

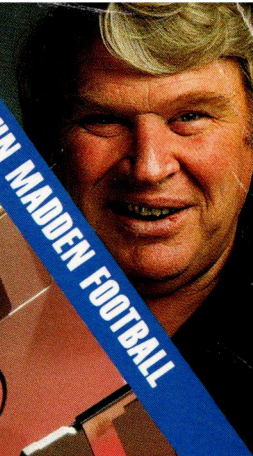


MAY 1989

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JOHN MADDEN FOOTBALL



The #1 Apple II Magazine

# HOLD EVERYTHING

Hard Disk Speed For Everyone

## HOMEBREW HARD DRIVE

Save Money, Build Your Own

## APPLE'S NEW VIDEO CARD

Desktop Video Breakthrough

## FIRST LOOK: EDUCATION

Geometry  
World GeoGraph



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BY WALTER S. MOSSBERG

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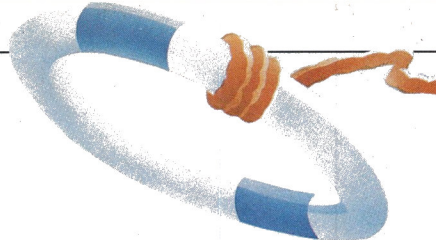
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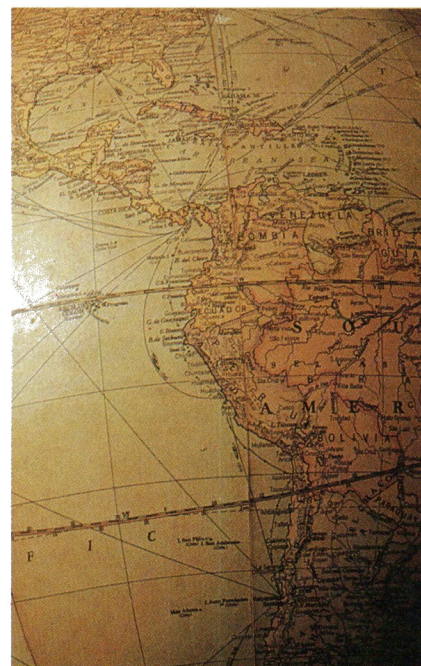
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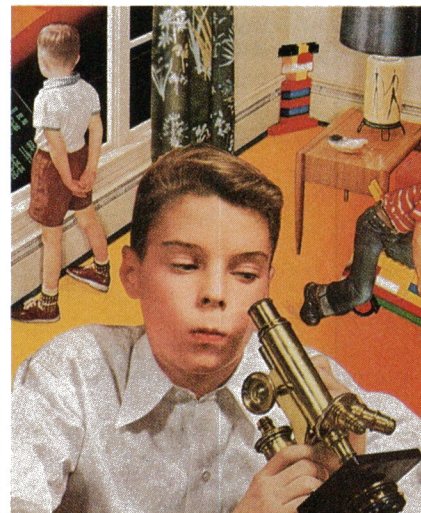
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# DISK ACCELERATOR

## THE MULTI-KACHE CARD



If you're using an Apple computer, saving time is more than a priority...it's a necessity. Speed is critical, and nothing irritates you more than waiting for your disk drives to play catch-up.

OKS has come up with a solution. The Multi-Kache Card. An intelligent multi-disk controller so fast...so powerful...so efficient...it will unleash performance you didn't even know you owned.

Let the facts speak for themselves:

1. The Multi-Kache Card is the fastest disk controller available for Apple computers!
2. The Multi-Kache Card is twice as fast as a ramdisk—and safer!
3. The Multi-Kache Card is up to 40 times faster than other controller cards!
4. With our 30-day trial period you can experience the Multi-Kache Card for yourself with no risks!

The OKS Multi-Kache Card is a multi-disk controller with real hardware cache. With the combined features of a disk controller and real cache memory, the Multi-Kache Card boosts throughput of your data to and from your computer.

The Multi-Kache Card performs without taking up any system memory.

Applications which access your disk drives frequently, such as a large data base will demonstrate dramatic speed improvements. And the Multi-Kache Card's real cache memory can extend the life of your drives.

The Multi-Kache Card controls both 3.5 and 5.25 drives and runs at 8MHz.

Check these features:

- The Multi-Kache Card can read an entire 3.5 disk from cache in 3.5 seconds
- can run the ProDOS 16 Launcher from cache in under 15 seconds
- will control up to 8 assorted disk drives
- can daisy-chain disk drives
- can reduce or eliminate slot congestion
- is compatible with all accelerators currently on the market
- is a SMARTPORT device that is 100% compatible with ProDOS 8/16, and GS/OS
- is compatible with Apple II+, IIe, and IIGS

The OKS Multi-Kache Card comes standard with 256K of cache memory and can be upgraded to a full 1 meg.

The Multi-Kache Card can control any combination of the following types of disk drives:

- The Apple Unidisk 3.5 Disk Drive
- The Apple GS 3.5 Disk Drive
- The Apple 5.25 Duodisk
- The older 5.25 Disk II Disk Drive
- The Apple 20SC SCSI Hard Disk Drive
- The Apple 5.25 Drive

For more information call us toll free at

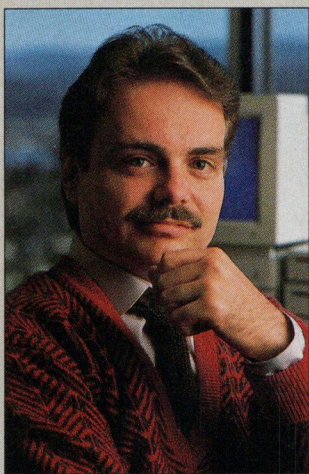
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## EIGHT BITS ARE PLENTY

The dull and boring division. Reportedly, that's what Apple cofounder Steve Jobs once called the Apple IIe development team.

For several years, the Apple IIe/c and, now, the Apple IIc Plus have lingered in the shadow of the Macintosh. The Macintosh was the cutting edge in 16/32-bit computer technology. The 8-bit Apple II was a computer that people loved, used, and bought. While the Mac brought in the prestige, the Apple II

family brought in the bucks. Still, the II was a second-class citizen at Apple.

With the introduction of the IIGs in late 1986, the 8-bit Apple II found a

competitor within its ranks. With advanced sound and graphics and a more powerful 8/16-bit processor, the IIGs gave exciting new potential and exciting news potential to the Apple II. Although the IIGs represents less than 10% of all Apple II computers, it generates a disproportionate amount of Apple II news. The outcome is that the IIGs gets the lion's share of press.

These points aren't lost on 8-bit Apple II owners, who often write *A+* to express reservations about the future of their computers. Apple IIe/c/c+ owners, however, should take heart and look at all their computers can do.

In Claris' AppleWorks, owners of Apple 8-bit computers have one of the most popular and productive programs of all time. The Apple IIe remains the standard in educational computing. And the Apple IIe/c/c+ boasts one of the largest and most varied libraries of commercial, public-domain, and shareware software in existence. But what about the future?

The IIGs may have the newsmaking

proWess, but the computer industry is not forsaking Apple's 8-bit computers. Nor is *A+* going to slight the majority of Apple II users. The Apple II 8-bit technology is still making news, a fact that's evident in this month's issue.

In "NewsPlus," you'll find a first look at Apple's newest peripheral: the Apple II Video Overlay Card. This exciting add-on board makes desktop video a reality for Apple II computers—and it does it equally well for the IIe and the IIGs.

In this month's hard-disk-drive roundup, you'll find a review of Chino's CT-20c, a newly designed hard-

disk drive created specifically for the IIc and IIc Plus.

**Apple IIe/c/  
c+ owners  
should take  
heart and  
look at  
all their  
computers  
can do.**

Finally, in the "GamePort" column we have an exclusive interview with the designer/programmers of Electronic Arts' John Madden Football, a masterful achievement in sports simulation that may well be the

most complex program ever created for an Apple II computer. And it runs superbly in a plain-vanilla Apple II with 64K RAM and one 5¼-inch disk drive.

True, the Apple II 8-bit technology is in the autumn of its life. The enhanced sound, graphics, and interface of the IIGs are the future of the Apple II line. That does not mean, however, that a secret time-release ROM will automatically make all 8-bit IIGs self-destruct someday. With its outstanding software and multimillion-person user base, the Apple II 8-bit computers will be an asset to users for some time.

*Bob*

BOB LINDSTROM/EDITOR

# EDITOR'S PAGE





## A new kind of hard disk from Applied Engineering.

And it will be like no other hard disk you've seen before. For more than two years, our sales department has been asking our R & D department to design a hard disk, but management was concerned about the less-than-perfect reliability record associated with hard disks. So, frankly, research in this area received a lower priority.

Working primarily in their spare time, a few of our best hardware and software engineers have made some exciting breakthroughs. Management had no choice but to support their work.

This new line of internal and external hard disks from Applied Engineering will achieve new reliability, performance, ease-of-use and low price standards. Our engineers say we'll be ready to ship in two to three months. No, we're not taking orders yet (we hate vaporware as much as you do). But we *will* take your name and mail more information as soon as it's available. You see, the final design isn't complete yet. An exact shipping date isn't known. And we're still expanding the specifications. But we *are* being up front and honest about this new product breakthrough. We *can* tell you two things about our new Apple compatible hard disks. They will be the best and they will be called Vulcan.

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# LETTERS TO THE EDITOR

## IIGS IS CATCHING UP

**Dear A+:** It has happened before, I'm sure. Go to any IIGs users'-group meeting, and you'll hear it. Spend a few minutes in any software store, and you'll see it. But now someone has finally put it into print: Instead of comparing the IIGs to other and older Apples, let's compare it to machines made by other manufacturers! Let's compare the graphics capabilities of the IIGs with IBM's VGA mode. Apple comes up 240 colors short. Congratulations to Bob Lindstrom for his comments on your January '89 editor's page. What an encouraging way to start the New Year.

IIGs owners don't need a new machine, not even an upgrade of the one we've got. What we want is software to equal the IIGs's capabilities and peripherals that can complement the IIGs, even enhance it.

But eureka! It's finally happening. The first of the next-generation software and hardware is beginning to appear on the market: paint programs with more than 16 colors. Affordable digitizers with "frame grabbers" and 256 colors or levels of gray.

The possibility of what may soon come boggles the mind. Already there is a program to read graphic data from Mac disks. Maybe the next thing will be reading from other formats, paint programs that will rival the 4096 on-screen colors of the "hold and modify" mode, or even the millions of colors of the PGA mode. Perhaps even the possibility of printing on laser printers made by third-party manufacturers. I'm hoping for a truly sophisticated animation program, with wire-frame, ray tracing, and raster graphics. Keep your Macs and Amigas, if these recent developments aren't just vaporware: For home use, I'll stick with the IIGs.

DUANE W. COX  
GIG HARBOR, WA

## WRONG TREE?

**Dear A+:** Although I agree that the improvements that Bob Lindstrom suggests for the Apple IIGs in his January 1989 editorial are needed and would be welcomed, surely he must realize that he is directing his comments to the wrong target.

If Apple Computer (The Company) were to produce an Apple close

to what he suggests, in his own words, "The IIGs could challenge the Macintosh." He is doing his readers a disservice by not pointing out to them that Apple will *never* knowingly produce a computer that might, in its eyes, challenge the Mac.

Rather, his suggestions, I believe, should be directed to an outside company (Laser?) that could produce an Apple clone that would do the things a IIGs should do, or to a third party (Applied Engineering or Checkmate) that might be able to produce add-on (or replacement) hardware to get the job done (à la Zip Chip for the IIG).

THOMAS E. MILITELLO, M.D.  
RANCHO PALOS VERDES, CA

## SCSI MODULARITY

**Dear A+:** I agree that the IIGs sorely needs some of the features that Bob Lindstrom calls for in his January 1989 editorial (faster processing speed, please!). What spurs me to write this letter is the wish he has for a built-in Apple II SCSI port. That is a good idea, but what happens when Apple upgrades the SCSI ROMs, as it just did (to revision C)? Disconnect everything and lug in the entire base unit, and then go without your computer for a few days—that's what happens.

Rather, I think the whole computer should be made modular, so that those of us who know how can disconnect any part needing an upgrade and take it in separately. Even parts that would totally disable the computer, such as system ROMs, would be easier to take in as a separate board (those who don't want to mess around with the innards can still take in the whole thing).

This is not to say that SCSI should not be built in. I would like to see that. But I think that hard-



# LETTERS

ware upgrades should be made possible with the least amount of trouble.

RAYMOND ROSS  
RENO, NV

*You can easily acquire the modularity you desire by placing the SCSI ROM chips in sockets on the IIGS motherboard, just as they are on the Apple II SCSI Card. The problem with sockets is that they increase production costs and the chance of failure for socketed components. That's why the IIGS makes extensive use of soldered, surface-mount, and pin-grid-array devices. They're a hassle to upgrade, but they keep costs down and reliability up.*—OWL

## COPYING WIZARDRY

**Dear A +:** In the "NewsPlus" item entitled "Software Confidential" on page 17 of the February 1989 issue, you imply that Wizardry IV can be installed on a hard disk since it is not copy-protected. This program is written with Apple 1.2 Pascal, however, which means that it must be booted from slot 6.

It would be nice to be able to use both the 3.5- and 5¼-inch drives on my GS, because Wizardry IV goes to the data disk during all encounters. Speaking of the data disk(s), Sir-tech has set them up to be read by track and sector, rather than by file, making it impossible to put them onto anything other than a 5¼-inch floppy also.

The No Copi paper Sir-tech uses is a big pain. My eyesight is not as good as it used to be, so I have to use a flashlight to read what is on the purple pages in dark print.

I hope other companies do not follow Sir-tech with this type of protection. If they do, I will not purchase their programs.

DON PENIX  
WAYLAND, MI

## DB MASTER USERS' GROUP

**Dear A +:** I have an Apple IIGs, which I purchased 18 months ago. I first bought it for my children but soon got hooked on the fun of learning a new way of thinking. I had been one of those people who

said, "I'll never have a computer because it will take away from my thinking power." How foolish I was!

I decided I needed to use my computer in my business and found a definite lack of business software for the Apple II family. Then came an ad in your magazine for DB Master from Barney Stone. I purchased his program and began customizing it for my business and really put it to the test.

DB Master is a serious tool for use at home as well as at the office. I would like to establish a users' group for people who want to share thoughts and ideas regarding the multiple uses of this program.

Please write me, James R. Plotkin, at 80 East Colorado Blvd., Pasadena, CA 91105.

JAMES PLOTKIN  
THE ORIGINAL PASADENA  
VACUUM & SEWING CENTER  
PASADENA, CA

*For a review of DB Master Version 5, see the November 1988 issue of A+.*—Editors

## APPLE IIGS DEFENDED

**Dear A +:** Enough! I've read criticism after criticism of the IIGs over the last few months in the A+ letters pages. One writer even implied that the IIGs was not an Apple II, saying it would not have the impact the Apple II had on the computing market. The most important thing to remember is that the machine is and always has been an Apple II.

The IIGs is an Apple II through and through, with even more flexibility and expandability than the original machine. Critics should remember that if you plugged into a IIe all the cards built into a IIGs, you'd be just as slot-poor. Even more so, because to date we have several expansion boards that allow users to use the slots without losing any of the built-in ports. But even if you want a card that requires you to lose one of the built-in ports, isn't it nice to be able to turn them off and use the slots any time you want?

The IIGs is a great computer. This is no insult to IIe owners. I still own a IIe and love having it. But there's no doubt in my mind that the IIGs is a better machine.

DEAN ESMAY  
FLOSSMOOR, IL

## A+ INDEX

**Dear A +:** I have enjoyed reading your magazine since I first obtained my Apple IIe computer. The computer has changed considerably since then, with increased memory, an accelerator card, and a mouse, all of which I purchased with guidance from your articles.

I often find myself dipping into old issues whenever my interests wander to a new area, but I find it somewhat cumbersome, if not inconsistent, to locate your features or advertisements manually.

Surely many of your readers would gladly pay for a yearly listing on a disk, or perhaps you could use it as a premium for subscribers.

ALEXANDER D. PSYCHOYOS  
PANAMA, PANAMA

*The Kula Index for A+ is an AppleWorks database that indexes the editorial content of the magazine, dating back to our premier issue, November 1983. The index is available on a 5¼-inch floppy for \$8 or on a 3.5-inch disk for \$9. For information, contact Kula Software, 2118 Kula Street, Honolulu, HI 96817; (808) 595-8131.*

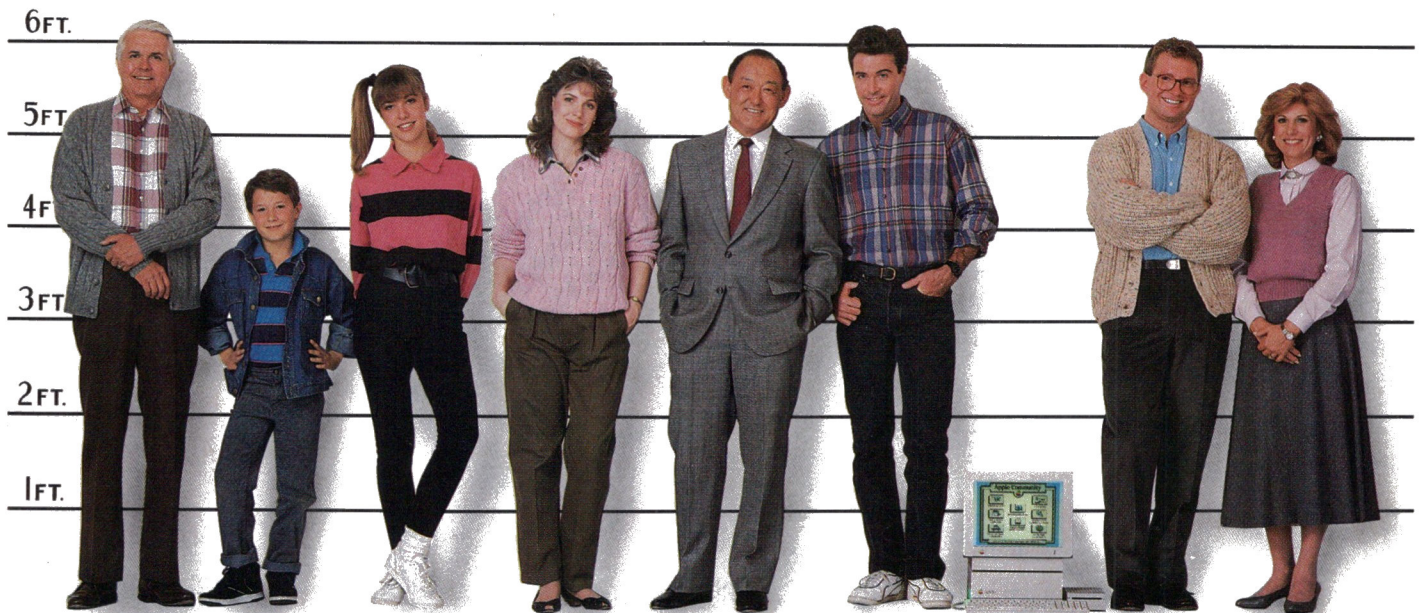
The Information Access Company recently launched a new search-and-retrieval service on CompuServe called the IAC Computer Database Plus. This service, which you can access by entering GO COMPLIB at any CompuServe prompt, contains an index of A+ and 120 other magazines targeted at the computer and electronics industry. The IAC Computer Database Plus covers the entire editorial content of A+, back to January 1987.

You can search for articles on companies, people, products, trends, and corporate financials, using keywords and Boolean-logic search conditions. When you get a list of relevant articles, you have the option of reading an encapsulated abstract of any article or the full text of articles from select publications (A+ included). The charge is \$24 per hour, in addition to the regular CompuServe connect fees, \$1 for each abstract, and \$1.50 for each full-text article that you access.

For information on becoming a CompuServe subscriber, contact CIS at 5000 Arlington Centre Blvd., P.O. Box 20212, Columbus, OH 43220; (800) 848-8199; (614) 457-8600. For more information on the Computer Database Plus, contact IAC at 362 Lakeside Drive, Foster City, CA 94404; (800) 227-8431; (415) 378-5000.—OWL



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You'll get online help and product support directly from the biggest names in Apple II software publishing. Then, visit the software library where you can download an impressive selection of programs.

## And that's just for starters.

In General Services there are endless possibilities. Look up facts in the up-to-date online encyclopedia. Make travel reservations. Get current on the latest-breaking news. Comparison shop for bargains in a 250,000-item online department store...to name just a few.

\*To use AppleLink software you need an Apple IIe, IIc, IIc Plus or IIcx® computer with Hayes-compatible modem. Apple IIe systems require enhanced ROM, 128K memory, an 80-column text card and a Super Serial Card. You must have a VISA, MasterCard or checking account for AppleLink registration.

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# NEWSPLUS

*Video card released, Apple myths debunked, education on line and in print, and other industry updates*

## VIDEO BEDFELLOWS

As predicted in the March 1989 "Make Your Own Movies" edition of A+, Apple Computer has gone video.

On April 3, the company introduced the Apple II Video Overlay Card. This add-in board for the IIe and IIgs allows users to combine Apple II computer graphics with video images from camera, tape, or disc.

With a price between \$500 and \$800 (undetermined at press time), the Overlay

Card includes several features that are essential to the advancement of desktop video in the Apple II marketplace. Among those features are:

- Genlock circuitry that synchronizes the Apple II with an external video source and permits users to overlay Apple graphics on the video signal, à la the cartoon characters in *Roger Rabbit*.
- True NTSC (National Television Standards Committee) video output compatible with existing video-recording equipment and, potentially, with commercial video-broadcast equipment.
- Composite video input/output and RGB output for the simultaneous use of video play/record devices and a standard AppleColor RGB Monitor.
- VideoMix software chooses a "key color" that is replaced on-screen by the incoming video signal. This software makes the Overlay Card compatible with most existing graphics and titling software, including Activision's Paintworks

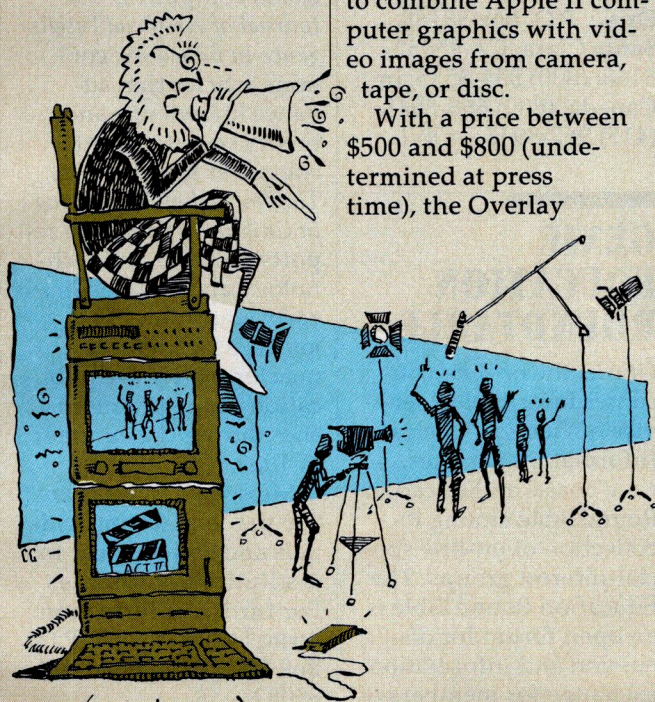
Gold; Epyx's Art and Film Director, and Home Video Producer; Brøderbund's Fantavision and VCR Companion; and Intellicreations' Video Title Shop. The board is also compatible with authoring programs such as MECC's Presenter and Video Lesson Writer from Whitney Education Services.

The product should have an impact in both the consumer and educational markets. Home-video hobbyists will use the Overlay Card to insert computer graphics and titles into their personal video productions. Educational publishers are expected to use authoring software to produce educational programs that combine laserdisc video with computer interactivity.

Interestingly enough, the Overlay Card duplicates all the video-generation circuitry of the Apple IIgs. Although Apple is not emphasizing this feature, it would be possible to write IIe software that accessed that circuitry directly and, in so doing, produce IIgs-quality graphics on a IIe.—BL

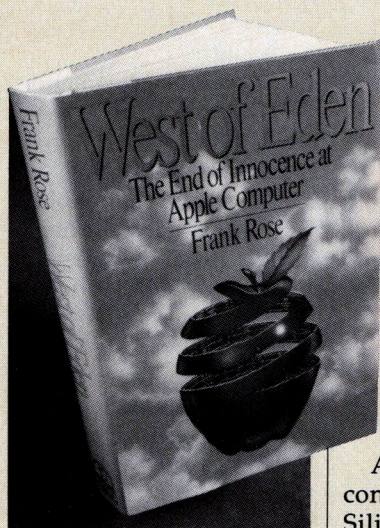
## THE REAL APPLE

Author Frank Rose puts the "two guys in a garage" image to rest with his newly published history of Apple Computer,





# NEWSPLUS



*West of Eden, The End of Innocence at Apple Computer* (\$19.95, Viking).

Covering the years 1983-1985—prior to John Sculley's arrival and following Steve Jobs departure—Rose reveals a company marked by visionary whining, political paranoia, and corporate uncertainty.

Although the book purports to be a tale of wildcat genius in conflict with big-business predictability, the events at Apple Computer seem much less grand in Rose's account. Rather, this portrait of Apple—garnered from interviews with more than 100 participants and observers—shows pinstriped and blue-jeaned eccentrics slugging it out with “ego” written on one fist and “insecurity” on the other.

And how does the Apple II figure in this history of tag-team management style? Hardly at all, except to be referenced by Jobs as the “dull and boring division.” In many ways, the book

confirms an Apple II user's worst suspicion: Even when the Apple II was the financial foundation of Apple and the Macintosh a liability, Apple's focus on philosophy rather than sales made the Apple II an also-ran technology.

Although not quite the controversial *Dallas* in Silicon Valley that the book jacket seems to promise, *West of Eden* is a readable and thought-provoking account of Apple Computer myth and reality.—BL

## CLARIS REVAMPS SUPPORT POLICY

As of February 1, only Claris customers will be eligible for the company's customer-relations and technical-support services, including telephone hot-line support, a technical newsletter, and notification of product updates and upgrades. Previously, Claris also supported users of Apple-labeled versions of its products.

Apple formed Claris in April 1987 to eliminate direct competition between Apple-labeled software and products from third-party developers. Claris inherited the workhorse of the Apple II world, Apple-

Works, and made a minor revision that allowed use of the integrated package on an AppleTalk network. In June 1988, Claris acquired StyleWare, picking up MultiScribe GS and a project in development that would ultimately become AppleWorks GS.

Claris will continue to provide support for the entire line of StyleWare products, but anyone with a copy of AppleWorks prior to version 2.0 will be denied support. Owners of Apple-labeled products can become registered Claris customers by upgrading to the most current version of AppleWorks (version 2.1) or AppleWorks GS (1.0).

For more information, contact Claris Corporation, 5201 Patrick Henry Drive, P.O. Box 58168, Santa Clara, CA 95052-8168; (800) 334-3535; in Canada, (800) 668-8948; (415) 962-8946.—OWL

## GENIE EDUCATION ROUNDTABLE

Genie, the on-line consumer information service of General Electric Information Services, now boasts an Education RoundTable among its collection of on-line special-interest groups. The Education RoundTable is an open forum for discussion and information exchange for members of

the educational community, professional trainers, and the interested public. Current forum topics include preschool to university education, vocational and special education, and education technology. The basic rate is \$5/hour for non-prime-time access at either 300 or 1200 baud. A 2400-baud rate is available for a higher price. For more information, you can contact GE Information Services at (800) 638-9636.—JB

## IT'S ACADEMIC

The Association for Computers in Mathematics and Science Teaching is publishing two new professional education journals that focus on educational computing. *The Journal of Artificial Intelligence in Education* contains articles that advance knowledge and theory on intelligent computer technologies. *The Journal of Computing in Childhood Education* reports research and technology applications in early education. Both journals will appear quarterly after the publication of the premier issues during the summer of 1989.

Subscription rates are \$36 per year for individuals and \$58 per year for institutions or libraries. For further information, write JAIE, ACMST, P.O. Box 60730, Phoenix, AZ 85082.—JB



# NEWSPLUS

## UPDATE

■ Apple Computer's Office of Special Education and Rehabilitation recently announced an updated 1989 version of *Apple Computer Resources in Special Education and Rehabilitation* published by DLM/Teaching Resources. This publication is an indispensable source of information on products, organizations, and publications that support disabled computer users. The 1989 edition is available from DLM for \$19.95. Those who purchased the original 1987 edition can request an unbound supplement that contains all the new information in the 1989 edition. For more information, contact DLM/Teaching Resources, One DLM Park, Allen, TX 75002; (800) 527-4747.

■ Davidson & Associates now offers foreign-language versions of its popular vocabulary-skill program, *Word Attack Plus*. Currently available in Spanish and French, these beginning vocabulary-drill programs are useful to students and travelers alike. *Word Attack Plus Spanish* and *Word Attack Plus French* are available in 5¼- and 3.5-inch disk formats. Suggested retail

price is \$49.95 apiece. For more information, contact Davidson & Associates, Inc., 3135 Kashiwa Street, Torrance, CA 90505; (213) 534-4070.

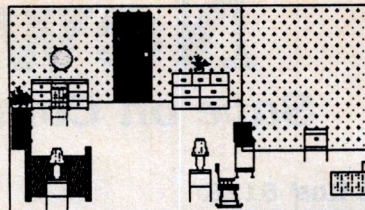
■ Davidson & Associates also plans to release network versions of *Math Blaster Plus*, *Word Attack Plus*, and *Homeworker* early this year.

The suggested retail price for each network title is \$299.95 per network server. Each package comprises software and a Davidson Teacher Resource Guide, which includes software-overview sheets, reference charts, assignment record-keeping sheets, reproducible activity sheets, and answer keys.

■ Zip Technology has recently announced new software that allows Zip Chip compatibility with Control Data's Corvus/Omninet Network. The Zip Chip is a 4-MHz microprocessor replacement for Apple II, II Plus, IIe, IIc, and compatible computers. The company offers classroom lab packs and corporate unit-pricing options. A Zip Technology site license for Corvus/Omninet networks is \$100. For further information, contact Zip Technology, 11340 West Olympic Blvd., Suite 350, Los Angeles, CA 90064; (213) 473-7662. +

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*Start-up, configuration,  
organization, program  
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# HOW TO HARD DISK

**S**ooner or later, if you spend a lot of time with your Apple II, it'll happen. You'll get really tired of those tiny-capacity 5¼-inch floppies, which hold just 140K. And even on a IIGS or a IIC Plus, you'll decide one day that the roomier 3.5-inch microfloppies, with 800K of storage, are still too confining. All the disk swapping and file splitting floppies require will just get too tedious. So (provided you can scrape up some extra cash) you'll go out and get yourself a hard-disk drive.

It's happening more and more these days, as software gets much larger and the prices of Apple II-compatible hard-disk drives (finally) come down from the stratosphere. There are plenty of Apple II hard-disk drives to choose among now—from the popular Apple, First Class Peripherals, and CMS lines to newer brands such as Chinook and Applied Ingenuity (see "Hard Choices" in this issue). They come in sizes from 20Mb to more than 100Mb, in versions that can hook up to nearly anybody's hardware setup.

There are even internal hard-disk drives for the IIE and IIGS (from Applied Ingenuity) and models for the IIC that get around the lack of a slot to hold interface cards (Chinook has one; Applied Ingenuity plans one soon). And for the dwindling number of hardy souls who use the ancient DOS 3.3, CP/M, or Pascal operating systems, there's even a Sider model that handles them (in addition to ProDOS and GS/OS). All other Apple II hard-disk drives can be used only as ProDOS or GS/OS devices.

So you've plunked down your \$500 or more, brought home your new hard-disk drive, and carefully hooked it up to your Apple II, following the manufacturer's crystal-clear (ahem) directions. Great. But how the heck do you use the thing? What's the best way to get the most out of it?

## **Making It Your Start-up Drive**

You're going to want your Apple II computer to boot up directly from your new hard-disk drive each time you turn it on. It should become your master disk, holding your system files, important programs, and critical data. So it



should be the disk you boot from.

To make sure it's your boot disk, just place the hard-disk-controller card, or interface card, in the highest-numbered slot—slot 7, or whatever the manufacturer recommends. Since Apples normally boot from the highest-numbered slot containing a disk-drive interface card, that'll make the hard-disk drive the boot disk—the Apple will "find" it during bootup before it finds your floppy-disk drive(s) in slot 6 or your micro-floppy-disk drive(s) in slot 5.

On a IIGS, this method works fine if you've set the Control Panel so Startup Slot is either Scan or Slot 7. But the GS gives you an additional option in case you want to put the hard-disk card into a lower-numbered slot: Just set Startup Slot in the Control Panel to match the one the hard-disk card is in.

### Configuring the Hard Disk

Like any disk, a hard disk has to be formatted, or initialized, and you have to copy onto it the files that constitute the operating system. Until you do so, the hard-disk drive can't become your start-up drive, even if you've put the card into the right slot. But, if you do it right, you should have to do it only once.

Some hard-disk drives come pre-formatted from the factory. Some even have ProDOS already loaded onto them. With others, you have to do these chores, using either special utilities the manufacturer supplies on a floppy or standard Apple utilities.

**R**emember, your hard disk is large enough to hold many programs and data files, but you need to put ProDOS (or GS/OS) on it only once, in one place: the main or "root" directory of the drive or the bootup partition of the drive (see below). Then you can launch all other ProDOS programs you run, from the hard-disk drive or floppies, without restarting ProDOS.

### Organizing Your Hard Disk

On smaller disks, not much organization is necessary. They often hold only one program, or a relatively small number of application programs and data files. But on a hard-disk drive, with its huge capacity, organization is essential.

The first thing to do is decide

**O**nce you get started, you will wonder how you did without it.

whether you want ProDOS to view the entire hard disk as one big volume—like a single floppy, but much larger—or two or more volumes. When you're using floppies, a "volume" usually means a disk. But a hard disk is large enough to contain two or more volumes if you use special software that does "partitioning." Some hard-disk drives come with such partitioning utilities, which split a big hard disk into separately named volumes.

For example, let's say you have a 40Mb hard-disk drive in slot 7 that is named /HARD1. It'd be known to your software as /HARD1—or Slot 7, Drive 1. But you can partition the hard disk into two 20Mb volumes: /HARD1 (S7,D1) and /HARD2 (S7,D2), which would look like separate disks to the software. The advantage of such a division is that you can make the first volume your bootup and program volume, containing ProDOS or GS/OS and all your application programs—AppleWorks, art programs, and the like. Then use the second volume for all your data files. It helps in organization and might minimize damage in some types of crashes. Furthermore, ProDOS limits the maximum volume size to 32Mb, so you'd be wasting storage if you configured your 40Mb drive as one volume.

Beyond setting up volumes, the other important thing to know about is subdirectories, also known as folders. They are theoretical containers within which you place related files. For instance, on your application volume, you might have folders for AppleWorks (with all the files the program uses, plus add-on utilities), telecommunications, graphics, and so on. On a data volume, you could set up folders for, say, Letters, Business, and School. Your ProDOS system files and associated folders (such as the SYSTEM folder on a GS) belong in the root directory—the basic, main level—of the bootup volume and shouldn't be tucked away in another folder.

### Loading Software from Floppies

You can use the standard Apple file-copying utilities, or a good utility program such as Copy II Plus from Central Point Software, to copy your favorite programs and data files from your floppies to the new hard disk.

Remember to copy them to the appropriate folders you've created. And remember *not* to copy the ProDOS or GS/OS system files or folders from your various disks if you've already installed these operating systems once on your hard disk.

Putting copy-protected programs, such as games, onto a hard disk is not as easy. In general, standard copying programs won't let you do it. Some copy-protected programs come with special installer utilities for hard disks, others let you use standard programs but force you to insert a "key" floppy each time you want to run the program from your hard disk, and yet others can be placed on the hard disk by Copy II Plus. But don't expect 100% success in putting copy-protected programs onto your hard disk.

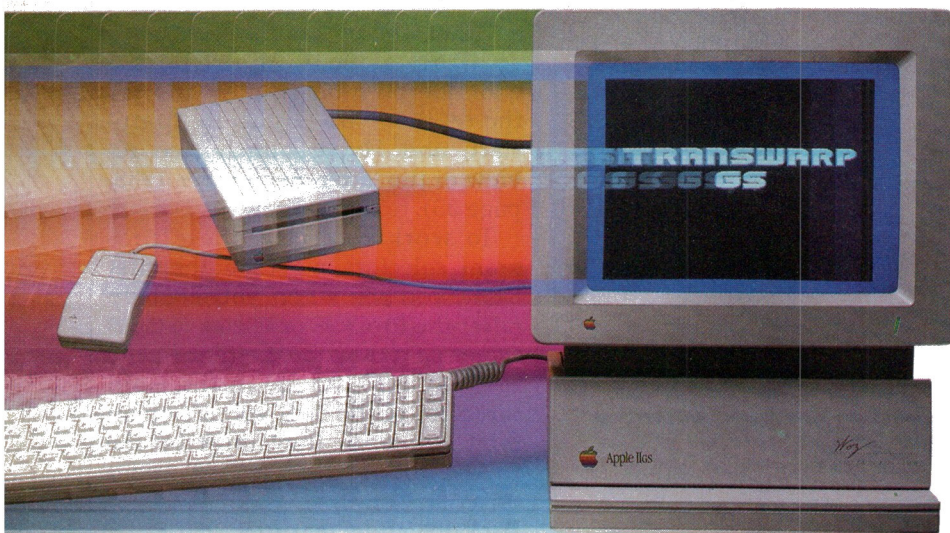
### Launching Programs

Once you've got your hard disk organized, with maybe 30 or more programs and many more data files tucked away in various folders, how do you actually launch applications? You'll need a program selector, a special program that appears whenever you boot up your computer and hard disk and presents a screen that lets you choose among your programs and launch them, no matter which folder they're in. When you're done running a program, selectors also typically return you to the program selector so you can choose another program.

All GS owners already own a program selector: the Finder. But even in the Macintosh market, where the Finder concept originated, there's a healthy demand for quicker selectors.

The best Apple II program selector, in my opinion, is ProSel, a \$40 gem that you can buy from its author, Glen Bredon. ProSel works on any Apple II and puts up a text-based screen that lets you pick from dozens of programs in GS/OS, ProDOS 8 or 16, and even DOS 3.3. It can handle multiple menu





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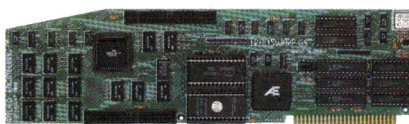
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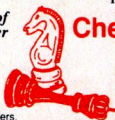
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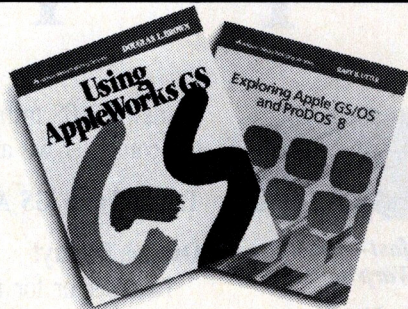
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screens, lets you arrange and alter the program titles, and works with keyboard or mouse. And it comes with a bevy of fantastic utilities. For a fuller description, see "Smart-Port," March 1989.

