throw five or six punches in quick succession and then be so tired that you are temporarily unable to move. Your opponent can then move in and score several times before you can defend yourself.

The program documentation lists the techniques available at the white-belt level as the side block, low block, punch, side piercing kick, front snap kick, and turning kick. When you become a yellow belt, a back piercing kick is added to this list. At the green-belt level, a down kick becomes available. A blue belt can also do a reverse turning kick, and a red belt can use any technique, including a flying side piercing kick. Unfortunately, Black Belt fails to provide instructions for executing some of these techniques, primarily the back piercing kick and the reverse turning kick.

Sparring matches begin when the buzzer sounds and last two minutes. The time left in the match and the players' scores are visible at the top of the screen.

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In Black Belt, you score points when your attacks connect with your opponent or when you block an incoming attack. The player with the most points when the time runs out wins the match.

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The referee warns you for certain infractions, such as leaving the mat, using an illegal blow—for example, kicking your opponent in the back—turning your back on your opponent, or stalling. One point is deducted for every two warnings you receive. Disqualification results after six warnings.

Sparring at the white-belt level is a little slow, but the blue- and red-belt sparring partners are fast, clever, and virtually tireless. One second-degree black belt who played the game gave up after two matches against the computer-controlled red belt.

Black Belt provides hours of challenging sparring matches and is an excellent introduction to some aspects of Tae Kwon Do. It is no substitute, however, for the hours of practice and self-sacrifice that any real study of a martial art demands.

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GAME FEATURE

WIZARDRY

The adventures of an adventure game

For 20 years, book reviewers have compared every new fiction fantasy that comes along to J. R. R. Tolkien's *Lord of the Rings*—often to the point of absurdity. So, let's get one thing straight right from the start. Wizardry, the best-selling fantasy/adventure game by Sir-Tech Software, Inc., is nothing like *The Lord of the Rings*.

True, both are fantasies that involve the adventures of a mixed crew of humans, elves, dwarfs, and other creatures. Both center on epic quests involving mystic talismans and conflict between the forces of good and evil. Both sweep the audience into their own complex fantasy worlds—worlds that are rich in anthropological detail.

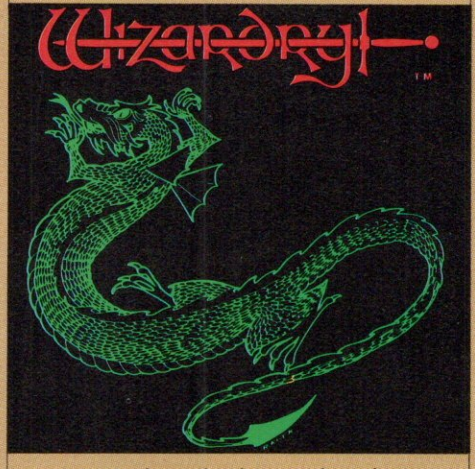
A final, inescapable comparison involves the vast popular appeal of Wizardry and *The Lord of the Rings*. Both began with obscure, "cult" followings, but their popularity quickly blossomed into the mainstream.

In the case of Wizardry, however, its following has grown not only well beyond its creators' wildest dreams but also in completely unforeseen ways. Today Wizardry can boast of some highly unusual players, among them a New York child psychiatrist and, soon, inmates at the Utah State Prison. Before delving into Wizardry's more arcane applications, however, a description of the game is in order.

The World of Wizardry

Computer adventure games fall into many categories. Prevailing definitions label Wizardry a "role-playing, graphically enhanced, maze-type," fantasy/adventure game. Luckily, you don't have to know what these terms mean to enjoy playing it—in fact, one of Wizardry's most intriguing features is just how little you need to know about the game as you begin to play. Wizardry's manual contains just enough information to get you started, but your ingenuity will determine how long you will survive.

The game begins. Your first task is to create the characters that will act as your alter egos during the adventure. Wizardry allows you to create and store on disk up to 20 such characters. The



game permits only six members in an adventure party, so a maximum of six players can play at one time, if each player controls the actions of a single character.

No rule forbids solitary adventuring, but Wizardry emphasizes cooperation—a single character will not get far, nor will a selfish one. Luckily, you don't need five other players every time you want to play Wizardry: A single player can manipulate several characters.

Building Characters

The characters in Wizardry have six basic characteristics: strength, I.Q., piety, vitality, agility, and luck. In addition to determining relative proportions of these characteristics, you must also choose your character's "alignment" (good, evil, or neutral), and race (human, elf, dwarf, gnome, or hobbit).

Finally, on the basis of all of these decisions, your character must belong to one of eight classes—fighter, mage, priest, thief, bishop, samurai, lord, or ninja. As the names suggest, these classes endow characters with very different abilities—strength, the capacity to cast spells or evade traps, and so on. Minimum scores—which characters must attain to qualify for membership—exist in each class. The manual explains some of these scores; players discover others during the game. Each class also has its advantages and disadvantages—again, some are explained, and others must be divined through Wizardry.

If all this talk of races, classes, and character points sounds complicated, don't worry. Sprinkled throughout Wizardry are small touches of fantasy-deflating humor, such as a sword called a "Blade Cuisinart" and an inscription on one of the walls of the maze—"Trebor Sux"—which bears no translation.

The same tongue-in-cheek spirit should not influence your initial character choices, however, because you may have to live with them for a long time. Wizardry characters, once created, endure until they are deleted. (Although a character may "die" during an adventure, a possibility may exist for eventual resurrection, depending on the circumstances of the demise.) Even at the end of the game, when you solve the puzzle of Wizardry's first scenario, The Proving Grounds of the Mad Overlord (a task that may take weeks or months), you have the option of buying another scenario and moving your character on to a new adventure. Two such additional scenarios are The Knight of Diamonds and the Legacy of Llylgamyn—both software best-sellers in their own right.

Of Mazes and Monsters

Once you have created your characters and assembled and equipped your adventure party, you are ready to tackle

the heart of the game—the adventure. Wizardry's challenge, a multilevel maze, is "unsafe, but possibly lucrative," as the manual understates.

As you break camp and begin your adventure, the maze appears as a three-dimensional line-drawing in the upper-left corner of the screen. You can see walls and doorways, nothing more. Occasionally, you stumble into a dark area and lose even this minimal visual aid. Mapping is essential to survival as you work your way through the maze.

The rest of the screen display is divided into four sections. The upper area lists your current options, and the bottom area shows a roster of the adventure party, which allows you to monitor their condition. The two middle areas comprise the heart of the text adventure. One describes the spells currently operating. The other gives a running account of the action, with messages such as Stairs going up, take them Y/N? or You are attacked by four bubbly slimes, the monsters surprised you.

When you see a message such as the latter, the maze display is replaced by a rough depiction of the monster at hand. Similarly, should you defeat the slimes (a task rendered more difficult by the surprise factor), you will be rewarded by the appearance of a treasure chest.

Beyond Swords and Sorcery

The sketchily designed maze—and the monsters, mysteries, and magic it contains—encourages players to exercise their creative powers. This conscious challenge to the imagination is the key to Wizardry's enchantment and has led to some imaginative uses of the game.

One player whose interest has been captured by Wizardry's unique graphic restraint—and its other qualities—is Dr. Ronald Levy, a New York child psychiatrist who was already experimenting with the use of computer games in the evaluation and treatment of children with emotional problems.

A former math major and sometime computer programmer, Dr. Levy purchased one of the first Apple IIs in 1978. Dr. Levy claims that he never planned to use his Apple for accounting or record keeping. His computer was destined from the start for an active role in his practice.

According to Dr. Levy, "Child psychiatrists often have playrooms for their patients. Especially with the younger children, a psychiatrist can learn a lot by observing their play. I initially saw the computer as a self-contained playroom—and one that offered some unique benefits, but there was a limit to what could be accomplished with arcade games."

In 1981, Dr. Levy heard about Wizardry, and his electronic playroom was enhanced by its addition. His first use of

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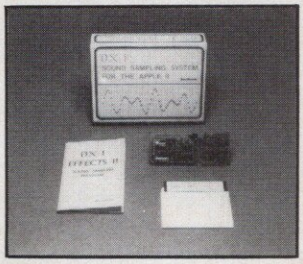

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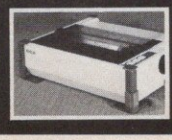

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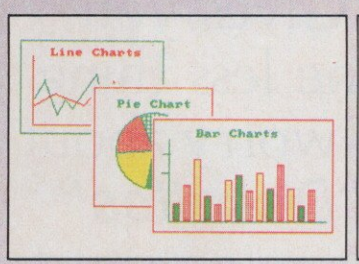

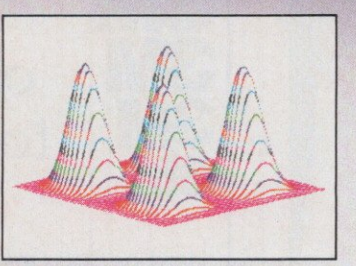

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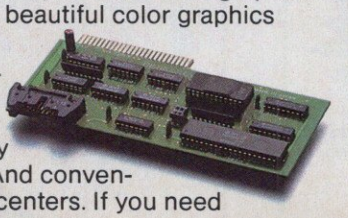

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AP11

the game directly utilized Wizardry's appeal to the imagination.

Dr. Levy says, "Many adventure games leave little to the imagination. The fact that Wizardry's characters are created by the players and never seen, coupled with the game's restraint in its depictions of the maze and the monsters, makes Wizardry almost the ideal psychological projection tool.

"When children create characters for the game, they imagine a number of details about them. I ask the children to make drawings of some of these characters and then tell me stories about them. I even keep toy armor and swords around, so that the children can follow up a Wizardry session by actively role-playing. Their fantasies reveal many things about them, such as their ambitions—their concepts of what makes up a hero.

"In addition, when the children are actually in the maze, using the characters to explore and to fight the monsters, some of their basic fears rise to the surface."

A Magical Transformation

Dr. Levy has found the game useful, too, in establishing initial contact with withdrawn and uncommunicative patients. As he puts it, "A wonderful thing can happen with Wizardry. Sometimes the game absolutely transforms the relationship between me and a child.

"The scenario goes something like this:

" 'You ever played this Wizardry game?'

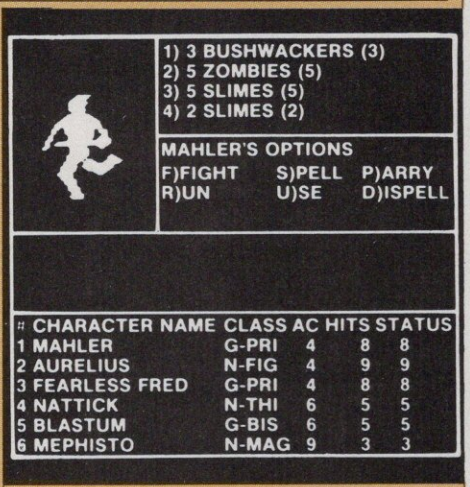
" 'Oh—you like computer games?'

" 'Yes, I play them all the time.'

"Pretty soon, there's a way in which we're friends—and the child is a lot more likely to open up to me.

"For example, I had one patient whose parents were having serious marital problems. This child, previously a bright and capable boy, had begun to do poorly in school. The first time I saw him was on an emergency basis, following a suicide threat.

"When he came to my office, he let everyone know that he didn't want to be there, and he refused to talk to me at all. He sat quietly, staring at the floor, re-



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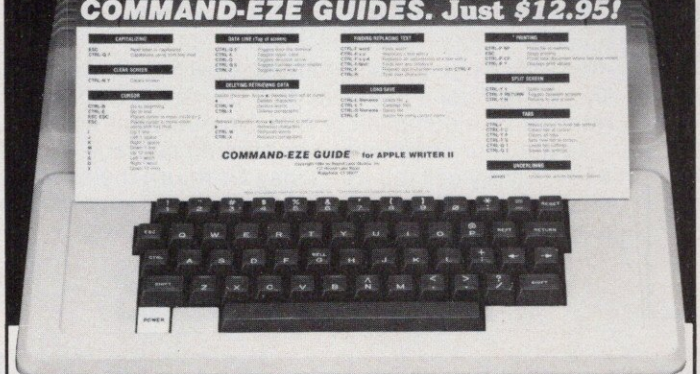

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fusing to respond to questions. Because this child had declared his intention to commit suicide and was uncooperative, I was considering admitting him to a psychiatric hospital for his own safety.

