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September 1986 \$3.95

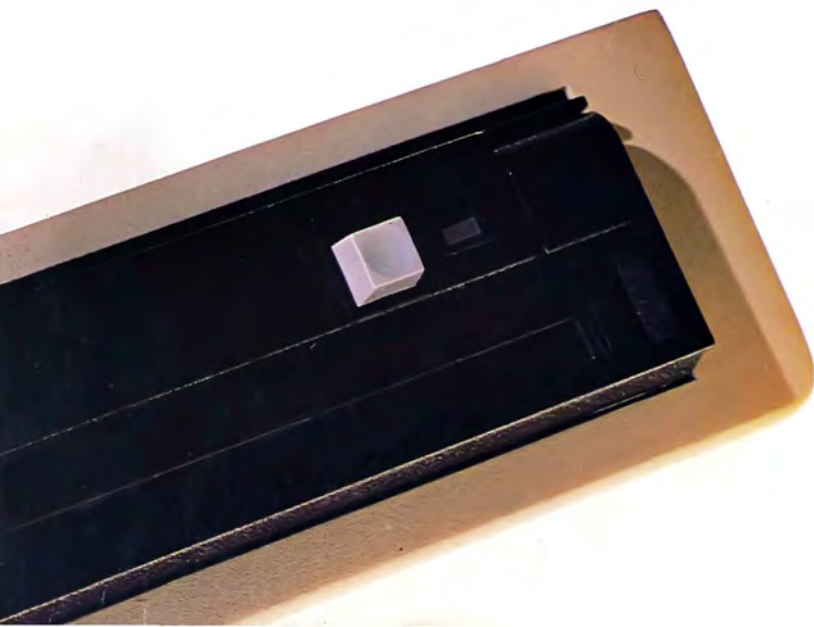
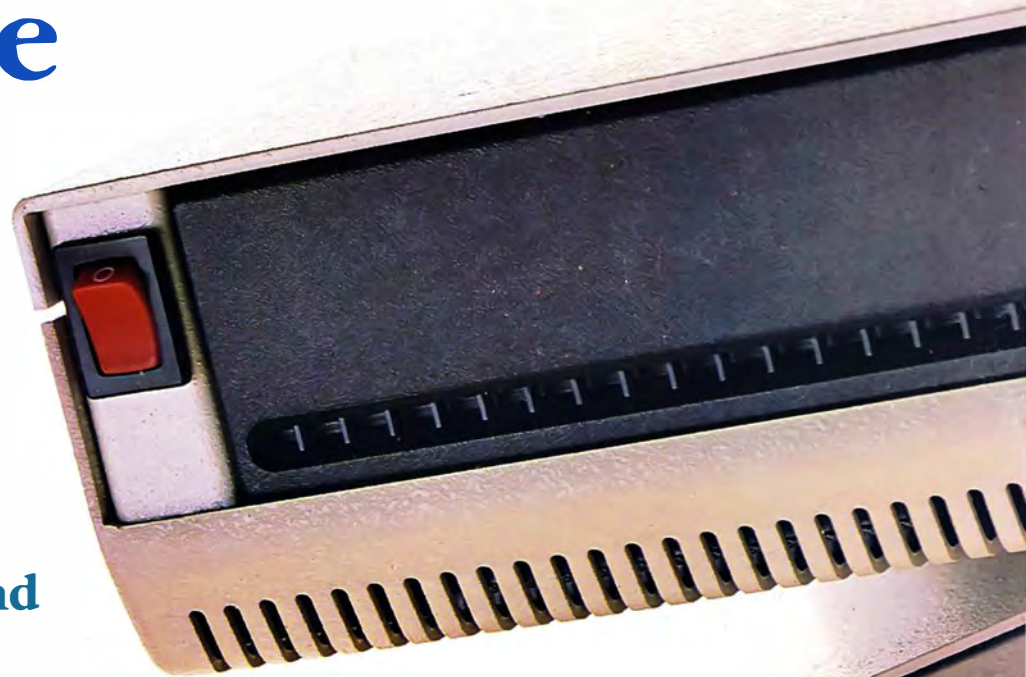
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The Macintosh™ Magazine

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- PageMaker Tips
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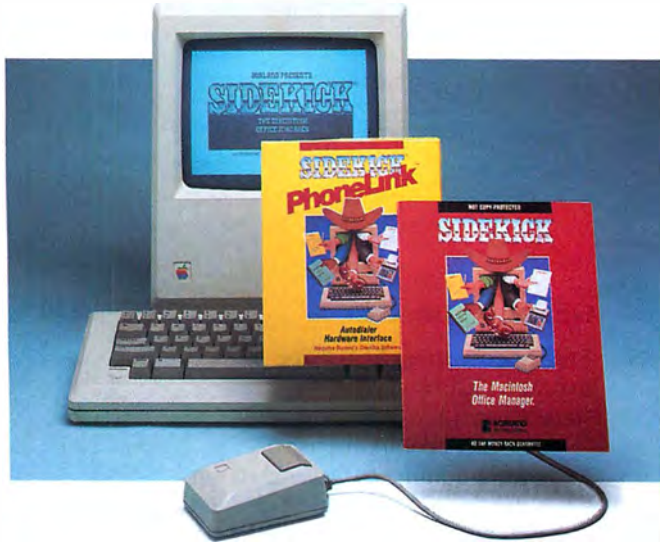
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M52



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MACWORLD

September 1986

The Macintosh™ Magazine

Getting Started

88 The Accounting Software Buyer's Guide

Steve Mann

The most comprehensive compendium of Mac accounting software ever compiled—a point-by-point comparison of 25 programs, covering over 150 criteria.

Review

98 Enter the SCSI Drives

Lon Poole

Evaluations of nine of the first crop of SCSI hard disks, including timing tests and a feature-by-feature comparison.

108 Mac Modeling

Reese Jones

With its elegant design and visual interface, *STELLA* brings professional modeling and simulation to a nontechnical audience.

112 Beyond ThinkTank

Reed McManus

ThinkTank 512's successor features multiple windows, graphic functions that automatically generate bullet and tree charts, a raft of utilities, and other improvements. But... is *More* better?

Hands On

116 Proficient Pagemaking

Richard Jantz

Pick up the pace of your *PageMaker* pasteup—timesaving tips, plus 14 keyboard shortcuts.

120 Four Secrets of Excel

Danny Goodman

Become an *Excel* expert with this series of solutions, tutorials, and sample worksheets that guide you through some of the program's arcane but effective features.

Community

124 Desktop Engineering

Paul Freiburger and Dan McNeill

A look at the Mac in its new role as part of a CAD workstation: the hardware, the programs, the problems, the future.

Departments

13 The Software Storm Ahead

David Bunnell

23 Born-Again Enthusiast

Jerry Borrell

27 MIDI Life Crisis

Steven Levy

37 Letters

59 Macworld View

Add-on SCSI ports, *dBase* for the Mac, Steve Jobs's new word processor, and other news for the Macintosh community.



On the Cover

See "Enter the SCSI Drives," page 98, for reviews of nine new 20MB hard disks. Photograph by Fred Stimson.

71 Get Info

Lon Poole

Macworld's tutor answers questions about disk space discrepancies, changing the startup application, *MacDraw* font-handling mix-ups, and other Macintosh concerns.

133 Macware Reviews

▪ *ComicWorks* Don't laugh. For cartoonists and others who combine words and pictures, this program represents a serious advance.

▪ *Record Holder* No dramatic breakthrough, but at less than half the price of its major competitor, this sturdy data manager is worth a try.

▪ *FullPaint* Is this the Mac graphics program you've been waiting for? Draw your own conclusions.

▪ *MaxThink* Get organized with this full-featured—but nicely priced—outline program.

▪ *KidsTime* Five entertaining educational programs for three- to eight-year-olds.

▪ *Uninvited* A mystery-in-the-mansion text and graphics game from the maker of *Déjà Vu*.

▪ *MacKeymeleon* Keyboard reassignment—including your choice of 14 foreign keyboard layouts—made easy.

▪ *MacInker* A ribbon-recycling system for intensive ImageWriter users.

▪ *Orbiter* Attention space cadets: the first space shuttle simulator may not be a blast, but it is clever and realistic.

▪ *Maccessories Portable Modem* A mini modem for beginners or mobile communicators.

▪ *One on One* The Doctor faces off against Larry Bird in a blazing b-ball battle.

▪ *MegaTrack XL* Need an intermediate-level sequencer? This new addition to *Deluxe Music Construction Set* may be playing your

191 Open Window

Jim Heid

An exchange of Macintosh discoveries, including a tip for producing better boldface with *Microsoft Word*, a method of double-sided LaserWriter printing, a way to include engineering equations in *Write* or *Word* documents, and a program that lets you see lengthy file names in Open dialog boxes.

183 Macworld Directory

Indexes

188 Advertisers

189 Products



Martin Marietta's Gerry Simonson with a model of the space station the Mac is helping to design. See "Desktop Engineering" on page 124.

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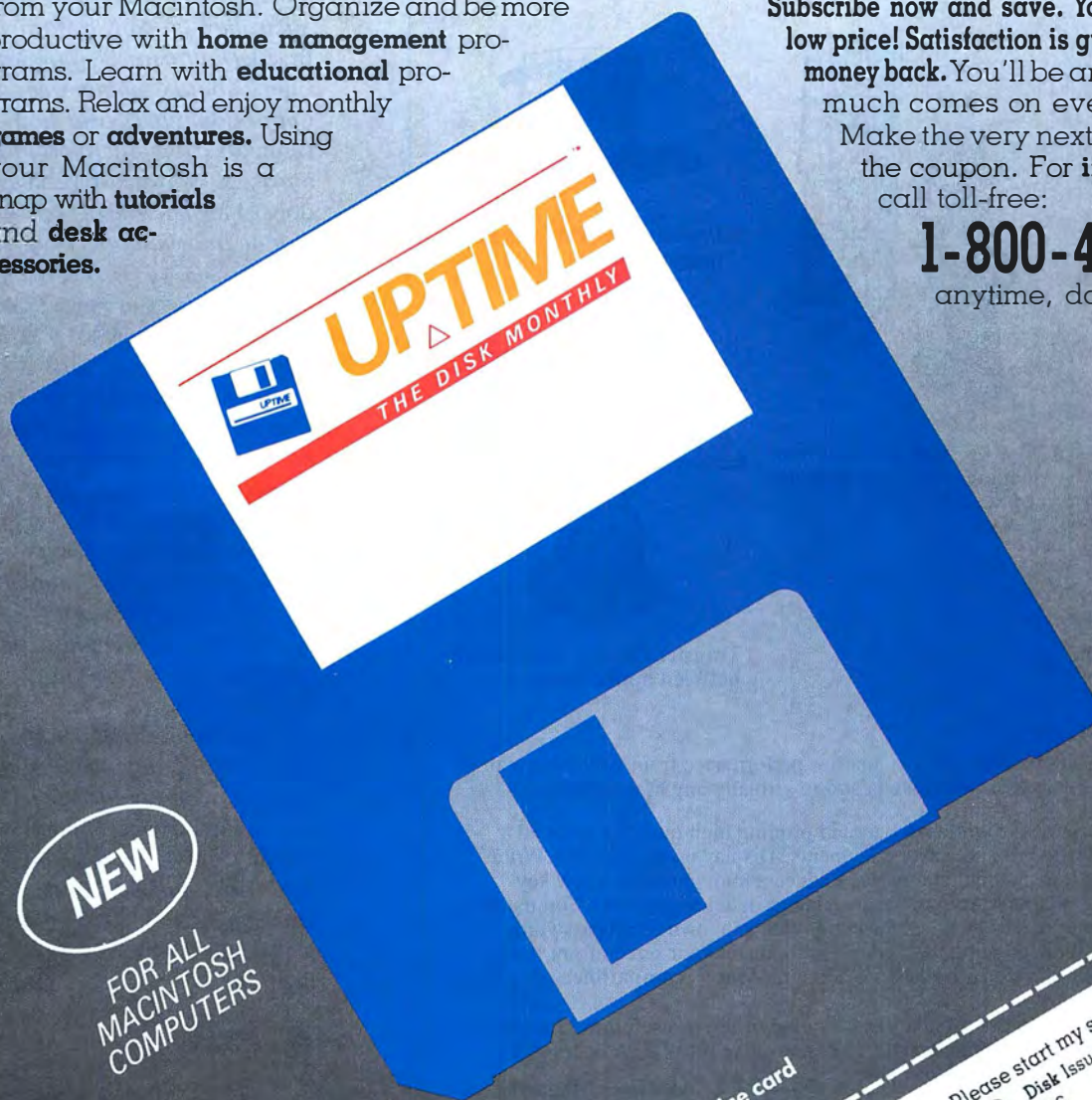
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Now available from Human Touch Computer Products, The Three to One Touch™ board brings your Macintosh® alive with stepped-up processing speed, increased power, expandability, and upgradability.

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All of which explains why *InfoWorld* judged HyperDrive "unbeatable in the current world of the Macintosh." And why *Macworld* proclaimed it "the happiest marriage of the Macintosh and a hard disk."

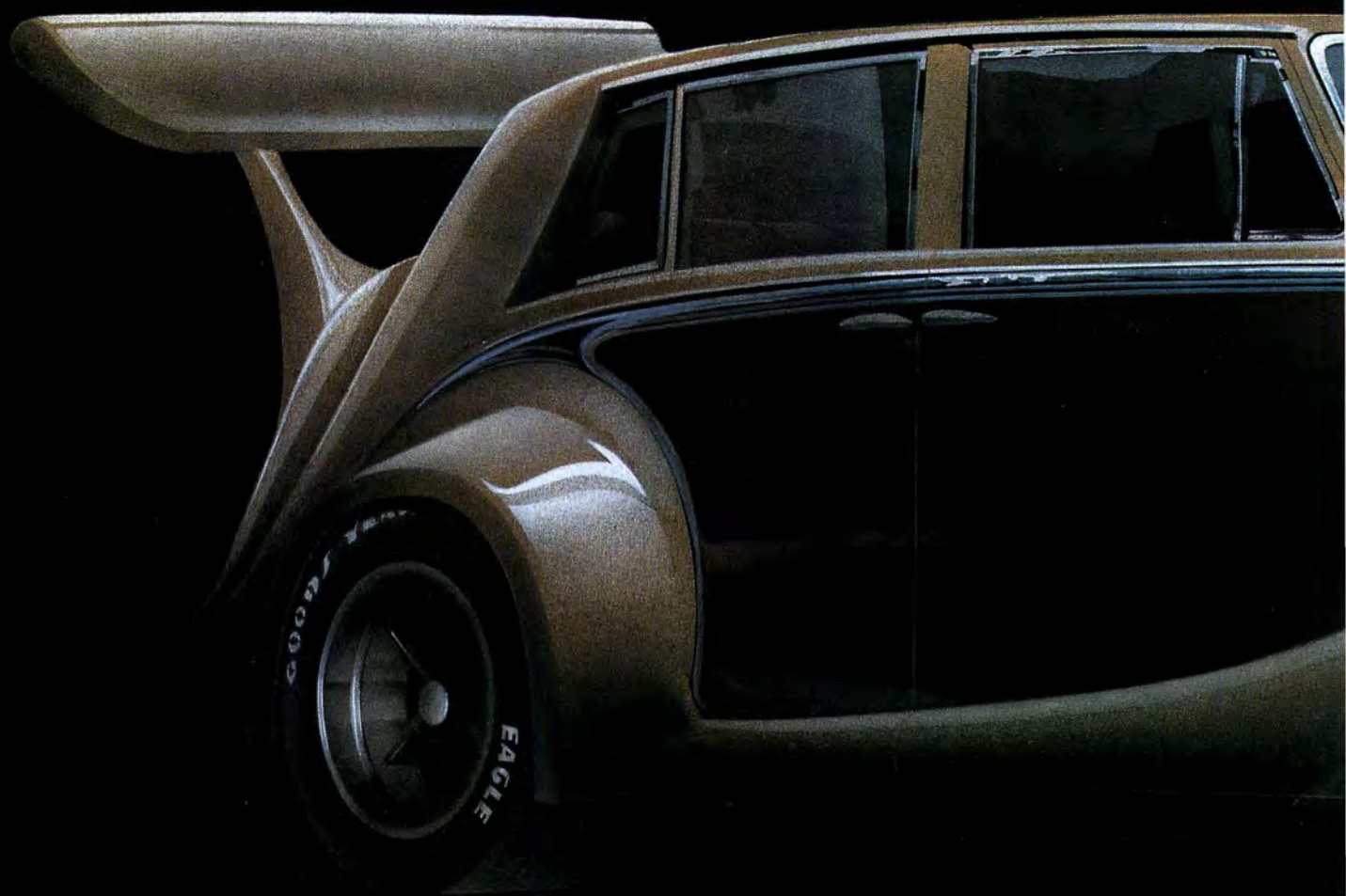
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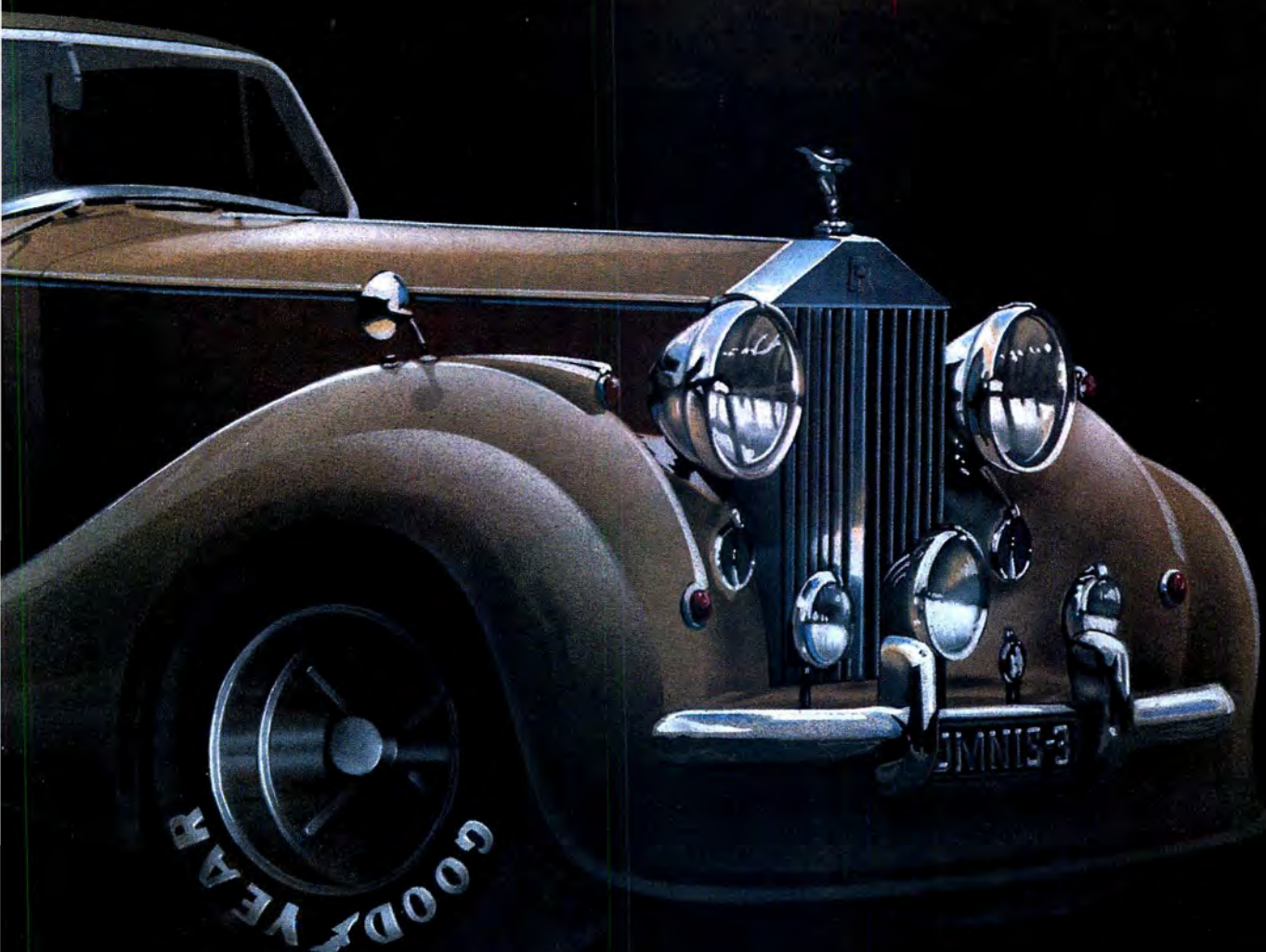
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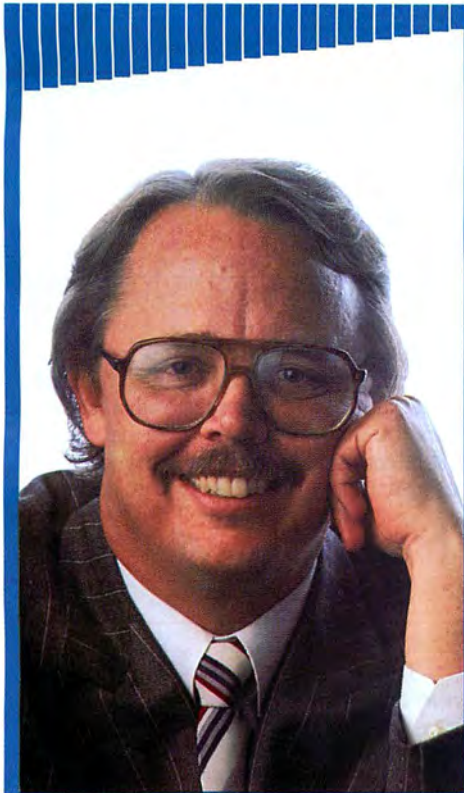
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The Software Storm Ahead

Before the Software Curtain falls, we must do something about the proposed bill that would outlaw software rentals



Illegal or unauthorized copies of software often lead to legitimate sales.

Batten down the software hatches—we're heading for a gale. A move is afoot to introduce a bill in the next session of Congress that would prohibit the rental of personal computer software.

Representative Pat Schroeder, D-Colo., with input from the Software Publishers Association, is sponsoring H.R. 4949, otherwise known as the Computer Software Rental Act of 1986. The issue is complex, problematic, and almost Catch-22 in its ramifications. Although well intentioned, the bill is fraught with danger for the software consumer and the personal computer industry alike.

Why? Because when customers have few meaningful opportunities to test software before buying it, they begin to shrink away from investing in expensive but unproven programs.

Surely we must be able to steer a creative course around the software storm the bill would create. Otherwise a lot of ships are going to go down, with all hands on board.

Schroeder sees software publishers as the sole victims: "Commercial business interests should not be allowed to reap profits from loopholes in the copyright laws or to conduct trade in copyrighted works at the expense of copyright owners."

The "loophole" she refers to is the "first sale doctrine" of the U.S. copyright law, which allows buyers of copyrighted works to dispose of them in any way they choose.

The bill's target is software rental outlets, but the real victim is you—the software user.

In my April 1986 column in *PC World* magazine, I described what I considered the real causes of the decline in personal

computer use. I observed that most software is confusing, difficult, and time-consuming to learn and that good software support is scarce. Consequently, customers become frustrated and give up computing instead of advancing further. Rather than encouraging power users, we end up with powerless users—a sad state of affairs.

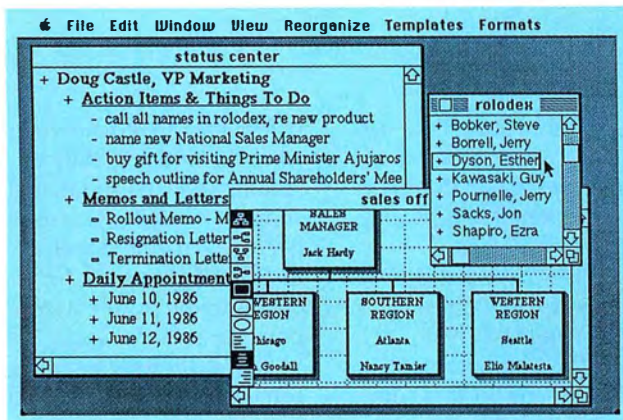
Now there is an interesting but controversial way to alleviate some of that software frustration—software rental. By renting a program, potential buyers can test its capabilities to see if it really fulfills their needs, and they can try out new applications as well.

Paul Terrell has helped pioneer the software rental concept with his San Francisco Bay Area chain of five Software Emporium stores. But Paul is not new to pioneering: he started the world's second computer store, which later became the world's first computer-store chain, known as the Byte Shops.

When you walk into a Software Emporium, you can easily mistake it for a video store. Terrell has the titles displayed full-face on all four walls. He has a superb selection of software, including packages for the Macintosh, the IBM PC, the Apple II, and the Commodore 64—a much greater variety of software than you would find in most computer stores. Daily rental fees range from \$1 to \$20, with a minimum two-day rental. If you later decide to buy, you get an attractive bonus: you can apply the full rental cost to the purchase price of the software.

(continues)

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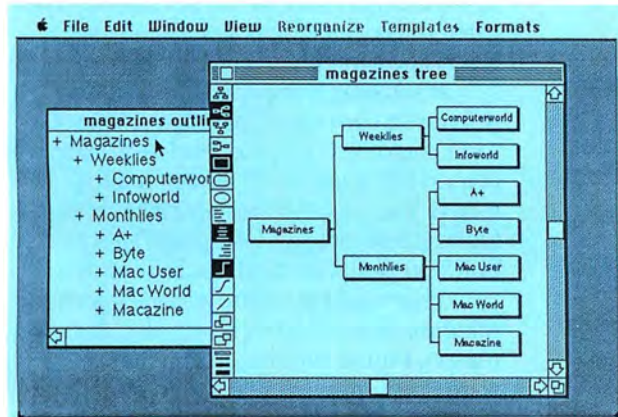
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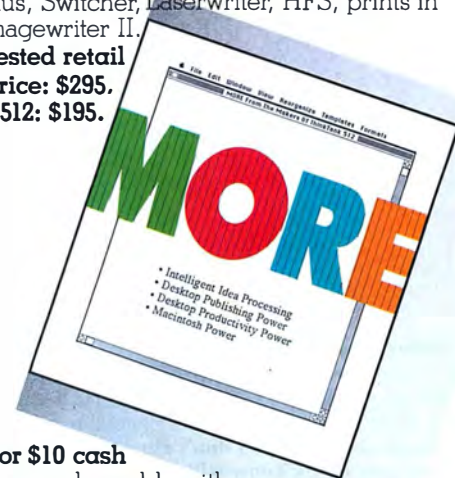
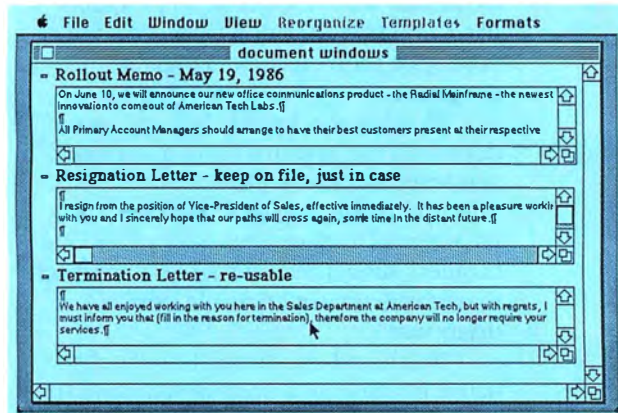


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Of course, some people see rentals as an opportunity to steal software. But as a *PC World* software piracy survey showed (see the September 1985 issue of *PC World*), illegal or unauthorized copies often lead to legitimate sales. People try out unauthorized copies of software, and once they're satisfied that the software is good, they most likely purchase it. They want the documentation, the customer support, and the program updates.

Neither Schroeder nor the Software Publishers Association—which is chiefly responsible for drafting the contents of the Computer Software Rental Act—has investigated the correlation between software rental and piracy.

If software companies would allow software to be rented, perhaps rental software could be copy protected, while purchased software would remain unprotected. You could try out any program you found interesting, and if it passed inspection, you would be motivated to buy it.

This would solve the serious training dilemma associated with software. For this reason, I think Paul Terrell and his Software Emporium are really onto something.

Unfortunately, some software rental companies operate on the premise that all software renters are thieves. These stores frequently sell code-breaking programs like *Copy II PC* or *Copy II Mac*, thus encouraging their customers to pirate programs.

This unconscionable behavior is undoubtedly the impetus behind Schroeder's anti-software-rental bill.

The problem with Schroeder's bill is its potential to destroy the software rental business altogether. Paul Terrell's approach to software education would then disappear.

We should encourage Terrell's alternative because it's a positive solution to the number one cause of declining personal computer use: the almost perverse complexity of software.

In announcing her proposal, Schroeder noted the passage of similar legislation banning the rental of audio recordings.

No real parallel exists, however, between the two products. You need not test a record album to determine its value. You hear the music on the radio; then, if you like the song, you buy the album.

Software is different. No store is completely reliable. You can read reviews in

(continues)

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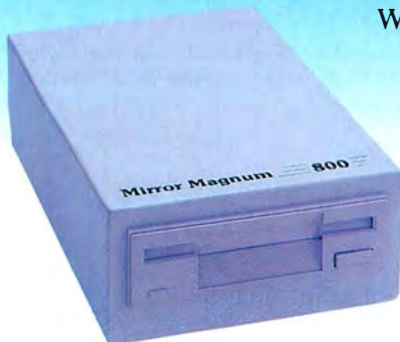
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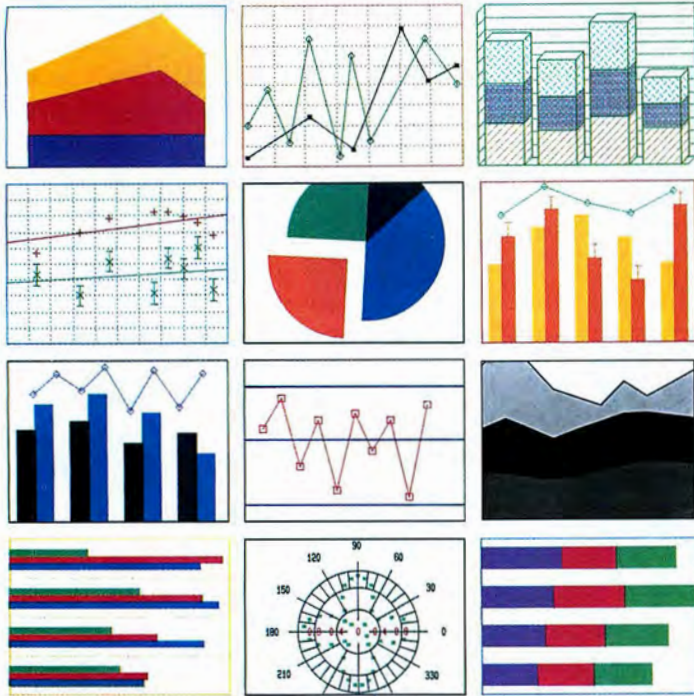
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magazines, but they provide only a certain amount of information. You can read advertising claims, but you can never be certain how a particular package might suit you. Until you run it, you can't really tell if it will work in your computing environment.

Because of these fundamental differences, the software business needs different laws than the record business. To draft a bill for the computer industry based on record industry legislation is a critical mistake.

Schroeder expresses concern about software rentals impeding the growth of the software industry because people steal rented software.

Anyone who's involved with personal computers can easily see that software companies impede their own growth when they market programs that don't work and have poor documentation—not to mention undocumented features and substandard support.

I doubt if software rental curtails software sales by more than 1 percent, certainly a marginal amount. On the other hand, software rental enables us to find out whether a program works before we put our money down.

Why should we have to pay \$700 for a database program, only to discover that it doesn't meet our needs, that it's bug-ridden, or that we can't figure out how to use it? Why can't we test-drive it first?

Schroeder's bill assumes that the consumer is wrong and that the software company is right. Ironically, the bill's passage may prove most damaging to those it's intended to protect—the software companies.

Eventually, many software customers will begin to shrink from investing their money in expensive but iffy programs.

And that would be a great loss for everyone—customers and software publishers alike.

Surely, software vendors and legitimate software rental businesses can find a creative solution before Schroeder's Software Curtain falls.

I urge readers to write to Schroeder expressing their concern about her proposed Computer Software Rental Act of 1986: Patricia Schroeder, Congresswoman, First District, Colorado, 2410 Rayburn House Office Building, Washington, DC 20515. □

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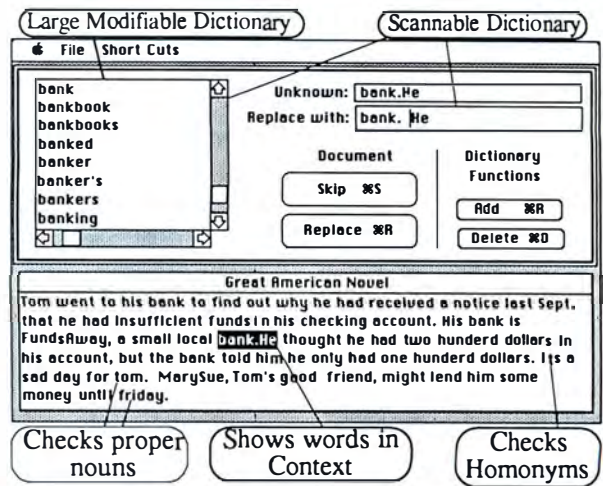
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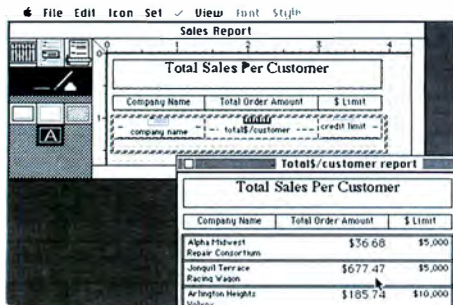
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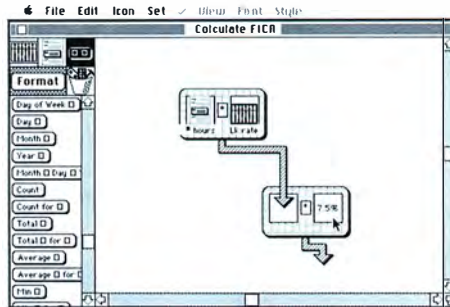
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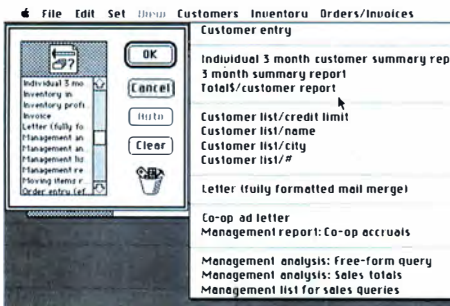
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- Supports 17 digit precision SANETM package (a full implementation of IEEE floating point standard)

Requirements

- Works with the Macintosh Plus, Macintosh 512K Enhanced, Macintosh 512K with external drive. Hard disk or 800K drives recommended.



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Born-Again Enthusiast

New prospects for the Mac revive the spirits of a jaded computer watcher



*'Next year will
begin a halcyon
period for computing.'*

After nearly a decade of work in the computer industry, I sometimes forget my original wonder with computers. Over the years my concern for the business of computers and electronics displaced my fascination with technology and its impact on society. Exuberance gave way to ennui, arising in part from the constant changes that occur in semiconductors, computers, communications, and manufacturing—enough to numb the most avid enthusiast. In part my feelings are shaped by experiences as a computer owner—feelings such as frustration with the amount of money I've invested, the recurring sense that my computer should be able to do more, and impatience with mechanical foibles.

Joining *Macworld* last November has recharged me with the same intensity I felt when microprocessors were new and personal computers were becoming a reality. For my first review of an Apple II (16K) in 1982, I had to tinker with the integrated circuits on the motherboard to attach a color monitor; fortunately the frustration level has decreased since then.

My enthusiasm has returned, not so much because of the Macintosh but because of Apple's commitment to the Macintosh product line's expandability and performance. Next year will begin a halcyon period for computing: the year 32-bit microprocessors combine with photographic-quality computer graphics, communications, and a wealth of new functionality to make the desktop computer exciting again. Not the excitement of slick ad campaigns, but the thrill that keeps us up nights learning how to do things with our computers.

The Macintosh product family will be a focal point in this era in which personal computers support advanced operating systems—such as UNIX—without causing us to resort to programming or arcane syntax. An era in which many manufacturers

Editor Borrell joins Apple executive vice president Del Yocam for a look at the new Cray supercomputer.



will offer computers that use the desktop, window, and icon metaphors. The Macintosh family is likely to stand in the middle ground between the mass-marketed offerings from Atari and a new generation of products from Sun Microsystems, IBM, and Apollo. The open Mac has the potential, if prices are kept low enough, to instigate another bull market like the two-year personal computer boom that began in 1982.

I hope this is the era of computing machines that allow us to grow as technology becomes more sophisticated—to graphic displays that rival nature in richness and detail, to programs that compete with the sophistication of human thought, and to communications as simple as the telephone system. We can see the rudiments of each of these: AT&T and Sun cooperating on UNIX development, implementation of advanced graphics techniques at Pixar, and the openly discussed Macintosh of this winter.

We are on the edge of a technological dream, waiting to see what appears when we open our eyes. □

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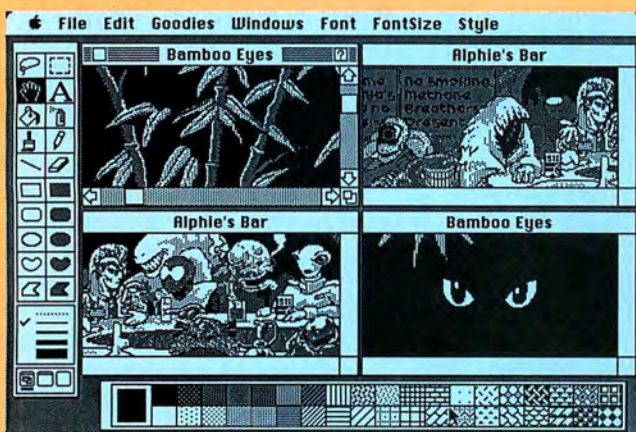
—Alan Stevens, MacTimes

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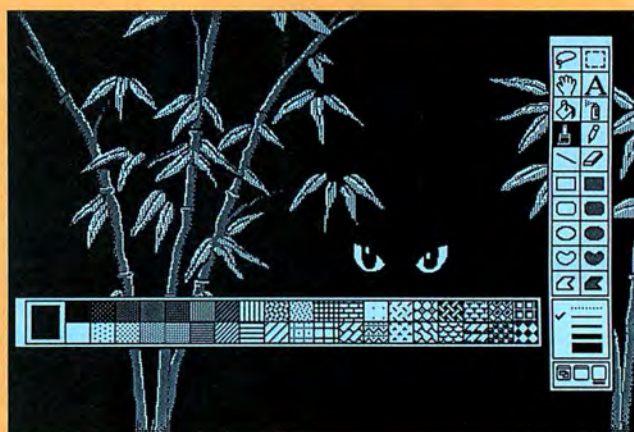
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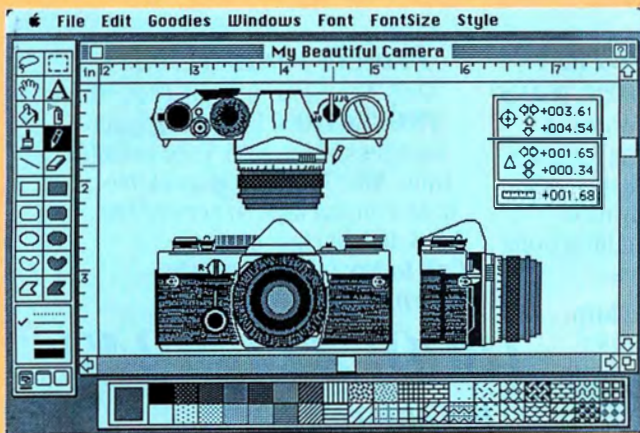
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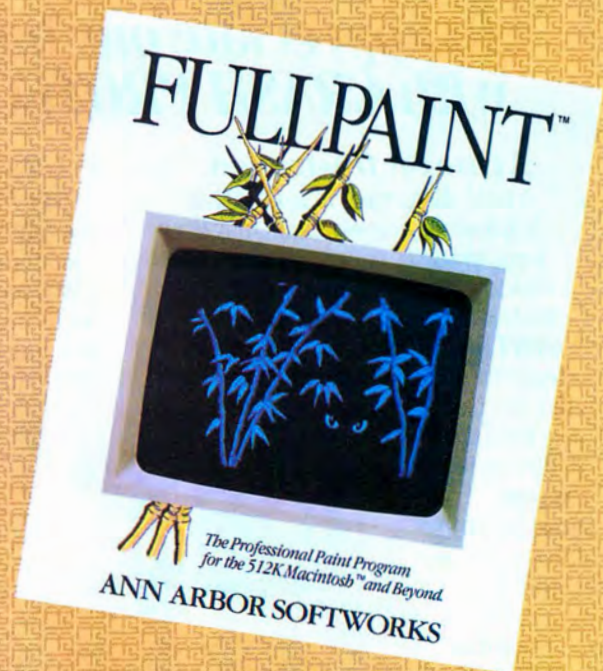


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MIDI Life Crisis

Can a columnist turn into a rock superhero with a boost from the Mac?

Early in my fourth decade of life, it began to dawn on me that I would never become a rock 'n' roll star. Though I had done little during the past 20 years to advance my musical career—occasionally strumming some coffeehouse tunes on a Martin D-28—this revelation was a dark milestone. You see, I had considered this writing thing a time killer. Something to turn a buck until I could get to the real work: headlining America's great arenas, whipping 20,000 fans into spasms of madness and temporary deafness.

I had just about conceded the field to Bruce Springsteen and Johnny Rotten when I visited some rock record producers. They told me that computer technology had dramatically transformed the recording studio, in the process opening the field to a new class of musician-composer-performer. Someone with good musical ideas but little skill in performing—even a person who can't read music—now has the power to create a “demo” tape that fleshes out ideas into a listenable form.

So when a representative from an electronics company boasted that “anyone can make a hit record in half an hour,” I immediately volunteered. And though I did not make a hit record, I did produce a decently funky rock-fusion ditty using state-of-the-art recording equipment.

Synthful

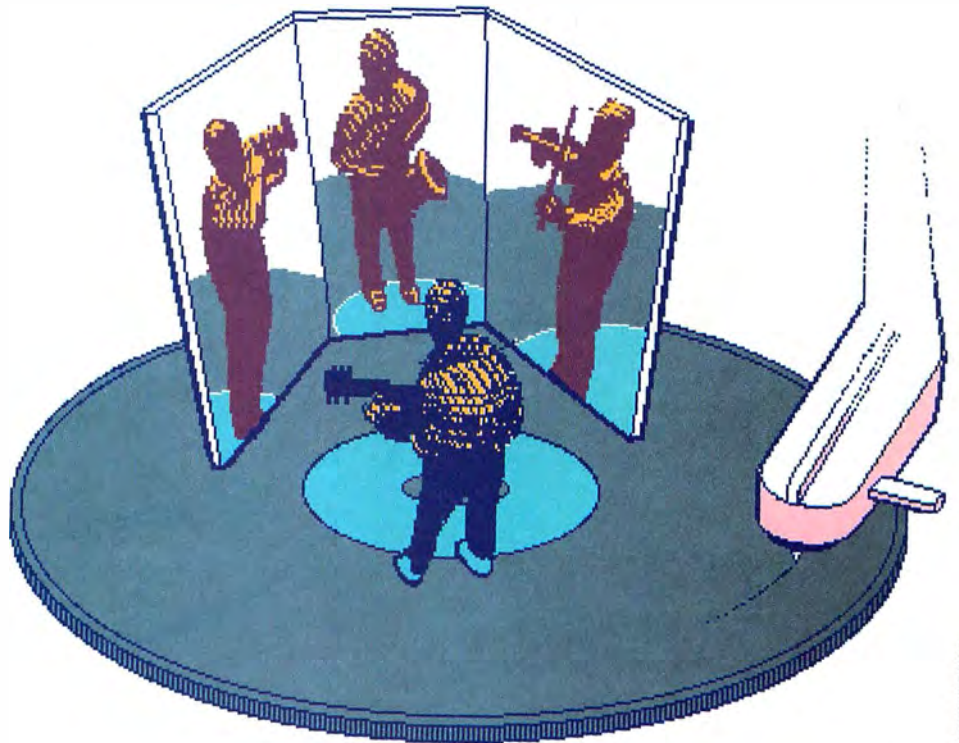
But how many people have state-of-the-art recording equipment? Not me, to be sure. But recently I acquired an amazing toy—a Casio CZ-101. Retailing at under \$500 and available at some discount outlets for half that price, the 101 is quickly becoming

the Volks-synthesizer. Though you might not find it in Herbie Hancock's keyboard armada, it is a real synthesizer, allowing users to construct sounds by manipulating the elements of sound itself. It can make fairly convincing imitations of almost every instrument imaginable. And by using something called a MIDI interface, the CZ-101 can hook up to my Macintosh and make real magic. As well as some music.

Instead of launching into an explanation of MIDI and its significance in changing modern music, let me get to the bottom line. Can the combination of Macintosh and Casio make me a rock 'n' roll star? To the mental accompaniment of Ray Davies singing “Low Budget Man,” I decided to try an experiment: how much music power can a synthesizer-ignorant Macintosh owner obtain by spending only a few hundred dollars on equipment and software?

The first requirement is the device that allows the synthesizer to communicate with the Mac. Several are available, and I settled on the Assimilation MIDI Conductor, which lists for \$89. I had no problems with it, but not long into my new career as a digital musician, I purchased a Mac Plus and discovered that none of the MIDI interfaces then available worked on the Plus, due to Apple's inexplicable fiddling with the serial port. (Just recently, Opcode Systems released a Mac Plus MIDI interface that lists for \$175.) So I had to forego the ample memory of the Plus and keep using my old Mac.

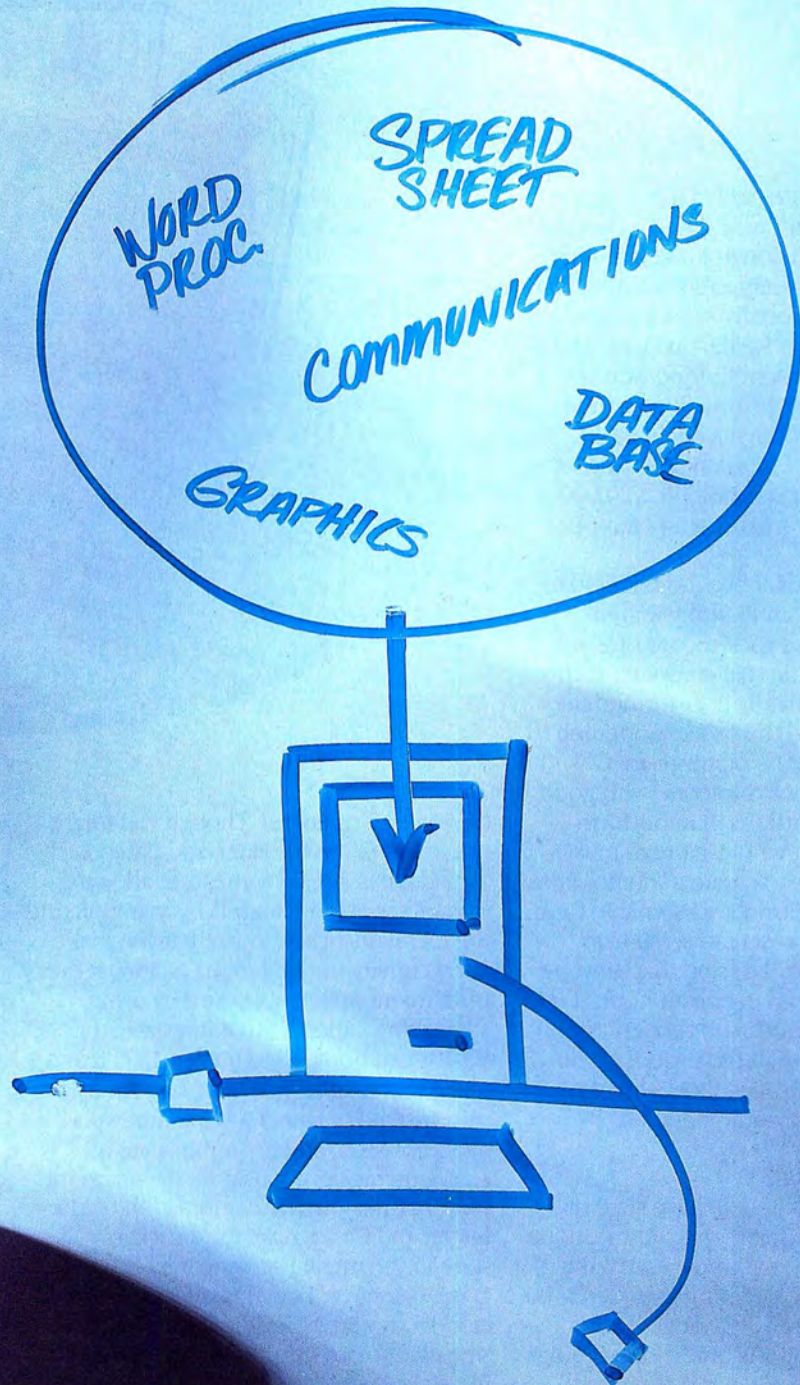
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THE POWER DESK
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The interface plugs into the modem port and comes with the proper cables to hook into the Casio. The ease of the connection only heightened the uneasy feeling I had about hooking up a musical instrument to my computer. Even though I knew that the musical instrument in question was a computer (a digital synthesizer has more chips than a bag of Fritos), it seemed impious. Not the kind of thing that Beethoven might try. But then I recalled that the initial response to the electric guitar was horror and ridicule. Like B. B. King and Bob Dylan, I embraced the marriage of music and technology.

Sounds Right

The first piece of software I tried was *Patch Librarian*, by Opcode Systems. *Patch* is synthesizer lingo for a sound, be it one that emulates a violin or a cat being stepped on. The Casio has 16 preset patches in ROM—standard stuff like organ, trumpet, and bass—and room for 16 “internal” patches in RAM. The preset sounds are there for eternity; the internal ones can be programmed by a hideously tedious process of fixing parameters, wave envelopes,

and other Theory of Acoustics esoterica. Once you create the patches, you store them on a RAM cartridge that holds 16 patches and costs \$35. Or at about a hundred dollars a shot, you can buy additional preprogrammed patches. The synthesizer may be cheap, but the sounds aren't.

The solution is *Patch Librarian*. For a mere \$50, this program gives you over a hundred sounds and allows you to store hundreds more on a Mac disk. I spent a few hours merely testing the sounds, everything from a soothing acoustic guitar to something that sounded like Jimi Hendrix orchestrating the closing scene of *Apocalypse Now*. I can't imagine anyone with a Casio and a Mac not taking advantage of this software. (Opcode is also about to release a patch editor, which will greatly simplify the process of programming your own patches; at \$125, *The MIDIMAC Patch Editor* will include *Librarian*.)

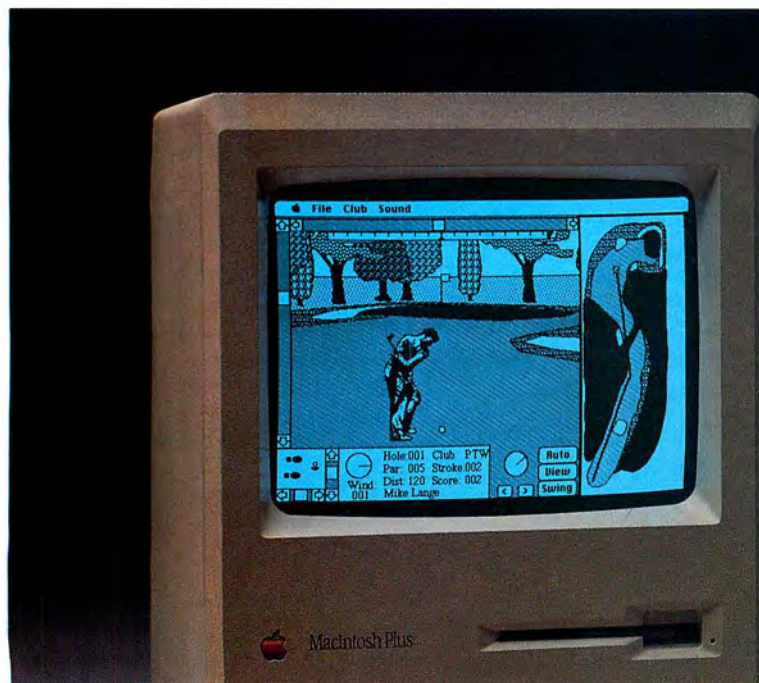
Armed with proper sounds, I was ready to do the hard work of recording. I gave myself a modest challenge—to produce a version of Rockin' Sidney's great zydeco hit, “(Don't Mess with) My Toot-Toot,” with several instruments going at once. One handicap was my near-complete

inability to play keyboard instruments. But I figured that technology could easily compensate for that.

Using traditional sound studio technology, I'd have to record my performance track-by-track on a tape recorder. The computer equivalent of a multitrack tape recorder is a sequencer: it does the job of a tape machine but stores music digitally. Several good under-\$200 sequencer programs are available for the Mac. I tried Opcode's *MIDI Mac* sequencer and the *Mega-Track* sequencer, by Musicworks. Both employ tape-recording metaphors, and their screen displays include record and playback “buttons.”