Other fine program selectors are available as well. Squirt does a good job on 8-bit Apples, and for the GS there are Squirt 16, Jumpstart, and HyperLaunch (see review of the latter, September 1988, page 53), to name a few.

To work correctly, these program selectors must be the first thing you see when you boot up (after the ProDOS or Welcome to the GS screen). So they must either be the first xxx.SYSTEM file in the main directory of the boot volume on an 8-bit Apple, or they must be the START file in the SYSTEM folder on a GS.

### Backups and Cleanups

Once you've put all your eggs in one basket and loaded that hard disk with all your favorite programs and data, you'll need to protect it. So you should get a hard-disk-backup program—a good one comes with ProSel—and use it to rapidly copy the contents of your hard-disk drive to floppies or a tape drive. Do it once a week or so, or once a month—whatever you're comfortable with. But do it regularly so that you'll have a set of floppies on the shelf that you can use to reconstruct your hard disk, or part of it, if you have a crash that wipes out data.

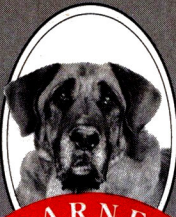
Another good maintenance operation to perform regularly is hard-disk optimizing, compacting files on the disk so the hard-disk drive head can get to them faster. It'll speed up disk-access time. A good utility for this operation is Glen Bredon's Beach Comber, also part of the ProSel package.

### You Can't Go Home Again

Once you've bought a hard-disk drive and taken these simple steps to get started, you'll wonder how you ever did without it. Apples with only floppies will seem unbelievably slow and clumsy to you. And power computing will at last be within your reach. +

Walter S. Mossberg is an economics reporter in the Washington bureau of the Wall Street Journal and writes an Apple II column in the monthly journal of Washington Apple Pi.



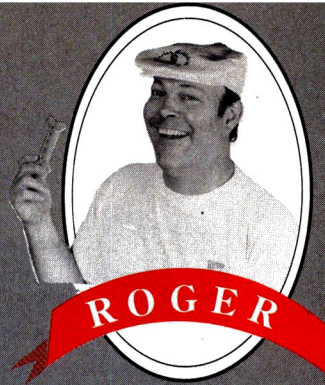


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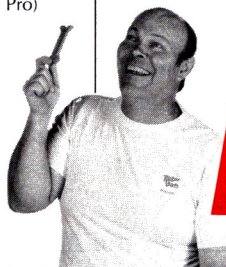
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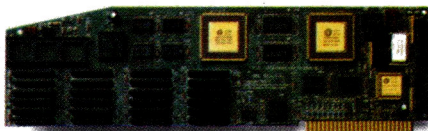
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### **Works with the hardware you already own.**

With PC Transporter, MS-DOS programs actually see your Apple hardware as IBM hardware, so you can use the same hardware and peripherals you have now.

With IBM software, your Apple hardware works just like IBM hard-

ware. Disk drives, monitors, printers, printer cards, clock cards, serial cards and even hard disks look like IBM type hardware whenever the PC Transporter is activated.

You can use your IIe or IIGS keyboard with IBM software. Or use our optional IBM-style keyboard (required for the II+).

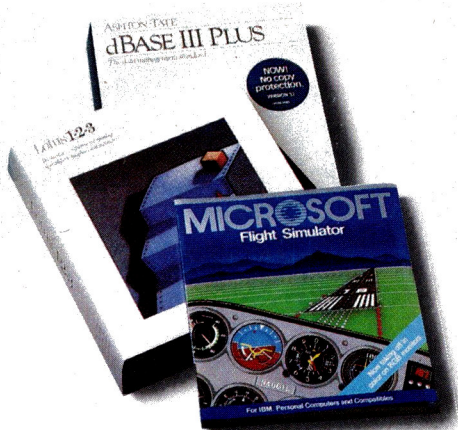
You can use your Apple mouse. Or an IBM compatible serial mouse.

### **Plenty of power.**

PC Transporter gives you 640K of user RAM and 128K of system RAM in the IBM mode.

PC Transporter works like an Apple expansion card, adding 752K of extra RAM in the Apple mode. The 752K is useable as a RAMdisk or as memory expansion to any program that follows the Apple Memory Expansion Card protocol (most do). The Apple memory expansion alone is a \$500 value.





PC Transporter taps into the world's largest software library. Now your Apple can run most of the software you use at work. And it opens a new world of communications programs, games and bulletin boards.

### Easy to install.

You can install PC Transporter in about 15 minutes, even if you've never added an expansion board. You don't need special tools. Simply plug it into an Apple expansion slot (1 through 7, except 3), connect a few cables, and go!

### A universal disk drive controller.

PC Transporter will run 3.5" IBM disks from your Apple (or compatible) 3.5" drive. And even if you want to run 5.25" IBM disks you can get our versatile 5.25" drive system and still run Apple 5.25" disks from an Apple 5.25" drive. In other words, when running 3.5" disks, your Apple 3.5" drive will run *both* Apple and IBM disks.

No matter what your drives, you can shift instantly between Apple ProDOS and IBM MS-DOS.

PC Transporter supports up to 5 drives in a number of combinations.

For example, you can connect a 5.25 Applied Engineering 360K dual drive system directly to the card. Then

PC Transporter controls Apple and IBM compatible disk drives. It supports 3.5" and 5.25" MS-DOS and ProDOS formatted diskettes.



plug two daisy-chained Apple 3.5 Drives (not the old Apple UniDisk 3.5) to the dual-drive system. For a fifth drive, you can even use a ProDOS file on a hard disk as an IBM hard disk!

### Versatile data storage.

You can store IBM programs and data on any ProDOS storage device including the Apple 3.5 Drive, Apple UniDisk 3.5, Apple 5.25 drive, SCSI or ProDOS compatible hard drives.

You can even use our 360K PC compatible drive for ProDOS storage and a 143K Apple 5.25 drive for MS-DOS storage.

### Make your Apple speak IBM.

#### PC Transporter w/768K \$679

Note: 768K RAM in Apple mode translates to 640K RAM in the IBM mode because PC Transporter uses 128K for system memory.

#### IIgs Installation Kit \$49

#### Ile/II+ Installation Kit \$39

Optional 5.25 IBM Format  
360K Drive Systems

#### Single-Drive System \$259

#### Dual-Drive System \$389

### What the experts say:

"Gives Apple II users the best of both worlds...an impressive engineering feat." —A+

"It's ingenious...a remarkable success!" —InCider

"When you buy a PC Transporter, you're not just giving your Apple the ability to act as a PC clone, you're upgrading your computer in a big way for all your Apple II computing." —Nibble

"An excellent solution for at least half a million people who enjoy Apple II computing at home and endure MS-DOS at work." —MicroTimes

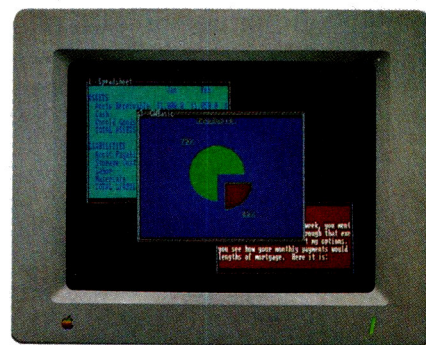
"Extremely versatile...one of the most ingenious and exciting products we've seen." —Classroom Computer Learning

"PC Transporter has created quite a stir. It's accuracy guarantees a whole host of uses...a masterpiece of engineering." —Apple Soft

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Apple II+ must be FCC certified.



PC Transporter produces better IBM graphics than IBM. Analog is sharper than digital. So with a IIgs analog RGB monitor, PC Transporter's CGA graphics and text are superior to IBM's digital display—even while running your IBM Software!

### Created by Apple's original designers.

The brains behind PC Transporter were also behind your Apple II.

The PC Transporter design team includes the former project managers for the creation of the Apple IIe and IIc. The co-designer of the Apple II disk controller. And the author of the ProDOS operating system.

So you know the PC Transporter and your Apple were made for each other.

### Support and service from the leader in Apple add-ons.

Applied Engineering sells more Apple peripheral boards than anyone else—including Apple Computer. So you know we'll be around after the sale.

PC Transporter comes with a 15-day money back guarantee.\* If you're not fully satisfied after using it, return it for a full refund. PC Transporter also comes with a 1 year warranty.

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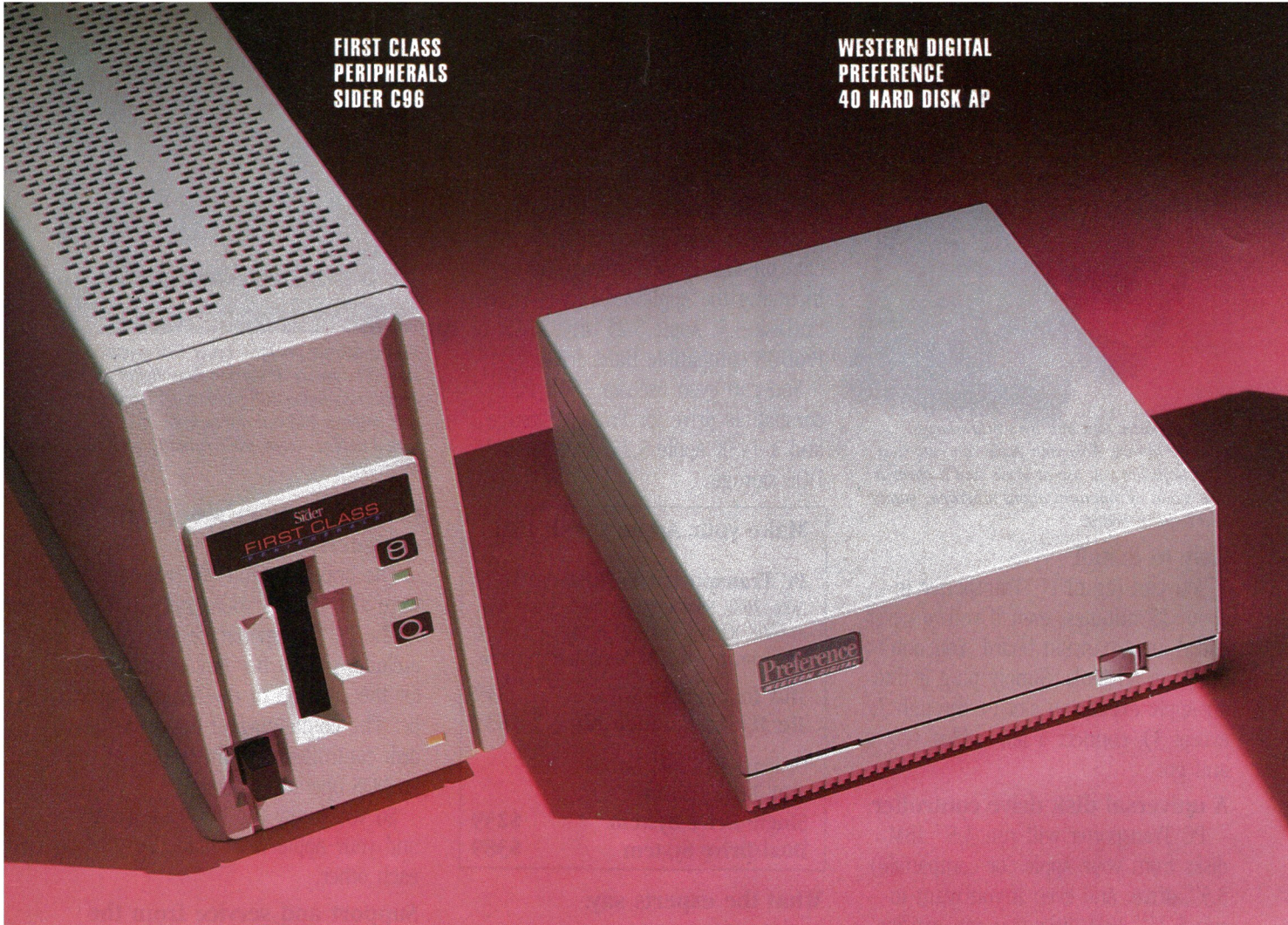
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FIRST CLASS  
PERIPHERALS  
SIDER C96

WESTERN DIGITAL  
PREFERENCE  
40 HARD DISK AP



COVER STORY BY MICHAEL FISCHER

# HARD CHOICES

*Four new products round out the list of hard-disk drives for the Apple II.*

**I**n November 1987, *A+* reviewed several hard-disk drives for the Apple II family. With the exception of the ProApp and Sun Remarking drives, those products are still available (see "Hard Disk Comparison," page 36). Four new hard-disk drives have appeared since that time, however, each with distinguishing characteristics:

- The Applied Ingenuity Inner Drive 40 fits inside the IIe or IIGS case, replacing the power supply.
- The Chinook CT-20c is currently

the only drive that works with the Apple IIc and IIc Plus. Although recommended only for the IIc and IIc Plus, the 20C also works with the Apple IIGS through the SmartPort or with an Apple IIe equipped with a UniDisk controller card.

- The Sider C96 has a built-in tape-backup unit. It is the largest of the Apple II hard-disk drives, both in physical size and storage capacity.
- The Western Digital Preference 40 Hard Disk AP is a true SCSI unit for either the Apple II Plus, IIe, or IIGS and a SCSI card.

Unlike products tested previous-

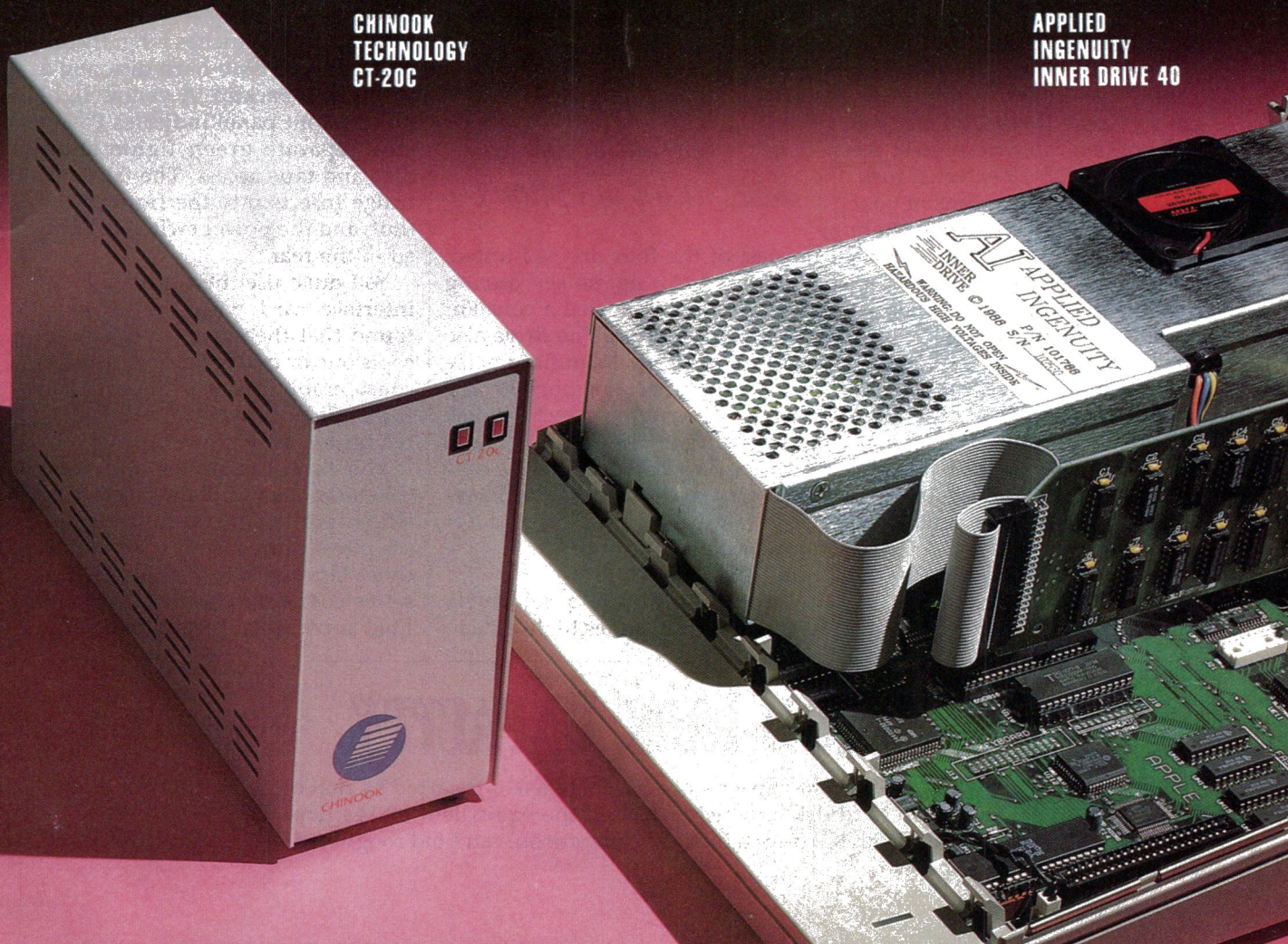
ly (see "Hard Disk Comparison" chart), these new hard-disk drives can be formatted only as ProDOS or GS/OS devices. You cannot store DOS 3.3, UCSD Pascal, or CP/M programs on them.

When you're buying a hard-disk drive, a factor to consider is cost per megabyte of storage. Larger drives, generally, are more economical on a per-megabyte basis. To determine the cost per megabyte, divide the total cost of the drive by the number of megabytes of storage. A 20Mb hard-disk drive that costs \$800, for example, carries



CHINOOK  
TECHNOLOGY  
CT-20C

APPLIED  
INGENUITY  
INNER DRIVE 40



a cost per megabyte of \$40.

Some other factors you should consider include noise level, size, and ease of installation.

#### **Applied Ingenuity Inner Drive**

The Applied Ingenuity Inner Drive is the only internal hard-disk drive made specifically for the Apple II. It comes in separate versions for the Apple IIe and the IIGS, available in 20 and 40Mb sizes. I tested the 40Mb unit for the IIGS.

The drive is roughly the same size as the Apple IIGS power supply it replaces. To install the drive, you remove the Apple IIGS power supply (the drive has a replacement power supply on-board), put the drive in that location, place the supplied interface card in a slot, and connect a ribbon cable from the drive to the card. The procedure takes less than ten minutes. My only problem was that a portion of my Applied Engineering PC Transporter video interface cov-

ered the location of the power connection on the power supply. I had to remove and reinstall that item to insert the Inner Drive.

Furthermore, the front of the Inner Drive is slightly wider than that of the IIGS power supply. If you have a long interface card in slot 1, you must take care it doesn't come in contact with the Inner

**N***o matter which Apple II you use, there's a drive for you.*

Drive. Applied Ingenuity supplies a piece of insulating cardboard to help avoid such a problem.

Even with its built-in fan, the Inner Drive is quiet. If you have an external cooling fan on your Apple IIGS, in fact, you will find it diffi-

cult to hear the drive at all.

The IIGS Inner Drive comes with the GS/OS operating system. The IIe version has ProDOS 8. Both include Apple's Backup II utility.

#### **Chinook CT-20c**

At present, the Chinook CT-20c is the only hard-disk drive that works on the Apple IIc or IIc Plus. It is not a SCSI drive. Instead, it operates through the external disk-drive connector. Should you later require a SCSI hard-disk drive, Chinook will upgrade a CT-20c to a full SCSI device for \$50.

Chinook manufactures three other drives for the Apple II family: The CT-20, CT-30, and CT-40 contain 20, 30, and 40 megabytes of storage, respectively. All are SCSI devices and require an Apple II SCSI Card.

The Chinook drive is 7 inches high, 3 inches wide, and 9 inches long. Ventilation slots are on the side, the power switch is in the



rear, and two red lights on the front indicate Power On and Disk Access.

On an Apple IIc or IIc Plus, you use a supplied cable to connect the CT-20c to the DB-19 external disk-drive connector on the back of your computer. You can also daisy-chain the Chinook drive to a UniDisk 3.5 or Apple 3.5 Drive. Additional 3.5- and 5¼-inch drives can be chained to the DB-19 connector on the back of the Chinook.

The Chinook drive can be the boot device—the disk unit from which your Apple loads the operating system—only if it is the first unit on the SmartPort chain. This requirement presents a problem if you are using an Apple 3.5 Drive. The 3.5-inch drive also must be the first item in the chain.

The Chinook CT-20c was the

**T**he four drives tested here provide you with a lot of options.

noisiest of the four drives I tested. It made clunking noises during disk access and emitted a constant medium-level hum. The drive also made an occasional shuffling noise as it automatically parked the read/write head to protect the disk from damage. The CT-20c comes with the ProDOS 8 operating system, Quality Computer's Easy-Drive (a program selector), and Apple's Backup II utility.

#### Sider C96

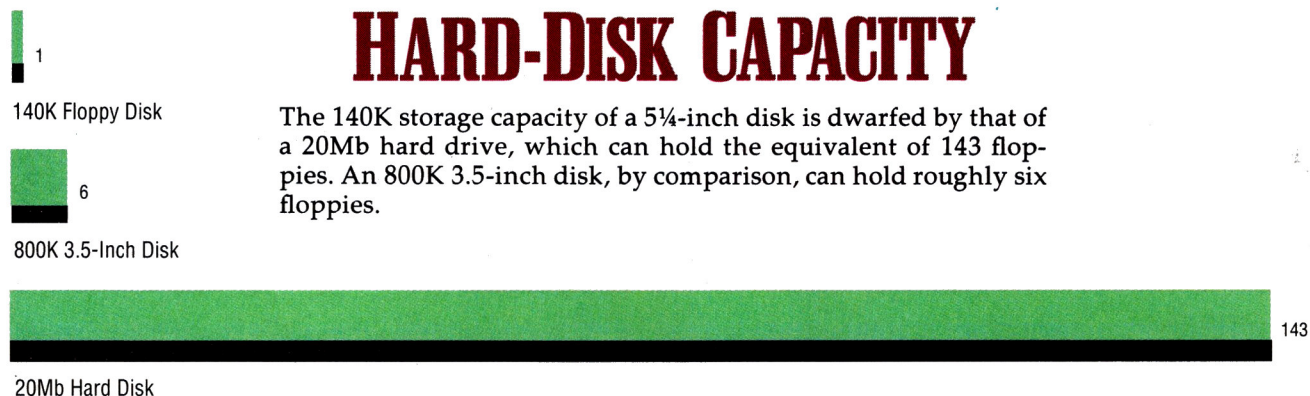
The Sider C96 is a relatively large drive at 8 inches high, 4 inch-

es wide, and 16 inches long. It contains both a 90Mb hard disk and a 60Mb tape backup. A yellow light on the front panel indicates Power On. Separate green lights show disk and tape access. The tape cartridge inserts into the front of the unit, and the power switch is located in the rear.

You must use the supplied Sider interface card with this drive. I found that the current version accepts one or two Sider drives and is considerably easier to install than earlier Sider cards. It takes less than ten minutes.

The tape backup on the Sider C96 uses standard data cassettes, which are not the same as audio-cassettes, although they resemble those tapes in size and shape. Cassettes cost less than \$10 each and hold approximately 60Mb of data.

## HARD-DISK CAPACITY

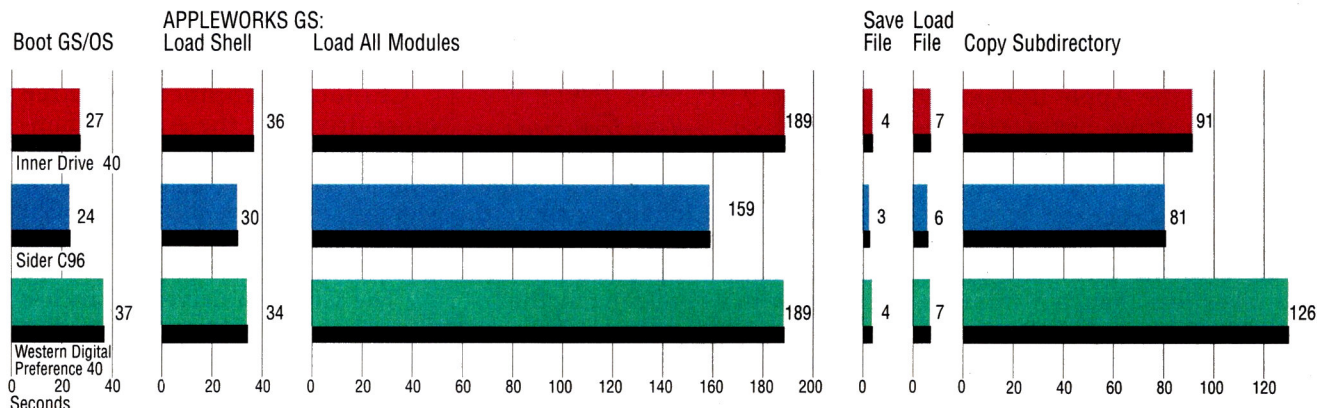


## APPLE IIGS TIME TEST

Hard-disk access time is normally specified in seek time and scan time. These two numbers, expressed in fractions of a second, are useful only in making rough approximations of comparative speed.

To measure disk speed, I performed several tests (on the Apple IIGS, all tests were under GS/OS):

- Booting into the Finder under GS/OS.
- Loading AppleWorks GS (shell only) from the Finder.
- Loading AppleWorks GS (all modules) from the Finder.
- Loading and saving a word-processing file in AppleWorks GS.
- Duplicating a subdirectory and its contents in the Finder.





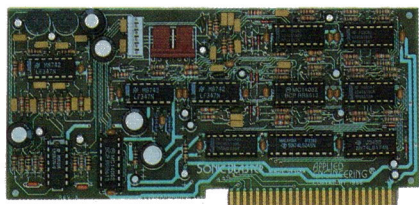


# Sonic Blaster.™ It's why they put the "S" in IIGs.

**Sonic Blaster™, the IIGs's first full-featured stereo digitizer, brings a new dimension to computing...the element of fun.**

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*Sonic Blaster's ultra-low-noise digital design is certified by the FCC.*

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fades, cut, copy and paste with the Super Hi-Res software we include.

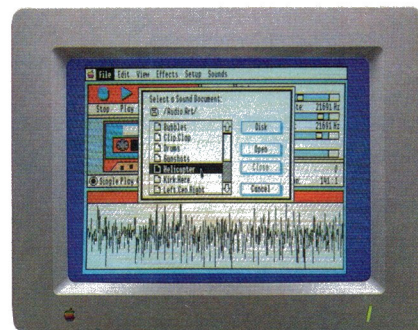
**We designed Sonic Blaster to be complete. Here's a quick tour of part of the software screen:**

### The Buttons

Stop, Play, Pause and Record buttons, perform the same functions they do on a tape recorder. Also included are Single and Continuous Play buttons and a VU Meter to visually represent input levels.

### The Sound Graph

The Sound Graph is the waveform at the bottom of the screen. Portions of the Sound Graph are selected with the mouse and then edited using the cut, copy and paste options within the Edit menu.



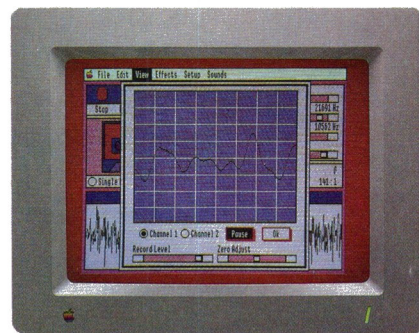
*Seventeen sound effects to get you started. Add your own collection of sounds.*

### The Bars

The Volume bar controls amplitude of the playback. Playback and Record mode sample rates are adjusted with the next pair of bars and the Record Level bar adjusts the level from the source connected to the Sonic Blaster's input connector.

### The Blocks

Three blocks give readouts of file length, available memory, bytes selected and resolution ratio.



*"See" the sound on the oscilloscope.*

### The Oscilloscope

Sonic Blaster's built-in oscilloscope gives you a real-time display of input sounds. Use it to set your input levels before recording. Or use the Auto Gain feature to adjust the level automatically.

**Sonic Blaster**

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You can transfer an entire volume or specific files to tape. Use the supplied software to select and back up the desired volumes or files. The software performs no special compression of files to conserve space.

Tape transfer is faster than backing up data to a floppy disk, particularly when you factor in the time spent swapping floppies. But a tape

is not as fast as a hard disk, and you must search through the tape sequentially to find files stored on it—so tape is useful only as a backup medium.

Like other Sider hard-disk drives, the C96 is moderately noisy although not annoying.

Additional Sider devices available include:

- The Sider D2 Econo, 20Mb.

- The Sider D4 Econo, 40Mb.
- The Sider D4 Turbo, 40Mb (nearly 2½ times the speed of standard Siders).
- The Sider D9 Turbo, 90Mb.
- The Sider T6 60Mb tape-backup unit.

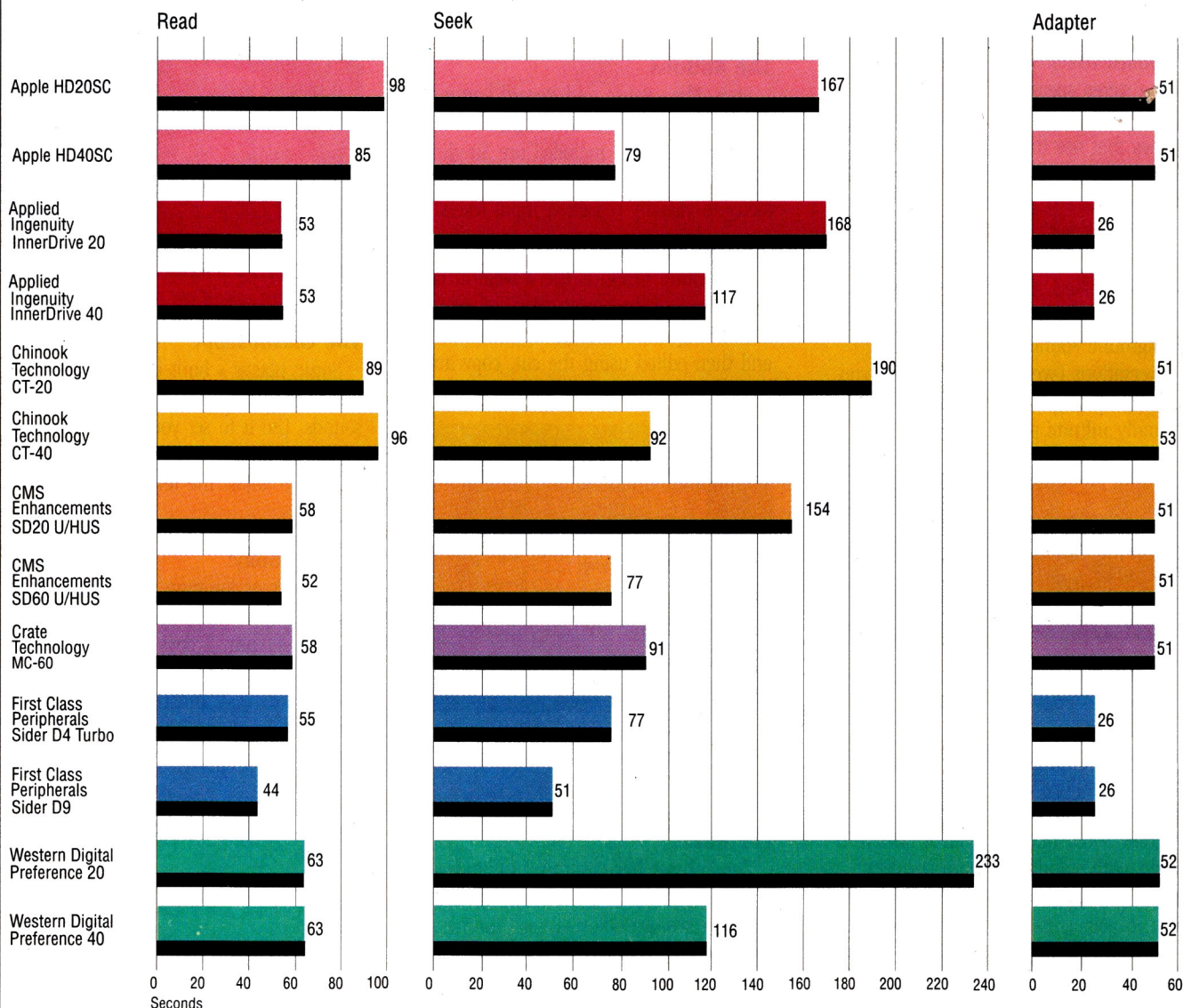
All Siders except the T6 and the D2 come with Glen Bredon's ProSel disk utilities (see "SmartPort," A+ March 1989). The C96 also

## DISKTIMER TEST

I ran a time test specifically for Apple IIGS drives called DiskTimer GS. This freeware program by Joe Jaworski is available on various on-line services. It performs three repetitive tests:

- A sequential read of disk blocks.
- Movement of the disk heads across 10Mb of data space.
- The efficiency of the adapter card.

The values from this test are in seconds. The lower the number, the faster the drive. I used DiskTimer GS on the three GS drives described in this article and verified values others had obtained on those drives. The graphs below show not only the values for the three drives tested, but also values for other drives as reported on CompuServe.





# PRODOS FOR CORVUS

**C**orvus Systems, Inc. manufactured one of the earliest hard-disk drives for the Apple II computer, back in the days before the Apple IIgs, GS/OS, or even ProDOS. Many of these drives are still in use, particularly in educational settings. Schools remain the strongest supporters of the pre-ProDOS DOS 3.3 operating system, in part because many educational programs work in that environment.

On the other hand, some schools and individuals may stay in the DOS 3.3 environment because they have no means of converting their old and expensive Corvus drives to run under ProDOS. Nodal Technologies provides a ROM chip replacement for the Corvus interface card that converts the drive to a ProDOS unit. The chip replacement lets you use the entire drive as a single ProDOS volume. You can also place the interface card in any slot of your II, not just slot 6.

The ProCore ROM chip costs \$75, including shipping and handling. It is available from Nodal Technologies, 1810 Michael Faraday Drive, Suite 101, Reston, VA 22090.

comes with the GS/OS operating system, SiderFile (a disk/tape-management system), and a disk-utilities package.

## Western Digital Preference

The Western Digital Preference 40 Hard Disk AP is a 40Mb SCSI hard-disk drive. As such, it requires an Apple II SCSI Card (not supplied) for use with an Apple IIgs, IIe, or II Plus. The unit measures 3 inches high, 7 inches wide, and 8 inches long. The ventilation slots are on the bottom of the drive,

so the unit does not require cooling clearance along the sides and top.

When you use a SCSI drive, there must be two terminators on the SCSI chain. One terminator is built into the Apple II SCSI Card, and the other must be attached to the last device in the chain. Instead of making you use bulky terminator connectors, Western Digital lets you specify with a dial on the back of the unit whether you want the drive terminated or not.

The front of the Western Digital

# RAM-RESIDENT DRIVERS

**A** new aspect of Apple IIgs hard-disk drives that promises speed improvements under GS/OS is the RAM-resident driver.

A driver is a program that operates a hard-disk drive. It takes disk I/O (input/output) commands issued by GS/OS and translates them into commands the disk-drive hardware can understand.

Typically, a hard-disk driver resides on the drive's interface card in a ROM chip. In a few cases, the information is contained on a non-volatile RAM chip.

The Apple IIgs slows down to its 1-MHz operating speed, however, when accessing most I/O cards in

slots, which limits hard-disk driver speed. In contrast, the Apple IIgs accesses internal RAM at an operating speed of 2.6 MHz, more than twice as fast as slot-based ROM. If the driver program for the hard-disk drive is located in the computer's RAM rather than the card's ROM, it can operate at a significantly faster speed.

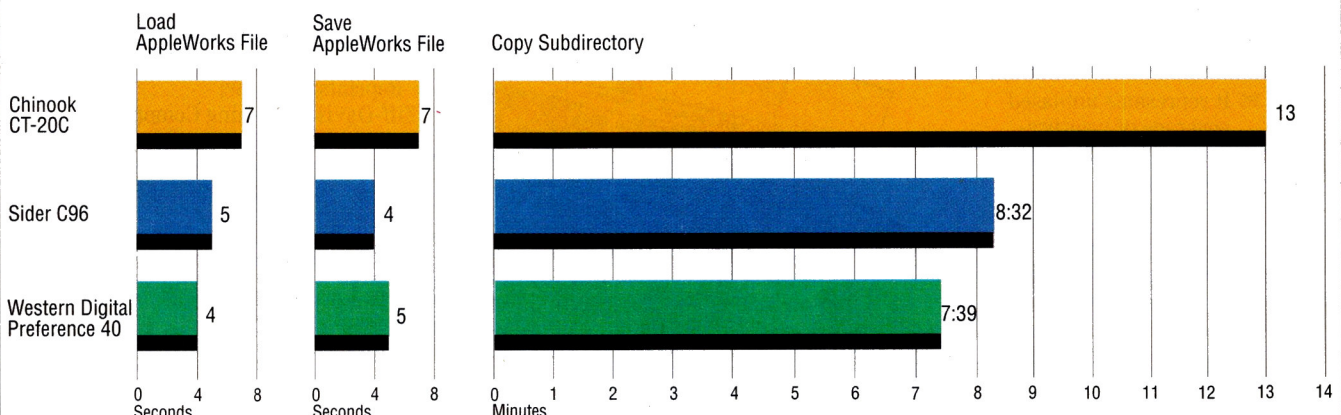
In the course of writing this article, I had the opportunity to test prerelease versions of RAM-based drivers for the Inner Drive 40 and the Sider C96. These drivers produced speed improvements of 15-25% with programs running under GS/OS. Applied Ingenuity and First Class Peripherals plan to ship their drives with the RAM-resident drivers in the near future.

# APPLE IIe/IIc TIME TEST

The speed tests for the Apple IIe and IIc drives were:

- Copy a subdirectory from a 3.5-inch floppy disk.
- Load and save a large AppleWorks word-processing file. The graphs below show the results of these tests.

I used an Apple IIc Plus at normal (1MHz) speed to test the Chinook drive.



*\*Direct comparison of these results is unfair because the Chinook CT-20C is limited by the SmartPort interface of the Apple IIc, while the other drives use their own interfaces in an Apple IIe.*



drive contains the power switch and three indicator lights. Two green lights indicate Power On and Disk Access. A red light indicates that the drive heads have been parked, thereby reducing the like-

lihood of disk damage.

Installation of the Preference drive involves inserting the Apple II SCSI Card into a slot (allow less than ten minutes) and attaching a cable between that card and the

drive. It is a very quiet unit that makes only a slight clicking sound during disk access.