"The boy agreed to play games on my Apple computer, however, and, with the help of Wizardry, I was able to move

Wizardry's immense popularity and its unusual uses have exceeded even the well-developed imaginative powers of its creators.

beyond this apparent impasse. Fascinated by my description of the game, the boy made a set of characters and played nonstop for almost an hour. During the second half of that time, he was willing to discuss with me what he was doing in the game; and I was able to learn a great deal about him, both from what he told me and from watching his play. Using the game as a springboard, we were able to talk about some of his worries. In the process, I found out that he was not nearly as depressed as he had initially appeared. In fact, at the conclusion of the visit he told me he had no intention of killing himself because he 'wanted to come back and play some more.' "

Sorcery in the Cell Block

Medical-journal accounts of success stories such as the one above—coupled with word-of-mouth communication among Apple aficionados—have inspired Dr. Allan Rowe, the psychiatrist at Utah State Prison, to put Wizardry to work in his very different practice.

According to Rowe, Wizardry is not the first computer game to go behind the bars of Utah State Prison; the function Wizardry is slated to perform, however, is very different from that of previous games.

"I've used arcade games previously simply as rewards. For example, one inmate wanted to quit smoking. We agreed that when he went without a cigarette for a certain amount of time, I would let him play Space Invaders on the Apple."

If that use of computer games seems relatively frivolous, the same can certainly not be said of Dr. Rowe's plans for Wizardry. Dr. Rowe plans to use Wizardry as a personality diagnostic tool, studying the play of the inmates and comparing their game strategy with that of a sample of the regular population. His hope is that the results will yield valuable insight into the psychological makeup of lawbreakers. The unique cooperative nature of the game might even have beneficial effects on the inmates.

Why We Play Wizardry

If these uses of Wizardry seem surprising, imagine how the game's authors feel. When Robert Woodhead and Andrew Greenberg began their collaboration more than five years ago at Cornell University, they felt that their goal was ambitious enough—the creation of an epic microcomputer fantasy that would challenge the imagination of its players. Wizardry's immense popularity and its unusual uses have exceeded even the well-developed imaginative powers of its creators.

Woodhead and Greenberg may be surprised, but, thanks to the psychological scrutiny surrounding Wizardry, they now have a theory to account for the game's tremendous appeal. According to Dr. Levy, "Wizardry taps into some of our most basic childhood traumas and offers a chance to master them creatively. The features that make the game so appropriate for psychological work have also made it extremely popular."

Anne Kaplan

PRODUCT INFORMATION

Wizardry
Sir-Tech Software, Inc.
6 Main Street
Ogdensburg, NY 13669
(315) 393-6633
List Price: $49.95
Requires: Apple II, II Plus, IIe, or IIc; 48K RAM; one disk drive

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SEE PAGE 10

PRODUCT NEWS

Trivia Mania
Based on thousands of challenging trivia questions, Trivia Mania bridges the gap between entertainment and educational software. The game has approximately 3500 questions on diskette and in printed form (you can play Trivia Mania without a computer). Questions represent three levels of difficulty in seven categories, covering science and technology, geography, history, sports, films and entertainment, famous people, and nature and animals. Players or teams fulfill user-selected point requirements in five of the seven categories and answer a category-completion question and a final game-winning question in order to win. *(List Price: $39.95)*
Requires: Apple II, II Plus, IIe, or IIc; 64K RAM; one disk drive
Professional Software, Inc.
51 Fremont Street
Needham, MA 02194
(617) 444-5224
CIRCLE 473 ON READER SERVICE CARD

Two Games from Trapeze
SETI (Search for Extraterrestrial Intelligence) is a time-constrained search to locate and decipher alien messages from space scattered throughout a computer. The program merges entertainment and learning experiences and incorporates strategy, spelling, and sentence construction with fast action.

In Twisted, players use the computer as eyes, ears, hands, and legs to explore for hidden treasures among the ruins of the ill-fated Realhigh Tech. Their exploration leads them through dozens of secret passages, one-way halls, and warped perspectives. Final scores are determined by the number of treasures found, rooms explored, and tasks performed. *(List Price: $39.95 each)*
Requires: Apple II, II Plus, IIe, or IIc; 64K RAM; one disk drive; joystick
Trapeze, Inc.
3727 Buchanan Street
San Francisco, CA 94123
(415) 922-6606
CIRCLE 474 ON READER SERVICE CARD

J-Bird
J-Bird is the first "Open-Book" software offering from Adam Osborne's new venture, Paperback Software International.

The player's goal is to hop J-Bird down the game pyramid and convert the color cubes to the color shown on the screen. Players are challenged to score points as they try to avoid a nasty snake, a hungry cat, and big red globs that squash J-Bird. The program will be distributed through bookstores. *(List Price: $19.95)*
Requires: Apple IIe; one disk drive
Paperback Software
2612 Eighth Street
Berkeley, CA 94710
(415) 644-2116
CIRCLE 475 ON READER SERVICE CARD

T.A.C. (Tactical Armor Command)
Players of this WWII game of armored combat control tanks, antitank guns, and infantry squads. T.A.C. for one or two players features high-resolution graphics, enhanced sound, and stimulating challenge. Five scenarios are available—Meeting Engagement, Rear Guard, Static Defense, Breakout, and Stalemate. Players control up to eight vehicles, guns, and squads simultaneously, using the equipment of either the German, British, Russian, or American forces. *(List Price: $40)*
Requires: Apple II, II Plus, or IIe; 48K RAM; one disk drive
Microcomputer Games, Inc.
4517 Harford Road
Baltimore, MD 21214
(301) 254-9200
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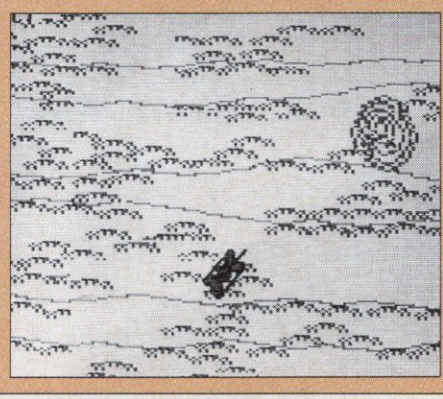
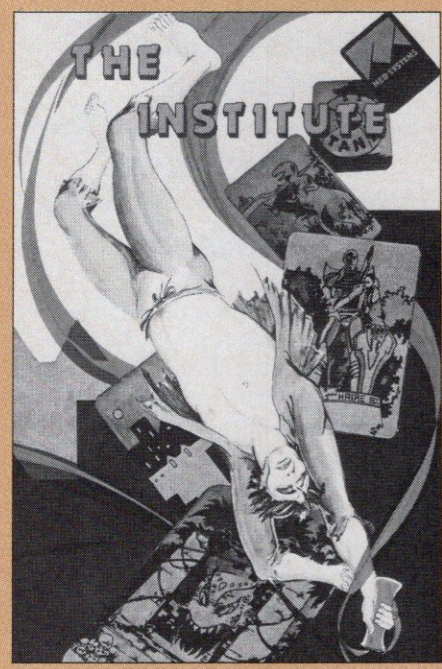


Institute
You must escape from the Institute, but the key to escape exists only in your dreams! The Institute is a psychological drama; in true Freudian fashion, you can find the clues to your escape only through a series of four dreams, which are induced by a mysterious red powder. You may find yourself in a prehistoric jungle or aboard the doomed Titanic.



Whatever the adventure, watch closely—each dream provides you with information and items you will need to escape! *(List Price: $29.95)*
Requires: Apple II, II Plus, or IIe; 48K RAM; one disk drive
Screenplay
P.O. Box 3558
Chapel Hill, NC 27514
(919) 493-8596
CIRCLE 477 ON READER SERVICE CARD

MORE ENTERTAINMENT PRODUCTS

Beyond Castle Wolfenstein, from Muse Software
Expedition Amazon, from Penguin Software
Trillium, from Spinnaker Software
Sorcerer, from Infocom, Inc.
Seastalker, from Infocom, Inc.
Black Belt, from Earthware Computer

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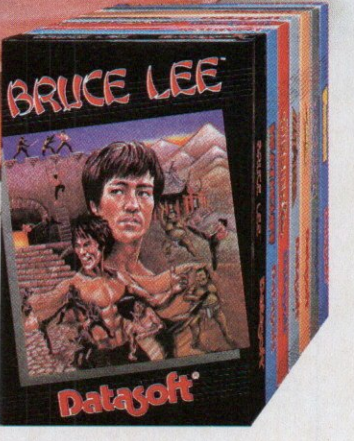

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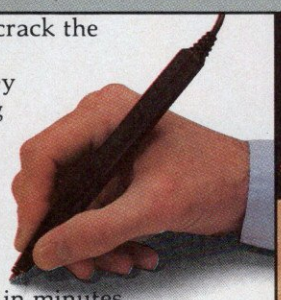

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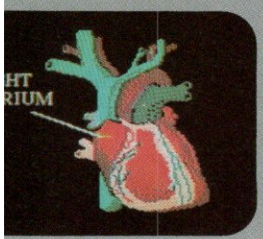

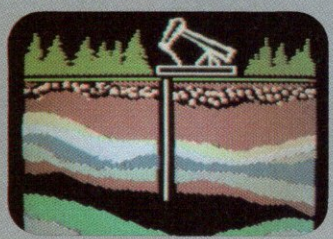

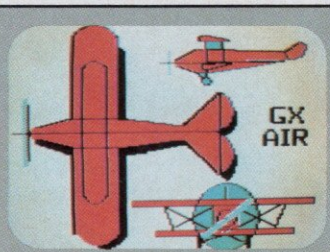

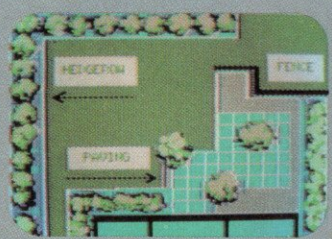

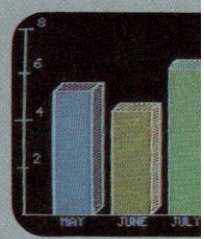

Apple IIe & II+ with 64K, one or two Disk Drives.

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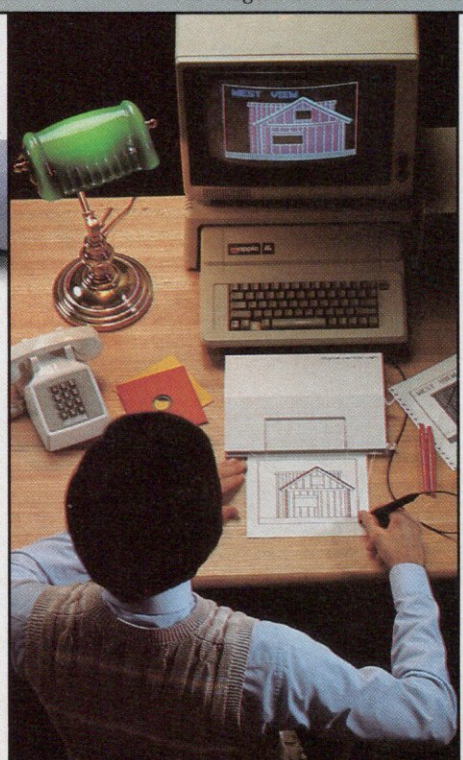

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programming contest

Send in for Your Listing

Here are the ways you can obtain the listings of the winning software of the *A+* Program of the Month contest:

1. Write to us, 11 Davis Drive, Belmont, CA 94002, and we'll send you a copy. State the name of the program, the month that it won, and include a self-addressed, stamped envelope.
2. Download the program directly into your Apple from CompuServe. Log onto CompuServe (you must already be a member) and type GO PCS51, which will bring you to the Micronet Apple User's Group area. The computer will then guide you through the system with a series of menus and help screens. If you have any questions, you can send a message directly to us via CompuServe's electronic-mail system. *A+*'s ID number is 72356,2673. If you want to contact CompuServe, its phone number is (800) 848-8199 (in Ohio, dial (614) 457-0802).

▸ CONTEST WINNER

Congratulations to Ken Haley of Englewood, Colorado, who is November's Program of the Month contest winner. This month's winning program, entitled Rabbit Hunt, is a game for the Apple II written in Pascal. It tests your skill at shooting rubber-tipped arrows to scare rabbits away from your garden. Ken is vice president of systems at Aurotech, Inc., which sells Pick OS-based minicomputers. He is a graduate of the University of Colorado and holds a B.A. in mathematics with a minor in physics. Ken will receive $500, and we'll enter him in our special $1000 grand-prize contest. Ken offers these comments about the program:

Rabbit Hunt

Rabbit Hunt is a simple 3-D graphics game written in Pascal (version 1.0). The minimum system requirements are an Apple II Plus, IIe, or IIc with 64K, at least one disk drive, and game paddles. A color monitor is highly recommended. The object of the game is to rid your vegetable garden (a 10 × 10 grid on the screen) of rabbits.