I played a few chords on the synthesizer and chose Playback. It was startling to hear my fumbling progression precisely echoed. I realized that using the computer as a sequencer forces you to rethink your concept of music. Musicians generate information. So when I press three keys on the Casio, the cable labeled MIDI Out tells the Macintosh not only which keys are being pressed but also the characteristics of the

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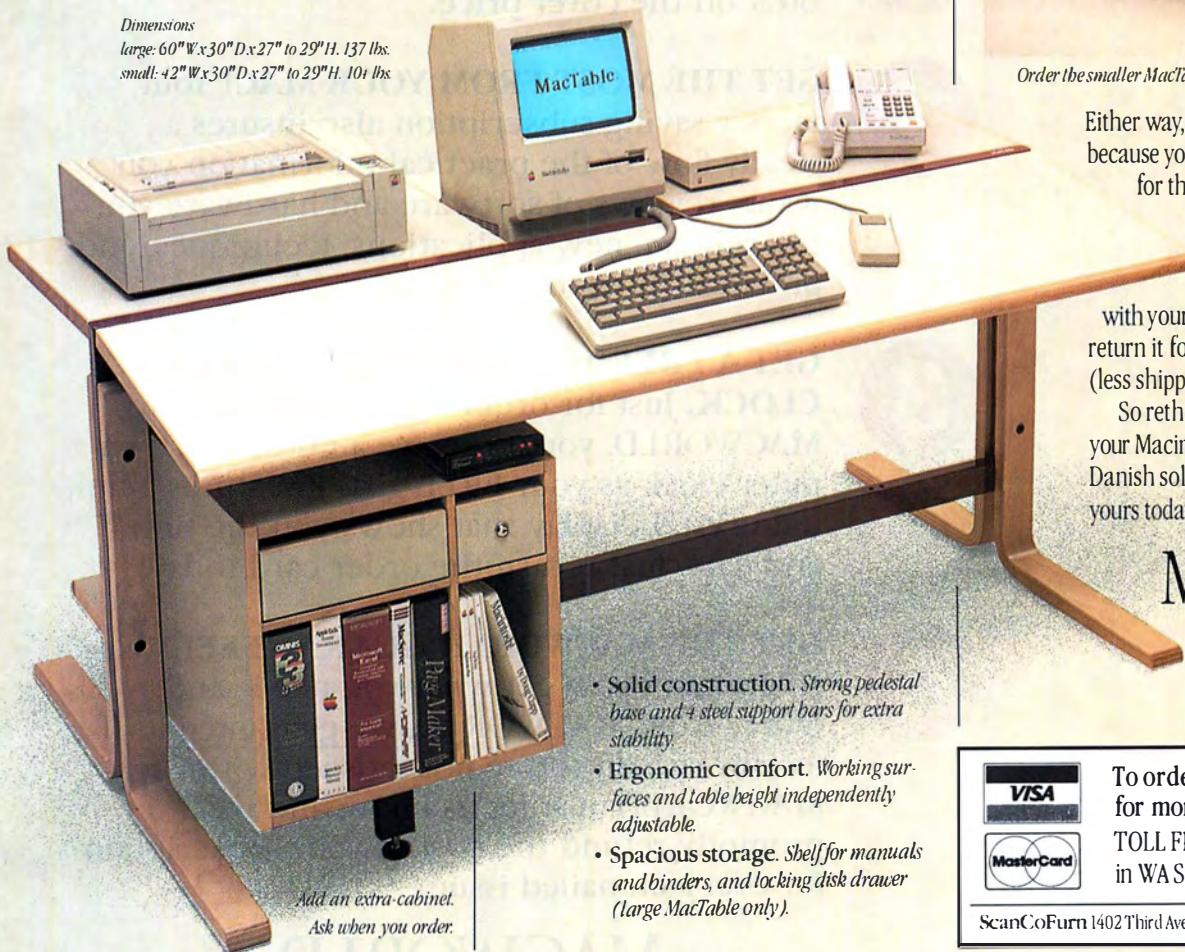
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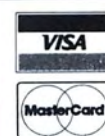
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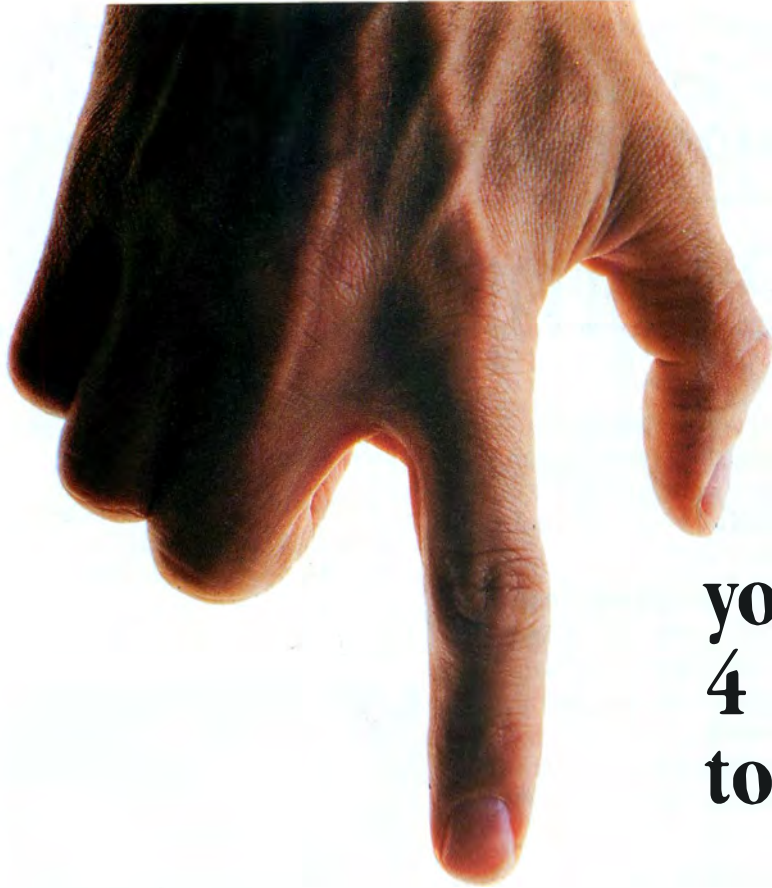


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sound, the volume, and the length of time I'm pressing the keys, and all this is stored in the Mac's RAM (or, if I save it, on a disk). During playback, the computer sends the information back through the MIDI Out cable, and the synthesizer translates it into sound. Just like the information that's stored in the form of a spreadsheet or word processing document, the musical data held by the sequencer is malleable. Once you record something, you can edit it, change the vibrato, make it louder, even transpose it to another key.

Instant Replay

Though I spent a lot of time playing with these functions, when I got down to playing "My Toot-Toot," I ran into some problems, especially in figuring out how to get two instrument sounds going at the same time. Eventually I concluded that while *MegaTrack* and *MIDI Mac* offer a variety of features that professionals need, Casio CZ-101 beginners might be frustrated by the resulting complexity. After talking to executives from both companies, I realized that the limitations of the Casio are part of the problem. The CZ-101, unlike its expensive counterparts, supports only a few

patches at once. In fact, if you want to record a song with four tracks playing at the same time, you must use the synthesizer's solo mode, which means you can sound only one note at a time. So much for fancy chording.

Then I booted another sequencer program, the \$139 *ConcertWare+MIDI*, by Great Wave Software. The program has three components: Music Writer, Music Player, and Instrument Maker. I first tried Music Player; I loaded one of the pre-recorded selections, Beethoven's Fifth Symphony, put my earphones on, and waited.

I see a lot of Macintosh software, much of it very good. But only a few programs a year pass the Jaw Drop Test. When something so wonderful occurs that my mouth involuntarily gapes, the test is passed. When *ConcertWare+MIDI* played Beethoven's Fifth in four parts, it was impressive, and it was cute that the screen had a little picture of a conductor surrounded by icons of four instruments. But when the instruments began changing—viola to piccolo, tuba to flute—and the icons switched along with them... well that was so Mac-like, in the best sense, that my chin almost hit my neck. I determined to produce a "Toot-Toot" on this software.

ConcertWare+MIDI was a felicitous choice because its default settings are geared specifically to the Casio CZ-101. It was easier to do multitracking than with the other sequencers, which really weren't happy unless paired with something like a \$2000 Yamaha DX-7. Another benefit of this choice: in the Music Writer mode, in which recording and composing occur, the keyboard input is translated to musical notation. This, I figured, would be very helpful when I was a rock 'n' roll star writing hit tunes so fast I would need instant transcription for my publishers.

Since *ConcertWare+MIDI* is actually an enhanced version of a program that is designed without MIDI (the plain old *ConcertWare+* program requires no synthesizer, though it does accept input from the low-cost MacNifty keyboard), some parts of the program were superfluous for my task. Also, I found that the manual bordered on cryptic when I sought instructions for some things I wanted to attempt. But since the program followed the Macintosh interface so well, I was able to experiment, and it didn't take long before I was

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Infoworld (July 8, 1985): "... it is Macintosh software done right."

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able to lay down the basic "Toot-Toot" melody, which I had painstakingly picked out.

Since the heart of zydeco music is the accordion, I used the preset accordion patch, taking advantage of the editing capabilities to correct my numerous mistakes. For track two, I produced a simple percussion beat; it was easy, since I could hear the first track playing while I recorded the drum sound. On track three I recorded a simple bass line, using the synthesizer bass setting on the Casio. I wanted to add some guitar fills on track four, but that sound wasn't in my Casio. So I closed the program, found a good guitar sound in *Patch Librarian*, loaded it into the synthesizer, went back to *ConcertWare*, and, after some trial and error, composed some simple "guitar" lines to embellish the song.

Rockin' Steven

On playback, I realized that the bass part wasn't so great. So I turned off track three and repeated the song until I created a more suitable one-finger bass line. When I thought I had it, I rerecorded that track.

My finished product will not cause Rockin' Sidney sleepless nights. But it was a four-track, four-instrument rendition that was recognizably "My Toot-Toot." Of my subsequent experiments, I had the most success with jazzlike improvisations layered over some basic chord progressions. The nice thing about improvisations recorded this way is that you can go over them later and clean them up.

At least one of my questions was answered: the Macintosh and very little money can give you astonishing power. If my work were accomplished enough, I could take the disk files I created on the Mac straight to Electric Ladyland studios and put my instrumental parts on a hit record—all the recording studios use MIDI these days. If you buy a little MIDI synthesizer, the capabilities of a recording studio are yours.

The answer to my second question, concerning my future as a pop star, was less clear. After all, it's a long road from "Don't Mess with My Toot-Toot" to "Born to Run." And I have yet to actually compose any tunes to set the whole world humming. Until I do, don't look for me in the Who's Hot issue of *Rolling Stone*.

Macworld Contributing Editor Steven Levy wrote Hackers: Heroes of the Computer Revolution and is a contributing editor of Rolling Stone. □



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These are the fastest SCSI hard disks available for Macintosh Plus or Macintosh 512. The main features include plated media hard disks for long reliable use. The PL hard disk is auto-booted either from the Macintosh Plus or the Macintosh 512/E with our Macport+. Each unit comes equipped with its own fan for optimum operation and extended product life. Also the PL series comes with a complete set of utilities to format and park the disk. Each PL drive can be placed either underneath, next to the Macintosh, or up to 20 feet away, how's that for versatility? The PL can be daisy-chained with 6 other peripherals, and is available in various capacities.

PL 20, 21meg formatted drive/**PL 30**, 32meg formatted drive/**PL 80**, 80meg unformatted drive/**PL 172**, 172meg unformatted drive.

MacBack+

SCSI TAPE BACK-UP

MacBack+ SCSI tape back-up units are what every SCSI hard disk has been waiting for. The SCSI experts from Peripheral Land deliver again. The wait is over! Now, finally, a fast, easy, and reliable way to back up your

Peripheral Land hard disk drives, or anybody's SCSI hard disk.

Say goodbye to floppies and hello to 22 megabyte 1/4" tape cartridge. The MacBack+ can either back-up or restore 20 megabytes in 8 minutes. Now that's how you spell relief and security for your precious data. The MacBack+ is available in either 22 or 60 megabytes of awesome capacities.

MacBack Plus 20/MacBack Plus 60

The MacFast

High-performance Series SCSI Hard Disk

The MacFast SCSI series is our top of the line hard disk for the ultimate Macintosh power user who demands speed from the hard disk. What makes the MacFast hard disk superior? An 8k buffer that maximizes raw data transfer on the SCSI bus to its fullest potential. A Turbo-Stream disk/tape controller that has its own Zilog Z-8 micro-processor with DMA that optimizes data transfer at a phenomenal 5 megabytes non-stop per minute between the MacFast disk and MacBack tape unit. The MacFast runs HFS and MFS volumes simultaneously when formatted with partitions. No competitor can come close to our MacFast performance. In fact, we challenge our competition to beat our capabilities, because we know no one will... Remember, We Are the SCSI Experts.

MacFast 20, Formatted/**MacFast 30** Formatted/**MacFast 80**, unformatted/**MacFast 172**, unformatted

MacBack

(QIC-02) High-performance Tape Back-up Unit

Our companion tape back-up system for the Mac Plus. Our Turbo-Stream technique has the ability to back-up and restore 20 megabytes of data in a blistering 4 minutes. In the 5 megabyte volume mode, MacBack will back-up or restore in exactly one minute, incredible but true.

MACPORT Plus

Auto-booting SCSI Adaptor for the Macintosh 512 and 512/E

Here's where Peripheral Land expertise really shines. An auto-booting SCSI adaptor for the Macintosh 512 or 512/E with the new 128k rom. This easy, convenient upgrade provides full SCSI compatibility with our hard disk or any other SCSI hard disk. Now, you can boot directly from the hard disk, just like the Macintosh plus, without modifications to your Mother Board or cabinet. The Macport adaptor snaps on to the Mother board without any soldering, or special modifications.



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Guide takes the hype out of Hypertext

Guide is the first hypertext system designed specifically for the Macintosh. Now you can direct the power of the Mac with the most innovative principles of hypermedia for your personal information management.

Move through information at the speed of thought.

Guide provides virtually limitless flexibility in storing, retrieving and assembling electronic information.

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Suggested retail for Guide is \$134.95 but if you respond before Nov. 15, you can put Guide to work for only \$99.95 (includes Mini-Guide desk accessory).

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Letters

Readers sound off on printing, word processing, financial modeling, and more

Cause and Effect

Although impressed by the quality of *my-DiskLabeler* from Williams and Macias, I found the copy protection a real hindrance. In a moment of frustration, I wrote a letter suggesting that the authors improve a very good product by removing the copy protection.

I expected the usual reply: "Unfortunately at this time our policy. . . ." Today one of the authors called to say they had received enough similar feedback from users that they are removing all copy protection from future releases. Here's a company that not only listened but responded both with a phone call and with real action.

Rudy Rugerbregt
Santa Clara, California

Monogram, publisher of Dollars and Sense, also dropped copy protection recently. Because copy protection generally obstructs the efficient use of a hard disk, the clamor of user complaints has grown to a din. This year in the IBM PC arena, in fact, software publishers seem to be responding to pressure in the marketplace by backing away from copy protection. Microsoft, for example, has removed copy protection from all of its PC-DOS products, though Mac products remain locked up tightly.

By the way, the telephone number for Williams and Macias was incorrect in some recent ads; the correct number is 800/752-4400. —Ed.

Learning by Doing

In his letter "A Learning Experience" in the May *Macworld*, Frank D. Mathon expressed regret and surprise that not much

educational software has been written for the Macintosh. I hope that by now Mr. Mathon has realized that just using the Macintosh is an educational experience.

Writing as a former computer science teacher, I feel that students are usually happier and learn more when they use application programs (such as word processors or spreadsheets) rather than drill-and-practice programs.

Sue Knopf
La Crosse, Wisconsin

Straight from the Printer

I enjoyed your article about the ImageWriter II. It was well written and covered the product's features quite thoroughly. However, all ten of the ImageWriter II printers where I work print crookedly; the fonts look as if they were being viewed through water, especially in Standard quality. This is most obvious on printed borders, such as those used in *Microsoft File*, in which the dots do not line up.

Vicky Jo Varner
Los Angeles, California

Users say that version 2.2 of the ImageWriter driver clears up the problem. Apple reports that the earlier printer drivers had the ImageWriter print bidirectionally in Standard quality, which might account for the misalignment. —Ed.

A Monkey Wrench in the Network

Earlier this month our newspaper completed installation of a network system consisting of six Macintosh computers, a LaserWriter, a Corvus hard disk, and Omninet network hardware and software.

Although the Macintosh Office has worked well for all aspects of our publishing, you can imagine my chagrin when I learned that Aldus's *PageMaker* program



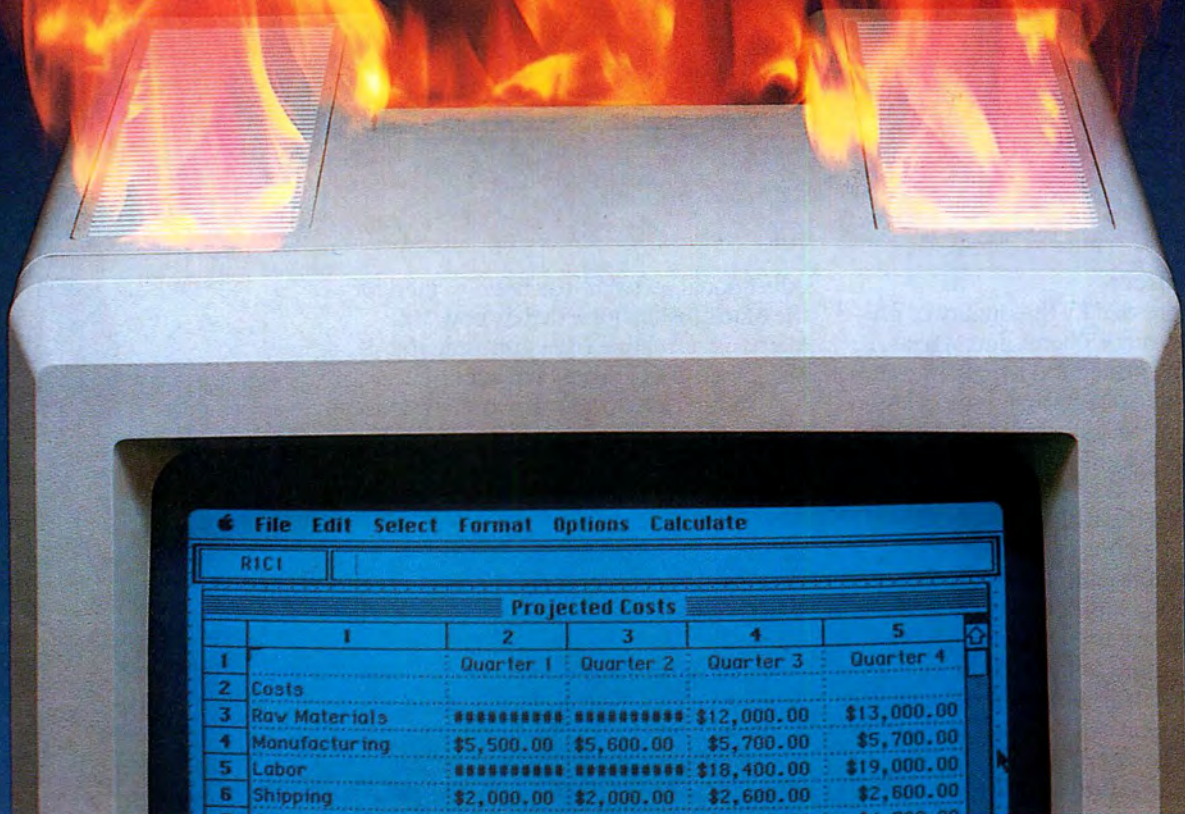
does not complete a print operation over the Omninet system. That's why we set up the system in the first place.

Eric Petermann
Delavan, Wisconsin

Omninet's print spooling does not work with PageMaker. You can attach your six Macs with Omninet, but to send a Page-

(continues)

Hot Problem



Introducing System Saver Mac.

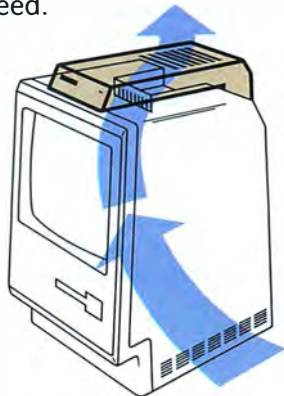
Ever put your hand on top of your Macintosh™ after it's been running a while? Pretty hot, isn't it? And that's a problem.

High temperature conditions can affect your computer's circuitry. Even shorten its lifespan. That's why we developed the System Saver Mac.

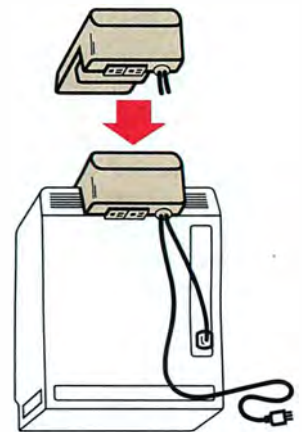
System Saver Mac keeps your Macintosh cool.

The System Saver Mac's quiet fan draws a breath of fresh air in through the ventilation slots on the bottom left and right sides of the Mac, across the circuit board, over the power supply (the primary source of heat), and out the top

ventilation slot (the one hidden under your Mac's handle) at the rate of 17 cubic feet per minute. It leaves your Mac cool, calm and running at top speed.

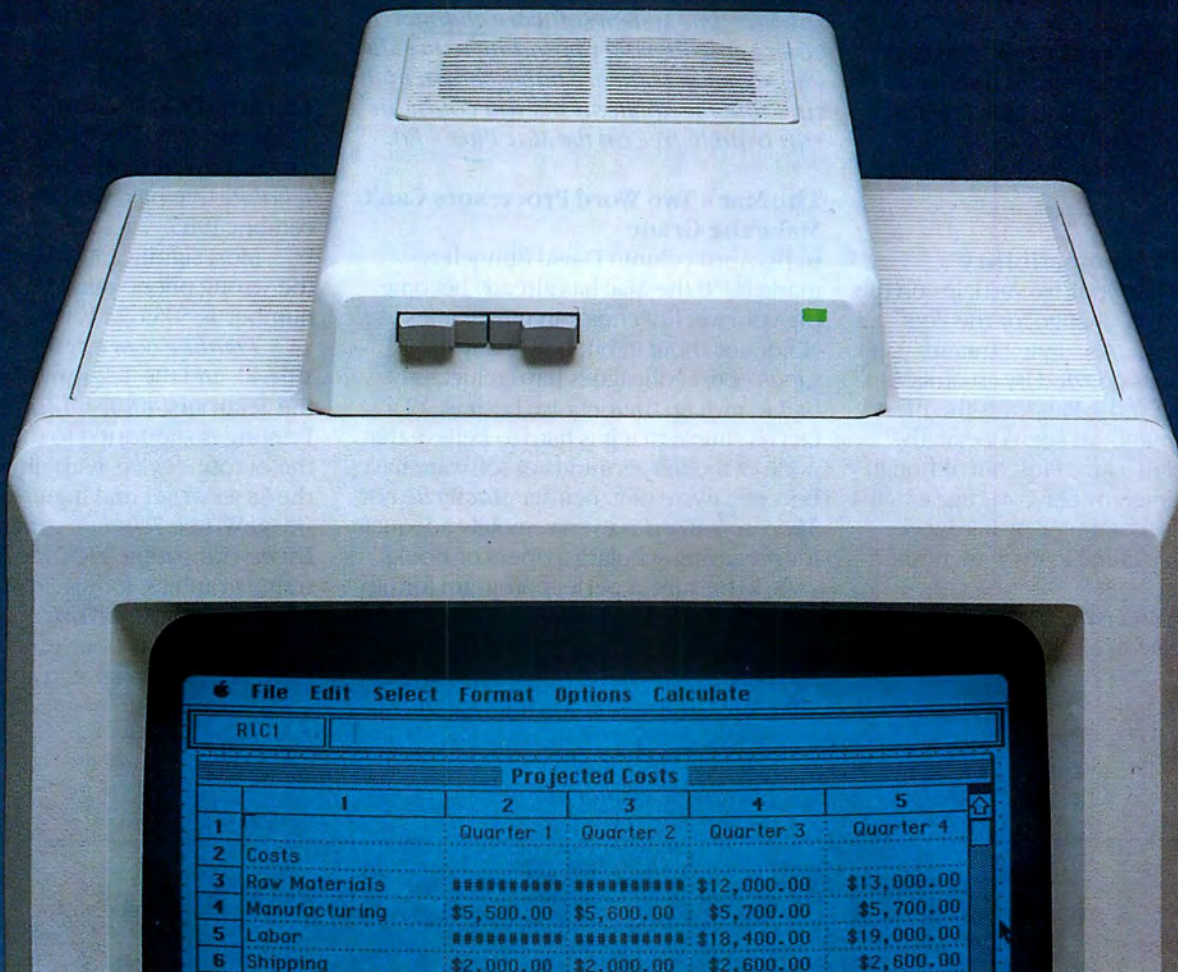


System Saver Mac stops the scramble for power.



No more reaching around to the back of your Macintosh to turn it on. No more fumbling for spare outlets. System Saver Mac organizes all your power needs. It provides outlets for two peripherals (like your printer and modem), while replacing the Mac's power cord.

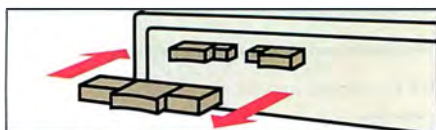
Cool Solution



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System Saver Mac has a great switch play.

System Saver Mac comes equipped with two switches—important for those of you who want to power one of your peripherals separately. For example, if you use a Hard Disk 20, you have to power up your hard disk first, before you turn on your computer. Just use one of the System Saver Mac's switches to control your hard disk and the other for the rest of your system.

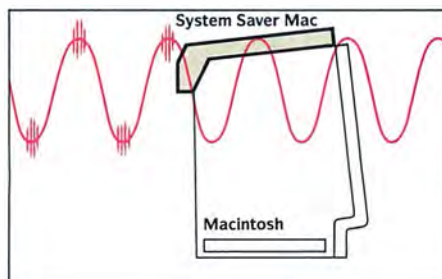


Of course, we realize that many of you would prefer the convenience of a single switch to control your entire system. That's why every System Saver Mac also comes with a special single switch cap. Just pop off the two separate switches and pop on the single one provided. "See Us at Macworld Expo Booth #532"

System Saver Mac provides pure power.

70-90% of all microcomputer malfunctions can be traced to impurities in the electrical current. Line noise can be interpreted as data, confusing your Macintosh and causing annoying system errors. Power surges and spikes can do costly damage to its delicate circuitry.

System Saver Mac clips surges and spikes at a safe level and filters out line noise. It provides pure power to make your Macintosh more accurate, efficient and reliable.



System Saver Mac is not a completely new idea.

Clever, yes. Versatile, convenient and useful, yes. But not completely new. After all, we've been making the original System Saver for years. It's the best selling accessory ever made for the Apple II—chosen by over 1/4 million Apple II owners. We thought you'd agree—Macintosh owners deserve the best, too.

System Saver Mac, \$99.95, is available from Apple dealers everywhere. For the dealer nearest you, or to speak to a Kensington sales representative, call toll-free 800-535-4242. In NY 212-475-5200.

Circle 11 on reader service card

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Maker document from one of the networked Macs to the LaserWriter, you have to connect the Corvus OmniDrive to the LaserWriter via AppleTalk. Print spooling for the LaserWriter does work with PageMaker on 3Com's 3Server. In addition, the current version of PageMaker is not meant as a multiuser product; a multiuser update is scheduled for release this year. —Ed.

HFS Software Incompatibility

I was impressed by your two articles on the new Macintosh ("A Change for the Plus" and "Developing a Megabyte Strategy") in April 1986 but was puzzled by an omission.

"A Change for the Plus" was the most thorough treatment I've seen of exactly what you get with a Mac Plus, but although it was accompanied by fair coverage of support for the new computer by hardware manufacturers, it failed to even mention software.

Donald F. McLean
APO San Francisco, California

Take a look at the follow-up article, "Order out of Chaos," in the May 1986 Macworld. Software compatibility is an issue any time system software changes. If you're considering upgrading to the Mac Plus, consult software publishers to make sure that the applications you count on run trouble-free on the Mac Plus. —Ed.

The Mac's Two Word Processors Can't Make the Grade

In his April column David Bunnell remarked, "If the Mac has already become the computer of choice in universities. . . ." No doubt about it, but how many thousands of my colleagues have reluctantly had to give up their choice because of a fact so simple that it is hard to believe that none of the masterminds of software have become aware of it: neither *MacWrite* nor *Microsoft Word* is even remotely adequate for preparing scholarly papers or books.

To be sure, a perfect program for bibliography (*Professional Bibliographic System*) has now been adapted to the Mac. But it's expensive. When can we expect suitable word processing software for the Mac?

Blake Lee Spabr
University of California
Berkeley, California

More word processing variety is on the way, as reported in *Macworld View*, July 1986. Next month we'll go into greater detail on the new writing tools for the Mac. —Ed.

Terminal Confusion

"Mini and Mainframe Connections" (*Macworld*, July 1986) reviewed a version of *Tekalike* that has been obsolete since December 1985.

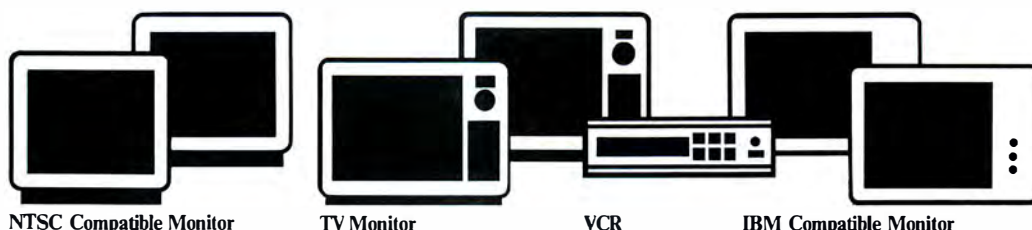
Most significantly, *Macworld* printed the wrong phone number. The correct number is 505/672-1998.

Tekalike now emulates the VT-100, the VT-640, and the Tektronix 4105 as well as the Tektronix 4010, 4012, 4014, and 4016. Printing is supported to the resolution of the output device, with direct support for the LaserWriter and high resolution for the ImageWriter. *Tekalike* generates *MacDraw*-compatible PICT files from mainframe graphics, for use in *PageMaker*, *MacDraw*, or *MacDraft*.

Plotting has been enhanced with multiple plots on a page and additional plotter

(continues)

Turn Your Mac Into A Presentation Center



The Mac Video Scan Converter enables video data from the Mac or Mac Plus to be simultaneously presented on a variety of low cost or high performance displays including NTSC or IBM monitors, TVs and VCRs.

It is intended for use in audio/visual displays such as classroom demos or to provide a convenient portable demo by storing the presentation on a video tape for use with a VCR.

An easy installation kit is available and requires no soldering. Installation will not void Apple Warranty.

The unit features:

- Freeze-frame screen memory
- Video frame advance
- Inverse video
- Compatibility with all Mac Software

Display Device	Video Output	Typical number of devices per output*
NTSC Compatible Monitor	Composite/NTSC Video	10 Monitors
TV Monitor**	Composite/NTSC Video	10 Monitors
VCR** (VHS & Beta)	Composite/NTSC Video	1 VCR
IBM Compatible Monitor	IBM Compatible Video	5 Monitors
High Speed Compatible Monitor (22.25 KHZ Horizontal scan rate)	High Speed Composite Video	10 Monitors
Color Monitor (RGB)	RGB Video	5 Monitors

*Maximum number of devices per output is a function of device type and impedance.

**May require use of RF Modulator.

Note: The two Composite/NTSC outputs are identical.

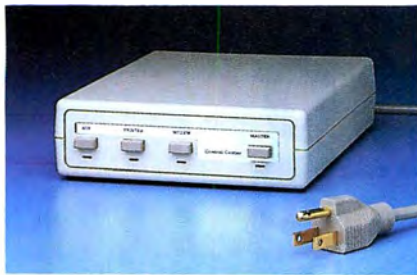
Each output will drive a number of specific display types (please see chart on the left) and will operate simultaneously.

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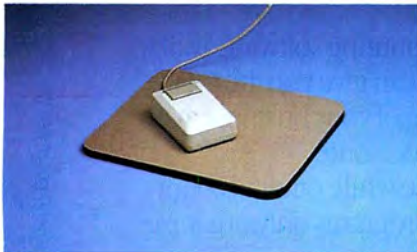
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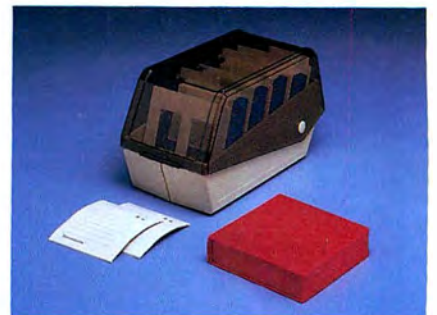
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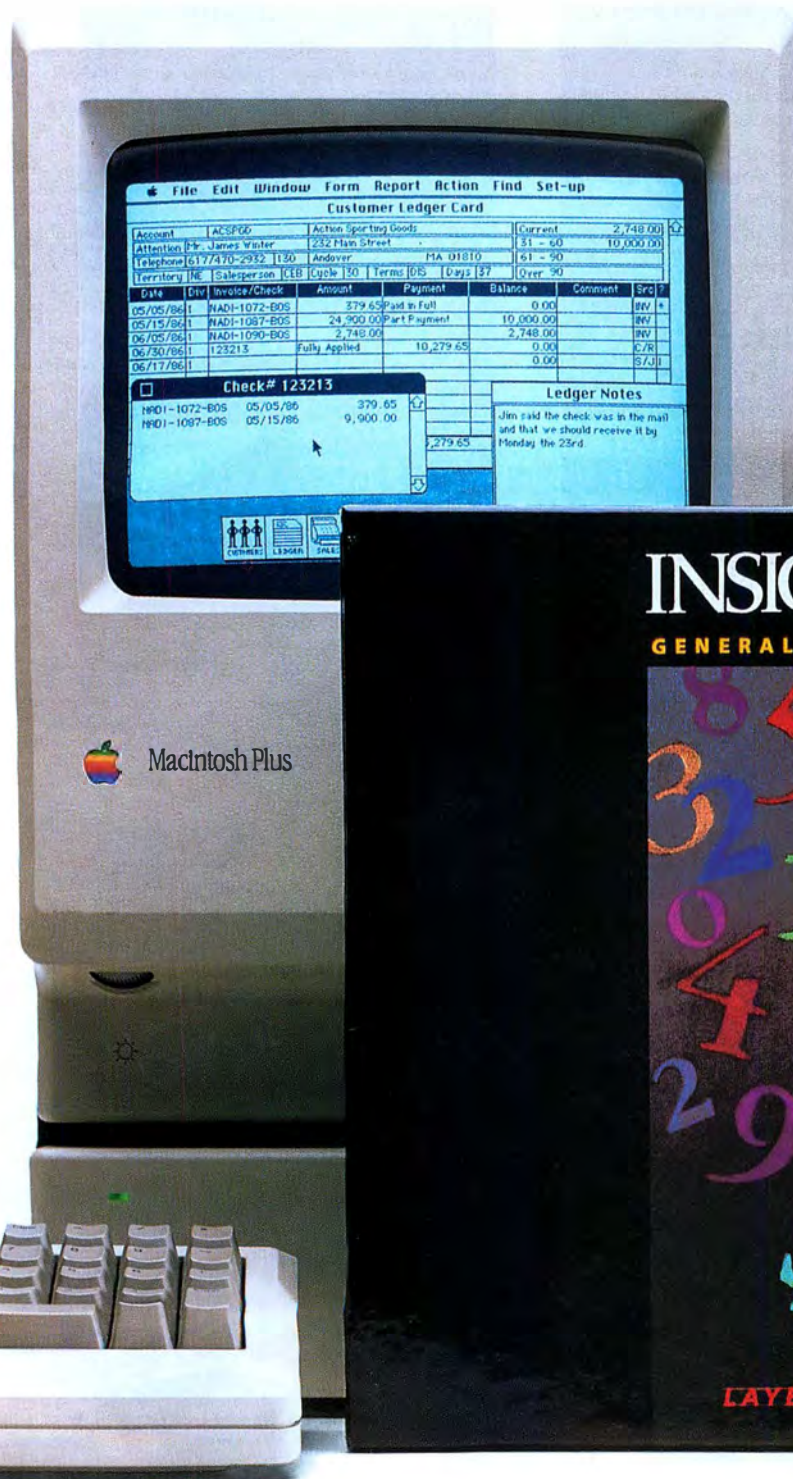
them. That's why we make a complete line of Cleaning Kits and Dust Covers for your Mac.

That's also why we've just introduced the System Saver® Mac! Turn back a page to see this important new peripheral.

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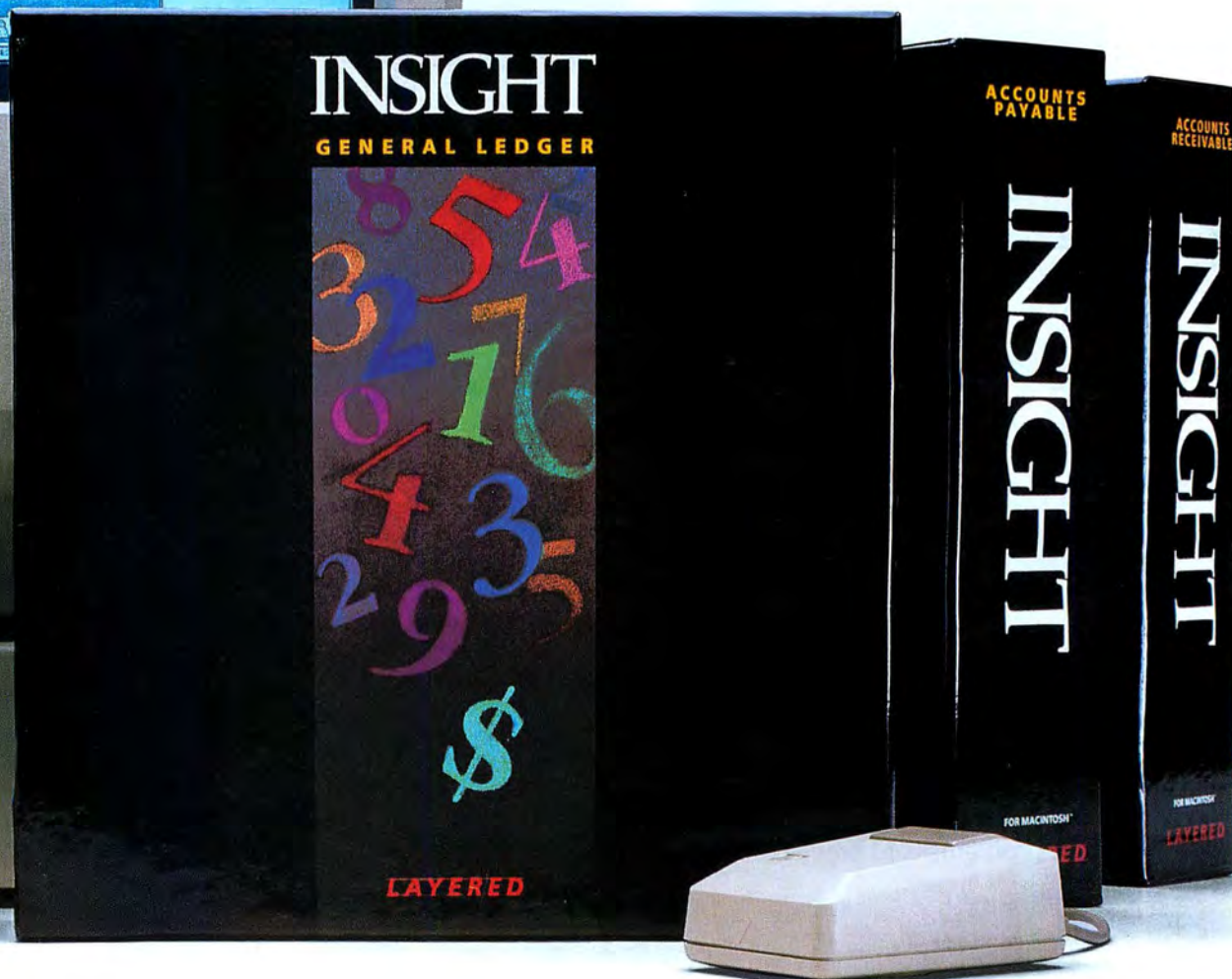
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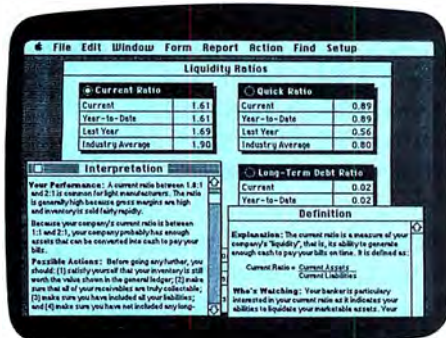
Insight General Ledger, Accounts Receivable, and Accounts Payable modules run on Macintosh 512k and Macintosh Plus.



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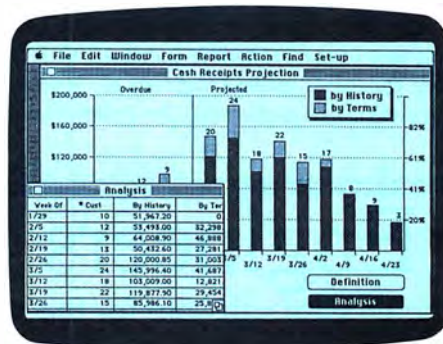
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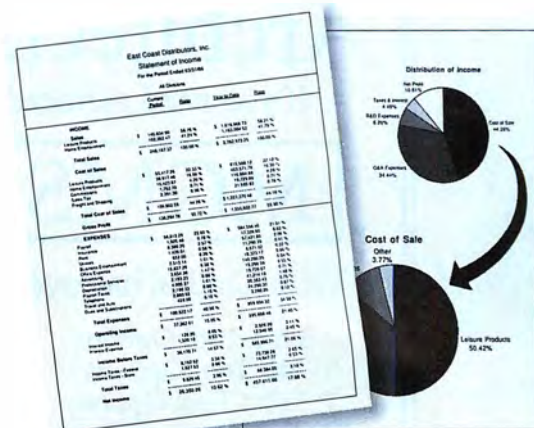
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Letters

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Tekalike is hard disk compatible and supports the Macintosh File System, the Hierarchical File System, and *Switcher*.

James E. George
President, Mesa Graphics
Los Alamos, New Mexico

Letter-Quality Bomb

Since letter-quality correspondence is crucial to my business, I wanted to make sure the Macintosh Plus was compatible with the Brother printer I use with my 512K and *Microsoft Word*. The local dealer brought a Mac Plus to my office, along with a copy of *Word* he said Microsoft had requested accompany the new Mac. To my astonishment, the program bombed when I set it to Brother printer. How can Microsoft have the audacity to supply free of charge an application that does not work properly?

C. Claude Dawson II
Greensboro, North Carolina

A Microsoft representative explained that the Word on the disks dealers supply with the Plus is the same version (1.05) that works so well on your 512K. Microsoft

says the problem lies with Apple's system software for the Plus. System 3.2 and Finder 5.2 should solve the problem. — Ed.

Can This Marriage Be Saved?

Some marriages are made in heaven, but the match of the Mac to a Hewlett-Packard LaserJet is certainly not one of them. In fact, the two immediately present the user with irreconcilable differences. I didn't realize that I'd need special software to make the LaserJet work. After buying a copy of Softstyle's *Laserstart*, I finally was able to print. However, the quality was disappointing—inconsistent spacing between words, descenders of letters inexplicably cut off, and ragged letters even in high quality. I was naive and made a costly mistake, but now I'm trying to arrange a divorce through classified ads in the newspaper.

Barbara Slater
St. Louis, Missouri

Bob Canaday, of technical support at Softstyle, says that most, if not all, of your problems could be avoided by taking pains to compose your document on the screen in a font that is compatible with the font you intend to print in. Match point size to point size, proportional type

to proportional type, and so on. To simplify the matchup, Softstyle is issuing an upgrade to Laserstart that provides four screen fonts that translate directly to LaserJet printing. — Ed.

Another Dimension to MacSpace

Some of the strongest points of our *MacSpace* program were not mentioned at all in "3-D In Depth" [*Macworld*, June 1986].

Moves. Because the program creates vector-based documents, you must specify an origin and an endpoint for objects moved. The review says this is a nuisance, but professional draftspeople are accustomed to working with vectors.

Rotation. True, in the case of a complex object it becomes difficult to rotate parts independently, but the table made it appear that no rotations are possible. In fact, the program offers rotations in any increment.

Accuracy. Drawings are done in real dimensions, with an accuracy of up to six digits to the right of the decimal point.

Zoom. An unlimited zoom allows users to work accurately on very small details or very large structures.

(continues)

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- Splining produces complex smooth curves passing through multiple points.
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EXTERNAL HARD DRIVE

PHOTON 20

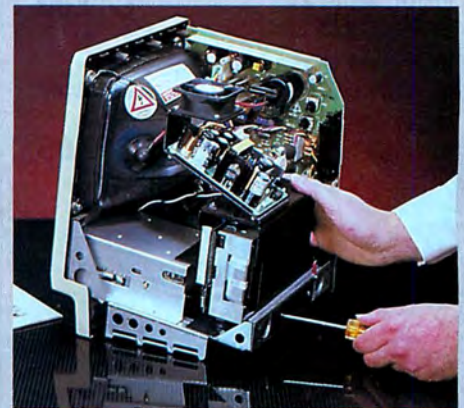
Compact, yet powerful, the Photon 20 unleashes the true potential of the Mac Plus by allowing you to put all your data and software on one hard disk. And if that's not enough, the Photon 20 allows you to daisy chain up to eight devices. Mac 512K owners can get the same results by ordering the Photon 20/512, an upgrade that adds an SCSI port to a Mac 512K.

\$945

Photon 20/512

\$795

Mac Plus



INTERNAL HARD DRIVE

WARP 20

A 20 megabyte hard drive that installs inside either a 512K or a Mac Plus. Like the Photon 20, the Warp 20 has its own cooling fan and power supply. Also, both drives are equipped with an automatic head lifting/locking mechanism for safe and secure data storage wherever your Mac travels. The Warp 20 is carefully designed to be installed by any Mac owner, regardless of experience or technical expertise.

\$895

Mac 512 K

\$949

Mac Plus

Compare for Yourself and Save

	Photon 20	Mac Bottom	Data Frame	Apple HD 20	Warp 20	Hyper- Drive	MicahDrive AT 20
Capacity	21	21	20	20	21	20	20
Internal/External	External	External	External	External	Internal	Internal	Internal
HFS Compatible	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Mac Plus Compatible	Yes	Soon	Yes	Yes	Yes	Yes	Yes
Data Transfer Rate, Mb	5.0	5.0	5.0	0.5	5.0	5.0	5.0
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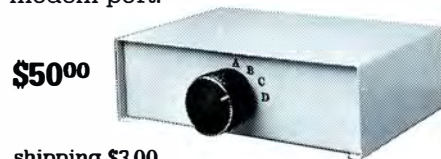
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Coordinates. X, y, and z coordinates are always available. Users enter absolute and relative coordinates with the mouse or the keyboard and input angles in the same fashion.

Existing point. MacSpace allows the user to position the origin of a vertex exactly on a point that has already been drawn; this procedure lets the user place one object precisely next to another without trial and error.

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We try to produce professional CAD programs that novices can use. Perhaps your reviewer failed to mention assets of our program because he did not fully understand our product.

*J. Louis Martin
President, Abvent
Santa Monica, California*

When we condense our experience with a product into a review, we are often forced to omit mention of some features. On moving and rotation, your point is well taken; our table oversimplified matters by saying neither was possible, though the text of the review stated moves sometimes require painstaking effort.

When a product is directed to both novices and pros, ease of use is important. Vector-based design may be familiar to professionals who have worked on high-end CAD workstations, but the Mac brings 3-D drawing tools within reach of users who lack such experience.

An upgrade of the program is now available (\$20 for registered owners) that removes hidden lines, supports high-resolution printing with the LaserWriter, and adds editing options. Another version (available at a discount to registered owners of MacSpace) is on the way for professionals; it includes features such as six layers of drawing, the ability to enter text, a library of objects, real-time rotation, and a way to convert free-hand drawings to elevations. —Ed.

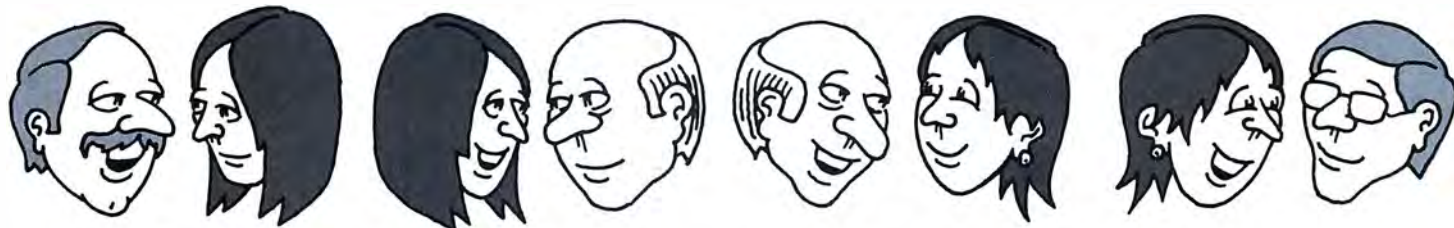
Don't Desert the Apple Corps

David Bunnell's concern ["The Macintosh Today and Tomorrow," April 1986] that Apple may have been considering dropping the 512K Mac to concentrate on pushing the Apple II was frightening to say the

(continues)

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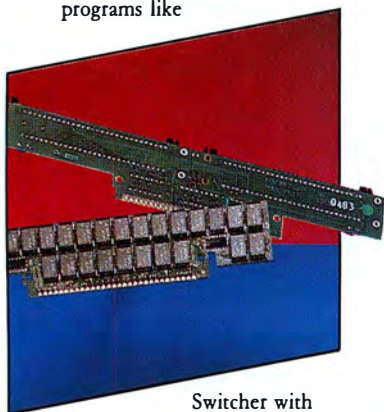
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If you have a Mac Plus, simply plug the MagNet 20x into the SCSI port; if you use a 512K, order the MagNet 20x/FastPort Bundle and have a qualified technician install the FastPort Interface for easy connection to the MagNet 20x Drive.

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From Target Software

MacLightning's new 2.0 version includes Merriam Webster's 80,000-word Ninth New Collegiate Dictionary, making it the most comprehensive Mac spelling checker. Only MacLightning watches your keystrokes and beeps when you misspell a word; or, work in silence and use MacLightning later to check selected text or an entire document.

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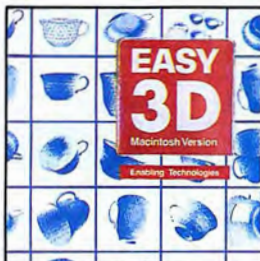
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Requires 512K or Mac Plus

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From Nevins Microsystems

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From Icon Review

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From Summagraphics

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Double Helix	SPECIAL \$289
Requires 512K or Mac Plus	

Bernoulli

Boxes From Iomega

Iomega's Bernoulli Box mass storage devices for Mac Plus offer a fast, reliable, and cost-effective solution for any office. These Bernoulli Boxes work off the Mac Plus' SCSI port, allowing auto-boot, HFS support, lightning-fast speed, and daisy chaining with other SCSI devices. Average access time is 35 milliseconds, with a data transfer rate of 1.13 meg/sec. The unlimited data storage and efficient backup provided by 10- or 20-megabyte removable data cartridges put the Bernoulli Boxes in a class by themselves. While your drive stays in place, the data is highly portable and easily stored for optimum flexibility.

10 Meg Single-Cartridge Drive	\$1499
10 Meg + 10 Meg Dual-Cartridge Drive	\$2099
20 Meg Single-Cartridge Drive	\$1899
20 Meg + 20 Meg Dual-Cartridge Drive	\$2699
10 Meg Cartridges (3pk)	\$169
20 Meg Cartridges (3pk)	\$219
Head Cleaning Kit	\$75

Electric Checkbook

From State of the Art \$29

Electric Checkbook is a personal financial manager that handles up to five bank accounts on a 128K Mac or ten on a 512K. Define categories for income, expenses, assets, and liabilities. Reconcile bank statements and checkbooks, calculate profit and loss, and determine net worth. Use a special "What If?" feature to see the effect of a payment schedule before



implementing it. You can even print your checks on continuous forms. (Sample checks and order forms are included.)

ORDERS
CALIFORNIA

Mac Zap

From Micro Analyst

\$39

If you mistakenly throw out a file and empty the Trash, Mac Zap



can retrieve it! It can even resurrect your hard disk or a crashed floppy that the Mac wants to reinitialize. And Mac Zap is a superior disk copy and software-backup program - copying master disks and moving protected programs to hard disk. Use Mac Zap to plumb the depths of your Mac - it disassembles applications, searches memory or disk blocks, compares disks, analyzes disk structure, and performs full-screen edits.

Mac Plus compatible

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800/824-8175

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Back to Basics	
• General Ledger	\$89
• Accounts Payable	\$89
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MacSpace	\$249
Professional 3D CAD for Mac	
Altsys Corp	
Fontastic Font Editor	\$25
Ann Arbor Software	
FullPaint	\$59
Casady Company	
Fluent Fonts	SPECIAL \$29
Fluent Laser Fonts	\$49
Six types disks available; call for details	
Challenger Software	
Mac 3D	SPECIAL \$119
Cricket Software	
Cricket Graph	\$129
Plots 20 times more data points than Excel!	
Datafood Software	
DrawForms	SPECIAL \$30
Requires MacDraw	
MacForms	SPECIAL \$42
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DrawArt	NEW \$29
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MacMatbook	NEW \$CALL
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Enabling Technologies	
Easy3D	SPECIAL \$59
Innovative Data Design	
MacDraft	SPECIAL \$139
Most powerful drafting tool for the Mac	
I/O Design	
ColorPrint	\$25
Print your graphics in color!	
Living Videotext	
More	NEW \$CALL
Outlining with presentation graphics	
Manhattan Graphics	
ReadySetGo 2.1	SPECIAL \$99
Best value in page processing—fast, flexible, and powerful!	