Western Digital also makes 20, 80, and 120Mb Preference drives, all of which come with GS/OS. [Western Digital plans to release its own Apple II hard-disk formatter. The company claims the new formatter will dramatically increase performance, as well as adding automatic read-write head parking.—Editors]

#### Multiple Options

The four hard-disk drives tested here provide a lot of options for Apple II users. Whether you own a II Plus, IIe, or IIGS, you should be able to find a drive that suits your needs. And IIc and IIc Plus owners finally have a viable hard-disk drive that appears to have no drawbacks. The varied capacity of these drives, from a minimum of 20Mb to a maximum of 90Mb, indicates not only the maturing of the Apple II hard-disk-drive market but also the increased storage demands of today's larger, more sophisticated application programs. +

Michael Fischer is A+'s telecommunications editor.

## CALL IT "SCUZZY"

**T**hose who have taken Apple's pronunciation training cautiously call it "Ess-See-Ess-Eye" but the real world calls it "scuzzy." SCSI is an abbreviation for Small Computer System Interface, a standard method of connecting parallel devices to a computer, supported by the American National Standards Institute. (In case you care, it is ANSI standard X3T9.2.)

The advantages of a SCSI hard-disk drive for an Apple II user are the following:

- You can attach up to seven devices to the SCSI chain.
- You can attach any standard SCSI device, not just one that was made by your hard-disk-drive manufac-

turer, to the SCSI chain.

- SCSI devices other than hard-disk drives (tape-backup units, for example) are usable on the chain.

In order to take advantage of these features, you must be using a "standard" implementation of the SCSI interface, which means you connect the drive to your Apple II Plus, IIe, or IIGS with either the Apple II SCSI Card or a clone of that card.

Of the four drives reviewed in this article, only the Western Digital Preference 40 uses a standard SCSI interface. The Sider drive is a SCSI drive (and can be attached to the SCSI port of a Macintosh), but it is not a standard implementation, so it does not offer all the advantages of SCSI.

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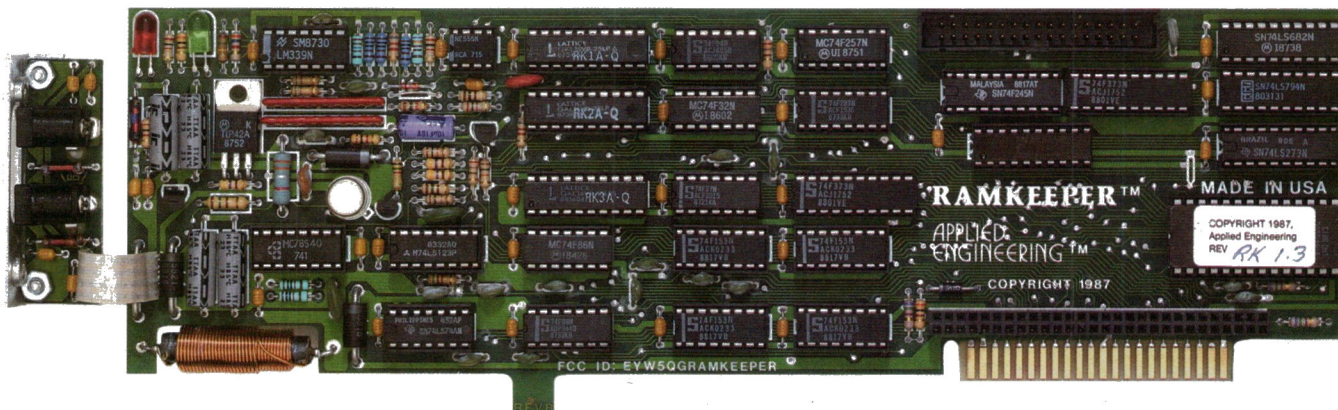
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# RamKeeper™ If not the first board you add to your IIGS



## Certainly the second.

Chances are the first board you add to your computer will be for memory expansion. RamKeeper™ makes a smart second addition by performing *two important tasks*:

**First**, it gives you a sensible way to grow beyond the Apple memory expansion board that probably came with your IIGs. Apple's board has room for only 1 MEG of memory, and the new, integrated programs need a MEG just to boot.

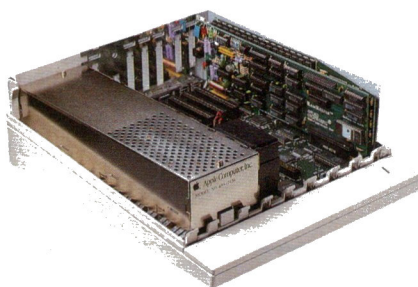
RamKeeper lets you add a second memory board to your memory expansion slot with a special "back pocket" connector. That way, you can use your 1 MEG Apple board and still expand beyond its 1 MEG limit. And RamKeeper "sees" the two boards as one, so all you'll notice is the increased memory.

**Second**, RamKeeper creates battery-backed Ram and ROM. Safely store your system software, often-used application programs and most-needed files on RamKeeper-enabled ROM. It's like an internal, electronic hard disk (up to 16 MEG!), but five times faster than an ordinary hard disk.

Turn your computer on and see the finder in 13 seconds, instead of several minutes.

### Safe storage

RamKeeper powers up to two memory boards simultaneously, even when your computer is turned off. What's more, the stored programs are protected against power outages by the reliable Gel/Cell battery we include. Startup checksums are employed to verify that no data was lost



**RamKeeper is easy to install and stores programs in an "instant on" electronic hard disk.**

while the power was off. To protect the operating software against program crashes, we installed RamKeeper's controlling firmware in an EPROM.

You can even mix different brands of boards. For example, an Apple board with at least 512K of memory (based on 256K x 1 chips), and AE's (MEG-chip based) GS-RAM Plus™ or GS-RAM Ultra™ boards. And most all other brand and size combinations are also possible.

### Advanced enough to be easy

We designed RamKeeper to be easy to use. Instructions are clear and most functions are automatic. For example, there's no need to manually configure if you add a second board, it's done automatically. The configuring is linear, so there's less chance of a program crash. And *you* decide how much memory to devote to ROM and to RAM—all without affecting your stored files.

### Compare features:

RamKeeper includes a collection of important features like *disk caching* that

tremendously accelerates access time to the 3.5 drive, running most applications up to *seven times faster*.

Our *diagnostic utility* feature graphically detects the presence of bad or improperly-installed chips and tests for CAS before RAS chips.

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AppleWorks users will find another bonus. Our AppleWorks enhancement package dramatically increases AppleWorks word processor lines from 7,250 to 22,500. Database records are increased from 6,350 to 22,500 and clipboard capacity climbs from 255 lines to 2,042.

### RamKeeper

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\*When purchased from Applied Engineering or thru a participating dealer.



# Programs & Peripherals



## Graphic Writer III by Seven Hills Software

**Graphic Writer III** is a feature packed desktop publishing package for the Apple IIgs. User friendly **Graphic Writer III** offers word processing, graphics and page layout. It's Mac-like interface allows you to start publishing in less than one hour. You can import images and text from other graphics and word processing programs. GS/OS, sample style sheets, clip art and spelling checker are included. .... **\$85.**

## COMMUNICATION SOFTWARE

<b>Activision</b> Teleworks Plus (IIgs)	66.	<b>Pinpoint</b> Point-To-Point	74.
<b>Checkmate Technology</b>		<b>United Software Industries</b>	
ProTERM (IIgs, IIe, IIc)	Special 95.	ASCII: Express Pro: Prodos	72.
<b>Compuserve</b> Compuserve Starter Kit	24.	ASCII: Express Mousetalk 1.5	69.

## BACKUP UTILITIES & BOARDS

<b>Alpha Logic</b>		<b>Central Point Software</b>	
Locksmith 6.0	36.	Copy II Plus	
<b>Apple</b>		(5.25" & 3.5" Bit Copy)	Special 23.
GS/OS (IIgs)	34.	<b>FWB Software</b> Disk Util II (IIgs)	52.

## PRINTER INTERFACE CARDS

<b>Apple</b> Apple Super Serial Card	119.	<b>SMT</b>	
SCSI Card	109.	No Slot Clock	42.
<b>Applied Engineering</b> Buffer Pro 32K	95.	Print Tech II (Parallel Interface)	37.
BufferPro 128K or 256K		<b>Thirdware</b>	
Serial Pro (II+, IIe, IIgs)	119.	Finger Print GSI Ver 2 (Includes	
Parallel Pro (II+, IIe, IIgs)	85.	Desktop Accessories-IIgs)	79.
<b>Orange Micro</b> Grappler C/Mac/GS	79.	Finger Print Plus	
ProGrappler (Apple IIe or IIgs)	84.	(Specify Cables: Parallel,	
Serial Grappler Plus	62.	Serial or ImageWriter II-II+ & IIe)	89.

## DISK DRIVES & HARD DISK SUBSYSTEMS

<b>American Micro Research (Micro Sci)</b>		<b>First Class</b> T6 60MB Tape	709.
A5 D Half Height 5 1/4" Drive		D2 20MB HD (IIe & IIgs)	509.
(IIgs Daisychain)	155.	D4/A 40MB HD (IIe & IIgs)	645.
A.5 Half Height (II+ & IIe)	129.	D4/T 40MB HD/High Perf. (IIe & IIgs)	855.
A.5C Half Height (IIc)	129.	D9 90MB HD/High Perf.	
Micro Sci C2 Controller	52.	(IIe & IIgs)	Special 1465.
<b>Applied Engineering</b> Transdrive 360K	209.	D96 Combo 90MB HD &	
Transdrive Dual 360K	305.	60MB Tape (IIe & IIgs)	2155.
Transdrive Half Height 360K	119.	<b>Rodime</b>	
<b>Chinook</b> CT-20 Hard Drive (AP & IIgs)	529.	Rodime 20 Plus Ext HD (IIe, IIgs)	615.
CT-20c Hard Drive IIc	645.	Rodime 45 Plus Ext HD (IIe, IIgs)	909.
CT-30 Hard Drive (AP & IIgs)	605.	Rodime 60 Plus Ext HD (IIe, IIgs)	915.
CT-40 Hard Drive (AP & IIgs)	715.	Rodime 100 Plus Ext HD (IIe, IIgs)	1079.
<b>CMS "SD Series - Stack" Platinum IIe, IIgs</b>		Rodime 140 Plus Ext HD (IIe, IIgs)	1325.
20 MB w/SCSI II card	645.	<b>Video Technology</b>	
43 MB w/SCSI II card	845.	Universal Disk Controller	45.
60 MB w/SCSI II card	950.	Laser DiskDrive (IIgs)	105.
<b>Cutting Edge</b>		Laser 800KB Drive	185.
XL 30 + SCSI HD (IIe & IIgs)	539.	Universal Disk Controller/800KB	
XL 45 + SCSI HD (IIe & IIgs)	669.	Drive Bundle	219.



## ThunderScan by Thunderware

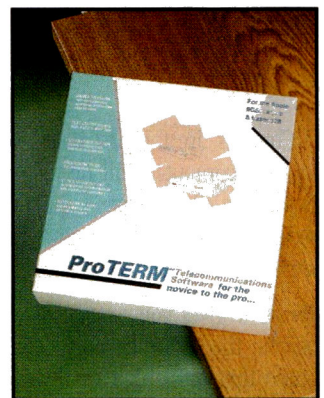
**ThunderScan** brings high-resolution scanning technology to the Apple II. Just insert the **ThunderScan** cartridge into your ImageWriter printer and your ready to scan. The **ThunderScan** system provides 16 shades of grey, contrast and brightness control. Fully ProDOS compatible, you can export scans to all paint programs for custom editing. .... **\$159.**

## MODEMS

<b>Anchor Automation</b>		<b>Practical Peripherals</b>	
1200E	119.	Practical Modem 1200 SA Mini	79.
2400E	159.	Practical Modem 2400 SA	181.
<b>Applied Engineering</b>		<b>Prometheus</b>	
DataLink Modem 1200B		Pro Modem 2400 (External)	255.
(Int II+, IIe or IIgs)	139.	Pro Modem 2400G (Non Expandable)	179.
DataLink Modem 2400B		Pro Modem 2400A (Single Card)	139.
(Int II+, IIe or IIgs)	185.	Pro Modem 1200A (Single Card)	119.
<b>EPIC</b>		<b>Supra Corporation</b>	
Epic 2400 Classic II Internal w/Proterm	189.	Supra Modem 2400 (Hayes Compatible)	149.
Epic 2400 Mini Modem Ext.	189.	<b>U.S. Robotics</b>	
<b>Hayes</b>		U.S. Robotics Courier 1200	199.
Hayes 1200 Baud Smartmodem	299.	U.S. Robotics Courier 2400	335.
Hayes 2400 Baud Smartmodem	449.	U.S. Robotics Courier 2400E	379.
<b>MDIdeas</b> Commlink 2400	189.	U.S. Robotics Courier HST 9600	689.

## ProTERM 2.1 by Checkmate Technology

**ProTERM 2.1** is the only telecommunications software for everyone who owns the Apple IIgs, IIe, IIc and Laser 128 computers with 128K of RAM. Logon to services like GENie™ and Compuserve™ with as little as one keystroke. Comprehensive manual, Hayes™ compatibility and easy access menus make it versatile and easy to use. Simple installation, password security and VT100 emulation make it the only choice for telecommunicating. .... **\$95.**



## BUSINESS SOFTWARE

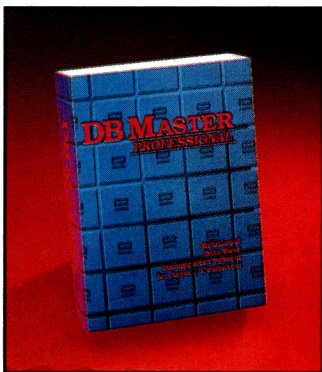
<b>Addison-Wesley</b>		<b>Multisoft</b>	
Wordbench (IIe & IIgs)	99.	DoReMe	55.
<b>Beagle Brothers</b>		<b>Peachtree</b>	
Timeout Graph	55.	Back To Basics	
Timeout SuperFonts or QuickSpell	45.	Professional: GL/AR/AP	129.
Timeout UltraMacros or SpreadTools	37.	<b>Roger Wagner Publishing</b>	
Timeout SideSpread, FileMaster, or		Macro Mate (IIgs)	35.
DeskTools	32.	Mouse Write (IIe, IIc, IIgs)	84.
Timeout Thesaurus, DeskTools II		<b>Sensible Software</b>	
or PowerPack	32.	Sensible Grammar ProDos (3.5" & 5.25")	59.
GS Font Editor or Program Writer	32.	Sensible Speller ProDos w/3.5" & 5.25"	69.
Timeout MacroTools or MacroTools II	19.	<b>Seven Hills Software</b>	
<b>Broderbund</b> On Balance	39.	Graphicwriter III (IIgs)	Special 85.
Bank Street Writer Plus (AP or C+)	50.	<b>Simon &amp; Schuster</b>	
<b>Brown Wagn</b>		Webster's Spelling Checker (ProDos)	41.
Desk Pak (IIgs)	55.	<b>Software Publishing</b>	
GS File	61.	All Programs for IIe with 128K or IIc	
<b>Claris</b> Apple Works (IIgs)	215.	PFS: Workmates (File/Report/Plan/Write)	119.
Multiscribe 3.0 w/Speller (128K IIe or IIc)	185.	<b>Softsync</b>	
Multiscribe IIgs 3.0	75.	Personal Newsletter with Clip Art	39.
<b>Dac Software</b>		<b>Softview</b>	
Dac-Easy Accounting	65.	Form Set Business Forms (IIgs)	59.
Garde Footing To Finish	55.	<b>Stone Edge</b>	
<b>Intuit</b> Quicken	34.	DB Master v5.	145.
<b>Legi Soft</b> Will Maker	39.	DB Master Professional	Special 195.
<b>Manzanita BusinessWorks</b>		<b>StyleWare</b>	
System Manager (IIe & IIgs) (Required)	69.	Deskworks (IIgs)	30.
GL/AR/AP or Inventory		Picture Manager or Desk Accessories	26.
Control (IIe & IIgs)	139.	<b>Third Wave Technology</b>	
Payroll Module (IIe & IIgs)	139.	Magna Charta	41.
BusinessWorks Bundle IIe & IIgs		Print-Quick	34.
(Sys. Manager, G/L, A/P,		Print-Quick Font Disk 1 or 2	15.
A/R, Inventory)	Special 299.	<b>Timeworks</b>	
<b>MECA</b>		Art Portfolio 4 in 1	75.
Managing Your Money 3.0 (IIe, IIc, IIgs)	95.	Publish-It 2.0 (IIe or IIgs)	84.
<b>Mecc</b>		People, Places and Things (IIe & IIgs), Design	
Calendar Crafter School (IIgs)	59.	Ideas (IIe & IIgs), Symbols and Slogans	
<b>Milliken</b>		(IIe & IIgs), Education Graphics (IIe &	
Medley (IIgs)	119.	IIgs), Font Pack 1 or 2 (IIe & IIgs)	27.
<b>Monogram</b>		<b>Word Perfect Corporation</b>	
Dollars and Sense (II+, IIe or IIc)	72.	WordPerfect V1.1 w/Speller (IIe & IIc)	99.
		WordPerfect (IIgs)	99.

**Visit Us In The Electronic Mall™ On Compuserve - GO PP**



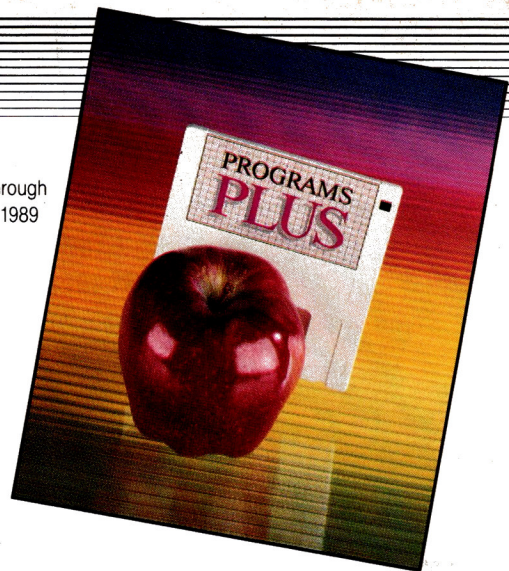
# Overnight

Specials good through  
May 31, 1989



## DB Master Professional by Stone Edge Tech

**DB Master Professional** brings the power of a relational database manager to the Apple II. Anyone who needs to keep track of interrelated types of information can utilize *DB Master Professional* to automate record keeping. Relate up to 10 files for automatic data entry, posting and updating. Includes a full featured reports generator, mail merge, password security and AppleWorks compatibility. .... **\$195.**

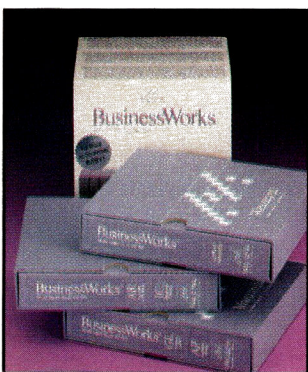


## EDUCATIONAL SOFTWARE

<b>Barron's</b> Computer SAT Revised Version	34.	Writer Rabbit (IIgs), Think Quick (IIgs)	
<b>Britannica</b> Jigsaw (IIgs)	25.	or Rockys Boots (IIgs)	30.
Body Transparent or States & Traits	25.	Magic Spells (IIgs) or Math Rabbit	24.
Designasaurus	24.	Gertrude's Secrets (IIgs)	24.
Designasaurus (IIgs)		Think Quick, Writer Rabbit	
Revolution (IIgs)	28.	or Math Rabbit (IIgs)	30.
Millionaire II	34.	Reader Rabbit, Magic Spells	
<b>Broderbund</b> Geometry (IIgs)	68.	or Rocky's Boots	24.
Science Tool Kit Master Module	50.	<b>MindPlay</b> Easy Street or Cotton Tales	35.
Science Tool Kit Module I, II or III	26.	<b>Mindscape</b> Crossword Magic	34.
Type!	19.	Perfect Score SAT	48.
Where in the World is Carmen Sandiego?	25.	<b>Pinpoint</b> Micro Cookbook (Ile or Ilc)	31.
Where in the USA is Carmen Sandiego?	29.	Bon Appetit	37.
Where in Europe is		<b>Roger Wagner</b> HyperStudio (IIgs)	85.
Carmen Sandiego? (AP or C+)	29.	<b>Sensible Software</b> Report Card II (Ile & IIgs)	37.
<b>Coda</b> Music Class Courses 1-5 (Bundle)	149.	<b>Simon &amp; Schuster</b> Speed Reading Tutor IV	
Fundamentals, Rhythm, or Ear Training	35.	or Typing Tutor IV	27.
Music Symbols or Note Reading	27.	Speed Reader Tutor IV (IIgs)	34.
<b>Compu-Teach</b> Once Upon A Time	25.	Typing Tutor IV (IIgs)	31.
Stepping Stones Level I or II	25.	<b>Spinnaker</b> Kidwriter Gold (IIgs)	31.
Joshua's Reading Machine	25.	Homework Helpers Writing or	
See the U.S.A.	30.	Math (Ile or IIgs)	34.
<b>Davidson &amp; Associates</b>		Facemaker: Golden Edition	27.
Math Blaster Plus (IIgs)		Kidwriter	27.
or Word Attack Plus (IIgs)	29.	<b>Terrapin</b> Terrapin Logo Plus	29.
Alge-Blaster or Math Blaster Plus	29.	<b>Tom Snyder Productions</b>	
Grammar Gremlins or Read 'N' Roll	29.	Reading Magic Library: Jack and the	
Spell-It, Word Attack Plus! or Math		Beanstalk or Flodd, the Bad Guy	Special 25.
Blaster Mystery	29.	<b>Weekly Reader</b>	
Math & Me (IIgs) or Reading & Me (IIgs)	29.	Stickybear Series: Sticky Bear ABC (5/4),	
Math & Me or Reading & Me	25.	Basket Bounce (5/4 or 3/2), Bop (5/4),	
<b>Electronic Arts</b> Mavis Beacon Typing	30.	Math I (5/4 or 3/2), Math II (5/4 or 3/2),	
Mavis Beacon Typing (IIgs)	37.	Numbers (5/4 or 3/2), Opposites	
<b>First Byte/Electronic Arts</b> The Rhyming		(5/4 or 3/2), Reading (5/4 or 3/2),	
NoteBook, The Dinosaur Discovery		or Shapes (5/4 or 3/2)	24.
Kit (IIgs), The Puzzle StoryBook (IIgs)	29.	Basic (5/4), Car Builder (5/4 or 3/2), Drawing	
<b>Grade Busters</b> Corp. Grade Busters 1, 2, 3	64.	(5/4), Map Skills (5/4 or 3/2), Math Word	
<b>Great Wave</b> Kidtime II (IIgs)	24.	Problems (5/4 or 3/2), Music (5/4), New	
SpaceLace	20.	Talking Alphabet (3/2), Parts of Speech (5/4	
<b>Harcourt, Brace, Jovanovich</b> Computer SAT	29.	or 3/2), Printer (5/4), Punctuation Rules (5/4	
<b>ImagiMedia</b> FactWorks 1, 2, 3 or 4	24.	or 3/2), Reading Comprehension (5/4 or	
<b>Learning Company</b>		3/2), Spellgrabber (5/4 or 3/2), Townbuilder	
Reader Rabbit (IIgs) or Writing and		(5/4 or 3/2), Typing (5/4 or 3/2), or	
Publishing Center (AP or IIgs)	36.	Vocabulary Development (5/4 or 3/2) (ea)	31.

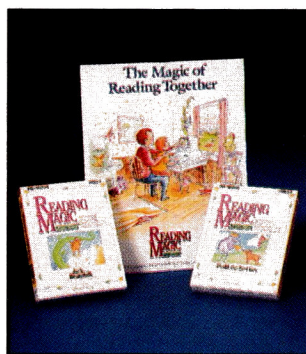
## BusinessWorks by Manzanita

**BusinessWorks** is the accounting package for small and medium size businesses. Combining G/L, A/P, A/R and inventory control in one flexible package. *BusinessWorks* lets you set up your accounts the way you want. Customize your reports to display the information you want displayed. *BusinessWorks* looks and acts like AppleWorks. *BusinessWorks* is the accounting solution for the Apple II. .... **\$299.**



## Reading Magic Library by Tom Snyder Productions

**Reading Magic Library** gives you the first animated interactive storybooks that let your child choose what happens next. Books include **Jack and the Beanstalk**, a whimsical retelling of the fairytale classic, and **Flodd, the Bad Guy**, a delightful fable about an ill-tempered chap who's making life tough for our hero. *Reading Magic* is the perfect way for your child to learn reading skills. .... **\$25 ea.**



## BLANK MEDIA

<b>3 1/2" Blank Diskettes</b>		Fuji 3.5" DS/DD (box of 10)	19.
BASF 3 1/2" DS/DD (box of 10)	17.	Maxell 3.5" DS/DD (box of 10)	20.
Bulk (Sony) 3 1/2" DS/DD (box of 10)	17.	Verbatim DS/DD (box of 10)	19.
Centech 3 1/2" DS/DD Color Disks (box of 10)	19.	3M 3.5" DS/DD (box of 10)	20.
Sony 3.5" DS/DD (box of 10)	19.	C. Itoh 3.5" DS/DD Color Disks (box of 10)	25.

## PRINTERS

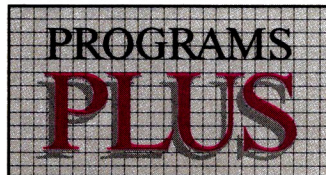
<b>Brother</b> M-1109AP (ImageWriter Comp.)	249.	<b>Seikosha</b>	
<b>Panasonic</b>		Seikosha SP 1000	
KXP-10801/M2 (144 cps) NLQ Mode	195.	(Imagewriter Compatible)	235.
KXP-10911/M2 (192 cps) NLQ Mode	209.	<b>Video Technology</b>	
KXP-10921 (240 cps) NLQ Mode	349.	Laser 190A w/Serial Interface	239.

## Copy II Plus by Central Point Software

**Copy II Plus** is the number one utility package for the Apple II, IIgs and Laser 128 computers. *Copy II Plus* has over twenty ProDOS and DOS 3.3 utilities, and fully supports 3.5" and 5.25" disks. Recover deleted files, format disks, verify drive speeds and more. *Copy II Plus* uses all available memory to make fast copies without disk swapping. .... **\$23.**



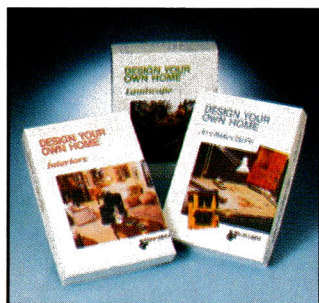
CIRCLE 185 ON READER SERVICE CARD



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STRATFORD, CT 06497  
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Customer Service 203/378-3662  
**800/832-3201**



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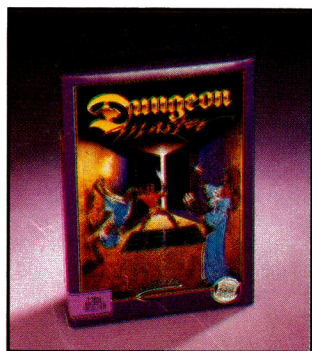


## Design Your Home Series by Abracadata

**Design Your Home** is a series of three programs including Architecture, Interiors and Landscape. Each program is designed to work as a definitive tool for home design. Draw scaled floor plans; arrange furniture and explore color schemes, and create landscape plans all from top or side views. .... **\$65 ea.**

## ACCESSORIES

<b>Apple Computer</b>		Printer Muffler Stand 80 or 132	24
Apple Mouse IIe	125.	AntiGlare Filter IIgs	39
Apple Mouse IIc	85.	System Saver (Platinum or Beige)	69
<b>Applied Engineering</b>		System Saver (IIgs)	75.
TimeMaster II H.O.	79.	New Turbo Mouse (Reg. or ADB)	119.
Sonic Blaster (IIgs)	109.	<b>Kraft</b>	
IBM Style Keyboard	119.	Universal 3 Button Joystick (IIe or IIc)	34.
Audio Animator (IIgs)	185.	<b>Koala Technologies</b>	
<b>Asher Engineering</b>		Koala Pad Plus w/Graphics Exhibitor	84.
Turbo Trackball (IIe or IIgs)	69.	<b>Kurta</b>	
<b>Big Red Computer</b>		IS ADB Tablet w/stylus (IIgs)	315.
Labels, Labels, Labels	29.	<b>MDIdeas</b>	
<b>CH Products</b> Hayes Flight Stick	52.	Digitizer Professional (IIgs)	139.
Hayes Mach II Joystick	29.	The Conservor (IIgs Switched	
Hayes Mach III Joystick	36.	Surge Suppressor w/Fan)	99.
Hayes Mach IV Plus Quad or ADB	65.	SuperSonic (Stereo Card for IIgs)	49.
Mirage Quad or ADB		SuperSonic Digitizer (IIgs)	49.
(Turns joystick into mouse)	39.	<b>Mouse Systems</b>	
<b>Cutting Edge</b>		A+ Mouse (IIc)	65.
EADB-105 Extended Keyboard (IIgs)	149.	A+ ADB Mouse (IIgs)	85.
<b>Digital Vision</b>		<b>MousTrak</b>	
Computer Eyes (IIe or IIc)	109.	MousePad 7"x9" Size	8.
Computer Eyes (IIgs)	209.	MousePad 9"x11" Size	9.
<b>Ergotron</b>		MousePad L/F (Low Friction)	9.
Mouse Cleaner 360° (IIgs)	15.	<b>Passport Designs</b>	
<b>Epyx</b> Epyx 500XJ Joystick	27.	Master Tracks Pro (IIgs)	99.
<b>Kalmar</b>		MIDI Interface w/Drum Sync (AP & IIgs)	89.
Teakwood Rolltop Disk Case (Holds 50)	18.	MIDI Interface w/Tape & Drum	
<b>Kensington</b>		Sync (AP & IIgs)	135.
Mouse Pocket (Reg. or ADB)	8.	<b>Ribbons</b>	
Mouseway (Mousepad)	8.	Available colors: black, blue, brown, green,	
Apple IIe, IIc or IIgs Dust Cover		orange, purple, red, yellow, silver or gold	
or ImageWriter I or II Cover	9.	ImageWriter Ribbon-Color	4.
Apple Security System	34.	ImageWriter Ribbon-Black six pack	20.
Printer Muffler 80	43.	ImageWriter II - 4 Color Ribbon	9.
Printer Muffler 132	58.	ImageWriter Rainbow Pk. (6 Colors)	20.

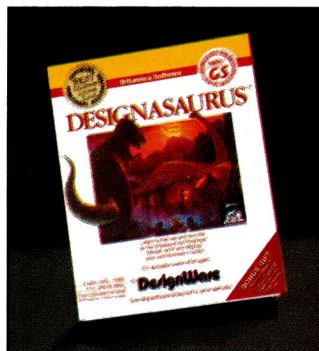


## Dungeon Master by FTL

**Dungeon Master** puts you inside the most detailed dungeon ever created in software. Every twist and turn, every nook and every corner looks real. Everything moves and works. Pickup objects with the mouse. Choose your comrades for this adventure carefully, because you'll need strong fighters and powerful wizards to survive. Requires an Apple IIgs and 1 Meg of memory. .... **\$29.**

## GRAPHICS PACKAGES

<b>Abracadata</b> Design Your Own Train	35.	Print Shop Graphics Library I, II, III	16.
Design Your Own Home: Architecture (IIgs)		or Holiday Ed.	
or Interiors (IIgs)	<b>Special 65.</b>	Print Shop Graphics Lib. Sampler Ed. (IIgs)	24.
Design Your Own Home: Landscape (IIgs)		Print Shop Graphics Lib. Party Ed. (IIgs)	24.
Design Your Own Home: Architecture, Interiors or Landscape	<b>Special 65.</b>	<b>Electronic Arts</b> DeluxePaint II (IIgs)	65.
Architecture Library 1, 2, 3 or 4 (AP or IIgs)	49.	DeluxeWrite w/DeluxePaint II (IIgs)	85.
Interiors Library 1, 2 or Landscape Library 1	21.	DeluxeWrite (IIgs)	55.
<b>Activision</b> PaintWorks Gold or Draw Plus	21.	<b>EPYX</b> Art & Film Director (IIgs)	55.
Paint/Write/Draw (Not Protected IIgs)	66.	PrintMagic	34.
<b>Baudville</b> Award Maker Plus (IIe & IIgs)	80.	Create-A-Calendar	21.
816/Paint (Works On All Apples)	24.	<b>Roger Wagner</b> Graphic Exchange (IIgs)	35.
<b>Berkeley Softworks</b> GEOS	46.	<b>So What Software</b> Iconix (IIgs)	35.
GEOPublish	80.	<b>Springboard</b>	
<b>Broderbund</b> Dazzle Draw (AP or C+) or Show Off (IIgs)	80.	Springboard Publisher 2.0 (IIe or IIgs)	84.
Print Shop (AP or C+) or Fantavision	39.	Certificate Maker or Newsroom	26.
Print Shop (IIgs) or Fantavision (IIgs)	29.	Certificate Maker Library #1	19.
Print Shop Companion	39.	Fonts For Springboard Publisher (IIgs)	19.
	25.	Newsroom Clip Art Collection Vol. 1, 2 or 3	14.
		<b>Styleware</b> TopDraw	43.
		<b>Thunderware</b>	
		Thunderscan (IIgs, IIe, & IIc)	<b>Special 159.</b>



## Designasaurus by Britannica Software

With **Designasaurus** for the Apple IIgs, learn to live, eat and survive as dinosaurs did long ago. Everything you do effects the ecological balance. See if you can live long enough to win a certificate. Create new dinosaurs from a collection of parts, or use a Brontosaurus, Stegosaurus or Tyrannosaurus. Print out 12 different dinosaurs. For dinosaur lovers of all ages. .... **\$28.**

## OUR POLICY

- ★ VISA and MASTERCARD accepted. No surcharge.
- ★ Your credit card is not charged until we ship.
- ★ If we must ship a partial order, the shipment that completes the order is sent freight free.
- ★ All shipments insured; no additional charge.
- ★ Upon receipt and approval, personal and company checks now clear the same day for immediate shipment.
- ★ No sales tax except orders shipped within CT, add 7.5% tax.
- ★ 120 day limited warranty on all products. Defective software replaced immediately. Defective hardware repaired or replaced at our discretion. Prices subject to change without notice. All items subject to availability.
- ★ Call us anytime Monday thru Friday 9:00 to 9:00 Eastern Time, or Saturday 9:00 to 6:00 Eastern Time. You can call our business offices Monday thru Friday 9:00 to 5:30 Eastern Time at (203)375-3560.
- ★ Purchase Orders accepted at our discretion, for more information call (203)378-1926, 9:00 to 5:30 Eastern Time.

## SHIPPING

- ★ **Continental U.S.:** Add \$6.00 minimum per order to cover Airborne Express Overnight\*, unless UPS ground delivers next day. Some areas require an additional day.
- ★ All (instock items) ordered by 5:00PM Eastern Time Monday thru Friday will ship that evening. Barring computer failures or other catastrophes.
- ★ **Alaska, Hawaii, outside Continental U.S., APO and FPO;** call (203)378-3662 or write for shipping information.
- ★ Mail-in orders (especially from foreign countries), please furnish telephone or fax number.

\*UPS ground service available at reduced rate per customer request.

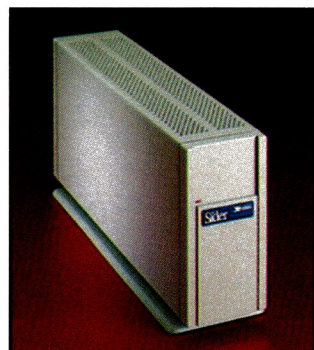
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Z-RAM Ultra 1 (256K or 512K)	Call	RamPak 4GS	Call
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GS-RAM (256K to 1.5Meg)	Call	<b>Zip Technology</b>	
		Zip Chip	165.

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<b>Big Red Computer</b>		ORCA/M Assembler (IIgs)	39.
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Micol Advanced Basic (IIgs)	99.	ORCA Desktop (IIgs)	34.
<b>Roger Wagner</b>		<b>TML Systems</b>	
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		ZBASIC 4.0 Interactive Compiler	39.