The program is interesting from several points of view: (1) It demonstrates the power and speed of Pascal—much can be done without a single peek, poke, call, or other machine-language interface. (2) It is a simple example of 3-D graphics, with true perspective used in drawing everything on the screen except the text. (3) The motion of the arrows follows the laws of gravity and motion according to Newtonian physics (ignoring air resistance).

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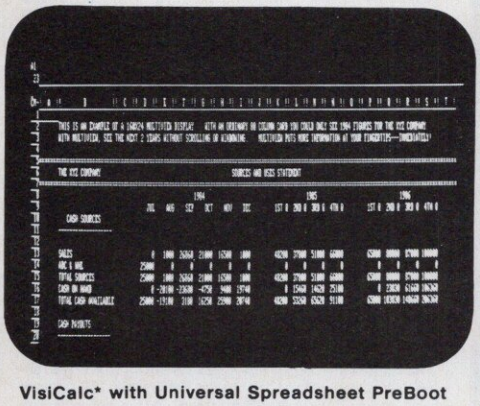

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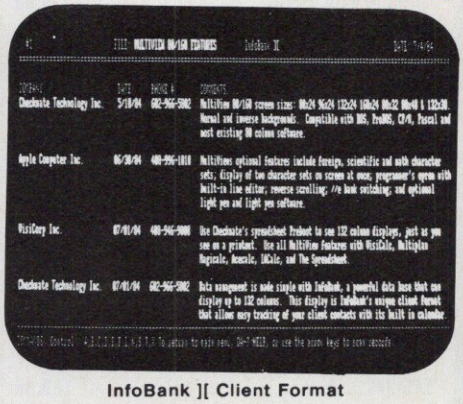

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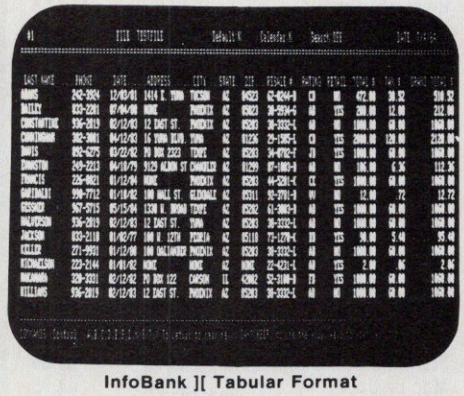

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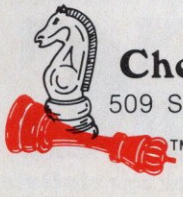

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▶ TUTORIAL/BY ROBERT COWART

HOW TO dBASE II

PART XIII

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

Welcome to our ongoing series of tutorials on the popular microcomputer data-management tool dBASE II. Assuming you have been conscientiously participating in the last 12 "How to dBASE II" installments in *A+*, chances are you are now adroit in almost all aspects of manually creating, maintaining, modifying, and reporting from just about any type of database you can dream up. Notice I said *manually*, though.

Some of you persistent students may know that besides including a database manager (for storing data) and a query language (for keyboard-selected retrieval of data), dBASE II also serves as a programming language.

Virtually all of the commands, functions, and operators you have become familiar with in the course of our tutorials can be incorporated into command files (programs) that dBASE can use to do things automatically with your databases—things like creating customized printouts, making automatic backups of files, or just eliminating the drudgery of remembering and typing in the same old commands again and again. The programs can be as complicated as you want, and you can design them specifically for a particular application. For example, people have written dBASE programs to handle all the accounting and patient-history files in a doctor's office. These programs can include everything from the printing of payroll checks, invoices, and form letters, to the maintenance of the general ledger, receivables, and payables.

In other words, dBASE can do most things that other languages such as BASIC, Pascal, and COBOL can, except that its built-in database manager makes things a lot easier. Even simple commands that we take for granted, such as Find, Display, and Skip, would take pages of programming to achieve with a nondatabase-oriented language but only a single word in dBASE.

Writing programs in dBASE can even be fun. A certain satisfaction (and sense of power) comes from seeing your program work the first time.

So, with no further ado, let's get moving. Just to get the feel of programming, let's create a program that does rather useless things, but at least does them automatically. First, we have to get into dBASE's text editor, because creating a program is like writing a letter with a word processor. Only after it's all written and saved on disk can you use it. Make sure you have a little room on your A drive and then type the following:

```
. modify command
ENTER FILENAME: first
```

The screen should clear, and the cursor will go up to the top. Now type the lines of code just as they appear below, using the Return key to advance to each new line. You may have to use the full-screen-editing control codes to move your cursor around, delete, insert, and make other changes (refer to your dBASE manual if you're in doubt).

```
set talk off
store 0 to x
? x
store x +10 to x
? x
store x +10 to x
? x
cancel
```

When you have it right, type Control-W to save your program; dBASE II will create a file on your disk called FIRST.CMD. The CMD extension stands for *command*, identifying this new file as a dBASE program (as compared to a database or index) file. Next, dBASE will present you with the familiar dot prompt again, at which point you can run the program and see what happens.

```
 do first
        0
       10
       20
DO CANCELLED
```

Real useful, eh? Now for a little explanation of what happened. First, if you are new to the concept of how programs run, consider that computers generally read programs the same way you read a page. You start at the top and move sequentially down the lines. dBASE does the same thing. In the case of our program, typing do first instructs your computer to look on the disk for a file called FIRST.CMD. Assuming it is there, the computer then reads the file into a reserved part of RAM (the memory chips inside your Apple). Next, dBASE walks sequentially through each line of the program, reading and then executing each instruction, one at a time.

Let's take a look at what our program does, step by step. The first line (set talk off) tells dBASE not to clutter up the screen with lots of unnecessary information about what it's doing.

The next two lines should be familiar to you, since we covered memory variables in past issues. First, we told dBASE to store the number 0 in a memory variable called X (store 0 to X) and then to display it on the screen (? X). Simple. The line store X+10 to X simply adds 10 to the existing 0 value in X. Since 0 + 10 = 10, X should now be 10, and the next line displays X's new value on the screen.

We repeated the process once more, resulting in the number 20 being stored in X and displayed. The Cancel command tells dBASE to stop running the program and return to the dot prompt. Actually, it would have done so anyway, but it's good practice to tell dBASE where the end of a program is. Now you know why the 0, 10, and 20 as well as the DO CANCELLED messages appeared on the screen.

Now let's try something a bit more practical. Dredge up the database we used in the last issue, or create a new one with the name, field layout, and data in figure 1.

Say this is your stereo-store inventory list, which an em-

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ployee updates daily. Once a week you want to know how many items you have in each category, what your total investment is, and how much retail value is wrapped up in your inventory. The dBASE Report command can provide this information, but it won't give it to you the way you want it. For custom reporting, you need a custom program, so let's start with something simple and then develop it into a pretty spiffy program.

```
STRUCTURE FOR FILE: A:INV-1.DBF
NUMBER OF RECORDS: 00010
DATE OF LAST UPDATE: 00/00/00
PRIMARY USE DATABASE
FLD          NAME        TYPE    WIDTH    DEC
001      PART:NUMB        N        005
002      CATEGORY         C        010
003      BRAND            C        010
004      MODEL            C        006
005      QUANTITY         N        002
006      COST             N        006    002
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```

Figure 1: Stereo-store database

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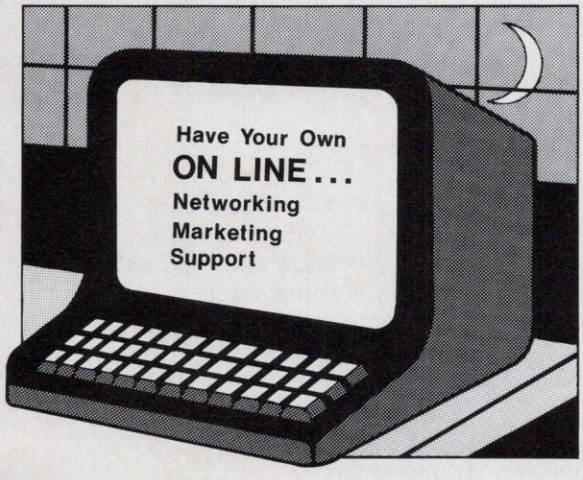

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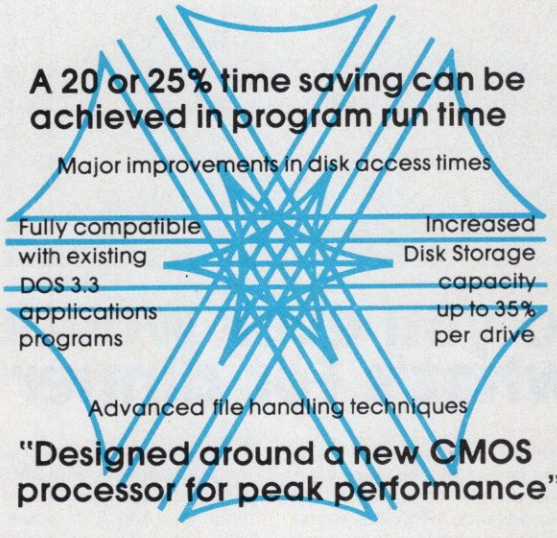

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CIRCLE 159 ON READER SERVICE CARD

So get back into dBASE's program editor using the Modify Command command, and create a new program called REPORT. It should look like this:

```
erase
set talk off
use inv-1
count for category = "RECEIVER" to r
count for category = "SPEAKERS" to s
count for category = "TAPE DECK" to td
count for category = "TURNTABLE" to tt
? r
? s
? td
? tt
sum cost to c
sum price to p
? c
? p
?
cancel
```

Don't forget to type Control-W to save the program. When you run the program by typing DO RETURN, you should see this:

```
       4
       2
       2
       2
1594.59
3449.80

DO CANCELLED
```

The program uses mostly commands you've seen before, though the Erase command may be new to you. It simply clears any junk off the screen so it's easier to read. Also, the last ? just moves the cursor down one line, adding some space between the last number and the DO CANCELLED message.

The obvious problem with this report is that we can't tell what's what, right? Luckily, it's easy to get dBASE to display messages on the screen, or on paper for that matter. So, try adding a few notes, modifying your command file to look like this (use the cursor-control codes to move around and Control-N to insert new blank lines where you need them):

```
erase
set talk off
use inv-1
count for category = "RECEIVER" to r
count for category = "SPEAKERS" to s
count for category = "TAPE DECK" to td
count for cateogry = "TURNTABLE" to tt
? "WEEKLY INVENTORY LISTING FOR WEEK OF / / /"
? "------------------------------------ "
? "Number of Receivers:"
? r
?
? "Number of Speakers:"
? s
?
? "Number of Tape Decks:"
? td
?
? "Number of Turntables:"
? tt
?
```

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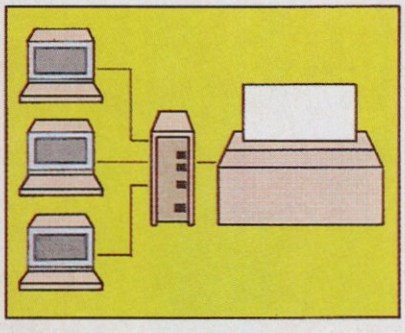

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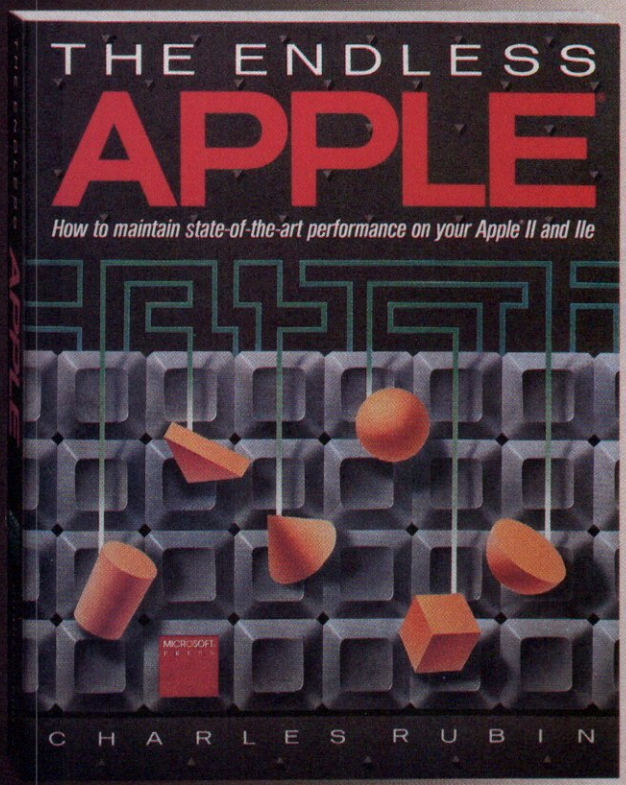

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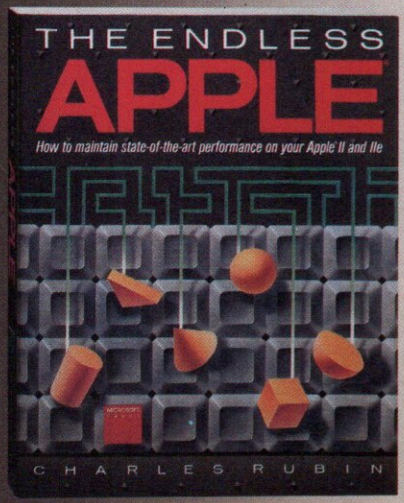

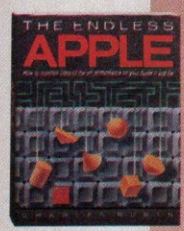

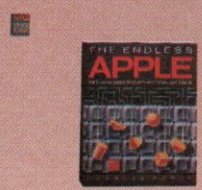

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**Catalyst works on the Apple IIc, IIe and Apple III. It is not compatible with Macintosh.

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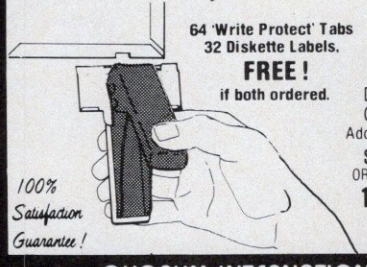

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CIRCLE 242 ON READER SERVICE CARD