Silicon Beach Software	
Accessory Pak #1	\$21
Silicon Press	SPECIAL \$42
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SoftStyle	
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Colormate Art	\$29
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Springboard Software, Inc.	
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PictureBase	SPECIAL \$48
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MacNifty Stereo System	\$75
New version—better sound—includes speakers	
MacNifty Studio Session	\$69

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X-10	
Powerhouse	NEW
Computerize appliances for convenience & security	
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• Burglar Alarm Interface	\$26
• Computer Interface	\$69
• Controller	\$9
• Thermostat Control Set	\$69

Double Helix

From Odesta

\$289

Double Helix packs double the punch you've come to expect from Odesta. Expanded power, flexibility, and ease of use make this the relational database for professional information management.

Double Helix features: the ability to create customized pull-down menus; three levels of password protection; subforms for easy in-voices and powerful reports; expanded data import/export; many new user-oriented additions and modifications; global delete; speed and statistical optimization; compatibility with the Mac Plus, LaserWriter Plus, and HFS; and Odesta's excellent technical support.

Requires 512K or Mac Plus and external drive



EDUCATION

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Kid Talk	SPECIAL \$39
SmoothTalker	SPECIAL \$49
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Great Wave	
KidsTime	\$35
QED Information Services	
Typing Made Easy	\$35

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Too many games to list all! Please call for prices of your favorites.

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Electronic Arts	
Pinball Construction Set	\$27
Microsoft	
Flight Simulator	NEW \$33
Psion	
Psion Chess	\$31
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Paper Airplane Construction	\$23
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Letters

least, but the remark, "the smart thing would have been to phase out the Apple II" is so cavalier that I must respond.

No matter how great the Macintosh is, Apple cannot afford to intentionally alienate the base it has built up in the Apple II. A company like IBM may get away with canning the PCjr, but I cannot believe Apple will be tolerated in regularly repeating such behavior. Why should users or developers bother to support an Apple III or a Lisa or a Mac if it costs them dearly to do so?

William Clarke
Missoula, Montana

Get More File Finders

In the May 1986 *Get Info*, Lon Poole wrote about desk accessories that allow file deletion. Our *FileFinder* was not mentioned, though it was featured in the April *Macworld View*. In addition to letting you delete files, *FileFinder* lets you copy, rename, and get info about files without having to quit an application.

Like the other desk accessories you mentioned, *FileFinder* version 1.1 is not compatible with the Hierarchical File System (HFS). Those interested in an HFS version may write to us, and we will notify them when this version becomes available. *FileFinder* can be ordered directly from us for \$24.95: Nashoba Systems Inc., 175 Sudbury Rd., Concord, MA 01742, 800/842-4250, 617/371-2029 in Massachusetts.

Don Warren
Nashoba Systems
Concord, Massachusetts

We have also learned about a file finder that works with the HFS: PBI Software's HFS Locator, which finds files by name or date, no matter how deeply nested in folders. Once it locates the files, the desk accessory can move, delete, launch, copy, rename, or get info about them. The program, which retails for \$24.95, is available from PBI Software, 1111 Triton Dr. #201, Foster City, CA 94404, 415/349-8765. —Ed.

Fedit Gone Astray?

Last November I sent a money order for \$30 to John Mitchell to become a registered user of his *Fedit* 3.0 file editing program (mentioned in the November 1985 *Macworld* article "Recovering a Damaged Disk").

The program itself is available at no charge via CompuServe. Users are free to try the program and, if they wish, pay the

fee to become registered users, who receive the instruction manual for the program and any updated versions as they are produced.

Five months later I had still not received a reply or a refund.

Brian L. Warbey
Saskatoon, Saskatchewan
Canada

John Mitchell informs us you've already been issued a refund check. Mitchell delayed sending updates while he prepared a version that would work with the HFS—thinking that it would take only another week... and then another.... The new version was nearing completion at this writing; call 408/773-9834 about availability. —Ed.

A New Angle on Shareware

In the spirit of the shareware concept, I am offering my booklet of Macintosh hints. As long as the supply lasts, in exchange for a 6- by 9-inch self-addressed envelope with 39¢ postage, I will send any *Macworld* reader a copy. The indexed booklet includes a number of the undocumented ⌘-key and Option-key combinations for the desktop, *MacPaint*, *MacWrite*, *MacDraw*, and many other programs. In turn, I encourage the recipient to send me \$3 or whatever seems fair.

Ken Knecht
1340 W. Third St. #130
Yuma, Arizona 85364

Not the Model Program

Keith Thompson's review of *Mindsight* ["Beyond Spreadsheets"] in your April 1986 issue touched a sore point.

Mindsight is unusable as a financial modeling program, mainly because it has no command language (macro) capability. If you prepare a model of 500 rows and need to print 70 rows for financial statements, you have to individually choose each row and format a report every time you want to print a different case. It is surprising that your reviewer should think so highly of such a crippled package. The same publisher's MS-DOS program, *IFPS*, does have command language capability.

The Macintosh is still crying out for a financial modeling language. I hope the people at Apple are listening.

M. Alland
Potomac, Maryland

(continues)



The C for the Macintosh

*"Library handling is very flexible...documentation is excellent...
the shell a pleasure to work in...blows away the competition
for pure compile speed...an excellent effort."*

COMPUTER LANGUAGES, 4/85

Why Professionals Choose Aztec C

Professionals choose Manx Aztec C development systems because they are the most powerful, portable, and professional microcomputer C development systems available. Professionals know that Manx Aztec C offers the features, dependability, and performance required for producing professional results.

Applications implemented with Aztec C development systems range from real time control of robot arms used in manufacturing, to message switching systems, to games, languages, operating systems, and business systems.

Much of the commercial software for the Apple Macintosh including top selling titles from software publishers Broderbund, Hayden Software, and Spinnaker is developed using Manx Aztec C.

Value, Performance, and Flexibility

Manx Aztec C68k for the Macintosh is available as a line of three upgradable development systems: Manx Aztec C68k-p, Manx Aztec C68k-d, and Manx Aztec C68k-c. Student, non-commercial, and small business discounts are available. Whatever your budget and requirements, there is a Manx Aztec C68k development system that offers you the best value and performance for your investment.

New Macintosh Mouse Interface

The highly acclaimed, powerful, and professional Manx Aztec SHELL development environment now includes a mouse interface. Developers unfamiliar with UNIX or MS-DOS can work entirely with the mouse interface. Those interested in learning the advanced features of the SHELL can do so at their leisure. Developer's familiar with UNIX or MS-DOS can ignore the mouse, if they so choose, and work entirely in a familiar command driven environment.

Aztec C, The Most Portable C.

Manx Aztec C Development Systems are available for the Apple Macintosh, Apple II, IBM PC, PC compatibles, CP/M-80 systems, Radio Shack Systems, and the Commodore 64/128. Manx Aztec C is also compatible with UNIX and UNIX ports. Manx currently is developing systems for the Amiga and other microcomputer systems. No other C Development System for the Macintosh comes close to the portability of Manx Aztec C.

Power To Spare

In benchmark after benchmark, Manx Aztec C appears in column after column as the clear winner.

The following sieve benchmark timings are reprinted with permissions of Computer Languages, 131 Townsend Sr., San Francisco, Ca 94107 from a Macintosh review that appeared in the April, 1985 issue:

compiler	compile/link	run	size
Manx Aztec	49	7	13,274
Megamax	114	7	13,816
Softworks	201	9	46,914
consulair	152	10	17,654
Hippo 2	102	13	30,648

The following sieve benchmark timings are reprinted with permission of Macworld, 555 De Harro St., San Francisco, CA 94107, from the May, 1985 issue from "Mac Wins By A Length" in the Open Window column.

Language	Run Time
Aztec C 1.06C	6.55
McFORTH 2.0	20.01
Modula-II	71.60
MBASIC 2.00	1170.00
Pascal	1270.00

Sieve timings for Manx Aztec C68k 1.06g:

with register variables 3.37 secs 5,007 bytes
without register variables 6.02 secs 5,140 bytes

Manx Aztec C68k - Professional Tools

Manx Aztec C68k is bundled with a rich abundance of tools to help produce superior results in reasonable time frames. The following is a list of features and facilities included in Aztec C68k-d, the Developer's System, and Aztec C68k-c, the Commercial system. Items that are marked -c are unique Aztec C68k-c.

Optimized C	Mouse Enhanced SHELL
UNIX-like SHELL	Creates desk Accessories
Macro Assembler	Creates Clickable Applications
Smart Overlay Linker	Phone Support
C-PASCAL Interface	PASCAL-C Interface
Resource Compiler	UNIX Library Functions
Debuggers	Terminal Emulator (Source)
Object Librarian	Easy Access to Mac Toolbox
Mouse Editor	unlimited code size
IEEE floating point	six register variables
Inline assembly	extensive sample programs
600 page manual	hard disk support
no license fees	PASCAL type strings
MacIrTalk support	AppleTalk support
code optimizer	symbolic debugger (512k)-c
MacRam Disk-c	UniTools (ul, make grep, diff)-c
Library Source-c	One Year Of Updates-c

Summary

If you plan to program in C on the Macintosh or are currently doing so using a brand x C compiler, there is a Manx Aztec C68k system for you that offers the best value and the greatest degree of portability, power, and professional quality available.

Look around, evaluate, and compare. The more you look, the more you compare, the more you will see that Manx Software Systems has succeeded in its objective to provide you with the best C development system available at the best possible price. Then, give us a call, and join the 25,000 users who already know and enjoy the Manx Aztec C advantage.

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Aztec C68k-c Commercial System	\$499
Aztec C68k-d Developer's System	\$299
Aztec C68k-p Personal System	\$199
C-tree database (with source)	\$399
Lisa Kit	\$ 99
MS-DOS → Macintosh Cross	\$750

Discounts

Discounts are available for professors, students, independent developers, hobbyists, and small businesses.

How To Become an Aztec C User

To become an Aztec C user call 1-800-221-0440 or call 1-800-832-9273 (800-TEC WARE). In NJ or outside the USA call 201-530-7997. Orders can be telexed to 4995812.

Payment can be by check, COD, American Express, VISA, Master Card, or Net 30 to qualified customers.

Orders can also be mailed to Manx Software Systems, Box 55, Shrewsbury NJ, 07701.

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30 Day Return Policy

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Distribution Of Manx Aztec C:

In the USA, Manx Software Systems is the sole and exclusive distributor of Aztec C. Any telephone or mail order sales other than through Manx are unauthorized. Aztec C is available from qualified retail outlets under license to Manx Software Systems.

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MANX

To order or for information call:

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dMac III... Macintosh and database. An exciting match.

Dealers circle 535 on reader service card
End Users circle 536 on reader service card

Letters

Reinventing the Typo

You're right. In many ways, *MacSpell+* [*Macware Reviews*, March 1986, and "Letter-Perfect Documents," July 1986] is a slick product—but with a serious problem: its dictionary contains misspelled words.

Back in the dim days of prehistory when I spent several hours per day with my Osborne 1, I used a spelling checker that contained all sorts of useful utilities, including the ability to remove words from the dictionary.

In this business, the wheel really is reinvented from time to time, and sometimes new versions are flat on one side.

Gary Johnson

White Bear Lake, Minnesota

Burned Up over Parts Policy

The flyback transformer burned out on my Mac's video controller board. When I took it to a dealer, I was given the option of purchasing a new board at \$515 or doing a board swap for \$195. I could not purchase just the new transformer because Apple sells those only to dealers. Again the little guy takes it in the shorts. I don't sell computers, I just happen to own one.

Jerry Stidham

APO Miami, Florida

Technically competent users find the policy exasperating, but it's typical throughout the personal computer industry that manufacturers discourage users from tinkering with the power supply, as a safety precaution. Though you may dispute the wisdom of absolutely restricting the distribution of parts—not even authorized service centers can obtain some parts individually—it does guarantee a standard quality of repair and prevent the intrepid but untrained from suffering injury or expensive fixes. —Ed.

Correction

An outdated telephone number was published for DPEX, maker of the Mac/2392 terminal emulator, in "Mini and Mainframe Connections," *Macworld*, July 1986. The current number is 408/734-5932.

Also, the correct number for Mesa Graphics, producer of the Teklike terminal emulator, is 505/672-1998.

Letters should be mailed to Letters, Macworld, 555 De Haro St., San Francisco, CA 94107, or sent electronically to CompuServe 70370,702 or The Source BCW440. We reserve the right to edit letters. All published letters become the property of Macworld. □

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Software	Time in Seconds
MacWrite	3.8
MacDraw	3.2
MacPaint	2.5
Excel	5.6

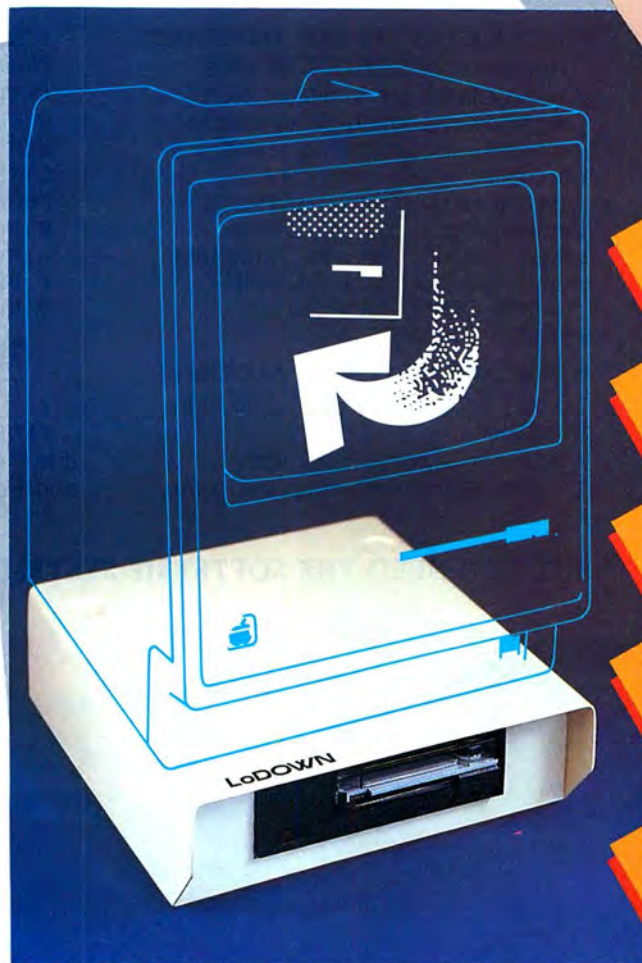
Action measured to nearest .5 second with a Mac Plus using Finder V5.2 and average over 3 consecutive executions, system cache on. Timings are based on the amount of time to open application.

LoDOWN's Hard Disk has a unique head locking feature providing a rated shock force of 60 G (design for portability) and a MTBF (Mean Time Between Failure) Of 25,000 hours (power on hours) which is twice that of the competition. For your convenience LoDOWN preloads over 300 public domain programs and for an additional charge, offers a Print Spooler, Floppy Backup and Networking software. The LoDOWN products require no fan providing an extremely quiet working environment. An additional AC power outlet to your Mac is included in the price along with the required cable and terminator.

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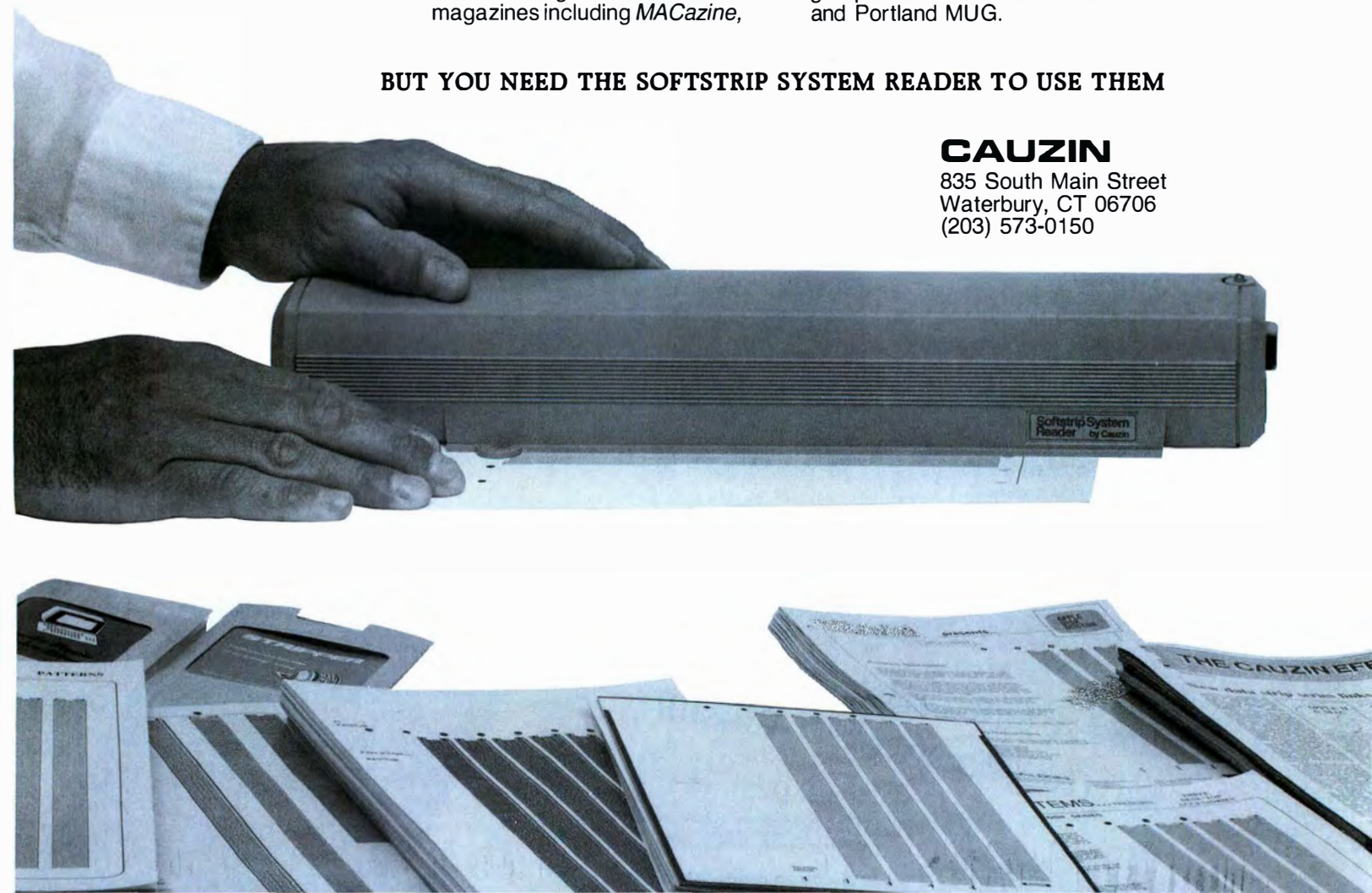
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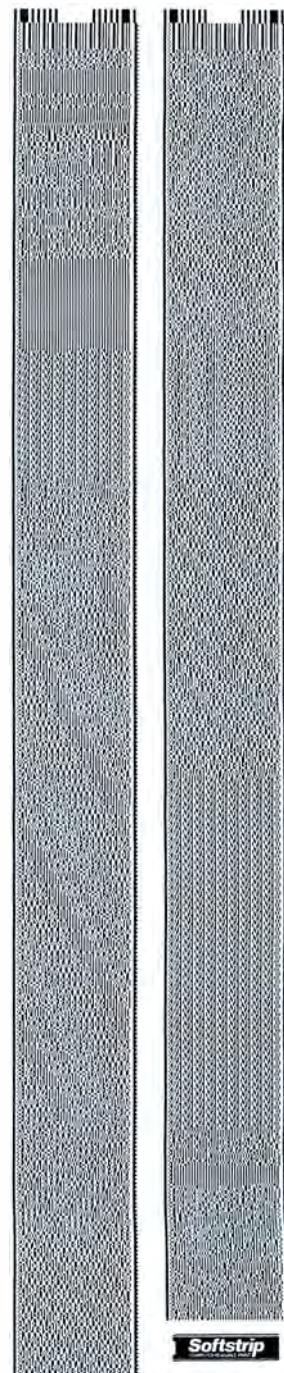
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screen. Pull information from different files together. Include graphics in your fields and reports. Print mailing labels 3 or 4-up, or more.

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With FileMaker Plus, you can put information *in* any way you want, without arbitrary limitations. It automatically indexes every word, number and date. You design your output right on the screen, so you can see exactly what you (and your clients, staff, suppliers, publishers, board of directors) are going to get.

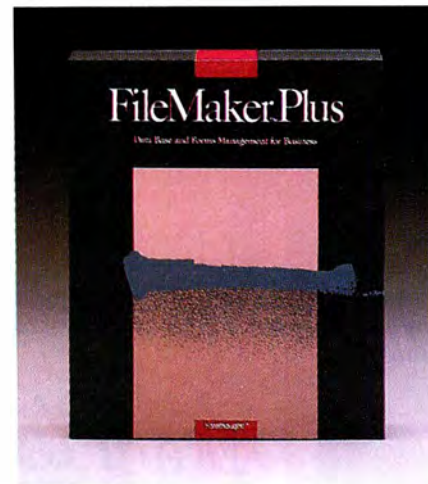
You can exchange information with other programs, like MacWrite™, MacPaint™, MacDraw™, Microsoft® Word and Microsoft Excel. You can share applications or formats you've created with other members of your team, or consolidate group efforts into one database. And FileMaker takes full advantage of the Macintosh™ family, including the Mac Plus, Mac 512, Imagewriter and LaserWriter.

So, for a mere \$295, you can watch as your data takes on all kinds of interest-

ing and profitable new forms. Call 1 800 MACWARE today for the name of your nearest dealer.

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Watch your data take human forms.

purchase order

Bowman Space Planners

October Billings Report

Expense Report

Item	Quantity	Unit Price	Extension
124	1	1,552.00	1,552.00
125	1	1,060.00	1,060.00
126	1	2,400.00	2,400.00
127	1	1,598.00	1,598.00
128	1	2,400.00	2,400.00
129	1	2,400.00	2,400.00
130	1	2,400.00	2,400.00
131	1	2,400.00	2,400.00
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377	1</		

Macworld View

An alternative to AppleTalk, SCSI tape drives, desktop publishing, large-screen Macs, and more

Edited by Daniel Farber

Big-Screen Mac



If you want a large black-and-white screen for applications like desktop publishing, computer-aided design, or education, a few options are available. One is to install a composite video display adapter from the Macintosh to a high-resolution monitor. This converts the 22.5-kHz scan rate of the Mac to the standard TV scan rates. Mentaurois Corporation (1658 IH 35 South, San Marcos, TX 78666, 512/396-1565), for example, sells a \$199.95 adapter that is compatible with a wide variety of monitors—costing from \$1000 to \$3000—and more expensive projection devices.

MacVideo Processor (MVP) from MultiVideo (4 Johnston Way, Scotts Valley, CA 95066, 408/438-3663) takes a different approach. It displays the Mac screen on standard TVs, projection TVs, and VCRs. An image processor attaches to the back

of the Macintosh with an interface board that clips onto the motherboard. You can zoom up to 16 times normal display and pan to view other sections of a magnified image. You can also freeze an image on the TV screen and continue to work on the Mac without affecting the TV image. The interlace design of TV screens results in some flickering, especially in images that contain lots of horizontal lines. Projection TVs eliminate most of the flicker, however. MVP has its own power supply and sells for \$995.

MegaScreen, from Micrographic Images (20954 Osborne St., Canoga Park, CA 91304, 818/407-0571) takes the big-screen concept one step further. The Mac screen appears on a 19½-inch, high-resolution monitor (the same one used for Sun workstations) at 1024- by 921-pixel resolution. In effect, MegaScreen displays four to six times the surface area of the standard Macintosh screen. The hardware includes a proprietary graphics control-

(continues)



The MacVideo Processor, which is installed on the back of the Macintosh, displays enlarged Mac images on standard TV screens.

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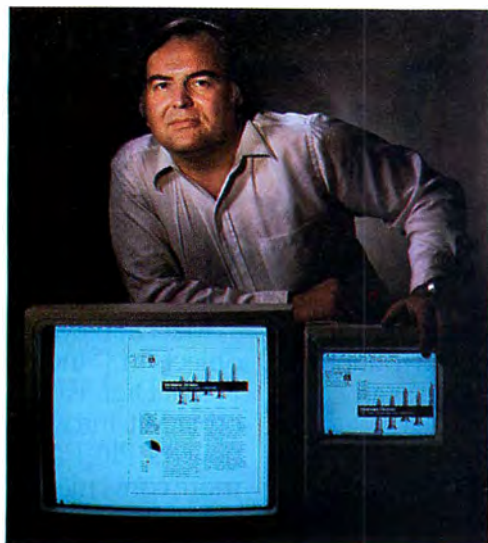
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Circle 478 on reader service card

Micrographic Images' Janek Kaliczak demonstrates the MegaScreen's ability to display a full-page PageMaker image at high resolution.



DAVID STRICK

Big-Screen Mac (continued)

ler, a power supply, and an interface to the motherboard. MegaScreen has outputs for both TTL and NTSC composite video. Programs like *MacDraw*, *PageMaker*, *ReadySetGo*, *Pro-*

fessional CAD for the Mac, *McCAD*, and *Quik Circuit* take advantage of the full screen and resolution without any problems. The monitor costs \$1595, and MegaScreen sells for \$1495.

dMac III

With Ashton-Tate's *dBase* the most popular database for personal computers, it's surprising that no one has developed a *dBase* for the Mac—until recently, that is. Format Software of San Diego now publishes a programmable database that is compatible with *dBase II*, *III*, and *III +*. The program transfers data between the Mac and PC-DOS-based versions without modification. *dMac III* doesn't use the full Macintosh interface, mainly because the program's first objective is compatibility with *dBase*.

(Ashton-Tate has yet to release its database product for the Macintosh, but we expect it to follow the Macintosh user in-

terface to the letter and to be compatible with *dBase* files.)

Tom Haag, president of Format Software, has aimed the \$495 product at developers of *dBase III* programs. "This gives them the flexibility to create turnkey systems for people who want to use the Mac," he says. "*dBase III* programs already existing can easily be ported to the Mac." The company plans to develop a more Mac-like version of *dMac III* in the future. For more information, contact Format Software, 11770 Bernardo Plaza Ct. #208, San Diego, CA 92128, 619/487-6946.

SCSI Tape Drives

As a kid you probably tried hanging on to a merry-go-round while your friends pushed it faster and faster until you either flew off or threw up. That's what life is like for information stored on a hard disk. The edge of a typical 3½-inch hard disk travels faster than 70 miles per hour; a 5¼-inch disk goes over 110 miles per hour. At those speeds, it's a miracle that information remains intact. When massive quantities of expensive programs and priceless documents go into orbit, you want to be prepared with a reliable copy of your hard disk's contents.

Sure, you can back up a hard disk on 25 or more double-sided disks, provided you have several hours and a strong wrist. If your budget exceeds your stamina, a tape drive may be the answer. Tape drives range in capacity from 20 to 60 megabytes per tape cartridge and store information at rates of up to 5 megabytes per minute.

Although most people think of tape drives as backup devices, they have other valuable uses. Imagine shipping or carrying 10 or 20 megabytes across the country, locking away sensitive information in a safe, or increasing the virtual capacity of your hard disk drive.

The advantages of tape drives are not lost on manufacturers of SCSI equipment for the Macintosh. Even Apple is widely rumored to be working on a SCSI tape drive, something Apple mass-storage product manager Al Zisser refuses to confirm or deny. At least one manufacturer is waiting to see what Apple decides to do. "We want people who use our tape drives to be able to exchange

tapes with people who use Apple's," says SuperMac Technology's president Steven Edelman.

However, the half-dozen developers who have already announced tape drives don't appear to be worrying about Apple setting a de facto standard.

Mirror Technology offers the Magnum Tape 20, which has a 20-megabyte capacity and a \$1095 list price. Another model, the \$2495 MagNet Tandem 40, puts a 20-megabyte hard disk and a 40-megabyte tape drive in one cabinet. LoDown's two tape drives, the T-20 and the T-60, have capacities of 20 and 60 megabytes, respectively. The T-20 lists for \$895, the T-60 for \$1795.

The Sun Safe-60 from Sunol Systems stores up to 60 megabytes on each tape cartridge you feed it. List price of the tape drive is \$2195. Micah offers a 40-megabyte tape drive that retails for \$1495.

AST has two SCSI product lines that include tape drives. The AST 2000 base unit contains a 20-megabyte disk drive and a 20-megabyte tape drive; it lists for \$2795. The AST 2000 with the tape drive alone costs \$1695. The higher-capacity AST 4000, with a retail price of \$6995, has a 60-megabyte tape drive and a 74-megabyte disk drive.

Peripheral Land offers the MacBack20 and the MacBack60, 20-megabyte and 60-megabyte tape drives that work only with Peripheral's MacFast line of SCSI disk drives. An intelligent link between tape drive and

(continues)

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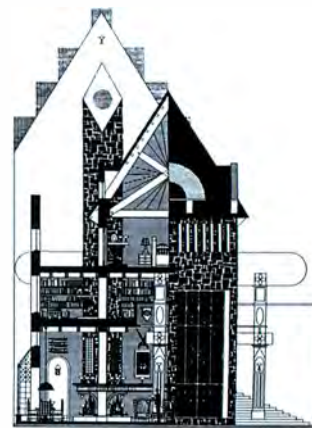
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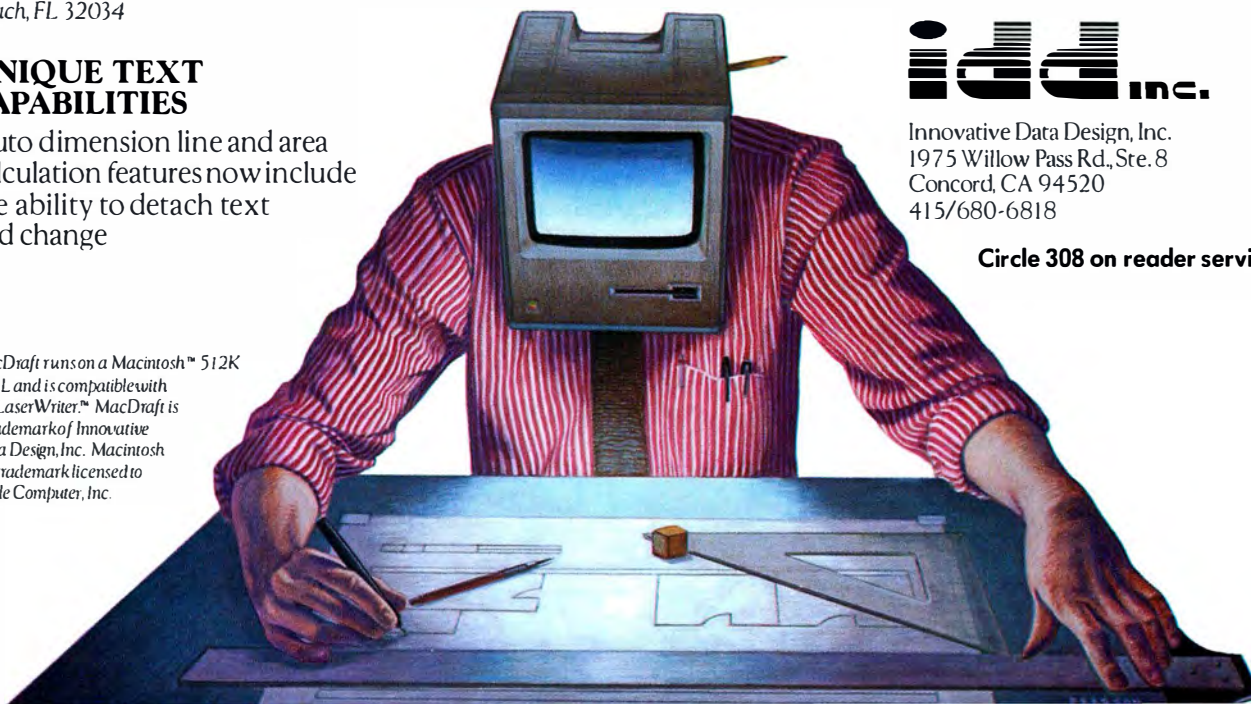
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SCSI Tape Drives (continued)

disk drive means that once information transfer has begun, the Mac's attention is no longer required. List price is \$1249 for the MacBack20 and \$1995 for the MacBack60.

Software supplied with the tape drives varies widely, and all of it is evolving rapidly. Minimal software simply dumps an entire disk or volume onto tape. Other programs let you pick folders and files to save to, or retrieve from, tape and can save and reuse lists of files and folders. Still more sophisticated software provides for automatic incremental backup: you insert a tape and click a button, and the software backs up all the files that have changed since the last backup. The best packages combine all these features, plus letting you add and remove files and folders before beginning the incremental backup. Most manufacturers provide free software updates to registered owners.

Is there a tape drive in your future? If you need removable mass storage for any reason—hard disk backup, increase storage capacity, information security, or portability—the answer may be yes. —*Lon Poole*

PhoneNet



Farallon Computing has introduced an alternative to Apple's AppleTalk hardware. PhoneNet is a system of AppleTalk-compatible network hardware that operates over ordinary phone lines. Installing the system with existing phone lines and standard modular phone extension cables reduces wiring costs from about \$1.50 per foot with Apple's cables to 10 cents per foot, says Reese Jones, a spokesperson for the company. "PhoneNet requires only two wires between machines, whereas AppleTalk uses three. The advantage of this stems from the fact that the phone company often installs only four conductor cables in a building. The telephone uses two of the lines, still leaving two for PhoneNet," Jones explains.

Originally developed by members of the Berkeley Macintosh Users Group at the University of California, PhoneNet uses a low-resistance floating

ground circuit, which allows much longer cable lengths (3000 feet or more with a repeater, compared to AppleTalk's 1000). The system is compatible with single-line phones and Private Branch Exchange (PBX) systems, and hardware such as IBM PC/AppleTalk boards and the Kinetics Ethernet Bridge. You can add or remove devices without disturbing the network, and you can daisy chain devices. The PhoneNet works in combination with Apple's cables and connector box.

"PhoneNet is a pragmatic approach to networks," says Jones. "Wiring up a network in a large corporation or university costs from \$1000 to \$3000 per room. PhoneNet is a less expensive way to accomplish the same thing."

The cost for the PhoneNet connector is \$49. Versions are available for both the 512K Mac and the Macintosh Plus. For more information, contact Farallon Computing, 1442A Walnut St. #64, Berkeley, CA 94709, 415/849-2331.



LEE YOUNGBLOOD

Dr. Brown with his consulting tool: face meets interface?

Plastic Surgery Mac



With mouse in hand, Donald Brown, M.D., trims and re-shapes the nose and chin of a face on the Macintosh screen. He then zooms into FatBits to sculpt a more distinct chin and refine the tip of the nose. With a few clicks of the mouse, he finishes the reconstruction, and the patient looks with satisfaction at Dr. Brown's artistry.

Brown, a San Francisco plastic surgeon, believes he has found the perfect device for improving doctor-patient communications. He scans preoperative photos of patients into the Macintosh via ThunderScan and then edits the photos in *MacPaint*. "The Mac serves as a blackboard for the physician and the patient. It is a great way of defining patient expectations, and it brings a closer understanding of what we will try to achieve through the surgery," says Brown. Before the Macintosh, Brown and most other plastic surgeons re-

(continues)

NextWrite



Steve Jobs may no longer carry the official flag for the Macintosh, but his new company, Next, has developed a new word processor for the Mac. The program takes over where *MacWrite* leaves off. "While useful for creating short, simple documents, the program also

has features that are invaluable for generating complex documents such as manuals and dissertations," says Dan'l Lewin, vice president of marketing at Next.

The program performs operations such as scrolling, reformatting, and repagination faster than *MacWrite* or *Microsoft Word*. It displays multiple columns of text on screen, as well as automatically numbered footnotes, headers, and footers.

Documents are limited only by memory, and you can open as many at once as memory allows. A built-in 50,000-word spelling checker and a utility that translates *MacWrite* and *Word* files to its document format are also included. At press time, Next, whose main focus is on developing scholars' workstations for higher education, had not finalized marketing plans for the product.

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Plastic Surgery Mac (continued)

lied on pencil and paper, tracing over photos on onionskin paper, and a lot of talk.

While the Mac is best suited for designing facial modifications, such as nose and chin alterations, Brown says it can give patients visual feedback about the potential results of face-lifts, breast reductions and augmentations, and fatty-tissue removal.

He now has three Macintosh Pluses networked in his office—one at the front desk for scheduling and maintaining patient records, another for accounting, and one in his own office for patient consultations. Brown's new technique has increased patient satisfaction, and consulting takes less time.

—Elinor Craig

512K SCSI Adapters

If you have a standard 512K Mac or a third-party megabyte Mac, and you don't want to invest \$599 or \$799 to get Apple's SCSI (and memory) upgrade, Peripheral Land's MacPort SCSI Host Adapter and SuperMac Technology's DataPort offer reasonable alternatives and cost savings. Even if you have a Macintosh 512K Enhanced, you can buy a third-party memory upgrade and one of these SCSI adapters, shaving about \$200 off Apple's upgrade price.

Both MacPort and DataPort connect to the Mac's ROM

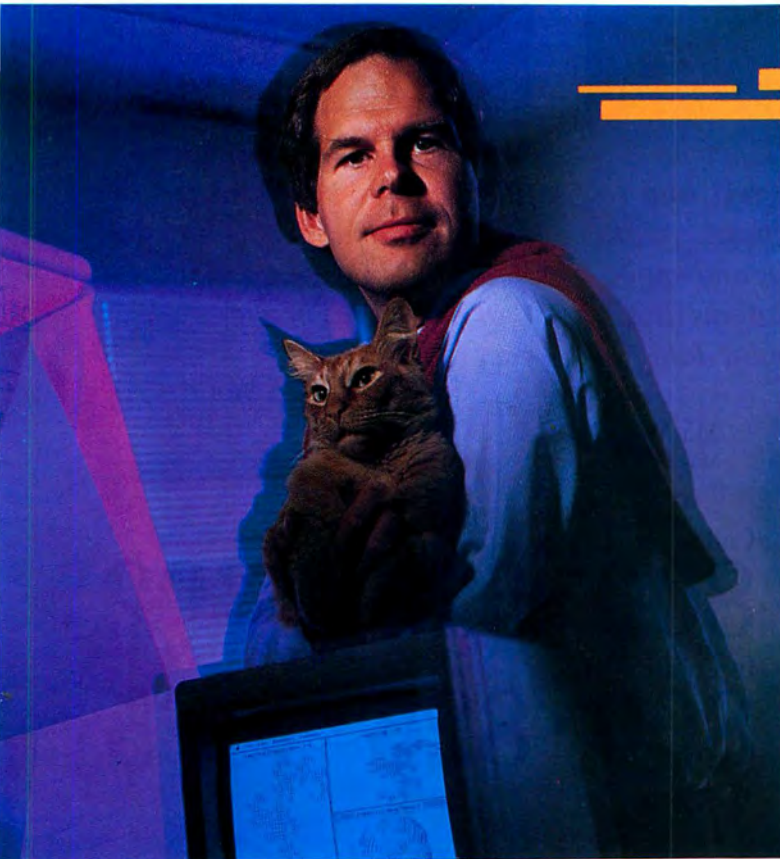
socket and provide a connector for external devices—through the battery panel—as well as for software. Dealers perform the upgrade, but you can do it yourself if you are mechanically inclined. Neither SCSI adapter works with the HyperDrive, since both connect to the bus. Both MacPort and DataPort let you start up without floppy disks if you have the 128K ROM.

MacPort, which costs \$99, works with any SCSI device that uses the Omti controller (SuperMac, LoDown, Mirror Technologies). Peripheral Land provides a 90-day warranty for MacPort.

The DataPort Apple SCSI driver is 100 percent compatible with Apple's SCSI controller, according to SuperMac Technology. The cost of \$99 with SuperMac Technology's Data-Frame SCSI hard disk, and \$299 without it, includes a one-year warranty.

For more information, contact Peripheral Land, 3677 Enochs St., Santa Clara, CA 95051 or SuperMac Technology, 1901 Old Middlefield Way, Mountain View, CA 94040.

Expertelligence



MARK HANAUER

Denison Bollay, president of Expertelligence, admits his ideas are ahead of their time. In 1980 he started the craze over computer camps—a concept that is still alive today. Bollay's real interest is now in artificial intelligence (AI), which he has been involved in since the mid-seventies—not as an esoteric science but as it applies to everyday life.

Since the coming of the personal computer, Bollay has dreamed of bringing AI applications like expert systems to PC users. But not until the advent of the Macintosh was he able to turn his concepts into reality.

Since there was no way to develop expert system tools rapidly without using LISP, the most popular AI programming language, Bollay created a version of LISP for the Macintosh—

ExpertLisp. Today Expertelligence, the publisher of ExpertLisp, has the largest installed base of compiled LISP users. Not large when compared to the number of developers using C or Pascal, but Bollay and his co-workers believe that the LISP revolution is just beginning.

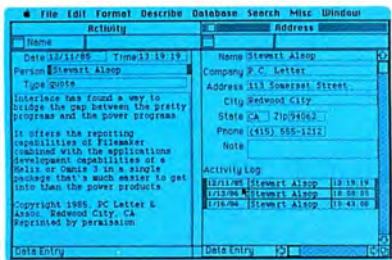
“Application programs have reached a threshold. To create more powerful, sophisticated ones, you must add a layer of intelligence or expertise. You can do so with Pascal or C, but LISP is specially designed for that task and is 10 to 20 times faster. There is a tremendous

(continues)

Putting AI on the Mac: Expertelligence president Denison Bollay—with office mascot Oliver.

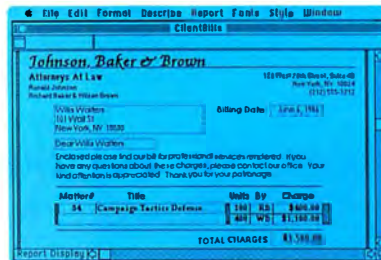
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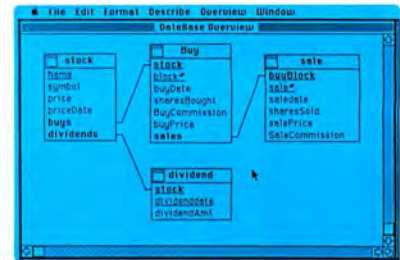
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May, 1986



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Expertelligence (continued)

potential for developing expert systems for the Mac or integrating them within a spreadsheet or database," says Bollay.

Bollay has also taken a step toward creating a symbiotic relationship between personal computers and dedicated AI development machines such as the Symbolics 3600. Recently, Expertelligence entered into a comarketing agreement with Symbolics, the leading manufacturer of symbolic processing systems, and developed *ExperLink*, which allows text files to transfer between a Symbolics LISP Machine and the Macintosh running ExperLisp. Expressions can be evaluated on the more powerful Symbolics machine and the results returned to the Macintosh.

According to Bollay, serious AI users who are accustomed to \$100,000 LISP machines will find that they can do at least 75 percent of their work on a Mac Plus and then use *ExperLink* to transfer data to the Symbolics machine.

In addition, *ExpMultiOPS5*, an expert system development tool, lets you create programs that run on both the Symbolics machine and the Macintosh. You can send data from remote locations to the Macintosh and incorporate that data into expert systems running on the Symbolics machine.

Bollay hopes to break the knowledge engineering barrier in a few years so that an expert's knowledge can more easily be distilled into a set of

rules, and is looking into creating expert system links to CD ROM databases. For the near future, however, he plans to finish version 2.0 of *ExperLisp*—with a Smalltalk-like class system—to provide expert system tools to harness the intellectual powers of Mac users.

MacCalc



Multiplan and *Excel* have garnered the majority of the spreadsheet market, but that didn't stop Bravo Technologies from introducing its own number-crunching program, *MacCalc*. The program lacks many of *Excel*'s powerful features, such as graphics, spreadsheet linking, and database and macro capabilities, but *MacCalc* is designed primarily for economy and speed: the \$99.95 product recalculates as fast as *Excel*, and cut and paste operations are even faster. The program also allows you to combine multiple fonts and styles within one spreadsheet and includes an annotation feature for appending notes to a cell. For more information contact Bravo Technologies, P.O. Box T, Gilroy, CA 95021-2249, 415/841-8552.

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Macworld Best-Seller Software

This month	Business	Last month	Months on chart
1	Microsoft Excel, <i>Microsoft</i>	1	6
2	Microsoft Word, <i>Microsoft</i>	2	14
3	PageMaker, <i>Aldus</i>	4	2
4	MacDraw, <i>Apple Computer</i>	3	11
5	Microsoft Multiplan, <i>Microsoft</i>	9	14
6	Microsoft File, <i>Microsoft</i>	7	13
7	Sidekick, <i>Borland</i>	—	0
8	Dollars and Sense, <i>Monogram</i>	14	14
9	ThinkTank, <i>Living Videotext</i>	—	5
10	MacDraft, <i>Innovative Data Design</i>	—	0
11	Jazz, <i>Lotus Development</i>	5	10
12	Microsoft Chart, <i>Microsoft</i>	—	13
13	MacProject, <i>Apple Computer</i>	6	11
14	Back to Basics, <i>Peachtree</i>	14	4
15	OverVue, <i>ProVue Development</i>	—	2

Source: InfoCorp survey of over 200 retail stores

Software Watch


Editors' choice: other recent software of particular interest

More, *Living Videotext*
Presentation outliner
SuperPaint, *Silicon Beach*
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Stat 80, *Statware*
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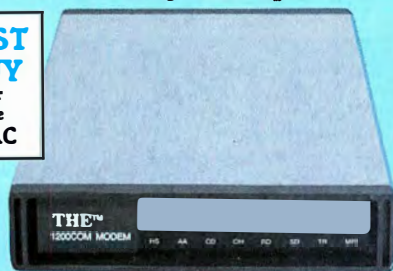
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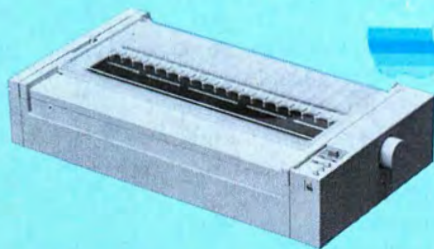


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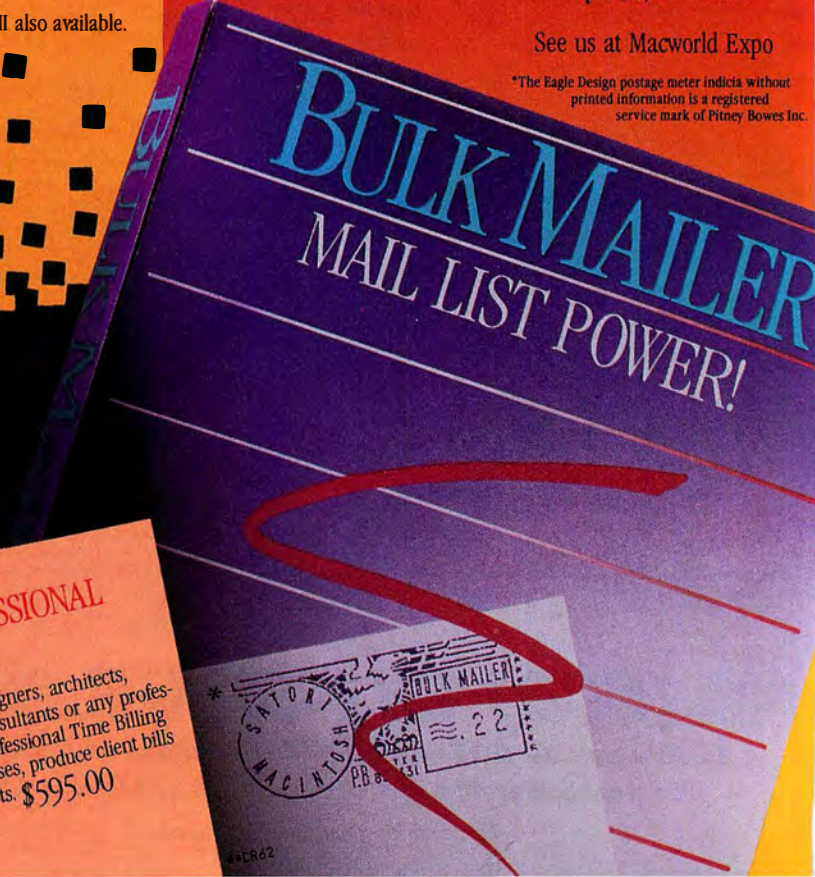
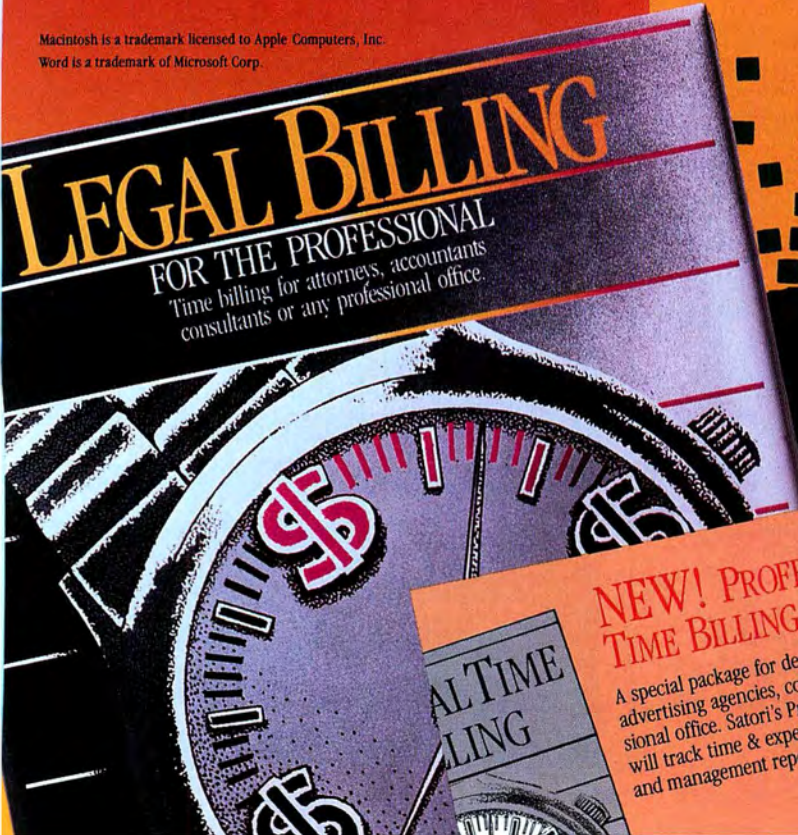
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Get Info

A hand decoder for system error messages, a technique for customizing date formats, and more

Lon Poole

If you've wondered why the vital statistics of a newly initialized disk don't add up, read on for an explanation. Also this month: how to change the startup application, modify date formats, and make room in a BASIC program for user input. Plus a report of flaws in MacDraw's font handling and an interpretation of system error codes.

Missing Disk Space

Q. Initializing a new double-sided disk consumes between 11K and 21K of disk space. For example, the disk's title bar may indicate that there are 0 items on the disk, 11K on disk, and 789K available. This didn't happen on 400K disks. Can you shed any light on the mysterious disappearance of the disk space?

*Chris Hagberg
Seal Beach, California*

A. Although the Finder reports 0 items, one file always takes up space on a freshly initialized or erased disk—an invisible file named Desktop that contains information the Finder uses. This information includes the Get Info comments, copies of icon images for most applications and documents on the disk, the whereabouts of applications on HFS (Hierarchical File System) disks, and folder contents on non-HFS disks.

I'll bet if you look closely at the space used and available as reported by the Finder for a newly initialized or erased double-sided (800K) disk, you'll discover that the two numbers don't add up to 800K. You'll probably find 14K or 15K unaccounted for. The Mac file system uses this space for a disk directory, an allocation

map, and the "boot blocks" that contain information used at startup.

Versions 5.0 and later of the Finder likewise fail to account for all 400K on a single-sided disk, although the discrepancy is only 9K or 10K owing to a smaller disk directory. By means of a semantic trick, Finder versions 4.1 and earlier usually make space used and available add up to 400K. Finder 4.1 defines 1K as 1000 bytes, or characters, while Finder 5.0 and later defines 1K as 1024 bytes. The true capacity of a single-sided disk is 409,600 bytes. According to Finder 4.1, that's 410K, but subtracting 10K for the disk directory and so on reduces the capacity to 400K.

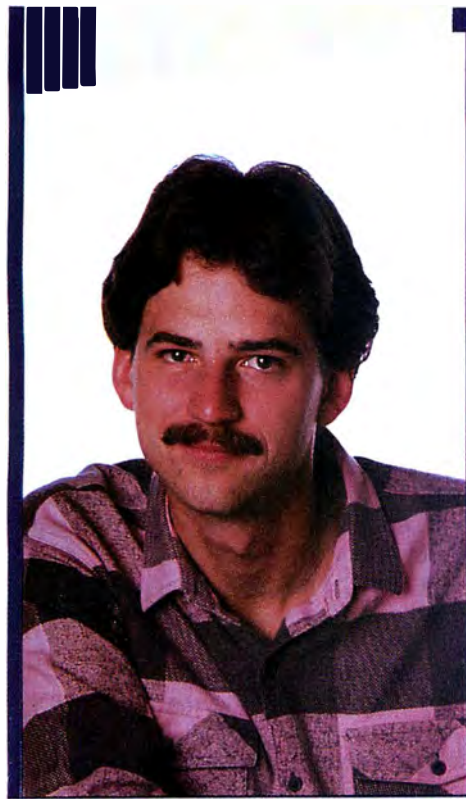
Undo Startup Application

Q. Several software packages have a startup routine that automatically starts a specific application. If I want to use other applications on the same disk, I have to wait for the automatic start and then quit. How can I modify the startup routine?