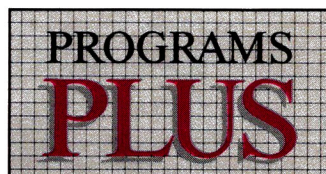


## JIGSAW! by Britannica Software

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Mini-Putt (IIgs) or 4th & Inches (IIgs)	27.	<b>Infocom</b> Sherlock	24.
Famous Course Disk Vol. 2	12.	Hitchhiker's Guide to The Galaxy or Leather Goddesses of Phobos	15.
Famous Course Disk Vol. 3 & 4	21.	Beyond Zork (IIe or IIgs) or The Zork Trilogy	34.
Test Drive or Bubble Ghost (IIgs)	21.	Zork Zero, Journey (IIe or IIgs) or ShoGun	34.
<b>Action Software</b> Thunder Chopper	19.	Zork Zero (IIgs) or ShoGun (IIgs)	41.
<b>Activision</b> Firepower	19.	<b>MasterPlay</b>	
Star Glider, GBA Championship		Star Saga: One! (AP or IIgs)	55.
Basketball (IIgs), or Shanghai (IIgs)	14.	<b>Melbourne House</b> Quarterback	19.
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The Last Ninja (IIgs) or Neuromancer (IIgs)	27.	<b>Micro League Sports</b>	
Might & Magic or Sky Travel (IIe or IIgs)	32.	Micro League Baseball	24.
Might & Magic II	34.	General Manager/Owner Disk	21.
Music Studio 2.0 (IIgs)	59.	Team Disk	14.
<b>Artworx</b> Bridge 5.0	19.	<b>Microprose</b>	
Strip Poker II (IIgs)	27.	F-15 Strike Eagle or Silent Service	22.
<b>BlueLion</b>		Silent Service (IIgs) or Pirates (IIe or IIgs)	26.
Ticket to Hollywood or R.S.V.P.	27.	<b>Miles Computing</b> Magic Candle	36.
Ticket to London, Paris, or Spain	27.	<b>Mindscape</b> Indoor Sports	19.
Ticket to Washington, D.C.	30.	Shadow Gate (IIgs), Uninvited (IIgs), Balance of Power 1990 (IIgs) or Deja Vu (IIgs)	32.
<b>Britannica</b> JigSaw (IIgs)	<b>Special</b> 25.	Balance of Power (IIe & IIgs), Gauntlet (IIgs) or Super Star Ice Hockey (IIgs)	29.
<b>Broderbund</b>		Super Star Ice Hockey or Joker Poker	27.
Ancient Art of War at Sea	31.	Gauntlet or Paperboy (IIe or IIgs)	25.
Wings of Fury (AP & IIgs) or Down Hill Challenge (IIgs)	23.	<b>Origin Systems</b> Times of Lore (IIgs)	27.
VCR Companion (AP or C+)	39.	<b>PBI Software</b>	
Ultima IV or Ultima V	39.	Strategic Conquest (IIgs) or Cavern Cobra (IIgs)	31.
<b>Buena Vista</b> Who Framed Roger Rabbit?	25.	The Tower Of Myrarglen (IIgs) or Alien Mind (IIgs)	32.
<b>California Dreams</b> Vegas Gambler (IIgs), Vegas Craps (IIgs) or Triango (IIgs)	25.	Sea Strike (IIgs) or Monte Carlo (IIgs)	25.
Mancala (IIgs) or Club Backgammon (IIgs)	25.	<b>Share Data</b>	
<b>Cinemaware</b> Defender of the Crown (IIgs), King of Chicago (IIgs) or Sinbad (IIgs)	32.	Concentration, Card Sharks, Jeopardy, Family Feud or Wheel of Fortune	10.
<b>Data East</b>		Jeopardy II or Wheel of Fortune II	11.
Kid Niki, Ikari Warrior or Platoon	23.	<b>Sierra On-Line</b>	
<b>Datasoft</b>		Space Quest (IIe or IIgs), or Space Quest II (IIe or IIgs)	32.
Tomahawk, Lancelot or Time & Magic	30.	Kings Quest I, II, or III (IIe or IIgs)	32.
Tomahawk (IIgs) or Hunt for Red October	37.	Kings Quest IV (IIgs)	34.
Hunt for Red October (IIgs)	37.	Leisure Suit Larry (IIe or IIgs)	26.
<b>Diversified Software Research</b>		Texder (IIgs)	24.
Diversi-Tune (IIgs)	55.	ManHunter (IIgs)	44.
<b>Electronic Arts</b>		or Police Quest (IIe or IIgs)	32.
Instant Synthesizer (IIgs)	59.	Mother Goose (IIe or IIgs)	19.
Cartooners (IIgs) or Puppeteers (IIgs)	44.	<b>Simon &amp; Schuster</b>	
Bards Tale (IIgs), Bards Tale II (IIgs), Instant Music (IIgs), Music Construction Set (IIgs), Bards Tale II, Madden Football, Bards Tale III, Wasteland, or Chessmaster 2100 (IIgs)	33.	Star Trek 4 First Contact	27.
Aaargh (IIgs), Chessmaster 2100, or Risk	29.	<b>Sir-Tech</b>	
Chuck Yeager Flight Sim, Scrabble, Scruples, Zany Golf (IIgs), Halls of Montezuma, World Tour Golf (IIgs) or Skate or Die (IIgs)	26.	Wizardry or Legacy of Lyllygamyn	32.
Strike Fleet or Marble Madness (IIgs)	23.	Heart of the Maelstrom or Return of Werdna	34.
<b>EPYX</b>		<b>So What Software</b> Sonix (IIgs)	39.
Sub Battle Simulator (IIgs), L.A. Crackdown, The Games: Winter Edition or The Games: Summer Edition	32.	<b>Sphere, Inc.</b> Gato	12.
California Games (IIgs)	29.	Soko-Ban (IIe or IIgs)	23.
Destroyer (IIgs), Final Assault (IIgs), or Impossible Mission II (IIgs)	29.	Tetris (IIe or IIgs) or Dondra	25.
California Games (AP or C+), Dive Bomber, Technocop, Tower Toppler, Sporting News Baseball or Sticker Maker	26.	<b>Strategic Simulations</b> Wizards Crown, Eternal Dagger or Roadwar 2000	26.
Street Sports: Basketball or Street Sports Football	14.	AD&D Dungeons Mstr. Asst. Vol 1	23.
Winter Games (IIe or IIgs) or World Games (IIe or IIgs)	14.	Questron II, Roadwar 2000 (IIgs) or AD&D Pool of Radiance	30.
Street Sports Soccer (IIe or IIgs), or Street Sports: Baseball	14.	Battle of Napoleon, Questron II (IIgs) or Typhoon of Steel	33.
Summer Games II or Sub Battle Simulator	14.	<b>Sublogic</b> Flight Simulator II	35.
		Jet	27.
		Scenery Disks 1, 2, 3, 4, 5 or 6	16.
		Scenery Disks 7, 11 or Western European Tour	20.
		<b>Taito</b> Arkanoid (AP or IIgs)	21.
		Bubble Bobble (AP & IIgs), Qix (AP & IIgs) or Renegade (AP & IIgs)	24.
		<b>Three Sixty</b> Warlock (IIgs)	24.









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# HARD DISK COMPARISON

Company	Hard Disk	Size (Mb)	Price	IIc/c +	II Plus	IIe
<b>Apple Computer, Inc.</b> 20525 Mariani Avenue Cupertino, CA 95014 (408) 996-1010	HD20SC	20	\$ 899			
	HD40SC	40	\$1,299			
	HD80SC	80	\$1,799			
<b>Applied Ingenuity</b> 14922M Ramona Blvd. Baldwin Park, CA 91706 (800) 346-0811 (818) 960-1485	InnerDrive 20	20	\$499 <sup>1</sup>			
	InnerDrive 40	40	\$650 <sup>1</sup>		 (with modification to case)	
<b>Chinook Technology</b> 601 Main St., Suite 635 Longmont, CO 80501 (303) 678-5544	CT-20c	20	\$769			
	CT-20	20	\$699			
	CT-30	30	\$799			
	CT-40	40	\$899			
<b>CMS Enhancements, Inc.</b> 1372 Valencia Avenue Tustin, CA 92680 (714) 259-9555	SD20U/HUS	20	\$ 895 <sup>1</sup>			
	SD30U/HUS	30	\$ 945 <sup>1</sup>			
	SD60U/HUS	60	\$1,295 <sup>1</sup>			
<b>Crate Technology</b> 6850 Vineland Avenue North Hollywood, CA 91605 (818) 766-4001	MC-20	20	\$645 <sup>1</sup>			
	MC-40	40	\$840 <sup>1</sup>			
	MC-60	60	\$939 <sup>1</sup>			
<b>First Class Peripherals</b> 3579 Highway 50 East Carson City, NV 89701 (800) 982-3232 (702) 883-4000	Sider D2	20	\$ 595 <sup>1</sup>			
	Sider D4A	40	\$ 795 <sup>1</sup>			
	Sider D4T (Turbo)	40	\$ 995 <sup>1</sup>			
	Sider D9	90	\$1,695 <sup>1</sup>			
	Sider C96	90 <sup>2</sup>	\$2,495 <sup>1</sup>		 (special order)	
<b>GCC Technologies</b> 580 Winter Street Waltham, MA 02154 (617) 890-0880	FX/20	20	\$ 779			
	FX/40	40	\$1,129			
	FX/60	60	\$1,279			
	FX/80	80	\$1,699			
<b>Western Digital</b> 2445 McCabe Way Irvine, CA 92714 (714) 474-2033	Preference 20	20	\$ 895			
	Preference 40	40	\$1,195			
	Preference 80	80	\$1,695			
	Preference 120	120	\$2,395			



	IIGS	Mac	SCSI	ProDOS	DOS 3.3	Pascal	CP/M	GS/OS	Seek Times (milliseconds)	Warranty
	  	  	  	  				  	85 30 30	90 days 90 days 90 days
	 			 				 	68 68	1 year 1 year
	   	  	   	   				   	68 68 38 28	1 year 1 year 1 year 1 year
	  	  	  	  				  	38 32 40	1 year 1 year 1 year
	  	  	  	  				  	65 28 28	2 years 2 years 2 years
	    	 	 	    				    	65 61 25 18 18	1 year 1 year 1 year 1 year 1 year
	   	   	   	   				   	65 40 40 26	1 year 1 year 1 year 1 year
	   	   	   	   				   	80 28 18 18	1 year 1 year 1 year 1 year



*A do-it-yourselfer's  
guide to  
low-cost  
data storage*

# HOMEBREW

**B**uilding your own hard-disk drive is an astonishingly easy project that offers many advantages over buying a commercial unit. First, you can save hundreds of dollars (see the cost-comparison chart in this article). In addition, you will learn something about your computer along the way, and you will beam with self-assured satisfaction every time the drive powers up. Soldering skills are not required—if you can wield a screwdriver with care, you've got what it takes.

If you have an Apple II Plus, IIe, or IIGS, you can purchase everything you need to build a quality

hard-disk drive through reputable mail-order companies. Pick up a copy of *Computer Shopper*, *MicroTimes*, or a similar magazine, and you'll find lots of ads for all sorts of electronic components. Here's a list of what you'll need (see figure 1):

- Apple II SCSI Card.
- Hard-disk mechanism.
- Power supply.
- Housing unit.
- Connecting cables.
- Low-level formatting software.

## Apple II SCSI Card

Apple Computer has adopted SCSI (Small Computer System Interface) as the standard means of connecting input/output devices—hard-disk drives, CD-ROM drives, and flat-bed scanners—to Apple II

and Macintosh computers. Most Mac models have a built-in SCSI port, but to add one to an Apple II, you need an expansion card. Third-party SCSI cards do exist, but it's best to stick with Apple's own card to ensure compatibility with the majority of software and hardware. If you really want to build on the cheap, you can save yourself some money by buying a third-party card, but be prepared for potential problems.

If you buy the Apple II SCSI Card, make sure it contains the revision C EPROMs (Erasable, Programmable, Read-Only Memory) and the Apple II SCSI Card Utilities software, which comes on both 5¼- and 3.5-inch disks.

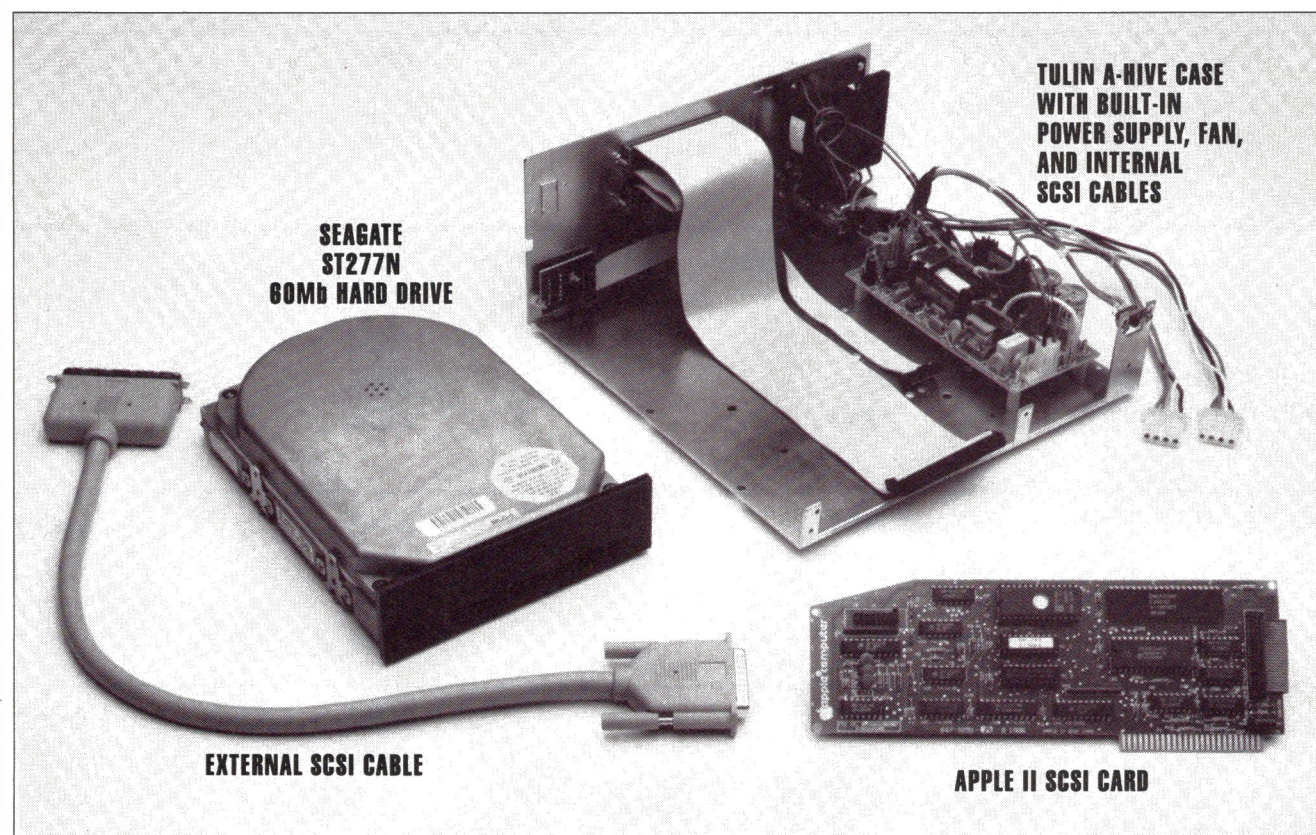


Figure 1: Components you will need for building your homebrew hard drive



# HARD DRIVE

## Hard-Disk Mechanism

Buying a "raw" hard-disk drive is not as difficult as you might imagine. Hundreds of mail-order outfits offer inexpensive RLL and MFM hard-disk drive kits, mostly for the IBM PC and compatibles. These are not SCSI drives, but you can convert them with an adapter (see "Adapting an IBM PC Drive" sidebar). You'll have a far easier time, however, if the drive you buy is "SCSI-embedded."

As long as you get a SCSI-embedded drive, it doesn't matter if it's full- or half-height, or uses 5¼- or 3.5-inch platters, as long as your housing unit and power supply are adequate. The most readily available SCSI hard-disk drives are the ones manufactured by Seagate Technology (see table below).

**O**n a strict dollar/mega-byte ratio, the ST277N is a best buy, at roughly \$450. This 5¼-inch model can hold 60 megabytes (Mb), has an access time of either 28 or 40 milliseconds (depending on the model), and requires 13 watts of power to operate. Although we use the ST277N as the example in this article, most of the information applies to other SCSI drives as well.

## Power Supply

Power supplies designed for use with a hard-disk drive generally accept 120-volt alternating-current input and have a standard four-pin connector that outputs both +5 and +12 volts of direct current. The wattage of the power supply you need depends on the drive you buy. It's a good idea to get a power supply that outputs at least twice the wattage that your drive requires. Then if you decide to add a second drive to your system later, you'll be able to tap the existing power supply rather than having

to buy another. When you order a power supply, make sure it comes with mounting hardware and rubber feet. Also, a power supply with an in-line fuse protects any connected equipment from serious damage.

## Housing Unit

A hard-disk drive is a delicate device that you don't want to leave exposed to the elements, so a housing unit is necessary. Many generic metal boxes for electronics hobbyists will suffice, but it's best to get a case designed to hold a hard-disk drive. It should have predrilled holes for mounting hardware and knockouts for cables, indicator lights, and other gadgets.

Insist on a case with room enough for your drive, power supply, and internal fan. A fan is essential to prolong the life of the

components. The A-Hive from Tulin Corporation is an excellent off-the-shelf solution that combines a 30-watt power supply, cooling fan, and internal SCSI cabling preassembled in a large metal case.

## Cables

The last ingredients you need are the cables for attaching the drive to the Apple II SCSI Card. The drive has a 50-pin male connector (see figure 2), whereas the card has a DB-25 female connector. You could connect the drive directly to the card with a single custom cable, but doing so would defeat the daisy-chain feature of SCSI, and an inadvertent pull on the cable could damage the drive. Instead, buy an internal cable that connects to the 50-pin connector on the drive and has a standard 50-pin SCSI connector (similar to a Centronics paral-

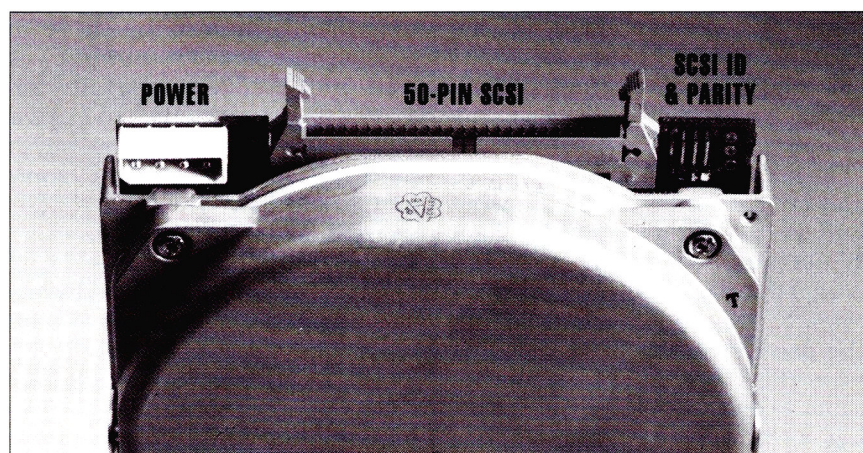


Figure 2: The three connectors on a Seagate ST277N drive

## SEAGATE TECHNOLOGY SCSI HARD-DISK MECHANISMS

Product Information	ST138N	ST157N	ST225N	ST251N	ST277N
Formatted Capacity (megabytes):	32	48	21	43	64
Access Time (milliseconds):	28	28	65	40	40
Power (watts with termination):	12	12	16.8	13	13



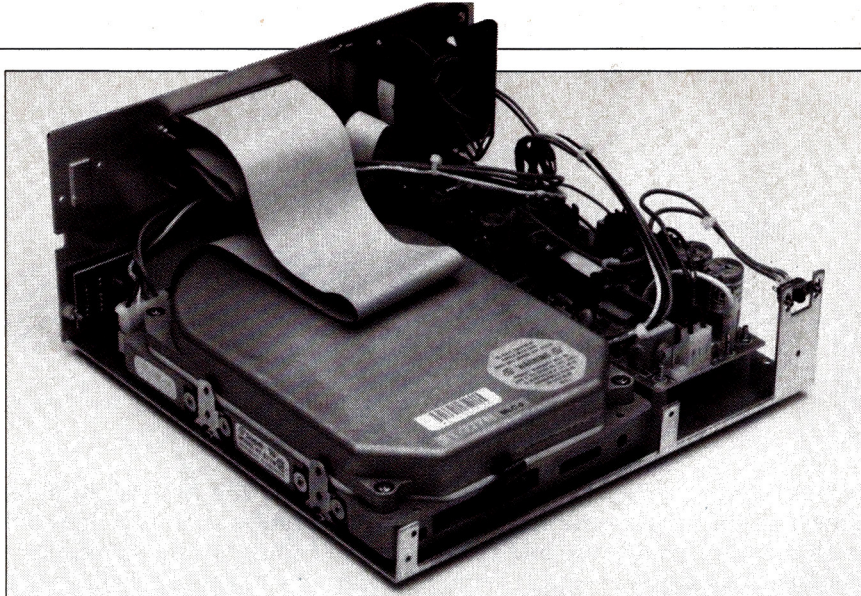


Figure 3: The Tulin A-Hive preassembled case. Shown here with a 60Mb Seagate drive, the case can accommodate two 5 1/4-inch, half-height drives.

lel-printer connector) on the other end that you can mount on the back of the housing unit. Then get a normal external SCSI cable to link the Apple II SCSI Card's DB-25 connector to the 50-pin connector on the case.

#### Putting It All Together

Once you've acquired the building blocks, assembling the components into a working hard-disk drive should take less than an hour. As with all delicate electrical devices, always carefully handle the drive by the metal frame or casting. Do not touch any of the components or connectors on the drive or SCSI card without first discharging static on a grounded object such as the power supply in the computer.

Install the power supply, fan, and internal cables in the housing unit if they didn't come built in. While the power supply is still unplugged, attach the internal SCSI cable to the 50-pin connector on the drive. Then connect the plug from the power supply to the receptacle on the drive. If you are using a Tulin A-Hive, connect the small 14-pin cable to the SCSI drive-select jumpers, which enables you to change the drive's ID number via DIP (Dual In-line Package) switches on the back of the case (see figure 3). These connectors should line up with corresponding numbers or notches on the drive. Now plug the power supply into a standard wall outlet and turn on the unit. The fan should start spinning, and the

drive will make some funny noises as it comes up to speed; if this doesn't happen, immediately turn off the power and scrutinize all of the connections.

Once you've verified that the drive assembly is correctly powered, turn it off and plug your Apple II SCSI Card into a vacant slot in your computer (also turned off) and run the external cable from the card's DB-25 connector to the 50-pin Centronics-type connector on the back of the hard-disk drive's case. Don't mount the drive or close up the housing unit just yet; wait until you've successfully formatted and partitioned the drive. You may have to make some minor modifications or move some jumper blocks on the drive to reset its SCSI device number.

#### Formatting

Now that your hard-disk drive is assembled and plugged into your computer, it needs a "low-level" format—which is quite different from an operating-system format—to prepare the disk surface to accept data. You must perform a low-level format before any operating system can recognize the drive as a valid storage device.

Get your hands on a copy of either HD Format or SCSI Hacker. Both of these ProDOS 8 programs are in the public domain and are readily available, with documentation, on most commercial information services and many local bulletin boards. Apple IIGS owners

should also get DiskTimer GS, a companion program to SCSI Hacker that helps determine the optimal interleave factor, increasing the drive's performance. With an Apple IIGS, depending on the drive you have, you may be able to use the Initialize feature of the Advanced Disk Utility program that came with GS/OS (see figure 4), but you won't get the opportunity to specify the interleave ratio. Likewise, don't bother trying to initialize the drive directly from the Finder when the dialog box appears saying that GS/OS can't read the drive. It simply won't work.

Once you've done the low-level formatting according to the instructions of the program you've chosen to use, partition the drive, using the SCSI HD Partitioning

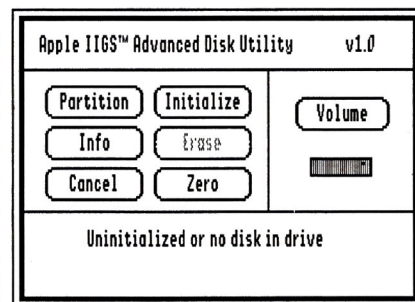


Figure 4: Apple's ADU might be able to do a low-level format of your drive, but it's not the best solution.

## COST COMPARISON

### Homebrew 60Mb Drive

Apple II SCSI card	\$99
External SCSI cable	39
ST277N hard-disk drive	450
Tulin A-Hive case	119
(with power supply, internal SCSI cable, and fan)	
Power cord	4
Formatting software	<u>FREE</u>
<b>TOTAL:</b>	<b>\$711*</b>
<b>Price per megabyte:</b>	<b>\$11.85</b>

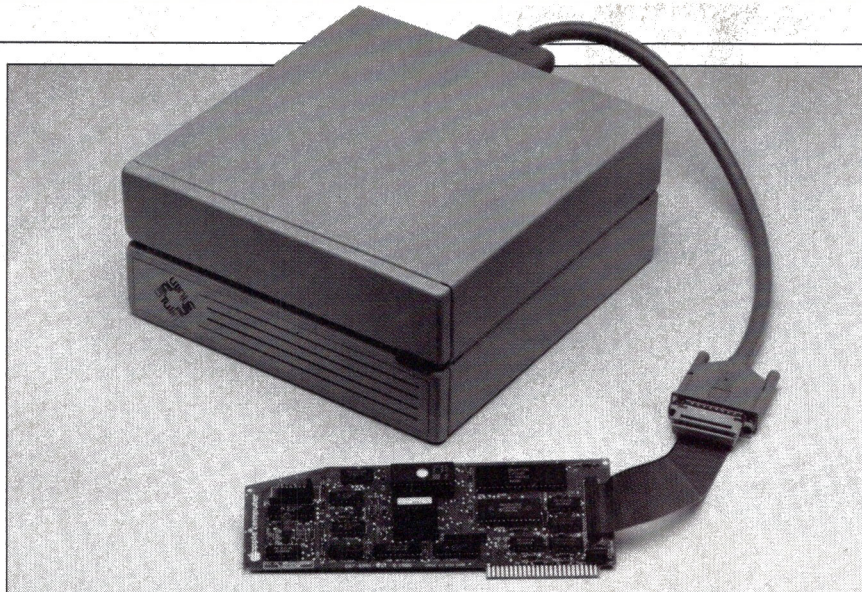
\*Typical "street" price as of March 1989

### Commercial 40Mb Drive

Apple Hard Disk 40SC	
(with SCSI card, external cable, and terminator)	
<b>TOTAL:</b>	<b>\$1,508**</b>
<b>Price per megabyte:</b>	<b>\$37.70</b>

\*\*Apple suggested retail price as of January 1989





**Figure 5:** The fully assembled homebrew hard drive needs only an Apple II SCSI card to work in a II Plus, IIe, or IIGS.

utility on the Apple II SCSI Card Utilities disk or the Partition feature of GS/OS's Advanced Disk Utility. Partitioning one large drive into several smaller virtual devices allows you to use the entire storage capacity of the drive (ProDOS imposes a volume-size limit of 32Mb). Now perform an operating-system format on the drive with a ProDOS utility such as the Finder, System Utilities, or Copy II Plus.

### Fill 'er Up

Once you're satisfied that you have successfully assembled, formatted, and partitioned the hard-disk drive to your liking, turn off all power, carefully mount the drive, and close the case (see figure 5). Congratulations! It's now time for you to start reaping the benefits of all your hard work by filling that great big hard disk with programs and data (see "How to Hard Disk" in this issue). **+**

## ADAPTING AN IBM PC DRIVE

**T**he widespread availability and competitive pricing of IBM PC hard-disk drives make it a buyer's market. You can convert most drives conforming to the prevalent ST506/412 standard to a SCSI device by using a separate host-adapter card from Adaptec (\$125 and up). Some drives are also bundled with a controller card that plugs into a slot in an IBM PC. Since you won't need this item, buy a drive that comes separately to save money. (The Seagate ST277R, for example, is a 60Mb RLL drive costing approximately \$380.)

Several different Adaptec interface cards are designed to handle the different types of hard-disk drives. The function of each card is to format the drive and translate its native signals into the SCSI protocol. The ACB-4000A works with MFM (Modified Frequency Modu-

lation) drives. If you have a drive that is RLL (Run-Length Limited—a higher-density format), you need the Adaptec ACB-4070.

AppleWorks versions 2.0 or greater do not work with any Adaptec ACB-4XXX series. If you can't live without AppleWorks, you need the ACB-5500 host adapter, which is a bit faster and has connections that let it translate for up to four drives instead of only two.

If you get a virgin ST506/412 drive with absolutely no formatting, you may not be able to do the required low-level formatting with any of the commonly available Apple II programs. Instead, you must use a more sophisticated Mac utility, such as SCSI Installer, available for \$50 from Carl Nelson & Associates, 4327 Rucker Avenue, Everett, WA 98201, to tell the Adaptec card some vital information about such parameters as drive size, bad blocks, and step rate. —TM

## FURTHER INFORMATION

### Source for hard-disk mechanisms

Hard Drives International  
1208 East Broadway Road  
Suite 110  
Tempe, AZ 85282  
(800) 234-3475

### Manufacturer of Adaptec controllers

Adaptec, Inc.  
691 South Milpitas Blvd.  
Milpitas, CA 95035  
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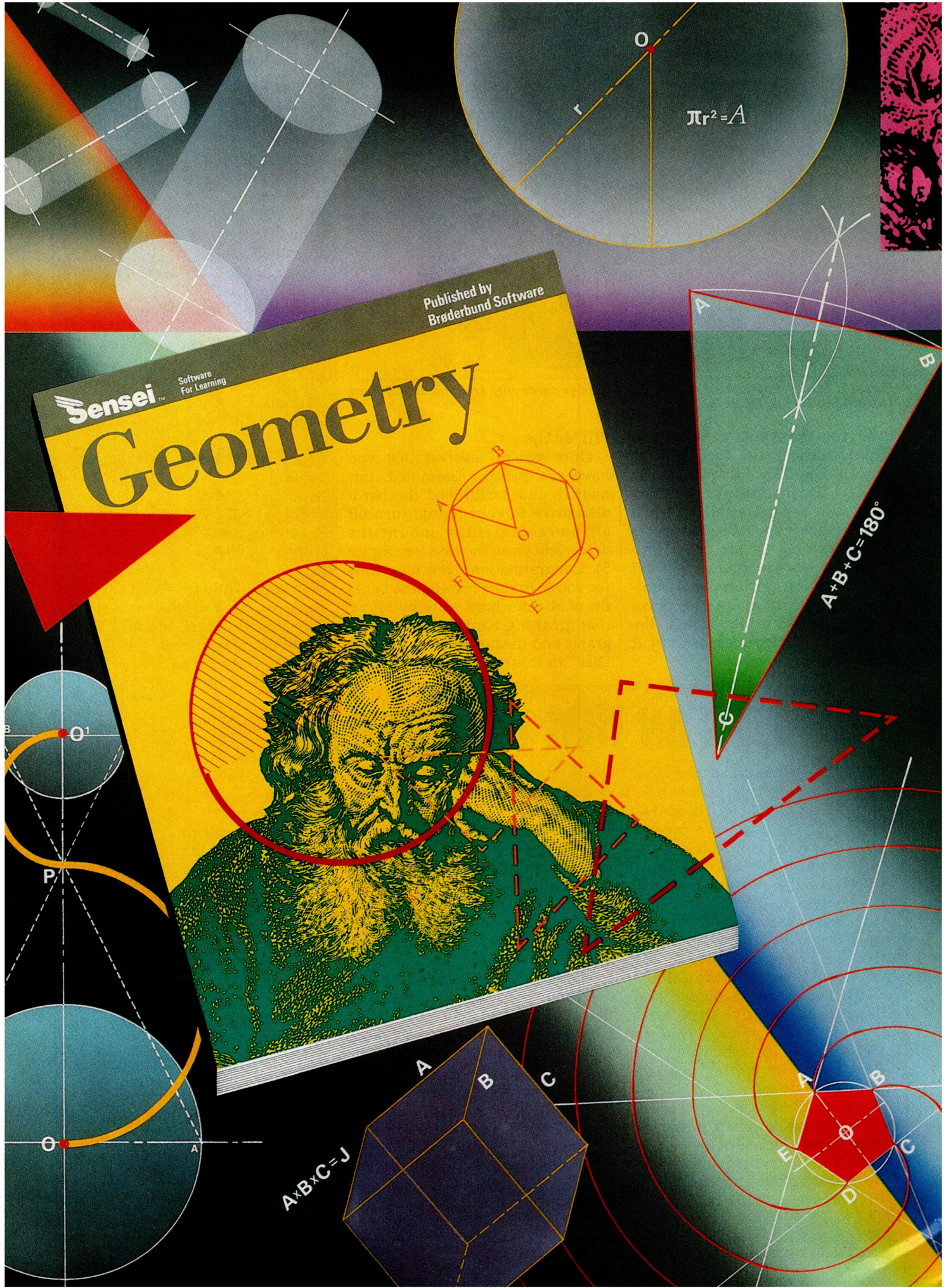
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*Tim McGraw is a Washington, D.C., writer. Owen W. Linzmayer is A+'s technical editor.*

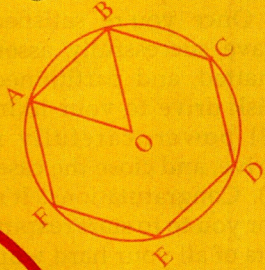




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# Geometry



$$A \times B \times C = J$$

$$A+B+C=180^\circ$$

$$\pi r^2 = A$$



# A NEW ANGLE ON

# Geometry

**G**eometry, for the Apple IIGS, was designed by Sensei Software and published by Brøderbund. *Sensei* means *master* or *teacher* in Japanese, and the team of Michael Coffey, Gene Kuechmann, Stephen Patrick, Tomi Pearce, and Loring Vogel are masters of a difficult art. They tackle tough subjects—geometry, physics, calculus—to create richly interactive, technically impeccable computer courseware.

## Features

Although the program is designed to simulate a book, Geometry is no mere electronic page turner. You advance through each chapter by clicking on the turned-up lower right-hand corner of each page, or you can go directly to any topic by clicking on the corresponding entry in a detailed index.

Each chapter is structured as an alternating series of tutorials and problems. By making a selection on the Options menu, you can choose to see only the tutorials or only the problems, but normally students work with both, so that is the default setting.

The chapters follow a modernized version of the classic geometry curriculum:

1. Points, Lines, and Planes
  2. Congruence
  3. Parallel Lines
  4. Parallelograms
  5. Similarity
  6. Right Triangles
  7. Circles
  8. Areas of Polygons
  9. Areas and Volumes of Solids
  10. Coordinate Geometry
- As an example of how Geometry

works, let's tackle chapter 8, "Areas of Polygons." After loading the program (which takes a few minutes), we open the chapter by selecting it on the pull-down Subject menu. The title page shows some pulsating polygons, so we must be in the right place. By clicking on the dog-eared "page corner" in the lower right-hand corner, we turn to page 1.

Each chapter of Geometry begins with several pages of postulates, or definitions, and theorems, which are statements that can be logically proven with postulates and previous theorems. Chapter 8 starts out with five pages of postulates and theorems.

They include the definitions for area, area addition, area congruence, and rectangle area, as well as the parallelogram area theorem, triangle area theorem, and trapezoid area theorem. Beside each theorem is a small green button labeled Proof. Clicking on this button opens a window containing the proof, a series of statements and reasons that uses standard symbols and abbreviations ordered according to formal rules that prove the theorem. After reading over each proof to be sure that we understand it, we put it away by clicking in its close box.

Page 6 has the first problem: Find the area of a parallelogram, given that the height is 3 and the base is 5. That's a snap: Multiply the height times the base to get 15.

The bank of buttons in the lower left corner of the page is *not* a calculator, although it looks like one. It's simply a numeric keypad for entering your answer with mouse-clicks. You can also use the keyboard, if you prefer.

If your answer is correct, a dialog

*A program that  
sets a new  
math-courseware  
standard for  
high schools*

box pops up to congratulate you. If your answer is wrong, the dialog box encourages you to try again. In either case, you must click to continue. Each page of problems is actually an inexhaustible stack, or set of similar items—the program continues to

present new problems for practice until you click to advance to the next page. This convention can be confusing at first—a determined student may keep plugging away at almost identical questions for a long, long time. It's self-paced learning—once you feel comfortable with your understanding of the concept, move on.

Page 7, a new problem: a trapezoid. Find the area given the height and the two base lengths. Uh-oh. I've forgotten how to do this kind of problem—Pull down the Help menu and select Hint. A dialog box pops up to suggest First identify the height and the two base lengths. That doesn't help me; I don't remember the proper formula to use. Pull down the Help menu again and select Reference to get a page of background information. Ah—the page that defines the area of a trapezoid pops up in a window, and the Brain



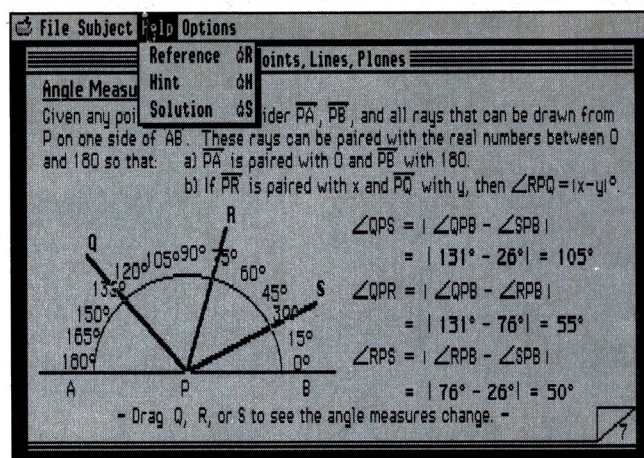


Figure 1: Pulling down the Help menu gives you the option of asking for a hint, a page of background information (Reference), or the solution to your problem.

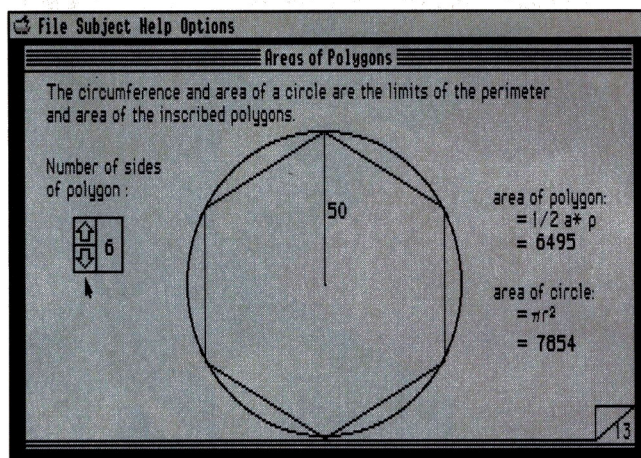


Figure 2: One of the program's 39 animations demonstrates that as the number of sides of an inscribed polygon increases, its area grows closer to the area of the circle.

Fog suddenly clears: half the product of the area and the sum of the two bases!

As a last resort, you can ask the Help menu for the solution. Geometry has no way of distinguishing errors in arithmetic from errors in understanding the problem, but it's comforting to know that the Right Answer is never more than a mouse-click away (see figure 1).

Page 9 begins a new topic, the tutorial on regular polygons. There's a classic interactive animation on page 13: A triangle (area = 3248) is inscribed in a circle (area = 7854). As we click on an up-arrow, the triangle becomes a square, then a pentagon, a hexagon, and so on. As the number of sides of the inscribed polygon increases, its area grows closer and closer to the area

of the circle (see figure 2). By the time we reach 60 sides, the area has become very close indeed. What a clear demonstration of the mathematical concept of limits!

The lesson ends on page 18, a problem page. The only indication that you've reached the end is that the page-turning button turns gray and you can't advance the page. Of course, the lesson never really

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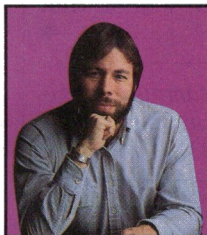
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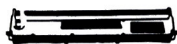


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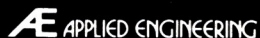
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ends—you can stay and practice as long as you wish.

Translating Geometry to the IIGs from the more powerful Mac required one compromise: the Proof module, which let students construct and test their own proofs of theorems, had to be eliminated. On the other hand, the program gained a bit of ornamental color (running Geometry with a monochrome monitor, however, would not mean losing any instructionally significant information). The sound capabilities of the IIGs are not exploited—a reasonable design decision for a program intended for classroom or library use.

There are 39 simple animations, such as the one in the tutorial on regular polygons, that help to clarify difficult concepts in a direct, interactive way. For example you can rotate, invert, and drag triangles to explore the concept of congruence, and you can experiment with a perpendicular line to see that it is the shortest distance from a point to a line.

Although many of the problems require simple arithmetic, the program has no built-in calculator. I had no difficulty installing a simple New Desk Accessory (NDA) calculator on the Apple menu, since there is plenty of room on the System disk. I would recommend that most users do the same.

Geometry has the best printing capability I have ever seen in tutorial software. The System disk includes a Classic Desk Accessory (CDA) for quick screen dumps to an ImageWriter. The File menu has a Print Page selection and the standard Choose Printer dialogue. You get beautiful results on a LaserWriter, especially for overhead transparencies, and the printouts from an ImageWriter are certainly good enough for classroom use.

#### Customizing

A teacher can customize Geometry to match the textbook and order of topics used in class. Most textbooks use the "classical" sequence, but those published by Houghton Mifflin use a "simplified" presentation. The choice is a simple matter of clicking on the appropriate button in a dialog box.