```
sum cost to c
sum price to p
? "Total cost of items:"
? c
?
? "Total retail value:"
? p
?
clear
cancel
```

Now save this version, run it, and see what you get. Your screen should look like this:

```
WEEKLY INVENTORY LISTING FOR WEEK   /  /
----------------------------------------

Number of Receivers:
          4

Number of Speakers:
          2

Number of Tape Decks:
          2

Number of Turntables:
          2

Total cost of items:
    1594.59

Total retail value:
    3449.80

DO CANCELLED
```

One new command you may have noticed is Clear. It closes any open databases and cleans out any memory variables. In other words, it resets the dBASE environment to a known state, which is a good idea after running a program. Otherwise, subsequent programs may run out of room for memory variables, use the wrong database, or encounter other problems.

The line that provides for a date is meant for printing out hard copies. If you have a printer hooked up, type a Control-P before running the program or put a Set Print On command anywhere in the first several lines of the program.

Congratulations! Now you've got the idea of programming. Next time we'll expand this program into something even more interesting. In the meantime, try some programs on your own.

Incidentally, you may want to use your favorite word processor instead of dBASE's rather crude editor, but you must make sure it's a word processor that has a "nondocument" mode intended for program writing. In the normal "document," or letter-writing, mode, editors such as WordStar insert invisible codes that only the editor can use. If dBASE encounters them, syntax errors will ensue when you run a program. With WordStar, use the N command, rather than D, to create and edit your dBASE programs. If you're using another editor, consult its manual.

Please address any thoughts or comments to me, Robert Cowart, c/o *A+* Magazine, 11 Davis Drive, Belmont, CA 94002. ✚

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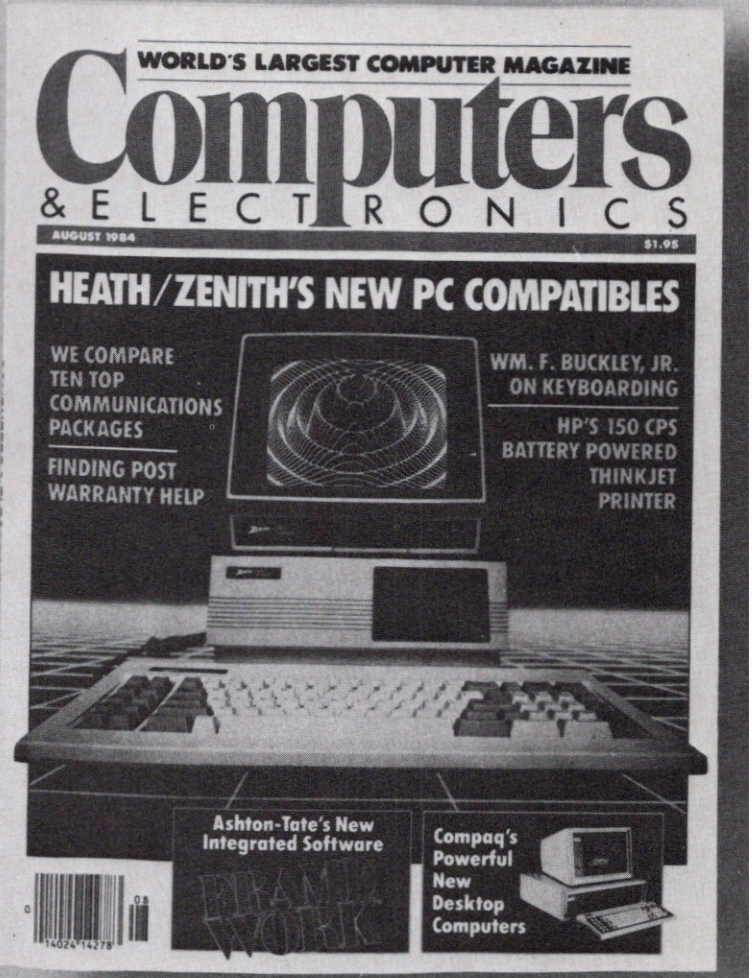

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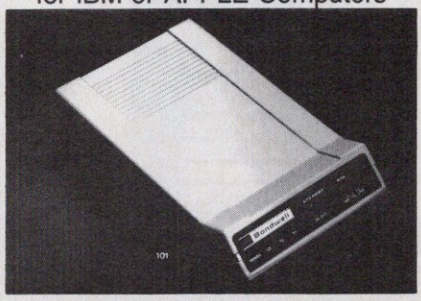

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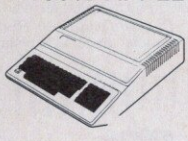

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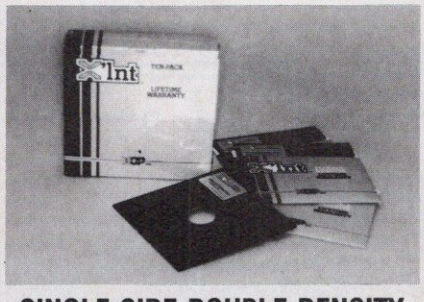

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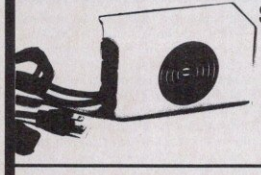

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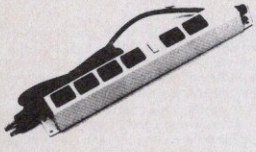

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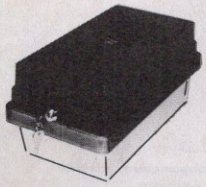

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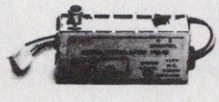

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The **SWITCH-A-SLOT** is an expansion chassis, which allows the user to plug in up to four peripheral cards at one time. One of these cards is selected for use, and only that card draws power.

This product is especially useful where the software requires the printer to be in a particular slot, and the user wishes to choose between two or more printers.

- Allows up to four peripheral cards to be plugged into one peripheral slot.
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- Saves wear and tear on delicate connectors.
- 18" cable connects Switch-a-slot to computer.

New—resistive terminations for better response

SWITCH-A-SLOT and EXTEND-A-SLOT work well with all slow to medium speed cards, such as Modems, Printers, Clock, 80 Column, Music, etc. They are not recommended for high speed data transfer devices such as disk drive controllers, alternate processor, and memory cards. These products may be incompatible with some alternate processor cards.

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The **EXTEND-A-SLOT** brings a slot outside your APPLE™, allowing an easy change of cards. The 18" flex cable is long enough to allow placement of the card in a convenient location. The high quality connectors are gold plated for reliability.

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Technicians—easy access to test points on accessory cards under actual operating conditions.

Experimenters—make easy changes to cards while card is installed.

EASY TO USE—just plug it in as you would any expansion card, then plug your card in. When you want to change cards, do it easily outside the computer, without the wear and tear on the computer expansion slot.

OTHER PRODUCTS

D Manual controller. Gives complete control over the $C000 through $C0FF range in hardware. Can be switched while program is running. $89.50.

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Paddle-Adapple

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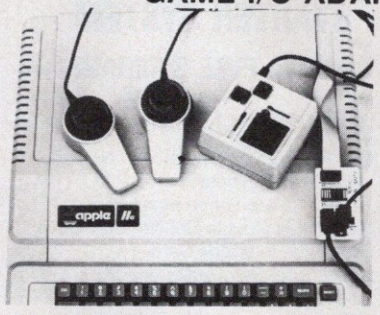

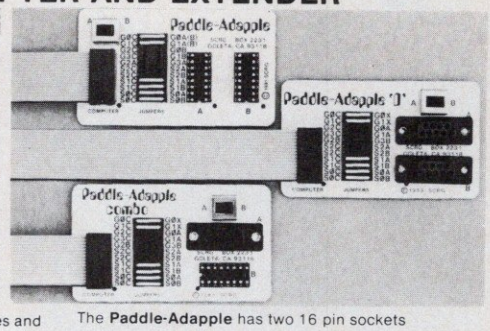

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The **Paddle-Adapple** has two 16 pin sockets

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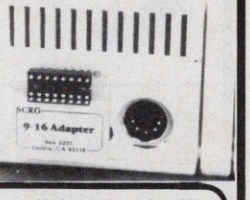

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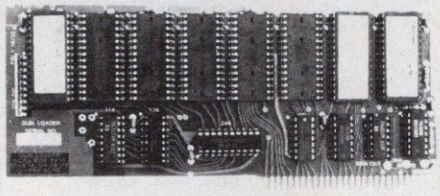
quikLoader™



FAST AND CONVENIENT

The quikLoader is the *fastest* way to load programs. **BAR NONE!** Programs can be loaded in fractions of a second. More importantly, DOS is instantly loaded every time the computer is turned on. Integer is even loaded in the language card. This process takes less than a second, saving valuable time. Frequently used programs are available *instantly* when you need them, without having to look for the disk, or hoping that the lengthy disk loading procedure goes smoothly.

To run a program from the quikLoader, bring up the quikLoader catalog (Q-reset), and the names of the programs will be displayed, along with an index letter. Pressing the index letter will instantly load and run the program.

Up to 23 programs on the quikLoader can be displayed on the screen at one time. If you have more programs, you may scroll through the catalog in either direction.

The quikLoader is **ideal** for applications requiring a dedicated computer. Your program can be automatically loaded and run at "power-up".

PROGRAMMING EPROMS

Putting your own programs on the quikLoader is easily done, using a separate EPROM programmer such as the **PROmGRAMER.** For APPLESOFT, INTEGER, or single machine language files, no programming knowledge is necessary. You **will** need experience if you want to save copy-protected or complex programs. The amount of experience necessary depends on the complexity of the program.

COMMERCIAL PROGRAMS

If you have a program that is valuable, it will become **more** valuable when it is instantly available to you. We are actively seeking licenses from software publishers to allow their popular programs to be made available for the quikLoader. Independent authors are encouraged to write programs suitable for the quikLoader. If the author wishes, we will market the program (with appropiate royalties), or the author can take care of all marketing. In either case, we will make known to our customers the availability of these programs.

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We are currently licensed to sell several very popular programs on EPROM. **DOUBLE—TAKE** by BEAGLE BROS., and **COPY][PLUS** by CENTRAL POINT SOFTWARE. The introductory price for DOUBLE—TAKE is $45.00. This includes the program exactly the same as you would buy it at your dealer for $34.95 (including disk and documentation), and a programmed 27128 EPROM (worth about $25.00). COPY][PLUS cost $65.00. This includes the original program (worth $39.95) and **two** programmed 27128's.

Other programs available directly from us or the publishers are, **BARKOVITCH I/O TRACER AND SINGLE STEP TRACE, MICRO/TYPOGRAPHER** from **TIDBIT SOFTWARE, ECHO** speech synthesizer software from **STREET ELECTRONICS,** and **MERLIN** assembler, from **ROGER WAGNER PUBLISHING.** More commercial programs are now in the works.

MEMORY CAPACITY

The quikLoader has eight sockets for EPROMs. These sockets can accommodate standard EPROMs from 2716 to 27512. These types can be freely intermixed. The memory capacity of the quikLoader depends on the EPROMS used. For example, the 2716 can hold 2K of programs, and the 27512 can hold 64K. (Frankly, the current costs of the 27512 is prohibitive,but should come down drastically in the next year.) At this writing, the least cost-per-bit is provided by the 2764, which can hold an 8K program. Using these "chips", the quikLoader becomes a 64K ROM. Using larger capacity EPROMs allows it to become a 128K, 256K, or even a 512K card. If more memory capacity is needed, the quikLoader operating system supports multiple quikLoaders.

INCREASED DISK CAPACITY

Since DOS is loaded from the quikLoader every time the computer is turned on, it is not necessary to take up valuable disk space with DOS. This will give you more than 5% additional space for programs and data on your disks.