*S. Sable
Chino Hills, California*

A. The Set Startup command in the Finder's Special menu determines which application on a particular disk runs automatically when you start up the Mac with that disk. If you want the Mac to start up at the Finder's desktop, make the Finder the startup application by selecting the Finder icon (it's usually in the System Folder) and choosing the Set Startup command.

(continues)



Even when the Finder reports 0 items, the Desktop file takes up space on your disk.

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Change Standard Date Format

Q. How can I change the System file, using a resource editor such as *ResEdit*, to change the system date format from MM/DD/YY to DD-MM-YY?

Israel J. Lawrence

FPO San Francisco, California

A. The all-numeric date format you mention is called the short date format and is part of an international resource in the System file, namely the INTL resource whose ID number is 0. You can change the order of the day, month, and year; the character that separates the different parts of the date; whether to show leading zeros for one-digit day and month numbers; and whether to show the century in four figures or two. Use Apple's *ResEdit* program (available from user groups) as follows:

- Copy your system disk; experiment on the copy, never on the original.
- Start *ResEdit* and insert a copy of the system disk. A small window appears for each inserted disk. Each window lists the applications and documents on the disk; for double-sided disks and other disks that use the Hierarchical File System (HFS), the window also lists folders. Double-click a folder's name if you want to see its contents.

- Find the System file (it may be in a folder on an HFS disk) and double-click it. Another small window opens, listing all the resources in the System file by their four-letter code names.

- Find the resource named INTL in the System window and double-click it. A window appears, listing the international resources by ID number.

- Double-click INTL resource 0. Labeled boxes in the window that opens allow you to change the formats for currency, short date, and time, as well as determine whether to use the metric system or not and specify a version number (see "Dates in Short Order").

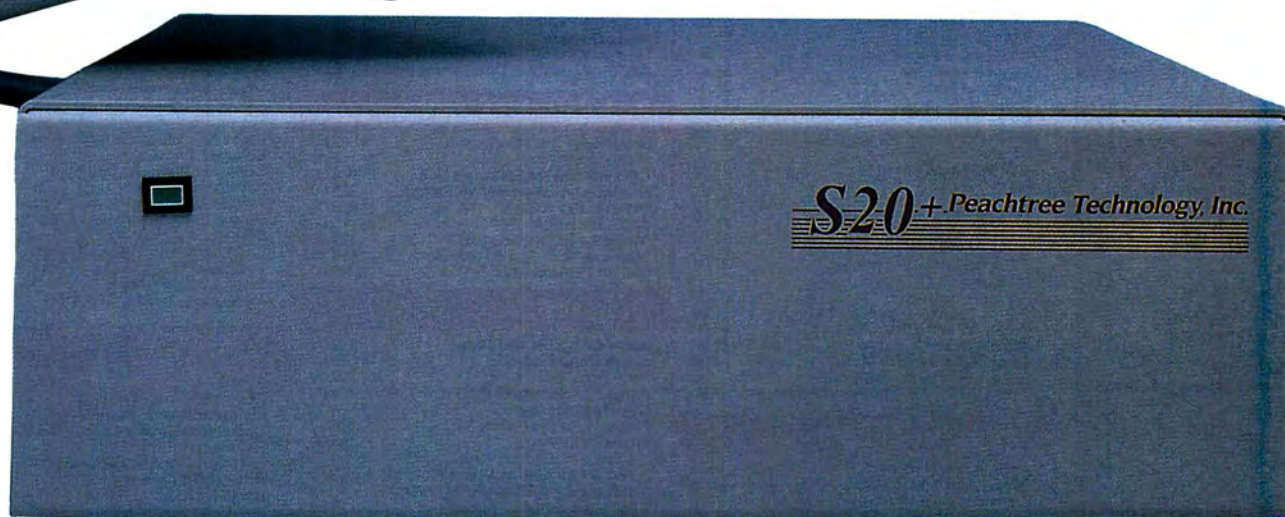
- To reorder the date to day, month, and then year, change the box labeled dateOrder to 1 (for DD-MM-YY). In this box, 0 stands for the order MM-DD-YY and 2 for YY-MM-DD.

- Change the character that separates the different parts of the date in the dateSep box. In your case, put a hyphen in this box.

(continues)

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Circle 553 on reader service card

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Get Info

Dates in Short Order

Using ResEdit to change the order of month, day, and year in dates, you open a series of windows, select the dateOrder box, and type a code for the preferred order.

● The shrtDateFmt box specifies whether to show leading zeros and whether to show the full four-digit century. To do without all of those extra characters, put a 0 in this box. For leading zeros on days below 10, add 32 to the value in the box; for leading zeros on months, add 64; and for centuries, add 128. For example, to show centuries and leading zeros in both day and month numbers, enter 224 (32 + 64 + 128).

● When you finish making changes, close all the windows, answering Yes when *ResEdit* asks whether you want to save your changes, and then quit *ResEdit*.

In addition to the short date format, there's a long date format in INTL resource 1, which—in its longest form—spells out the month and the day of the week. The resource specifies the spelling or abbreviation of the month and day names, along with the punctuation and other options you can set in the short date format. Unfortunately, the latest version of *ResEdit* available at this writing, version 1.0D7, does not include an editing window for INTL resource 1. Apple's *Redit* program (available from user groups) does, but the program doesn't work with HFS disks.

Making Room for BASIC Input

Q. I am writing a program in Microsoft BASIC version 2.0 that requires the user to input long sentences. However, the cursor doesn't wrap around to a new line, and even adjusting the width of the window does not prevent the characters from dis-

appearing off the right edge of the screen. Is there any way to change the width of the screen for input?

Tommy Beller
De Land, Florida

A. Use EDIT FIELD statements to define editable text fields within a window. These fields work just like editable text fields in other Mac applications, such as the comments field in the Finder's Get Info dialog box. Each EDIT FIELD statement specifies the following:

- A field ID number
- The suggested text to be edited or a blank area for entering text
- The size of the field
- Whether the field has a border
- Whether word wrap is on and Returns are not allowed as part of the entry, or word wrap is off and the user must press Return to end a line
- The format of the text—flush left, centered, or flush right.

After defining the window and edit fields, use the DIALOG function to monitor what the user does with the mouse and the keyboard. Specifically, when DIALOG(0) equals 2, the user has clicked an edit field, and DIALOG(2) identifies which one. Use an EDIT FIELD statement with just a field ID to activate the selected edit field.

When the user finishes editing the fields in the window and so signifies by

(continues)



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Get Info

clicking the OK button you have thoughtfully provided, the EDIT\$ function retrieves the current contents of the edit fields.

The simple program in Listing 1 illustrates these concepts. For specific information on the full range of parameter values for the EDIT FIELD statement and the DIALOG and EDIT\$ functions, see the Microsoft BASIC manual.

MacDraw Font Follies

Q. The System file on my HyperDrive hard disk has lots of fonts, but *MacDraw's* Font menu lists only nine of them. I tried a public domain program called *Scroll 'em*, which implements scrolling menus on non-Plus Macs, but it doesn't work right with *MacDraw*.

(continues)

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```
true=NOT(false)
quit=false
WINDOW 2,, (125,110)-(400,215),-2      'Display window
CALL TEXTFONT(Chicago)                  'Display 3 edit field labels
CALL MOVETO(5,21):PRINT "Title:"
CALL MOVETO(3,86):PRINT "Tape:"
CALL MOVETO(80,86):PRINT "Counter:"
EDIT FIELD 2, "", (40,75)-(70,90),1      'Display and activate 3 edit fields
EDIT FIELD 3, "", (140,75)-(190,90),1,3 '(this one is right justified)
EDIT FIELD 1, "", (40,10)-(260,60),1     '1st one last so it's 1st for entry
BUTTON 1,1,"OK", (210,72)-(265,96)      'Display OK button
fieldNo=1                               'field 1 is 1st for entry

WHILE NOT(quit)                          'Don't quit until OK clicked
  dialogEvent=0
  WHILE dialogEvent=0                    'Wait for user to do something
    dialogEvent=DIALOG(0)
  WEND
  ON dialogEvent
    GOSUB ButtonClick, EditMove, NoOp, NoOp, NoOp, ReturnKey, TabKey
WEND

WINDOW CLOSE 2
END

ButtonClick:                             'User clicked the OK button
  title$=EDIT$(1)                        'Get edit field entries
  tapeID$=EDIT$(2)
  tapeCount=VAL(EDIT$(3))
  GOSUB SaveRecord
  quit=true
  RETURN

EditMove:                                 'User clicked an edit field
  fieldNo=DIALOG(2)                      'Find out which field
  EDIT FIELD fieldNo                     'And activate it for entry
  RETURN

NoOp:                                     'Do nothing for some dialog events
  RETURN

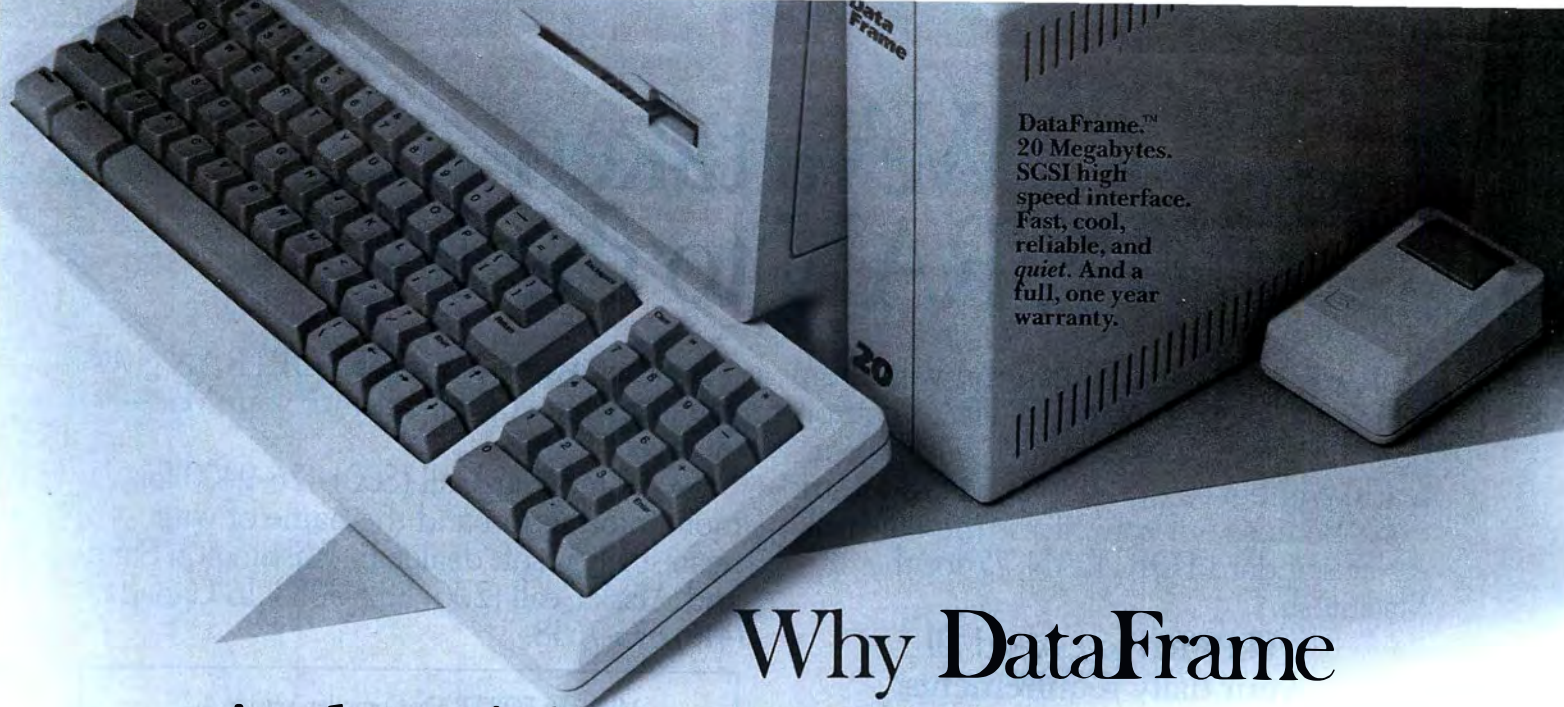
ReturnKey:                               'Pressing Return same as clicking OK
  GOSUB ButtonClick
  RETURN

SaveRecord:                              'Saving entries to disk not
  implemented here                       '
  RETURN