Buyers of the school edition or lab pack also receive a 32-page illustrated teachers' guide, with a detailed content analysis and many

helpful suggestions for using the program.

Geometry is a huge program on three 800K disks. Disk 1 is Apple's ProDOS 16 System disk (v. 3.2). Disk 2 includes the first five chapters of the course (791K of program and data), and disk 3 includes the last five chapters and the key-disk copy-protection scheme (793K). If you are using disk 2, you are prompted to briefly insert disk 3 to verify its authenticity. A set of backup disks is available for \$15.

#### Evaluation

The 28-page illustrated *User's Guide* explains the program menus and options and provides clear instructions for using the program with a hard-disk drive or RAM disk. Since the program makes extensive disk access, a RAM disk speeds things up considerably, but it has to be a memory-slot RAM disk created from the IIGS Control Panel. I was unable to run Geometry from a RAM card in slot 7.

Geometry's authors resisted the tendency toward "dumbing down" educational material, which has gone so far toward eroding the mathematical competence of Americans. The program uses big words and presents tough concepts. For many high school students, the reading level of Geometry will be a challenge, but the online Help and the smooth user interface will be a delight. No computer program can ever replace a human teacher, or a good textbook, but programs such as Geometry set a new and very high standard for computer-aided instruction. This package belongs in the software library of every high school that owns an Apple IIGS. +

*Mike Markowitz is a computer engineer and has been writing about Apple II computing since 1983.*

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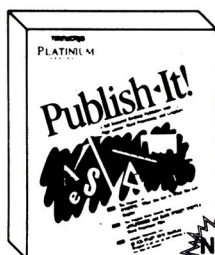
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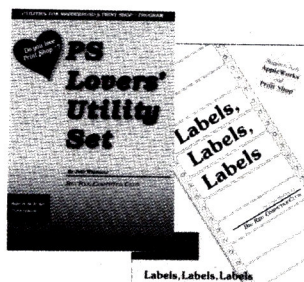
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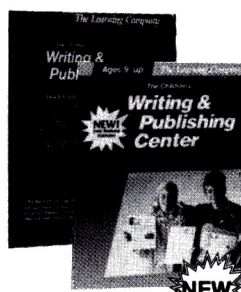
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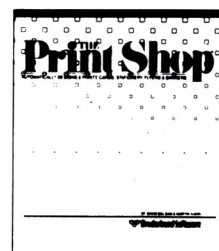
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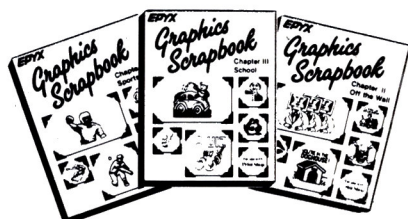
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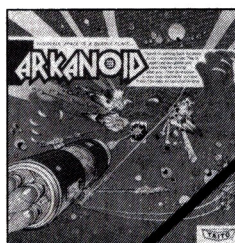
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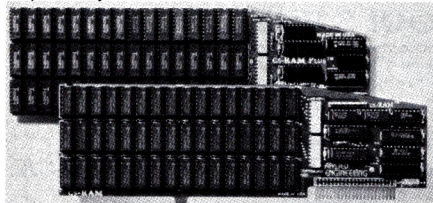
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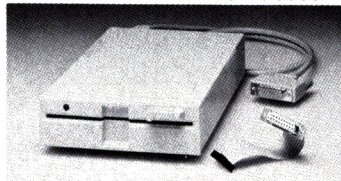
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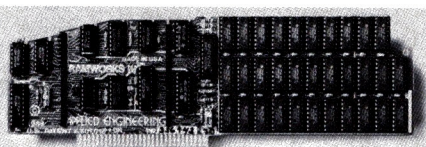
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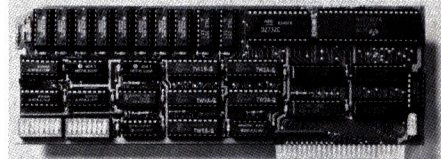
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# Talking with

*Cross-Works lets you exchange spreadsheet, word-processing, and data*

A word you hear a lot these days is "connectivity." Everyone wants to connect their PCs to their Macs, their Macs to their mainframes, and their mainframes back to their PCs again. Some pundit coined the term *connectivity* to refer to all this networking, linking, interfacing, and communication.

Can your Apple II be a part of

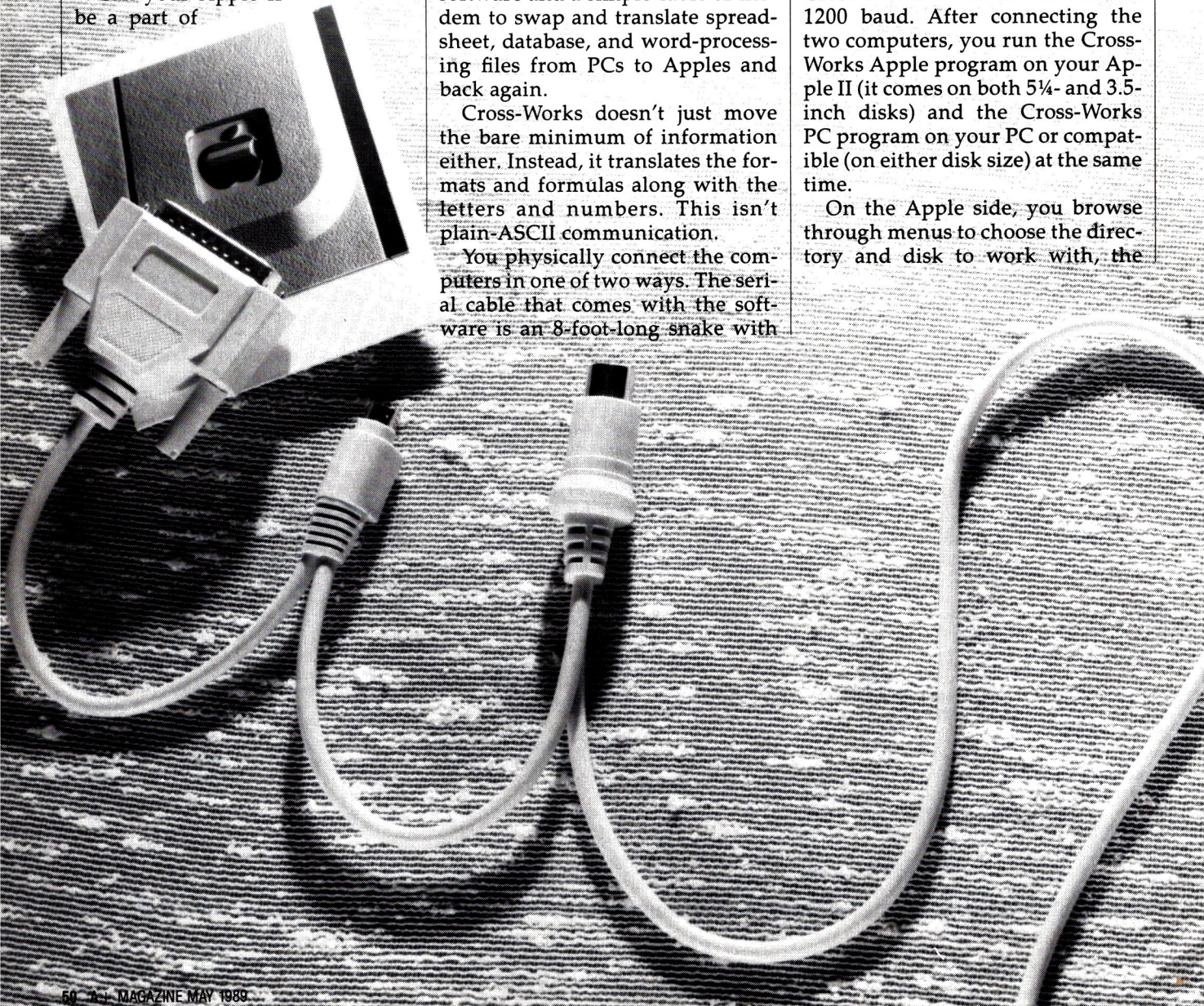
this information sharing? Yes. Several programs and peripherals let you run PC software (see cover story, August 1988) or read PC disks on Apple II computers and vice versa. In each case, information moves from one system to another mainly as ASCII (text) files. Now another connectivity tool—called Cross-Works—is available. It uses software and a simple cable or modem to swap and translate spreadsheet, database, and word-processing files from PCs to Apples and back again.

Cross-Works doesn't just move the bare minimum of information either. Instead, it translates the formats and formulas along with the letters and numbers. This isn't plain-ASCII communication.

You physically connect the computers in one of two ways. The serial cable that comes with the software is an 8-foot-long snake with

9- and 25-pin connectors on the PC end (for both common serial ports) and three Apple connectors (IIe, IIc, and IIGs) on the Apple end. It allows data transfers at 19,200 baud with an error-detecting protocol to ensure accuracy. The alternative is to have both computers connected to modems and then to use the telecommunication routines built into Cross-Works to move the files at 1200 baud. After connecting the two computers, you run the Cross-Works Apple program on your Apple II (it comes on both 5¼- and 3.5-inch disks) and the Cross-Works PC program on your PC or compatible (on either disk size) at the same time.

On the Apple side, you browse through menus to choose the directory and disk to work with, the





# Strangers

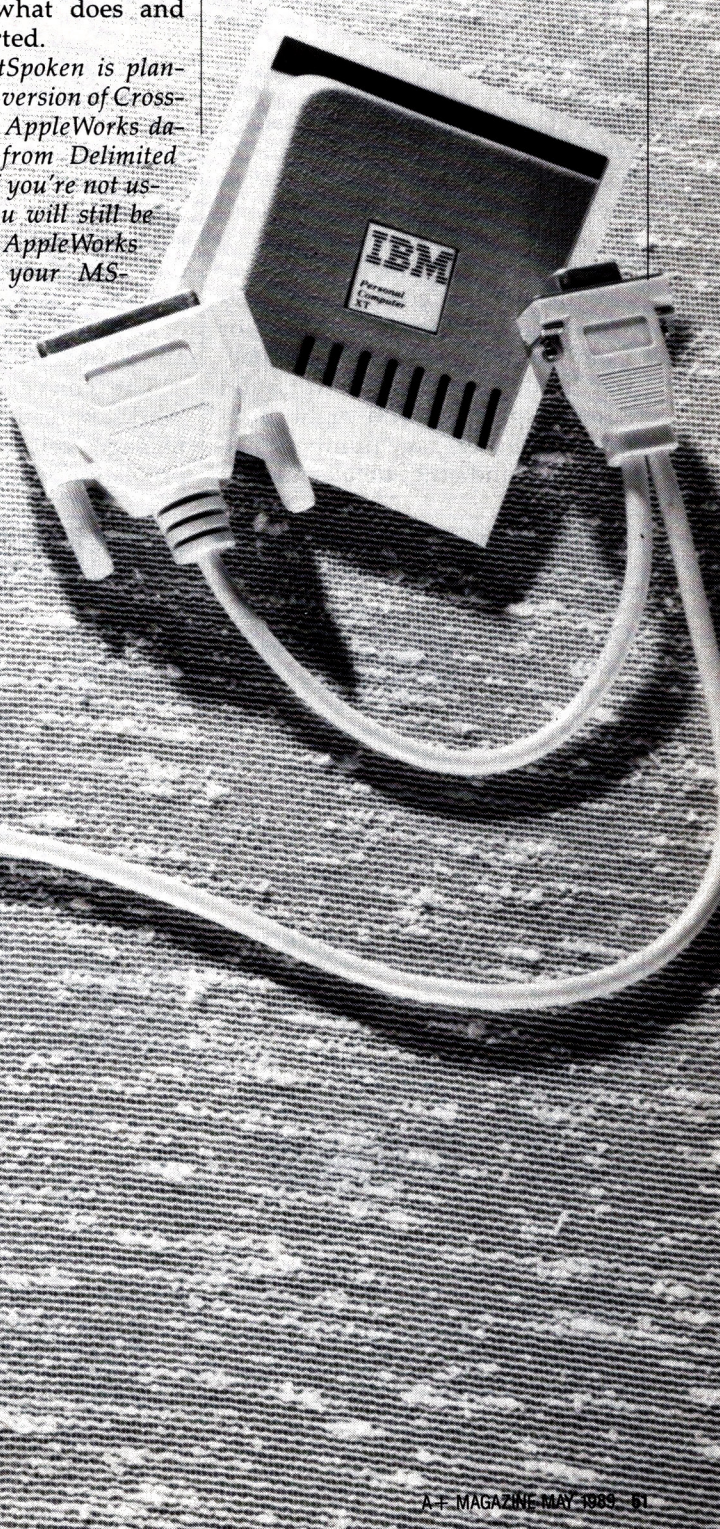
*files between IBM PCs and Apple IIs*

files to move, and whether to send or receive files. Menus on both the Apple and PC sides let you select modem communication, dial a number, hang up the phone, auto-answer, work in the Chat mode, and set the communications speed and port.

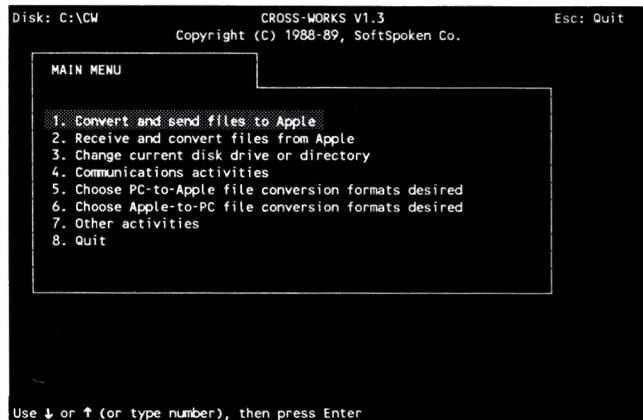
All of the file translation, from the Apple program formats to IBM formats or the other way, actually occurs within the IBM machine and software (see figures 1-4). Cross-Works is fluent in AppleWorks—spreadsheet, database, and word processor—and in the standard MS-DOS business programs: Lotus 1-2-3, dBASE III+, and WordPerfect. It can also move plain ASCII files, adapting them for the proper environment (IBM or Apple), but it doesn't accurately or completely translate all details of the files, because different programs don't have all the same fea-

tures and formats. Cross-Works' manual specifies what does and does not get converted.

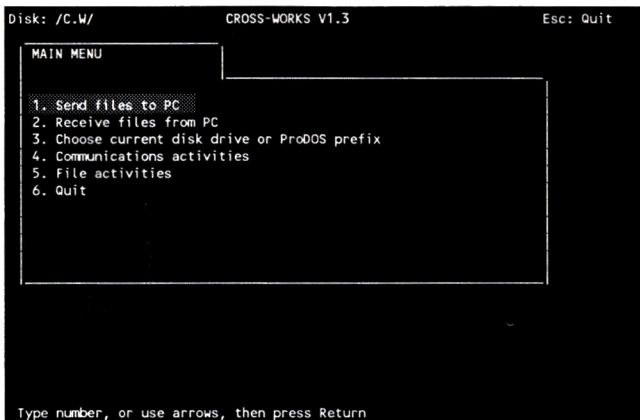
*[Editors note: SoftSpoken is planning to release a new version of Cross-Works that converts AppleWorks database files to and from Delimited ASCII text files. So if you're not using dBASE III+, you will still be able to swap your AppleWorks database files with your MS-*







**Figure 1: In Cross-Works all of the file conversion, regardless of the direction of the file transfer, occurs on the IBM PC.**



**Figure 2: The software on the Apple II side of the connection can send and receive files, but does not handle their conversion.**

DOS database. The new version will also allow you to convert files on your IBM PC to Apple format. You will be able to upload these files to bulletin boards or use them with programs such as Match Point and PC Transporter; you won't have to send them directly to an Apple II.]

Cross-Works converts AppleWorks word-processor files to or from WordPerfect 4.2 files. Boldfacing, underlining, subscripts and superscripts, left and right margins, centering, page numbers, justification, and other details make it

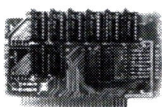
from AppleWorks to WordPerfect, but mail-merge information does not. Going the other way, centering, boldfacing, underlining, subscripts and superscripts, and margins make the trip, but many of the sophisticated WordPerfect features don't (including redlining, auto-footnotes, multiple columns, table of contents, numbered paragraphs, and mail-merge).

The conversion from AppleWorks' spreadsheet to Lotus 1-2-3 manages cell formats, labels, data, protection, ranges, and operators

such as @AND, @OR, @SUM, and @LOOKUP. The manual warns you "never to use any translated spreadsheet for important financial calculations until you have thoroughly verified proper operation using known data" because of "subtle differences" between the different programs. Some operations may have the same name and yet behave differently in the two programs. Still, getting most of the formulas is better than just getting a stripped ASCII or DIF file. On the route from Lotus 1-2-3 to Apple-

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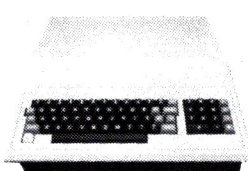
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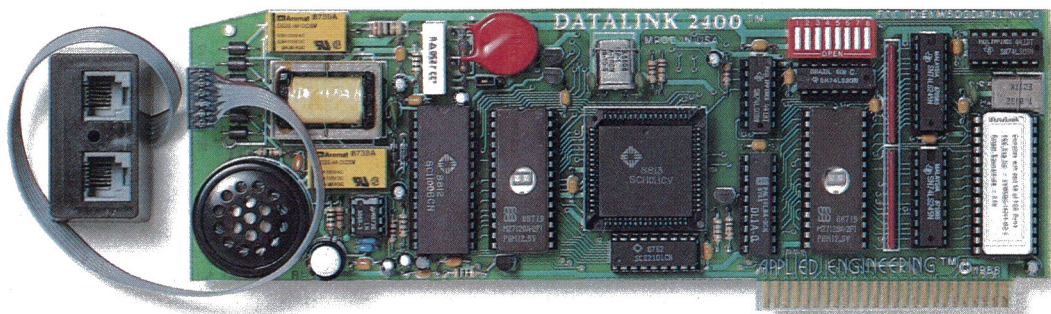
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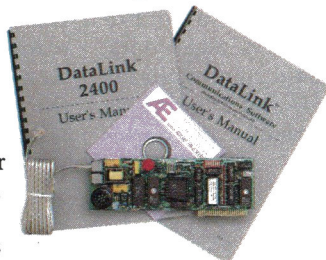


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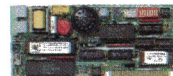
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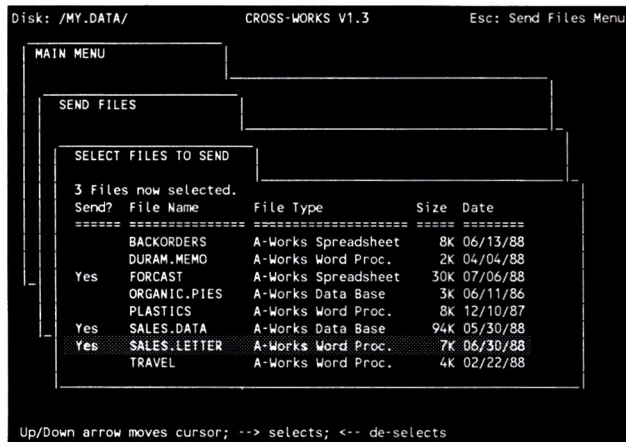


Figure 3: Depending on the direction of the transfer, the IBM software presents you with a menu of conversion formats.

Works, labels, formats, ranges, and many operations are retained, but a host of other 1-2-3 operations (including @PMT, @DATE, @ISS, and @HLOOKUP) are not. The manual has a long list of tips on how to manage this conversion because of the large number of 1-2-3 features that have no close relatives in AppleWorks.

As far as databases are concerned, AppleWorks database files heading for dBASE hold numeric, text, date, and time data, as well as

category names, but all report formats are lost. The program also handles other differences, by truncating AppleWorks' 20-character category names to dBASE's 10-character maximum, for example, and using dBASE fixed fields instead of AppleWorks' variable-width fields. You can move dBASE III files to AppleWorks with numeric, text, date, and Boolean data, as well as with field names. Index files, memo fields, and report formats are lost, as are any categories

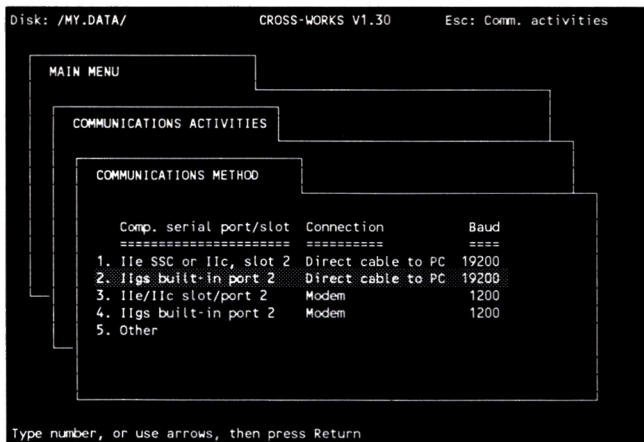
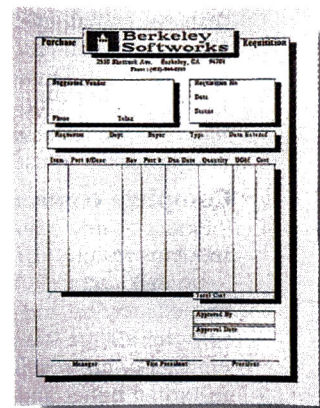
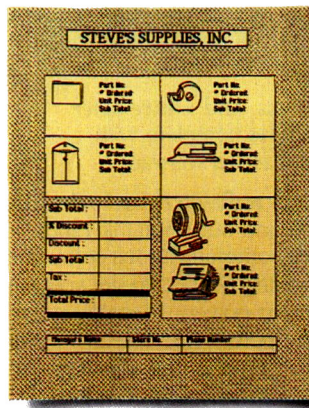
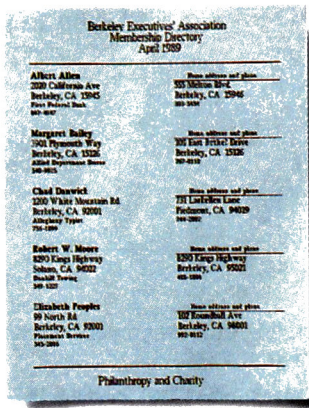


Figure 4: You can configure Cross-Works to transfer files between an IBM PC and an Apple Iie/c/GS/c+.

after AppleWorks' maximum of 30, and dBASE II files don't get translated at all.

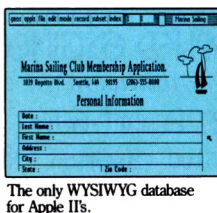
File translations are fast (from 3 or 4 seconds to 15, depending on the size of the file) and automatic if you have the proper file types. Make sure to rename the DOS files with a .WP (WordPerfect), .WK1 (1-2-3), .TXT (ASCII), or .DBF (dBASE) extension if you want the conversion to be smooth. I puzzled over this step for a while but had no more problems after I remembered



# FINALLY, A DATABASE THAT

No matter how good you think they are, most databases—including yours—do little more than drone out drab drifts of data. Which is why you should know about geoFile, the only database that stores and manages your data—including graphics—exactly the way you use it.

You see, geoFile™ is as much a desktop publisher as it is a powerful database. So you can store, display and print any or all of your data—



even graphics—any way you like. Which means instead of simply stamping out facts and figures, you can design your own forms and layouts, using imported clip art or built-in fonts, styles and fill patterns. Even entering your data is a snap. Just click your mouse or joystick and “fill in your form.” That's it.

## MAKING APPLEWORKS WORK HARDER.

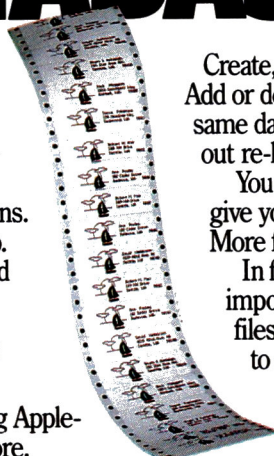
With geoFile, you can do everything AppleWorks can do, and much, much more.

Create, change and store layouts. Add or delete fields. Even drop the same data into different layouts without re-keying.

You still want more? Okay, we'll give you more. More characters. More fields. More records.

In fact, you could automatically import your largest AppleWorks files and still have plenty of room to spare.

Best of all, geoFile integrates completely with the entire GEOS system,





I also had some trouble getting the modem option to work: Cross-Works on the Apple couldn't get my Apple Personal Modem 1200 to respond. The tech-support people at SoftSpoken didn't know just what was wrong, nor did they have direct experience with this particular Apple modem. They did have a list of suggestions, however, including checking the Control Panel and the modem settings. Apple's tech-support people for the modem assured me that the model was Hayes-compatible—the only requirement for Cross-Works—and also suggested checking the Control Panel settings. It didn't help. Finally, I used a Prometheus Promodem 2400 with the IIGS (using the very serial cable that came with Cross-Works) and another Hayes modem with the PC. The transfer went smoothly, just as it did with the direct connection, although a bit more slowly.

probably be able to use them even if you or your "connectivity" partner use some other PC word-processing program. The database-translation facility is also nice, although I haven't had too much trouble moving standard ASCII files from databases before. Still, retaining more information should be helpful, especially with large databases.

# VITALS

## STATISTICS

A "connectivity" package that lets you transfer files between IBM PC and Apple II computers


Apple IIe/c/gs/c+ or Laser, 128K RAM, one 5¼- or 3.5-inch disk drive, AppleWorks required, ProDOS 8, not copy-protected; IBM PC, XT, AT, PS/2, or compatible; 192K RAM; one 5¼- or 3.5-inch disk drive; one serial port; DOS 2.0 or greater

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spreadsheet user as far as file format goes. Standard DIF files do a pretty good job of moving the basics of a spreadsheet, however, and I'm not sure how much or how soon I want to trust the Cross-Works conversion, which may inadvertently add or subtract subtle meaning from formulas. That's not a criticism of the program—AppleWorks and 1-2-3 just don't share some important features, so you can't fully convert files from one to the other. Certainly Cross-Works can save you some keyboard time by retaining the cell formats, column widths, and what formulas it does understand.

Cross-Works is fast enough and certainly cheaper than some of the other Apple II/PC connectivity options. If you're moving from the Apple II to the PC or just want to stay on speaking terms with PC-using friends, Cross-Works can provide the basics. **+**




[illegible]

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 Registration Number: 103-610704

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 Membership District: 115  
 Club: 103-610704

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[illegible]

FEATURE	GEO-FILE	APPLE-WORKS	BANK ST. FILER
Fields per record	115	30	50
Chars per field	250	80	80
Records per file	35,000	Limited by memory	
Maximum file size	700K	Limited by memory	
Include graphics	YES	NO	NO
Fonts & Styles	YES	NO	NO
Computed fields	YES	NO	YES
Display formats:			
Dates & Times	YES	YES	YES
Numbers	YES	NO	NO
Calculations	YES	NO	NO
Auto Import of AppleWorks files	YES	N/A	NO

All of which not only makes geoFile more fun to use, but a heck of a lot more practical, too.

So if you're looking for a database that's more than just a base for your data, consider geoFile.

**SYSTEM REQUIREMENTS:** Apple IIc, IIc Plus, IIe (or compatibles; IIe need not be enhanced), II GS, with 128K memory, double hi-res graphics capability, joystick or mouse, 5-1/4" or 3-1/2" disk drive.

geoFile is not copy protected and includes easy to use manual, sample clip art. 5-1/4" disks (3-1/2" disks available).

**geoFile** \$69.95 To order call 1-800-443-0100 ext. 432 (California residents add 7% sales tax.) \$4.50 US/\$7.50 Foreign for shipping and handling. Allow four to six weeks for delivery. GEOS, geoFile, and Berkeley Softworks are trademarks of Berkeley Softworks. Apple IIe, IIc, IIc Plus, IIIGS, AppleWorks and Bank St.



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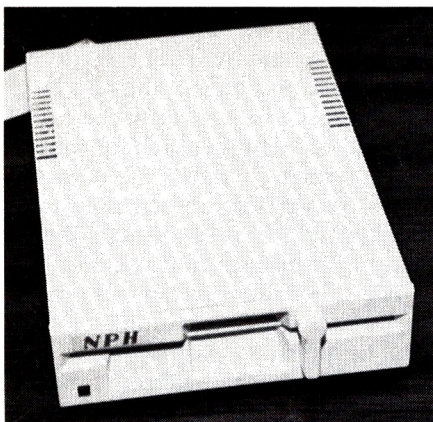
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# PROTERM

*A remarkably complete telecommunications program*

**P**roTERM version 2.1 is a complete telecommunications program that beginners will find easy to use and experienced users will find loaded with desirable features. The program uses pop-up windows, accessible with one or two keystrokes, to list the options you can select (see figure 1). These windows are created with MouseText characters, so you must have an enhanced IIe or a IIc, IIGS, or IIc Plus to display them properly. The program does not offer mouse control.

To call another system, you select its name from a scrolling dial list of up to 28 systems. If you call more than 28 systems, you can create and link together additional dial lists.

Before dialing, ProTERM displays a list of your system's parameters. You can modify them or dial (see figure 2).

You can send and receive individual files, using ASCII, Christensen, XModem, XModem ProDOS, XModem DOS, or XModem CRC. YModem, ZModem, Kermit, and Transit let you transfer groups, or batches, of files. You select the protocol you want from a scrolling list. The Binary II option automatically compresses or extracts files as they transfer.

ProTERM's scrollback feature, a continuous-capture buffer, stores in memory all the information that appears on your screen. The size of the scrollback buffer depends on

the amount of memory available in your system, but it can be as large as 2.5Mb. You can copy portions of the scrollback buffer to the editor, print it, or save it to disk.

## The Editor

The program's text editor has the editing and printing capabilities of a word processor. With commands similar to those of AppleWorks and AppleWriter, you can move, copy, find and replace, save, and print text. The only function that is missing is a cut/copy operation for text that is less than a line in length.

The print module gives you full control over margins, headers and footers, justification, lines per page, underlining, and bold printing and lets you send control codes

## Main Menu

D = Dial a system	H = Hang up the phone
O = Online parameters	M = Macro editor
S = Send a file	R = Receive a file
C = Copy buffer	K = Clear copy buffer
V = View copy buffer	G = Print copy buffer
W = Write copy buffer	T = Type disk file
J = Print disk file	N = Show connect time
A = Autosave to disk	P = Toggle printer
Q = Control show	U = Unattended mode
Z = Catalog pathname	L = Load in a file
E = Enter the editor	F = Exec a macro file
Y = Issue DOS commands	B = Send break signal
I = Install hardware	X = Exit ProTERM

Arrows enter scrollback 1-8 activate macros  
 OA-Ctrl-P Print Screen OA-Ctrl-T Toggle Line

Figure 1: ProTERM's main menu. The program uses pop-up windows to list the options you can select.

## System Parameters

System Name: CompuServe  
 Phone Number: 5915415  
 Baud Rate: 2400 Carrier Delay: 30  
 Format: 8N1 X-OFF: ^S X-ON: ^Q  
 Duplex: Full Status Bar: [Yes] No  
 Terminal Emulation: No Emulation  
 Logon Macro: [Off] On Learn  
 Command: **U**ia **C**ontinuous **E**dit **D**ele

Figure 2: Before dialing, ProTERM displays a list of your system's parameters, which you can modify.



to your printer. You can also import AppleWorks files. On-line help is available to guide you through all these procedures.

#### Utilities and Macros

ProDOS commands accessible from within the program allow you to copy, delete, and rename files; create directories; format and catalog disks; and change pathnames. You can save files in either 4K or 32K blocks. The 4K option is ideal for long messages that you plan to send to bulletin-board sys-

tems that have a 4K message limit.

ProTERM allows you to create three different kinds of macros: system, global, and macro files. ProTERM automatically learns a system's log-on sequence as you log onto it manually. The result is a system macro that automatically logs you onto a particular system.

Global macros access specific functions and can be used with more than one system.

Macro files are text files that perform complicated tasks. For exam-

ple, a macro file can log you onto a system, check your mail, retrieve the latest messages, transfer files, and log off—all at any time of the day you choose, all at the touch of two keys.

ProTERM offers terminal emulation, including DEC VT-52 and VT-100 emulation, and an unattended mode that lets you call your system from another computer.

The package includes a 5¼-inch disk, a 3.5-inch disk, and a manual. The well-written 160-page manual devotes a chapter to each of the main program segments.

The appendixes cover topics such as dealing with call waiting, long phone numbers, modem-setup strings, and troubleshooting. The manual also includes a complete list of cable pinouts for the different Apple serial ports.

ProTERM is a complete telecommunications program. It is easy to learn and use but has features that make it one of the most powerful programs on the market today. I plan to make it my own telecommunications program. **+**

*Larrie Easterly is a free-lance writer when he is not working on his tree farm, being involved in a local Apple users' group, or using his Apple IIgs in video productions.*

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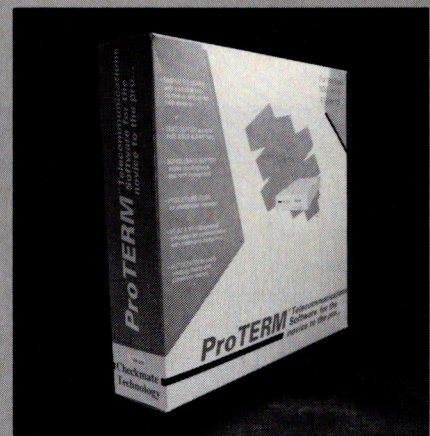
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## VITAL STATISTICS



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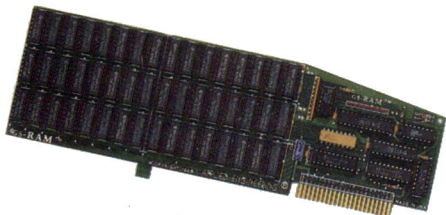


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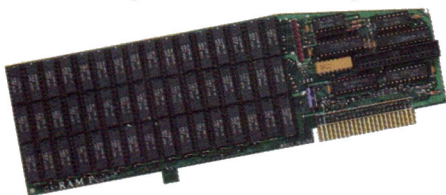
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# 2.

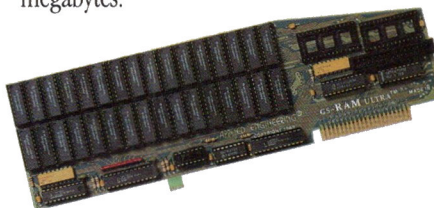
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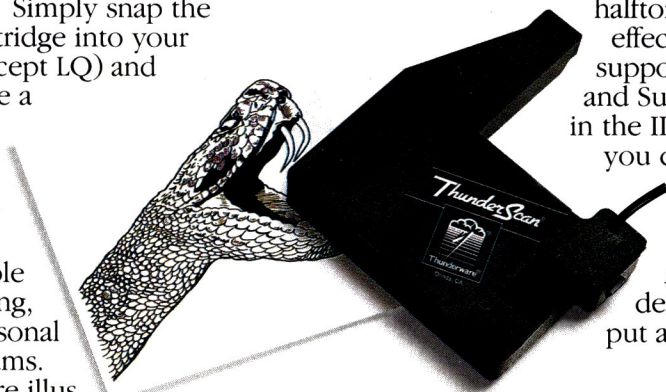
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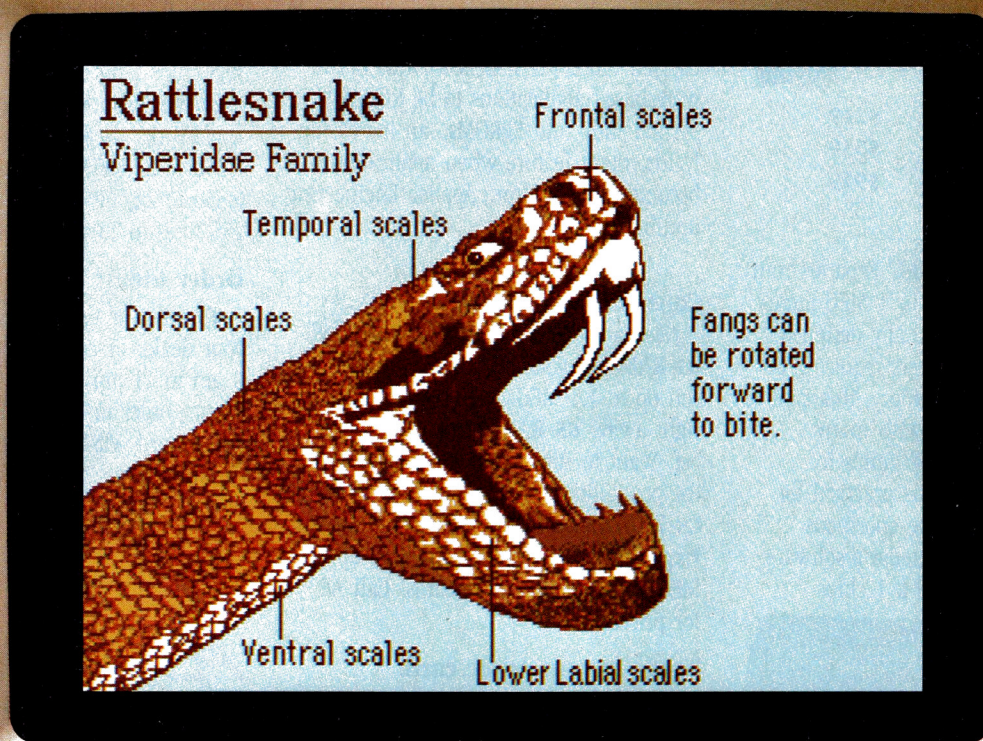
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a variety of paper*

BY ROBERTA SCHWARTZ AND MICHAEL CALLERY

**L**ast month *A+* took an in-depth look at AppleWorks GS. As you may recall, we like this program in large part because it integrates several different functions. This integration provides useful and exciting capabilities. This month we'll start off with a few examples of things you can easily do with integrated software that would be difficult at best to do with stand-alone programs.

- Create visual databases including a digitized image of each item. Just use a digitizer such as ComputerEyes or ThunderScan to capture the images and import the graphics directly into a picture field. If the images need touching up, the graphics module is instantly accessible. A household inventory in a visual database is particularly useful for insurance purposes.

- Encourage your children to catalog their collections, which will assist them in developing good organizational skills. Younger children should enjoy creating databases of their favorite stories and/or nursery rhymes—complete with their own illustrations.

- Making letterhead stationery is a snap. Just create the letterhead in the graphics module, write your letter in the word processor, and integrate the two in the page-layout module. If you use the same letterhead all the time, make a page-layout document with nothing but the letterhead in place and save it

under the name Letterhead. Next time, just open Letterhead and type in your letter. Use Save as to save your letter so that you can reuse the blank letterhead template.