ABOUT THE DESIGNER

The quikLoader was designed by Jim Sather, author of UNDERSTANDING THE APPLE][(forward by Steve Wozniak), published by QUALITY SOFTWARE (21601 Marilla Street, Chatsworth, CA 91311 (818) 709-1721).

SYSTEM REQUIREMENTS

The quikLoader plugs into any slot of the APPLE][+ or //e. If used in a][+, a slightly modified 16K memory card is required in slot 0. A disk drive is required to save data.

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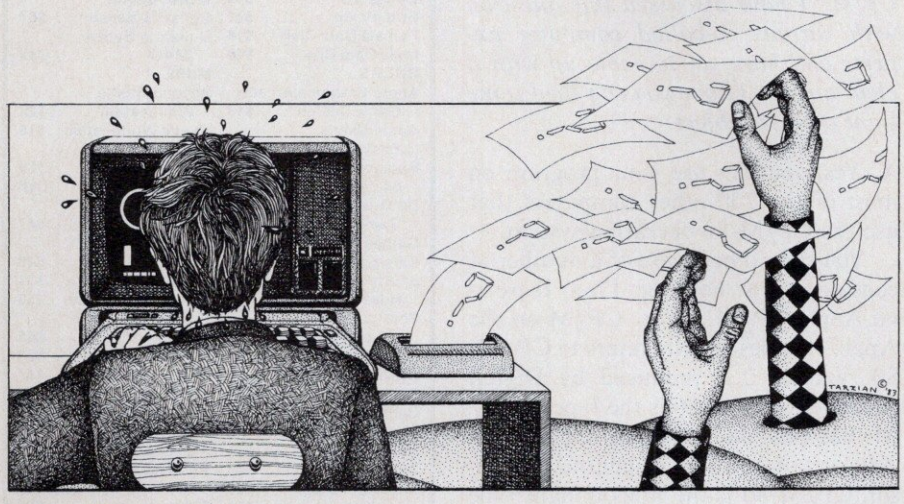
BY FREDERIC E. DAVIS
Questions from our readers



DONNA TARZIAN

▸ UPGRADING YOUR II PLUS

Q. *I would like to upgrade my Apple II Plus computer to have the capabilities of an Apple IIe. The features that are most important to me are the ability to display lowercase characters (the Apple II Plus normally displays only uppercase letters); the ability to use the Shift key to switch between uppercase and lowercase; an 80-column display that works with the previous two features; the potential to expand the RAM to more than 64K; and higher-resolution graphics. What hardware do I need to perform this upgrade?*

A. Steve Wozniak, the designer of the Apple II, has said that he favors a single board that would upgrade an Apple II Plus to the capabilities of an Apple IIe. Unfortunately, Apple Computer, Inc., does not seem to be interested in committing the necessary resources to the project; and to my knowledge, neither Apple nor any other company is planning such a product. Two basic approaches to upgrading your Apple II Plus exist at this time: buy the add-on hardware necessary to give you the capabilities you want, or replace the Apple II Plus system unit (the basic computer without peripheral cards, monitor, drives, and so on) with an Apple IIe.

Because the Apple II series has more add-on hardware available to it than any other type of computer does, you can choose from a huge assortment of hardware items to increase the capabilities of your Apple II Plus.

In order to get lowercase characters, you can buy an inexpensive ROM chip with a lowercase-character set, which you can easily swap with the uppercase-only chip that is standard in the Apple II Plus.

The easiest way to get the Shift key to work is to perform the so-called "Shift-key mod," which entails the use of a small wire to connect pin 24 on the keyboard-encoder board to pin 1 of the socket marked H14 on the computer's motherboard. Many software packages recognize this Shift-key modification, but many do not. Products such as the Videx Keyboard Enhancer combine a variety of related features such as lowercase, Shift-key use, Shift lock, and a keyboard buffer.

You can get an 80-column display by purchasing one of the many available 80-column cards, but certain software will work only with certain types of 80-column cards. Be sure that the card you plan to buy works with the software you want to use it with. Every 80-column card I've seen also has the ability to display lowercase characters, and some cards support the Shift-key mod or provide their own method of utilizing the Shift key.

You can buy RAM-expansion cards for the Apple II Plus that boost RAM up to 512K. Since the Apple's 6502 processor can deal with only 64K of RAM at one time, however, software must make special accommodation for the use of extra RAM. Although these RAM-expansion boards are great for certain applications, they do not work with most software and are usually not compatible with software designed to take advantage of the Apple IIe's RAM expansion.

Your last desire was to obtain better graphics resolution. Expansion boards such as the Number Nine Graphics System Board (see *A+*, August 1984, pages 68–71) offer superb graphics capabilities that far exceed those of the II Plus or the IIe. These expansion boards are compatible only with certain software, however, and will not work with programs intended for use with double hi-res on the Apple IIe.

Clearly, you can upgrade each of the features you mention and actually wind up with a system that is more powerful than an Apple IIe. The bad news is that even if you upgraded each of the features of your II Plus, you would not have a computer that was fully compatible with the IIe. Also, the cost of upgrading all the features could total well over $1000. Since a stripped-down Apple IIe system unit sells for less than $1000, you would be better off buying a new IIe system unit than buying all the individual upgrades.

Buying a new IIe system unit is the only solution that insures full compatibility with the IIe. Also, you will be left with a good II Plus system unit that you could sell to help defray the cost of the IIe system unit. Or you may find a creative application for your old II Plus; after all, it can even be used with a cassette tape recorder instead of a disk drive. Replacing your II Plus system unit with a IIe does not mean that you must replace your entire computer system—the rest of the hardware in your II Plus system (monitor, disk drives, printer, and most cards) should work just fine with the IIe.

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CIRCLE 230 ON READER SERVICE CARD

▶ PRESCRIPTION FOR THE 80'S

Q. I am an optometrist and have recently developed an optometric prescription-writing program in the MBASIC language using the CP/M operating system and the Z80 Softcard from Microsoft. My question is: Can this program run on other computers that use the CP/M operating system, or is the program restricted to Apple CP/M? I have discussed this question with various so-called computer experts and have yet to come up with a clear answer. I hope you can shed some light on this subject.

A. Yes, you can use your program on most of the 700 other computers that use the CP/M-80 operating system.

You should be aware of a number of considerations, however. First, there is no Apple CP/M per se. CP/M on the Apple II series usually refers to CP/M-80, Version 2.2, produced by Digital Research. CP/M-80 is the type of CP/M that runs on computers that have a Z80 or 8080 variety of central processor. CP/M-80 is the predominant type of CP/M in use today.

Further, don't confuse CP/M-86 and Concurrent CP/M-86, which are similar but incompatible operating systems for 16-bit computers. Make sure that the computer you want to run your program on offers CP/M-80, Version 2.2, and has the MBASIC language from Microsoft installed. Certain programs, such as communications and graphics software, require a modification to the host system's BIOS (Basic Input/Output System) as well, but I suspect that your program will run without modification. In fact, several companies now offer a diskette-format-conversion service that can transfer programs from an Apple diskette to a variety of other CP/M diskette formats.

MBASIC is a fairly standard version of BASIC, and you may find that with a little more work your program will work with CP/M-86 or Concurrent CP/M-86 or on non-CP/M computers with other versions of BASIC. For example, MS-BASIC for the Macintosh and IBM PC are other similar BASIC language packages Microsoft offers. Although the other versions of MS-BASIC are not exactly like MBASIC, it is usually easy to modify an MBASIC program to run under MS-BASIC. ✚

Please send your questions and problems to Rescue Squad, A+, 11 Davis Drive, Belmont, CA 94002.

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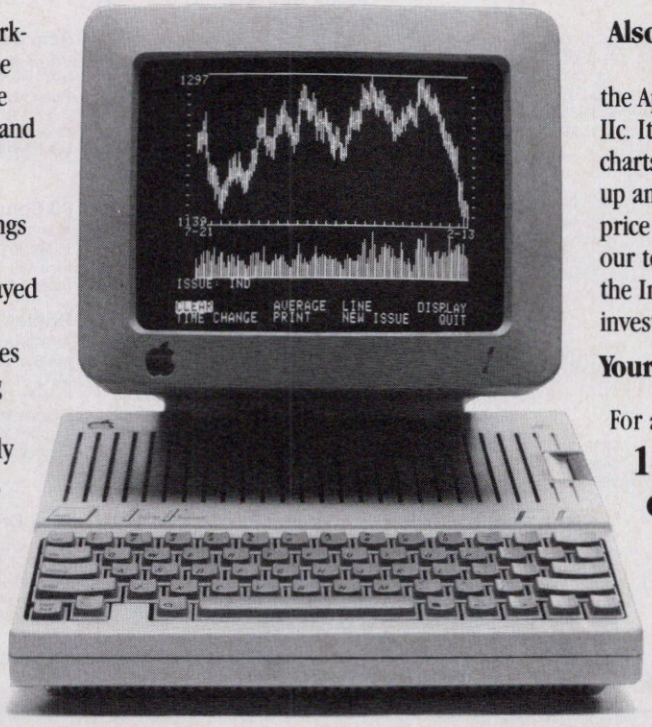

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Kensington System Saver Fan	$ 65.00
Super Cooling Fan w/2 outlets/Surge	$ 35.00
Lemon Surge Protector	$45.00

CPM Cards:

ALS CPM 3.0 Card Version 3.0	$269.00
ALS Zcard II	$120.00
CPM Card (Taiwan) Same as ZCard II	$ 79.00
Microsoft Softcard	$225.00

Ram Cards:

Microsoft 16k Ram Card	$ 65.00
MPC 16k Ram Card	$ 55.00
Titam 128k Ram Card	$350.00
Titan 128k + 80 Col (IIe)	$285.00
Titan 192k + 80 Col (IIe)	$365.00
4164 200ns Rams	$ 5.25

80 Column Cards

ALS Smarterm II	$129.00
Videx 80 Column Card	$179.00
Videx 80 Column Card w/Inver/SoftSW	$209.00
Videx Ultraterm (160col. Card)	$239.00

Printer/Serial Cards:

ALS Dispatcher Serial Card	$ 89.00
MA Systems Omnigraph (Same as Grappler)	$ 79.00
MPC Parallel Printer Card/Cable	$ 55.00
Orange Micro Grappler Plus	$110.00
Orange Micro Buffered Grappler Plus	$175.00
Tymac Connection Commodore to Printer	$ 99.00
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Disk Drives:

Apple Brand Disk Controller Card	$ 55.00
Rana Elite I Disk Drive	$245.00
Shugart 40trk Disk Drive	$189.00
Tandon 40trk SS/DD TM-100-1 Disk Drive	$ 99.00
Tandon 40trk DS/DD TM-100-2 Disk Drives	$210.00

Elephant Products:

Disk Type	1-9 Boxes	10-19 Boxes	20+ Boxes
EMS SS/SD	15.95	$15.25	Call
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PRODUCT NEWS