TabKey:                                  'User pressed the Tab key
  fieldNo=(fieldNo MOD 3)+1              'Advance to next edit field
  EDIT FIELD fieldNo                     'And activate it for entry
  RETURN
```

Listing 1

This short program demonstrates a technique for creating editable fields for user input in Microsoft BASIC programs.



Why DataFrame is the *right* hard disk for any Mac:

Because we looked carefully at what Users need in a hard disk system for the Mac, and made the right design decisions. Decisions that give you significant benefits over any other Mac hard disk. They are:

Decision: Floppy disk port or SCSI?

Hard disks that use the serial or floppy disk port, such as the Apple hard disk, are *slow*. The SCSI interface (introduced with the Macintosh Plus) is considerably faster. The DataFrame uses the SCSI interface, and consequently runs *much* faster than hard drives that use slower ports. Yes, even faster than non-SCSI internal drives. It really makes your Mac *fly*.



◀ (If you own a Mac 512, you can get DataFrame performance too, with our \$99 SCSI adapter.)

Decision: Internal drives versus external drives?

Internal drives save desktop space, but there are serious trade-offs. First, you lose your system while the drive is installed. Worse, you lose your system if the drive needs repair. (Internal drives have earned a not undeserved reputation for frequent breakdowns.)

Then there's heat—the enemy of reliability. Internal drives add heat to the system. You either use a fan—which means you listen to an annoying whine while you are working—or you use no fan, which means your system gets too hot.

DataFrame is external, so it adds no heat to the system. Because the drive is preformatted, you can take it right out of the box, plug it in, and be *working* in minutes. And if your hard disk should ever need service, you just unplug the DataFrame (you can *still*

use your Mac) and get a replacement *immediately* from your dealer.

Decision: Under-system or beside-system?

A drive under your Mac has the same heat problems as a drive inside your Mac. The drive must either have a fan (*noisy*) or it sits under your Mac like a little hotplate (*unacceptable*).

DataFrame sits *beside* the Mac, uses a vertical 'chimney' design to vent heat, needs no fan, and therefore stays cool *silently*.

What else?

SCSI means easy expansion—you can 'daisy chain' up to seven additional drives or other SCSI peripherals, using DataFrame's second SCSI port. Plus, DataFrame boots your system directly from disk, saving you time. And we used Apple's Hierarchical File System, so all 20 megabytes are available on line at all times. Most important, DataFrame is so reliable, we back it up with a full, one year unlimited warranty. That's confidence you can't even get from Apple.

The result of all these decisions:

DataFrame has been chosen by more professionals, more Macintosh software developers (including many in Apple Computer, Inc.), more dealers, and in fact, *more people* than any other SCSI Macintosh drive, *by far*.

So before you commit to *any* hard disk for your Macintosh, you owe it to yourself to see DataFrame in action. You'll find it at any of the hundreds of qualified SuperMac™ dealers. They're listed next to this ad.

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TECHNOLOGY

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See us at MACWORLD EXPO/Boston, booth 740

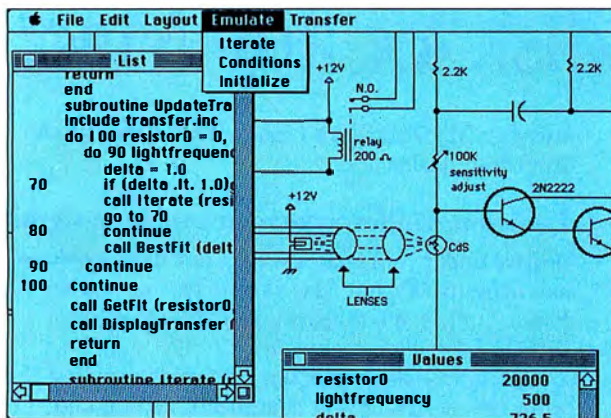
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Our compiler makes the programming faster as well. FORTRAN enhancements like DO...WHILE make structured programming easy. Dynamic overlays let you run mainframe-size programs. Even in 128K of RAM. And a powerful set of utilities gives you complete library management. Not to mention dynamic linking, a program editor and an interactive source code debugger.

In other words, Microsoft FORTRAN gives you just what you'd expect for your Mac—the max.

So get moving. Call (800) 426-9400 for more information and the name of your nearest Microsoft dealer. In Washington State and Alaska, call (206) 882-8088. In Canada, (416) 673-7638.

Microsoft FORTRAN Compiler Version 2.2

Microsoft FORTRAN Compiler

- Full ANSI FORTRAN '77—the standard.
- Port mainframe and minicomputer applications with little or no change.
- Calculate with IEEE-standard floating-point numbers.
- Performs direct 32-bit integer arithmetic.
- Supports virtual arrays as large as available disk space.
- Compile up to 1600 lines per minute.
- Optionally compile into Apple's MDS assembly language.
- Structure your code using separately compiled modules, statement functions, block IF, block DO and SELECT CASE constructs.

Interactive Window-Oriented Source Debugger

- View your source file while debugging.
- Single-step through your program.
- Set source-level breakpoints to control execution.
- Examine and modify your variables.
- Search source code for labels or line numbers.
- Examine file status for all units.

Extensive Toolbox Interface

- Access over 475 built-in Macintosh toolbox functions, including windowing, cursor handling, pull-down menus, mouse tracking, event queue handling and desk accessory management.
- Draw using powerful Macintosh graphics routines: points, rectangles, ovals, arcs, polygons and regions.

Library Manager

- Build your own libraries of useful subprograms.
- Include over 200 procedure files per library.
- Mix FORTRAN and assembly language procedures.

Object Code Linker

- Dynamically link routines as needed while executing.
- Statically link subprograms for faster execution.

Other Productivity Tools

- Apple's source code editor—optimized for faster programming.
- Apple's resource compiler—takes advantage of special Macintosh capabilities.

System Requirements

- 128K Macintosh.
- One disk drive.

Microsoft® FORTRAN for the Macintosh.™

The High Performance Software.

Microsoft is a registered trademark of Microsoft Corporation. Macintosh is a trademark licensed to McIntosh Laboratory, Inc. and is used with its expressed permission. Microsoft FORTRAN for the Macintosh was developed by Absoft Corporation.

Also, *MacDraw* seems to identify fonts in a document by their positions on the Font menu, not by their names. Suppose, for example, I type some text in a *MacDraw* document using Chicago, which is the first font on my *MacDraw* Font menu. Then I quit *MacDraw* and use the Font/DA Mover to add the Los Angeles font

to the System file. When I reopen the *MacDraw* document, Los Angeles is at the top of the Font menu, and the text I typed in Chicago has been converted to Los Angeles.

*Bill Stewart
Norcross, Georgia*

System Error ID Codes

ID Code Meaning

1	Bus error: a memory reference problem occurred on a Mac XL or on a modified Mac or Mac Plus.
2	Address error: the program referred to an odd memory address.
3	Illegal instruction: the MC68000 microprocessor encountered a machine language instruction it did not recognize.
4	Zero divide: a machine language instruction Signed Divide (DIVS) or Unsigned Divide (DIVU) had a divisor of zero.
5	Check exception: the machine language instruction Check Register Against Bounds (CHK) failed; perhaps a Pascal "value out of range" error occurred.
6	TrapV exception: the machine language instruction Trap On Overflow (TRAPV) failed.
7	Privilege violation: the Mac always runs in privilege (supervisor) mode; perhaps an erroneous Return from Execution (RTE) machine language instruction was encountered.
8	Trace exception: the trace bit on the microprocessor's status register is set.
9	Line 1010 exception: the 1010 trap dispatcher failed, making it impossible to use the ROM.
10	Line 1111 exception: an unimplemented machine language instruction was encountered; perhaps a leftover breakpoint from program debugging.
11	Miscellaneous exception: a nonspecific error condition caught by the microprocessor.
12	Unimplemented core routine: the microprocessor encountered a nonexistent trap number, perhaps a fictitious ROM routine.
13	Spurious interrupt: the interrupt vector table entry for a particular level of interrupt is NIL; this error usually occurs with level 4, 5, 6, or 7 interrupts.
14	I/O system error: the Mac's File Manager found a bad type field in an entry on an I/O request queue, the dCtlQHead field was NIL during a Fetch or Stash call in a custom driver routine, or a needed device control entry has been purged.
15	Segment Loader error: the GetResource procedure was unable to read a segment into memory.
16	Floating-point error: the halt bit in the floating-point environment word was set.
17-24	Can't read PACK resource into memory.
25	Memory full or fragmented: the Memory Manager was unable to fill the program's request for more memory.
26	Segment Loader error: the GetResource procedure encountered a non-executable resource or was unable to read 'CODE' segment 0 into memory for some other reason.
27	File map destroyed: the volume contains a block with a block number higher than the last block or lower than the first block on the volume.
28	Stack overflow error: a memory problem occurred because the stack expanded into the heap.

A. Apple knows about *MacDraw*'s font troubles. Although no *MacDraw* upgrade has been officially announced, one is in the works, and I can confidently speculate that it will allow you to choose from a larger selection of fonts and that it will not mix up fonts.

Incidentally, when I use *MacDraw* (version 1.7 or 1.9) on a Mac Plus that has 15 fonts in the System file on a SCSI hard disk, I see 11 fonts (not 9) listed on *MacDraw*'s Font menu. I have to scroll the menu to choose the 48-point size at the bottom of the menu, but the menu scrolling built into the Mac Plus ROM works. However, on systems with more fonts on the Mac Plus, I have seen the screwy scrolling you report. Because the Mac Plus ROM alphabetizes Font menus, font mixup is no longer related to a font's position in the Font menu; it's the font's position in the System file that matters.

Bomb Error Codes

Q. In the course of using my Macintosh, I often encounter system errors. I don't know what I am doing wrong, but the computer gives ID numbers to most of the errors. Could you please print a list of the ID numbers and what they mean?

*Brian Kalt
Southfield, Michigan*

A. When you stomp the Mac, it displays the "serious system error" alert box—the one that shows a bomb icon in the upper-left corner and a mysterious number in the lower-right corner. These numbers translate to equally esoteric phrases. In most cases only someone who is intimately familiar with the program code for the Finder or the particular application software understands why a code might have appeared. But for the curious, the table "System Error ID Codes" lists interpretations for numbers 1 through 28.

Send questions to Get Info, Macworld, 555 De Haro St., San Francisco, CA 94107. Send electronic mail to Compu-Serve 70370,702 or The Source BCW440. All published submissions become the property of Macworld.

Lon Poole is a Contributing Editor of Macworld. □

It's crazy to buy

SOFTWARE

Affinity Microsystems

Tempo (power user's macro utility) \$79.

Altsys

Fontastic (create your own fonts) 27.

Ann Arbor

FullPaint (open four documents at once) 55.

Assimilation

MIDI Composer (music record/playback) 22.

Right•Word (spell checker & thesaurus) 69.

ATI

Teach Yourself Multiplan 39.

Jazz Training 39.

Excel Training 39.

Batteries Included

The Mac BatteryPak (desk accessories) 27.

Borland International

Sidekick w/Phonelink 59.

BPI Systems

General Accounting 239.

BrainPower

Think Fast (improves recall) 23.

Chipwits (robot simulation) 26.

StatView (statistics package) 52.

Designscope (electronic circuit design) 129.

StatView 512+ (req. external drive, 512k) 179.

CAMDE

Nutricalc (diet & nutrition analysis) 49.

Casady Company

Fluent Fonts (two-disk set) 29.

Central Point Software

Copy II Mac (includes MacTools) 20.

Challenger Software

Mac3D (3D graphics, CAD features) 115.

Chang Labs

Rags to Riches Ledger call

Rags to Riches Receivables (reqs. 512k) call

Rags to Riches Payables (reqs. 512k) call

Inventory Control call

Rags to Riches Three Pak call

Cortland

Top Desk 35.

Creighton Development

MacSpell+ (requires 512k) 55.

Cricket Software

Statworks 79.

Cricket Graph 129.

DataViz

MacLink (transfer Mac/IBM files) 89.

Desktop Graphics

DrawArt (MacDraw artwork, 512k) 27.

DrawForms (requires MacDraw) 30.

Digital, etc.

Turbo Mac accountant 299.

Dow Jones

Straight Talk 59.

Spreadsheet Link 62.

Market Manager PLUS 125.

Dreams of the Phoenix

Day Keeper Calendar 27.

Phoenix 3D 27.

Quick & Dirty Utilities Vol. 1 27.

Quick & Dirty Utilities Vol. 2 27.

Twelve-C Financial Desk Accessory 27.

Electronic Arts

Financial Cookbook 32.

Deluxe Music Construction Set 32.

Enabling Technologies

Easy3D (create solid 3D objects) call

Enterset

Quickpaint (find MacPaint files fast) \$27.

Quickset (icon-driven accessory) 27.

Quickword (word processing tool) 32.

MacGAS (requires 512k, external drive) 55.

1st Byte

Speller Bee (spelling-learning tool) 39.

KidTalk (writing-learning tool) 39.

Smoothtalker (version 2.0) 49.

Forethought

Factfinder (free-form entry) 79.

FileMaker (custom forms & reports) 99.

Fortnum/Southern

MacInooga Choo-Choo (reqs. 512k) 21.

FWB Software

Hard Disk Util 57.

Great Wave Software

KidsTime 27.

ConcertWare+ (music composition) 39.

The Art of Fugue (Bach) 12.

Haba/Arrays

Home Accountant (reqs. external drive) 52.

Hayden Software

I Know It's Here Somewhere 20.

Hayden:Speller 27.

MusicWorks 46.

Building Blocks 46.

Home Design 57.

Score Improvement System for the SAT 58.

VideoWorks & MusicWorks Bundle 58.

Commercial Interiors 114.

Ideaform

MacLabeler (print disk labels) 29.

Innovative Data Design

Paste-Ease (requires MacPaint) 35.

MacDraft (requires 512k) 139.

Kensington

Graphic Accents 29.

Type Fonts for Text 29.

Type Fonts for Headlines (reqs. 512k) 42.

Layered

Notes...For Excel 42.

Notes...For Jazz 42.

Front Desk (scheduling & organizer) 69.

Legisoft/Nolo Press

WillWriter (prepare your own will) 27.

Linguist's Software

Tech (1000 different symbols) 59.

FOREIGN LANGUAGE FONTS

MacCyrillic 39.

SuperFrench/German/Spanish 39.

MacArabic 59.

MacKana/Basic Kanji 59.

MacSemitic/Coptic/Devanagari 59.

MacKorean 59.

MacGreek 59.

MacHebrew 59.

MacHieroglyphics 59.

LaserGreek 79.

MacGreek/Hebrew/Phonetics 89.

Living Videotext

Think Tank 512k (outline processor) 99.

Magnum

McPic - Volume 1 28.

McPic - Volume 2 28.

The Slide Show Magician 34.

Manhattan Graphics

Ready Set Go (requires 512k) 99.

Microsoft

Flight Simulator 32.

Learning Multiplan and Chart \$39.

Chart 1.0 72.

Logo 1.0 75.

Basic 2.1 89.

Multiplan 1.1 105.

File 1.02 111.

Word 1.05 111.

Fortran 2.1 169.

Excel 1.0 225.

Miles Computing

Mac the Ripper - Volume III 27.

Mindscape

The Luscher Profile 24.

The Perfect Score: SAT 47.

Monogram

Forecast (tax planning) 41.

Dollars & Sense 81.

Nevins Microsystems

Turbocharger (requires 512k) 39.

New Canaan MicroCode

Mac Disk Catalog II (requires 512k) 32.

Odesta

Helix (requires 512k, external drive) 125.

Double Helix special

Palantir

MacType (supports Dvorak keyboard) 26.

MathFlash (math flash card drills) 26.

WordPlay (crossword puzzles) 26.

Inventory Control 69.

inTouch (communication to emulation) 79.

PBI Software

Icon Switcher 14.

Icon Fun & Games Library 14.

Icon Business Library 14.

HFS Locator 27.

Hard Disk Backup 29.

Peachtree

Back to Basics General Ledger 89.

Back to Basics Accounts Payable 89.

Back to Basics Accounts Receivable 89.

Back to Basics ThreePack 239.

Polarware

Graphics Magician 49.

ProVUE Development

OverVUE 2.0 (power-packed database) 149.

QED Information Sciences

Typing Made Easy 36.

Rubicon Publishing

Silver Palate Collection (NY's finest!) 29.

Dinner At Eight (recipes to wines) 32.

Dinner At Eight-Silver Palate Bundle 54.

Satori

BulkMailer (mailing lists) 75.

Sierra On-Line

MacOneWrite (cash disbursements) 137.

MacOneWrite (accounts receivable) 137.

MacOneWrite (general ledger) 137.

Silicon Beach Software

Accessory Pak 1 21.

Silicon Press (printer utility, 512k) 42.

Simon & Schuster

The Mac Art Department 24.

Paper Airplane Construction Kit 24.

Typing Tutor III 35.

SMB Development

MacMate (requires 512k) 35.

SoftStyle

Colormate Art (color graphic images) 25.

Colormate (color printing utility) 49.

Epstart 27.

We'd like to think you're even stranger.

A walk on the weird side.

Back in prehistoric Mac times (early 1985) we held a contest to unearth strange-but-true Mac stories. Winners received \$500 worth of Mac add-ons and software, and became stars of a series of MacConnection advertisements.

The response was overwhelming. Our customers were using their Macs to run detective agencies, back up heavy metal bands, even to help explore the frozen tundra for remains of old expeditions.

The odd get even.

Well, it's time to find out what new heights of eccentricity you've achieved. Has your Mac saved your life during a terrorist attack? Have you used a Mac to predict how many times per episode of Miami Vice Don Johnson will say the word "pal"? Have you used a Mac to create a mutant life form that will save the planet from radioactive fallout?



We're looking for adventure, romance, mystery, the occult. Mac applications that are so fascinating, far-fetched, or far-out that your fellow Mac fanatics will froth at the follicles, and feel all fuzzy around their foreheads. Oh yes.

We're talking serious strangeness here.

Send along any relevant snapshots, drawings, and/or newspaper clippings with your entry. Don't forget to enclose your name, address and phone number. And keep a copy for yourself—everything you send us becomes the property of MacConnection.

What do I win?

\$500 worth of free add-ons and software and instant fame! All entries must be received by December 31, 1986.

The totally subjective decision of our judges is final. Good luck! And remember, whether you win or not, we at MacConnection are always here to fulfill your wildest Mac dreams.

MacConnectionTM

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HARDWARE

Assimilation	
Mac•Epson•Connection	\$40.
Mac•Port•Adaptor	85.
Numeric•Turbo	145.
Compucable	
Mac to Hayes Smartmodem cable	16.
Mac Plus to Hayes Smartmodem cable	19.
Mac Plus to Imagewriter II cable	21.
Cuesta Systems	
Datasaver AC Power Backup (90 watts)	call
Curtis Manufacturing	
Diamond (6 outlets)	29.
Emerald (6 outlets; 6 ft cord)	36.
Sapphire (3 outlets; EMI/RFI filtered)	47.
Ruby (6 outlets; EMI/RFI filtered; 6 ft cord)	55.
Epson	
AP-80 printer (Imagewriter compatible)	call
FX-85 printer	call
FX-286 printer	call
LQ-1000 printer (letter quality)	call
Ergotron	
MacTilt (includes external drive bracket)	75.
MacBuffer 256k	219.
MacBuffer 512k	319.
MacBuffer 1 Megabyte	489.
Hayes	
Smartcom II (communications software)	89.
Smartmodem 1200	call
Smartmodem 2400	call
Transet 1000	call
IOMEGA	
Bernoulli Box (dual 10-MB w/SCSI)	2195.
Bernoulli Box (dual 10-MB storage)	2475.
10 Meg cartridge	48.
Kensington	
External Disk Drive Cover	8.
Mouseway	8.
Mouse Pocket	8.
Mac (Plus) Dust Cover	9.
Imagewriter (II) Dust Cover	9.
Mouse Cleaning Kit w/Mouse Pocket	16.
Universal Printer Stand	17.
Disk Case (holds 36 Mac disks)	19.
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Tilt/Swivel	22.
Polarizing Filter	31.
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A-B Box (specify Mac or Mac Plus)	62.
Control Center	62.
System Saver Mac	65.
Koala Technologies	
KAT Graphics Tablet	139.
MacVision (digitizer)	175.
Kraft	
QuickStick (Mac joystick)	45.
Micah	
MicahDrive AT (20 Meg internal drive)	1195.
Mirror Technologies	
FastPort ("SCSI" for your 512k Mac)	139.
MagNet 20x External Drive w/cable	939.
Mouse Systems	
A+ Optical Mouse	59.
N² Products	
Mac-Modem cable (6 feet)	19.
Mac-Transet 1000 cable (9 feet)	19.
Mac (Plus)-Printer cable (6 feet)	19.
Mac Plus Adapter cable	19.
Mac Plus-SCSI cable	24.

Paradise Systems	
Mac 10 (10 megabyte hard disk)	call
Mac 20 (20 megabyte hard disk)	call
PBI Software	
Switch Box	36.
Personal Computer Peripherals	
MacBottom 20 Hard Disk Drive	949.
PKI	
McD 800k External Drive	249.
Summagraphics	
MacTablet 6" x 9"	269.
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MacGard (surge protection)	55.
Thunderware	
Thunderscan (high-resolution digitizer)	175.
Mac Plus Power Accessory	29.
Western Automation	
DASCH RAMdisk 500k	299.
DASCH RAMdisk 1000k	359.
DASCH RAMdisk 2000k	435.

DISKS

Single-sided Diskettes

BASF 3½" Disks (box of 5)	10.
Memorex 3½" Disks (box of 10)	17.
Sony 3½" Disks (box of 10)	17.
Verbatim 3½" Disks (box of 10)	17.
MAXELL 3½" Disks (box of 10)	18.
Fuji 3½" Disks (box of 10)	18.
3M 3½" Disks (box of 10)	21.

Double-sided Diskettes

Fuji 3½" Double-sided Disks (10)	26.
Sony 3½" Double-sided Disks (10)	26.
Verbatim 3½" Double-sided Disks (10)	26.
MAXELL 3½" Double-sided Disks (10)	28.
3M 3½" Double-sided Disks (10)	29.

INFORMATION SERVICES

Compuserve	
Compuserve Information Service	27.
Dow Jones	
Dow Jones News/Retrieval Membership Kit	19.
Source Telecomputing	
The Source (subscription & manual)	30.

ACCESSORIES

Automation Facilities	
Floppiclone Drive Care Kit	15.
MacPak Complete Care System	29.
Clean Image Ribbon Co.	
Clean Image Ribbon Kit	12.
Computer Coverup	
External Disk Drive Cover	4.
Imagewriter (II) Cover	8.
Mac (Plus) & Keyboard (two covers)	10.
Diversions	
Underware Ribbon	9.
Colorpens	10.
Jumbo Colorpens	13.
ColorPack (includes Colorpens)	19.
Environmental Software Company	
The Clutch (holds 8 disks)	9.
MACATTIRE (Rip-stop nylon covers)	
External Drive Cover (400k or 800k)	7.
Numeric Keypad Cover	7.

Numeric Turbo Cover	\$8.
Imagewriter (II) Cover	11.
Wide Imagewriter Cover	13.
Mac (Plus) & Keyboard Cover	15.
Laserwriter Cover	17.
Mac (Plus) & HD20 & Keyboard Cover	18.
I/O Design	
Imageware (Imagewriter case)	39.
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Imageware wide	49.
Macinware Plus (Mac Plus carrying case)	59.
Innovative Concepts	
Flip & File Micro (holds 25 disks)	9.
Flip & File (holds 40 disks)	18.
Innovative Technologies	
The Pocket Pak (holds 6 disks)	9.
The Easel (holds 20 disks)	12.
The Disk Directory (holds 32 disks)	18.
Kalmar Designs	
Teakwood Roll-top Case (holds 45 disks)	14.
Teakwood Roll-top Case (holds 90 disks)	21.
Teakwood Printer Stand 24"	29.
Magnum	
Mouse Mover (let your mouse ride!)	14.
Moustrak	
Moustrak Pad (standard 7" x 9")	8.
Moustrak Pad (large 9" x 11")	9.
Imagewriter Pad	12.
Ribbons Unlimited	
Imagewriter Color Ribbons	5.
Imagewriter Ribbons Six Pack	25.
Imagewriter Rainbow Six Pack	25.
Smith & Bellows	
Mahogany Disk Case (holds 90 disks)	28.

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Mac products and

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Laserstart	59.
Decision Map	75.
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Art a la Mac Vol. 1-People and Places	23.
Art a la Mac Vol. 2-Variety Pack	23.
Easy as ABC	29.
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State of the Art	
Electric Checkbook	39.
Symmetry	
Acta (outline/writing desk accessory)	39.
PictureBase (clip art manager, 512k)	45.
T/Maker	
Click Art Personal Graphics	29.
Click Art Publications	29.
Click Art Letters	29.
Click Art Effects	29.
ClickOn Worksheet	46.
Target Software	
MacLightning (reqs. 512k, external drive)	53.
Telos Software	
Business Filevision (512k, external drive)	199.
Think Educational	
MacEdge II (math & reading)	28.
TML Systems	
TML Source Code Library	59.
TML Pascal	69.
TrueBasic	
True BASIC	89.
Algebra Utility	36.
Calculus Utility	36.
3D Graphics Utility	36.
Videx	
MacCalendar (incl. reminder system)	52.

GAMES

Activision	
Championship Star League Baseball	22.
Hacker (you're on your own!)	27.
Mind Shadow (Who am I?)	27.
Borrowed Time (murder mystery)	27.
Alter Ego (become someone else)	36.
Ann Arbor Softworks	
Grid Wars (3D graphic arcade)	22.
Artworx	
Bridge 4.0	21.
Bantam Electronics	
Sherlock Holmes: Another Bow	27.
Blue Chip	
Millionaire (stock market)	35.
Tycoon (commodities)	35.
Baron (real estate)	35.
Squire (personal finance, reqs. 512k)	35.

MacConnection Special of the Month

through September 30, 1986

ODESTA

Double Helix

Powerful relational database for your 512k Mac or Mac Plus. Supports HFS and includes the following features:

- Password protection
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External drive required. \$249.

Broderbund Software

- Lode Runner (you'll never sleep!) 24.
- Ancient Art of War (military strategy) 27.

CBS

- Murder by the Dozen (twelve mysteries) 25.

Electronic Arts

- Golden Oldies Vol. 1 (software classics) 24.
- Skylox (3D graphics) 27.
- One on One/Dr J vs Larry Bird (reqs. 512k) 27.
- Pinball Construction Set 27.

Epyx

- Rogue (the mainframe classic!) 24.
- Temple of Aposhai Trilogy (4 levels) 24.
- Winter Games (Olympic events) 24.

Hayden Software

- Perplexx (scrabble-like game) 24.
- Sargon III (9 levels of chess) 29.

Infinity Software

- Grand Slam (tennis, reqs. 512k) 28.

Infocom

- Seastalker
- Junior level of difficulty each 23.

- | | | |
|---|--------------------|------------|
| Ballyhoo | Wishbringer | Planetfall |
| Enchanter | Zork I | Cutthroat |
| The Witness | Hitchhiker's Guide | |
| Standard level of difficulty each 23. | | |

- | | | |
|---|----------|---------|
| Zork II | Sorcerer | Infidel |
| Zork III | Suspect | |
| A Mind Forever Voyaging | | |
| Advanced level of difficulty each 26. | | |

- | | | |
|---|--------------|-----------|
| Deadline | Spellbreaker | Suspended |
| Starcross | | |
| Expert level of difficulty each 29. | | |
| Invisicues (hint booklets) | | each 6. |

Miles Computing

- Fusillade (arcade-maze) \$21.
- MacAttack (3D tank simulation) 27.
- Harrier Strike Mission (3D flight simulation) 27.
- MacWars (3D space simulation) 27.

Mindscape

- Rambo: First Blood Part II 24.
- James Bond 007: "A View to a Kill" 24.
- Stephen King's "The Mist" 24.
- Racter (converse with your Mac!) 27.
- Balance of Power (world politics) 30.
- Bratavicus (requires 512k) 30.
- Uninvited (mystery adventure) 30.
- Deja Vu (murder mystery) 33.

Origin Systems

- Exodus: Ultima III (fantasy adventure) 38.

PBI Software

- Strategic Conquest (war strategy) 29.
- Fokker TriPlane Flight Simulator 35.

Polarware

- Transylvania (rescue Princess Sabrina) 15.
- Crimson Crown (sequel to above) 15.
- Sword of Kadesh (fantasy adventure) 15.
- The Quest (beware of the dragon!) 15.
- Xyphus (role playing adventure) 15.

Practical Computer Applications

- MacGolf (requires 512k) 36.

Psion

- Psion Chess (3D and multi-lingual) 31.

Sierra On-Line

- Frogger (classic video game) 24.
- Championship Boxing (knock 'em out!) 24.
- Ultima II (role playing adventure) 35.

Silicon Beach Software

- Airborne! (digitized-sound war game) 20.
- Enchanted Scepters (text & graphics) 21.

Simon & Schuster

- Star Trek—The Kobayashi Adventure 24.

Sir-Tech

- Mac Wizardry (fantasy) 36.

Spectrum Holobyte

- GATO (submarine simulation) 26.
- Orbiter (requires 512k) 27.
- Tellstar North Level I (reqs. 512k) 27.

Unicorn

- Futura (sci-fi adventure) 24.
- Animal Kingdom (ages 6-12) 27.
- Decimal Dungeon (math, ages 9 and up) 27.
- Fraction Action (arcade style math game) 27.
- Mac Robots (pre-school program) 27.
- Read-A-Rama (reading, ages 5-8) 32.

Videx

- FunPak (Solitaire and more) 25.
- MacCheckers/Reversi 25.
- MacGammon/Cribbage 25.
- MacVegas (7 casino games) 25.

1-800/Mac&Lisa

620C

MacConnection™

MacConnection, 14 Mill Street, Marlow, NH 03456 800/622-5472 603/446-7711



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*Defective software replaced immediately. Defective hardware replaced or repaired at our discretion. Some items have warranties up to five years.

Circle 4 on reader service card

The Accounting

Steve Mann

Here it is: the most comprehensive comparison of Macintosh accounting software ever prepared. The capabilities, the characteristics, the problems, the prices—over 150 evaluation criteria for 25 programs. If you're trying to make sense of the crowded Mac accounting market, let this survey be your guide.

Considering accounting's relative simplicity, the profusion of accounting software is overwhelming. The accompanying table, which pulls together information on over two dozen Mac accounting packages, provides an easy way to compare programs and sort out your options.

Using the Table

To select an accounting package, you have to know how your business works—what types of accounting transactions regularly occur, how the business is structured, what types of reporting requirements you have, and so on. First, determine what type of accounting you use—cash, accrual, or fund accounting. Most small businesses use either cash or accrual accounting or a combination of the two.

Next, to determine which modules you need, ask yourself what functions drive your business. For instance, almost all businesses need a general ledger, but only certain kinds of companies, like manufacturers and distributors, need an inventory module. Keep in mind that you can track almost any type of financial transaction with a general ledger. If you're not sure about a particular module, you probably don't need it. Those offered with each package are listed at the top of the Overall Information section.

Finally, for each module you need, list the features you think you must have and those that would be useful but not essential. A variety of factors will influence your choice of features. Here are a few of the most important considerations:

Organization. Most small businesses have simple organizational structures. You may, however, want to track profitability for different departments or profit centers. The Overall Information and General Ledger sections list a number of organizational considerations you should address.

If you have separate departments for accounting functions like accounts payable and accounts receivable, you probably need a multiuser package or one that offers separate modules. A single-user product with separate modules can often be used by two or more people with individual Macintoshes. The different sets of data can then be merged when necessary.

Transaction volumes. Pay careful attention to table entries indicating maximum volumes and transaction sizes. You should have a rough idea of how many account numbers you currently need, how many transactions you generate, and how many customers, vendors, and employees you have. Make sure you select a package that can handle those volumes for each module, and be sure to consider the growth you expect over the next few years.

Dollar limits. Most accounting products limit the size of dollar entries. Make sure that each module you buy can handle your largest single number and your largest year-to-date cumulative amount.

A word of caution: for some programs, the maximum number of digits per dollar entry is also the maximum number the program can handle, period. Also, a limit of 11 digits may not mean a program can handle entries as large as 999,999,999.99. Some programs may allow a maximum entry of only 222,222,222.22, for example. If you have any doubt, be sure to ask the vendor.

Transaction types. Different accounting modules enable you to enter specific types of transactions. For instance, the basic purpose of an accounts receivable module is to bill customers and track the receipt of payments.

Within each type of module, special transaction types may or may not be available. For instance, the Accounts Receivable section of the table includes information on sales commission and sales tax calculations, finance charges, partial payments, and so on. Browse through each section looking for any special transaction types you may need.

Reports. While the table provides information on certain types of printed output, such as invoices, mailing labels, W2 forms, and checks, listing all the reports and formatting options of each program would have

Software Buyer's Guide

required a whole table in itself. Contact vendors for specific information about the report types and format options you require.

In addition, check the report formatting and custom reports information in each section of the table. You may be able to create your own reports or modify the standard reports to meet your needs. Also check the data export entry in the Overall Information section, as you may be able to export data from a module into a spreadsheet or database program to create special reports.

After examining the tables for the best possible fit between your requirements and the features of each program, you should be able to isolate those programs that are most likely to fulfill your accounting needs. Your next step is to contact the vendors or your dealer and ask for more detailed information. Also, because

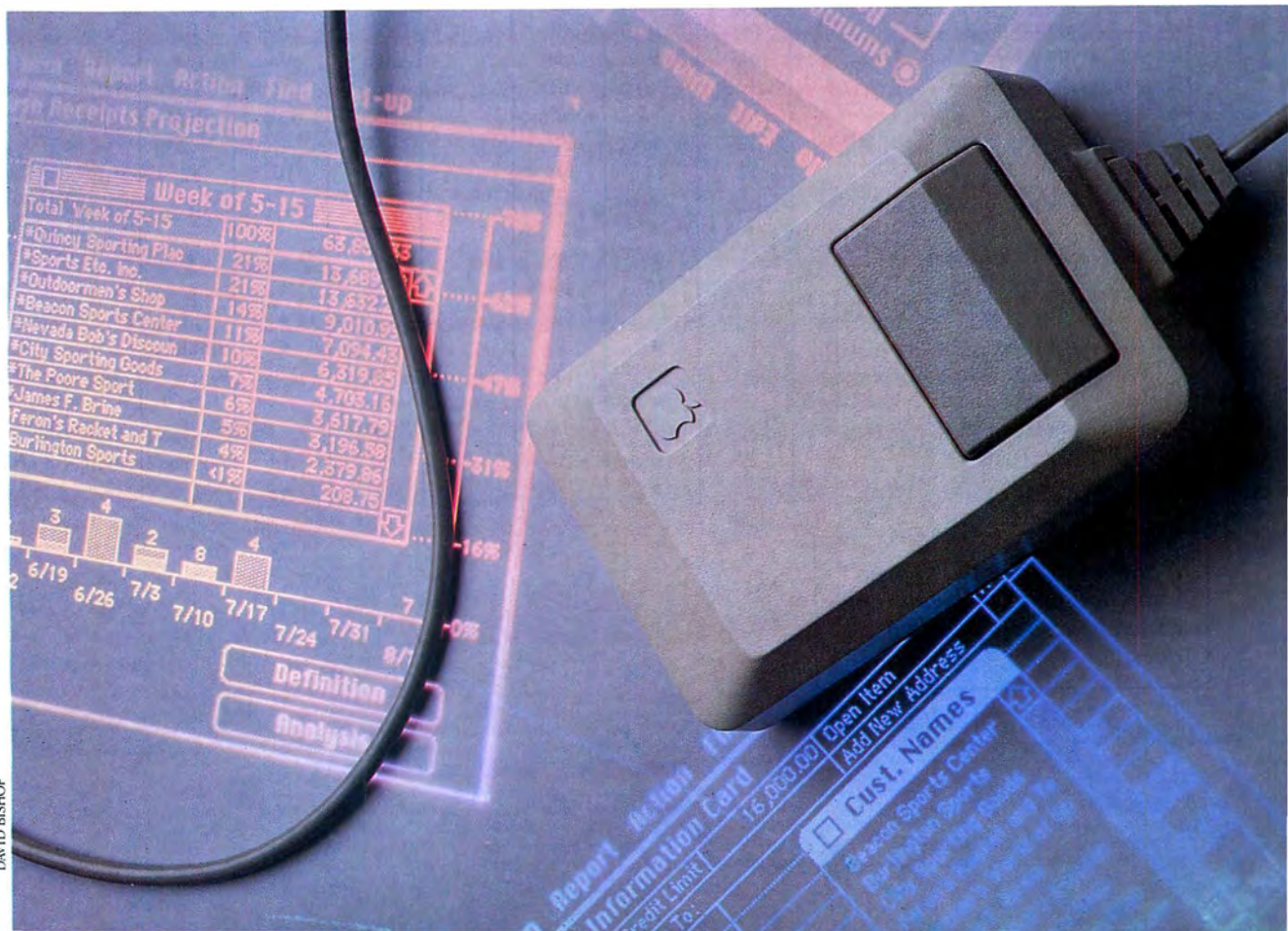
every program has subjective qualities that can be evaluated only by hands-on experience, ask for a demonstration disk, if one is available, or a dealer demonstration.

Caveats

Every attempt has been made to ensure the accuracy of all the information in the table. Unfortunately, because of the magnitude of the data collected, and because upgrades may have come out after this article went to press, the table may contain some inaccuracies. Accordingly, we advise you to verify a program's capabilities before making a purchase.

In addition, because of the table format's limitations, certain entries may not tell the whole story. For

(continues)



	Accountant Inc.	AMS General Ledger/ Checkmark Payroll	Back to Basics	dbPay	Dollars and Sense	Gallery Finance	General Accounting	General Ledger for the Macintosh	Great Plains Hardisk Accounting Series	Insight	Maccountant
Overall Information											
Modules ¹	GL/AR/ AP/IN	GL/PR	GL/AR/ AP	PR	GL/CD/ CR	GL/AR/ AP/CD	GL/AR/ AP/PR	GL	GL/AR/ AP/PR/IN	GL/AR	GL/AR/ AP
Version	1	2.02/1.0	1.02	2	2	2.0	1		3.03	1	2
Multiple programs		•	•								
Cash/accrual/fund	c/a	c/a	c/a	c	c	c/a	c/a	c/a	a	a	c/a
One-write/double-entry	double	double	double	n/a	double	one	double	double	double	double	double
Passwords	•	•				•	•	•			
Copy protected											
Help screens		•			•	some					
Tutorials in manual	•	•	•		•	•	•				
Multiuser									•		
Max # of companies	disk	disk	1	1	disk	disk	disk	1	1	disk	1
Sample data included	•	•			•	some	•	•	•	•	some
Data export	•	•			•						
Macintosh interface	•	•			•	•	•	•			
Required RAM	512K	512K	128K	128K	128K	512K	512K	128K	512K	512K	128K
Hard disk required									•		
Toll-free calls			• ³				•		• ³		
Price	\$300	\$195/mod	\$175/mod	\$395	\$149	\$229	\$425	\$245	\$495/mod	\$95/mod	\$150
General Ledger											
				n/a							
Max # of accounts	99,999	1000	254		120		8000	disk	2000	disk	1000
Digits per account #	5	10	4		3	9	4	5	10	11	4
Max # of departments	n/a	9	10		3	n/a	10	n/a	n/a		
Max # of profit centers	n/a	9	n/a		n/a	n/a	n/a	n/a	999	999	n/a
Max # of fiscal periods	12	12	12		12	12	12	varies	12	varies	12
Max # of transactions	disk	disk	4000/mo		2000	disk	disk	disk	disk	disk	disk
Max lines per transaction	12	no max	21		100	1	12	1	10	no max	no max
Max # of digits per \$ entry ⁴	12	11	9		6	10	12	11	10	10	10
Automatic recurring entries		•	•		•		•		•	•	
Budgeting	•	•			•				•		
Predefined account # ranges		•	•				•				
# of predefined reports	7+	10			7	3	8	8	12	7+	8
Report formatting						•				•	
Financial statement formatting		•			•	•	limited	•	•	•	
Custom reports											
Automatic reversals											
Produces graphs											
Max # of bank accounts	2	no max	3		12	1	no max	no max	no max	no max	5
Flexible posting		•									

A bullet indicates that a program does have the feature in question; a space means it doesn't.

MacOneWrite	MacStore/ AP with GL	Open for Business I	Open for Business II	Palantir Financial Series	Personal Accountant	Plains & Simple	Rags to Riches	ShopKeeper	Strictly Business	Timecard	Turbo Macaccountant	Versa Series	WOS Fund Accounting System
AR/CD	GL/AR/ AP/IN	GL/AR/ CD	GL/AR/ AP/IN	GL/AR/ IN	GL/CD/ CR	GL/AR/ AP	GL/AR/ AP/IN	AR/IN	GL	PR/CD	GL/AR/ AP/PR	GL/AR/ AP/PR/IN	GL/PR/ FA
2	1/1.03	1	1	3.1	2.3	1	2.6/1.0	1.33	1.85	1.82	1	2.02	1.0
•	•	•	•	•	•	•	•	•	•	•	•	•	•
c/a one	c/a double	c double	a double	c double	c double	c/a one	c/a double	a n/a	c/a double	c n/a	c/a double	c/a double	f double
•	•	•	•	•	•	•	•	•	•	•	•	•	•
•	•	•	•	•	•	•	some •	•	•	•	•	•	•
1	1	disk	disk	1	disk	disk	disk	disk	disk	disk	disk	1	1
•	•	•	•	some •	•	•	•	•	•	•	some •	•	•
•	partial	•	•	•	•	•	•	•	•	•	•	partial	•
512K	512K	512K	512K	128K	128K	512K	512K	512K	512K	512K	512K	512K ²	512K
varies	•	•	•	•	•	•	•	•	•	•	•	•	•
\$250 \$130/mod	\$450/AR& IN \$500/ AP&GL	\$495	\$995	\$145/mod	\$100	\$695	\$200/mod	\$80	\$395	\$200	\$495	\$99/mod \$150 GL	\$4995
n/a	•	•	•	MBASIC	•	•	•	n/a	•	n/a	•	MBASIC	•
•	disk	disk	disk	disk	disk	500	5000	•	disk	•	8000	disk	disk
•	10	9	9	3	n/a	3-6	n/a	•	5	•	4	6	21
•	n/a	99	99	n/a	n/a	n/a	99	•	99	•	99	100	disk
•	n/a	n/a	n/a	n/a	n/a	n/a	n/a	•	99	•	n/a	n/a	disk
•	12	12	12	12	1	varies	12	•	12	•	12	varies	12
•	disk	disk	disk	disk	disk	3000/mo	10,000	•	disk	•	disk	disk	disk
•	1	98	98	1	1	1	no max	•	n/a	•	no max	no max	no max
•	11	10	10	11	10 ⁵	10	16	•	12	•	10	11	13
•	•	•	•	•	•	•	•	•	•	•	•	•	•
•	•	•	•	•	•	•	•	•	•	•	•	•	•
•	10	10	15	10	5	8	10	•	15	•	9	9	2
•	•	limited	limited	•	•	limited	limited	•	•	•	•	•	•
•	•	•	•	•	•	•	•	•	•	•	•	•	•
•	5	1 active	1 active	no max	no max	no max	no max	•	no max	•	5	1	no max
•	•	•	•	•	•	•	•	•	•	•	•	•	•

¹ GL= general ledger, AR= accounts receivable, AP= accounts payable, IN= invoice, PR= payroll, CD= cash disbursements, CR= cash receipts, FA= fund accounting.

² Hard disk not supported.

³ For paid support only.

⁴ Includes cents.

⁵ Maximum dollar amount = \$20,000,000.00.

	Accountant Inc.	AMS General Ldg r/ Checkmark Payroll	Back to Basics	dbbPay	Dollars and Sense	Gallery Finance	General Accounting	General Ledger for the Macintosh	Great Plains Hardisk Accounting Series	Insight	Maccountant
Accounts Receivable		n/a		n/a				n/a			
Max # of customers	99,999		400		n/a	disk	8000		3000	disk	1000
Digits per customer #	5		6		n/a	4	4		7	10	4
Max # of transactions	disk		3500/mo		2000	disk	disk		disk	disk	disk
Max # of lines per transaction	12		10		100	1	16		16	no max	no max
Max # of digits per \$ entry ¹	8		9		6	10 ²	12		10	10	10
# of aging periods	4		4		n/a	4	2		4	3	4
Separate prod. svc. table	•					•					
Tracks salespeople											
Calculates sales tax	•		•								
Calculates commissions											
Handles payment terms	3 types		•								
Calculates discounts	•					•					
Supports sales territories										•	
Open item/balance forward	both		bal		open	both	bal		both	both	n/a
Calculates finance charges	•		•								
Handles invoice adjustments	•		•		•	•	•				
Handles partial payments	•		•		•	•	•				
Automatic invoice numbering			•				•		n/a	•	n/a
Separate bill-to/ship-to	•					•					
# of predefined reports	10+		9		2	2	7		24	34+	2
Report formatting						•					
Prints invoices/statements	both		st		inv		inv		st	both	
Produces custom reports					•						
Prints mailing labels	•		•						•		
Credit limit processing	•		•								
Handles one-time customers					•		•				•
Produces graphs					•					•	
Accounts Payable		n/a		n/a				n/a		n/a	
Max # of vendors	99,999		300		disk	disk	8000		3000		1000
Digits per vendor #	5		6		n/a	3	4		7		4
Max # of transactions	disk		2000/mo		2500	disk	disk		disk		disk
Max # of lines per transaction	12		15		100	1	16		16		no max
Max # of digits per \$ entry ¹	8		9		6	10 ²	12		10		10
Automatic recurring payments					•						
Voucher adjustments	•		•		•	•	•				
Calculates discounts	•		•						•		
Manual checks	•		•		•	•	•				
Selective voucher payment	•		•		•	•					
Partial voucher payment	•		•		•	•					
User-assigned check numbers	•		•		•		•				
# of predefined reports	10+		12		2	2	7		21		3
Report formatting											
Prints checks	•		•		•		•				
Produces custom reports					•						
Handles payment terms	•		•								
Credit limit processing	•										
Handles one-time vendors			•		•		•				•
Produces graphs					•						
Prints mailing labels	•		•						•		

MacOneWrite	MacStore/ AP with GL	Open for Business I	Open for Business II	Palantir Financial Series	Personal Accountant	Plains & Simple	Rags to Riches	ShopKeeper	Strictly Business	Timecard	Turbo Maccoutant	Versa Series	WOS Fund Accounting System
					n/a				n/a	n/a			
disk	disk	disk	disk	disk		700	5000	disk			8000	1500	disk
6	25	n/a	n/a	4		n/a	n/a	10			4	5	21
disk	disk	disk	disk	disk		2500/mo	10,000	disk			disk	10,000	disk
9	no max	98	98	20		1	no max	10			disk	no max	no max
9	7	9	varies	11		10	16	8			10	9 ³	13
4	0	4	4	4		4	4	4			4	4	1
	•		•	•				•			•	•	•
	•		•	•				•			•	•	•
•	•	•	•	•		• ⁴		•			•	•	n/a
						• ⁴					•		n/a
						• ⁵					• ⁵		n/a
•	•	•	•	•		• ⁶		multiple			• ⁵	•	n/a
both	open	both	both	both		both	open	open			both	both	both
•	•	•	•	•		•	•	•			•	•	n/a
•	•	•	•	•		•	•	•			•	•	•
•	•	•	•	•		•	•	•			•	•	•
•	•	•	•	•		•	•	•			•	•	n/a
6	10+	10	8	5		8	9	8			5	8	n/a
st	inv	st	both	st		limited	limited	both			both	both	n/a
•	•	•	•	•		•	•	•			•	•	n/a
		•	•	•		•	•	•			•	•	n/a
		•	•	•		•	•	•			•	•	•
					n/a	n/a		n/a	n/a				
disk	disk	disk	disk	disk		300	5000			disk	8000	1000	disk
n/a	3	n/a	n/a	n/a		n/a	n/a			n/a	4	4	6
disk	disk	disk	disk	disk		2500/mo	10,000			disk	disk	10,000	disk
1	3	98	98			1	no max			1	disk	1	no max
9	11	10	10			10	16			8	10	10	13
	•	•	•	•		•	•			n/a	•	•	•
	•	•	•	•		•	•			•	•	•	•
•	•	•	•	•		•	•			•	•	•	•
•	•	•	•	•		•	•			n/a	•	•	•
•	•	•	•	•		•	•			n/a	•	•	•
•	•	•	•	•		•	•			•	•	•	•
6	8+	4	7			9	10			5	3	6	14
•	•	•	•	•		•	limited	•		•	•	•	•
	•					•				n/a	•	•	•
						•				n/a	•	•	•
						•				•	•	•	•

¹Includes cents.

²Maximum dollar amount = \$20,000,000.00.

³Maximum dollar amount = \$1,000,000.00.

⁴With difficulty.

⁵One per customer.

⁶One per invoice.

	Accountant Inc.	AMS General Ledger/ Checkmark Payroll	Back to Basics	dbbPay	Dollars and Sense	Gallery Finance	General Accounting	General Ledger for the Macintosh	Great Plains Hardisk Accounting Series	Insight	Maccountant
Payroll	n/a		n/a		n/a	n/a		n/a		n/a	n/a
Max # of employees		100		2500			8000		250		
Digits per employee #		n/a		n/a			4		7		
Max # of transactions		disk		disk			disk		disk		
Max transaction lines per employee		1		24			10		20		
Max # of deductions per employee		9		12			n/a		24		
Pay period types		4		many			n/a		8		
# of deduction types		3		15			n/a		999		
Max # of pay categories per employee		9		16			n/a		26		
Handles manual checks				only			•				
# of state tax tables		6		1			n/a		50		
User-updated tax tables		•		•			n/a		•		
Calculates fed withholding		•		•					•		
Handles vacation and sick pay		•							•		
Tracks labor distribution									•		
# of predefined reports		5		10			4		42		
Prints W-2 forms		•							•		
Prints state tax reports		•							•		
Report formatting											
Prints checks		•					•		•		
Custom reports											
Produces graphs											
Inventory		n/a	n/a	n/a	n/a	n/a	n/a	n/a		n/a	n/a
Max # of items	99,999								6000		
# of digits per item code	5								15		
Max # of transactions	disk								disk		
# of flow assumptions	0								34		
Costing methods	avg, last								std, last		
Max # of digits, quantity on hand	5								8		
Max # of digits, cost per item ¹	9								10		
Max # of digits, price per item ¹	9								11		
Max # of suppliers per item	no max								no max		
Max # of price types per item	1								5		
Max # of costs per item	1								2		
Handles inventory adjustments	•								•		
Handles subassemblies	•										
Reports reorder point	•								•		
Prints purchase orders	•										
Max # of decimals per cost	6								4		
Max # of decimals per price	6								4		
Calculates cost of goods sold	•								•		
Tracks freight	•								•		
Handles sales returns	•								•		
Multiple units of measure											
Supports standard costs									•		
Custom reports											
Supports inventory transfers	•								n/a		
# of predefined reports	1+								29		
Report formatting											
Interfaces to sales/purchases	both								both		

MacOneWrite	MacStore/ AP with GL	Open for Business I	Open for Business II	Palantir Financial Series	Personal Accountant	Plains & Simple	Rags to Riches	ShopKeeper	Strictly Business	Timecard	Turbo Macaccountant	Versa Series	W/Os Fund Accounting System
n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a				
										disk	8000	800	disk
										n/a	4	n/a	8
										disk	8000	800	disk
										0	1	3	no max
										7	10	7	15
										7	none	4	6
										4/person	10	8	6
										4	4	3	5
											•		•
										1	0	50	50
										•	•	•	•
										•			•
													•
										17	2	6	10
										•	•	•	•
										•			•
										•	•	•	•
n/a		n/a			n/a	n/a			n/a	n/a	n/a		n/a
	disk		disk	disk			3000	32,000				disk	
	25		10	4			n/a	5				15	
	disk		disk	disk			50/day	disk				disk	
	0		0	0			0	0				0	
	avg		avg	avg			actual	avg				last, avg	
	4		5	11			5 ²	5				10	
	7		9	11			10 ³	5				10	
	7		9	11			10 ³	5				10	
	no max		n/a	n/a			n/a	n/a				1	
	1		1	2			1	1				2	
	1		1	1			1	1				2	
	•		•	•			•	•				•	
	•		•	•			•	•				•	
	•												
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	n/a		•	•			•	n/a				n/a	
	10+		7	7			22	7+				7	
	both		sales					sales				both	

¹Includes cents.

²Maximum quantity-on-hand entry= 32,000.

³Maximum dollar entry per item = \$21,000,000.00.

⁴Weighted average; first in, first out; last in, last out.

Phone Support Information

Product	Company	Phone Support	Phone
Accountant, Inc.	Softsync Inc.	Unlimited free support	212/685-2080
AMS General Ledger/Checkmark Payroll	Checkmark Software, Inc.	Unlimited free support	303/484-3541
Back to Basics	Peachtree Software	45 days free, then \$20/call + \$1/min. after 20 min.	800/554-8900, 404/564-5700
dbsPay	Summit Systems Inc.	Unlimited free support	617/344-1251
Dollars and Sense	Monogram	Unlimited free support	213/215-0355
Gallery Finance	Haba Systems	30 days free, then \$50/quarter	818/994-1899
General Accounting	BPI Systems	60 days free, then \$20/call or \$75/5 calls or \$295/yr.	800/531-5236, 512/328-5400
General Ledger for the Macintosh	Lake Avenue Software	30 days free, then \$10/call or \$200/yr.	818/792-1844
Great Plains Hardisk Series	Great Plains Software	30 days free, then \$25/call or \$650/yr. + \$50 reg.	800/345-3276, 701/281-0550
Insight	Layered Inc.	30 days free, then \$60/hr. or \$125/10 hr. or \$300/yr.	617/423-9041
Maccountant	Digital Etc., Inc.	Unlimited free support	213/452-5636
MacOneWrite	Sierra On-Line, Inc.	90 days free, then \$30/yr./module or \$100/yr.	800/344-7448, 209/683-6858
MacStore/AP with GL	Vertical Business Software Inc.	Unlimited free support	800/992-9914, 914/632-8305
Open for Business I	Open Systems, Inc.	\$2.95/min.	800/328-2276, 612/829-0032
Open for Business II	Open Systems, Inc.	\$2.95/min.	800/328-2276, 612/829-0032
Palantir Financial Series	Palantir Software	90 days free support	800/368-3797, 713/955-8880
Personal Accountant	Softsync Inc.	Unlimited free support	212/685-2080
Plains & Simple	Great Plains Software	30 days free, then \$25/call or \$200/yr. + \$50 reg.	800/345-3276, 701/281-0550
Rags to Riches	Chang Labs	90 days free, then \$75/yr.	800/972-8800, 800/831-8080 in CA
ShopKeeper	Woodtec	Unlimited free support	316/441-0187
Strictly Business	Future Design Software	Unlimited free support	714/891-9796
Timecard	Varo Design Group, Inc.	Unlimited free support	617/643-6135
Turbo Maccountant	Digital Etc., Inc.	45 days free, then \$150/yr.	213/452-5636
Versa Series	H&E Computronics	60 days free, then \$75/yr. or \$50/6 mo.	800/431-2818, 914/425-1535
WOS Fund Accounting System	WOS Data Systems, Inc.	Unlimited free support	913/462-7581

instance, an entry might indicate that the number of general ledger accounts is limited only by disk space. However, this doesn't tell you just how many accounts you can enter before system performance degrades. Most vendors do not list that kind of information, so be sure to ask.

It's impossible to fully explain how to select accounting software in a thousand words or less. If you have any doubts, it might be a good idea to have your accountant or an independent consultant guide you through this process. Selecting a product and then converting from a manual to an automated system can require as little as a few hours to as much as several days. Once you have your system up and running, however, the time savings and flexibility you'll enjoy will more than make up for the effort. □

Acknowledgment

The author would like to thank several Peat Marwick colleagues without whom this article could not have been completed: Beth Gordon, Laura Doane, Doug Griscom, Debra Jackson, Doug Martin, and Jim Pierre.

■■■■■■■■■■ Steve Mann is a micro-computer and accounting systems specialist employed by the San Francisco office of Peat, Marwick, Mitchell, & Co., the largest corporate user of Macintoshes in the world.

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Enter the SCSI Drives

Lon Poole

Hot on the heels of Apple's Mac Plus announcement, nine manufacturers announced hard disk drives that attach to the Plus's SCSI port. With so many drives to choose from, deciding which one to buy is a challenge even for an experienced disk drive shopper.

For this review I tested nine SCSI drives: the AST 4000, the Bernoulli Box 10 + 10, the LoDown-20, the MDIdeas HD-20, the MagNet 20X, the MacFast20, the Sun Streak SCSI-21, the DataFrame, and the SlimLine 1010-2R. By the time I completed my tests, five other manufacturers had announced SCSI drives (see "SCSI Drive List" for a complete list of SCSI drive offerings).

Arriving at trouble-free performance is an evolutionary process with pioneer products. The first SCSI drives were no exception to the rule. Almost every drive had problems worthy of criticism. In addition, Apple's implementation of the SCSI interface caused some drive manufacturers trouble. However, during the two-month test period for this article, all the manufacturers corrected their drive malfunctions, worked around the SCSI port idiosyncrasies, issued improved utility software, and distributed better documentation. And at the end of the test period, Apple was about to release System 3.2. The new System reportedly includes fixes to the Mac's SCSI software, but I was unable to test the drives with it.

On Your Mark

Setting up a SCSI drive is a snap; plug the data cable into the drive and the Mac and plug the power cord into an outlet. All drives include both power cables and data cables, except the Bernoulli Box 10 + 10, the Sun Streak, the DataFrame, and the MagNet 20X, which lack data cables.

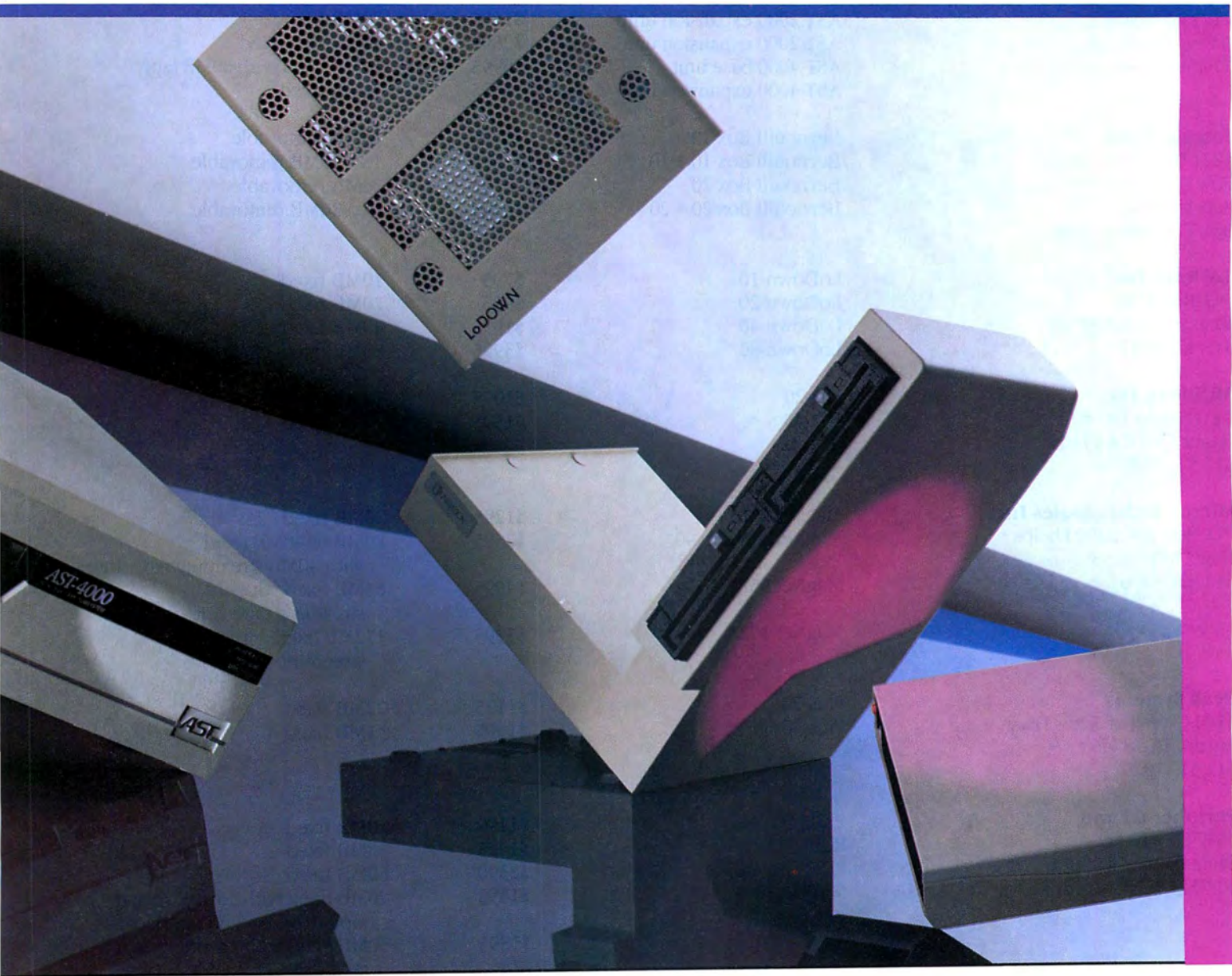
None of the drives tested require initialization, formatting, or other preparation.

None of the drives tested require initialization, formatting, or other preparation. Unless a floppy disk is inserted or an Apple Hard Disk 20 is attached to the floppy disk port, the Mac Plus uses the SCSI drive as the startup disk.

I ran each drive heavily for four or five days, with a sizable mixture of applications. The hard disks contained 13 megabytes of application programs and documents along with System 3.1.1, Finder 5.2, ImageWriter 2.2, and LaserWriter 3.0.

The Bernoulli 10 + 10, the LoDown-20, the MacFast20, and the DataFrame all require a special file from Apple, usually named SCSI Helper. If that file isn't present in the System Folder of the initial startup disk, the Mac sporadically locks up while starting applications and copying or duplicating files with the Finder.

(continues)



SCSI Drive List

Manufacturer	Model	Price	Capacity
AST Research, Inc. 2121 Alton Ave. Irvine, CA 92714 714/553-0340	AST 2000 base unit	\$2795	20MB fixed with 20MB tape
	AST 2000 expansion unit	\$1595	20MB fixed
	AST 2000 expansion unit	\$2695	Two 20MB fixed
	AST 4000 base unit	\$6995	74MB fixed with 60MB tape
	AST 4000 expansion unit	\$3595	74MB fixed
Iomega Corp. 1821 West 4000 South Roy, UT 84067 800/446-6342, 801/778-3000 in Utah	Bernoulli Box 10	\$1795	10MB removable
	Bernoulli Box 10 + 10	\$2695	Two 10MB removable
	Bernoulli Box 20	\$2395	20MB removable
	Bernoulli Box 20 + 20	\$3495	Two 20MB removable
LoDown Inc. P.O. Box 5146 Pleasanton, CA 94566 415/426-1747	LoDown-10	\$795	10MB fixed
	LoDown-20	\$995	20MB fixed
	LoDown-40	\$1995	40MB fixed
	LoDown-80	\$3995	80MB fixed
MDIdeas, Inc. 1111 Triton Dr. #205 Foster City, CA 94404 415/573-0580	HD-20	\$1095	20MB fixed
	HD-30	\$1595	30MB fixed
Mirror Technologies Inc. P.O. Box 304, 2209 Phelps Hugo, MN 55038 612/426-3276	MagNet 20X	\$1295	20MB fixed
	MagNet Tandem 40	\$2595	20MB or 40MB fixed with 40MB streaming tape drive
	MagNet 85X	\$4995	85MB fixed with 40MB streaming tape drive
	MagNet 172X	\$5995	172MB fixed with 40MB streaming tape drive
Peak Systems 1120 Capital of Texas Hwy. Austin, TX 78746 512/329-1020	Plus-20	\$1195	22MB fixed
	Plus-30	\$1595	31MB fixed
Peripheral Land 3677 Enochs St. Santa Clara, CA 95051 408/733-7600	PL20	\$1195	20MB fixed
	PL30	\$1495	30MB fixed
	PL80	\$2390	80MB fixed
	MacFast20	\$1595	20MB fixed with partitions and tape drive backup interface
	MacFast30	\$1895	30MB fixed with partitions and tape drive backup interface
	MacFast80	\$2890	80MB fixed with partitions and tape drive backup interface