- A family newsletter, with a contribution by each member of the family, can become a tradition, especially at holiday time. Use the page-layout module to format the text and the graphics module to add illustrations as well as digi-

chart. Display it prominently. Perhaps when family members see how much of the monthly budget goes to electricity, they will agree to turn off the lights now and then.

## Clip Art

With a program such as AppleWorks GS, you'll soon be longing for some good clip art. After all, no matter how accomplished an artist you may be, you probably can't draw everything. Figures may be

your forte, but you may be a terrible calligrapher. Some of us can draw impressive letters, but we can't draw animals. Sometimes, too, we may have the skills but not the time.

The biggest problem with clip art is that quite a bit of it is either rather amateurish or forbiddingly expensive. Which brings us to an exciting new product.

## Graphic Images

Graphic Images, an impressive new program from Oltrad Graphics, is a collection of digitized art (see "A Feast for Graphics Gluttons" in "Product Roundup," January 1989). The Apple II ver-

sion, divided into three sections, consists of approximately 100 illustrations. The first section, Printers, Borders & Fonts, in DOS 3.3 format, is compatible with programs such as The Print Shop. The other two sections are in ProDOS 8 format and thus compatible with programs such as Dazzle Draw, Publish It!, and 816/Paint. You'll find borders, letters, and charming old-fashioned winter scenes. Consider-

## PUT YOUR GRAPHICS TO GOOD USE

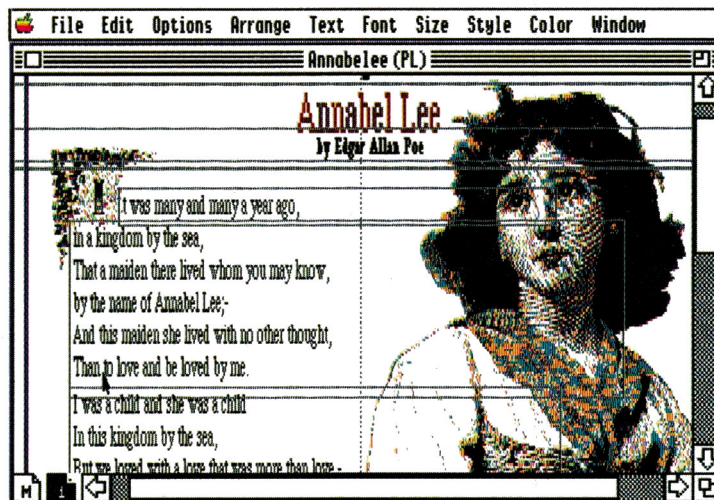


Figure 1: We imported clip art from Oltrad Graphics' Graphic Images into an AppleWorks GS file to create "Annabel Lee."

tized photographs.

- Many school, business, and personal-finance reports benefit from the addition of charts and graphs. Write the report in the word processor, do your calculations and charting in the spreadsheet module, and then use the page-layout module to put it all together.

- Make a family expense report. Enter monthly bills into the spreadsheet module and create a pie



ing the limitations of Apple II graphics, we're amazed at how detailed these images are.

The IIGS version consists of more than 700 illustrations and is compatible with all GS graphics programs that recognize the Apple Preferred Format, such as Paintworks Gold, and AppleWorks GS. We found this collection perfect for AppleWorks GS (see figure 1). The vast array of borders, mortices, old-fashioned vehicles, musical instruments, and illuminated alphabets is super.

### Paper

Any document, no matter how well designed, looks mediocre if it's printed on thin, raggedy paper. Low-cost 20-pound bond paper, the kind you usually find in stationery and computer stores, is fine for test prints and copies that you're storing in the file cabinet. When you're sending these "publications" to colleagues, friends, and teachers, however, you want to make an impression, and quality paper may make the difference.

Lots of different kinds of paper

are available. If you use a dot-matrix printer, rather than a LaserWriter, don't be thrown off if a paper you like is not available in pin-feed format; just use single-sheet friction-feed.

Here's a sampling of the paper we've worked with.

Computer Sensations offers white pin-feed paper with all sorts of colorful border designs, including carousel horses, ships, flowers, clowns, and cats. If you're creating banners, you'll want to check out the company's 36-foot rolls of whimsical banner paper. The rolls have no cross-perforations, so confetti, bears, hearts, and balloons roll on and on.

Regular and pin-feed paper comes in all sorts of colors these days. A particularly good source is Power Up! Software. In its catalog, you find heavyweight (60-pound) and medium-weight (20-pound) paper with clean-edge perforations. Clean-edge means that the paper separates at the perforations without getting ragged ends. The premium colors (cherry red, wild pink, electric blue, brilliant yellow, and kelly green) are really bright, and the pastel colors (winter green, light blue, pastel yellow, orchid, and french vanilla) are elegant. Power-Up! Software also offers matching greeting-card and business envelopes.

One of the most exciting types of paper we've come across is Intergraphix's Quickcolor Formats. This 70-pound-bond, 8½ × 11-inch pre-printed paper allows you to create professional-quality colored brochures. The sheets are colored on two-thirds of the page and white on the other third. Print your report, fold it into thirds, and, voilà, a professional colored-stock brochure. Quickcolor Formats comes in 100-sheet and 500-sheet packages of blue, red, gray, green, and yellow. A 400-sheet rainbow pack (100 sheets of red, green, gray, and blue) is also available, but this paper does not come in the pin-feed format.

Many companies make special paper for use with laser printers. We've tried them all, and we use, and highly recommend, Hammermill Paper's Laser Print paper. The paper is a brilliant white, and its coating makes laser-printer output look superb.

Certificates, fliers, cards, and other special printings look especially impressive printed on textured paper such as parchment. Baudville offers pin-feed and laser-quality parchment paper as well as a quality, water-laid Bahia Blue paper. R&R Direct's catalog of computer supplies offers Pro-Tech Laser Icon-Parchment paper in three colors—ivory, tan, and white—as part of its extensive paper line.

For truly exciting output, check out Letraset U.S.A.'s Copy FX paper. This paper simulates airbrushing with color that graduates from dark to light. The colors are wonderful (vivid blue, green, orange, red, yellow, brown, black), and the paper comes with horizontal or vertical color gradation.

Don't stop here. Experiment. Check out stationery stores, specialty paper stores, and your local art-supply shop. Try different textures and colors. Try different-weight papers. Do be aware, however, that the LaserWriter doesn't print properly on heavily textured paper. Always try a test sheet before spending lots of money on any paper.

With your Apple II computer, a printer, AppleWorks GS, and some interesting paper, you can do most anything. +

## PAPER SUPPLIERS

Computer Sensations  
P.O. Box 3744  
Long Beach, CA 90803  
(213) 434-2655

Letraset U.S.A.  
40 Eisenhower Drive  
Paramus, NJ 07653  
(201) 845-6100

Power Up! Software  
Channelmark Corporation  
P.O. Box 7600  
San Mateo, CA 94403  
(800) 851-2917

Baudville, Inc.  
5380 52nd Street SE  
Grand Rapids, MI 49508  
(616) 698-0888

R&R Direct  
129 South Ludlow Street  
P.O. Box 1702  
Dayton, OH 45401  
(800) 654-7587

Intergraphix Corporation  
260 Corporate Park  
Oak Street  
Pembroke, MA 02359  
(800) 451-2515

## VITAL STATISTICS

### APPLEWORKS GS

An integrated program comprising six modules: word processor, graphics, spreadsheet, database, page layout, and communications

Apple IIgs, 1.25Mb RAM, two 3.5-inch disk drives, GS/OS, not copy-protected  
**PRICE:** \$299

Clarix Corporation  
5201 Patrick Henry Drive  
Santa Clara, CA 95051  
(800) 334-3535 • in Canada (800) 668-8948  
(415) 960-8946

Upgrade information for owners of AppleWorks, MultiScribe, and MultiScribe GS: (800) 544-8554

CIRCLE READER SERVICE NO. 360

### GRAPHIC IMAGES

An impressive collection of clip art in II and IIgs versions

Apple II+/e/c/gs/c+, 48K RAM, one 5¼-inch disk drive, DOS 3.3 and ProDOS 8, not copy-protected; Apple IIgs, 512K RAM, one 3.5-inch disk drive, ProDOS 16, not copy-protected  
**PRICE:** \$29.95

Oltrad Graphics, Inc.  
5100 North Sixth, Suite 139  
Fresno, CA 93710  
(209) 224-2864

CIRCLE READER SERVICE NO. 361



# Stuck with Pinpoint? Trade up to TimeOut

## It's Beagle Bros to the rescue as Pinpoint quits the Apple II market

Back in the old days, PINPOINT was the undisputed leader in AppleWorks add-ons and desktop accessories. In fact, way back then, Pinpoint was the whole show.

Today, Beagle Bros' TIMEOUT series simply blows Pinpoint away in terms of speed and features. Meanwhile, Pinpoint has become somewhat of a dinosaur.

And where is Pinpoint now? Gone. With the dinosaurs. They don't do Apple II anymore.

## Trade up now and save a bundle

Beagle Bros wants to spread the word about TimeOut, and here's an offer that Pinpoint owners just shouldn't refuse. Mail in any original Pinpoint disk and Beagle Bros will send you the corresponding TimeOut software at 50% off.\*

If you already bought TimeOut, send in your original Pinpoint disk and we'll mail you a 2-for-1 software coupon good on your next mail order purchase from Beagle Bros.

## AppleWorks+TimeOut=More features and speed

	Pinpoint Spelling Checker	TimeOut QuickSpell
<b>SPELLING</b>		
Check 1.5 pages from 5.25 disk	8 min 56 sec	23 sec
Check 1.5 pages from 3.5 disk	7 min 22 sec	19 sec
Check 1.5 pages from RAM disk	5 min 42 sec	6 sec
Built-in dictionary size	60,000 words	80,000 words
Word count feature	No	Yes

	Pinpoint KeyPlayer	TimeOut UltraMacros
<b>MACROS</b>		
New AppleWorks commands	0	21
Mouse control	No	Yes
Fully integrated	No	Yes
Powerful programming language	No	Yes

	Pinpoint Graphic Edge	TimeOut Graph
<b>GRAPHS</b>		
Speed in creating a graph	slow	fast
Number of graph styles	8	9
Smart Automatic Scaling	No	Yes
Axes formatting	No	Yes

Note: Graphic Edge does not work inside AppleWorks.

## The Dynamic Duo: AppleWorks and TimeOut

The nice thing about AppleWorks is that it is fast, especially compared to GS integrated software. With AppleWorks, it's Zip—you're at the top of a document, Zip—you're at the end. Searches are fast, printing is fast, and screens are refreshed in an instant. Some GS specific software does work in color (slow color) and AppleWorks doesn't. But then, you can't have everything.

The nice thing about TimeOut is that it lets you use AppleWorks' word processor, data base and spreadsheet like you always do. Nothing seems different until you press G-escape to access a TimeOut application. When you're done, it's back to AppleWorks without missing a beat. With TimeOut, you never leave AppleWorks.

To add TimeOut's features, you update your AppleWorks Startup disk one time only. It's fast and it's easy.

TimeOut does not require a fancy system; it works with any Apple IIGS, IIC, IIC+ or IIe, 128K min. In general, the more memory your Apple has, the faster TimeOut can do its thing. (TimeOut works with AppleWorks v2.0 and v2.1.)

## Four trade-up deals are available:

### TIMEOUT ULTRAMACROS for Pinpoint KeyPlayer

- TIMEOUT ULTRAMACROS gives you one-keystroke commands and mouse control for all three AppleWorks applications.  
(reg. \$59.95, special offer \$30.00\*)

### TIMEOUT QUICKSPELL for Pinpoint Spelling Checker or Pinpoint Document Checker

- TIMEOUT QUICKSPELL proofreads documents up to 50-times faster than Pinpoint. Custom dictionary and word count too.  
(reg. \$69.95, special offer \$35.00\*)

### TIMEOUT GRAPH for Pinpoint Graphic Edge

- TIMEOUT GRAPH quickly converts spreadsheet data into graphs. Nine graph styles with flexible scaling and labeling.  
(reg. \$89.95, special offer \$45.00\*)

### TIMEOUT DESKTOOLS or DESKTOOLS II or POWERPACK for Pinpoint Desktop Accessories

Here are partial feature lists for our multiple-application disks:

- TIMEOUT DESKTOOLS: Calculator, calendar, caps converter, pop-up date/time, dialer, file encrypter, word count, etc.  
(reg. \$49.95, special offer \$25.00\*)
- TIMEOUT DESKTOOLS II: Scientific calculator, disk tester, file searcher, screen blanker, printer-code sender, etc.  
(reg. \$49.95, special offer \$25.00\*)
- TIMEOUT POWERPACK: 36-file desktop, triple-clipboard, word processor sorter, custom help screens, file librarian, etc.  
(reg. \$49.95, special offer \$25.00\*)

\*Plus \$3.50 shipping and your original Pinpoint disk. Trade-ups are available only by direct mail from Beagle Bros. This is a limited time special offer good through June 30, 1989.

## LET'S MAKE A TRADE- PINPOINT FOR TIMEOUT

- ☐ \$30\*+KEYPLAYER for TimeOut ULTRAMACROS
- ☐ \$35\*+SPELL. or DOC CHECK for TimeOut QUICKSPELL
- ☐ \$45\*+GRAPHIC EDGE for TimeOut GRAPH
- ☐ \$25\*+DESKTOP ACCESSORIES for DESKTOOLS
- ☐ \$25\*+DESKTOP ACCESSORIES for DESKTOOLS II
- ☐ \$25\*+DESKTOP ACCESSORIES for POWERPACK
- ☐ \$0+ANY PINPOINT Disk for a Beagle 2-for-1 Coupon

NAME \_\_\_\_\_

ADDRESS \_\_\_\_\_

\*Add \$3.50 shipping (+7% tax in Calif.)

TOTAL AMOUNT: \$ \_\_\_\_\_

Pay by check, money order, or...

VISA/MASTERCARD NO. \_\_\_\_\_

EXPIRATION DATE \_\_\_\_\_

SIGNATURE \_\_\_\_\_

Mail with your Pinpoint disk(s) to:  
BEAGLE BROS, INC. 6215 Ferris Square, Suite 100  
San Diego, CA 92121



*The AppleWorks User's Best Friend*



# SPEAKING OF GRAPHICS GALLERY

## CITYSCAPES

**F**rom the tops of skyscrapers to the bottom of a skateboard, reflections of mobility and city life fill this month's "Gallery." Our teenage artists include Tim Freeman, who was 14 when he created "Trains," Andy Grant and Kevin Kluge.

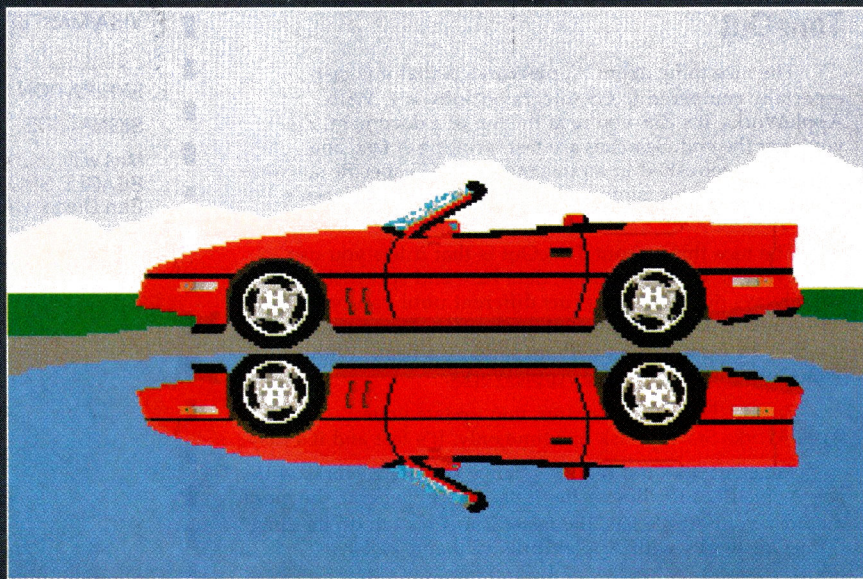
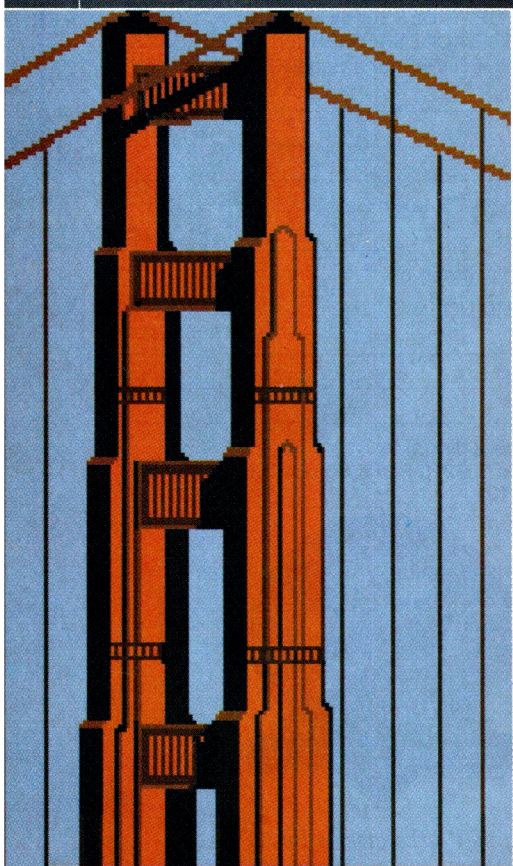
*Artists note: Beginning with the June issue, contributors whose work appears in the "Gallery" will receive an A+ T-shirt, so be sure to include your address and T-shirt size (S-M-L-XL) with your submissions.*



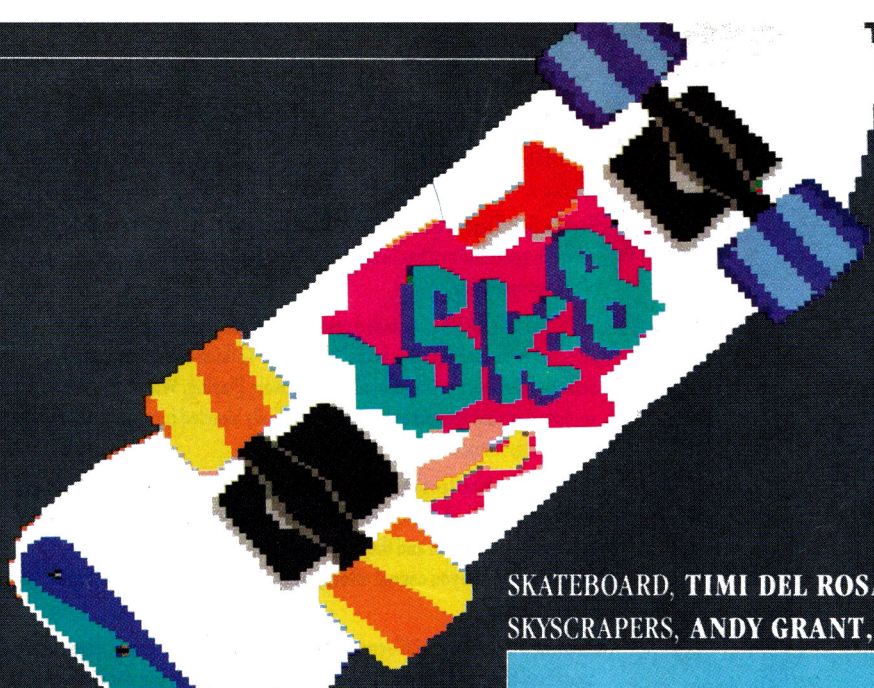
TRAIN, **TIM FREEMAN**, Alden, NY

GOLDEN GATE, **AIRLEE OWENS**, Bandon, OR

CORVETTE REFLECTION, **CHIP DICKINSON**, Thousand Oaks, CA





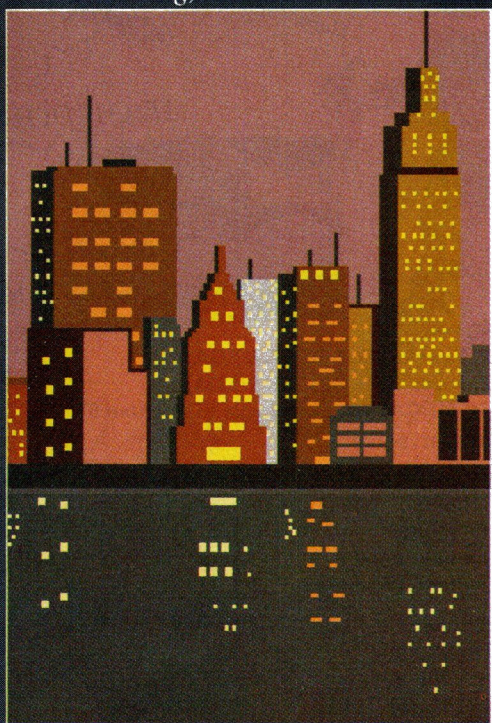


SKATEBOARD, **TIMI DEL ROSARIO**, *Aiea, HI*  
SKYSCRAPERS, **ANDY GRANT**, *Andover, MN*



REBEL, **KEVIN KLUGE**, *Coon Rapids, MN*

SKYLINE, **MARYJANE CUMMINGS**  
*East Galesburg, IL*





## A CATACLYSMIC STRUGGLE BETWEEN GOOD AND EVIL

For the first time, Tolkien's panoramic vision of the cataclysmic struggle between good and evil has been skillfully crafted into a single computer game of epic proportions.

**FIVE MAN-YEARS** of detailed research and programming have been invested to ensure that this is the "definitive Tolkien computer game." Selected elements of traditional Fantasy Role Playing, War strategy, and animated adventure games have been skillfully blended for a unique computer gaming experience.

Follow in the footsteps of Frodo, Aragorn and Gandalf as they battle to get the ring to the Cracks of Doom. Ranged against you are all the evil forces of the Dark Lord Sauron and the corrupt wizard Saruman. The odds are overwhelming, but you cannot afford to fail. The destiny of Middle Earth lies in the balance.

Roam at will across the 36-screen scrolling map of Middle Earth, wherein are contained thousands of digitized locations in which you can control a cast of over 80 animated characters and armies. Test your strategic abilities as you command entire legions to move against the forces of evil.

With the almost infinite variety and multiple layers of play, War in Middle Earth is a game you can finish in days or weeks, or savor for months. It will delight and enthrall, and ultimately become a firm favorite in any software library.

*May your heroic efforts be met with success, and the forces of darkness be vanquished!*

J.R.R. Tolkien's

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MIDDLE  
EARTH

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SCREEN SHOTS TAKEN FROM AMIGA, IBM, APPLE IIGS AND ATARI ST VERSIONS.

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HARADWAITH

Near Harad



# GAMEPORT

BY BOB LINDSTROM

*Electronic Arts produces the ultimate football game, the long-awaited John Madden Football.*

## THE LONGEST YARD

John Madden Football has only just arrived on store shelves, but already it ranks as a history-making product—and not just because it may be the most complex game ever to run on a 64K Apple II computer.

"It smashed the record for development time," Electronic Arts (EA) president and Madden co-designer Trip Hawkins boasts with equal amounts of pride and embarrassment. "The previous record was held by Starflight (an MS-DOS role-playing game),

but John Madden Football went way beyond that."

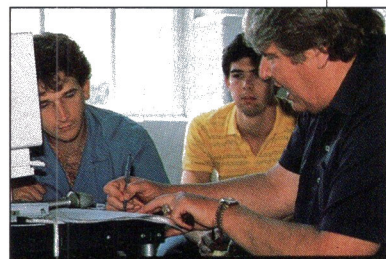
More than four years in the making, Madden Football has been around almost as long as Electronic Arts. In fact, when the first "GamePort" column saw the black of ink in November 1986, this arcade/statistical football simulation had already been in development for more than two years.

EA's determination to produce the ultimate football game has its roots in the youthful Hawkins' first commercial venture. He borrowed money from his father and founded a company to publish a board-based football simulation. Not too many were sold. "We lost all the money," Hawkins admits.

But a year after EA was formed, the young company revived Hawkins' pigskin dreams and began work on a computerized football simulator. The man who drew the assignment to quarterback the effort was programmer/designer Robin Antonick. Like Hawkins, Antonick "had a burning desire" to create a computer football simulation. "I played wide receiver in college, and I can still relive moments that I experienced playing football—they're so vivid."

In spring of 1984, Antonick took a week's vacation "and slept about

six hours that week while I created a prototype on the Apple II that had 22 players." In so doing, he convinced himself and EA that a 64K Apple II "had the horsepower" to do a full-scale football simulation.

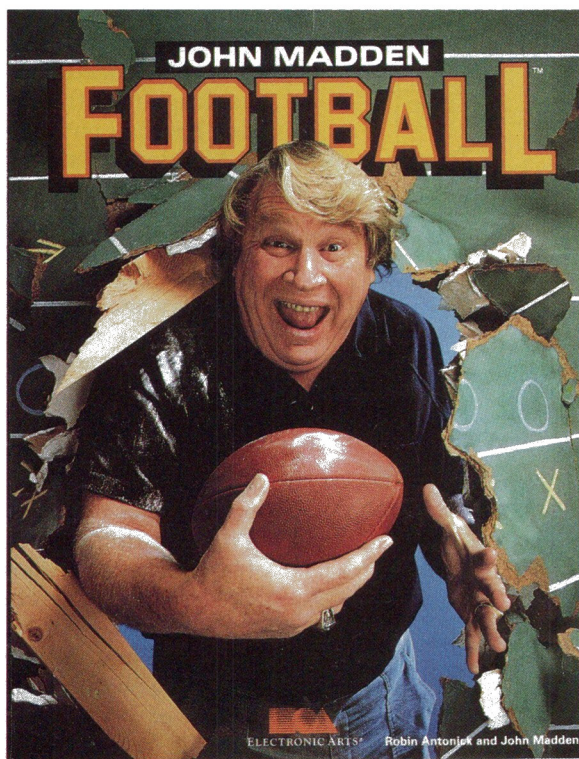


**John Madden and game designer Robin Antonick**

Almost five years later, Antonick notes, "I've probably done enough work on Madden Football to do two or three football products. This is really a third- or fourth-generation product in its first release."

But in exchange for "a large share of [his] adult life," Antonick may have truly recreated the team spirit and cooperation of football. "The soul of Madden Football is that you have a legitimate, honest expression of individual artificial intelligences collectively forming a team. When you're on the field, as often in real life, you can count on your computer teammates to carry out their tasks.

"Most of all," Antonick concludes, "I'm proud that, with a lot of effort





# GAMEPORT GAMEPORT

on EA's part, we've been able to take a physical model and get reasonably close to NFL averages."

To further ensure the authenticity of the simulation, EA enlisted the talents of former Oakland Raiders coach John Madden. On a two-day train ride from Denver to Oakland, aerophobe Madden and an EA team discussed the key elements in Madden's game philosophy: the paramount importance of matchups and field conditions, the caveat to avoid trick plays, and the wisdom of trusting the percentages. What emerged was a hard-headed, logical attitude toward football strategy.

"Madden spent the whole day chewing on a huge cigar that must have been about a foot long. He never lit it, and by the end of the day it was pretty disgusting," Hawkins laughs. But contrary to his colorful public image, "Madden is a real no-nonsense kind of guy, consistent and credible. In the TV ads, he's almost like a cartoon character; he's playing the character of John Madden. In fact, he's not like that at all. He has a genius for organizing and motivating a group."

With Madden's experience as the strategic foundation, the job of creating a game got underway. Like a head coach perfecting his playbook, Antonick tried many unsuccessful approaches before arriving at the final product.

Although it runs on a bare-bones 64K Apple II, Madden Football attempts to have it all in the features department. The game can be enjoyed as an action/strategy game. Grab a joystick and control the ball carrier. Look for an opening and then run wide or pass deep. You're doing the dodging in the running plays and scanning the field for a receiver in the passing plays.

If you prefer the cerebral side of the conflict, leave the joystick untouched. Just coach and call plays. The computer will automatically take

care of directing the on-screen action.

Two players can go head to head, or the computer can function as a Madden-like opponent. For running statistical simulations, the computer can coach both sides with no human intervention. Ten teams come on the disk, fictional imitations of real-life players, including a team of All-Timers and the All-Madden lineup (Madden's personal favorites).

If you don't see what you want on a team, edit your own player statistics. Among the player performance ratings are

individual values for durability, rushing, coverage reading, pass and run blocking, zone coverage, tackling, and interceptions. There are also team ratings for penalties, block/kick avoidance, field goals, and kick length. You can save newly edited teams on your personal data disk. It's a great way to recreate real-life players or create a phony team of full-pad supermen.

The built-in playbook contains 81 plays, designed according to Madden's own by *San Francisco Examiner* sportswriter Frank Cooney, in consultation with the Los Angeles Raiders coach at the time, Tom Flores. You can design, practice, and save your own playbook on a data disk, however. It's as easy as drawing paths and positions on a chalkboard. Then, use that customized playbook against other Madden Football enthusiasts.

Madden insisted that the product be valid as a teaching tool. As a result, players can use the game's Practice mode to test play against play. "It's a great training product," Hawkins states. "After playing with it for so long, I find that I watch football on TV differently. I can instantly spot coverages." While testing plays, Hawkins adds, you learn the strategic differences, for example, between zone and man-to-man blocking or the relative merits of 3-4 and 4-3 defensive formations.

## LAUGHTRACK



"Look, dad! I nuked planet Zorg!"




# GAMEPORT

When the going gets rough, get John going. Consult the big man himself in The Madden Report, a feature that graphs the comparative abilities of two teams in strategic situations such as Long vs. Man and Pressure vs. Blitz.

Could this be the ultimate football simulation? That's up to Apple II sports enthusiasts to decide. But until they do, John Madden Football has a solid front line in midiron simulation.

## TIPSTERS FIELD

We're importing game secrets from across the Pacific Ocean this month. An Wu Meng of Singapore sails this one into the "GamePort":

"In [Sierra On-line's] Hexder . . . you can't just top in mid-air and shoot the lights out of the enemies; you have to come down and get your goose cooked (more often than not) by some weirdo at the bottom . . . But not any more! Now you just have to press and hold any of the number keys on the main keyboard (not the keypad) and you will freeze in mid-air, regardless of whether you are in robot or jet form! The action will continue . . . And best of all, the jet's shots are all pinpointed! Now the robot really flies. Now the jet's VTOL." If you want to hoot while suspended aloft, be sure to hit the 

key before you press a numeral.


For those of you who have been counting pixels trying to precisely find the deck during carrier landings in Brøderbund's Wings of Fury, David Phillips of Rensselaer, New York, proposes a low-tech but effective solution:

"Before you start off, put a small piece of tape at the highest level of your ship's deck. This will help you land and shows you the height of trees, other ship decks, and the maximum height you can drop a torpedo from."

Good proposition, David, so I'm sure our copy editor will forgive you for ending that sentence with a preposition.

If you have a secret game tip, grammatically painstaking or otherwise, let "GamePort" readers know what sneaky strategies you're playing with. (Oops, I did it, too). Ship those tips to: GamePort, A+, 950 Tower Lane, 18th Floor, Foster City, CA 94404.

## FIGHTING OFF THE WOLVES

Contrary to information in the April "GamePort," Taito is not doing an Apple version of its Operation Wolf arcade game. Taito does plan Apple versions of Bubble Bobble (IIE/c/GS/c+), Qix (IIE/c/GS/c+), Rastan (IIGs), and Renegade (IIE/c/GS/c+). 

ADVERTISEMENT

## Flight notes



# 7B

✈ "Hawaiian Odyssey" Scenery Disk - Yes, our new "Hawaiian Odyssey" Scenery Disk puts Flight Simulator and Jet pilots in a tropical paradise! The islands contain many wonderful sights; one of them also contains a mysterious gateway to a fantasyland unlike anything you've ever seen!

The natural beauty of Hawaii adds up to one great Scenery Disk. Our design team did an excellent job of recreating downtown Honolulu and Pearl Harbor on the island of Oahu. Flying into the crater of Mauna Loa, one of Hawaii's most volatile volcanoes, is exhilarating and perfectly safe. The 400-mile long Hawaiian Island chain's distinctive visual details, airports and radio nav-aids make it a perfect complement to all SubLOGIC flight simulation programs.

"Hawaiian Odyssey" also offers the very first structured SubLOGIC Scenery Disk adventure! A number of clues are scattered about the islands. They can be located only by exploring each island at low altitude (and what better way can you think of to pass the time?). These clues will guide you to a very surprising reward; don't let anyone tell you about it ahead of time!



### Top Selling Apple II Products This Month:

1. Flight Simulator II (\$49.95)
2. "Western European Tour" Scenery Disk (\$24.95)
3. Jet (\$39.95)
4. San Francisco Scenery Disk (\$24.95)
5. Scenery Disk # 7 - U.S. Eastern Seaboard (\$24.95)
6. Scenery Disk # 11 - U.S. Northeast Border (\$19.95)
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8. Scenery Disk # 4 - U.S. Northwest (\$19.95)

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# ENTERTAIN

*Holding your own  
on the fairway, in  
the world of sleazy  
deals, and in  
sinister realms.*

## THE DARKER SIDE OF ADVENTURE

You really have to be ready for these. Either you're an amnesiac private detective dying of a mysterious poison, or you're lost in a house that would have been cosy for Jack the Ripper. Either way, you don't want to be slothful or careless—there are too many ways to die!

But perhaps I'm getting ahead of myself (not

a good thing to do if you don't want to meet yourself coming back the other way). I'm talking about three of the best adventure games around: *Deja Vu*, *Uninvited*, and *Shadowgate*. All three are for the IIGs from ICOM Simulations (distributed by Mindscape), and all three share a similar effective interface.

I have to admit that this is not my first encounter with these programs. I first met all three of them on the Macintosh, in black and white. "Ugh," you groan. "B&W is so tacky!"

Yes, but maybe not in this case. I actually grew to enjoy the somber detail of these games on the Mac, and so it was with some trepidation that I entered their colorized rooms and hallways on the IIGs. My feelings were about on a par with my feelings about Ted Turner's colorized old movies—dubious.

I'm pleased to report, however, that the operation was a success. Not

speck of creepiness and mystery. Whether you prefer color is a matter of taste, but the games are at least as good. Try thinking of them as paintings rather than etchings.

We're talking about three different games here, although *Uninvited* and *Shadowgate* are



quite similar. Both involve extremely sinister haunted houses, evil presences, and an unpleasant assortment of creatures and entities. You'll find black magic, hidden doorways, and many other surprises. Basically, once you enter the front door of either *Uninvited* or *Shadowgate*, you can abandon all hope, but don't abandon your Save Game command. You'll need it! In fact, you'll probably want to save the game at several points along the way. Nothing is more frustrating than getting through a long series of puzzles and events, only to find that you've forgotten to bring along that one critical object!

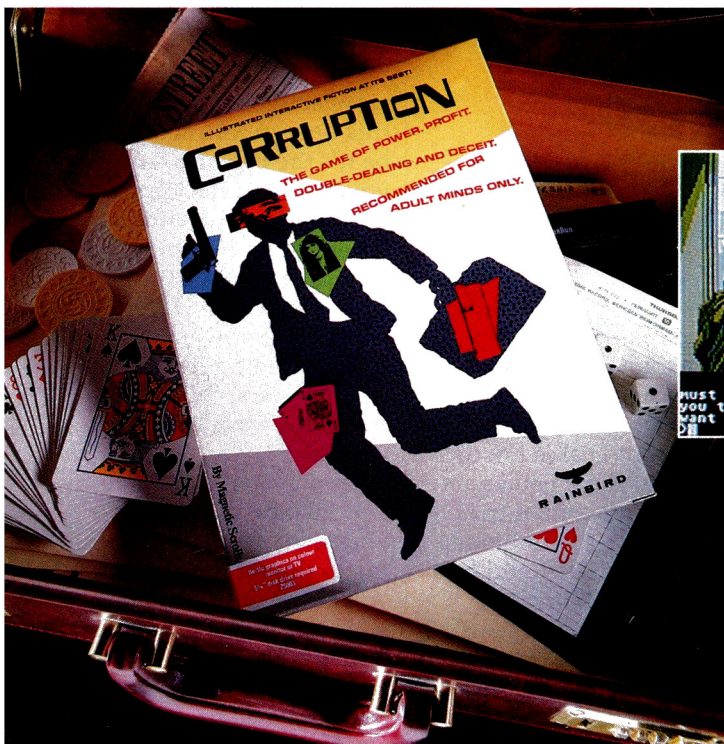
*Deja Vu*, whose subtitle is "A Nightmare Comes True," is a little different. It has the same

only are these games excellent in color, but they have lost not one





# MENT REVIEWS



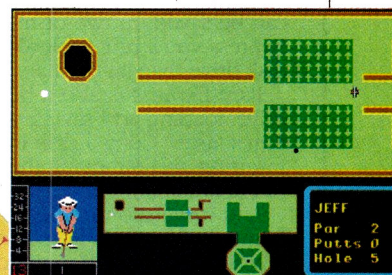
known exits. And, of course, the "action" takes place in the center of the screen. Basic commands



For instance, to unlock a door, you might Operate a key on it. To push a button, you might Operate yourself on the button, and, similarly, to kill a troll with a sword, you might Operate the sword on the troll. Thus Operate covers a lot of ground. Unlike many adventures, this one doesn't make you find just that right word to do something. It's not a matter of choos-

are Examine, Open, Close, Speak, Operate, Go, Hit, and Consume.

Perhaps the most useful command is Operate.



interface, but Raymond Chandler would be more at home here than H.P. Lovecraft. (If that doesn't make much sense to you, then suffice it to say you play a character in a '40s-style detective story.) Not only do you have to discover your own identity, which has been conveniently misplaced, but you are wanted for murder, the mob is after you, and you are slowly dying from an unknown poison. Sound like fun? Well, get ready for some adventures in the city. You'll have to go from sewers to high-rises in your search for truth and justice—and survival. Like the other games, *Deja Vu* is not easy.

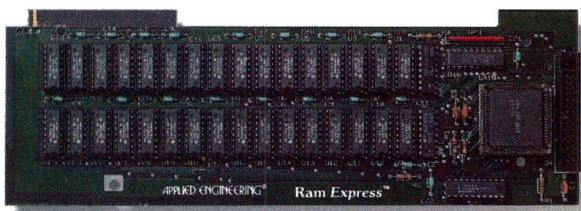


All three adventures work much the same way. You have a series of commands that you choose with the mouse. The objects you carry are in a special window that you can open, resize, or close at will, and you can drag objects from one place to another with the mouse. Another special window displays all





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# REVIEWS

*Once you enter  
the front door,  
you can abandon  
all hope, but  
don't abandon  
your Save Game  
command.*

ing among such words as *get, acquire, or pick up*. If you know what you want to do with something, chances are the game will, too. That is not to say that these games are entirely devoid of trickery or less-than-obvious options. That would be a vast untruth. In fact, these are very devious games, and solving any one of them requires a combination of intelligence, patience, and a bit of good fortune.

This trio is among the best of the graphic adventure games. They are sometimes a little slow on the Apple IIGs (you can speed them up by copying them to a hard disk, if you have one), and they can be obscure at times, but these games are well worth your time if you enjoy mysteries and challenges.