HARDWARE

Electronic Compact NP

Olympia's Electronic Compact NP is a low-cost, high-speed, dot-matrix printer that features a parallel Centronics-compatible interface. An optional RS-232C serial interface is also available. The printer offers bidirectional, logic printing in its Text mode and unidirectional printing in its Bit Image mode. Its nine-pin printhead can print a full 96-character ASCII set with descenders and seven international character sets. In addition, the printer has a print buffer of 2000 characters and built-in tractor feed, and it can accommodate fanfold or continuous paper up to ten inches wide. *(List Price: $499)*

Olympia USA, Inc.
P.O. Box 22
Somerville, NJ 08876-0022
(201) 722-7000

CIRCLE 900 ON READER SERVICE CARD

Olympia's Electronic Compact NP is a low-cost dot-matrix printer.

Insta-DOS Card

A new add-on product for Apple computers is the Insta-DOS plug-in card, which can load a DOS 3.3-compatible image into computer memory. Disk drives are unnecessary, although you can select them to auto-boot if you wish. *(List Price: $49.95)*

Requires: Apple II, II Plus, or IIe

Horizon
Computer Products Department P
440 Colfax
P.O. Box 454
Palatine, IL 60078-0454
(312) 991-3434

CIRCLE 901 ON READER SERVICE CARD

Alphacom Printers

The Alphacom Traveler, a lightweight, 80-column, portable printer, uses advanced thermal technology to print at a speed of 60 characters per second. The Traveler produces 8 × 10 dot-matrix print with true descenders and 640 dots/line bit-mapped graphics. It also recognizes standard ASCII control codes.

The printer comes with rechargeable batteries that enable it to print 100 pages of text and a separate 110 VAC adapter/recharger that users can plug into a wall outlet for continuous operation. Users can link most popular computers to the printer by plugging the appropriate interface cable into the Traveler's cartridgelike slot.

Alphacom has also introduced a compact letter-quality, daisy-wheel printer, the Alphapro. This 18-character-per-second printer uses standard Diablo- and Qume-compatible print wheels and ribbon cartridges, and its intelligent cable interface adapts it to RS-232 and RS-422 and Centronics ports. The Alphapro features path-seeking logic to maximize printing speed, a 93-byte buffer (or optional 4000 bytes), true proportional spacing, double-strike, boldface, strikeout, phantom space, superscripts and subscripts, and reverse line feeds. Operator controls include line feed, test, set top of form, hammer intensity, reset, pause, and form feed. LED lamps indicate power-on and out-of-ribbon conditions. Alphapro's price includes a ribbon cartridge, print wheel, and power adapter. *(List Price: Traveler, $199.95; Alphapro, $399.95; interface cables, $49.95 each)*

Requires: Apple II, II Plus, or IIe with RS-232 serial card; Apple IIc

Alphacom, Inc.
2323 South Bascom Avenue
Campbell, CA 95008
(408) 559-8000

CIRCLE 902 ON READER SERVICE CARD

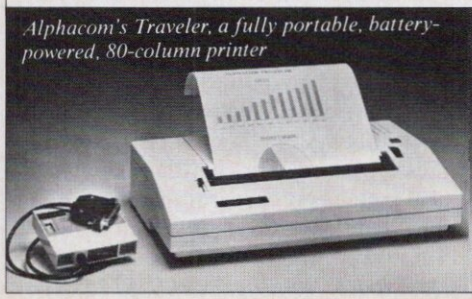
SPC-1-IIc Interface

The SPC-1-IIc is a parallel interface for the Apple IIc that allows its serial interface to connect to printers that have a Centronics parallel interface. The interface comes in a color-coordinated plastic enclosure and is accompanied by all necessary cables and a manual. *(List Price: $89.95)*

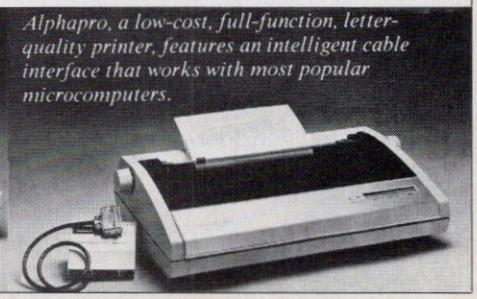
Requires: Apple IIc

Processor Hardware
A Division of Hartman
Electronics Corporation
8016 Remmet Avenue
Canoga Park, cA 91303
(818) 340-8097

CIRCLE 903 ON READER SERVICE CARD



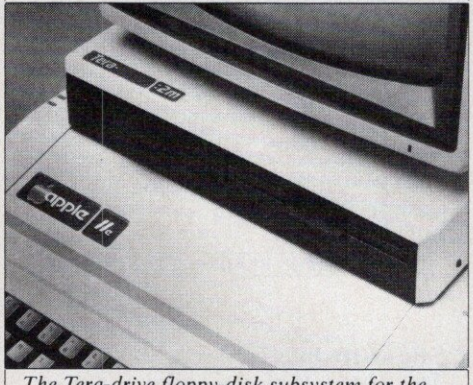
Alphacom's Traveler, a fully portable, battery-powered, 80-column printer



Alphapro, a low-cost, full-function, letter-quality printer, features an intelligent cable interface that works with most popular microcomputers.

PRODUCT NEWS

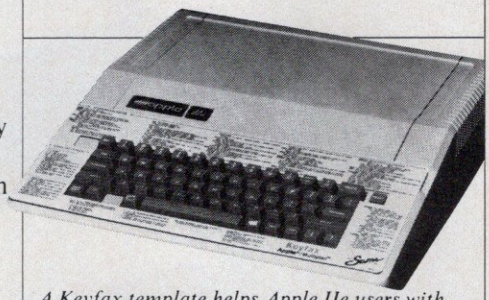
Okidata Microline 92 and 93 Printers
The ML 92 and 93 dot-matrix Apple-compatible printers emulate Apple's Imagewriter, enabling users of the Macintosh and Lisa to reproduce the images that appear on the screen. They also provide correspondence-quality printing for the Apple IIe and II Plus in the word-processing mode. *(List Price: Microline 92, $599; Microline 93, $899)*
Requires: Apple II Plus, IIe, Lisa, or Macintosh
Okidata
532 Fellowship Road
Mt. Laurel, NJ 08054
(609) 235-2600
CIRCLE 904 ON READER SERVICE CARD



The Tera-drive floppy-disk subsystem for the Apple IIe

Tera-drive
The Tera-drive is a high-performance, high-capacity 5¼-inch floppy-disk subsystem for the Apple IIe and II Plus. The drive has a data-transfer rate of 62.5K/second and uses cobalt-coated high-density floppy disks that offer more than 2 megabytes of usable file space on dual 3.2-megabyte unformatted slim-line drives. With the Tera-drive, users get Eicon's enhanced operating system that supports UCSD Pascal, CP/M, and DOS 3.3. The enhanced operating system also contains several utility functions—TERAFORMAT, TERACOPY, and PINIT. *(List Price: 1-megabyte drive, $995; 2-megabyte dual drive, $1595)*
Requires: Apple II Plus or IIe
Eicon Research, Inc.
520 Fifth Avenue PH
New York, NY 10036
(212) 719-5353
CIRCLE 905 ON READER SERVICE CARD

HARDWARE ACCESSORIES



A Keyfax template helps Apple IIe users with Multiplan spreadsheet commands.

Keyfax
A two-sided template that fits around a microcomptuer keyboard, Keyfax enables users to easily access reference data about control commands and other vocabulary they need for working with word processors, spreadsheets, DOS, and BASIC. Side 1 of the template displays all operating commands for many software packages, and side 2 provides major commands for DOS 3.3. Templates currently available for Apple computers include Applesoft BASIC (both sides), Apple Writer IIe/DOS 3.3, Multiplan/DOS 3.3, ProDOS (both sides), and VisiCalc/DOS 3.3. *(List Price: $12.95 each)*
Howard W. Sams & Co., Inc.
4300 West 62nd Street
Indianapolis, IN 46268
(317) 298-5400
CIRCLE 906 ON READER SERVICE CARD

HARDWARE/SOFTWARE

SynPhonix 100
A speech-synthesizer board that features the SSI263 phoneme synthesizer, SynPhonix 100 plugs into slots 1–7 on an Apple II computer. The SynPhonix package allows users to easily generate speech and sound effects and incorporate them into their own software by using standard BASIC statements. The board contains an audio amplifier, volume control, and an external speaker jack. SONIX-65, an easy-to-use speech operating system on diskette, accompanies the board. The SynPhonix package also includes preprogrammed vocabulary, demonstration software, a Spelling Tutor program, and a users' manual. *(List Price: SynPhonix 100, $125; SynPhonix 100+, $135)*
Requires: Apple II or IIe, 48K RAM
Artic Technologies
2234 Star Court
Auburn Heights, MI 48057
(313) 852-8344
CIRCLE 907 ON READER SERVICE CARD

Science Software and Biosensor
A new series of science simulation software and a biofeedback program are now available from HesWare. The science software comprises Project: Space Station, which simulates the construction and operation of a space station; Cell Defense, in which you must prevent the spread of a virus through the body; Life Force, in which you manage cell division and growth; and Reflections, which teaches the physics of light refraction. Calmpute, the biofeedback program, measures your stress level and suggests exercises to reduce tension. It comes with a biosensor, which plugs into your computer's joystick port. *(List Price: $34.95 each; Calmpute with biosensor, $79)*
Requires: Apple II, II Plus, IIe, or IIc
Human Engineered Software
150 North Hill Drive
Brisbane, CA 94005
(415) 468-4111
CIRCLE 908 ON READER SERVICE CARD

InfoPHONE Model IPX-1200
InfoPHONE Model IPX-1200 is an external modem that works with any Apple II series computer using a serial RS-232 interface. It offers 300/1200-bps transmission rate, full duplex, auto-dial, auto-answer, automatic voice/data switching, Hayes compatible commands, pulse- and touch-tone dialing, call monitoring, and a speaker. InfoPHONE Model IPX-1200 is packaged with communications software and more than $400 worth of free offers from popular information services. *(List Price: $445)*
Requires: Apple II, II Plus, IIe, or IIc; 48K RAM; one disk drive; serial card
Transend Corporation
2190 Paragon Drive
San Jose, CA 95131
(408) 946-7400
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Requires: Apple II, II Plus, or IIe
COMMSOFT
2452 Embarcadero Way
Palo Alto, CA 94303
(415) 493-2184
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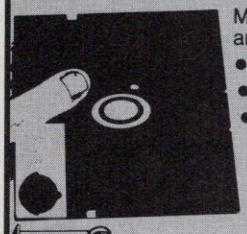

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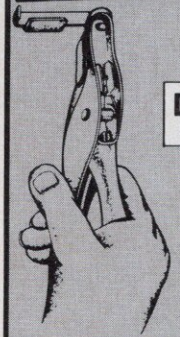

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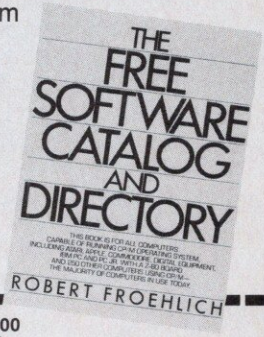

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CIRCLE 283 ON READER SERVICE CARD