	MacFast170	\$4995	170MB unformatted
	MacFast2020T	\$2495	20MB fixed, 20MB tape backup
	MacStor10	\$2195	10MB removable

Manufacturer	Model	Price	Capacity
Personal Computer Peripherals Corp. 6204 Benjamin Rd. Tampa, FL 33614 800/622-2888, 813/884-3092 in Florida	MacBottom SCSI	\$1195	21MB fixed
ProApp, Inc. 1475 S. Bascom Ave. Campbell, CA 95008 800/424-2425, 408/559-3552 in California	ProApp10 ProApp20	\$795 \$995	10MB fixed 20MB fixed
Rabbit Industries 206 W. 38th St. #224 Austin, TX 78705 512/473-2935	Magic20 Magic30 Magic40 Magic186	\$1050 \$1250 \$1450 \$4995	20MB fixed 30MB fixed 40MB fixed 186MB fixed, ultra high performance
Softworks Limited 2944 N. Broadway Chicago, IL 60657 312/975-4030	SD11A SD22A SD30A SD60A SD140X SD170X SD4000	\$995 \$1275 \$1595 \$2750 \$6400 \$7400 \$4895	11MB fixed 22MB fixed 30MB fixed 60MB fixed 140MB fixed 170MB fixed 60MB with 60MB tape backup
Sunol Systems, Inc. 1777 Quarry Ln. Pleasanton, CA 94566 415/484-3322	Sun Streak SCSI-21 Sun Streak SCSI-45 Sun Streak SCSI-70 Sun Streak SCSI-110 Sun Streak SCSI-160	\$2195 \$4595 \$5295 \$6995 \$8795	21MB fixed 45MB fixed 70MB fixed 110MB fixed 160MB fixed
SuperMac Technology, Inc. 1901 Old Middlefield Way Mountain View, CA 94040 415/964-8884	DataFrame	\$1299	20MB fixed
Univation 1231 California Circle Milpitas, CA 95035 408/263-1200	SlimLine 10R SlimLine 1010-2R SlimLine 20 SlimLine 30 SlimLine 40 SlimLine 2010R SlimLine 3010R SlimLine 4010R	\$2195 \$3495 \$1795 \$1995 \$2995 \$2995 \$3295 \$4495	10MB removable Two 10MB removable 20MB fixed 30MB fixed 40MB fixed 20MB fixed and 10MB removable 30MB fixed and 10MB removable 40MB fixed and 10MB removable

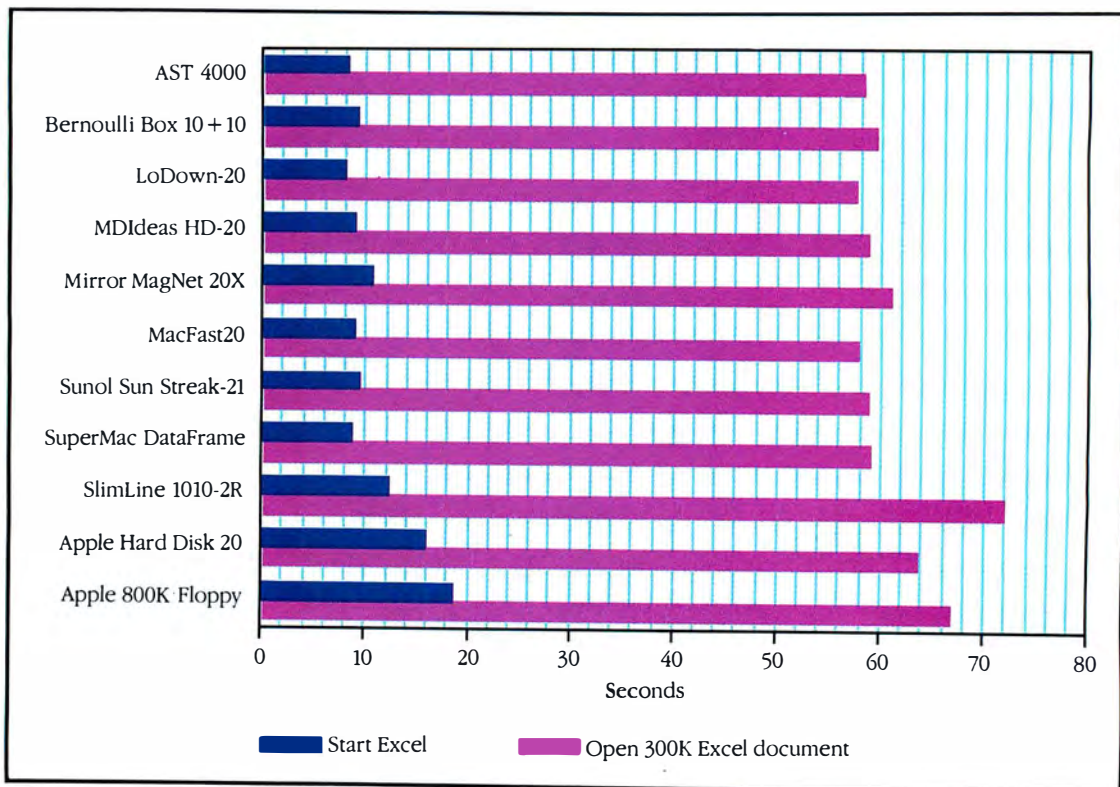
Gauging SCSI Performance

Hard disks that attach to the high-speed SCSI port on a Mac Plus all operate faster than drives connected to a serial port or a disk port. Theoretically, SCSI drives should operate even faster than they do, but the Mac Plus cannot accept and process information as fast as a hard disk can send it through the SCSI port. The disparity between theoretical and actual transfer rates occurs because the Mac Plus periodically interrupts the flow of information to arrange the incoming program or document file in its memory.

Curiously, actual performance varies tremendously depending on file and folder organization and on what kind of information is being transferred. For example, a typical SCSI drive takes about 9 seconds to start the 372K *Microsoft Excel* application. In contrast, the same drive takes nearly 60 seconds to open a 300K *Excel* document.

To measure performance, I timed the nine SCSI drives, Apple's Hard Disk 20, and the Mac Plus 800K internal floppy disk drive to see how long each took to start *Excel* from the Finder and to open a 300K

worksheet document from *Excel* (see "On the Test Track"). In each case, I made three timings and averaged them. All the hard disks had the same set of 1090 files organized in identical HFS folders. On most disks, they occupied just over 12 megabytes. The AST 4000, however, allocated disk space in larger chunks due to its high capacity and required about 13 megabytes for the same files. On the Bernoulli Box and SlimLine, both drives that utilize removable disk cartridges, the files were spread across two cartridges.



On the Test Track

The measured times for starting *Excel* or opening a 300K *Excel* worksheet were comparable for all of the drives I tested. In everyday use, a 1-second difference is inconsequential.

(System 3.2 reportedly circumvents the need for the SCSI Helper file.) The MagNet 20X requires a special version of the System file to work correctly.

During the test period, the disks all seemed to perform at about the same speed. To measure performance, I ran a series of timing tests, the results of which appear in "Gauging SCSI Performance." Many of

'What's that sound?' callers asked when the Bernoulli Box was idling in the background.

the differences between drives, however, are most apparent when you compare the drives feature by feature (see "SCSI Drives at a Glance"). The following synopsis covers each drive's performance during the test period.

AST 4000

The 74-megabyte AST 4000 is best suited for sharing among several Macs on an AppleTalk network with disk- or file-server software such as Infosphere's *Mac-Serve* or Centram's *TOPS*. It was the largest and the loudest drive I tested. The smaller, quieter AST 2000 stacks neatly under the Mac Plus and is more appropriate as a personal hard disk drive than the AST 4000. However, it was unavailable for testing at press time.

Using the versions of the System file, Finder, and AST 4000 Install File application that came with the drive, I occasionally had startup trouble that was easy to work around. After I installed System file 3.1.1, Finder 5.2, and AST's Install File 1.04, the drive worked faultlessly.

One unique feature of the AST 4000 is its built-in 60-megabyte tape drive. The included backup software dumps the entire 74 megabytes—whether it's all in use or not—onto two tapes in about half an hour, or it backs up individual files you select one by one. The software does not allow selection by folder, date, or file type. The AST 2000 also includes a built-in tape drive that reportedly backs up 20 megabytes in under 9 minutes and reads and writes individual files like a disk drive.

Bernoulli Box 10 + 10

"What's that sound?" callers always asked on the telephone when the Bernoulli Box was idling in the background. The drive ticks like a grandfather clock because the read/write head moves randomly to avoid wearing out one place on the disk.

With the Bernoulli Box you get the most flexible backup application program I have seen to date. For example, you can build a list of files to be backed up by name, date and time, kind, or a progressive combination of those criteria, and you can add or remove individual files from the list. You can have the program back up all files on the list or only those files that have changed since the last backup.

No problems turned up during the five days of heavy use. Because the Bernoulli Box was the easiest to daisy chain with all the other drives, I kept using it to copy a standard set of application and document folders to whatever drive I was about to test. Once, however, as I was about to copy files to another drive, the red light on the back of the Bernoulli Box went on, indicating an internal fuse had blown. Iomega product manager Greg Brashear explained that the internal fuse protects the SCSI bus's 5-volt line, which the Bernoulli Box augments. According to Brashear, Iomega is modifying the drive's design to correct the problem.

LoDown-20

The LoDown-20 performed well except for one problem: a bad spot developed on the disk. The disk error rendered an application unopenable and uncopyable. While I was able to discard the damaged application and recopy it from a floppy disk, the problem could have occurred in a more critical location that might have meant reformatting the entire disk.

March of the SCSI Soldiers

(Left to right) Bernoulli Box 10 + 10, DataFrame, and MDIdeas HD-20. The Bernoulli Box features two 10-megabyte removable cartridges. The quiet DataFrame sits next to the Mac, while the MDIdeas HD-20 fits nicely beneath the computer.



SCSI Drives at a Glance

	AST Research AST 4000	Iomega Bernoulli Box 10+10	LoDown LoDown-20	MDIdeas HD-20	Mirror Technologies MagNet 20X
Capacity of sample unit (formatted)¹	73,350 bytes	19,218 bytes	20,334 bytes	21,670 bytes	21,496 bytes
Noise level (subjective)²	loud	loud	quiet	medium	medium
Number of ports	1	2	2	1	1
Type of connector	Amphenol 50-pin	Amphenol 50-pin	DB-25	Amphenol 50-pin	Amphenol 50-pin
Data cable included	yes	no	yes	yes	no
Convenience AC outlet	yes	yes	yes	no	no
Dimensions (H × W × D in inches)	5.5 × 14.5 × 17.25	6.25 × 12.5 × 17	3.5 × 10.25 × 11.75	3.75 × 10 × 12	3 × 5.375 × 9.25 ⁴
Backup software	limited ⁶	elaborate	unavailable for test	adequate	unavailable for test
Standard warranty	180-day limited	90-day limited	90-day limited	90-day full	90-day limited
Price	\$6995	\$2695	\$995	\$1095	\$1295
Additional features	60MB tape drive; dual voltage (120 VAC 60Hz or 240 VAC 50Hz)	removable disks	includes more than 300 public domain programs		includes MacServe file server and print spooler



Last but Not Least

(Left to right) Peripheral Land MacFast20, AST-4000, MagNet 20X. Peripheral Land's drive includes an intelligent tape drive controller. AST's drive stores 74 megabytes and includes a 60-megabyte tape drive. The MagNet 20X comes with Info-sphere's MacServe disk server software.

The LoDown-20 was the quietest drive tested. However, the same factors that make it quiet—it has no fan and it sits beneath the Mac—appear to hinder the escape of hot air through the grillwork on top of the drive. According to LoDown spokesperson Kathy Anderson, heat-related failures are unknown in LoDown drives even when they run 24 hours a day. Despite this reassurance, I suspect that keeping the Mac and all other objects off the LoDown would enhance the drive's reliability and longevity.

In addition to the usual disk format and mount utilities, the LoDown-20 includes an interesting extra: 300 public domain applications, fonts, and desk accessories. A backup application is available from LoDown for \$40.

MDIdeas HD-20

The MDIdeas HD-20 worked without a hitch. The moderately quiet, fan-cooled HD-20 resides in a cabinet that gives you several placement options, including stacking the Mac atop it. The HD Backup program included with the drive gives you two options: back up the entire hard disk onto floppy disks or copy just the files that have changed since the last backup.

The drive I received came with very little documentation, just a one-page instruction sheet. MDIdeas now ships a more complete manual, but I did not see it prior to press time.

MagNet 20X

The MagNet 20X from Mirror Technologies has the smallest cabinet of any drive tested. It also has a small remote power supply designed to sit up to 4 feet away from the drive. The first MagNet 20X that I tested, which had no fan, failed after a few hours of use. Mirror Technologies shipped a replacement unit that included a fan. Joel Ronning, president of Mirror Technologies, explained that although their test showed that the temperatures measured inside the cabinet



Peripheral Land MacFast20	Sunol Systems Sun Streak SCSI-21	SuperMac Technology DataFrame	Univation SlimLine 1010-2R	
21,379 bytes	20,574 bytes	20,468 bytes	21,755 bytes	¹ Capacity may vary slightly among different units of the same model due to different number of defective sectors.
medium	loud	quiet	loud	² Noise varies markedly from one unit of the same drive to the next. If noise is a factor, try the individual unit before buying.
2 ³	1	2	1	³ Second port is for smart tape drive.
Amphenol	Amphenol	Amphenol	DB-25	⁴ Plus power supply cabinet, 2.625 × 4.125 × 6.5.
50-pin	50-pin	50-pin		⁵ Cabinet size of test unit was 3 × 6.875 × 15.25.
yes	no	no	yes	⁶ Backup software works only with the built-in tape drive.
no	no	no	yes	⁷ Backup software comes with companion tape drive (not tested).
3 × 9.5 × 9.5 ⁵	3.375 × 7.5 × 14.5	8 × 3 × 9.5	15.75 × 12 × 10.75	
none ⁷	none ⁷	unavailable for test	unavailable for test	
180-day full	6-month limited	1-year full	1-year limited	
\$1595	\$2195	\$1299	\$3495	
smart tape drive port; optional fixed-size MFS and HFS volume partitions			removable disks	

were well below the drive's published limits, a fan was added for insurance. Mirror claims that since adding the fan, it has had no reports of heat-related failures.

I experienced some additional heat-related problems with early versions of the software. Chuck Thiesfield, who wrote the Mirror software, explained that versions 1.61 and above make allowances for normal temperature changes as the drive warms up. In my tests the fan-equipped MagNet 20X with version 1.61 performed well.

The MagNet 20X comes with the *MacServe* disk and print server software created by Infosphere (see "Expanding Your Network Options," *Macworld*, June 1986). *MacServe* enables other Macs in an AppleTalk local area network to share the MagNet 20X. What's more, *MacServe* allocates part of the MagNet 20X for a print spooler so that you can continue working while printing documents.

MacFast20

Peripheral Land's MacFast20 can be set up as four 5-megabyte Mac File System (MFS) or Hierarchical File System (HFS) volumes or as a single 20-megabyte HFS volume. The MacFast20 also has a built-in provision for a smart external tape backup unit, Peripheral Land's MacFast20 Tape. Once a transfer between disk and

tape begins, the Mac is free to do anything that does not require the disk or tape. I did not test the tape unit or the backup application supplied with it, but Peripheral Land claims the tape drive backs up 20 megabytes in under 5 minutes.

During the test period, Peripheral Land made a minor change to the drive's controller electronics and sent out Apple's revised SCSI Helper software to solve some performance problems with the MacFast20. With these changes, the MacFast20 performed reliably. Plans were also well underway to change the cabinet so that the MacFast20 would match the Mac Plus's footprint.

Sun Streak SCSI-21

The Sun Streak SCSI-21 I tested was a preproduction model, but there was nothing premature about its performance. It performed ably during the test period.

The Sun Streak cabinet is too narrow to stack under the Mac. You have to put this drive alongside the Mac or in some more remote location. The prototype's noisy fan made me favor a remote location, but Virginia Wurts, Sunol Systems' sales manager, assured me that production units would have quieter fans.

Because the Sun Streak was a prototype, it came with no manual and no utility software. Wurts says that a brief manual and formatting and diagnostic software will accompany the drive. Backup software comes only with Sunol's tape backup unit, the Sun Safe-60.

DataFrame

The DataFrame was the first drive I received and one of the few drives I tested that was completely trouble-free during the entire test period. Although it came with just a single instruction sheet, four weeks later that was replaced by a well-written, comprehensive manual. The DataFrame's greatest deficiency was scant utility software. Recognizing this, SuperMac plans to ship free backup, file security, and background printing utilities to all DataFrame owners by the time you read this review. I did not see any of the new software in time to test it.

The DataFrame runs hotter than the fan-cooled drives. However, the DataFrame uses the same time-tested cooling mechanism as a double-hung window. Hot air inside the cabinet rises, escapes through vents near the top of the cabinet, and sucks cooler air in through vents near the bottom. To check its cooling capability, I left the DataFrame running for four weeks straight, and it worked fine during that time.

SlimLine 1010-2R

The SlimLine I tested was a preproduction unit with two removable 10-megabyte hard disk cartridges. The drive worked fine as long as I inserted both cartridges and let them come up to speed before switching on the Mac. However, the drive wouldn't recognize any cartridges I inserted after startup, including those

I ejected and later reinserted. According to Mike Higgins, Univation's director of marketing, the prototype contained a prerelease version of the drive's controller electronics. He assured me that production units would properly handle cartridge removal and insertion from the Finder. But you won't be able to swap cartridges quite as freely as you swap floppy disks.

The L-shaped Univation SlimLine drive cabinet wraps around a Mac Plus so that the two units look like one. The actual drives are stacked lengthwise in the

The DataFrame was one of the few completely trouble-free drives tested.

upright part of the SlimLine cabinet on the right side of the Mac. The Mac-and-SlimLine combination stands only 2¾ inches taller and 2¼ inches wider than the Mac alone. Space conservation has its price, however. You give up peace and quiet to a moderately loud fan in the base of the SlimLine cabinet. Also, the SlimLine partly blocks the vents on the right side of the Mac. In spite of this, Higgins reports that the slight temperature rise inside the Mac presents no problem.

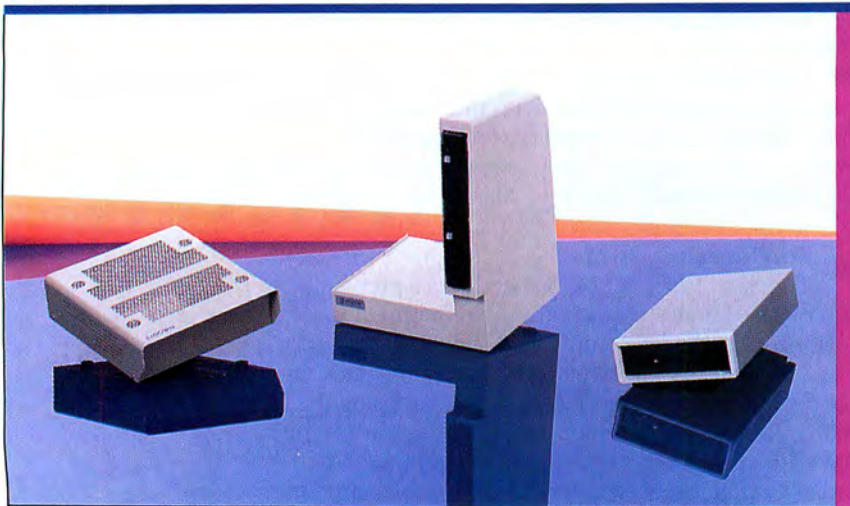
Shopping for Megabytes

In evaluating SCSI disk drives, consider the capacity, size, shape, noise level, warranty, and price that best suit your needs. Reliability is difficult to ascertain by testing a single unit. However, with the latest software, all the drives seemed reasonably reliable. Surprisingly, performance isn't a major comparison point because all the SCSI drives are limited by the Mac and run at nearly the same speed when performing everyday tasks.

Four drives seem particularly suited to the individual user who is concerned about price: the LoDown-20, the MDIdeas HD-20, the SuperMac DataFrame, and the Mirror MagNet 20X. Businesses and other users who are more concerned with data security than price may prefer a drive with removable disk cartridges, namely the Iomega Bernoulli Box 10 + 10 or the Univation SlimLine 1010-2R. The Peripheral Land MacFast20 satisfies both the price-conscious and the security-conscious user; it costs a bit more than the low-priced drives but offers a couple more features, notably a provision for adding a smart tape backup. At the high end of the scale, the AST 4000 is ideal for businesses with large databases or AppleTalk networks. □

And Three Makes Six

(Left to right) LoDown-20, SlimLine 1010-2R, and Sun Streak SCSI-21. LoDown's drive comes with 300 public domain programs. The SlimLine 1010-2R's two drives are housed in an unusual L-shaped cabinet that wraps around the Mac. Sunol's drive sits alongside the Mac.



Lon Poole is a Contributing Editor of Macworld.



The inventors of the 3.5" drive recommend only one floppy disk. Theirs.

If your computer has 3.5" drives, it has a little bit of Sony. Because Sony invented the 3.5" drive technology that has taken floppy disk memory all the way to two megabytes.

So nobody knows better than Sony how important high standards are for producing 3.5" floppy disks. But then, Sony invented those, too, as well as the most demanding methods for making 3.5" disks.

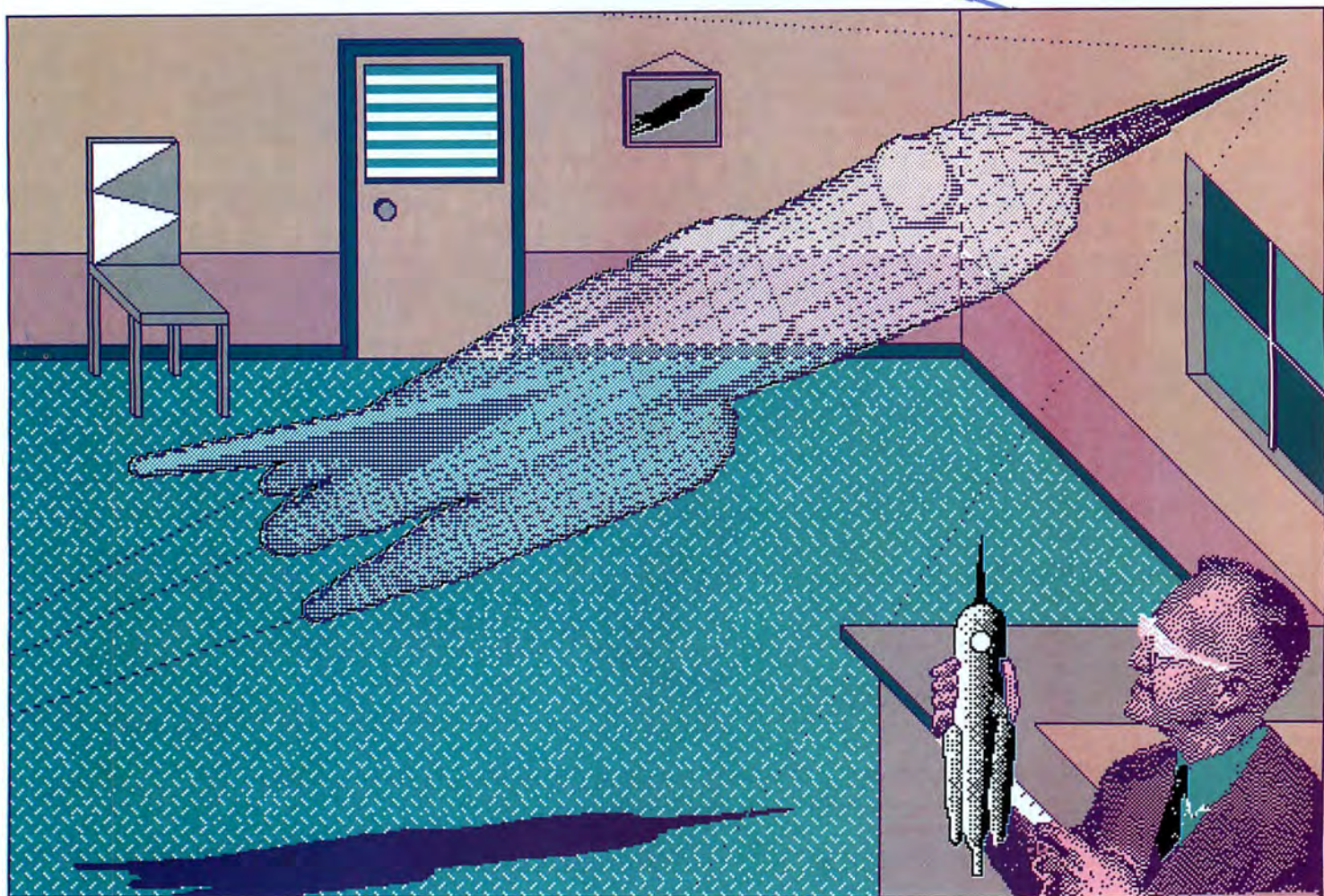
Such as the Sony Vivax™ magnetic medium, with the high coercive force necessary to suppress the "noise" that can cause disk error. And the Sony DDL™ binder system for incredibly even dispersion of magnetic particles on the disk surface. Then there's Sony's burnishing expertise that eliminates microscopic projections as small as 1/1,000,000th of a millimeter.

But the best reason to trust only Sony is your irreplaceable data. After all, you'll be storing six times the information on a disk that's one-third smaller than a 5.25" floppy. That's why we recommend only one floppy disk for our 3.5" drives. The Sony.

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Circle 255 on reader service card



Mac Modeling

Reese M. Jones

STELLA brings professional computer simulation and modeling to the Macintosh

Modeling and *simulation* may sound like arcane, information-age practices, but really they're as common and as old as thinking. Every time you put ideas together to figure out how something works, you're creating a mental model. When you use your ideas about how things work to make a prediction, you're engaging in simulation. The formal discipline of explicit modeling is no different—just more rigorous.

An explicit model is an abstract system that uses equations to describe the parts and behavior of a real system. Explicit modeling has long been performed on mainframes and minicomputers in the physical and biological sciences, business, economics, public policy, and many other fields. But in the personal computer world, modeling software has been restricted to very limited applications, such as spreadsheet programs and project managers. Now a new program from High-Performance Systems, *STELLA*, enables the Macintosh to be used for modeling applications as varied as evaluating airplane designs, estimating the effects of rent control on a local economy, or predicting the casualties from a nuclear disaster.

STELLA (*Structural Thinking, Experiential Learning Laboratory with Animation*) is a relatively complete environment for constructing and experimenting with explicit models. With its elegant, visual interface, it represents the first of a new type of modeling program that's accessible to relatively nontechnical users yet powerful enough to build substantial models with real-world applications.

The Diagram Window

STELLA's visual orientation makes it unique among modeling programs. You begin constructing a model by outlining its structure in the Diagram window (see Figure 1). *STELLA* diagrams have four main elements: The boxes, called *stocks* or *accumulators*, represent quantities that can grow or shrink as the model runs. The hollow arrows, known as *flows*, indicate movement in and out of the stock boxes. The circles attached to the flows are called *converters* or *logic receptacles*; these contain the decision rules that control the flows and, ultimately, the model's behavior.

The fourth element, the curved arrows, are the *input links*, or *signals*. Signals show logical connections between a model's components. In Figure 1, for example, revenues and expenses are both linked to profits.

STELLA is capable of handling complex models with multiple, convoluted feedback loops and numerous interacting factors. Models can extend beyond the edge of the screen; the display zooms out to show the overall structure of the model or in to enlarge a particular section. Also, when dealing with a complex diagram, you can search for a model's components by name.

Making the Rules

After you have pieced together your model on the Diagram window, it's time to define the contents of each stock box and

logic receptacle. *STELLA*'s defining dialog boxes are one of its most powerful features. The algebra box (shown at the top of Figure 2) tells you which parts of your model you must include in the current definition. The Required Inputs list is determined by the links you have drawn in your structural diagram and is one of the ways in which *STELLA* ensures that you maintain a one-to-one correspondence between your diagram and your equations. If you leave anything out of your equation, the program won't accept your definition.

The algebra box also shows a menu of built-in mathematical and logical functions that you can include in a definition simply by clicking on them. An on-line error-checking feature tells you when you have entered an equation incorrectly; unfortunately, you can't query the error checker to find out the correct format for a function before you enter it.

In addition to defining elements algebraically, the graph dialog box (shown at the bottom of Figure 2) lets you easily define a nonlinear response for a logic receptacle by specifying its input and output values. You can also use the mouse to draw a plot representing the relationship between the values. The combination of these defining tools gives you great flexibility when constructing complicated models with many feedback controls and nonlinearities. At the same time, you don't have to know calculus, solve sets of nonlinear partial differential equations, or do any programming.

Simulation

An important requirement for a simulation program is the ability to control the step size and numerical precision of the simulation. *STELLA* allows for great flexibility in setting these parameters. You can also choose simulation start and stop times, the ranges within which variables will be scaled for plotting or animation, and combinations of fixed or floating-point values with different precisions. The program even offers a selection of numerical-integration algorithms, including Euler's method and second- and fourth-order Runge-Kutta, that enable you to trade off speed and precision and deal with instabilities. This combination of features allows you to debug your model with a series of quick, approximate simulation runs before you do a longer, more precise calculation.

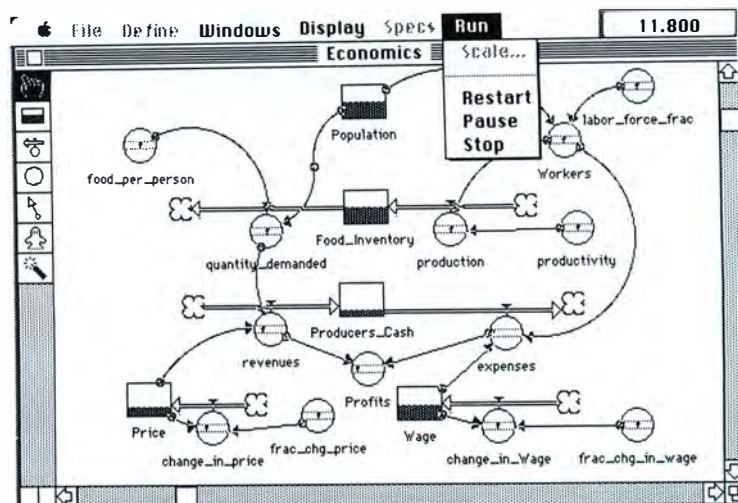


Figure 1
A diagram of a complex economic model with extensive interconnections and feedback-control loops. You construct a diagram by dragging elements from the tool-box on the left and arranging them in the window.

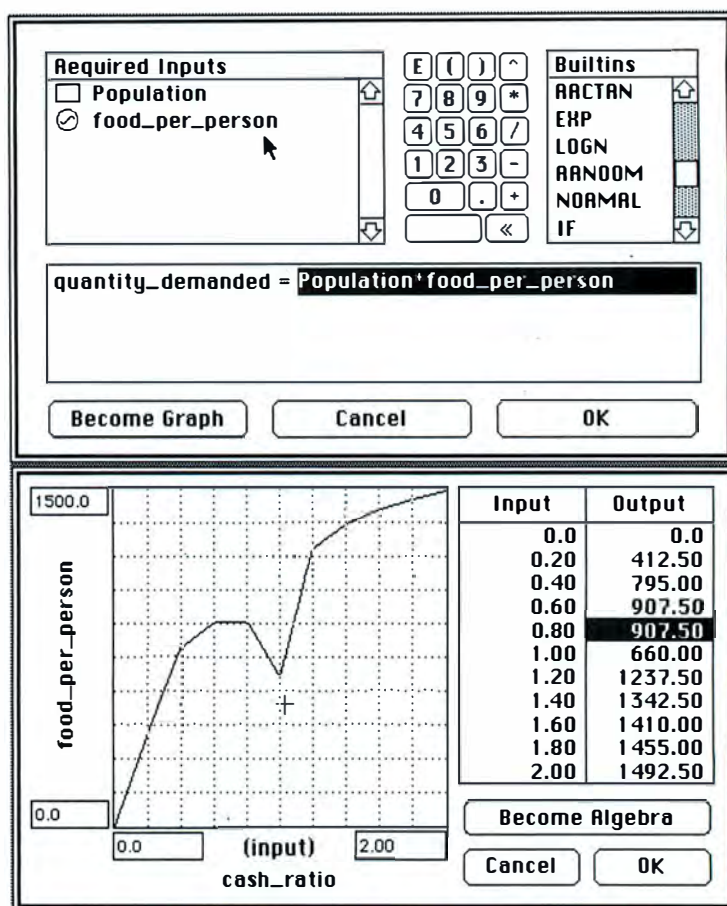


Figure 2
STELLA offers two alternatives for defining the elements in a model: the algebra dialog box at top indicates which terms of your model you must include in your current definition and offers built-in mathematical and logical functions; the graph box lets you define nonlinear responses by either drawing a curve or entering values.

Another important feature for a simulation program is the ability to produce graphic—even animated—output. Responses that are difficult to see in tables of numbers are often obvious in plots. Animation enables you to observe cycling phenomena and recognize early on if your simulation needs adjustments.

STELLA's output features are another of its strengths. You can plot the change in any value over time and watch as the program produces an animated graph (see

Figure 3). *STELLA* can plot up to four independently scaled variables, and you can plot any variable against any other over time to display their relationship.

To set up a plot, you simply open the Graph Pad window and select the variables you want from a menu. To scale the graph, you can determine the ranges for every variable automatically by running through

a simulation cycle, or you can save time by letting the program determine the range for a single variable of particular interest. *STELLA* also lets you set plot-display ranges manually. This unusual variety of options makes it easy to compare the behavior of very different components of a model.

One stunning output feature is *STELLA*'s ability to animate the components of the structural diagram in the Diagram window. As the program runs, stock boxes fill up or empty to show changes in stock quantities over time. *STELLA* indicates the relative value of an equation in a logic receptacle by means of a moving speedometer needle (see Figure 1). You set the relative scaling of each variable for this animation in the same manner as you set the ranges for the plots.

Simulation results can also be displayed and printed in a traditional table format (see the Table window in Figure 3). However, *STELLA* cannot transfer tabular output to other programs—a serious drawback. *STELLA* does not support the Mac's Copy and Paste commands or provide a facility for printing a table to disk. This means you can't, for example, generate a data curve in *STELLA* and then move the data to a *Microsoft Excel* or *FORTRAN* program for analysis, or to *Cricket Graph* to make a presentation-quality graph. The only way to move a table, a diagram, or a plot from *STELLA* to *MacWrite* or *MacDraw* is to create a *MacPaint* bit map via a ⌘-Shift-3 screen dump. A business version of *STELLA* that addresses many of these shortcomings is in the works.

Documenting and Data Fitting

STELLA's model-documenting abilities are limited. You can display the equations used in a model in the Equations window, which is useful for debugging the model (see Figure 3). But *STELLA* automatically displays equations in order by type and then alphabetically within types—a scheme that most likely bears no relation to the structure of your model. Mainframe simulation programs often provide more flexible equation-listing capabilities, allowing you to add comments to equations and to sort and group equations based on the model's structure. Such features can be important when you're working with large, complicated models.

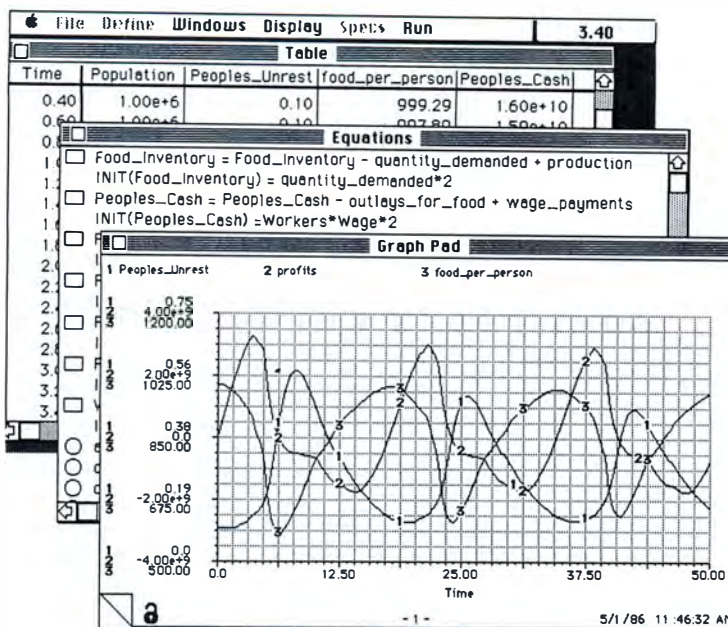


Figure 3

Three of *STELLA*'s output windows. The Graph Pad displays an animated plot of up to four components of your model. The Equations window shows a model's algebraic structure. And the Table window gives the numerical values of model components over time (the number in the upper-right corner indicates elapsed time).

Once a model has been constructed and tested, it's often necessary—particularly for applications in the physical and biological sciences—to fit the model to a set of experimentally observed data to determine the exact quantities of unknown parameters in the model. *STELLA* is very useful for getting the structure and parameters of a model qualitatively correct, but its ability to determine the real-world value of variables is limited.

Evaluation

STELLA's documentation is structured as a series of tutorials that take several hours—and some effort—to complete. While this manual is well written and presents interesting insights into modeling theory and logical thinking, it lacks some key elements. There is no systematic overview of the program's features and, worse, no index. These omissions leave you with no way of answering specific questions; instead, you must thumb through the tutorials until you find the information you need.

The size of a model in *STELLA* is limited to the number of components that fit on one worksheet, which is partly a function of available RAM. *STELLA* version 1.2 works on a Mac Plus or a 512K Macintosh, but for most professional applications 512K will probably be unsatisfactory.

STELLA is an exciting and powerful tool that can be used in a variety of fields, from physics and biochemistry to psychology and public policy.

It is well suited for modeling and simulating dynamic systems and deals grace-

fully with the particularly difficult modeling task of multiple feedback loops. The program's graphic interface, animation, and sophisticated simulation-control features allow you to concentrate on the structure of your model rather than on the logistics of programming or mathematics.

If you have a model to develop, seriously consider *STELLA*. If you are interested in learning more about modeling and simulation, this program represents a relatively easy and inexpensive way to do so. □

▲▲▲▲▲ Reese M. Jones is doing research in neurochemistry and brain imaging at Lawrence Berkeley Laboratory while working toward a Ph.D. in biophysics at the University of California, Berkeley. He is also president and founder of the Berkeley Macintosh Users Group.

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STELLA, version 1.1
 High-Performance Systems
 13 Dartmouth College Hwy.
 Rte. 1, Box 37
 Lyme, NH 03768
 603/795-4122
 List price: \$200

Beyond ThinkTank

Reed McManus

Does More really give you more for your money?

Who needs a \$300 outliner? That's the question I asked myself when I first saw *More*, the successor to Living Videotext's *ThinkTank 512*. To its popular "idea processor," Living Videotext has added several disk utilities, a number of new outline-organization features, multiple windowing, graphics functions that enable you to generate bullet and tree charts automatically, and other improvements.

The not-too-surprising answer, as it turned out, is that *More* is a program for intensive outline users—people for whom conceptualization and organization are major job components and who like the outline format. *More* is not likely to replace *ThinkTank* in the near future among authors, researchers, teachers, and others who regularly use outlines. But it could be a key program for managers and other business professionals, helping them to coordinate their hectic workdays and to plan, present, and execute projects.

I looked at a prerelease version of *More*. The program's substantial features were up and running, but some disk utilities and file transfer functions were not. *More* requires 512K and two disk drives. It is not copy protected.

ThinkTank Plus

Those familiar with *ThinkTank 512* will immediately recognize *More*'s structure: headings with subheads are preceded by a plus symbol, and headings without, by a minus symbol. Flush-left or indented headlines can be created anywhere in an outline, and existing headlines can be moved anywhere, along with their subheads, simply by clicking and dragging.

You can collapse an outline to study relationships between topics at the same hierarchical level or expand the outline to take in the details. Word processing or graphics windows can be attached to any headline.

More's outliner offers several organizing features not found in *ThinkTank 512*. Hoist lets you focus on a selected topic and work with it apart from the rest of the outline. Promote and Demote let you change the status of all subtopics below a selected heading without clicking on and dragging individual headings.

Cloning creates a cross-referenced copy of a headline; changes made to a heading are automatically reflected in its clone. For example, if you modify an entry in an alphabetical list of company names, the entry's clone in a list sorted by geographic region changes automatically.

Mark and Gather allow you to tag topics as you scroll through your outline and then move, copy, or clone the entire group. These features let you reorganize an outline without cutting and pasting items one by one. *More*'s Search function adds a wild-card capability and is useful for finding topics slated for gathering.

More Windows

More's multiple windows are its most significant outlining enhancement. Instead of trying to stuff all your ideas or projects into one outline, or closing an outline and opening a new file for each project, you can keep six windows cooking at one time (see Figure 1). This windowing ability en-

ables you not only to keep "desktop" outlines—address files, daily to-do lists, memo files—alongside project outlines, but to readily switch among them.

Windows can be overlaid or displayed side by side. Click on a window, and its outline becomes active; select Zoom In, and all other windows disappear. Data, including graphics, can easily be transferred between outlines and documents with the Clipboard or the Scrapbook.

Working with Words

More can handle all but the most intensive word processing tasks. Unlike *ThinkTank 512*'s word processing capabilities, *More*'s are neatly integrated into the outliner. You can attach a document window to any heading and use the Clipboard or the Scrapbook to transfer data between any document window and outline.

More's editing functions allow you to delete characters to the right of the cursor

and to use keyboard commands for all editing. However, the program lacks an Undo command. In document mode, you can select any font and size in the System file, but you are restricted to plain text. (For outlines you can also choose among six font styles: plain, bold, underline, italic, outline, and shadow.) You can set tabs and choose either fixed-width or word-wrapped text. Page breaks are not shown on screen.

Instant Presentations

More's classiest act is its ability to automatically generate bullet and tree charts from an outline. When you select any outline heading, it and its subheads (including document and graphics windows) become a series of bullet charts or a tree chart suitable for presentations or desktop publishing.

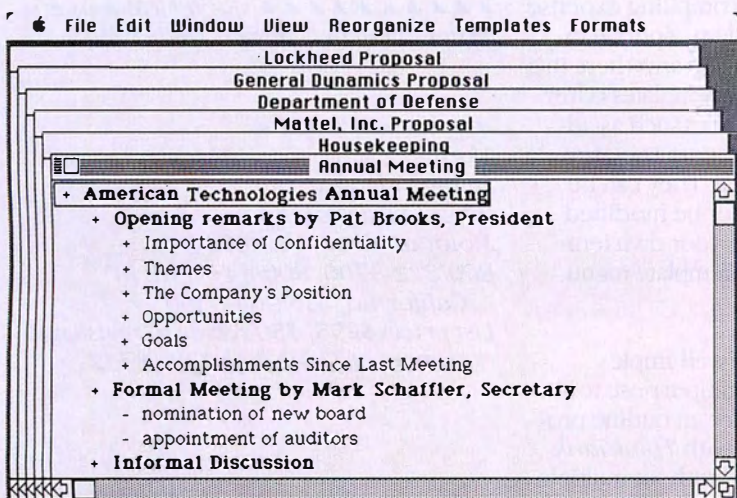
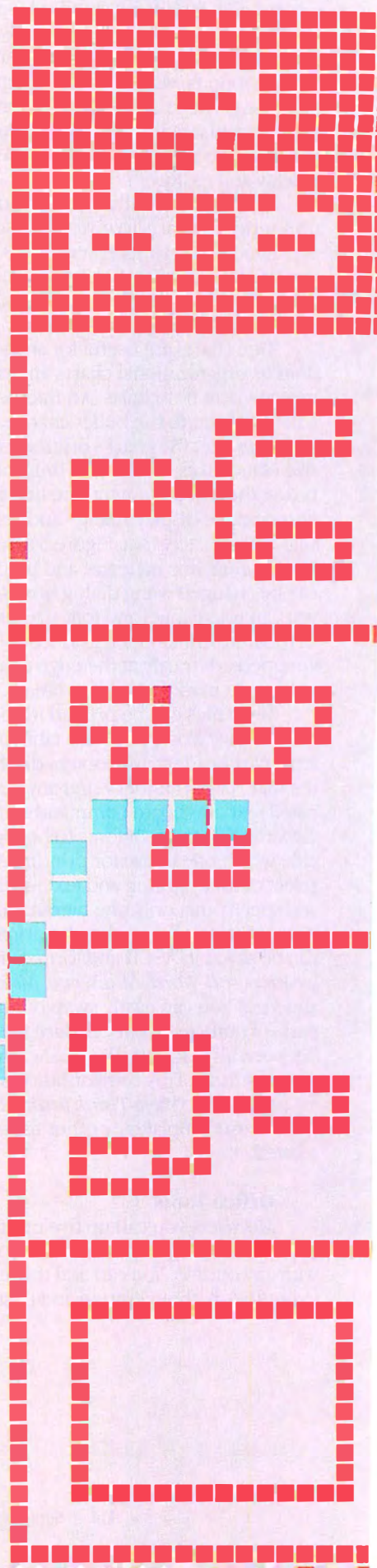


Figure 1

Multiple windows let you organize projects into separate but easily accessible outlines. Here, project proposals, annual meeting presentation plans, and daily organization files are each just a mouse click away. When you start *More*, you can select a group of outlines from the desktop for the program to open at once.



The bullet chart features a unique interactive palette that could be the forerunner of a new Macintosh standard (see Figure 2). To design a chart, you simply rotate through a variety of font, spacing, and decorative options, without making repeated selections. This instant visualization significantly speeds up the design process, enabling you to try a variety of options quickly and easily.

You can print bullet charts or queue up a series of charts to give an on-screen presentation. During presentations, you can let *More* scroll automatically through the slides at a designated pace or advance slides manually with a mouse click.

Tree charts are useful for such applications as organizational charts and project management flowcharts. An interactive palette similar to the bullet chart palette lets you select the chart's orientation, the size of its boxes, the style of links between boxes, the text alignment, the line thickness, and the display sizing—and see the results immediately (see Figure 3). Box sizes, box spacing, line patterns, and fill patterns can be changed using dialog boxes, and you can rotate fonts and font sizes using keyboard commands. Text is word-wrapped arbitrarily at the edge of a box unless you mark forced line breaks.

More files can be printed in six colors on an ImageWriter II, with a table of contents plus headers and footers displaying the date, page numbers, and any designated text. Keyboard commands let you view the full range of fonts to help you decide which one to use for printing. You can select outline spacing and text justification and specify that only one hierarchical level or subsection of an outline be printed. Files can be saved in ASCII and formats readable by *Microsoft Word*, *MacWrite*, *MacDraw*, and *Jazz*. You can easily swap outlines or parts of outlines between *More* files and between all Mac and IBM PC incarnations of *ThinkTank*. This compatibility is a boon for people who have *ThinkTank 512* and want to use templates or other files they've created.

Office Tools

More lets you call up five utilities and 11 preformatted templates while working with any outline. You can add the templates to outlines without cutting and pasting. A

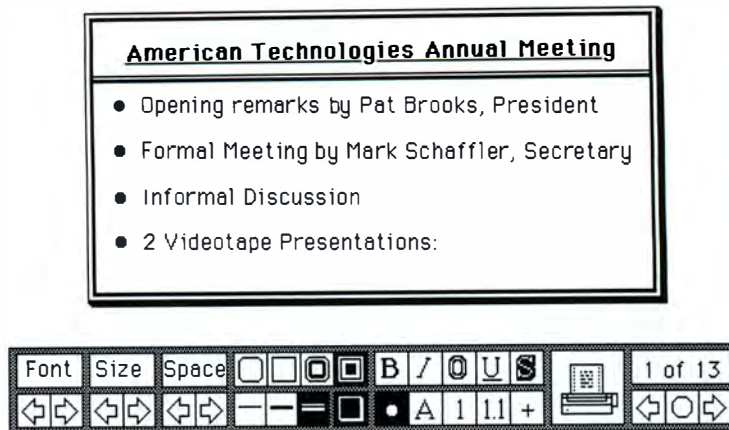


Figure 2
Bullet charts turn outlines into presentations automatically. By clicking on any of the options in the palette, you can instantly preview a different font size or style, spacing, or arrangement of decorative elements.

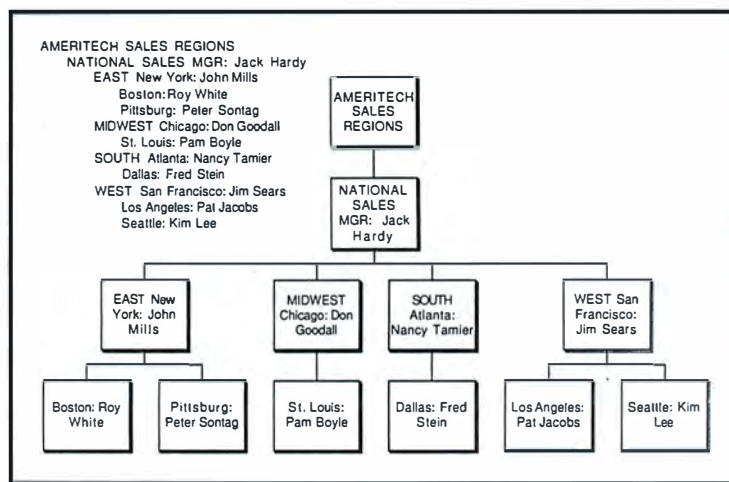


Figure 3
Tree charts can be created automatically from outlines simply by changing views. The hierarchical relationships of the outline (left) are graphically depicted in the tree chart (right).

time-and-date-stamping facility lets you organize outlines by date and keep logs of meetings and phone calls. A calendar through the year 2039 generates appointment books covering any number of days with user-selected time intervals. A calculator adds up the figures in all subheads of a selected heading and is useful for simple applications such as compiling expense reports. If you use a modem, a phone dialer calls a number recorded anywhere in a selected headline. *More*'s templates cover routine record-keeping tasks such as address files, sales leads, order entries, travel expenses, and time billing. They can be added to an outline as is or be modified and saved. You can create your own template and install it in the Template menu.

More or Less

More is a clever and well-implemented but expensive multipurpose tool. If you're simply looking for an outline processor, consider sticking with *ThinkTank 512*—unless you can't live without multiple windows and *More*'s improved text pro-

cessing abilities. However, if you juggle many projects during your workday and can take advantage of *More*'s presentation graphics, desk accessories, and templates, this jack-of-all-trades might easily become your office command post. □

▲▲▲▲▲▲▲▲▲▲ Reed McManus is a writer living in Oakland, California.

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Proficient Pagemaking

Richard Jantz

A pasteboard of time-saving tips and practical techniques for using PageMaker

So you joined the legion of desktop publishers. Armed with a Macintosh, the LaserWriter, and *PageMaker*, one of the popular page-makeup programs, you're willing to try whatever the job calls for: newsletters, reports, brochures, ads, marketing materials, magazines, books. As long as you don't run out of paper or cartridge toner, you're ready. . . .

Or are you? Just how adept are you at controlling your desktop publishing system? Have you mastered *PageMaker's* sophisticated capabilities, or do you still squander hours trying to get page layouts just right?

This collection of tips will help you get the most out of *PageMaker* (see "Keyboard Shortcuts"). Whether you're a veteran or novice user, these tips turn pedestrian page navigation into streamlined sailing.

Ad-Lib Eraser You can produce a crude but functional "eraser" with the toolbox. Select the None and White options in the Lines and Shades menus, respectively. Then use the box or circle tool to draw an invisible object large enough to cover an unwanted page element.

Cut and Paste with Caution Cutting or copying with one tool and pasting with another can generate a file-corruption error. Don't mix the arrow and text tools during cut and paste operations.

Create Precision Art Augment *PageMaker's* drawing abilities with *MacDraw*, which offers features such as curves, freehand shapes, and polygons; or *MacDraft*, which features precision-controlled drawing, object rotation, and scaling. Save *MacDraw*

Keyboard Shortcuts

 Mouse click



Placing Documents

Place  

Place text with original line breaks   with text icon


Stop text flow  anywhere on page



Typing Text

Discretionary hyphen  

Em dash   

Page number marker   

Opening quotation mark  



Closing quotation mark  

Single opening quotation mark   

Apostrophe   

Selecting Text

Line   

Paragraph  



Text block   

Word  

Changing Views

Actual size  

Fit in window  



Go to "Actual Size" from other view   at new center



Go to "Fit in window" from "Actual Size"  

Go to "200% Size" from any view    at new center

Changing Graphics

Resize proportionally  while dragging

Return a "placed" graphic to original proportions   handle

Change a rectangle to a square   handle


Change an oval to a circle   handle

Using Tools

Show/hide guides  

Show/hide rulers  

Show/hide toolbox  

Use grabber hand  while dragging

The mouse and keyboard shortcuts in this list provide quick operation and some special functions.

graphics in PICT format, and place *MacDraw* drawings into *PageMaker* via the Clipboard or the Scrapbook or by turning them into *MacPaint* files.

Condense and Stretch Type You can use *MacDraw* in conjunction with *PageMaker* to embellish type. Type the text into *MacDraw* in a laser font and save the file in PICT format. Open *PageMaker* and place the *MacDraw* file. Eight handles surround the type; drag one in any direction to stretch or compress the type (see Figure 1).

Save Unplaced Text Avoid the loss of unplaced text when you close a file in the middle of a layout. Click the plus (+) handle at the bottom of the unfinished text block and place the remaining text on the pasteboard instead of the publication window before saving the file.

Form-Fitting Headlines Sometimes it's difficult to fit a long headline or a logo that spans multiple columns at the top of a page. Keep in mind that line length is determined by where you click the text insertion point. Inside the publication window, new text must conform to the column guides; therefore, type large text or headlines on the pasteboard and then drag them into place on the page.

Tighten Up Big Heads Because *PageMaker* lacks automatic or manual kerning features, it's difficult to tighten up large headlines. Although this method is imprecise, the program's text editor can divide a major headline into separate text blocks at points where you want kerning. For example, a large headline like "Winston Wins" might consist of three

separate text blocks: "W," "inston W," and "ins." Use Actual size or 200 percent to position each text block.

Save Disk Space Customize *PageMaker* backup disks to gain as much free space as possible and avoid swapping disks. Remove the Quicktour, Quicktour Text & Graphics, and Help Screens folders. Also remove either the ImageWriter and Aldus Prep folders or the LaserWriter folder, depending on which system you intend to use. Finally, remove any unneeded fonts or desk accessories from the System Folder with the Font/DA Mover.

Creating Em and En Spaces Create alternative spaces with special keyboard commands. Make an em space by pressing Option-Shift-hyphen. Make an en space with Option-hyphen.

Zoom with Precision You may lose track of your page position when you focus in on a layout's detail by selecting the 200 percent Page option. Keep your bearings by holding down both the ⌘ and Option keys, then click with the arrow at the point you wish to zoom in on.

Switch to the Fast Lane Use *Switcher* to move quickly and easily between programs such as *MacWrite*, *Microsoft Word*, *MacPaint*, and *MacDraw*—as long as your Macintosh has enough memory. Although 512K is recommended, you can allot 256K to a customized *PageMaker* disk that contains only essential files. The amount of memory remaining dictates how many other programs you can install. Two megabytes of RAM give you room to create an integrated desktop publishing system: load *PageMaker* along with design programs, a picture library or a clip art manager, a word processor, and digitizing software.

Diagonal Scrolling Scroll diagonally or in any direction by holding down the Option key while dragging the mouse. This is often more efficient than the scroll bars because it lets you move directly to a new page position with the tool known as the *grabber band*.

Smooth Those Jaggies Bit-mapped graphics, like those produced by *MacPaint*, are slightly distorted when printed on a LaserWriter. For best results, both printer and graphics should have the same resolution; however, a LaserWriter (300 dots per inch) has more than four times the resolution of bit-mapped graphics (72 dots per inch). To enable the printer to fill in the jagged edges, use the Print dialog box to select the Smooth option. Then reduce the Scaling to 96 percent to enable the printer to add dots and produce an exact multiple of the bit-mapped resolution.

Bleeding Graphics Normally, you can't print graphics or text that extends, or "bleeds," to the page's outside edges on the LaserWriter. This holds true even



Figure 1

Use *PageMaker* with *MacDraw* to stretch or condense type—a technique that adds flair to headlines and initial capitals.

after setting up 0.00-inch margins or trying to print an enlargement, because the LaserWriter automatically creates a 3/4-inch border. However, you can create bleed effects on the top and bottom of letter-sized pages by printing on longer paper than you want for the final publication and trimming off the excess with the following procedure.

- Open a new file, choose Page Setup from the File menu, and select U.S. legal paper (8½ by 14 inches) in the dialog box. Use *PageMaker*'s default margin settings.
- Choose Actual size from the Page menu and drag two horizontal ruler guides to mark off 11 inches. Add dotted lines to provide a guide for trimming the excess paper off the printout.
- During the layout process, let the text and graphic elements you want to bleed overlap the top and bottom edges of the 11-inch document (delineated by the ruler guides). If you wish to shorten text blocks that extend too far over the dotted line, select and drag the bottom plus (+) handle upward.
- Print the final copy on legal-sized paper and cut off the excess. □

Richard Jantz, based in Berkeley, California, is a freelance writer and the principal author of Creating the Best Impression: All about Business Graphics Software (Hayden Book Company, 1986).

PageMaker, version 1.0
Aldus Corp.
411 Second Ave. S
Seattle, WA 98104
206/622-5500
List price: \$495

Four Secrets of Excel

Danny Goodman

Learn how to make your spreadsheets sizzle with four efficient techniques for linking, opening, printing, and moving within spreadsheets

Anyone can be an accomplished *Excel* user and still be unable to come up with what should be simple solutions. One problem that crops up frequently concerns *Excel*'s spreadsheet-linking abilities, particularly in relation to updating external references to nonresident worksheets. I'll explain how to smooth these linking operations while demonstrating how to

- set up multiple-document *Excel* systems you can open as a single document from the Finder or from within *Excel* (for example, a system containing a worksheet, a macro sheet, and graphs)
- create a "living" table of contents for a large worksheet
- print irregularly shaped (nonrectangular) worksheets without printing all the blank pages in between.

Secret #1: Linking Spreadsheets

Linking *Excel* worksheets is a real asset in many business situations. Linking lets you consolidate information from several worksheets into a summary worksheet. In a budget forecast, for instance, you can combine expense figures forecast by each department head to determine the company's total cash requirements.

In *Excel* parlance, the department worksheets are called *supporting* documents. The summary worksheet is called a

dependent document because it contains formulas that retrieve values directly from one or more supporting documents. When you open a summary worksheet, its formulas seek information from supporting documents named in those formulas, even if the supporting documents are not open at the time. Whether or not you can retrieve values from closed documents, however, depends on the way the formulas are constructed.

Simple versus Complex

Excel can retrieve values in closed supporting documents if the formulas in the summary worksheet contain "simple external references" but not if they contain "complex external references." A simple reference refers to a specific cell or range of cells in a supporting document. This can be an absolute cell or range reference, such as "Department1!\$C\$14," or a range name, such as "Department1!January_Total."

A simple reference must also refer to only one such cell or range name in a formula at a time. Consequently, you can't add, subtract, or perform any function on two or more external references within a formula without creating a complex reference. The formula "= Department1!\$C\$14 + Department1!\$C\$15" is a complex external reference.

Once opened, a summary worksheet attempts to update the supporting documents. If they're closed, a dialog box asks whether you wish to update references to nonresident (that is, not open, or not resident in memory) worksheets. The updating process will be successful if the formulas linking the summary worksheet to

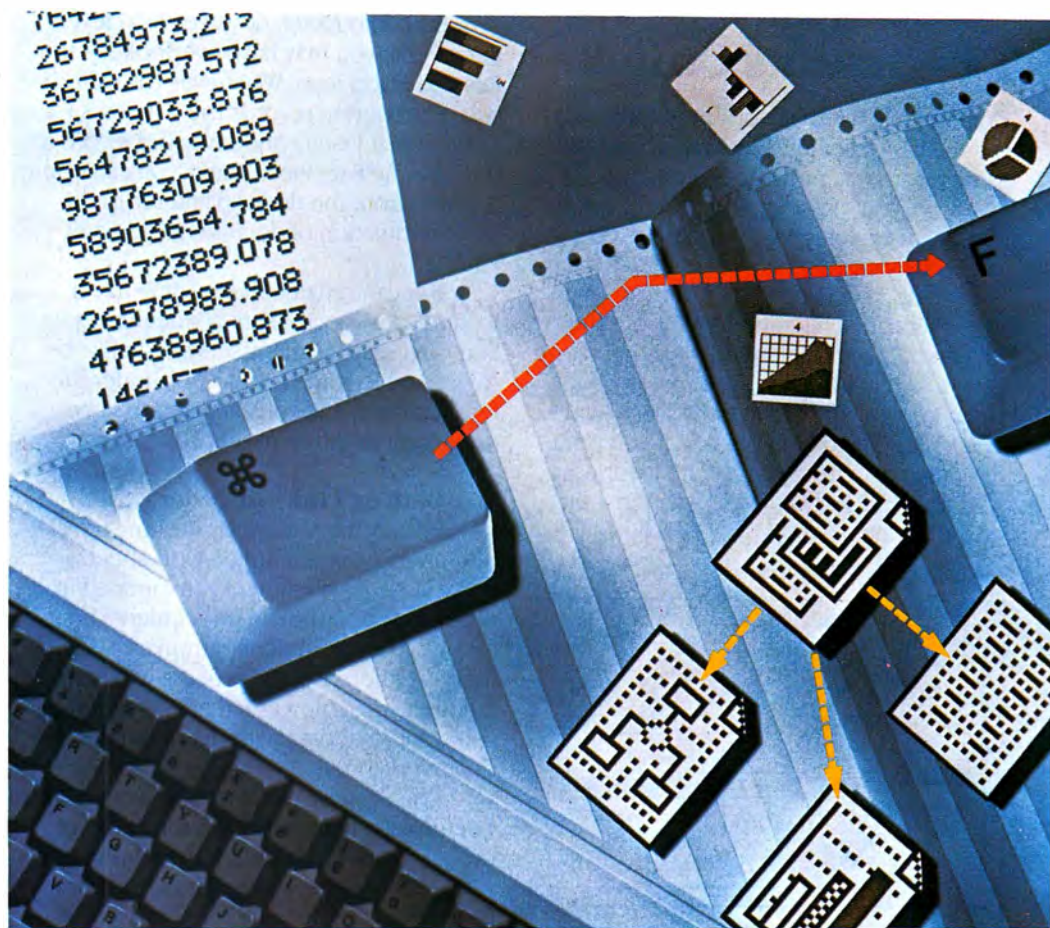
the dependent documents contain only simple references, but not if complex references are used. So much for theory. Let's look at some examples.

The Problem

Figure 1 illustrates two simple supporting worksheets that list sales, expenses, and profits for each month of the first calendar quarter. Figure 2 shows two different methods of referencing external cells after *Excel* has attempted to update those references without opening the supporting documents. Notice the #REF! error message in cell B19. This message indicates that *Excel* had trouble with the reference in the formula. That formula, “=sheet1!\$B\$3 + sheet2!\$B\$3,” attempted to add the January sales figures from two nonresident worksheets, making it a complex external reference (see Figure 3). This formula would work only if the two supporting documents and the summary document are open simultaneously.

The Solution

The second method solves this problem by using formulas containing only simple references, namely, “=sheet1!\$B\$3” in cell B10 and “=sheet2!\$B\$3” in cell B14. Each formula refers to a specific absolute reference cell in one external sheet. With the simple references working fine on the summary worksheet, you can go ahead and use the imported values in the summary sheet's own calculations. Therefore, in cell B4, the formula “=B10 + B14” adds the values fetched by *Excel* in cells B10 and B14.



MARK FARRIN

The formulas referring to nonresident worksheets must be either absolute references (indicated by dollar signs on both sides of the cell references) or range names. A relative reference in the formula (for example, “=sheet1!B3”) would make this a complex reference. Therefore, if you think you might rearrange cell locations on a supporting worksheet, you should define as many cells as possible with range names (using the Define Name choice on the Formula menu) and refer to cells by name rather than by cell number. Since *Excel* considers a reference to a nonresident worksheet's range name to be a simple reference, you won't lose track of supporting cells as you adjust the supporting document's layout.

Saving Memory