Rusel DeMaria

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Get the feeling you're being set up?

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*Corruption* has its moments of melodrama. Tell the wrong person what you know, and you'll be



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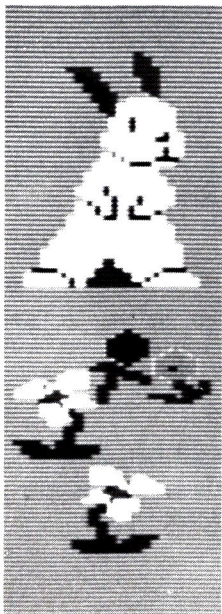
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# REVIEWS

## *Corruption gives you real, grownup problems to deal with.*

arrested, poisoned, shot, or blown up. For the most part, though, the game proceeds in quiet comings and goings, with well-crafted and slightly ironic prose. (The vocabulary is British to the core: The game recognizes *cheque* but not *check*, for instance.)

Corruption is more polite than most American games, asking helpful questions if it doesn't understand what you wanted. And it gives many options. You can play with or without graphics or descriptions, you can abbreviate commands and string them together, and you can save up to eight different stages of play. If you get stuck, 11 pages of encoded hints can help you get going again.

But the game itself doesn't always reflect the care that went into the packaging. Playing with graphics requires some clumsy disk swapping, even with two drives. Some of the hints are too long, and the game can't interpret them, nor can it always recognize abbreviated commands when they're part of a string. And although the game saves and restores smoothly, it hangs when you quit.

Still, Corruption is worth a look. It's billed as

a game "for adult minds only," which is misleading. It only means you have real, grownup problems to deal with: shady business ethics, lack of courage, a failed marriage. Younger players may have difficulty sustaining interest in the game. Older players know only too well how real that ticking clock can be.

Tad Davis

### CORRUPTION

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## GOOD GREENS ON SCREEN

Isn't it an amazing coincidence? After years of being overlooked by the software industry, miniature golf, the once ubiquitous suburban entertainment, has inspired not one but *two* new games for the Apple IIgs. But rather than being in competition with each other, the two games, Zany Golf and Mini-Putt, are different in intent and execution and are just possibly aimed at different audiences.

Written by Will Harvey and his design team, Sandcastle, Zany Golf is a graphic tour de force; a fantasy miniature-golf game of the mind, possible only on a computer screen. The nine holes of



# REVIEWS REVIEWS

***Zany Golf is a graphic tour de force; a fantasy miniature-golf game of the mind, possible only on a computer screen.***

a traditional miniature golf course are now nine increasingly difficult levels of an eye-popping arcade game. Each level is so beautifully detailed and cleverly executed that you will not rest easy until you have seen them all. The outer game box shows you partial screen shots of the Hamburger Level (yes, it has a bottle of squirting ketchup), the Pinball Level, the Magic Carpet Level, the Castle Level, and the absolutely awesome Energy Level. Not pictured are the Windmill Level, the Fans Level (with its rotating fans to whoosh the ball along its path), the moving Walls Level, and the Ant Hill Level (where the hole changes position without warning). A whimsical musical score composed by Douglas Fulton accompanies the action and contributes immeasurably to Zany Golf's fun.

The object of miniature golf is to sink the ball into the holes, using the fewest number of strokes possible. Every hole has a predetermined par value

representing the maximum number of putts it should take you. In Zany Golf, you start out the first hole with five strokes. If you get the ball into the hole in fewer than five, the remaining strokes move to the next hole, giving you extra chances to complete it. On any level, if you use up all your strokes and haven't gotten the ball into the hole, the game is over, and you must start over from the first hole. One to four gamers can compete by alternating shots, each player using a different-colored ball.

Harvey & Co. have provided ways to earn bonus strokes, and they promise a secret hole (which I have not seen) if you play all nine levels in par or better. You can also play the Secret (tenth) Level, if you can find the trapdoor that leads to it. As with any arcade game, practice makes perfect, and I predict you will wear out your mouse pad trying.

A distinct contrast to the high-pressure arcade-game world of Zany Golf, Mini-Putt has the look and feel of real miniature golf. It's a strategy-oriented, leisurely, thoroughly craftsmanlike enterprise, ideal for those who want to enjoy a computer game without feeling like a wimp because they can't get past the first level.

Mini-Putt has four separate nine-hole courses (Traditional, Deluxe, Challenge, and Classic).

***Mini-Putt is a strategy-oriented, leisurely, thoroughly craftsmanlike enterprise.***

Although every hole has a par value, you can play each course through, no matter how many strokes you take to get the ball into the hole. Each completed hole receives an individual score, and you get a total at the end of the course. Once you have seen all 36 holes on the four courses, you replay Mini-Putt to achieve a lower score. As with Zany Golf, up to four golfers can play at once.

The holes' design is colorful and well thought out, with only a few animated accoutrements on some. Of course, one of the holes has a windmill (I guess no miniature-golf game is complete without one), and several holes have water traps and other dastardly ways for you to use up strokes. Putting the ball with the mouse is a bit more complicated in Mini-Putt than it is in Zany Golf. In Mini-Putt, one click of the mouse controls the force with which you hit the ball, and an extra click ensures the accuracy of your shot. But before you shoot, you must carefully consider the terrain, with its slopes and breaks indicated by arrows on the playing

field. Mini-Putt is challenging, but it is not tough.

If you happen to be in a computer store and you pick up the box for Mini-Putt, don't let the promotional material on the cover fool you. The lively copy says things like "Mini-Putt. The wackiest miniature golf game in the world! Mini-Putt . . . tests your sanity . . . Can your nerves take it? . . . Straitjacket not included," as if you should play it with a bottle of Valium handy. To my mind, this hyped-up commentary misrepresents a perfectly fine game. In fact, the second paragraph of the copy reads, "If you're looking for a lighthearted and relaxing miniature golf game for your computer, then you're holding the wrong box, duffer." Wrong, Accolade. "Lighthearted" and "relaxing" are perfect ways to describe Mini-Putt's considerable charms.

Donald Oliver

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# SMARTPORT

*Where to find answers to  
your Apple II problems*

BY OWEN W. LINZMAYER

**I**t's going to happen to you someday—I guarantee it. You'll sit staring at the computer monitor with glazed eyes, trying to figure out how to get that stupid program to work with that blasted hardware. Stop! Before you tear out your hair or punch out your computer, read the rest of this column. Only after you have exhausted all the following suggestions should you seriously consider putting the computer out of your misery.

## **Before You Buy**

The first step toward retaining your sanity is to make sure any product you're thinking of buying will do what you want with the hardware and software you already own. Ask retailers for demonstrations and check with manufacturers about system requirements, compatibility, and warranties. Don't part with any of your hard-earned cash until you are confident that a product is going to live up to your expectations or that you can return it for a refund.

## **Register**

Once you've taken the plunge, register the product immediately. Almost every software and hardware package contains a registration card, but, according to numerous publishers and manufacturers, very few customers bother to register purchases. Neglecting this step may be a costly mistake, for several reasons. Some firms, as a means of discouraging piracy, refuse to provide technical assistance to unreg-

istered users. You may call a help hot-line, only to be admonished for not sending in your card.

Furthermore, many companies rely on registration cards to contact owners in the event of a bug fix or upgrade. Central Point Software, for example, often adds new parameters to its popular Copy II Plus utility and then offers the new version to registered users. You can

original disks and work with these backups, never the master copies. Most productivity software is not copy-protected, so making backups is a simple matter of using the Finder or System Utilities. Before you even attempt to make a copy, be certain the original disk is write-protected to guard against erasure.

Backups are your first line of defense against having something—

physical damage or viral infection (see "Terminal Illness," April 1989)—go terribly wrong with your software on disk. As long as you keep the original disk in pristine condition, you can always use it to make "control" copies. That is, if a program you've been using for a while suddenly starts acting flaky, see if the problems clear up when you work with a fresh copy. If that's the case, the fault lies with the copy you've been using, not the program or system configuration.

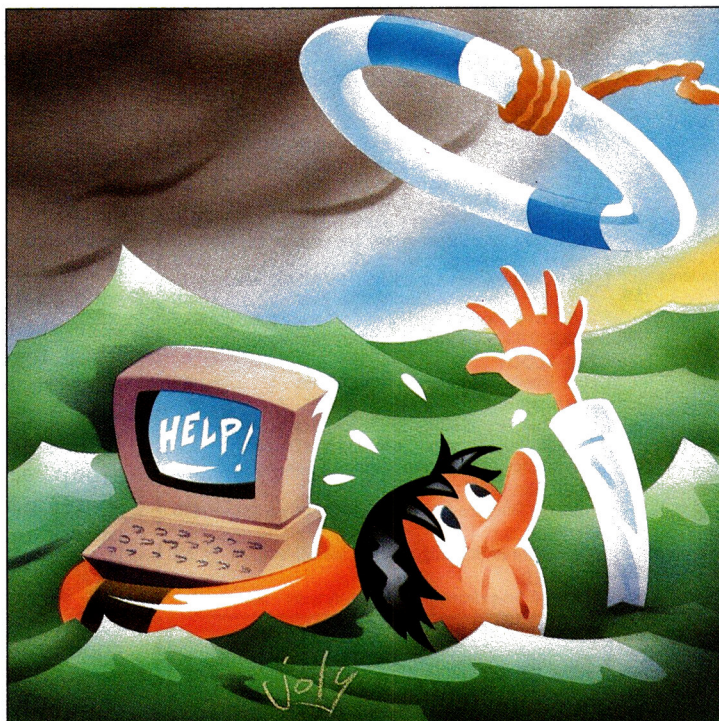
## **Read First**

With the popularity of the Macintosh-style user interface on the Apple II family—the GS in particular—software is now easier to use than ever. Perusing

pull-down menus and availing yourself of built-in help can often tell you all you need to know. Subtle operations and special features often elude simple explanations, however. You've got to go to the manual.

I understand the temptation to get started right away with a new piece of software, but it pays to

## **WHAT TO DO WHEN ALL ELSE FAILS**



avoid many problems by updating and upgrading your hardware and software to keep it current. Do yourself a favor and always complete any registration card that you receive.

## **Back Up Now**

No matter how many times you have heard it before, it bears repeating: Always make copies of



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Somewhere on the software box or in the manual, you're sure to find a company address and phone number. Before you call or write, compile a description of your system. You should know what cards are in what slots, the memory configuration, and the version numbers of any software you suspect may be causing problems. Whenever you call for help, be seated at your computer so the technical-support representative can walk you through tricky procedures.

### Telecommunicate

All of the major telecommunications services (see A+, February 1989) operate Apple II forums, and many third-party developers provide on-line technical assistance. And thousands of other knowledgeable Apple II users are always ready to provide a helping hand. It's not uncommon to post a message in the morning and receive several solutions by nightfall.

### Band Together

Aside from an information-service account, perhaps the most valuable resource is an active users' group. Members of users' groups share an interest in Apple II computers and have all been through the same painful process of climbing a steep learning curve. Your dealer may be able to suggest a good group in your area but, if not, you can call Apple at (800) 538-9696, extension 500, and ask for the users' group nearest you.

Apple Computer also operates a customer-relations help line at (408) 252-2775, from 9 A.M. to 5 P.M., Pacific time. Don't expect these silicon Samaritans to be helpful in solving problems pertaining to non-Apple equipment, but when all else fails, it can't hurt to give Cupertino a call.



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**CIRCLE 102 ON READER SERVICE CARD**



*Claris, the publisher of  
AppleWorks and AppleWorks GS, answers  
your AppleWorks questions.*

# APPLEWORKS HELP FILE

## USING AWGS.INSTALL

**Q.** I have AppleWorks GS and an Apple Hard Disk 20SC. When I run the AWGS.INSTALL program to try to modify the icon file on the root directory of the hard disk, the error message The application must be named APPLEWORKS.GS appears. What am I doing wrong?

**A.** To select the disk on which the APPLEWORKS.GS file resides, click the Disk button of the AWGS.INSTALL dialog box until the name of your hard-disk drive appears at the top of the box. If the program is in a folder, open the folder until the file APPLEWORKS.GS appears in the file dialog box. Double-click on this name. Now, the AWGS.INSTALL program will make the modifications necessary to allow you to launch AWGS by double-clicking on a document file from the Finder.

## APPLEWORKS 2.0 AND THE IIc PLUS

**Q.** I've just purchased a new Apple IIc Plus computer. My AppleWorks 2.0 boots fine, but I am unable to load or save files with the built-in 3.5-inch disk drive. The message Getting errors trying to read directory at Built-in disk

appears on the screen when I try. Why can't I use the built-in 3.5-inch drive?

**A.** Since AppleWorks 2.0 was written before the creation of the Apple IIc Plus, it assumes it is running on an original IIc with a 5¼-inch floppy. AppleWorks version 2.1 solves this problem; it distinguishes between the older IIc and the IIc Plus. To work around this problem with version 2.0, set the current disk drive to Disk 3.5 #1. To change the current disk drive, choose Other Activities from the main menu and then choose Select standard location of data disk. A list of available disk drives will appear. Select Disk 3.5 #1 and press Return. The name of the selected disk drive will then appear in the upper left corner of the AppleWorks screen. You can now access the built-in 3.5-inch disk drive.

## AWGS MODEM RECOGNITION

**Q.** I can't get AppleWorks GS to work with my Avatex 1200hc modem. The modem is connected to the computer via an Apple Super Serial Card in slot 2. I choose Hardware from the Settings menu and then select External modem, External 1200, Super serial card, and slot 2. When I click on OK, the message Unable to initialize modem appears. The

modem works with my other communications software. What's wrong?

**A.** In order to recognize a modem, the AppleWorks GS communications module depends on the modem or, in this case, the Super Serial Card to send an interrupt signal. To enable interrupts on the Super Serial Card, set DIP switch 6 on switch bank 2 to ON. AppleWorks GS will now be able to initialize the modem.

## LABELING AWGS FIELDS

**Q.** AppleWorks GS prompts me for a field name when I create a field for the database, but this field name does not appear when I enter data in the form view. All that shows up is an empty box for the field contents. How can I display the names of the fields when I'm entering data in the form view?

**A.** AppleWorks GS does not automatically display the field names in the form view. To attach visible names to AppleWorks GS fields, you must create label fields. Once these label fields are created, position them next to the database fields they are meant to identify. To create a label field:

1. Return to the field-definition screen by choosing Show Definition from the Template menu.
2. Move the pointer to the place in the form where you want the top left corner of the label field to begin and drag to create the label-field box. The Select field type: dialog box will appear.
3. Click on the Label box in the upper right corner of the dialog box.
4. Click on the appropriate button in the dialog box to choose the field type.
5. Type the label name as you want it to appear on the form view and then press Return.



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CIRCLE 146 ON READER SERVICE CARD

## HELP FILE

### READING DATABASE FILES

**Q.** Can AppleWorks read a database file created with AppleWorks GS?

**A.** AppleWorks can't read AppleWorks GS files directly. To transfer AppleWorks GS database information to AppleWorks:

1. Open the AppleWorks GS database you intend to export and note the number of fields in it (you will need this information later).

2. Choose Save As from the File menu.

3. Name the file in the text-entry box, click on the As ASCII Text button, and then press Return. The file will be saved as an ASCII file in the location you've specified.

4. Open the ASCII file you've just saved with the AppleWorks GS word processor.

5. Replace all Tabs with Returns, using Find/Replace on the Search menu.

a. With the insertion point in the Search for box, press Option-Tab (the code for Tab).

b. Move the insertion point to the Replace with box and press Option-Return (the code for Return).

c. Click on the Go to Beginning and Replace All buttons and press Return. All Tabs will be replaced with Returns.

6. Save this file as another ASCII text file. This text file is now in the proper format for importing into AppleWorks.

7. Quit AppleWorks GS.

The reason for this replacement is that AppleWorks GS saves ASCII files in Tab-delimited format—Tabs between fields and Returns separating records. To import an ASCII file correctly into AppleWorks, the ASCII file must be in the Return-delimited format—with carriage returns following each field.

Now you're ready to import the file into AppleWorks:

1. Start AppleWorks.

2. Choose Add files to the Desktop from the main menu and then press Return.

3. Choose Make a new file for the Database and press Return. Specify From a text (ASCII) file and enter the

number of categories per record.

4. Enter the number of fields per record in the original AppleWorks GS database and press Return. AppleWorks then asks you for the pathname.

5. Make sure the disk with the ASCII file from the AppleWorks GS database is in the disk drive. Type the complete pathname, including volume, subdirectory, and filename.

6. Finally, enter a name for the new AppleWorks database and press Return to complete the transfer of the database file.

### MINIMUM FREE RAM

**Q.** My Apple IIGS computer has 2.25 megabytes of memory. Can I copy the contents of both the AppleWorks GS System and Program disks to the RAM disk and still be able to run the program?

**A.** No. AppleWorks GS needs a minimum of 1.25Mb of free RAM. A RAM disk size of at least 1.6Mb (1600K) is necessary to hold the contents of both the AppleWorks GS System and Program disks. Since the total free memory would be reduced by the amount of the RAM disk size, there would not be enough memory remaining to run the program (2.25Mb of total RAM - 1.6Mb of RAM disk = 625K of remaining free RAM).

### AWGS DISK FORMATTING

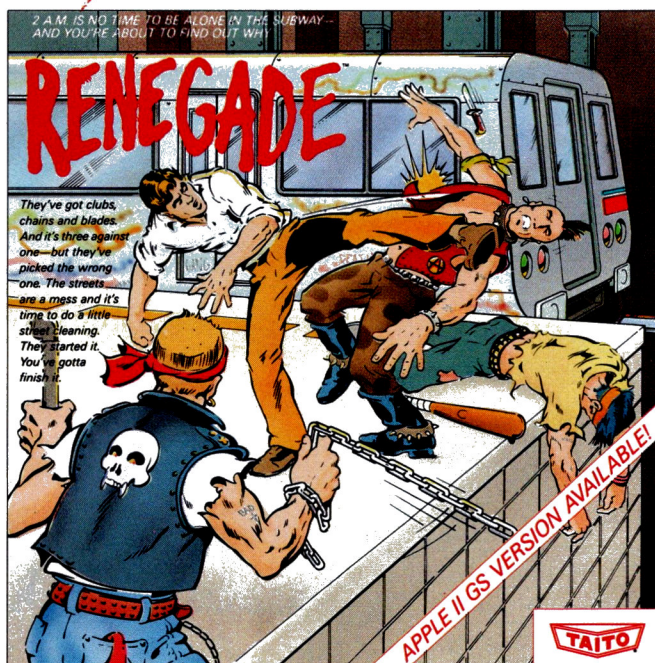
**Q.** Can I format a blank data disk from within AppleWorks GS?

**A.** No. Be sure to format plenty of blank disks before using AppleWorks GS. You cannot format disks once you've started AppleWorks GS unless you have a desk accessory with disk-maintenance capabilities. +

The technical staff at Claris answers your AppleWorks questions. Call the Claris Technical Support Department at (415) 962-0371 (6:00 A.M. to 8:00 P.M., Pacific time) or write to Help File, A+, 950 Tower Lane, 18th Floor, Foster City, CA 94404.



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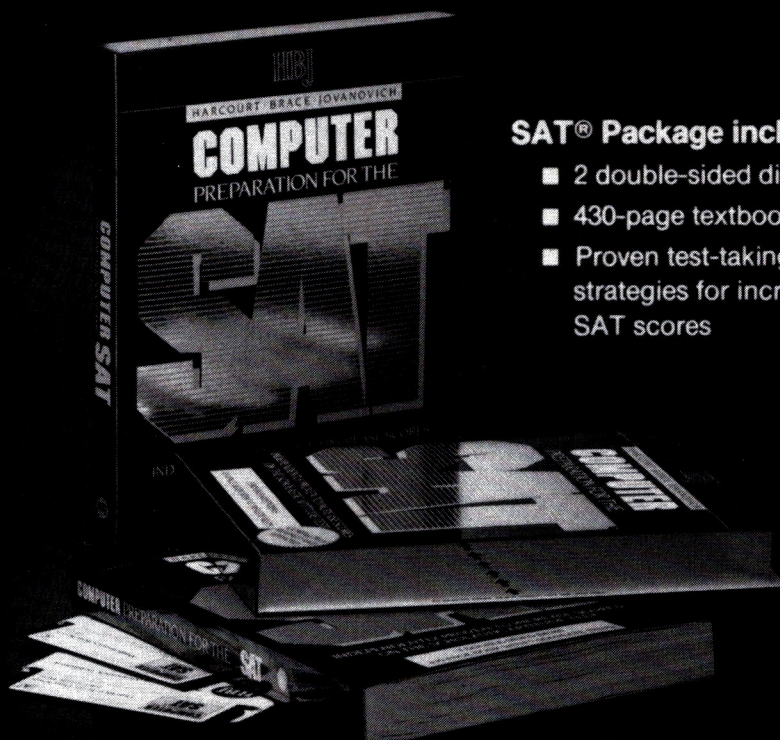


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# LEARNING CURVE

*The conclusion of our series on teaching to multiple intelligences*

BY DAVID D. THORNBURG

**T**his month we complete our exploration of computers and Howard Gardner's theory of multiple intelligences by examining the inter- and intrapersonal and bodily-kinesthetic intelligences.

People who display a highly developed bodily-kinesthetic intelligence are good at motor activities such as sports and dancing. They have a well-developed sense of their body and how it moves in relation to the surrounding world.

At first glance, computer technology might seem too limiting to offer much to these people. Bodily-kinesthetic children often have a hard time in a traditional classroom. They find it hard to sit in one place for long. If such children are moved from the desk to the computer, you might expect fidgeting to set in pretty quickly.

For this reason, computer activities that involve movement are appealing. Two applications that come to mind are LEGO Technic and Brøderbund's Science Toolkit. Both involve devices that are connected to the computer to receive information or to let you control mechanical gadgets.

LEGO Technic consists of a set of LEGO blocks with wheels, gears, and motors that can be controlled by commands from a special version of the Logo programming language. Students are free to build their own robots or other mechanical devices, which they can then

operate and control with computer programs that they have generated themselves.

Tools such as the Science Toolkit or Sunburst Communication's Exploring Science materials operate a bit differently. Instead of using the computer to control an external device, students employ the computer as a tool to receive data from external temperature, light, or

provides a bridge from the bodily-kinesthetic to the logical-mathematical domain.

Students with a highly developed intrapersonal intelligence have a good sense of self and are often highly motivated to work things out for themselves. Because the computer easily complements this inward style, intrapersonal learners gravitate toward creating

computer programs or playing complex computer games.

Because the bulk of educational computer software seems to be geared to "lone wolf" computer users, finding computer tools for intrapersonal learners is easy. By allowing such children to create their own databases or programs to explore specific topics, you can easily expose them to different intelligence domains.

Logo programming, for example, can shore up skills in the spatial and logical-mathematical domains. Database construction can form a bridge to the interpersonal domain as students describe the database to others or work with others to extend it.

The greatest challenge for these learners is computer access. If the classroom has only one computer, the kind of unrestricted time that intrapersonal learners need to explore topics on their own is hard to come by.

The development of software for interpersonal learners is fairly recent. The Decisions, Decisions series by Tom Snyder Productions is a

## MIND AND BODY COMPUTING



motion probes. They can then analyze this data and display it in graphical form on the screen. Since they must assemble an experiment and install the computer probes, this activity meets the needs of bodily-kinesthetic learners.

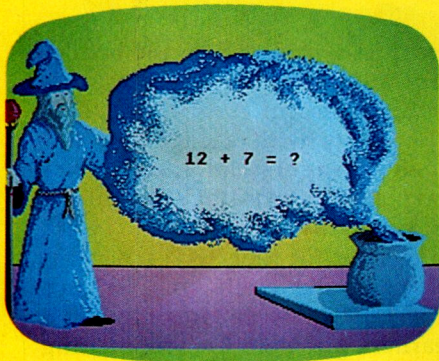
LEGO Technic provides a bridge from the bodily-kinesthetic to the spatial domain. The Science Toolkit



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good example of what is now available. In one series title, *On the Campaign Trail*, students take the part of someone running for elective office. During the course of the campaign, each participant has to make decisions and trade-offs that often present conflicts between the integrity of the campaign and the desire to capture as many votes as possible. The activity provides several computer-based "advisers" who are available to help at various stages of the campaign. When several students are using the program at the same time, the campaign can continue in the classroom, not just on the computer.

As with other programs from Tom Snyder, *Decisions, Decisions* is geared to the needs of interpersonal learners while making optimal use of a single computer in a classroom.

Use of bulletin-board services and correspondence with electronic pen pals are also well suited to interpersonal children. Unfortunately, few classrooms have telephone lines with modems to allow such communication. Even so, educators can simulate this type of environment by setting up a computer with a word-processing program on which students can enter their own messages to the class and print out the messages at the end of the day before erasing the screen for the next day's messages.

### Putting It Together

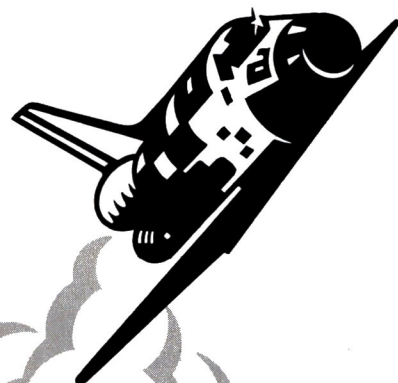
In the past several months, we have taken a cursory glance at a topic that could occupy us for years: finding ways to use computers to teach to the whole child. The beauty of Gardner's theory of multiple intelligences is that it makes sense to anyone who has ever looked at the diversity of talent in our classrooms.

In considering classroom technology, we need to think of ways to validate children's dominant intelligence while finding ways to build bridges to the development of their other intelligences. **+**

*David Thornburg is actively involved in the development of creative uses for computers. He has created a problem-solving audiocassette tape, based on the theory of multiple intelligences, called *The Secret House*. For information on this tape, write to him in care of this magazine.*

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Timemaster H.O.	78.95
Transwrap	178.95
Uni Drive American	149.95
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Computer Type _____	SHIPPING _____
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BY JENNIFER BRAWER

*World GeoGraph  
harnesses IIGS technology  
and delivers a unique learning tool.*

# A+ TEACHERS' TOOLBOX

Do you know that one out of seven Americans cannot find the United States on a blank world map? This bleak statistic puts geography in the same camp as math and science. It is one more academic subject area in which this nation's students are notoriously deficient.

According to geography experts, students need a solid understanding of five fundamental geographic themes and must be able to apply them to information about the world in order to achieve geographic competence. The five themes are location, which refers to position on the earth's surface; place, or a location's physical characteristics; relationships within places, pertaining to how people interact with their environment; movement of people and how they interact; and regions, the basic units of geographic organization.

World GeoGraph, a recently released product from MECC, uses the unique characteristics of the IIGS desktop environment to convey the essence of these five themes and their interrelationships. It is an interactive database that combines beautifully detailed map graphics with a comprehensive information database.

## **The World at Your Fingertips**

There is more than one route around World GeoGraph. Depend-

ing on individual learning styles, students can choose to explore the world through the maps or through the information database. I'm a visual learner, so let's start with the maps.

---

*World GeoGraph  
is an exciting  
program that suggests  
the way of the  
future for Apple II  
technology and  
educational computing.*

---

World GeoGraph's opening screen is a blank world map, complete with national boundaries, oceans, and latitude/longitude lines. The menu bar at the top of the screen offers the standard File and Edit features plus the program's unique options: Display, Maps, Data, and Report. Pressing Control-A reveals a special management option reserved for teachers that allows modification of World GeoGraph to suit particular instructional goals or to add up to three data categories to the existing database.

Students can work with a world map or maps of the continents and 21 world regions. The maps' construction reflects a variety of cartographic projection techniques that accurately portray the relative dimensions of the earth's continents. The name of each country appears on continent and region maps but not on the world map.

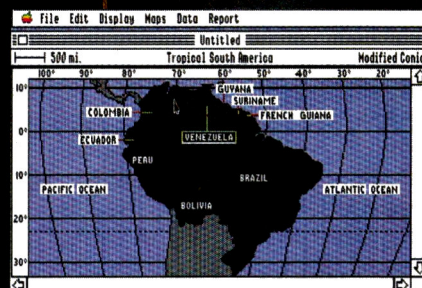
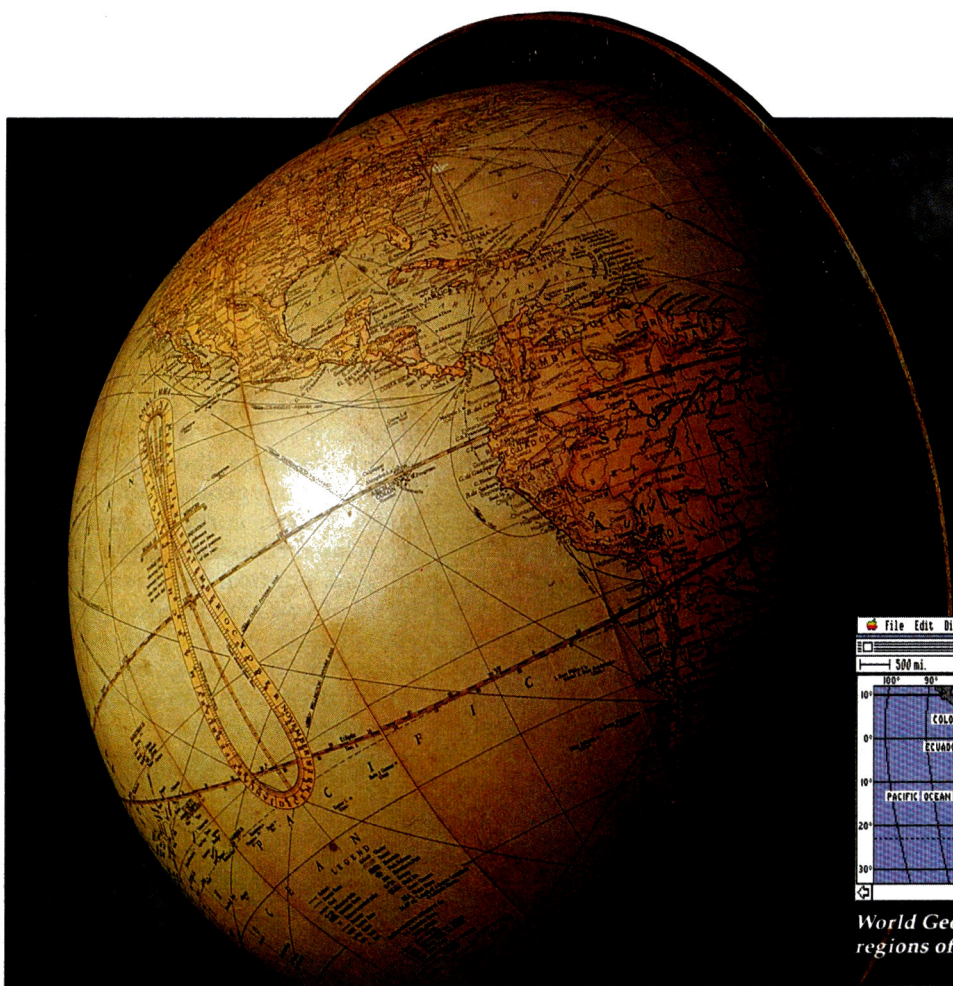
Depending on which map is in use, students can take advantage of some unique program features. One of the most exciting is the theme map, which presents color-coded maps depicting climate zone, land elevations, energy consumption, or population density.

The Locate Nation feature is great for finding obscure places or learning locations. Once selected, Locate Nation presents a scrolling menu of all countries on the map. After you choose a country from the menu, the program calls up a map of the appropriate region, and the country flashes in black and white. This feature is great for most countries, but for small islands such as Barbados, the flashing is hard to see.

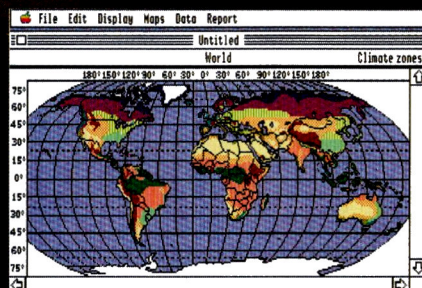
The Compare feature uses continent maps to illustrate how one nation compares to the rest of the continent on some numerical dimension the student has selected. For example, a student might compare Egypt's literacy rate with that of other nations in Africa or with the rest of the world. In order to accomplish this task, you must have a map containing the continent of interest on the desktop. Scrolling menus present the names of the countries and the list of possible comparison dimensions. Once you've selected the target nation and a comparison dimension, the program presents a color-coded map of the area.

The World Quartiles feature is similar to Compare, but instead of comparing nations with one target nation, it graphically illustrates how nations compare with other

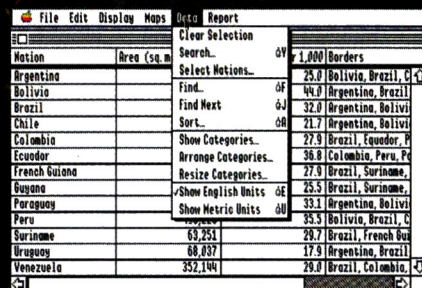




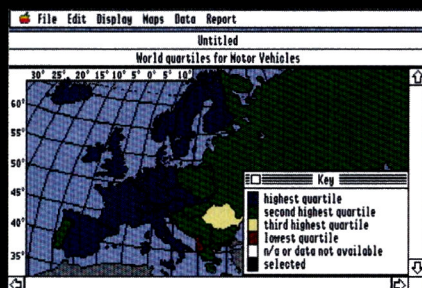
World GeoGraph includes maps for 21 regions of the world.



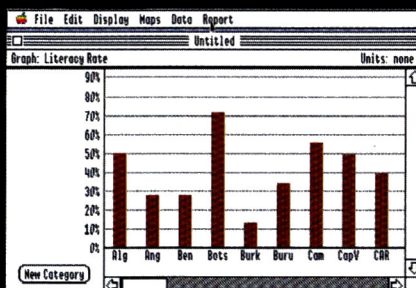
Climate zones is one of the color-coded World GeoGraph theme maps.



Students have a number of sophisticated options for fine-tuning the database.



World Quarters compares nations in terms of numerical dimensions.



One click of the mouse transforms numerical data into bar graphs.



nations in terms of numerical dimensions such as per-capita income. Students can use World Quartiles to visually assess a country or continent's world-quartile standing on the chosen dimension.

#### **Worth a Thousand Words**

As students work with the maps, they also work with the information database. Because the on-screen maps are linked directly to the database, what students do with the maps controls what occurs in the database. For students working with the database, the reverse holds true: The underlying maps reflect the activities taking place in the database. Here's how it works:

Students use special mouse-clicking techniques to explore the different continents and their respective nations. Clicking on a nation displayed on a map selects its database in table or card form. Double-clicking on a continent brings up a table or card series containing information for each nation on the continent. Shift-clicking lets students select and deselect as many nations as they want. And, if they choose to examine data tables or cards, the cards or tables will contain information only for the nations or continents they've selected—not for the entire continent, world, or region. A technique called Apple-clicking performs a zoom function for going back and forth between map levels and the respective data tables and cards.

The data cards and data tables consist of the same information but organize it in different ways. Both contain 55 categories—some with multiple entries—of information on 177 nations. Since that's too much information to view or work with at one time, the program lets users work with custom subsets of information. Students can use features on the Data menu to design data tables and cards containing information categories of their choice, arranged the way they want them.

The Data option on the main menu offers search and sort capabilities that make perusing the data a manageable task. Also on the Data menu, the Find and Find Next options help serious geographers locate specific textual or numeric data; a Sort option allows alphabetical and numeric sorting; and the Search command opens up a dialog

*Students can progress  
from learning  
geographic locations  
to doing more complex  
analyses of the  
related economic,  
environmental, and  
political realities.*

box in which students define custom search rules to restrict the database to nations and data categories that meet their specific search criteria.

Using Search and Sort or Find to organize data is one thing; understanding it is another. World GeoGraph's graphing function, on the Display menu, makes a vertical bar graph for numeric data in the current data table or data card, or for the current map. This graphing function does not wimp out with one scrawny bar; I was able to construct a graph depicting literacy rates for 49 of the 52 countries in Africa. If you're wondering how to view a bar graph of that size, World GeoGraph has a horizontal-scrolling feature that scrolls through the entire length of the graph.

Anything students use with World GeoGraph—any map, table, or set of data cards or graphs—can be printed out in two ways. The simpler option is Print Window, which prints what appears on the screen. The second option is Print Report, which prints maps, graphs, data tables, or cards saved via the Report option, an option that lets students save tables, graphs, or maps they've constructed.

#### **In the Classroom.**

For an additional charge, MECC offers a *Classroom Guide* designed to help teachers who are using World GeoGraph in the classroom. This reference is a collection of complementary lesson plans for activities that can be completed during one class period. They cover learning how to use World GeoGraph; the five themes of geographic education; regions of the world; a variety of geography-related topics such as urbanization, energy, and population density; and geography games. Teachers will also find text-

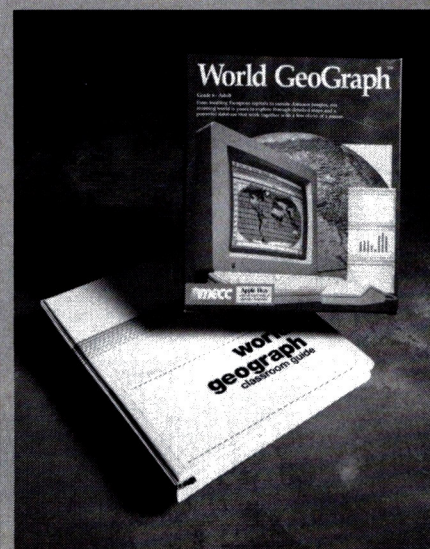
book/curriculum correlations, and teacher-training and student reference materials.

#### **What a Way to Travel!**

World GeoGraph is one of the most exciting programs I have ever seen and should set new standards for educational-software development. Using this program is comforting, for it suggests the way of the future for Apple II technology and educational computing. Instead of emulating a workbook, as most educational-software programs do, World GeoGraph harnesses IIGS technology and delivers a unique learning tool.