PRODUCT NEWS

ble system gathers data from eight temperature sensors for analysis, experimentation, data retention, and temperature control. The system's easy-to-use turnkey software allows you to program seven parameters for each sensor: sensor location, maximum and minimum temperatures, delay time, and three parameters that program the control ports. The system is easy to install and comes with a comprehensive users' manual. *(List Price: $495)*
Requires: Apple II, II Plus, IIe, or IIc; 64K RAM; RS-232C serial interface; 80-character card
Temptron Systems
1595 West Amador, Suite F
P.O. Box 16008
Las Cruces, NM 88005
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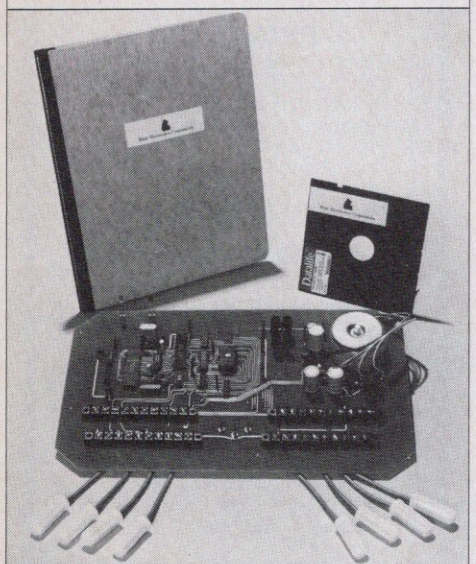

The SABRE Temperature Monitoring and Management System gathers data from eight temperature sensors.

SOFTWARE

The Librarian List

A powerful database system for libraries, The Librarian List consists of nine programs that enable users to enter, delete, change, sort, search, and print information concerning collection, loan, and staff of a library. Users of the system can produce reports in a variety of formats at the touch of a key. The nine programs comprise Book/Loans Catalog, Journal Catalog, Want Lists, Staff, Staff Schedules, Text Editor, Mail List, File Transfer, and Data Base. *(List Price: $150)*
Requires: Apple II or II Plus, 48K RAM, one disk drive, language card (Apple II only)
Andent, Inc.
1000 North Avenue
Waukegan, IL 60085
(312) 223-5077
CIRCLE 912 ON READER SERVICE CARD

The Dental Billing System

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Requires: Apple II Plus or IIe, 48K RAM, DOS 3.3, two disk drives
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P.O. Box 329
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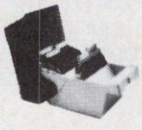

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PRODUCT NEWS

Sensible Speller for ProDOS

The Sensible Speller proofreading program is now available in a new version that works with many word-processing programs and integrated-software systems that run under Apple's ProDOS operating system. Features of the program include an 80,000-word dictionary, display of misspelled words in context, correct-spelling suggestions, and correction of misspelled words.

In addition, Sensible Software has improved its original Sensible Speller IV program so that it can now proofread PFS:Write files. *(List Price: $125, both programs)*

Requires: Apple II, II Plus, IIe, or IIc; ProDOS; Disk II floppy-disk drive or ProFile hard-disk drive

Sensible Software, Inc.
24011 Seneca
Oak Park, MI 48237
(313) 399-8877

CIRCLE 915 ON READER SERVICE CARD

Memory Minder

A self-indexing query system in this home-fact organizer manages any size database, from birthdays and hobbies to sports records dating back many years. By responding to simple English queries, users instantly access information stored in the database. Memory Minder automatically cross-indexes information, is expandable at any time, and uses no predefined formats. *(List Price: $44.95)*

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

Human Engineered Software
150 North Hill Drive
Brisbane, CA 94005
(415) 468-4111

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The Easy Checkwriter

This program is designed to handle all checkbook functions, maintain a current balance, and print checks on tractor-feed check forms. You can expense each check you enter into the system to up to ten categories, and you can print a report by category that reflects month-to-date and year-to-date balances for each category at any time. The program can handle 250 categories and 75 estab-

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"How to Operate the Apple IIe Using ProDOS" is the title of an interactive self-paced tutorial that is designed to teach "hands-on" computer operation. Two two-voice audio cassettes help users master the keyboard, essential system utilities, and BASIC commands. The tutorial operates on any standard cassette player and comes in a vinyl album with a fully indexed quick-reference guide. *(List Price: $39.95)*
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B.R. Cursor
The San Francisco Independent
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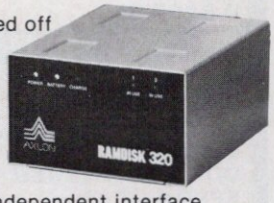

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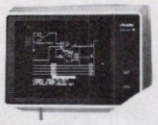

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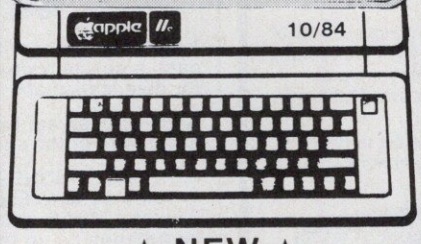

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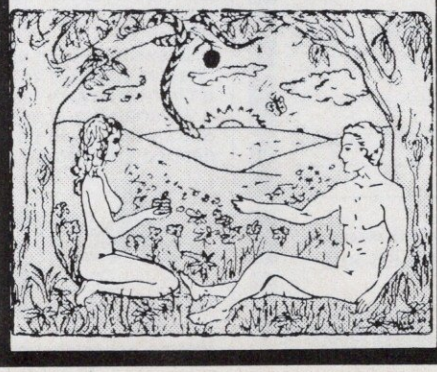

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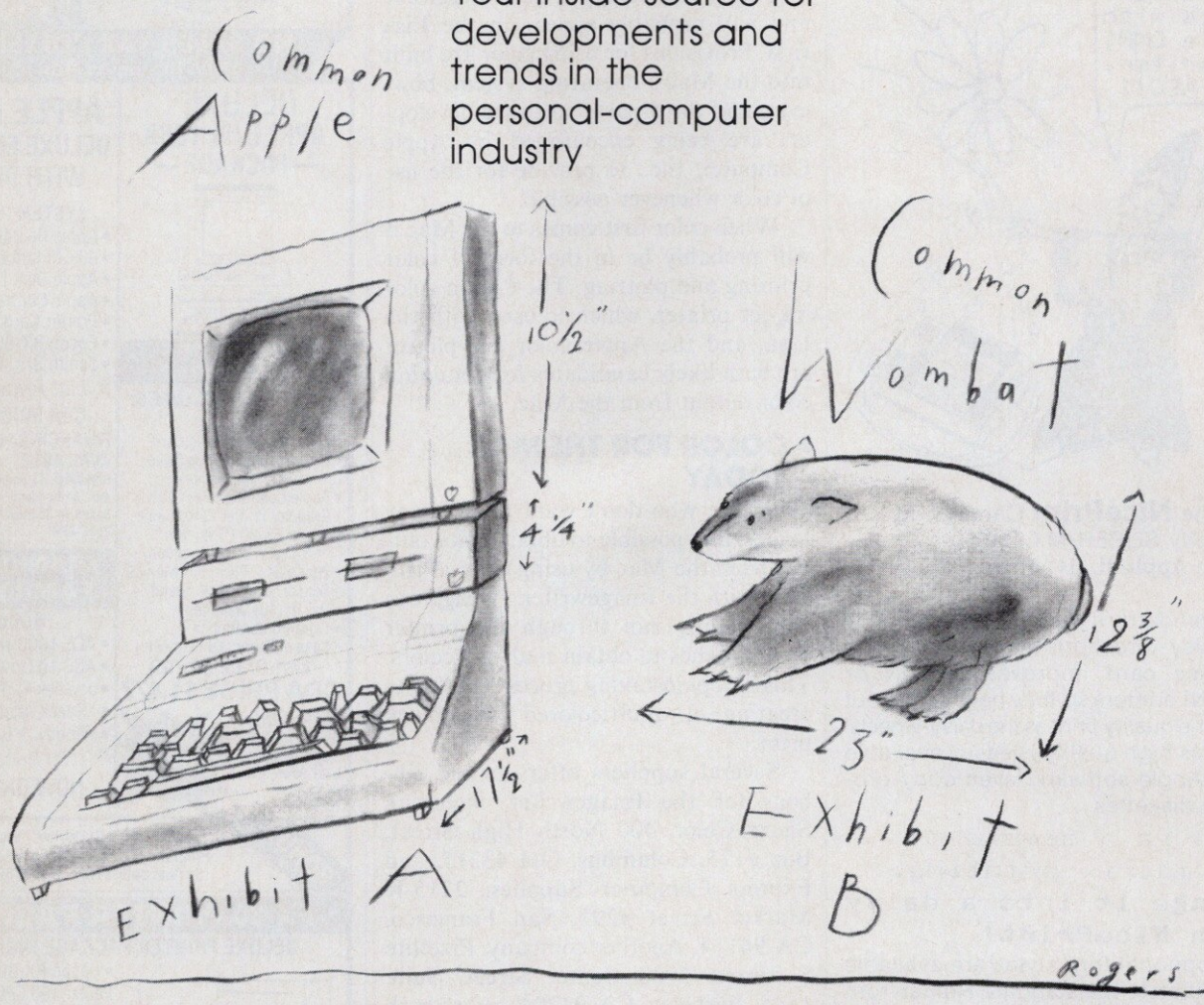

APPLE WINS DOWN UNDER

Apple Computer has won a major victory in its battle against Computer Edge's Wombat computer, an Apple clone that ripped off the software contained in the Apple II's ROM chips. The Wombat was made in Taiwan and sold in Australia for a low price—but a big profit. Previously, an Australian judge named Beaumont had held the door open for the Wombat by ruling that Apple was not entitled to copyright protection on the information contained in its ROM chips. Judge Beaumont decided that ROM chips were not a "literary work" as defined by the 1968 Australian copyright law.

Apple appealed that decision, however, and the Australian Federal Court recently decided that a literary work did not have to possess a particular literary quality in order to receive copyright protection. According to a justice who ruled on the case, "It is accepted that the term *literary work* includes mathematical tables, codes, and in general, alphanumerical codes . . . the object codes contained in the Apple ROMs are a straightforward electronic translation into a material form of the source codes . . ."

The justices overturned the previous decision since they felt that Apple was entitled to copyright protection under the current law. This case received enough publicity in Australia to get the government to sit up and take notice. The Australian government now plans to strengthen the existing copyright laws by amending them to include interim protection for computer software. After Australia and other countries agree on the best legal methods for protecting software, a new section covering computers will be permanently appended to the Australian Commonwealth Copyright Act.

▸ 512K MAC ARRIVES EARLY

Apple Computer announced an expanded-memory version of the Macintosh on September 10, four months earlier than the January 1985 date the company had originally aimed for. The new Macintosh, which has 512K RAM, has been dubbed "fat Mac" by industry observers to differentiate it from the original 128K version. The price of the 512K Mac is $3195, the price of the 128K Mac will drop to $2195 from $2495, and a kit to upgrade a 128K Mac to 512K will cost $995. To mollify current Mac owners upset about the steep upgrade price, Apple will throw in a copy of MacProject and MacDraw with the upgrade if you bought your Mac before September 10.

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▸ COLOR FOR THE MAC TOMORROW

It looks as though the Macintosh with a color screen is still a few months away. The color technology is quite expensive and will probably appear in the Lisa first. Provisions for using color are built into the Mac's operating system, however, and third-party software developers are being encouraged by Apple Computer, Inc., to provide for the use of color whenever possible.

When color first comes to the Mac it will probably be in the form of color printing and plotting. The Canon color ink-jet printer, which is used with the Lisa, and the Apple color pen-plotter are both likely candidates for obtaining color output from the Mac.

▸ COLOR FOR THE MAC TODAY

For those who don't want to wait any longer, it is possible to obtain color output from the Mac by using colored ribbons with the Imagewriter. A page can be carefully run through the printer several times to obtain multiple colors. This is a painstaking process similar to creating a multicolored woodblock print.

Several suppliers offer colored ribbons for the Imagewriter, including Sharp Color, 400 North High Street, Box #175, Columbus, OH 43215; and Express Computer Supplies, 2215-R Market Street #292, San Francisco, CA 94114. Another company, Pixellite Software, 2000 Center Street, Suite 1345, Berkeley, CA 94704, offers both colored ribbons and colored paper for a variety of printers that work with the Macintosh and Apple II.

▸ TYPESET-QUALITY GRAPHICS

We've already mentioned in *A+* that George Lithograph can reproduce MacPaint documents on a typesetting machine. Now other companies are getting involved with graphics services for Macintosh users. ReadySetGo is a professional typesetting service that converts Mac text into typeset text. The service is offered by Manhattan Graphics, 163 Varick Street, New York, NY 10013.