All of the foregoing have a significant impact on the way you organize your linked worksheets and use memory. Complex references, as it turns out, allow you to accomplish much more on the summary worksheet with as few cells as possible—

you can perform calculations that refer directly to external cells. Your summary document, therefore, will be compact, but all supporting documents must be open at the same time.

If you use simple references, however, you must essentially replicate the data cells from the nonresident sheets on the summary sheets to perform calculations on those values. While this may require a large summary sheet, it still may be more parsimonious with memory than using complex references, because you need only the extra room on the summary worksheet for the raw values. Since you'll likely be totaling or performing other calculations on the data, you don't need to import the totals from the nonresident sheets. Therefore, by using simple external references, you may very well use less total memory to achieve the same results of linking the data.

(continues)

Secret #2: Documents Unite!

Creating macros that work independently of specific worksheets lets you reuse the same macro in a number of situations. However, you must remember to open the macro sheet along with the worksheet. You can usually open several documents from the desktop at once by Shift-clicking each document and choosing Open from the File menu. Opening linked documents can be problematic because you must open them in a specific order. Otherwise, you risk having the dialog box ask if you want to update data from nonresident worksheets; you're only allowed to open a single document.

sheet1					
	A	B	C	D	E
1					
2		January	February	March	Q1 Total
3	Sales	1000	2000	2500	5500
4	Expenses	200	600	1000	1800
5	Net Profit	800	1400	1500	3700

sheet2					
	A	B	C	D	E
1					
2		January	February	March	Q1 Total
3	Sales	300	500	1200	2000
4	Expenses	100	750	500	1350
5	Net Profit	200	-250	700	650

Figure 1
With department profit figures used as supporting documents, and the same spreadsheet layout for each department, values can be easily linked to a dependent document (see Figure 2).

sheet3					
	A	B	C	D	E
1					
2					
3		January	February	March	Q1 Total
4	Sales	1300	2500	3700	7500
5	Expenses	300	1350	1500	3150
6	Net Profit	1000	1150	2200	4350
7					
8	Simple:				
9	From	1000	2000	2500	
10	Sheet 1	200	600	1000	
11					
12					
13	From	300	500	1200	
14	Sheet 2	100	750	500	
15					
16					
17	Complex:				
18	From Both	#REF!			

Figure 2
A dependent document can retrieve information from nonresident supporting documents when the references to those unopened documents are simple references. A complex reference generates a #REF! error, as shown in cell B19.

The Resume Excel Icon

Built into *Excel*, however, is a clever device that you may have overlooked—the Resume Excel icon. Whenever you quit *Excel*, the program records the windows open at that instant and saves the record as the Resume Excel icon. Later, you can open the icon from the desktop and return to the combination of documents you quit earlier.

You can rename the Resume Excel icon to save specific sets of documents. You can create as many sets as you like by saving the Resume Excel icons under different names, and you can use the same document in different sets.

Getting Links in Order

Be careful when your Resume Excel documents contain linked worksheets; make sure the documents are opened in order. Open supporting documents first, followed by dependent (summary) documents. Otherwise, the process will be curtailed by the dialog box that asks whether you want to update with data from nonresident worksheets.

The Resume Excel icon first opens the document whose window was on top of the stack when you quit. If the summary worksheet is on top, you'll have to "bury" its window before you quit. Choosing **Alt-M** quickly places the topmost window at the bottom of the stack. Conversely, **Shift-Alt-M** brings a buried window to the top.

Secret #3: Spreadsheet Rapid Transit

Large worksheets usually consist of several small, distinct areas that are interrelated. A construction proposal, for example, might contain several subsections for calculating estimated cost and schedule details. The information in the subsections provides backup material for another subsection—a one-page summary contained elsewhere on the worksheet.

Large worksheets present two difficulties: moving between subsections is slow; and when you do move, it's easy to lose your bearings. By creating a simple macro, you can point to any cell in the summary sheet and issue a keyboard command, and you'll be moved directly to the related backup material on the worksheet. A second macro returns you to the summary page. Figure 4 shows a worksheet with a summary page that represents a 1040 tax form. In another section of the worksheet, several backup forms represent different tax schedules.

The Reference Section

To make a single macro work regardless of the cell you select, you must create a new section in the worksheet, such as the area called "Replica" in Figure 4. This section, located 100 rows below the 1040 form, holds the references to the

sheet3					
	A	B	C	D	E
1					
2					
3		January	February	March	Q1 Total
4	Sales	=B10+B14	=C10+C14	=D10+D14	=SUM(B4:D4)
5	Expenses	=B11+B15	=C11+C15	=D11+D15	=SUM(B5:D5)
6	Net Profit	=B4-B5	=C4-C5	=D4-D5	=SUM(B6:D6)
7					
8					
9	Simple:				
10	From	=sheet1!\$B\$3	=sheet1!\$C\$3	=sheet1!\$D\$3	
11	Sheet 1	=sheet1!\$B\$4	=sheet1!\$C\$4	=sheet1!\$D\$4	
12					
13					
14	From	=sheet2!\$B\$3	=sheet2!\$C\$3	=sheet2!\$D\$3	
15	Sheet 2	=sheet2!\$B\$4	=sheet2!\$C\$4	=sheet2!\$D\$4	
16					
17					
18	Complex:				
19	From Both	=sheet1!\$B\$3+sheet2!\$B\$3			

Figure 3
A simple external reference fetches data from only one nonresident cell. Math operations can then be performed on that data, as shown in B4:E6. The formula in cell B19 attempts to retrieve data from two external cells at once. Both supporting documents must be open for the summary sheet to "see" this data.

names of the backup forms. After placing the *Excel* cell pointer on a cell containing the amount extracted from a supporting form, choose Option-⌘-f (or another keyboard equivalent you've specified), and the short macro will look in the cell in the same column, 100 rows down, where it will find the name of the desired schedule's cell range. The formula immediately scrolls to that schedule. Pressing Option-⌘-x initiates the second macro, restoring the view of Form 1040.

Creating the Macro

The macro listings are shown in Figure 5. To create the macros, perform the following operations:

- 1. Choose New from the *Excel* File menu.
- 2. In the resulting dialog box, click the macro sheet button and OK.
- 3. Type in the listings on the macro sheet just as they are shown in Figure 5. Pay particular attention to location of parentheses.
- 4. Select cell A1 on the macro sheet and choose Define Name from the Format menu.
- 5. The name of the macro ("jump") will already appear in the Define Name dialog box. Click on the button to the left of the word *Command*. This will activate the small text box in the lower-right corner of the dialog box.
- 6. Press the Tab key twice to advance the text pointer to that small box, and type the letter you wish to use as a keyboard macro ⌘ equivalent. Then click OK.

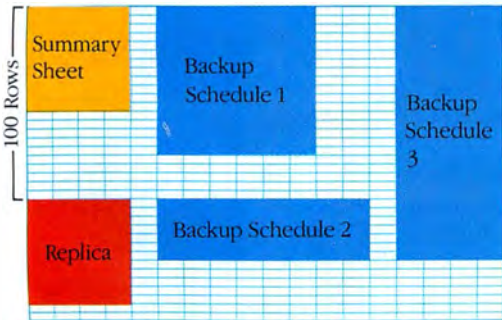


Figure 4
In a large worksheet, a summary sheet area may rely on values calculated in several supporting subsections on the sheet. The cell range for each form is defined with a recognizable name, such as "SchedB." By placing the range names of the backup areas in the Replica area, a simple macro zips the desired backup area into view.

- 7. Select cell A5 on the macro sheet, and choose Define Name from the Format menu.
- 8. As in step 5, click on the ⌘ button.
- 9. Tab the text pointer to the small text box and type any lowercase letter as a keyboard command to return to the main form. Then click OK.
- 10. Choose Save As from the File menu and assign an easily recognizable name to this macro sheet (if you're using HFS, save the macro in the same folder as the worksheet).

In the 1040 form you can add more cells linked to other worksheet areas without revising the macro. Simply type the range name of the supporting worksheet area into a cell 100 rows below its value on the 1040 form.

You can also use this macro to create a table of contents for an *Excel* document that is divided by pages. After listing the page titles and page numbers as they might appear in a book's table of contents, select the cell containing the page number and issue the macro, and *Excel* will bring that page to the screen in an instant.

If you are creating an *Excel* environment for inexperienced users, you might want the macro to summon instructions for particular entry cells. When unsure about the kind of data to put in a cell, the user could issue the macro, which would then shift the view to a context-sensitive help screen from elsewhere on the worksheet.

Secret #4: Print No Blanks

As the previous document demonstrates, *Excel* worksheets (or interesting areas thereof) can grow to nonrectangular proportions. When you print large worksheets, however, you may often produce

blank or unnecessary pages that make the document unwieldy and difficult to read. This problem is caused by blank areas of the spreadsheet and areas used for calculation that are unnecessary for the final report.

The good news is that *Excel* lets you bypass the pages you don't want to print, even if the resulting print area is oddly shaped. Print areas must be contiguous, and you cannot specify more than one print area at a time.

Selecting a Print Area

Selecting a nonrectangular print area is easy. Simply choose contiguous rectangles while holding down the ⌘ key until you build up the shape you want.

When you have marked the area, release the ⌘ key, pull down the Options menu, and choose Set Print Area. This action creates a named range on your worksheet called Print_Area just as if you had selected those cells and named them yourself with the Define Name menu command. In fact, if you choose Define Name from the Format menu, you will see that the Print_Area range has been named for you automatically.

Now when you print, only the areas selected and assigned to Print_Area will be printed. Later, if you want to print a different section, select the appropriate cells on the worksheet and choose Set Print Area again. But if you want to print the entire worksheet, then be sure to delete Print_Area from the Define Name dialog box.

These four tips should keep you going for a while. Try them in your *Excel* work, and let us know how you're doing. □

Danny Goodman
is a Contributing Editor to *Macworld* and author of *Hands-On Excel* (1986; Scott, Foresman & Co.).

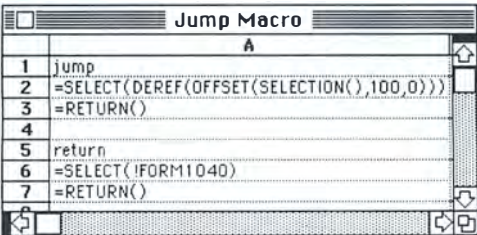


Figure 5
The top macro, "jump," looks for the name of the desired backup area in a cell 100 rows below the location of the cell cursor. Return always returns the view to the summary sheet.

Excel
Microsoft Corp.
16011 N.E. 36th Way
Redmond, WA 98052
206/882-8080
List price: \$395

The Macintosh tackles the final frontier at Martin Marietta, where engineers are using it to design the space station and shuttle. Pictured is Gerry Simonson at the company's Denver Aerospace Facility.



Desktop Engineering

Paul Freiberger and Dan McNeill

The Macintosh is helping design the space station. It started when an engineer at Martin Marietta took a Lisa computer to work. Others liked it, and soon the company ordered more. When the Macintosh appeared, project managers began supplying them to engineers' desks in bulk.

The story is typical. Over the last few years, thousands of Macintoshes have quietly filtered into the engineering departments of companies like Hughes Aircraft and McDonnell Douglas. And for every one of those, there are probably ten more in smaller environments.

While administrators have tended to favor IBM, the Macintosh has won acceptance mainly from the engineers themselves. "Many corporations say they swear by IBM, but what you see when you walk in are Macs," says Marvin Kreithen of Bridgeport Machines. Apple intends to promote desktop engineering—primarily in the area of CAD (computer-aided design)—much as it previously pushed the concept of desktop publishing. This commitment greatly heartened third-party developers, and several first-rate Macintosh CAD programs are already available.

The Macintosh Edge

The Macintosh is a newcomer in the engineering design and drafting domain, but it has some distinct advantages. One is price. The least expensive Apollo workstation now costs around \$9000. An IBM PC AT with an enhanced graphics board and an enhanced monitor sells for about \$4500, and *AutoCAD*, the reigning prince of IBM PC CAD software, ranges from \$1000 to \$2500. A Macintosh with a second disk drive sells for around \$2495, and CAD programs cost between \$400 and \$2495—bringing the price of a Mac design station to no more than \$4990.

Another advantage is the Macintosh user interface, which allows engineers new to the Mac to start

working in a few hours and become fluent in two weeks. You need days of training to use *AutoCAD* and weeks or months to become fluent.

A third Macintosh advantage is that it lets you move designs easily from program to program at different stages of a project. For instance, you could easily shift a CAD drawing via the Clipboard to *MacPaint* for touching up, then transfer the drawing to *PageMaker* and print a high-quality technical document.

CAD Fundamentals

Creating, editing, transmitting, and storing drawings are completely electronic processes with CAD. CAD programs give you instant erasure and numerous special aids for structured drawing. For creating designs with specific lengths, widths, and depths, most CAD programs display a grid and automatically calculate and draw tangents, fillets, circles, perpendiculars, and different views of an object. They also have multiple layers, which you display as you choose.

For adding cross-hatching and labels, most programs offer several fonts and fill patterns, as well as automatic dimensioning. This last feature is essential because manually calculating height and width outside a drawn item is such a time-consuming process.

Lower-level programs like *MacDraw* and *MacDraft* are relatively inexpensive and can help conceptualize floor plans and machine parts. But they don't offer multilayering, perspective views, or rotation from one plane to another, nor do they support large plotters. Programs like *Mac3D*, *Easy3D*, and *MacSpace* let you draw and manipulate objects in three-dimensional space (see "3-D In Depth," *Macworld*, June 1986), but they lack the features needed to solve sophisticated engineering problems.

The New CAD Programs

Among Macintosh CAD programs, *EZ-Draft* and *Professional CAD for the Mac* appeal to mechanical engineers, who need a rather rigid format; *Dimension* appeals to designers and architects, who like the numerous fonts and fills, the ability to stretch circles and squares on the screen, and the greater freehand capacity.

Bridgeport Machines' *EZ-Draft*, the first of the Macintosh CAD packages, permits six views of an object—top, bottom, and four sides—and lets you project from one to another. With what Bridgeport calls *dynamic dimensioning* you create dimensions with or without tolerancing data and move and edit the dimensions easily. *EZ-Draft* has 256 layers, an IGES (International Graphics Exchange Standard) interface for communicating with mainframes, a macro capacity, and good documentation. An upgrade, which at press time was slated for release in mid-August, includes an Undo command, fonts and fillets for architects, and a tenfold increase in speed. *EZ-Draft* was originally ported from VAX and Apollo machines; future releases will follow the Macintosh user interface more closely. Bridgeport is also developing a translator that allows *EZ-Draft* to read *AutoCAD* files.

EZ-Draft is clearly the most complete CAD program available on the Macintosh, but the new version will require 1 megabyte of RAM and cost \$2495.

Professional CAD for the Mac, from Micro CAD/CAM, is a smaller, less expensive package that fits onto a single 400K disk and sells for \$800. Like *EZ-Draft*, *Professional CAD* addresses mainly mechanical engineers and has good preliminary notices. The program offers 40 layers, mirroring, adjustable grids,



Glowing globes created in Visual Information's *Dimension* via ray tracing and displayed on the VMI Intelligent Monitor.

splines, and an interface to most plotters. *Professional CAD* also works with the company's CAM software. To fit *Professional CAD* onto a 400K disk and get the program to run efficiently on a 512K Mac, Micro CAD/CAM had to sacrifice 3-D capability, an Undo command, and a macro language. However, *Professional CAD* sells for a third of the price of, runs faster than, and follows the Mac user interface better than *EZ-Draft*. Future plans for the product include 3-D projection, an IGES interface, and additional architectural fills.

Dimension, a \$750 program from Visual Information, specializes in conceptual design. The program lets you create surface-sculptured solid models and is the first Macintosh CAD program with a true 3-D database. *Dimension* rotates the perspective and manipulates up to 16 simultaneous views; the program includes mirroring, infinite nested groups, and color options. *Dimension* should appeal mainly to architects, engineers, and others preparing technical documents. Ideally, *Dimension* should let you move designs to 2-D programs to create more precise renderings. To that end, Visual Information is working with 2-D program developers so that files can be exchanged.

Minicad, from Diehl Graphsoft, began as a one-person project at the Johns Hopkins Applied Physics Lab. After several incarnations, it became a two-dimensional CAD system with a three-dimensional designer. Objects can transfer freely between the 2-D and 3-D modules, with no size restriction. The 2-D portion is *MacDraw*-like but with higher precision, 15 layers, and color capacity. And the program formats for standard A, B, C, D, E, and F plotter sheets. However, the \$395 *Minicad* still lacks a macro language and fill capacity and doesn't yet support IGES.



Professor William R. Dale at Cal Poly, Pomona. Cal Poly's computer-aided design program is one of the largest in the country, with over 1200 architecture, landscape architecture, and planning students.

Templates

Like *MacPaint*, CAD programs can be supplemented by templates—clip-art-like drawings that plug right into a design. Architects, for instance, require illustrations of items such as gates, doors, windows, and trees. The number of templates available for a CAD program can greatly affect its value. *AutoCAD* on the IBM PC is no longer the most efficient CAD software around, but it benefits greatly from the number of templates written for it. This fall CompServCo expects to introduce one architectural and two engineering templates for both *EZ-Draft* and *Professional CAD for the Mac*. The company already offers *MacCAD*, a collection of 12 libraries of three to four disks each for *MacDraw* and *MacDraft*.

Specialty Software

A great variety of specialty programs are also available. For example, SolarSoft offers *Sumpas* to help engineers and architects calculate indoor temperatures for buildings. A different kind of specialty program aids printed circuit board (PCB) designers. Vamp sells *McCAD*, a series of sophisticated integrated CAD modules that automates the PCB design-and-analysis process. *McCAD* modules are currently in use at companies like Hughes, Motorola, and RCA. Bishop Graphics' *Quik Circuit* helps engineers to create products efficiently for the Macintosh itself. With this program Micrographic Images designed and laid out its first 1-megabyte upgrade board in a day and a half.

Two more specialty programs deserve mention here: *DesignScope*, from BrainPower, allows an engineer to take a block diagram, assign parameters, and run a simulation to see if the design works; *Frame-Mac* is a structural engineering package that Erez Anzel distributes for designing and analyzing two-dimensional frames or trusses with any number of nodes and prismatic elements. Anzel also developed *Beamac II*, a program for analyzing and designing continuous (indeterminate, multispans) or simply supported beams.

Configurations of Macintosh CAD

The Macintosh is most often used for CAD in conjunction with other computers. In the space station program at Martin Marietta, where some engineers have IBM PCs, Centram's *TOPS* network connects all the computers. However, the Mac generally links to larger machines, either as a complement or as a terminal.

Given the cost of minicomputer workstations, companies often buy Macs for simple work and reserve their minis for more complex tasks. Other companies tie the Mac, as a terminal, to a larger system. At Alcoa's Technical Center near Pittsburgh, Macs act as VT-100 and Tektronics graphics terminals for engineers seeking to improve metalworking processes.

Academia is also advancing the idea of connecting the Mac to other computer systems. At the University of Michigan, the MacApollo Project is developing a distributed computing environment to serve more than 6000 students and teachers. The project has al-

ready achieved its first milestone: an RS-232 connection between a Mac and an Apollo. This product is available in the public domain through the Apollo Domain Users Society. Eventually the MacApollo Project should connect several Macs on a network to a gateway for an Apollo network.

The Mac's Future

The Macintosh is not yet the dream machine for desktop engineering, but it's making headway. For designers who prefer a larger CRT, the MegaScreen, from Micrographic Images, offers 1024- by 921-pixel resolution and increases the Mac's display size by four to six times. MegaScreen currently works with most CAD programs, with the major exception of *EZ-Draft*.

Colors make the layers of a complex drawing much more distinct, a real plus for applications such as floor plans and topographical maps. Fortunately, a full-color, 640- by 480-pixel screen is available for the Mac from Vermont Microsystems. The company also makes "smart" boards for its monitors that convert CAD specifications to screen images displaying up to 256 colors at once, out of a palette of 250,000. However, programs must be written specifically for these boards; thus far, only *EZ-Draft* and *Dimension* work with them. The monitors retail at \$2195 for the 13-inch model and \$4495 for the 19-inch model. When Apple comes out with its new Macintosh next year, the Vermont Microsystems graphics boards should plug right in.

Since CAD programs perform many calculations over and over, a 68881 floating-point coprocessor, which handles over 40 complex mathematical functions, speeds up the design process considerably. Four upgrades substantially increase the Mac's processing power: Novy Systems' Floating Point Accelerator; Quesse Computer's Maccelerator; the HyperDrive 2000, from General Computer; and the Levco Prodigy 4. All four boards supply the Mac with a floating-point coprocessor; in addition, the Levco and General Computer products replace the Mac's 68000 processor with



VAMP's George Soluk waits while a plotter rolls out a printed circuit design created in *McCAD*.

A Sampling of CAD Products for the Mac

DesignScope

BrainPower
818/884-6911
List price: \$249.95

Dimension

Visual Information, Inc.
818/918-8834
List price: \$750, Dimension/
Color \$1250, solid shading
add-on module \$995

Easy3D

Enabling Technologies, Inc.
312/427-0408
List price: \$99

EZ-Draft

Bridgeport Machines
215/659-5055
List price: \$2495, \$1995 limited-
time introductory offer

Floating Point Accelerator

Novy Systems Inc.
904/427-2358
List price: \$449

Frame-Mac, Beamac II

Erez Anzel
212/884-5798
List price: Frame-Mac \$495,
Beamac II \$295

HyperDrive 2000

General Computer Corp.
800/422-0101, 617/492-5500
List price: \$3195

Intelligent Monitor

Vermont Microsystems, Inc.
800/354-0055, 802/655-3800 in
Vermont
List price: 13-inch \$2195, 19-
inch \$4495

MacCAD

CompServCo
800/272-5533, 504/649-0484
List price: \$69 to \$169 per tem-
plate package

Maccelerator with Quick- SANE software

Quesse Computer Co., Inc.
206/392-7701
List price: \$495, \$995 bundled
with the Consulair Direct Ac-
cess C Compiler and installa-
tion kit

MacDraft

Innovative Data Design, Inc.
415/680-6818
List price: \$239

MacDraw

Apple Computer, Inc.
408/996-1010
List price: \$195

MacSpace

Abvent
213/659-5157
List price: \$395

McCAD

Vamp Inc.
213/466-5533
List price: \$395 to \$595 per
module

McNET

Argus Software
617/475-8952
List price: \$250, Components
Library Builder \$100, demo
disk \$50

MegaScreen

Micrographic Images Corp.
818/407-0571
List price: \$2995, without
monitor \$1495

Minicad

Diehl Graphsoft
301/461-9488
List price: \$395

Prodigy 4

Levco
619/457-2011
List price: \$7000

Professional CAD for the Mac

Micro CAD/CAM Inc.
213/838-7851
List price: \$800

Quik Circuit

Bishop Graphics CAD
Systems Corp.
818/991-2600
List price: \$695, \$15 for
demo disk

Sunpas

SolarSoft, a division of Kinetic
Software, Inc.
415/342-3338
List price: \$189

a faster chip. (For a thorough discussion of these up-grades see "New Ways to a Faster Mac," *Macworld*, August 1986.)

Many observers think Apple's next Mac or Mac-like machine will feature a 68020 CPU and a 68881 coprocessor. It may also have UNIX, which has become a standard in the technical world. Such a computer would spread the CAD revolution even further and faster. To that end, Apple recently acquired rights to Cadmus Computer Systems' proprietary software, which is based on a UNIX workstation that runs on the 68020 microprocessor and has the graphics user inter-

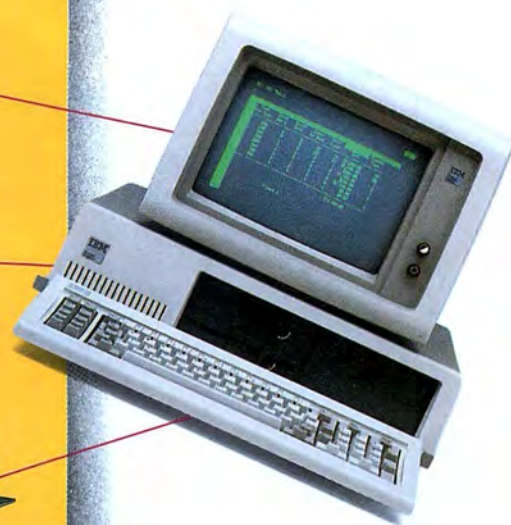
face of the Macintosh and a distributed file system for Macs and IBM PCs.

But even without such a super-CAD device, the Macintosh is well poised to shape the contours of desktop engineering and perhaps become one of engineers' premier machines. □

• • • • • Paul Freiburger
and Dan McNeill are coauthors of *Com-
puter Sense* (Bantam, 1986) and other
books and contributors to *MacOffice*
(Compute! Publications, 1985).

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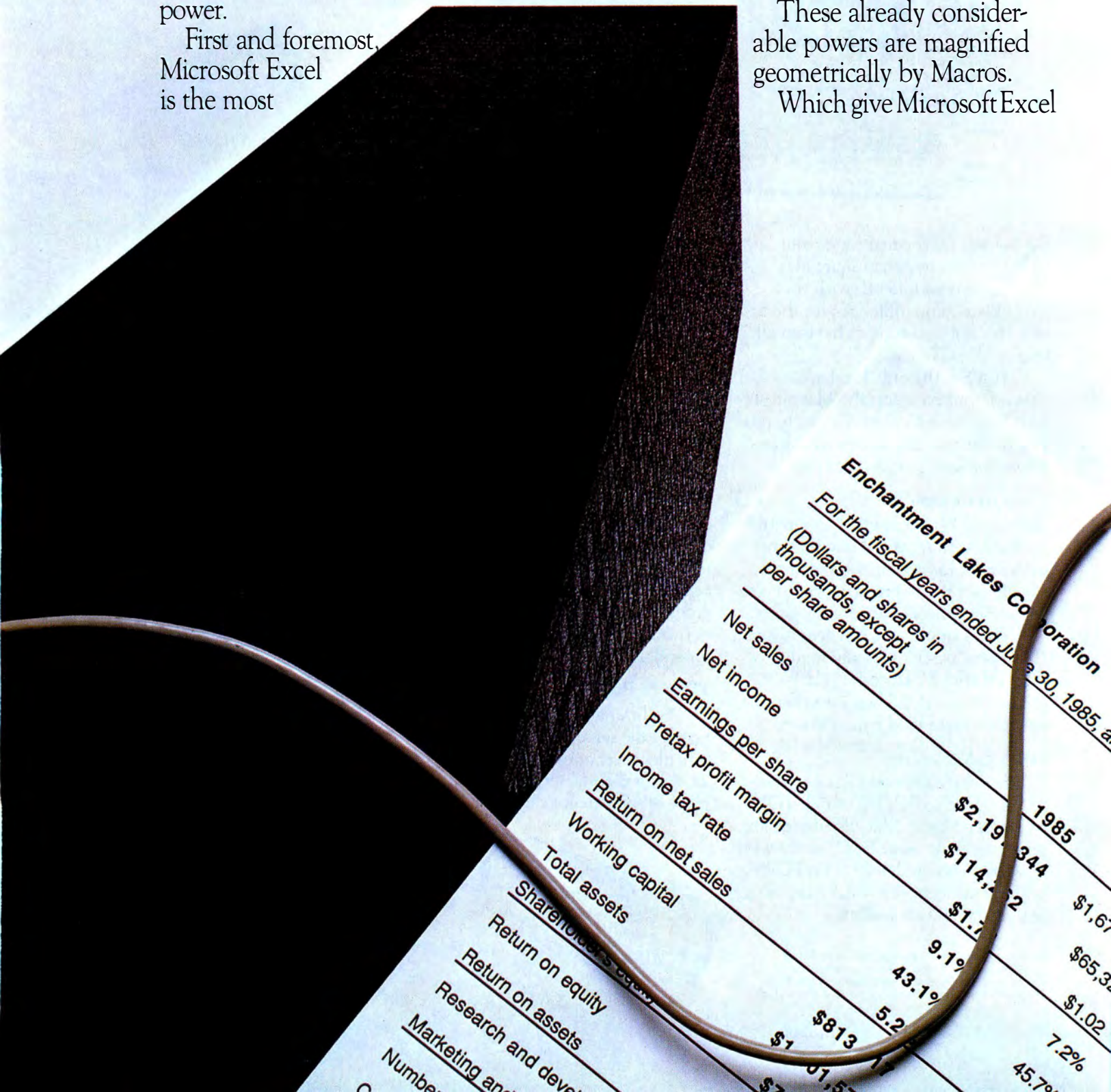
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Macware Reviews

ComicWorks, Record Holder, FullPaint, MaxThink, KidsTime, Uninvited, MacKeymeleon, MacInker, and Orbiter

Edited by Erfert Nielson

Comic Relief

Considering the levity of the Sunday comics, it's sometimes difficult to appreciate the amount of work that goes into them. But as anyone who has ever drawn a comic strip knows, cartooning is a labor-intensive art. **ComicWorks** promises some relief from the drudgery of creating repetitive panels by providing a cartoonist's wish list of features specifically geared to producing comic strips and comic books. *Macworld* examined a prerelease version of this exciting new program, which was developed by MacroMind and published by Mindscape.

ComicWorks combines the capabilities of bit-mapped programs like *MacPaint* with the object-oriented approach of programs like *MacDraw*. If you're not a cartoonist, **ComicWorks** doubles as a limited desktop publishing program, allowing for the easy integration of text and art in greeting cards, short newsletters, and flyers.

A Panel Discussion

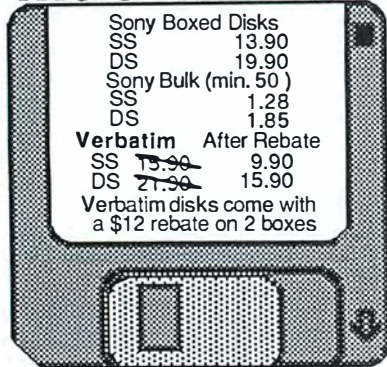
Whether you're drawing a daily strip or a monthly comic book, the steps are usually the same: ruling panel borders, lettering dialog balloons, and drawing the same characters over and over—often in recurring poses. Creating a comic strip with **ComicWorks** is similar to drawing a strip by hand. To start making panels, click on the New Panel tool, select a spot on the screen, and drag the panel to the size you want. Resize and reshape a panel by dragging its handles.



You then use the New Easel tool to produce a drawing area, an *easel*, within a panel. All the familiar *MacPaint* drawing tools work within this easel (see "Launching a Cartoon"). Unlike a *MacPaint* drawing, however, each easel—and the drawing it holds—exists as an autonomous, movable object, which you can move without disturbing other easels and place in front of or behind them. Numerous easels fit in a single panel to illustrate individual elements such as characters, objects, and background. The Easel Switcher tool lets you find a buried easel by flipping through a panel's stack of easels one by one.

(continues)

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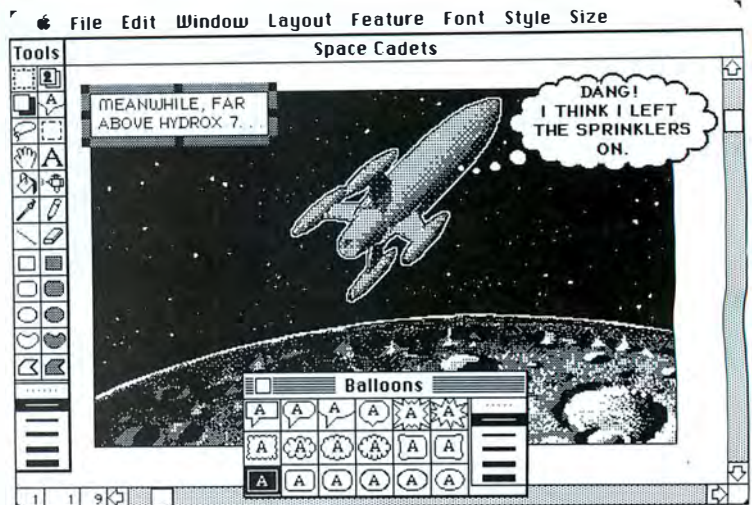
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Launching a Cartoon

The ComicWorks screen resembles MacPaint, with a few exceptions. Four new tools occupy the top of the tool rack. The palette of dialog balloons, along with the tool rack and other palettes, can be hidden for full-screen drawing.



Meaningful Dialog

The words of comic characters most often appear within the whimsical confines of dialog balloons. You create balloons by dragging a balloon style from a specialized palette containing balloon-style icons and begin typing in the dialog. Unlike with *MacPaint*, text automatically wraps around to fit within the balloon. You can later change the balloon's shape or size; text reshapes itself to match the new balloon's dimensions. Moreover, you can edit a balloon's text at any time, changing fonts, type sizes, styles, and justification. This word processing capability, combined with the ability to place balloons of any shape or size anywhere on a page, allows *ComicWorks* to double as a page-makeup program. A text-filled rectangular balloon with an invisible border can also be interpreted as a column of text.

You can type text in custom comic fonts such as Crypt and Commando or stick to tamer fare like New York and Geneva (or their LaserWriter equivalents, Times and Helvetica) or add fonts with Apple's Font/DA Mover.

Drawing in Detail

If you thought *MacPaint*'s spray can was pretty good, wait until you see the action on the *ComicWorks* airbrush. You can alter the airbrush's spray size from tiny to large in ten increments by pressing the ten number keys. Then it's up to the plus and minus keys to fine-tune these changes in one-pixel increments. You can also vary the spray density.

Several sizes of FatBits are available, making detail work much easier. And a unique ThinBits feature places a miniature version of the current page next to the full-size page. All of *ComicWorks*' tools and

commands work on both pages. Drawing on the full page lets you sketch a large figure or lay out a page without constantly moving the drawing window. The Show Pages command displays a reduced version of two adjacent pages.

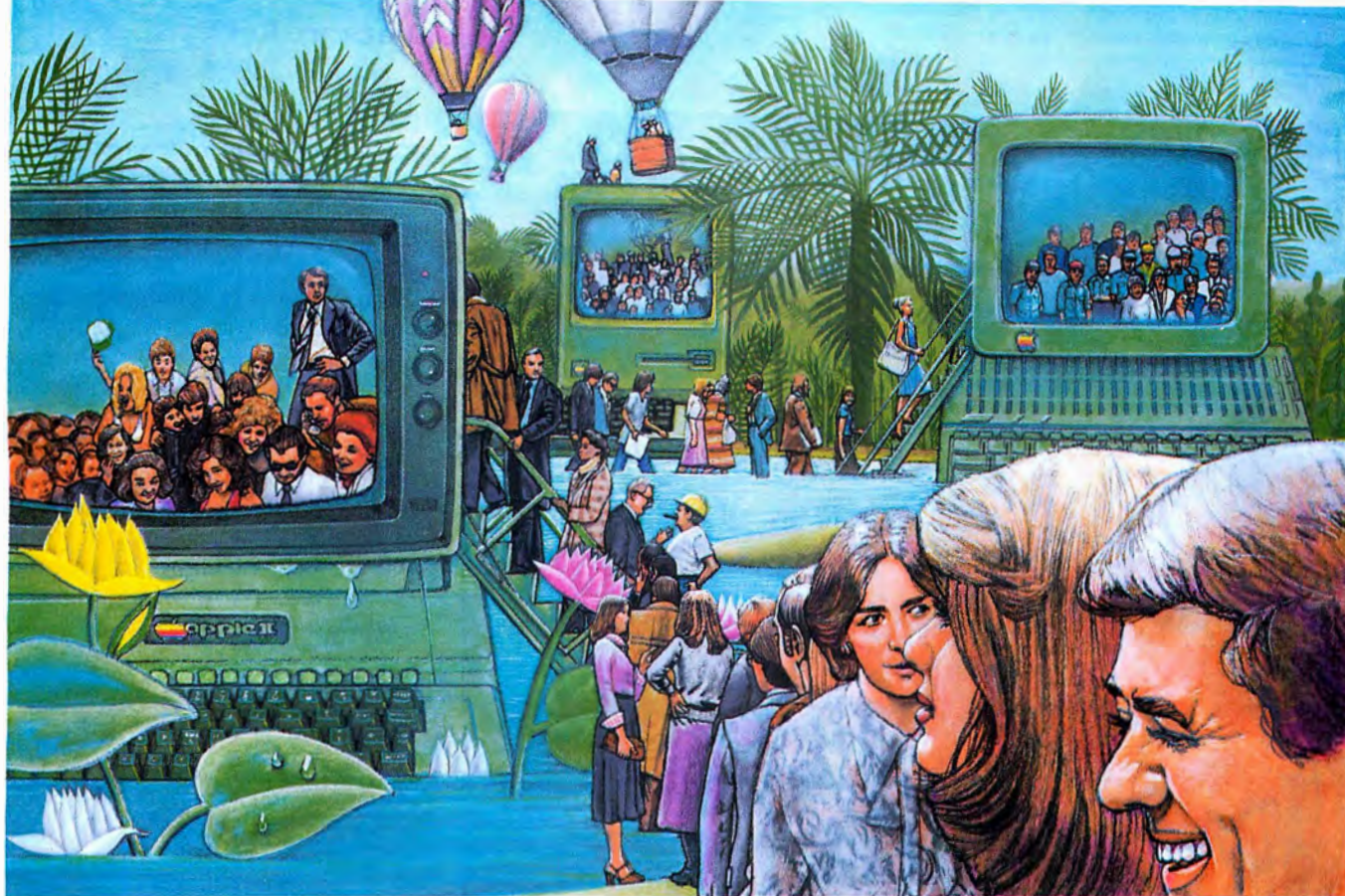
Detail work is further facilitated by buttons that let you move in sequence from page to page, panel to panel, or easel to easel and a grid that resizes to inches, centimeters, or pixels. *ComicWorks* also lets you draw in eight kinds of "ink," which are similar to the special effects in *VideoWorks*. These menu choices let one drawing show through another, reverse blacks and whites when drawings overlap, and so on.

Print and Paste Extras

Art Grabber+ and PosterMaker are two additional programs that come with *ComicWorks*, along with a disk of clip art by Mike Saenz, creator of *Shatter*, the first comic book produced with the Macintosh. The ArtGrabber+ desk accessory provides easy access to *MacPaint* files from within *ComicWorks*. PosterMaker divides documents into printable subsections for enlarging comic strips or *MacPaint* documents to poster or billboard size. Pasting printed subsections together produces posters as large as 26 feet by 21 feet.

As far as printing goes, *ComicWorks* was designed primarily with the ImageWriter in mind. The program supports the LaserWriter to a certain extent, but printing is slow when bit-mapped graphics and LaserWriter fonts are combined in a document. Like *MacPaint*, *ComicWorks* doesn't

(continues)



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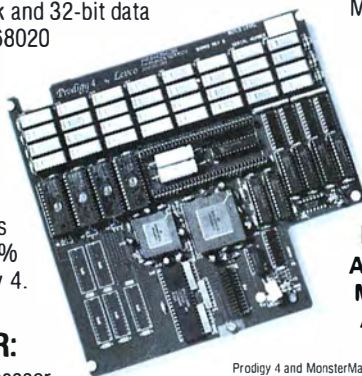
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—Jay Kinney

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In the data department, *Record Holder* lacks the picture fields that make *File* ideal for storing digitized images, and it does not allow you to paste a picture into a form layout, as does *FileMaker*. *Record Holder* handles only text, number, currency, and date values. You can designate computed fields to process values according to a user-specified formula, but *Record Holder* cannot display data as flexibly as its competitors can. For example, dates appear in only one format, and you cannot change a field's alignment to center or right-justify its contents.

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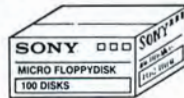


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Record Holder does shine in one crucial area in which *File* and *FileMaker* fall flat. You can specify any field as "required," meaning that it must contain data before *Record Holder* accepts a record. Specifying important fields as required helps ensure that a record is complete.

Forms, Finds, and Reports

Record Holder's form-design facility adequately creates simple data entry and retrieval screens. With the drag function you can position fields anywhere, and all Mac fonts, sizes, and styles are available. A horizontal ruler appears when you're designing a form, but it doesn't allow the precise positioning provided by *FileMaker's* T square. *Record Holder* also lacks *FileMaker's* line- and box-drawing tools for sprucing up forms.

Unlike *File* and *FileMaker*, a *Record Holder* database can have only one form layout. Both *File* and *FileMaker* can create a virtually limitless array of forms and switch between them quickly, letting you specify precise entry or retrieval requirements. Also, unlike *File*, *Record Holder* can't show a database in table form, a format useful for quick browsing and proofreading.

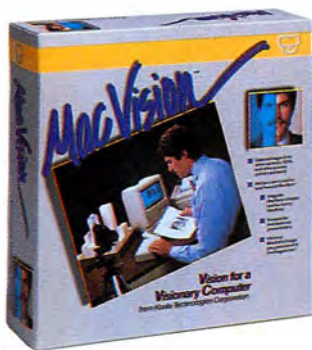
Record Holder's form features may be limited, but its data entry and searching talents aren't. A complete set of ⌘-key shortcuts lets you zip through data entry sessions without having to reach for the mouse. You can even move the cursor left and right using the arrow keys on a numeric keypad or by pressing Option-← and Option-→. And to cut down on repetitive typing, *Record Holder* lets you specify that fields not be cleared when a record is added.

Record Holder makes it easy to locate data. Menu commands and an icon in the form window let you browse through a database one record at a time (see "Browsing Records"). To locate specific records, you can type search criteria in the What to Find window. *Record Holder* allows more specific search specifications than either *File* or *FileMaker*. Along with relational operators (greater-than, less-than, equal-to), you can use logical operators (AND, OR, NOT) to create very specific search specifications (for example, all employees earning less than \$20,000 or more than \$30,000 who do not work in the accounting department).

(continues)

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Live Action to Newsletter ...in Seconds



Ted Benhari is Public Information Officer at Dominican Hospital in Santa Cruz, CA. He is very much into Desktop Publishing. He produces numerous publications for the hospital, including "The Dominigram," a magazine for the general public, "The Scanner," a newsletter for employees, and a catalog promoting various classes at the hospital's Education Center. Ted likes having the ability to digitize

three-dimensional objects. **He can go from live action to his newsletter in seconds.** MacVision™ saves him time and money and gives him tremendous creative flexibility in his publishing efforts. If you need to image three-dimensional objects (buildings, displays, people, products, etc. as well as flat art) you will need MacVision™. It's that simple. And **each MacVision™ package contains valuable coupons** for special discounts on color and black-and-white cameras so you can go from live action to print in seconds. **Save \$366 on a Panasonic Camcorder and \$85 on a black and white camera.** MacVision™ is available at leading computer dealers everywhere.

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Alphonse Castaneda...Blooming Genius

The gorgeous orchid corsages at the Hospital's Employee Service Award Dinner came not from some South American jungle, but from the carefully tended plants grown locally by Alphonse Castaneda, the instrument technician in the Surgery Department.

Alphonse has been growing orchids for seven years. Bloomed from a hobby into a part-time vocation, his orchids are in great demand by local flower shops for retailing to the public.

Orchids' delicate beauty belies their durability. They make great gifts - a cut stem

laden with flowers, called a spray, can last for one to two months, Alphonse says. He grows his plants by cloning them in petri dishes, or sometimes varieties through hybridization. The work is exacting, as is his delicate adjustments of the sophisticated surgical equipment.

My gift hints to make sure everything used in an operation is working properly," says Alphonse. "It requires great care and the ability to troubleshoot during a procedure if something isn't working as well as it should.

Alphonse's expertise goes beyond mere

maintenance. He redesigned a surgical saw used for cutting through blocks of vertebrae fusions. "The improvement makes the procedure go a lot faster," Alphonse says with justifiable pride.

Alphonse was a prime mover in organizing the Hospital softball team, although his schedule doesn't permit him to play this year. The team's boost morale by helping people from different departments get to know each other as people," he says, "not just as functions."

This is very important to Alphonse, who, as anyone who knows him will affirm, is a real "people person," with a well-deserved reputation for kindness and generosity.

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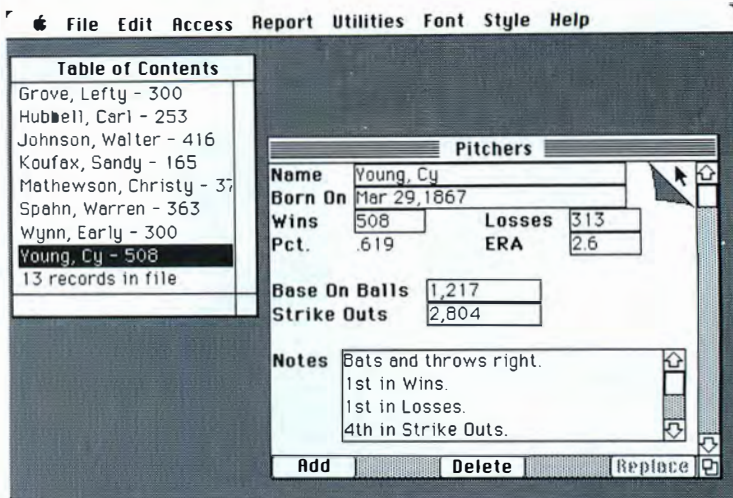
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Record Holder's unique Table of Contents window lets you locate a specific record by selecting its table-of-contents entry, a less technical way of referring to a database's index fields—the fields on which a database is sorted. You can see roughly 18 table-of-contents entries at once, meaning you have one-click access to 18 records. As the Mac's Open dialog box does, *Record Holder* scrolls to the first file that begins with a typed character.

Record Holder's reporting features let you put data on paper easily and effectively. You can create tabular reports with headers (no footers, however) and generate free-form reports such as invoices or forms. Like its competition, *Record Holder* prints totals and averages, though the minimum, maximum, and standard deviation functions available in *File* are missing. Unlike its peers, *Record Holder* can print more than one mailing label across the page, giving you more choices when shopping for labels. *Record Holder* also lets you preview a report on screen before printing, compensating somewhat for the lack of a tabular display.



Browsing Records

With *Record Holder* you can leaf through a database by clicking the browse icon. You can also jump to a given record by clicking its entry in the Table of Contents window or by typing its first few characters. Also noteworthy are the vertical scroll bars that *Record Holder* adds to lengthy text fields.

Record Holder communicates with other programs through its Import and Export commands, which read or save files whose records are separated by carriage return codes and whose fields are separated by tab characters or commas. *Record Holder* can't access SYLK files as can *File-Maker*, but its data-interchange features are sufficient for exchanging files with other data managers such as *Interlace*, *Microsoft File*, and *Helix*—or with word processors.

Not Lost in the Crowd

Despite some shortcomings—only one form layout per file, no graphics capabilities, and few functions for analyzing data in reports—*Record Holder* commands a place in the crowded market of Mac data managers. Its searching and browsing skills are strong, its manual and help screens are

(continues)

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MARK ULRICH

clear and concise, and it's only a bit harder to use than a notebook or index card file. And at \$49.95, it isn't much more expensive, either. Software Discoveries plans to up the ante to \$69.95 in October, but even that beats the competition. *Record Holder* brings simple, effective filing within anyone's reach. Maybe it does break new ground after all. —Jim Heid

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Paint Your Bandwagon

Although *MacPaint* is an excellent program, most of us have lists of features we wish it had. Several companies have recently come up with their own piecemeal solutions: T/Maker Graphics' *ClickArt Effects* rotates and slants objects, while Silicon Beach Software's *Paint Cutter* takes care of cutting and pasting large sections of drawings.

The first company to transform its wish list into a stand-alone program was Ann Arbor Softworks. Its program, **FullPaint**, is a significant improvement on *MacPaint*, combining the features of several *MacPaint* add-ons with a number of other good ideas. *FullPaint* is not a revolutionary advance in Macintosh graphics software. Indeed, at first glance *FullPaint* looks just like *MacPaint*. But a keen eye will quickly discern a few additions to the *MacPaint* screen: a menu called Windows, scroll bars and a grow box in the document window, and three new icons at the bottom of the tool palette. Together they comprise *FullPaint*'s two major advances: the ability to access up to four documents simultaneously and the ability to work on a document that fills the entire screen.

Windows and Views

After opening two or more windows, you can cut and paste sections of one document into another without having to close any files or use a desk accessory like *QuickPaint* or *Art Grabber*. You can arrange the windows any way you like by resizing them with the grow box and moving them with the title bar. Double-click on the title bar, and a window expands to the edges of the screen. Double-click again, and it shrinks to its previous size. With the

(continues)

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Windows menu you can bring hidden windows into view or rearrange them neatly on the screen. Unlike *MacPaint*, *FullPaint* lets you keep desk accessory windows open for reference while you work.

The three icons at the bottom of the tool palette represent the program's three view options. Clicking the left-hand icon produces a view similar to *MacPaint*'s screen layout. The central icon expands a document so that it fills the screen up to the menu bar; scroll bars and title bar are missing, and the tool and pattern palettes sit on top of the document (see "The Big Screen"). The icon on the right provides a full-screen view that obliterates the menu bar (although many commands and the menu bar itself are still accessible through \mathbb{A} -key combinations). In all three viewing modes, the palettes can be dragged anywhere on the screen and can even be removed or recalled by pressing the space bar.

Improved Tools

Although the three view icons are the only additions to the tool palette itself, *FullPaint* has enhanced the functions of



many existing tools. For example, not only can you choose a brush shape but you can create your own brushes as well. The Option, Shift, and \mathbb{A} keys play a much wider (and often more consistent) role in the use of several tools. For instance, many *MacPaint* masters know that pressing Option while using the pencil changes the pencil into the hand, allowing them to move the drawing area. In *FullPaint*, this time-saving technique also works with the eraser. Other tool and keystroke combinations al-

low you to select areas larger than the window, type white letters on a black background, and perform other useful operations. And the program provides enough \mathbb{A} -key equivalents to use up almost every letter in the alphabet. In addition, *FullPaint* tops *MacPaint* in the docu-

(continues)

The Big Screen

In *FullPaint*'s full-screen view, the active document fills the entire screen, and the palettes float above it. The palettes can be placed anywhere on the screen or erased by pressing the space bar, and many tools can pass "underneath" the palettes as if they weren't there.

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mentation department; the program's 94-page manual far exceeds *MacPaint*'s skimpy one.

FullPaint adds a number of bells and whistles likely to be found on many people's *MacPaint* wish lists. These include four special-effects commands similar to those found in *ClickArt Effects*: Free Rotate, Distort, Perspective, and Skew. You can add a custom font size (from 1-point to 127-point) to the FontSize menu, although most of the resulting fonts are not too attractive. One convenient option lets you double-click on an object to lasso it, rather than painstakingly surround it with the lasso. FatBits AutoScroll scrolls the window when you reach the edge, allowing you to continue drawing without jumping in and out of FatBits.

Several *FullPaint* features prove helpful for precision work. The program contains rulers that can measure inches, picas, centimeters, or pixels. The Mouse Crawl option restricts drawing tools to one-pixel increments. Mouse Crawl makes the most sense combined with MouseSpot, a small window that displays the current pointer

location and the dimensions of any object created by dragging, such as a rectangle or a circle.

On Compatibility, Printing, and Life

MacPaint is an eminently compatible program that allows you to transfer illustrations into documents produced by other programs; *FullPaint* shares this ability. I combined *FullPaint* documents with those of several other applications, including *PageMaker*, *PictureBase*, *MacWrite*, and *Microsoft Word*, and encountered no compatibility problems.

When you're ready for some hard copy, *FullPaint* offers a range of printing options. An ImageWriter can print an entire document or a section at normal, half, double, or quadruple size (enlarged documents are printed on more than one page, if necessary). A LaserWriter can produce copy anywhere between 25 and 400 percent of original size. *FullPaint* also includes LaserPrint, a program that enhances a document's appearance for high-resolution (150 and 300 dots per inch) printing.

A final note: a *FullPaint* goody that probably never graced anyone's wish list

but that is entertaining nonetheless is the Game of Life. If you're experiencing illustrator's block and want to while away a few minutes, surround an area with the marquee and press **⌘-Option-L** repeatedly. Select Undo to restore your drawing.

Full Enough?

With such an abundance of new features, what could anyone find to complain about? Not much, actually, but enough to make at least a few people think twice before buying *FullPaint*. The most serious drawbacks? It lacks full-page drawing capability and a horizontal, or landscape, mode. In addition, *FullPaint* is clearly geared to the new, Mac Plus generation. That's no concern for the growing number of Mac Plus owners, but it can be for the rest of us. For example, you can use *FullPaint* with *Switcher*, but not on a 512K Mac (unless you enjoy shifting from *Switcher* to *FullPaint* and back). Also, on a 512K Mac

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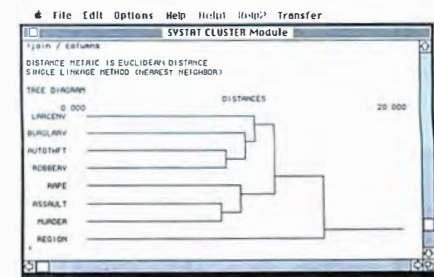


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71	55.000	61.000	1.000	2.000	1.000
81	53.000	63.000	2.000	1.800	2.000
91	78.800	64.000	1.000		
101	80.000	67.000	2.000	1.000	2.800
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Macware Reviews

it's impossible to open four documents at once—the program allows you access to only three. But the program's worst sin may be its key disk copy-protection scheme (hard disk owners get two hard disk installs that do not require a key disk), which results in unnecessary aggravation and a black mark on an otherwise respectable program.

FullPaint is a powerful tool that transcends the features you can get by souping up *MacPaint* with various add-ons. But the program is, as they say, evolutionary, not revolutionary. Mac Plus owners are the logical candidates for a *FullPaint* purchase, since *MacPaint* is not bundled with the Plus and is more expensive and less versatile than *FullPaint*. Owners of 512K Macs who already have *MacPaint* should think carefully before buying *FullPaint*, especially if they already own *MacPaint* add-ons.—Robert C. Eckhardt

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Order out of Chaos

Outline processors let you toss ideas onto your computer screen and shunt them around until they make sense. *MaxThink*, by MaxThink, closely follows the format set by its sole competitors in the Mac outline marketplace—Living Videotext's *ThinkTank* and *ThinkTank 512*. The program's underlying hierarchical structure organizes topics into headings with subtopics, prefaced by a plus sign, and headings without subtopics, indicated with a minus sign (see "A MaxThink Screen"). A few keystrokes or mouse clicks change a topic to a subtopic or reorder existing headings. Unlike *ThinkTank*, *MaxThink* lets you expand a single entry into several pages of text, but you can't add graphics to an outline. *MaxThink* provides the essential tools for creating coherent outlines and includes on-screen tutorials, all for just \$89—less than half the price of *ThinkTank 512*.

Movers and Shapers

Although you'll find more ways to organize headlines using *MaxThink* than with *ThinkTank*, *MaxThink*'s default mode for moving headlines is a slow, four-

(continues)

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Macware Reviews

step process: click on a heading, cut it to the Clipboard, click on a destination heading, and select Paste, Paste After, or Paste Before from the Edit menu. A more direct method, Fast-Move, cuts the steps in half but must first be invoked through keyboard commands or a menu selection. Click on a topic, and it disappears; click on a second topic, and the hidden topic reappears above the current one or as a subtopic, depending on where you're positioned. In contrast to *ThinkTank*, *MaxThink* also streamlines operations on a range of headings: simply stretch a rectangle around desired topics and choose a command such as Cut or Copy. Select All instantly captures the entire outline as a range.

MaxThink's Sort menu provides five separate functions for reorganizing headings. Prioritize lets you click on headings one by one to create a newly ordered outline. Binsort lets you designate any number of topics as categories, or "bins," and then assign separate headings to each. Both are good features, but you must leave the main outline to perform them. The other three sort functions alphabetize headings, remove all indentations, and randomly reorder headings (to produce "new patterns of thought," according to the manual).

Other organizing functions include Toggle Expand, which suppresses or expands all subtopics under a selected range of topics; it is especially useful for developing consistency among headlines at equal levels. The Markers function, which works like a telephone's auto-dial, finds up to eight preselected topics automatically. Use it for permanent headings like phone numbers, schedules, and daily to-do lists. Unfortunately, if you change a topic's text, the marker text associated with it does not change.

A *MaxThink* Screen

Topics without sub-heads are preceded by minus signs, and topics with subheads, by plus signs. When printed, headings are numbered and lettered consecutively. If you want a command to affect more than one topic, stretch a rectangle around the desired range and select the command.

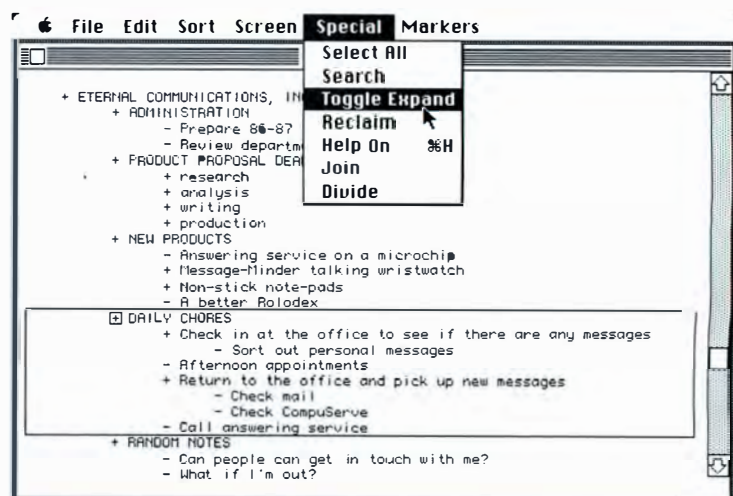
Some *MaxThink* functions have limited value. Search finds only the first occurrence of designated text, Join combines separate entries into one long heading, and Divide separates a multiple-line text entry into individual headings. Join can be useful for combining several topics into one, but you must usually edit the joined headline to have it make any sense. Divide does not let you determine where text will be split. Reclaim resurrects erased headings, starting with the most recent deletion. It works well with topics you have deleted with Clear, but not with the more commonly used Cut command.