The interactive maps allow students to explore the world with ease and infer basic geographic relationships. And, with the information database, they can progress from learning geographic locations to doing more complex analyses of the related economic, environmental, and political realities. Finally, for all of you who would love to get your hands on the other Apple computer, this program's emulation of the Macintosh environment is as good as it gets. +

## VITAL STATISTICS



#### **WORLD GEOGRAPH (VERSION 1.0)**

A program that lets students work with maps and databases to increase their geographic literacy

Apple IIes (ROM version 1.0 or higher), 768K RAM, one 3.5-inch disk drive, GS/OS, not copy-protected

**PRICE:** \$139; classroom guide, \$19

MECC

3490 Lexington Avenue North

St. Paul, MN 55126-8097

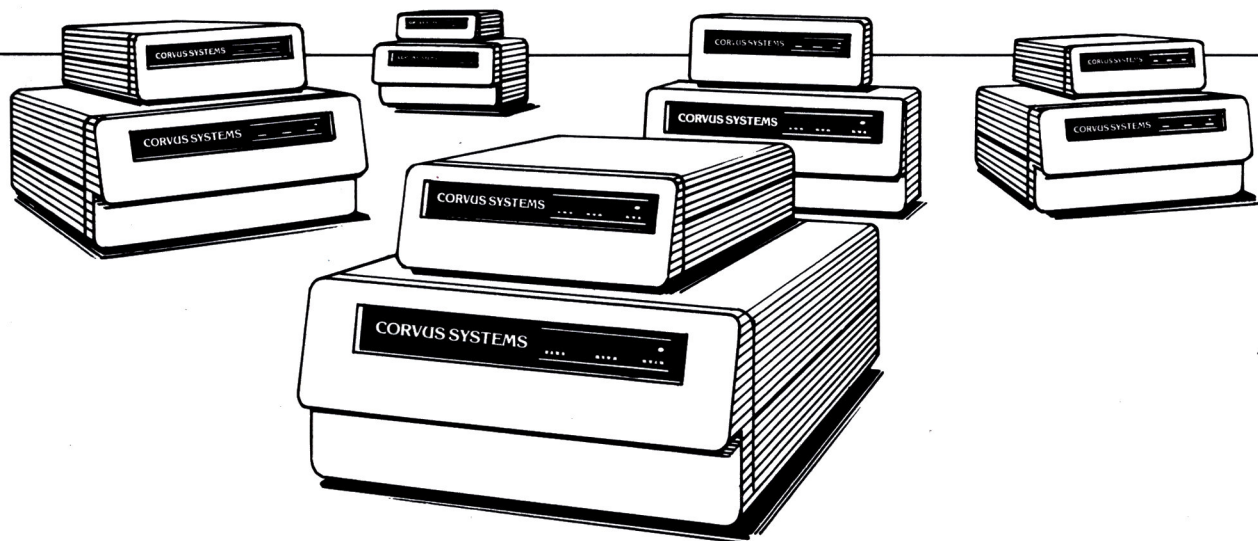
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**PICK OF THE CROP**  
BY LESLIE STEERE, MARY BOHANNON,  
AND SHANON CULLEN

*Online help for programmers,  
expanded memory, braille graphics,  
and more for your Apple II-series  
computers*

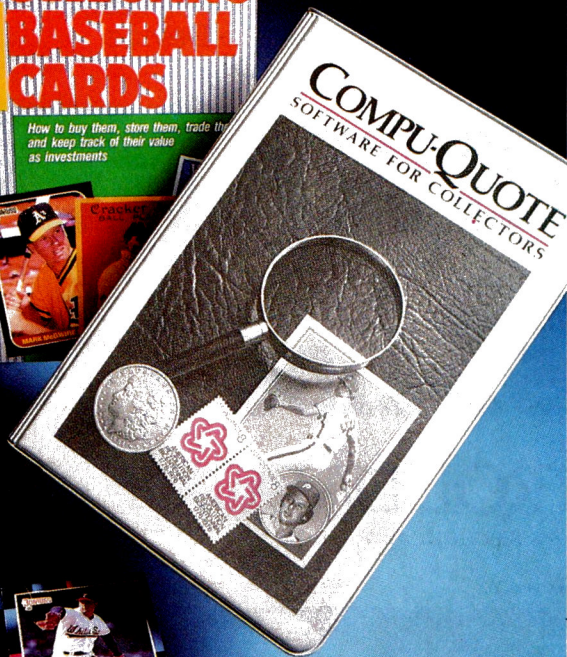
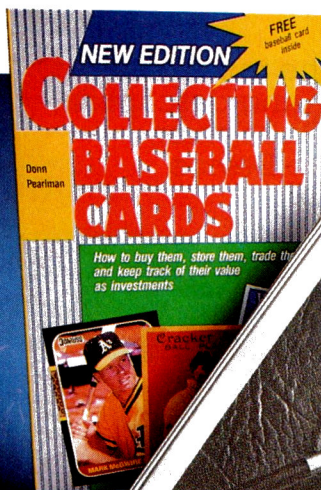
# PRODUCT ROUNDUP

## NOT A BAT INVESTMENT

Which investment arena is a safer bet—Wall Street or baseball cards? Apparently quite a crowd says baseball, and Compu-Quote's release of Card/Fax for the Apple II series makes it easier for us-

ers to track their market share of cards. Card/Fax—software for inventorying and evaluating baseball card collections—covers more than 26,000 issues from Topps, the leading producer of baseball cards. Databases for other card producers

**Card/Fax, for the serious  
baseball-card collector**



**PixCELLS braille graphics software lets blind computer users load, create, and modify graphic images.**

also are available.

Card/Fax can instantly show collectors the current market value of their cards; provide written records for investing, tax, and insurance purposes; and track the value of a collection, automatically updating prices each year. The program comes packaged with a free copy of *Collecting Baseball Cards*, a 118-page book of tips on how to buy, store, trade, and keep track of the cards. Registered owners of Card/Fax receive regular newsletters and unlimited technical support.

### CARD/FAX

Apple IIe/c/gs/c+, 128K RAM, two 5¼- or one 3.5-inch disk drives, ProDOS 8, not copy-protected

**PRICE:** Card/Fax with Topps database, \$95; preview pack, \$15; other card-maker versions, \$25-\$45 per version; Annual Market Value update disks, \$25

### Compu-Quote

6914 Berquist Avenue  
Canoga Park, CA 91307  
(800) 782-6775 • in CA (818) 348-3662

CIRCLE READER SERVICE NO. 501

## BRAILLER GRAPHICS

With pixCELLS braille graphics software and a braille embosser, blind and visually impaired computer users can load and modify

graphic images saved to disk by other hi-res Apple drawing programs and can create simple graphics from scratch and print them as tactically legible images. The first braille graphics software to include drawing tools, pixCELLS lets you draw lines, boxes, and borders; erase and reverse portions of the image; shift the image relative to the screen; and add horizontal and vertical braille labels.

When pixCELLS sends your image to a braille embosser, each lit pixel of the screen becomes one braille dot; because braille dots are larger and farther apart than Apple pixels, your lines will print as series of unconnected dots. Therefore, pixCELLS is best suited for such things as simple geometry diagrams, street and room layouts, and other schematic information.

Although pixCELLS is a ProDOS program, it can directly read graphic files from DOS 3.3 disks. All graphics functions are controlled through the Apple keyboard, and used with a Street Electronics Echo or Cricket voice synthesizer, the program provides enough audible feedback for blind users to independent-



ly load and emboss images. Included with pixCELLS are a detailed, large-print manual that includes several braille-embossed print examples; three audio tapes of instruction; and a disk of sample graphic files.

#### PIXCELLS

Apple IIe/c/gs/c+, 128K RAM, one 5¼-inch disk drive, ProDOS 8, braille embosser, not copy-protected

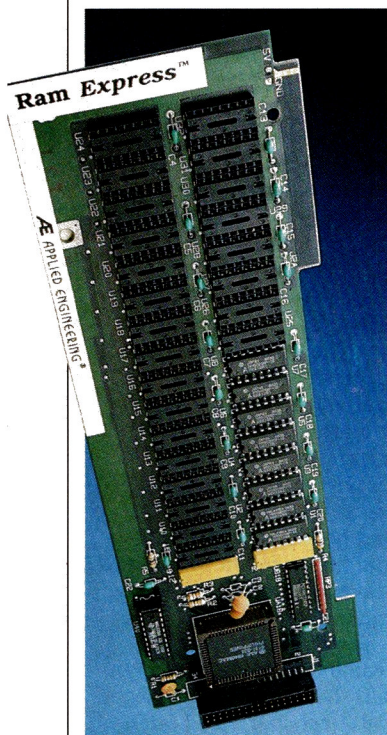
**PRICE:** \$150; demo disk with online documentation, \$5

Raised Dot Computing, Inc.  
408 South Baldwin Street  
Madison, WI 53703  
(608) 257-9595

CIRCLE READER SERVICE NO. 502

## A PLUS FOR THE IIc PLUS

Just plug Applied Engineering's Ram Express memory expansion board into the memory expansion connectors of your IIc Plus, and you have a high-performance AppleWorks engine.



**Ram Express turns the Apple IIc Plus into a high-performance AppleWorks engine.**

with up to 800% more random-access memory at your disposal. Software included with the board makes the AppleWorks clipboard almost ten times larger; increases maximum word-

processor and database file sizes by up to 400%; loads AppleWorks into memory; and creates a solid-state RAM disk capable of copying 800K floppy disks in a single pass, without disk swapping. By plugging 256K chips into its empty sockets, you can add up to 1Mb of additional memory to your Ram Express board after purchase. An optional clock is also available.

#### RAM EXPRESS

Apple IIc Plus, or IIc with memory-expansion connector

**PRICE:** \$249 for 256K, \$399 for 512K, \$699 for 1Mb; optional clock, \$59

Applied Engineering  
P.O. Box 5100  
Dallas, TX 75011  
(214) 241-6060

## PROGRAMMER'S CRIBSHEET

Here's help for Apple IIgs programmers who are tired of taking their hands from the keyboard to search through piles of reference manuals for essential information. With Addison-Wesley's *The Programmer's Online Companion* installed as a Classic Desk Accessory on your IIgs, a few keystrokes give you access to an extensive database (volumes I and II of *The Apple IIgs Toolbox Reference*) of toolbox calls, constants, and types. A series of ⌘-key command combinations lets you quickly search the database in a variety of ways for the toolbox call you need; alternatively, you can scroll through the database entry by entry, line by line, or word by word. Because you can copy entries from the database directly into your source code, you can stop worrying about typing errors slipping into your programs, and you can customize the database to fit your development preferences.

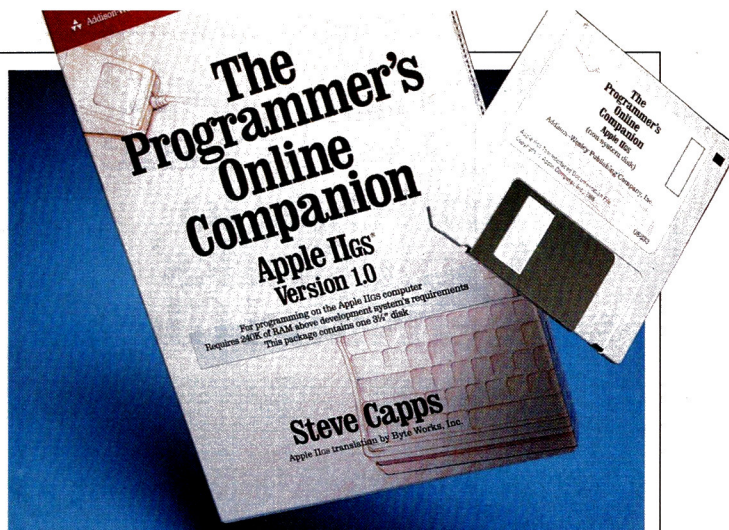
#### THE PROGRAMMER'S ONLINE COMPANION

Apple IIgs, 240K free RAM, one 3.5-inch disk drive, ProDOS 16, not copy-protected

**PRICE:** \$49.95

Addison-Wesley Publishing Company  
Route 128  
Reading, MA 01867  
(617) 944-3700

CIRCLE READER SERVICE NO. 503



**Help is but a keystroke away for IIgs programmers with Addison-Wesley's *The Programmer's Online Companion*.**

## BUILD YOUR OWN ROBOT

Fischer America's newest robotics construction kit, Computing Experimental, helps Apple II users learn about and experiment with machine and robot programming. With a minimal knowledge of the BASIC programming language, you should be able to build your own turtle robot and use it to experiment with motors and switches, measuring and evaluating light and temperatures, and arti-

ficial intelligence. The kit comes with all the wires, cables, and colorful plastic pieces you'll need, along with the software, interface, power supply, and a comprehensive guide.

#### COMPUTING EXPERIMENTAL

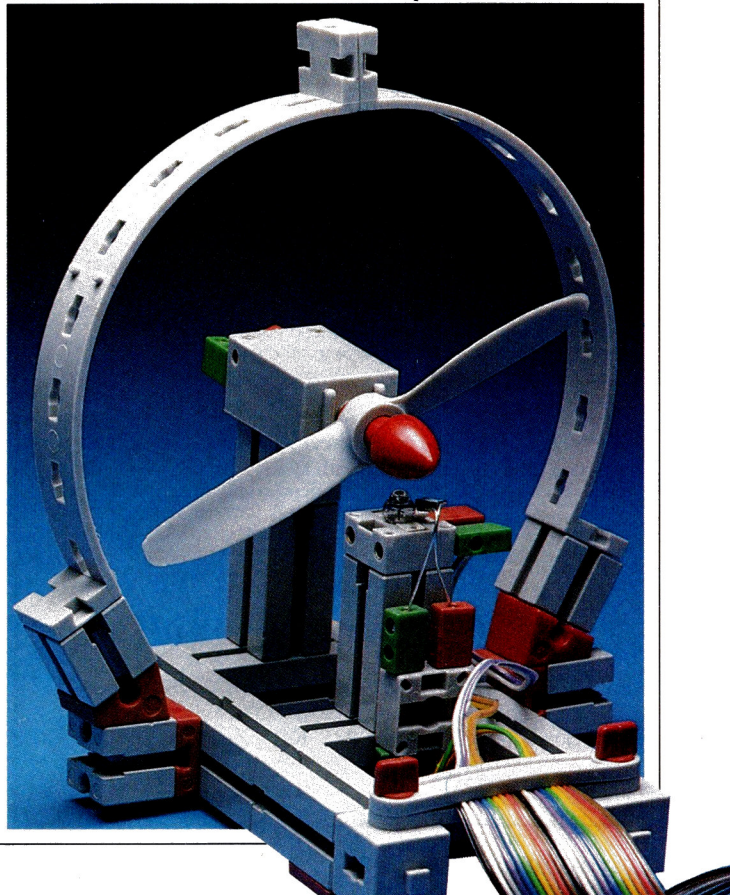
Apple II+/e/gs, 48K RAM, one 5¼-inch disk drive, DOS 3.3, not copy-protected

**PRICE:** \$379

Fischer America, Inc.  
2420 VanLayden Way  
Modesto, CA 95356  
(209) 575-3445

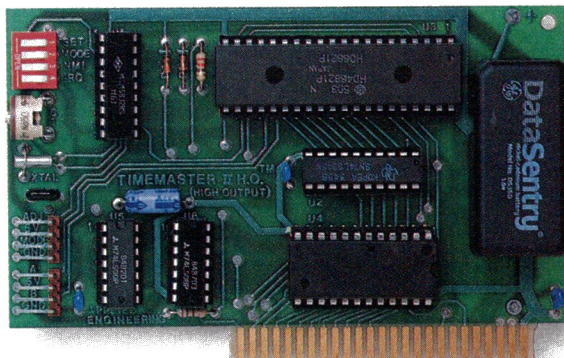
CIRCLE READER SERVICE NO. 504

**Fischer America's Computing Experimental kit lets you build a robot and use it to conduct experiments.**





# The first clock card to add time and date to AppleWorks' screens and files.



*Timemaster H.O. So many features it's become the world's best selling clock card.*

It's the smart way to put the time and date on your Apple IIe or II+. Because only the Timemaster H.O. packs *ALL* the important features of all the competition *combined*, including leap year, year (not just in ProDOS), month, date, day of week, hours, minutes, seconds and milliseconds. It's totally ProDOS, DOS 3.3, PASCAL and CP/M compatible. And, of course, it works better than any other clock with AppleWorks.

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If you're using or writing software for other clock cards, you're still covered. Because the H.O. will *automatically* emulate them. And only the Timemaster H.O. adds 15 new commands to BASIC. The H.O. even comes complete with two disks full of sample programs, including a computerized appointment book, a DOS dating program, interrupt programs, and over 30 programs that others charge you extra for — or don't even offer. As a low-cost option, you can add true BSR remote control to the H.O., giving you remote control of up to 16 lights and appliances in your home or office.

- Time in hours, minutes, seconds and milliseconds; date with year, month, day of week and leap year • 24-hour military format or 12-hour AM/PM format • Eight software controlled interrupts so you can run two programs at the same time (many examples included) • Can be set precisely to the exact second • Digital I/O port for advanced applications • Allows AppleWorks to time and date stamp all data automatically • Displays time and date on AppleWorks screens and files • Five-year warranty.

Timemaster H.O. ....	\$99.00
BSR option (may be added later) .....	\$29.00

Order Timemaster today ... with 15-day money back guarantee and our five-year parts and labor warranty. See your dealer or call (214) 241-6060, 9 a.m. to 11 p.m. 7 days, or send check or money order to Applied Engineering. MasterCard, VISA and C.O.D. welcome. Texas residents add 7% sales tax. Add \$10.00 if outside U.S.A. Prices subject to change without notice.

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*The Apple enhancement experts.*

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## PRODUCT ROUNDUP

### NO OFFENSE

The Personal Care Media/Software Teaching System introduces grades K-3 to health and hygiene through the lighthearted tale of Joe, a dirty little boy who with the help of a soap-bubbling "Clean Machine" learns the importance of cleanliness from hair to teeth to toes. The program features the Joe character in colorful graphics and animation.

Students in grades 4-6 can view the Person Power filmstrip or video and reinforce the concepts presented, using the accompanying software. Person Power is the story of two teens, Jason and Lisa, who, in their quest to find summer jobs, learn the basics of personal care and development. It explores reasons why personal hygiene is not only pleasant but also necessary and includes examples of how personal care can affect health, relationships, and acceptability to others. Students are asked to match job applicants with the available jobs according to the applicants' grooming habits.

### PERSONAL CARE MEDIA/SOFTWARE TEACHING SYSTEM

Apple II+/e/c/gs/c+, 48K RAM, one 5¼-inch disk drive, DOS 3.3, copy-protected

**PRICE:** filmstrip/software package, \$132; video/software package, \$148

MarshMedia  
5903 Main Street  
Kansas City, MO 64113  
(800) 821-3303 • (816) 523-1059

CIRCLE READER SERVICE NO. 505

### FOLLOW YOUR CURIOSITY

What is the capital of Niger? What is the currency of Turkey? How can you expect to know what on earth is going on if you don't know where it is? Atlas Explorer allows you to follow your curiosity about other lands around the world. This program for ages 10 to adult in-

cludes detailed on-screen maps showing all continents, countries, and major cities. Political boundaries are shown for China, the U.S.S.R., Canada, Mexico, the United States, and the United Kingdom. You can choose to view a tutorial on any location. The program presents information on countries' population, currency, language, capital, size, and major cities. Teachers can store a list for each student and have the program do a detailed analysis of each quiz. Review options give students a chance to replay a quiz or display the questions they've missed on the screen or printer.

### ATLAS EXPLORER

Apple IIe/c/gs/c+, 128K RAM, one 5¼-inch or 3.5-inch disk drive (specify), ProDOS 8, not copy-protected

**PRICE:** \$49.95; five-disk/one-manual lab pack, \$100

Springboard Software, Inc.  
7808 Creekridge Circle  
Minneapolis, MN 55435  
(800) 445-4780 • (612) 944-3915

CIRCLE READER SERVICE NO. 506

### TEXTURED PAPER

James River Corporation has introduced three types of textured computer paper designed for use with impact printers. The papers include Riblaid, Linen, and Brushed Cotton printer paper. The Riblaid paper has a subtle riblaid finish and is available in white, ivory, and gray. The linen is 25% cotton sheet with embossed texture, available in white, warm gray, and blue. The Brushed Cotton is 50% cotton; has a woven finish; and is available in white, ivory, and blue.

The printer papers are available in continuous fan-fold sheets and are packaged 250 sheets per box. Matching #10 business envelopes, packaged 40 to a box, are also available.

### PRO TECH PRINTER PAPER

**PRICE:** Linen, \$24.95/box; Riblaid, \$24.95/box; Brushed Cotton, \$29.95/box

James River Corporation  
356 B Sewall Street  
Ludlow, MA 01056  
(800) 521-5035 • (413) 589-7592

CIRCLE READER SERVICE NO. 507



# PRODUCT ROUNDUP

## BIGGER IS BETTER

Kidsword is a large-character word processing program designed for children, with some features that make it suitable for more advanced applications. The double-size characters are displayed on the screen in 12 lines of 20 columns, rather than the usual 25 lines of 40 columns. The large characters are useful for children, learners with special needs, and the visually impaired. The top two lines are used for status lines, leaving the remaining 10 for entering your own text. You can change the background border and character colors, but not the colors of the status line. Kidsword also contains all the commands necessary for the business and college user, such as search/replace, cut and paste, and chaining of documents.

### KIDSWORD

Apple II e/c/g/s/c+, 64K RAM, one 5¼-inch disk drive, ProDOS 8, not copy-protected  
**PRICE:** \$49.95

Kidsword Software, Inc.  
P.O. Box 98  
Warner, NH 03278  
(603) 927-4428

CIRCLE READER SERVICE NO. 508

## JUST THE FACTS, MA'AM

The FACS (Fundamental Arithmetic Concepts and Skills) tutorial software series teaches whole-number arithmetic to grade three through adult. The program contains an initial diagnostic test that determines the starting lesson for each student. FACS includes several lessons, each of which consists of two or three tutorials followed by reinforcement questions and drills. A quiz at the end of each lesson determines whether a student advances to the next lesson.

Disks in the series include Place Value, Adding Whole Numbers, Subtracting

Whole Numbers, Multiplying Whole Numbers, Dividing Whole Numbers: Short Division, and Dividing Whole Numbers: Long Division. The Place Value program contains reproducible worksheet masters; the arithmetic disks contain worksheet-generating programs. All numbers in the tutorials, reinforcements, and quizzes are randomly generated.

### FACS

Apple II +/e/c/g/s/c+, 48K RAM, one 5¼-inch disk drive, DOS 3.3, copy-protected  
**PRICE:** \$59.95 each, \$295 for entire series

Educational Activities, Inc.  
P.O. Box 392  
Freeport, NY 11520  
(800) 645-3739 • (516) 223-4666

CIRCLE READER SERVICE NO. 509

## RAIN, SNOW, OR SHINE

This program is geared towards improving elementary-level students' knowledge and understanding of the weather. The three-program package includes An Ocean of Air, The Water Cycle, and Forecasting the Weather. A video, Weather Wise, is also available. In the Ocean of Air program, students in grades 4-6 learn that without air there would be no weather. They examine examples of how temperature, pressure, humidity, and air movement combine to create some of nature's mysteries.

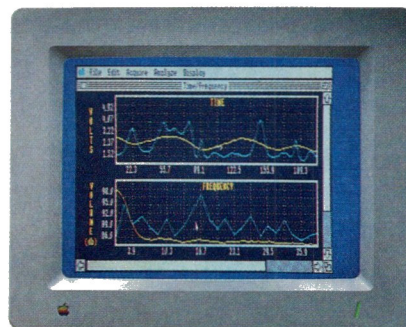
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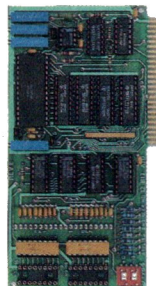
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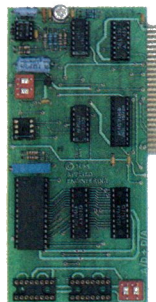
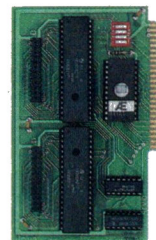


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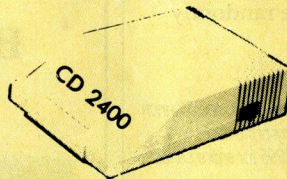
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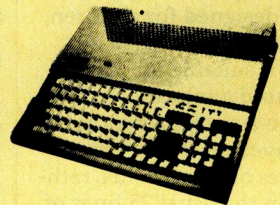
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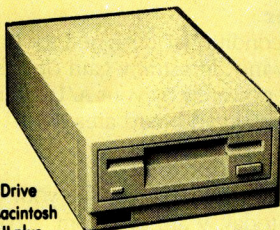
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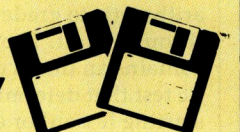
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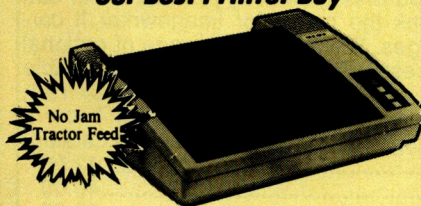
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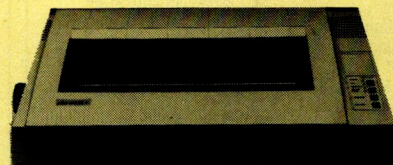
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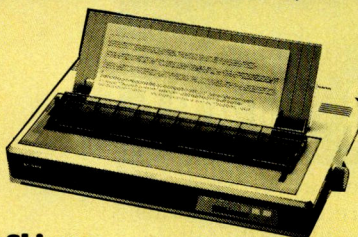
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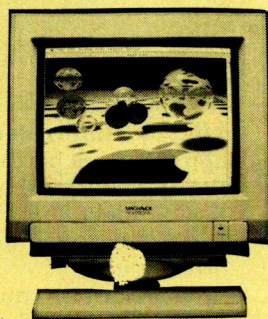
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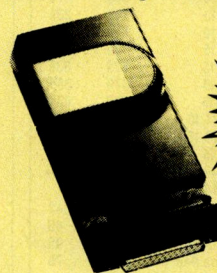
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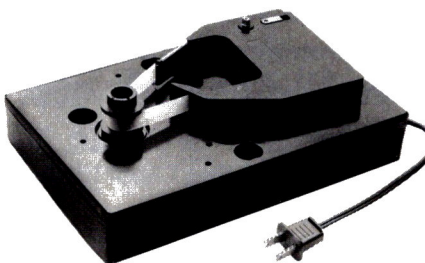
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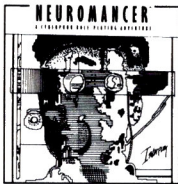
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Apple IIc +	B.	G.
Other Apple II's	C.	H.
Laser 128	D.	I.
Macintosh	E.	J.

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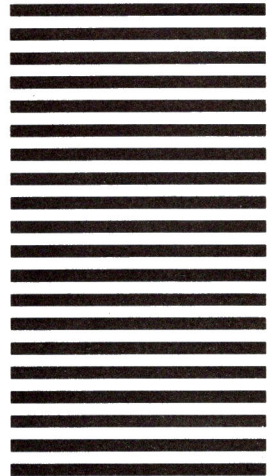
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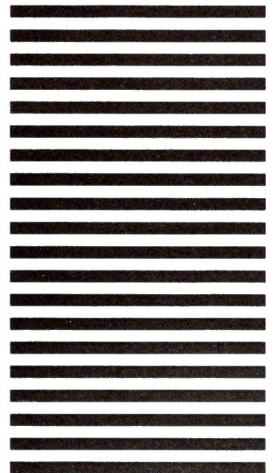
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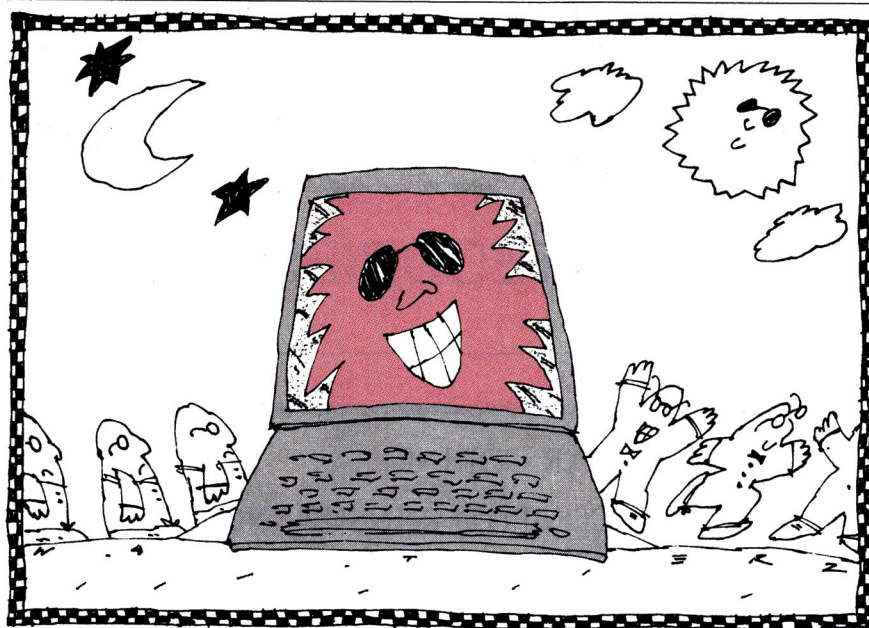
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# TIPS AND TECHNIQUES

## APPLEWORKS WITH UNIDISKS

In the January 1989 installment of "Help File," Claris suggested that an old ROM chip in the Apple IIc may have been to blame for the inability of AppleWorks to recognize a UniDisk 3.5 Drive connected to the computer (see "IIc, AppleWorks, and UniDisk 3.5" on page 104). Note that no version of AppleWorks prior to 1.3 recognizes UniDisk 3.5 Drives as connected devices. If you select Change current disk drive or ProDOS prefix from the Other Activities menu, the UniDisks will not appear as drives you can use.

The trick to accessing UniDisk 3.5 Drives is to enter the correct pathname of the disks inserted in the drives. Using the System Utilities or Copy II Plus, format all of your 3.5-inch disks and name them UNI or something else you can easily remember. Now whenever you

want to use these disks with AppleWorks, enter the disk name as the ProDOS directory for your data disk. AppleWorks will now allow you to use the UniDisks to create or delete subdirectories as well as load, save, or delete files.

C. DAVID SINEX  
HOKKAIDO, JAPAN

## FLASHER ALERT

Roger Wagner, president of the software company bearing the same name, recently informed us that the screen-border-flashing routine described in the February 1989 installment of "Tips and Techniques" can cause trouble when it's used with ProDOS 8 programs (see "The Flasher," page 101). This "silent bell" feature of ProDOS 16 (version 1.7) and GS/OS was designed to visually notify the hearing-impaired (or those who just don't like the system beep) that the bell was being rung,

usually as a warning or a prompt. The unwanted side effect is that bytes on the zero-page are altered, which can cause a lot of grief for ProDOS 8 programs that also make use of zero-page memory. Roger's solution: Don't keep your Volume setting in the Control Panel at its lowest level.

OWEN W. LINZMAYER  
TECHNICAL EDITOR

## SPARSE WARNING

Joe Outlaw, president of Third Wave Technology, called A+ to warn users of a little-known feature of the ProDOS FST (file-system translator) in GS/OS: It now handles sparse files—files with long strings of null bytes (\$00)—automatically. Sparse files make more efficient use of disk space and are quicker to save and load than other types of files.

If you use the Finder to copy a sparse file, the null bytes are not saved to disk if the string of nulls would occupy an entire disk block. Instead, the number of null bytes is recorded with the file information in the volume directory. That's why a copy of a file may occupy less disk space (fewer blocks) than the original, yet if you examine the ENDFILE information in an 80-column Catalog, both files will be the same length in bytes.

Under most conditions, when a sparse file is retrieved, application programs "see" the correct number of null bytes, as though they had actually been written to disk. But programs that rely on the block information in the volume directory to determine how many blocks to read—a standard programming technique—may not read the entire file, causing programs to crash or data to be lost. If you suspect that this situation is causing any problems you have encountered, try copying the file using a disk-maintenance utility other than the Finder, such as Copy II Plus or the System Utilities.

OWEN W. LINZMAYER  
TECHNICAL EDITOR

*Please send your Apple II tips to "Tips and Techniques," A+, 950 Tower Lane, 18th Floor, Foster City, CA 94404. If we publish your tip we will send you an A+ T-shirt. Please include your name, address, and size (S-M-L-XL) with your submission.*



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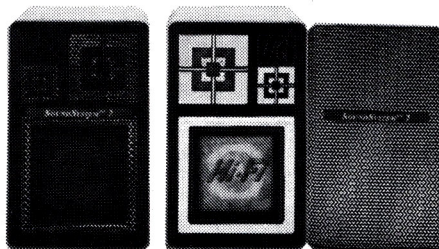
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Joystick III similar to Mach III

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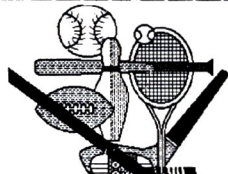
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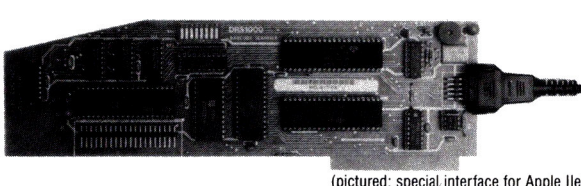
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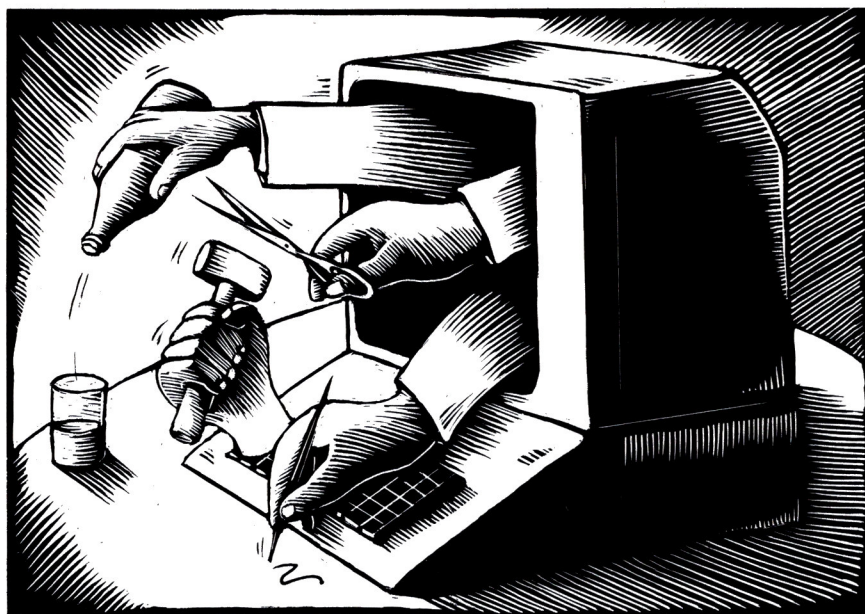
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# RESCUE SQUAD

BY GARY B. LITTLE

## FINDING THE IIgs I/O PORT

**Q.** I've just read the book *Practical Things to Do with a Microcomputer* by J. Tatchell and N. Cutler. This book shows how to build simple electronic devices that a computer can control through an input/output (I/O) port. My Apple IIgs does not seem to have such a port. Is there any way I can add one to it?

BRIAN GHOSHHAJIA  
PITTSBURGH, PA

**A.** Actually, the Apple IIgs does have a built-in input/output port, which you can probably use with many of the devices your book describes. It's the white, 16-pin Game I/O connector that is labeled J21, located just in front of slot 4 on the Apple IIgs motherboard. All models of the Apple II, except the IIc and IIc Plus, have the same type of port, primarily for joysticks and paddles.

The Game I/O port provides four digital switch inputs, four analog control inputs, and four digital annunciator outputs (see figure 1). Many of these signals are also available on the nine-pin

hand-controller connector on the back panel of all Apple IIe/c/GS/c+ computers.

Before you attempt to use the Game I/O to communicate with your devices, I suggest you study the electrical specifications in the *Apple IIgs Hardware Reference* (Addison-Wesley, 1987). Also try to get your hands on a couple of useful (but hard-to-find) books that describe several interesting interfacing projects: *The Apple Connection* by James Coffron (Sybex, 1982) and *Hardware Interfacing with the Apple II Plus* by John Uffenbeck (Prentice-Hall, 1983).

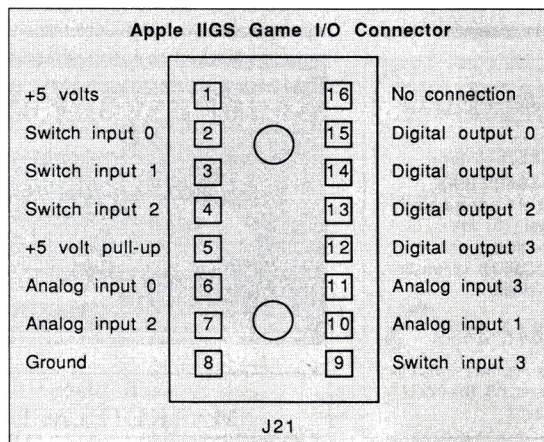


Figure 1: Apple IIgs Game I/O Connector

I describe several Game I/O port experiments in chapter 10 of my book *Inside the Apple IIe* (Brady/Prentice Hall Press, 1984). The end of that chapter refers to several magazine articles that explain how to hook up a thermistor (for measuring temperature), light pen, and even a lie-detecting device.

## IMAGewriter LQ DRIVER

**Q.** In the September 1988 "Rescue Squad," you referred to the Apple IIgs System Disk 3.2 as being the source of a driver for the ImageWriter LQ printer. I called Apple Customer Support and was told that this disk was available only to purchasers of the Apple II network. Where can I get this driver?

MARCIA CONRAD  
ST. PAUL, MN

**A.** The easy solution is to upgrade to System Disk 4.0 (the one that includes GS/OS), which is readily available from all Apple dealers. The disk contains many new drivers, including ones for the ImageWriter LQ and Epson printers. Unfortunately, this ImageWriter LQ print driver operates the LQ in the ImageWriter II emulation mode and does not use the 27-pin print head for superior-resolution hard copy. Apple has yet to release a GS driver that takes advantage of the LQ's 216-dot-per-inch vertical-resolution capabilities.

## LONGER IIgs KEYBOARD CABLE

**Q.** Does anyone make a longer Apple Desktop Bus (ADB) cable for the keyboard on the Apple IIgs?

PHIL WILSON  
CHICAGO, IL

**A.** Kensington Microware, of System Saver fame, is the only company I'm aware of that sells longer ADB cables. Contact Kensington at 251 Park Avenue South, New York, NY 10010; (800) 535-4242; (212) 475-5200. **+**

Gary Little is manager of technical references and special resources in the Developer Tools Group at Apple Computer. If you have contacted the appropriate manufacturer(s) and still need help, please send your questions and problems to "Rescue Squad," A+, 950 Tower Lane, 18th Floor, Foster City, CA 94404. Because of limited space, we aren't able to publish responses to all inquiries we receive.





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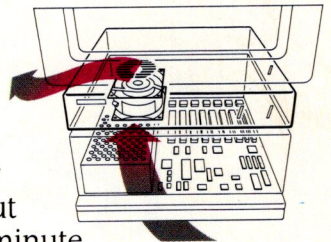
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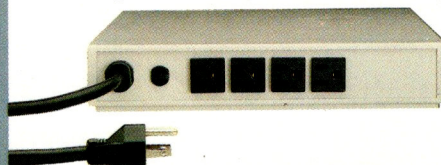
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