ImageSet is a more innovative image-processing company that offers typesetting as well as typeset-quality screen dumps and graphics output from a variety of Macintosh software, including MacPaint, MacDraw, MacProject (which can print huge projects on large single sheets), and Telos's Filevision.

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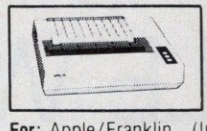

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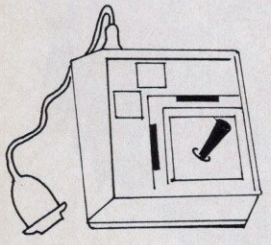

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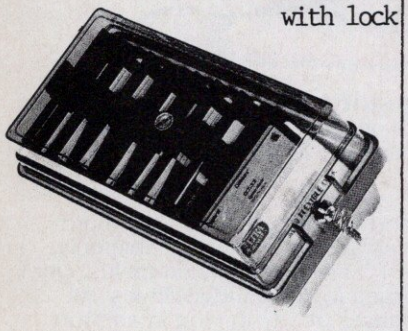

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▸ INSTANT DEMO DISKS

Forethought, of Mountain View, California, has an interesting copy-protection scheme for its Fact Finder free-form data-management program that runs on the Macintosh computer. Making a copy of your master Fact Finder diskette results in the creation of a demo diskette. The company encourages you to make copies of the program to give out to your friends and associates; all you'll be giving them is a demo version of the program. Forethought hopes that this novel method of distributing demonstration copies of its program will be an effective marketing tool by giving a lot of people an easy way to try out Fact Finder.

▸ MORE MAC NEWSLETTERS

Semaphore Signal is a free monthly newsletter for users of the Macintosh and Lisa computers. In order to start your free subscription, send the serial number from your computer to Semaphore Signal, 207 Granada Drive, Aptos, CA 95003. *Iconcepts*, P.O. Box 1936, Athens, TX 75751, a monthly newsletter about the Macintosh, is available for $18 a year. To round out your selection of monthly newsletters, *MacLine*, $24 a year, is available from the well-informed folks at MacLine, Inc., 218 Leland Avenue, Menlo Park, CA 94025. Remember to tell all these folks that *A+* sent you.

▸ APPLE II MICE ARE SCARCE

The AppleMouse for the IIe and IIc have been in short supply. Even here at *A+* we're having trouble getting our hands on an Apple IIc mouse. The situation is so bad that Monogram Software and Brøderbund Software have decided to abandon the AppleMouse in favor of a mouse developed by Mouse Systems of Santa Clara, California, for use in a special promotion they are planning. The promotion is a bundling of Monogram's Dollars & Sense and Brøderbund's Bank Street Writer with the Mouse Systems mouse for the suggested retail price of $239.95.

▸ LAST-MINUTE SCOOP

Don Williams has left Apple Computer to join Rupert Lissner (author of Quick File, III E-Z Pieces, and AppleWorks) to rewrite and market AppleWorks for the Macintosh. They plan to ship the new product in December. ✚

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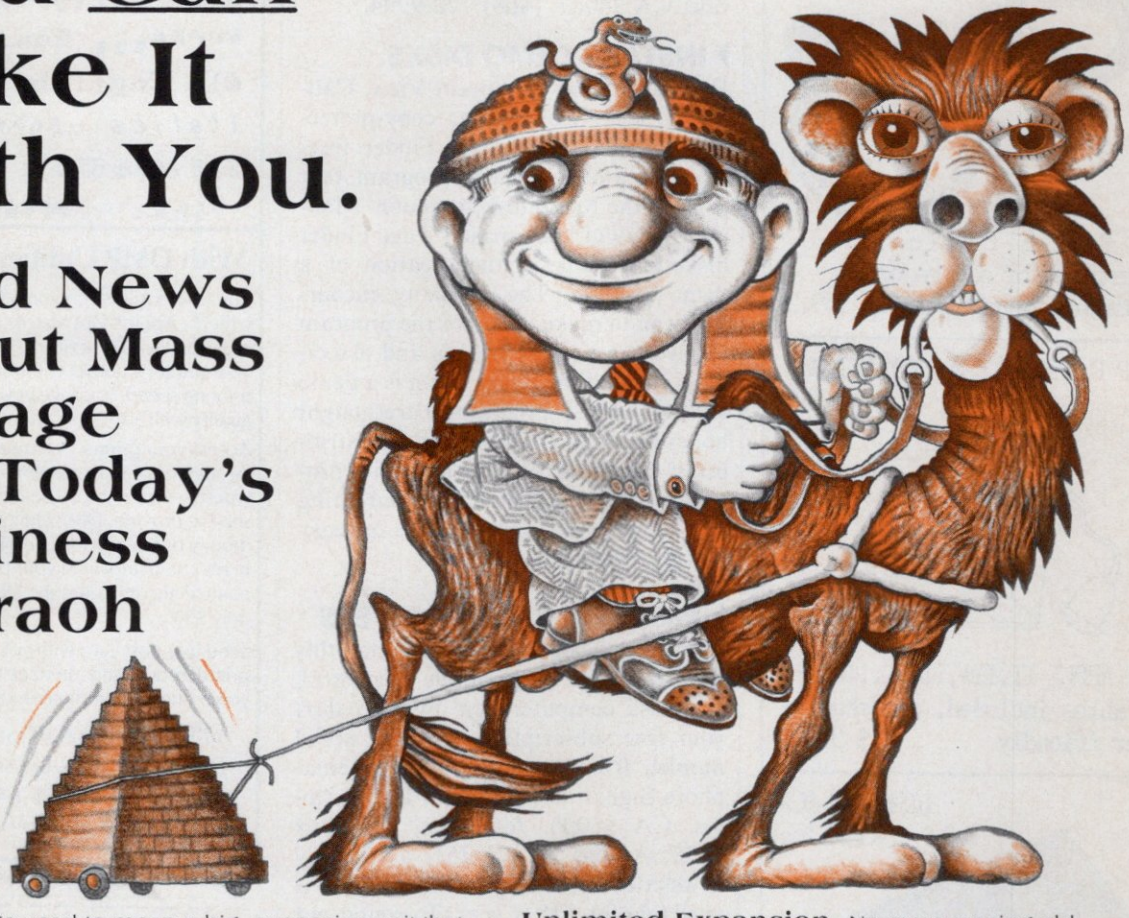

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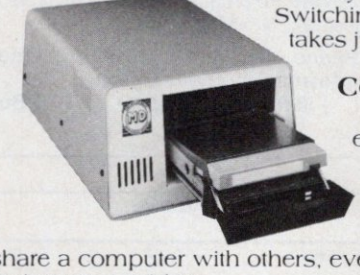

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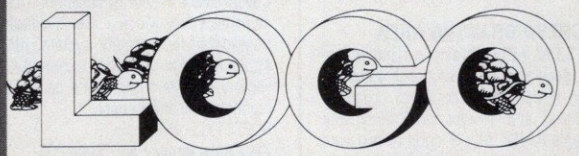

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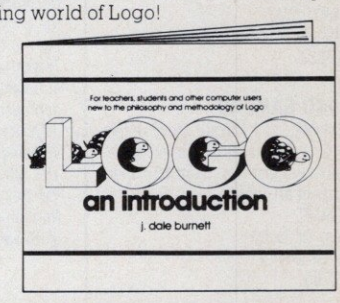

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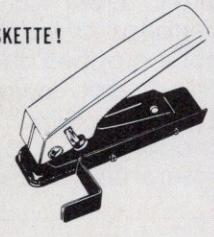

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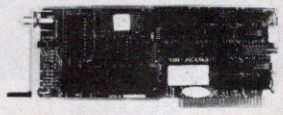

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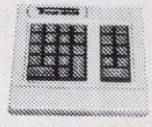

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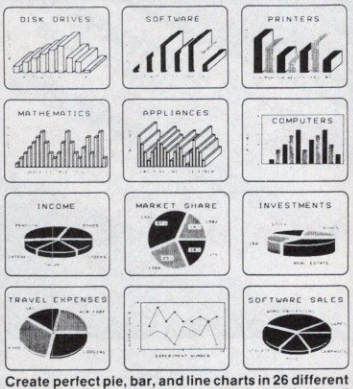

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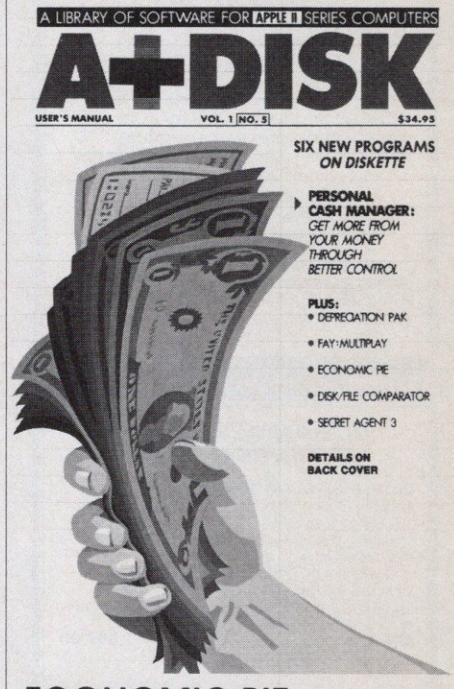

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INDEX TO ADVERTISERS

READER SERVICE NO.	ADVERTISERS	PAGE
172	Action Research Northwest	75
*	ALF Products	53
203	Almaly Trading Corp.	164
259	Alpha Logic Business Systems	96
244	American Eagle Software	49
351	Ampex Corporation	14-15
*	Applied Engineering	73
*	Applied Engineering	171
388	Artic Technologies, Inc.	164
212	Assimilation Process	154-155
342	AxLon	134
178	AxLon	211
202	Bank of America	74
141	BASF	4
295	BASF	132
156	Baudville	41
249	Beagle Brothers	47
380	BHT Group	77
162	Bible Research Systems	55
232	BK Enterprises	120
160	Black Sun	150
112	Blue Chip Software	203
179	Boston Tele Computer	136
392	Broderbund Software	52
*	Business Comp. of Peterborough	57
306	The Byte General	200
116	Bytes & Pieces	93
235	Calc Shop, Inc.	215
149	Caribbean Computer Sales, Inc.	58
292	CDA Computer Sales	214
184	Central Points Software	48
128	Checkmate Technologies	183
221	Citizen America	162-163
311	Compuserve	21
220	The Computer Colorworks	180
163	Computer Cover Co.	128
290	Computer Discount Products	204
129	Conroy-Lapointe/Computer Exchange	54
233	Core Concepts	210
237	Cortran International	205
367	Covers By Babette	209
111	CPU, Inc.	40
199	Creative Software	160
139	Creative Solutions	126
146	Creighton Development	131
234	Creighton Development	157
236	Crown Publishers	205
228	Custom Computer Products	209
125	Datasoft	179
310	Datasoft	181
138	Davong Systems	121
355	Decillionix	174
102	Dennison Computer Supplies	C-4
110	Disk World, Inc.	20
108	Disk World, Inc.	208
144	Doss Industries	174
109	Dow Jones Software	149
107	Dow Jones Software	151
153	Dow Jones Software	153
225	Dow Jones Software	199
370	Earthware Computer Services	18
350	Electronic Arts	45
170	Enhancement Technology Corporation	1
278	ExperTelligence	108
126	Forethought, Inc.	110-111
315	Formula International	195
154	Funk Software	99
265	Garden of Eden	212
*	Gourmet Software	187
338	Haba Systems	127
216	Hanzon	146
101	Harper & Row Software	37
195	Harper & Row Software	62
349	Harvard Associates	120
367	Hayden Software	32-33
104	Hayden Software	89
119	Hayden Software	165
*	H & E Computronics	C-2
396	Hippopotamus Software	122
117	Industrial Computations	156
193	InForcom	159
150	Intermatrix	142-143
356	Iomega Corporation	125
143	Kensington Microware	84
277	Kensington Microware	C-3
143	Kensington Microware	113
301	Koala Technologies	78
288	Legend Industries, Ltd.	224
192	Longwood Computing	208
230	McCarron Dial Systems	198
272	Megahaus Corporation	34
242	Megamax	192
158	Mercury MegaBank	91
140	Microcom, Inc.	139
132	Micro Design	216
275	Microsci	166
320	Microsoft	82
*	Microsoft	117
319	Microsoft	118-119
167	Microsoft Press	190
*	MicroVision, Inc.	10
*	MicroVision, Inc.	177
171	Nocturnal Software	187
124	Nonagon Software	16
330	Northeastern Software	182
161	OHM/Electronics	109
173	OHM/Electronics	189
240	Okidata Corporation	22
352	One Step Software	56
252	Orange Micro	170
145	Origin Systems	144
360	Organizational Software Corp.	145
115	Pace Systems	92
231	Palantir Software	123
200	Patton & Patton Sft. Design Dev.	80
335	PBI Software	133
371	PBI Software	148
376	PC Network	106-107
359	Penguin Products	140
113	Penguin Software	8
255	Penguin Software	152
152	Polaroid	68-69
229	Precision Data Products	176
103	Prentice Hall	24-25
148	Professional Software	42
146	Professor Jones	186
122	Prometheus Products	172
299	Program Plus	158
166	Pro/Pac	186
175	Protecto Enterprizes	26
127	Protecto Enterprizes	27
300	Pryority Software, Inc.	124
309	Quark, Inc.	191
*	Quorum International Unlimited	192
131	Rio Grande Software	129
*	Round Lake Studios	176
159	Rune Enterprises	188
246	S. California Research Group	196
399	Sensible Software	72
147	SGC	184
168	Silicon Express	63
260	Sir Tech	168
164	Softronics	85
334	Software Arts	112
151	Software Arts	76
155	Software Discounters of America	198
*	Software Publishing Corp.	39
238	Spies Laboratories	214
296	Street Electronics	5
187	Street Electronics	93
182	Street Electronics	167
374	Sunol Systems	130
391	Superex	140
394	Superex	122
205	Tecmar, Inc.	100
353	Telemax	98
283	Texprint	206
289	3M Recording Products	6
227	Thuderware	31
223	Timetronic Corp.	215
106	Tronix/Monogram	94
169	Uptown	194
190	Utilico Software	83
142	Videx, Inc.	105
214	Vilberg Brothers Computing, Inc.	215
294	Villa Press	207
136	Vufax	146
165	Winslow Sales	175
383	Woodbury Software	19
195	Zoom Telephonics	60

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Lisa	E	M
Macintosh	F	N
Other (specify)	G	O
None	H	P

3 For what, if any, business application(s) do you use the microcomputer you currently own?_____

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	1 Own	2 Plan to Buy
Apple II	A	I
Apple IIc	B	J
Apple IIe	C	K
Apple III	D	L
Lisa	E	M
Macintosh	F	N
Other (specify)	G	O
None	H	P

3 For what, if any, business application(s) do you use the microcomputer you currently own?_____

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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**
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SANDY™	**18**

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

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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.

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