From Topic to Text

Unlike *ThinkTank*, *MaxThink*'s word processing features are fully integrated into the outline—you can stretch a single entry into several pages of text without calling up a separate function. However, this is no-frills text editing, offering basic word-wrap and cut-and-paste but no formatting functions. For any substantive writing, you will undoubtedly prefer *MaxThink*'s Write command to create a text file readable by a word processor. Such files created with a word processor can be opened as a *MaxThink* outline; all incoming text appears as a single outline entry.

Printing involves choosing from the Page Setup menu among ten print format options covering margins, indentations, and spacing. The default line numbering scheme replaces the outline's plus and minus signs with consecutive letters and numbers. You can change the scheme and view your formatted outline before saving it or sending it to the printer.

(continues)



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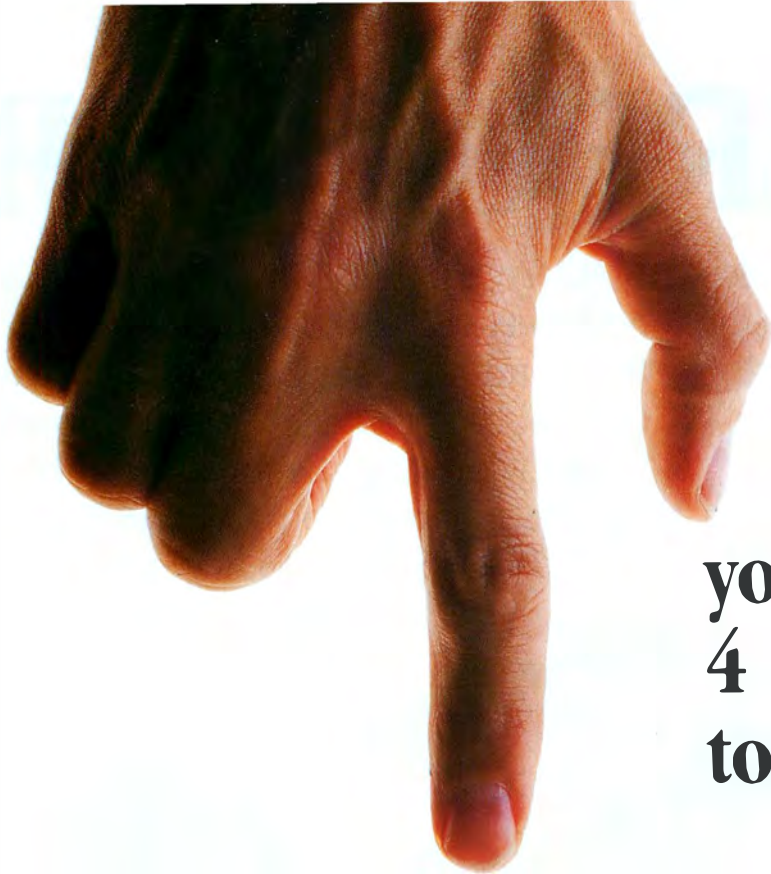
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Three Gripes

Although my general complaints about *MaxThink* aren't earthshaking, they aren't trivial either. First, *MaxThink* takes minimal advantage of the Mac's graphics capabilities. Text appears in a bland 9-point Monaco font with no optional typefaces, and graphics cannot be included in an outline. Second, programming oversights make file management confusing: *MaxThink* asks if you want to save changes when quitting or closing files even if you've done no editing, and opening a new file without returning to the desktop forces you to stare at the previous outline's title until you've saved your new outline. Third, the poorly edited *MaxThink* manual takes some getting used to: only 18 of its 78 pages explain how to use the program, and complex program functions are given short shrift. My advice: read the short "how-to" section and ignore the rest.

MaxThink has a free upgrade program. The current version, 2.2, appears bug-free, although our tests determined it won't work on a 128K Mac. The developers claim they're working on that one. *MaxThink* isn't as elegant as *ThinkTank*, but it is a full-featured outliner that gives *ThinkTank 512* a run for its money. —Reed McManus

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Hey Kids!

Apple may be marketing the Macintosh as a business machine, but anyone who's watched a five-year-old playing with *MacPaint* knows that the Mac can also be a wonderful toy and a fine teacher. Although the Mac's graphic interface is easy for children to understand, few programs have been available for them to use. The number of educational programs is slowly growing, however. Great Wave Software recently introduced *KidsTime*, a package specifically aimed at three- to eight-year-olds. *KidsTime* includes five programs that teach numbers, the alphabet, and basic music skills. Dollar for dollar, it's hard to find software that offers more educational value and fun.

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Dot-to-Dot

Young children will learn the alphabet and numbers by playing Dot-to-Dot, the Mac version of the classic coloring-book activity. The screen shows a sequence of numbered or lettered dots. When all the dots are connected with the mouse, a picture appears. A new puzzle is just a mouse click away. The program comes with ten ready-made puzzles and a puzzle editor that lets you turn *MacPaint* drawings or digitized images into custom dot puzzles.

Match-It

Match-It is really several games, all of which require players to match up cards by dragging them to empty boxes on the screen. Some of the games involve simple matching operations, such as pairing pictures with corresponding letters. Others involve arranging picture fragments into a completed puzzle. The most complex puzzles require the child to fill a two-dimensional matrix, matching shapes with sizes or patterns. Although it wasn't available for this review, a MatchMaker program is promised in the manual that will allow *KidsTime* owners to create their own Match-It puzzles to supplement those that come on the disk.

ABKey

In ABKey, letters and/or pictures appear on the screen. When a child presses the key that corresponds to a letter or a word, it disappears while the computer pronounces it (for example, "uppercase A" or "Apple"). While ABKey is a good teaching tool, the keyboard's QWERTY layout may prove confusing to children who have just learned the alphabet. A big improve-

ment would be an ordered set of alphabet buttons at the bottom of the screen that could be clicked to select letters.

Story Writer

Once children are able to find their way around the keyboard, they can graduate to Story Writer, a sort of mini *MacWrite* that includes a voice. Typed words appear in a text window, and a special Storybook font makes each key into a picture (see "Every Picture Tells a Story"). A Key Caps window at the bottom of the screen shows the locations of letters and pictures. Also at the bottom of the screen are several tools, including a potentially dangerous eraser that can instantly clear away hours of creative effort. Fortunately, the eraser is undoable, but only if the child knows where to find Undo in the Edit menu. Younger kids will enjoy listening to stories being read aloud, but they may have trouble finding the Read All menu option. A read icon would be helpful.

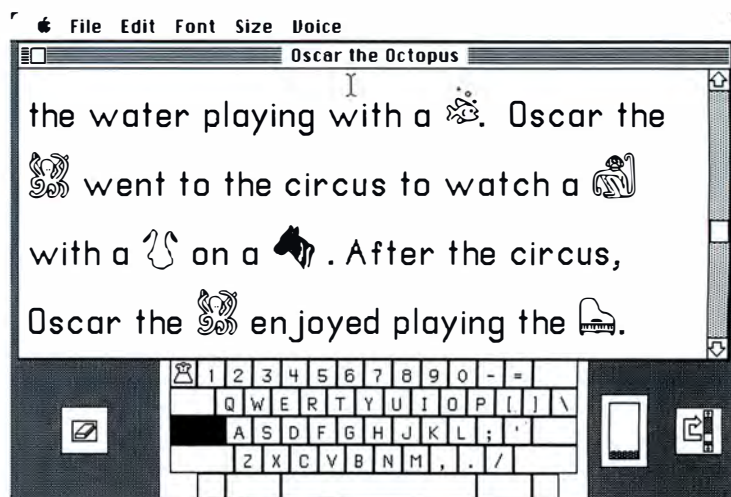
KidsNotes

Finally, there's KidsNotes, a program that allows children to create simple melodies using an on-screen piano keyboard or the Mac's keyboard. Once notes are entered on the musical staff, you can change the time values by clicking on note icons located in a second window, but you can't enter the notes onto the staff by dragging them from the icon window. The staff's main purpose seems to be allowing simple editing of songs before they're saved to disk. As with Story Writer, most pre-

(continues)

Every Picture Tells a Story

In *KidsTime*'s Story Writer, pressing the Shift and Option keys reveals a set of pictures hidden beneath the letter keys on the screen. Pictures inserted into the text are read aloud by the computer when Read All is selected from the Voice menu.



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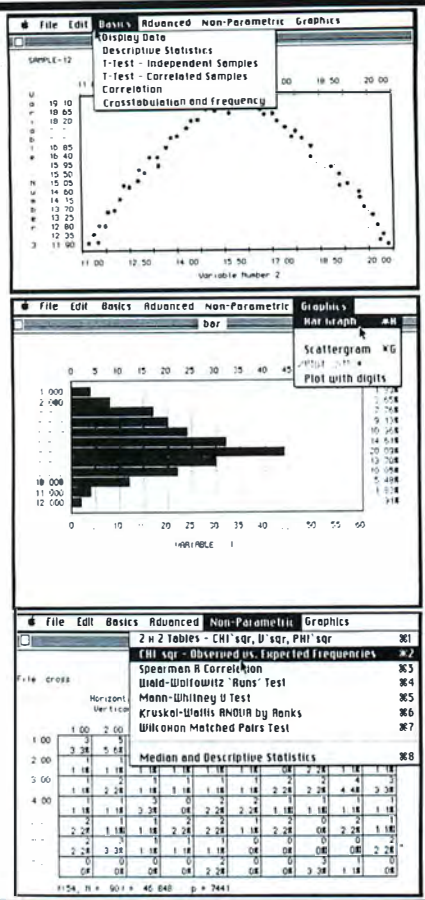
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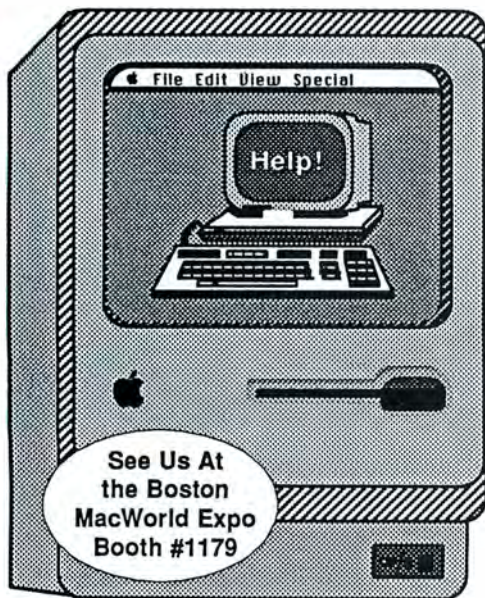
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schoolers will need some help with this program. Unfortunately, kids who can handle KidsNotes by themselves will probably find it of limited interest.

All the Trimmings

The *KidsTime* disk has a special software safety lock that prevents anything from being saved or changed unless a special file is present. Users familiar with the Mac may be frustrated if they dive into *KidsTime* without reading the manual, spend time writing a story or composing a song, and then find out that their composition can't be saved; however, this feature is a wise precaution given the intended users of the program.

KidsTime comes with a thoroughly readable manual that includes a beginner's guide, a discussion of the educational theory, complete instructions for all the games, and tips for advanced use. All in all, the manual is an excellent guide for parents. The only thing missing is a set of instructions aimed at the kids themselves.

Grade Card

Although *KidsTime* is for the most part a well-designed program, young children may have problems using the scroll bars, the pull-down menus, and the keyboard. The designers should have relied more heavily on icons, which even the youngest children can understand. A fully functional Clipboard in Story Writer and Dot-to-Dot would allow parents or children to enhance stories and pictures with other programs, such as *MacWrite* or *Art Grabber*.

But *KidsTime* has so much going for it that these complaints seem minor. The package has so many diverse activities, levels, and features that just about any kid under 12 can enjoy it for hours or days. Simple animation adds reinforcement for young learners, and the computer voice is an effective and exciting teaching tool. The open-ended nature of the program allows parents to create new puzzles, making the games continually fresh, personal, and creative. *George Beekman*

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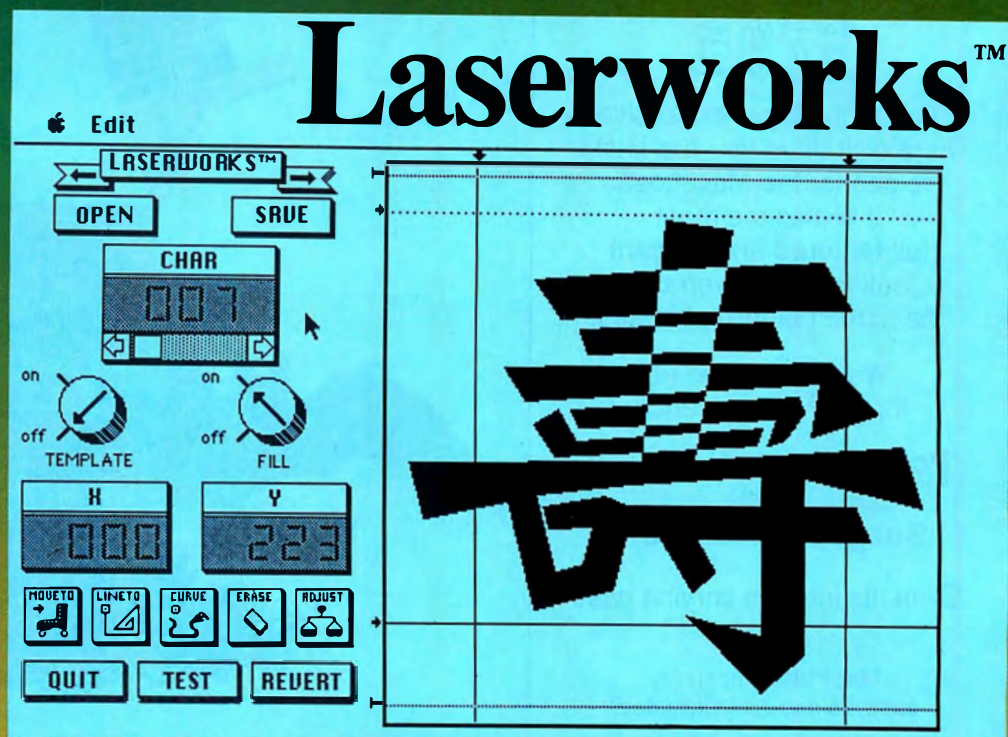
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Ghoul Diggers of '86

If you boot up *Uninvited* and have an uncanny feeling you've been there before, it's probably just a touch of *Déjà Vu*—last year's text and graphics adventure game that let Mac owners manipulate objects with the mouse rather than enter Cro-Magnon commands such as "Get book" or "Drop torch" (see *Macware Reviews*, January 1986). Mindscape's latest game is also created by ICOM Simulations, the developer of *Déjà Vu*. *Uninvited* shares *Déjà Vu*'s format, including the ability to move objects, some delightfully sarcastic commentary, and an intriguing and challenging plot.

As the game begins, you awaken at the wheel of your wrecked automobile, discover that your little brother has disappeared, and clamber out of the wreckage and into an adventure that starts out in a Gothic mansion. The object of *Uninvited* is to find your little brother and escape with your lives—not an easy task.

Who Invited You?

Once inside the mansion, you'll encounter a host of unpleasant creatures, but only a few signs of your host's existence. You'll wander through dozens of dilapidated rooms, each artfully illustrated, collecting clues and encountering more than one red herring (see "A Room with a Clue"). You'll find magical incantations in ancient books bearing the sign of the pentagram, but you must figure out how and where to use them. It's quite a thrill the first time you utter a spell and see the results. *Uninvited* surpasses *Déjà Vu* in the use of digitized sounds—thunderclaps, barking dogs, and creaking doors, to name a few—as well as animation. Scuttling spiders, flapping bats, and a most annoying little demon who periodically scampers across the screen all add excitement to the game.

I found myself vacillating between fascination and frustration. Some of the puzzles are quite tricky, and I felt foolish interrogating every chair in the house in an attempt to gain information. In the end I

had to swallow my pride and resort to peeking at a few clues; Mindscape will send a free hint sheet to registered owners upon request.

Save Yourself Some Trouble

If you know what's good for you, you'll save early and often—a single slip can end the game and wipe out a good deal of work. The game's quick reference card advises you not to save games on either of the program's two disks, which are filled with the files necessary to run the game, but to use a separate disk (the easiest method is to eject Disk One and insert a game storage disk). Not a big fan of disk swapping, I discarded the ImageWriter file on Disk One to create ample room for at least one game. (If you want to print out the certificate that appears at the successful conclusion of a game, however, you should leave the ImageWriter file intact.)

Saving games avoids wasted time and effort when you experience an untimely demise, and you should also map the game's terrain, both inside the house and out. Like its text-adventure ancestors, *Uninvited* subjects players to a maze. However, this puzzle exists not only in the imagination, but as a seemingly endless series of illustrations, each with a chamber nearly identical to the last. Adventure game veterans already know this, but I had to learn the hard way: you must draw a map of the maze as you traverse it. And watch out for the zombies!

If you like a good mystery, you should enjoy *Uninvited*. The graphics are skillfully drawn and plentiful, the plot is intricate and amusing (although at times frus-

trating), and the imaginative sound effects and animation make this game a winner.

—Erfert Nielson

Uninvited

Mindscape, Inc.

3444 Dundee Rd.

Northbrook, IL 60062

800/221-9884, 800/942-7315 in Illinois

List price: \$49.95

Across-the-Keyboard Customization

If you use your Macintosh to write in a language other than English, you've experienced the frustrating delay caused by pressing the Option key, pressing the appropriate key for an accent or a diacritical mark, and then typing the accented letter (Option-i, for example, produces a circumflex). Worse yet, you may have to open the Key Caps desk accessory to find out where an accent resides. Now you can customize your keyboard, thanks to *MacKeymeleon*, from Avenue Software.

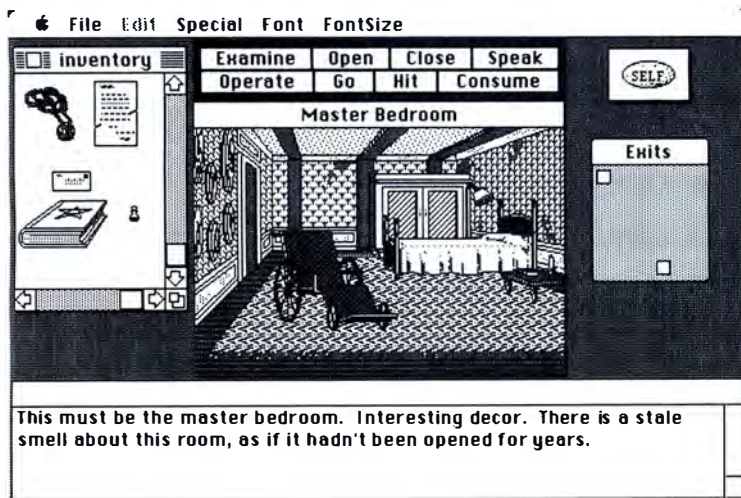
MacKeymeleon saves you the trouble of remembering keystroke combinations by letting you assign accented letters to infrequently used keys. For example, you could assign the letter é to the percent sign, ô to the asterisk, and so on.

In addition to allowing you to assign accented characters to any key you wish,

(continues)

A Room with a Clue

One of the many rooms you'll tour in *Uninvited*, the master bedroom provides clues in the guise of wheelchair, book, and candle.



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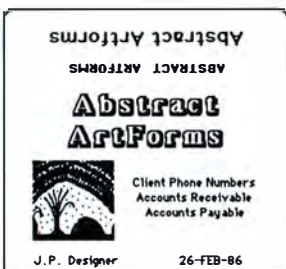
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Macware Reviews

MacKeymeleon lets you customize the keyboard layout. For example, the standard French keyboard is arranged differently than the QWERTY layout to which American typists are accustomed. You can choose from among 14 standard setups, including standard, French, Italian, and Dvorak. The program offers two fonts, Hénédine 12 and Grondines Bold 24.

The process of designing a keyboard is not difficult, and the program's manual covers the installation procedures well, leading you through a number of examples. You can install several customized keyboards on a word processing disk and have one of these layouts automatically install itself when you insert the disk.

When you add a **MacKeymeleon** keyboard to a disk, the program adds a desk accessory called Keymeleon to your word processor's Apple menu. When you select Keymeleon, a new menu appears on the menu bar. This menu allows you to change from one keyboard layout to another during a word processing session and to select fonts and font sizes. (The developers of **MacKeymeleon** are French-speaking Québécois, so the program's menus are available in French as well as English.) **MacKeymeleon** uses the Key Caps desk accessory to remind you of the locations of your custom keys. If you leave the Key Caps window open below your word processing document window, you'll have a handy map of your keyboard layout.

I encountered a few glitches in **MacKeymeleon**, but nothing that seriously affected the program's performance. For example, the Key Caps desk accessory tends to lag behind your typing, occasionally highlighting keys at random as you type. The manual is generally informative, but the differences between the standard and international keyboards aren't well documented—the inclusion of extra keys on the international keyboards isn't mentioned in the documentation.

On the whole, however, **MacKeymeleon** is an extremely useful program. Now you can have your gâteau and eat it too. —*Emil Flock and Miriam Flock*

MacKeymeleon 1.1
Avenue Software Inc.
1173 Charest Blvd. #250
Québec City, Québec G1N 2C9
Canada
418/682-3088
List price: \$49.95

(continues)

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The editors of *MacUser* named ThunderScan the Best Peripheral Device of 1985. Here's what they said: "ThunderScan from Thunderware is an astonishing device that transfers images to the Mac by scanning them using a snap-in device that replaces the ImageWriter ribbon...Easy to hook up and use, relatively inexpensive, this device should be owned by anyone who uses graphic images on the Mac."

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MACazine

Based upon their personal use, the readers of *MACazine* voted ThunderScan the Best Graphics System of 1985.

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MACazine

We didn't finish first here, but in this case we don't object to second best. Of all the hardware products on the market, ThunderScan finished second only to the Mac 512 as the Year's Best Hardware Product.

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ThunderScan

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In the Black

Black ImageWriter ribbons range in price from \$3.95 to \$10.50, depending on where you buy them. When they become old and gray, they're usually thrown away. However, there are alternatives. If you use a considerable number of ribbons, you should investigate **MacInker** from Computer Friends.

I Ink, Therefore I Am

MacInker is a small plug-in device that reinks fabric ribbons. The model I tested—MacInker 234IM—is designed for ImageWriter I and II ribbons; also available is a Universal Cartridge model that accommodates some 200 cartridge types. The package includes the reinking machine, a felt roller with an ink reservoir, and a bottle of ink. Additional ink (in black, brown, red, green, yellow, purple, orange, gold, and silver) is available for \$3 a bottle, \$8 for gold or silver. Computer Friends claims that one bottle will reink 25 to 40 ribbons.

MacInker is easy to operate, although becoming a proficient reinker takes some practice. A plastic platform with a spindle turns the ribbon, which in turn loops around the ink-saturated felt roller. To re-

ink a ribbon, you fill the roller's reservoir with ink, place the ribbon cartridge on the platform, pull out a section of ribbon and place it around the roller, and turn on the machine. An ImageWriter ribbon takes about 15 minutes to reink. Ideally, you should let the ribbon sit overnight before using it, to ensure even absorption. According to Computer Friends, a ribbon can be reinked 60 to 100 times, depending on the quality of the fabric and the other components of the ribbon cartridge.

Reinking is not without its frustrations. The first time I used MacInker I applied too much ink, producing a very dark and slightly smudgy printout. Following the instructions in a page of tips included in the package, I reinserted the cartridge in MacInker and wrapped the ribbon around a roll of paper towels to absorb excess ink. The second printout was crisper, but still a bit too dark for my liking. The manufacturer suggested a technique for obtaining a somewhat lighter ribbon: fill the roller's ink reservoir only halfway, then run MacInker for two or three hours. Using this method I finally got satisfactory results.

With a little practice, you should be able to reink ribbons effortlessly. You will, of course, get ink on your hands, but it

washes off surprisingly easily. If you use only a few ribbons a year, MacInker is not worth the expense and effort involved. But businesses with heavily used ImageWriters, or even individuals who are prolific users of printers, should consider investing in a MacInker.

Would You Like a Refill?

If you're not the do-it-yourself type, you might want to use the services of American Inc. Products, which manufactures ribbons in black, green, blue, brown, purple, yellow, orange, and silver. Mail a worn-out ribbon cartridge to the company and it will refill the cartridge with a new ribbon for \$3.25 (\$3.75 for colored ribbons) plus \$2.25 shipping. Because of mailing charges, the refills are no bargain if you send only one or two cartridges. But it can be economical for larger orders, since these are good-quality ribbons comparable to those sold in computer stores. And if you don't mind getting your hands dirty, the company also sells ribbons separately for \$2.65 for installation in your own cartridges. —*Erfert Nielson*

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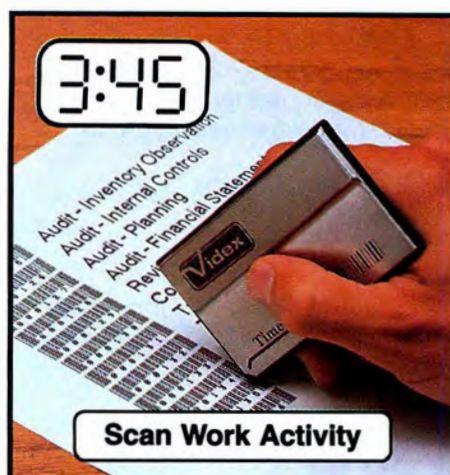
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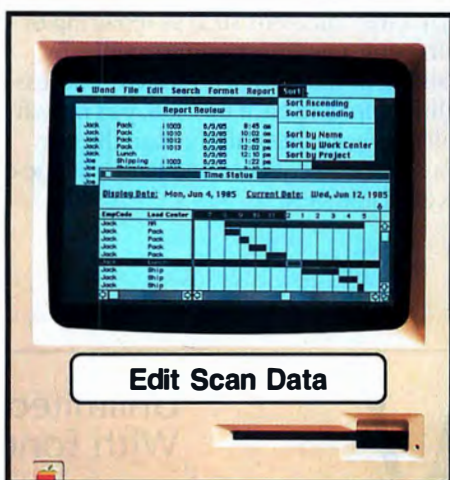
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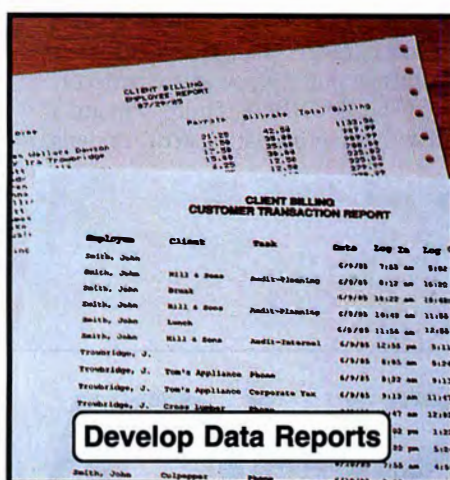
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San Francisco, CA 94105

415/982-0161

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Star Struck

If you own a 512K Mac, you can get an idea of what space travel is like, thanks to Spectrum HoloByte putting you at the helm of the Space Shuttle Orbiter. There, you are greeted with an intimidating array of dials,

buttons, toggle switches, and CRTs that make up the Shuttle's forward control panel. During a mission, the screen divides into quadrants that illustrate the specific CRTs and subpanels you need for each phase of an operation. You can also transform one of the quadrants into a window, allowing you to gaze back at Earth or track a satellite in anticipation of a rendezvous (see "A View from the Bridge").

Orbiter simulates a number of missions, which must be accomplished before the Shuttle's life-support systems run low. A training mission familiarizes novice astronauts with the workings of the vehicle's panels and controls. Following lift-off and the achievement of a stable orbit, your first task is to launch a telescope using the shuttle's mechanical arm. Later, you must perform other missions such as repairing or retrieving a malfunctioning satellite by walking in space. When you have successfully completed each mission, you must finally navigate the craft through the perilous reentry sequence and land it at one of six available sites.

Technology Triumphs

Orbiter is an impressive programming achievement. Every gauge, switch, and control on the panel is fully functional. Each minute movement through the cosmos is tracked on one of three CRTs, which provide the accurate telemetry data necessary to successfully complete your mission. Messages from Mission Control are delivered by a synthesized voice and simultaneously displayed as text on one of the CRTs. The crisp graphics include a "map" view of the Earth and depictions of the ship's position relative to the Earth, the Moon, and other objects in space.

As with the real shuttle, many aspects of your mission are controlled by on-board autopilots and ground control computers. You can disable these fail-safe systems, however, and instead use manual control to get a firsthand taste of space flight.

(continues)

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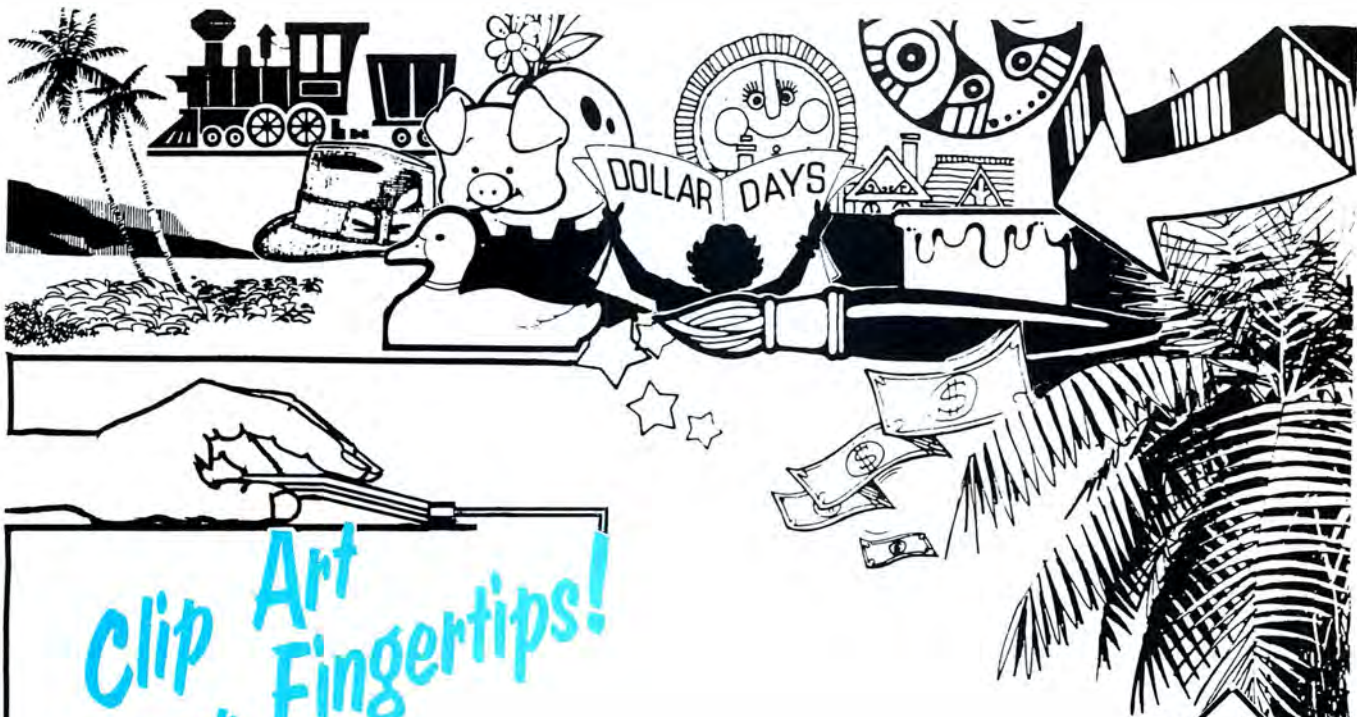
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Lost in Space

Maneuvering the shuttle requires precision and practice and at least a basic understanding of space physics. Because you are operating in a vacuum, you must get used to the concept of inertia. Also, you must take into account the curvature of the shuttle's orbit before you can overtake other objects in space.

These and other basic principles of space flight are outlined in *Orbiter's* manual, but beyond a detailed training mission and an adequate explanation of how to set up display quadrants and access menus, documentation is somewhat limited. For example, it tells you how to retrieve a satellite once you're within docking range but offers few directions for getting that close.

The manual is also rather inadequate when trouble arises. When the Shuttle burned up the first two times I attempted reentry, I was shown a dialog box explaining that my acceleration rate was too high. Unfortunately, I found no suggestions for solving that problem in future missions.



A View from the Bridge

Orbiter's screen is divided into quadrants: Control, Engines, CRT, and Forward Main Station. The panel in the lower right lets you select subpanels such as the view outside the shuttle shown here.

Reality Strikes

Orbiter's designers have gone to great lengths to accurately simulate all aspects of shuttle operation. Ironically, the very realism that makes the simulation so impressive is also responsible for its major weakness: *Orbiter* is ultimately somewhat boring. In his now classic book, *The Right Stuff*, Tom Wolfe describes the test pilots who became our first astronauts as "Spam in a can." The astronauts didn't "fly" their

spacecraft—they merely pushed buttons or monitored the activities of on-board and ground computers.

Similarly, when at the controls of *Orbiter*, you simply push buttons and check readouts under the guidance of Mission Control. While my first few missions were entertaining, educational, and challenging,

(continues)

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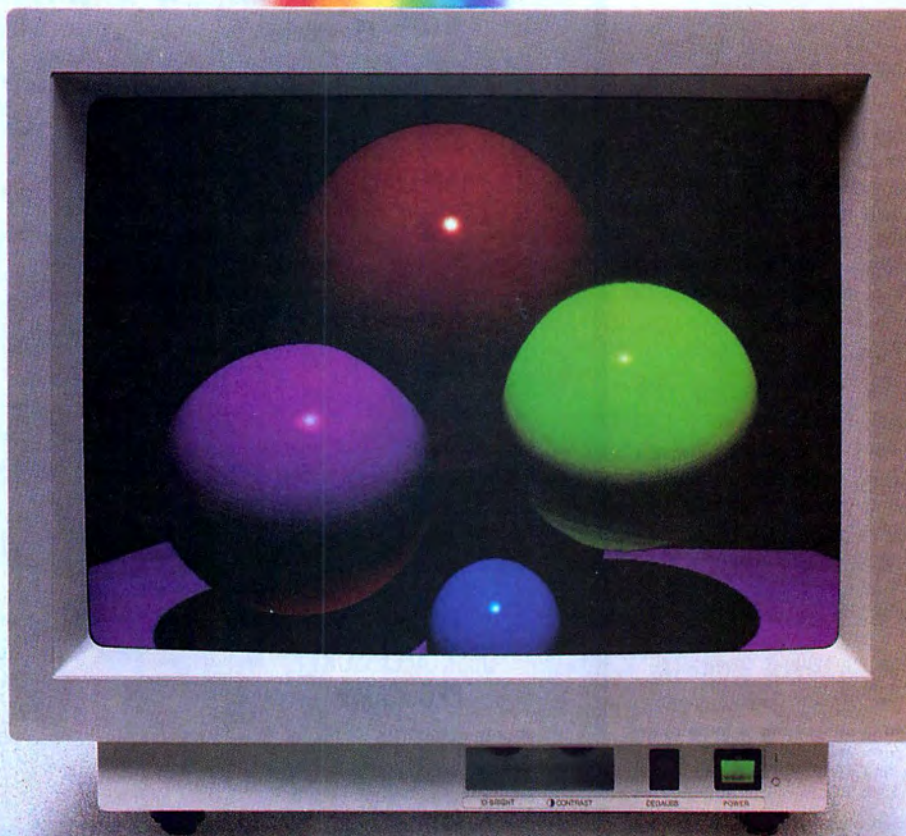
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So, if you need to do business graphics, or are an artist who is tired of working in shades of gray, or you are a design engineer who loves the ease of using the Mac, a Vermont Microsystems intelligent monitor is what you need.

Believe what you see on this page. The image on the screen was produced using Visual Information, Inc. M.C.A.D. color graphics software and the VM-8861 intelligent color monitor. It was then transferred onto film using

the N.I.S.E. Rembrandt film recorder. The resultant photographic image was color separated for use in this ad. It is unretouched. To prove it we'll send you a copy of the slide. Just write to us requesting the Mac slide.

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I soon tired of flying the shuttle. Even with the autopilot disengaged, you encounter long interludes with little to do but languidly cruise through the vastness of space. *Orbiter's* time-compression feature helps somewhat but doesn't alleviate the monotony altogether.

There is much to like about *Orbiter*. For dedicated students of space travel, it's a must. However, if you want excitement as well as a realistic simulation, you may be happier with a faster-paced program such as Microsoft's *Flight Simulator* or PBI's *Fokker Triplane Flight Simulator*. Unfortunately, many people will find they lack the patience for extended space travel. —Walter C. Burns

Orbiter, version 1.0
Spectrum HoloByte Inc.
1050 Walnut #325
Boulder, CO 80302
303/443-0191
List price: \$49.95

Making Tracks

Although there are almost as many styles of music programs as there are styles of music, none is more magical to me than the sequencer. Attach a synthesizer to the Macintosh through a Musical Instrument Digital Interface (MIDI) adapter, start up a sequencer program, and the Mac lets you record one track, play it back while recording another, and so on until you've created a complete arrangement. And because the Mac stores not sounds but digital information, each playback is an original performance (for background on music products for the Mac, see "Musical Wares," *Macworld*, February 1986).

Macintosh musicians can choose from several sequencers, from beginner-oriented products like Creative Solutions' *Studio Mac* to professional-caliber products like Southworth Systems' *Total Music* and Mark of the Unicorn's *Professional Performer*.

Also near the high end is *MegaTrack XL*, from Musicworks of Boston (not to be confused with Hayden Software's *MusicWorks* program). *MegaTrack XL* is part of Musicworks' *Professional Musician* sys-

tem, which includes Musicworks' Mac MIDI Star MIDI adapter hardware and Electronic Arts' *Deluxe Music Construction Set* for transcribing sequences into sheet music.

Simple and Straightforward

MegaTrack XL's greatest strength is its intuitive design. Many other sequencers litter the screen with windows, each devoted to a particular function. *MegaTrack XL*, in contrast, divides its functions between menu commands, dialog boxes, and windows, resulting in an uncluttered display and a straightforward, easy-to-use program. Each track you create is shown in the Tracks window, while another window contains four buttons corresponding to the tape controls on a tape deck. To add a track, you simply choose New Track from the Track menu, type a track name, click the Run button, and start playing.

Recorded tracks can be played back as is or altered using numerous track-manipulation features. Looped tracks, which repeat continuously, are useful for bass lines or other repetitive parts. You can *quantize* a track, causing *MegaTrack XL* to correct

(continues)

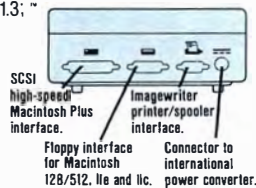


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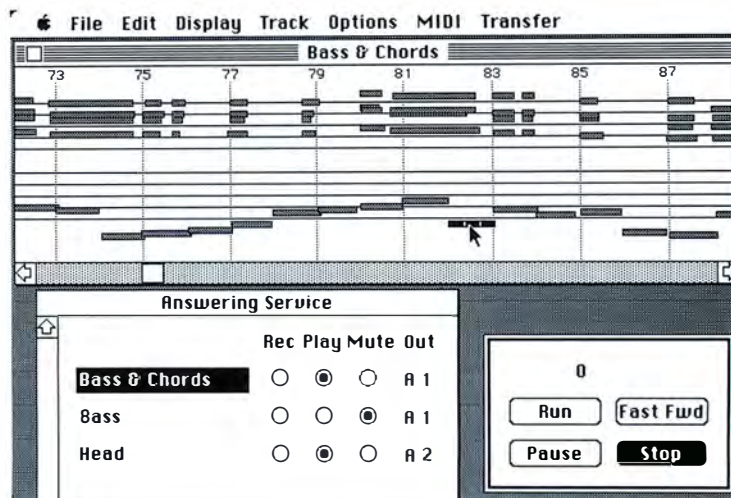
timing errors by rounding off note values to the nearest beat; change the playback speed; merge several tracks into one; and change the MIDI channel on which the track is played back.

Graphic Editing

Most exciting, however, is *MegaTrack XL*'s track-editing feature, which lets you graphically view and alter notes. Notes in a track are shown in proportional form—with longer notes appearing wider than shorter ones—on a musical staff (see "Changing Notes"). When a track is initially displayed, you see its entire contents. By selecting an area, then double-clicking it, you can zoom in on a particular section to more easily see and edit short notes. This zooming process is infinite; you can continue selecting and double-clicking until even the shortest note is wider than the Mac's screen. *MegaTrack XL*'s graphic editing is easy to use, but it lacks the precise control over a track's contents offered by other sequencers, such as *Professional Performer*.

A Slow Jump

MegaTrack XL has other shortcomings. While you can zoom in on a track for detailed editing, you can't zoom out one or



Changing Notes

MegaTrack XL's editing feature lets you alter individual notes in a recorded performance. You can alter a note's length, pitch, and position in time. You can also copy, delete, and create new notes.

two steps to see the larger picture. You must revert to the full-track view, then zoom in again. Worse, you can't jump to a given point in a piece. To reach the middle of a *MegaTrack XL* sequence, you must use the fast-forward button, which plays the piece at eight times normal speed, until you reach the desired point. The current version of *MegaTrack XL* doesn't let you

edit MIDI data such as pitch bends, synthesizer patch changes, and mode changes, although Musicworks representatives told me a future version will offer enhanced editing capabilities as well as the ability to jump to specific points in a score.

To its credit, *MegaTrack XL* does a great deal while taking up a remarkably small 30K of disk space, and it runs on a 128K Mac, while *Professional Performer*,

(continues)

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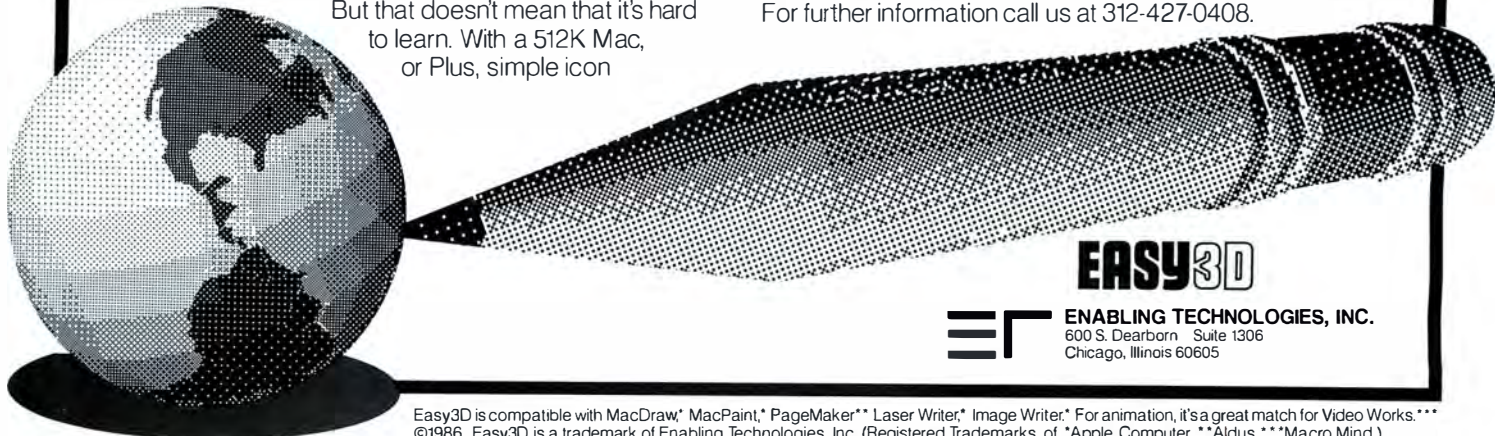
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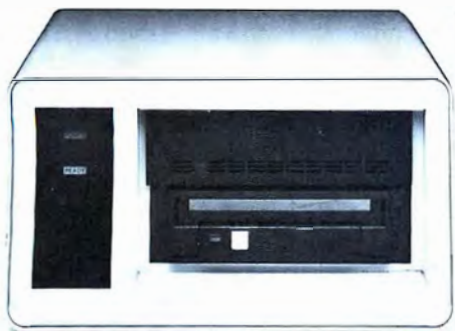
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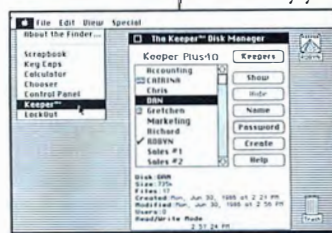
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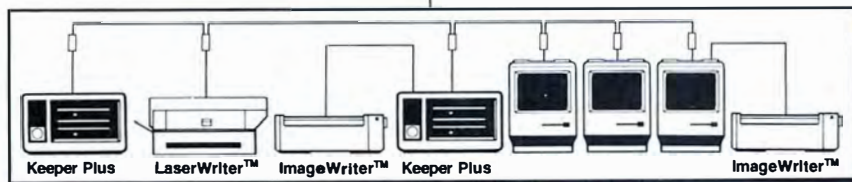
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Opcode Systems' *Sequencer*, and Southworth's *Total Music* each require 512K. I'd like to see Musicworks sell *MegaTrack XL* separately, without *Deluxe Music Construction Set*, at a lower price. In my opinion, *Professional Performer* is the better program for professional musicians, while *MegaTrack XL* is an ideal sequencer for beginners and intermediate-level musicians.

—Jim Heid

MegaTrack XL, version 2.1

Musicworks

18 Haviland St.

Boston, MA 02115

617/266-2886

List price: \$495 (includes MIDI adapter, Deluxe Music Construction Set, and MIDIWorks utility for translating files between programs)

Professional Performer, version 1.21

Mark of the Unicorn, Inc.

222 Third St.

Cambridge, MA 02142

617/576-2760

List price: \$295

Modemette

In today's world of 2400-bps, auto-everything modems, a 300-bps, manual-dial modem is as anachronistic as black-and-white home movies and poodle skirts. Nonetheless, alongside my Mac is a 300-bps, manual-dial modem: Kensington Microware's **Maccessories Portable Modem.**

The Maccessories modem does differ from its ancestors: it's smaller (roughly the size of a paperback novel), and it's powered (supposedly for up to two years) by a 9-volt battery. A 20-inch cable connects it to the Mac, and the cables going to the phone line and a telephone plug into two modular jacks. The modem comes with a well-written manual.

Dialing by Hand

The Maccessories modem is a manual-dial; to establish a link, you first start your communications program, then dial the number on a telephone. When you hear the remote computer's carrier tone, you flick a switch on the modem from "Phone" to "Apple." The manual-dial Maccessories modem doesn't use modem commands for dialing, answering the phone, or hanging up. That means you need not worry if it's incompatible with your communications

software. The trade-off is losing the capabilities that make auto-dial modems appealing: the ability to redial busy numbers and to conduct unattended communications.

I won't say that the Portable Modem is comparable to other modems I've used; after all, it wasn't designed to replace the Hayes Smartmodem. However, the Maccessories modem works well and won't drain a power outlet. It also hooks up to the Apple IIc, and Kensington wisely includes a list of the modem's pin signals in the manual, enabling you to wire a cable for using the modem with battery-powered portable computers like the NEC 8201. Travelers will appreciate the modem's in-a-briefcase portability, but its use may be restricted, since the phones in most hotel rooms are wired directly into the wall, making it impossible to use direct-connect modems. It's a good second or backup modem for the frequent communicator and an inexpensive way for beginners to try their hand at telecommunications.

But even beginners should evaluate their future communications needs before buying the Maccessories modem. Commu-

(continues)

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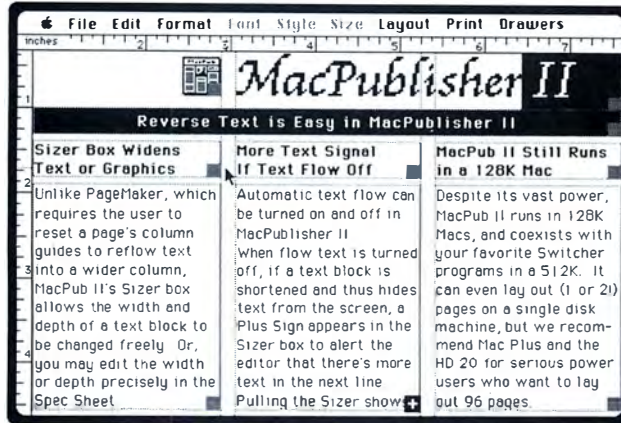
Publishing Power

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The year Apple introduced Macintosh, we introduced MacPublisher for the Macintosh and ImageWriter. The first Macintosh Electronic Publishing System was designed for laying out newsletters with text and graphics in multiple columns. Articles were measured with a unique transparent Ruler, clipped with a Scissors tool, and dropped into columns on the layout MiniPage. Graphics were cropped to size with a Camera tool.



Page Designers seeking perfection in their display type require **Kerning** to change spacing between letterpairs —sometimes even making them touch or over-lap. Kerning is critical for control of LaserWriter spacing idiosyncracies. MacPublisher's kerning is also user-adjustable, instead of being determined by the font.

NAVAL

kerns to

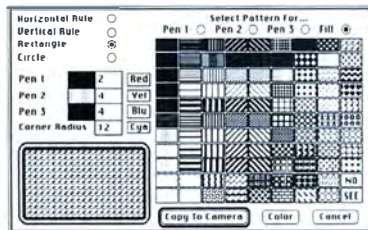
NAVAL

MacPublisher introduced advanced typographic features like leading and micro-justification, Automatic Save and a Table of Contents generator.

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nicating at 300 bps is four to eight times slower than using today's standard 1200- and 2400-bps modems; you may see your initial savings eaten up by high telephone and connect time charges. And with manual dialing you have to redial when the number you're calling is busy. Finally, remember that 1200-bps, Hayes-compatible modems are available for between \$300 and \$400 (Apple's 300/1200 Personal Modem and the Prometheus ProModem are my choices). That isn't much more when you consider the advantages offered by such fast, smart modems. —*Jim Heid*

*Macaccessories Portable Modem
Kensington Microware Ltd.*

251 Park Ave. S

New York, NY 10010

800/535-4242, 212/475-5200

List price: \$140

One on One

Julius Erving and Larry Bird going head to head would be a basketball confrontation to take your breath away. In **One on One**, Electronic Arts' programmer Eric Hammond brings this dream match to the Mac screen. Hammond studied hundreds of game films and action photos and consulted with both athletes to reproduce the players' styles and strategies in their digital counterparts.

Jump Ball

One on One offers four levels of competition: Park and Rec, Varsity, College, and Pro. You can assume the role of either player while the computer takes the other, or two people can play against each other. The game includes a 24-second clock, a referee who calls fouls, and instant replays. Animation of the athletes and sound effects, such as the squeak of rubber-soled shoes, add a degree of authenticity. For further realism, a fatigue bar for each player indicates his condition; if your man has expended a lot of energy running and jumping, he slows down, and his shooting and defensive skills wilt. You can reenergize him by dribbling in place or by taking a time-out.

Both players shoot with either hand and execute realistic reverse lay-ups, jump shots, and a variety of dunks. They have,

(continues)

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Tired of the claims manufacturers make about their tape back-up units that aren't true? Ever call the manufacturer and quiz him about the performance of his unit? Can he back-up his words with actions? Well, we've had enough. Some tape drive manufacturers advertise that they are able to back-up 20 meg drives in 4 minutes. We challenge them to PROVE IT!! At MDIdeas, we don't make claims we can't "back-up."

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TDBK-20+ is the best performing SCSI tape drive for your money. The TDBK-20+ will back-up and restore MDIdeas' HD-20 and HD-30, Apple's Hard Disk 20,TM Hyperdrive,TM Corvus,TM and virtually any other Macintosh hard disk or volume. Not only will the TDBK-20+ back-up HFS volumes but even volumes across networks under MacServe. With a mechanism that has a tape speed rated at 90 inches/sec., back-ups are fast and reliable. Data is read and verified with each back-up and restoration; even sensitive software such as ExcelTM can be backed-up and restored. Restores complete mirror images, no thought...no mistakes. If your drive's capacity has more than the tape's 22 meg capacity, such as MDIdeas' HD-30—a 30 megabyte hard disk drive—no

problem. The TDBK-20+ will back-up the first 20 megabytes from the drive and will then ask for just an additional tape. No need to buy a larger capacity tape unit. BONUS: Extra tape is supplied. The price of the TDBK-20+, \$1095.

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MDIdeas also offers SCSI Hard Disk Drives for the Macintosh Plus. Add incredible speed and storage capacity to your Macintosh Plus with the HD-20 and HD-30, 20 and 30 megabyte hard disk drives. Place them underneath your Mac to save desk space. Connect them to the SCSI port and you can transfer data up to 16 times faster. Turn them on and they automatically boot up. Comes complete with the necessary cables and a bonus; HD Back-up, a floppy back-up utility from PBI Software, is included (a \$50.00 value).

Expand your horizons, go see MDIdeas' TDBK-20+, HD-20, and HD-30 at your local authorized Apple dealer.

MDIdeas, Inc.



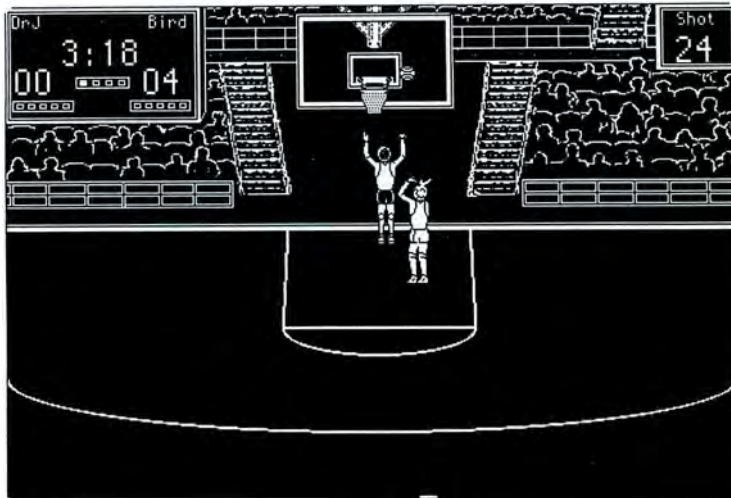
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however, no hook shots in their repertoire. And regrettably, you cannot control the type of shot your man takes.

Occasionally play is halted by a slam dunk that disintegrates the backboard. A little man shuffles out, sweeps away the broken glass, and utters some unintelligible phrase. Slow-motion instant replays sometimes appear, but like the foul calls and backboard-exploding dunks, they occur randomly. After seeing these gimmicks a few times, you'll wish for a way to terminate them forever.

Mouse versus Joystick

Your opponent, whether Bird or Erving, is a deadly shooter from anywhere on the court. And maneuvering with the mouse, rather than a joystick, has serious limitations. You can't move your player to the basket for rebounds after missing an outside shot, for example. Instead, you flounder helplessly in the backcourt while your opponent dunks the ball with impunity. The offensive player cannot beat the defender to the basket; in fact, from Varsity level and beyond, I was unable to



Take It to the Hoop
Dr. J goes baseline against Larry Bird in Electronic Arts' One on One.

move past my opponent and drive to the basket. Forget playing against Erving or Bird at the higher levels with the mouse—you'll get crushed. However, with a little experience and the joystick, your chances for scoring improve.

The Coach's Advice

The game offers a sense of NBA magic. Hammond captures the styles of both superstars, even though you experience only a few facets of their true talents—those that can be statistically represented. I found the

game absorbing because of the degree of realism, but unless you use a joystick, you will be at an unfair disadvantage. —Richard Miller

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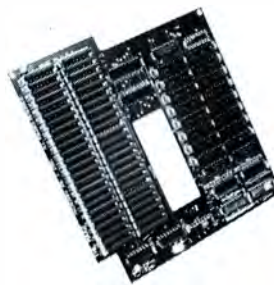
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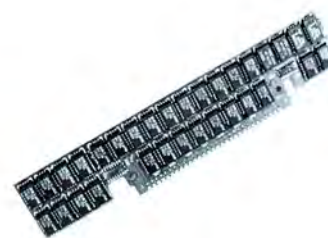
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Now, DiskExpress puts maximum performance back into your disk. It gathers all the pieces of files and puts them into contiguous blocks. Then your drive head need only move to the beginning of a file where it can continue to read sequentially. All the unused blocks are also placed together so that MacServe users will no longer suffer from the "disk too fragmented" message when attempting to create new volumes. DiskExpress will optionally organize your files by usage to reduce future fragmentation. It supports floppy and hard disks with both MFS and HFS directories.

Bonus Features

DeskTop file compacting: The Finder stores application and document icons in a hidden DeskTop file on every disk. Old icons no longer needed are never removed. DiskExpress will optionally dispose of those "unneeded" icons without losing any file comments or leaving any documents with "plain generic" icons. This not only recovers space but also speeds up the time it takes to return to the Finder from an application. **Discarded data security:** Deleting a file only removes the file name, not the information. DiskExpress will optionally erase all information in blocks of deleted files so that it cannot be recovered by unauthorized individuals.

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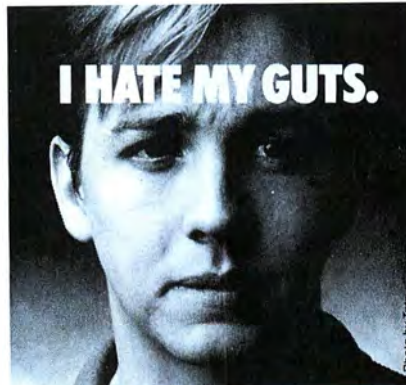
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■ Accessories

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■ Hardware

○ Bar Code

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Safeware, The Insurance Agency Inc., 2929 N. High St., P.O. Box 02211, Columbus, OH 43202, 800/848-3469 (Natl), 614/262-0559 (OH)

Publications

Microcomputer Books

- **Mac Midnight Madness** \$17.95
 - **Mac Spreadsheets: Using Microsoft Multiplan, Chart & File** \$15.95
 - **Microsoft File** \$17.95
 - **Microsoft Macinations** \$18.95
 - **Planning Big with MacProject** \$15.95
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 - **The Printed Word** \$16.95
- MC/Visa/AE. FREE Directory.

Micro Books, P.O. Box 4068, West Richland, WA 99352, 800/547-9755 ext. 8, 509/967-5084 in Washington

Mac Artist Wanted!

Do you miss *Macworld Gallery*? Do you have patterns or drawing tips to share? I am putting together a portfolio of computer artists. Send a self-addressed stamped envelope and a disk with your artwork on it, and it will be printed and published. Prizes awarded to top entries. For a copy of *Mac Artist* send \$5 to:
Mac Artist, 12 Calvin Ct., Walnut Creek, CA 94595, 415/935-2270

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Cognitive Concepts, 1219 Phelps Ave., San Jose, CA 95117, 408/243-6886

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International Data Acquisition + Control, Inc., 4 Limbo Ln., P.O. Box 387, Amherst, NH 03031, 603/673-0765

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Medina Software, Inc., 2008 Las Palmas Circle, Orlando, FL 32822, 305/281-1557

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Applied Ideals, Inc., P.O. Box 3225, Manhattan Beach, CA 90266

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Devionics, P.O. Box 2126, Covina, CA 91722, 714/779-7193

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Pascal Extender/C Extender

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Palo Alto Shipping Company, P.O. Box 7430, Menlo Park, CA 94026, 415/854-7994, 800/44FORTH

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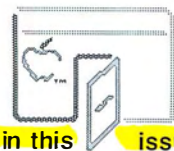
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Advertiser Index

Reader
Service
Number

552 Adobe, 64
525 Advanced Logic Systems, 16
274 Affinity Microsystems, 143
557 Alsoft, 181
227 Altsys Corp., 164
204 Ann Arbor Softworks, 24-25
550 B. Knick Drafting, 182
481 BPI Systems, 115
380 Batteries Included, 162
490 Beale Tech, 195
373 Best Computer Supplies, 72
38 Blyth Software, 10-11
381 Borland Int'l., IFC-1
199 Boston Software Publishers, 177
479 Bridgeport Machines, 144
— Casady Co., 21
452 Cauzin Systems, 56-57
175 Central Pt. Software, 148
524 Centram Systems West, 129
148 CheckMark Software, 140
458 CompServCo, 44
496 CompuCover, 182
330 CompuServe, 135
271 Computer Friends, 46
548 Computer Shoppe, 188
418 Cortland Computer, 6
384 Cricket Software, 20
485 D.O.S., 157
523 Data Graphics, 193
546 Desktop Graphics, 178
498 Dove Computer Corp., 132
193 Echo Data Services, 189
410 Educomp, 182
403 Enabling Technologies, 174
144 Forethought, 58
535 Format Software, 54
536 Format Software, 54
323 GTCO Corp., 52
143 General Computer, 8-9
520 Greene, Johnson, 21
517 GridComm, 33
257 Hayes, BC
529 Honeywell/Disc Instruments, 141
434 Human Touch Computer
Products, 7
530 I/O Design, 146
272 Icon Review, 48-51
249 Infosphere, IBC
308 Innovative Data Design, 62
171 Iomega, 155
11 Kensington, 38-39, 41
489 LM Software, 192
543 Layered, 42-43
493 Levco, 136
28 Linebacker, Inc., 154
50 Living Videotext, 14-15
466 LoDown, 55
250 Lotus Development Corp., 28-29
467 MDIdeas, 179
291 MPH Computer Products, 166
395 Mac Doctor Electronics, 153
4 MacConnection, 84-87
— MacMemory, 180, 182
368 MacRentals, 178
16 MacStore, 187
— Macworld Expo, 78-79
112 Manx Software, 53
97 Mesa Graphics, 142

Reader
Service
Number

352 Micah, 145
— Microsoft, 82, 130-131
— Microsoft Press, 76-77
470 Microtech Peripherals, Inc., 150
406 Mirror Tech, 17-19
353 N2 Products, 40
284 New Canaan MicroCode, 182
215 Northeastern Software, 168-171
13 Odesta, 22
547 Owl Int'l., 36
4 PC Connection, 84-87
558 PC Quick-Art, 165
45 PC Network, 68-69
541 PTI Industries, 139
450 Panamax, 196
553 Peachtree Technology, 73
509 Peripheral Land, 35
304 Peripherals Computers &
Supplies, 159
— Practical Computer Applications, 30
516 Pro Plus Software, 148
508 ProAPP, 172
77 ProVUE Development, 34
194 Programs Plus, 74-75
334 Public Domain Exchange, The, 172
533 QWare, 12
544 RH Electronics, 181
459 Rabbit Industries, 187
551 Reach Tech, 175
— Satori Software, 70
400 ScanCoFurn, 31
420 Singular Software, 66
435 Software Discoveries, 47
545 Software Library, 196
500 Software Ventures, 97
255 Sony, 107
554 Spectra Micro Development, 158
225 StatSoft, 156
542 Summit Systems, 188
— SuperMac, 80-81
491 Systat, 147
471 TML, 194
461 Tangent Technology, 149
478 Target Software, 60
522 Template Systems, 190
— Thunderware, 161
483 Tussey Computer Products, 173
134 USA-Flex, 138, 160
549 Univation, 26
537 Uptime, 5
556 Vermont Microsystems, 167
383 Videx, 163
459 Vision Technologies, 134
439 Warp Nine Engineering, 45
539 Western Computer, 151
538 White Pine Software, 156
374 Williams & Macias Microcomputer
Products, 160

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37 38 39 40 41 42 43 44 45 46 47 48
49 50 51 52 53 54 55 56 57 58 59 60
61 62 63 64 65 66 67 68 69 70 71 72
73 74 75 76 77 78 79 80 81 82 83 84
85 86 87 88 89 90 91 92 93 94 95 96
97 98 99 100 101 102 103 104 105 106 107 108
109 110 111 112 113 114 115 116 117 118 119 120
121 122 123 124 125 126 127 128 129 130 131 132
133 134 135 136 137 138 139 140 141 142 143 144
145 146 147 148 149 150 151 152 153 154 155 156
157 158 159 160 161 162 163 164 165 166 167 168
169 170 171 172 173 174 175 176 177 178 179 180
181 182 183 184 185 186 187 188 189 190 191 192
193 194 195 196 197 198 199 200 201 202 203 204

205 206 207 208 209 210 211 212 213 214 215 216
217 218 219 220 221 222 223 224 225 226 227 228
229 230 231 232 233 234 235 236 237 238 239 240
241 242 243 244 245 246 247 248 249 250 251 252
253 254 255 256 257 258 259 260 261 262 263 264
265 266 267 268 269 270 271 272 273 274 275 276
277 278 279 280 281 282 283 284 285 286 287 288
289 290 291 292 293 294 295 296 297 298 299 300
301 302 303 304 305 306 307 308 309 310 311 312
313 314 315 316 317 318 319 320 321 322 323 324
325 326 327 328 329 330 331 332 333 334 335 336
337 338 339 340 341 342 343 344 345 346 347 348
349 350 351 352 353 354 355 356 357 358 359 360
361 362 363 364 365 366 367 368 369 370 371 372
373 374 375 376 377 378 379 380 381 382 383 384
385 386 387 388 389 390 391 392 393 394 395 396
397 398 399 400 401 402 403 404 405 406 407 408

409 410 411 412 413 414 415 416 417 418 419 420
421 422 423 424 425 426 427 428 429 430 431 432
433 434 435 436 437 438 439 440 441 442 443 444
445 446 447 448 449 450 451 452 453 454 455 456
457 458 459 460 461 462 463 464 465 466 467 468
469 470 471 472 473 474 475 476 477 478 479 480
481 482 483 484 485 486 487 488 489 490 491 492
493 494 495 496 497 498 499 500 501 502 503 504
505 506 507 508 509 510 511 512 513 514 515 516
517 518 519 520 521 522 523 524 525 526 527 528
529 530 531 532 533 534 535 536 537 538 539 540
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553 554 555 556 557 558 559 560 561 562 563 564
565 566 567 568 569 570 571 572 573 574 575 576

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Product Index

Reader
Service
Number

Software

Business

- 274 Affinity Microsystems, 143
- 481 BPI Systems, 115
- 381 Borland Int'l., IFC-1
- 148 CheckMark Software, 140
- 458 CompServCo, 44
- 418 Cortland Computer, 6
- 384 Cricket Software, 20
- 546 Desktop Graphics, 178
- 144 Forethought, 58
- 536 Format Software, 54
- 535 Format Software, 54
- 249 Infosphere, IBC
- 489 LM Software, 192
- 50 Living Videotext, 14-15
- 250 Lotus, 28-29, 42-43
- Microsoft, 130-131
- 547 Owl Int'l., 36
- 516 Pro Plus Software, 148
- Satori Software, 70
- 225 StatSoft, 156
- 542 Summit Software, 188
- 537 Uptime, 5
- 383 Videx, 163

Vertical

- Satori Software, 70

Data Management

- 38 Blyth Software, 10-11
- 381 Borland Int'l., IFC-1
- 144 Forethought, 58
- 250 Lotus, 28-29
- 13 Odesta, 22
- 77 ProVUE Development, 34
- 420 Singular Software, 66
- 435 Software Discoveries, 47
- 383 Videx, 163

Word Processing

- 525 Advanced Logic Systems, 16
- 520 Greene, Johnson, 21
- 489 LM Software, 192
- 478 Target Software, 60

Communications

- 524 Centram Systems West, 129
- 249 Infosphere, IBC
- 304 Peripherals Computers & Supplies, 159
- 500 Software Ventures, 97
- 538 White Pine Software, 156

Educational

- 537 Uptime, 5

Entertainment

- Practical Computer Applications, 30
- 533 QWare, 12

Graphics/Desktop Publishing

- 552 Adobe, 64
- 227 Altsys Corp., 164
- 204 Ann Arbor Softworks, 24-25
- 550 B. Knick Drafting, 182
- 479 Bridgeport Machines, 144
- Casady Co., 21
- 458 CompServCo, 44
- 384 Cricket Software, 20
- 485 D.O.S., 157
- 546 Desktop Graphics, 178
- 530 I/O Design, 146
- 308 Innovative Data Design, 62
- 50 Living Videotext, 14-15

Reader
Service
Number

- 97 Mesa Graphics, 142
- 547 Owl Int'l., 36
- 558 PC Quick-Art, 165
- 374 Williams & Macias Microcomputer Products, 160

Personal Business/Home

- 381 Borland Int'l., IFC-1
- 418 Cortland Computer, 6
- 547 Owl Int'l., 36
- 374 Williams & Macias Microcomputer Products, 160

Languages/Development Systems

- 112 Manx Software, 53
- Microsoft, 82
- 471 TML Systems, 194

Utilities

- 557 Alsoft, 181
- 175 Central Pt. Software, 148

Miscellaneous

- 380 Batteries Included, 162
- 199 Boston Software Publishers, 177
- 175 Central Pt. Software, 148
- 330 CompuServe, 135
- 548 Computer Shoppe, 188
- 523 Data Graphics, 193
- 410 Educomp, 182
- 403 Enabling Technologies, 174
- 284 New Canaan MicroCode, 182
- 334 Public Domain Exchange, The, 172
- Satori Software, 70
- 491 Systat, 147
- 522 Template Systems, 190
- 537 Uptime, 5
- 374 Williams & Macias Microcomputer Products, 160

Hardware

Digitizers/Scanners

- 541 PTI Industries, 139
- Thunderware, 161

Display

- 556 Vermont Microsystems, 167

Modems

- 271 Computer Friends, 46
- 257 Hayes, BC

Hard Disks/Storage

- 498 Dove Computer Corp., 132
- 143 General Computer, 8-9
- 171 Iomega, 155
- 493 Levco, 136
- 466 LoDown, 55
- 467 MDIdeas, 179
- 352 Micah, 145
- 406 Mirror Technologies, 17-19
- 553 Peachtree Technology, 73
- 509 Peripheral Land, 35
- 508 ProApp, 172
- 459 Rabbit Technologies, 187
- 551 Reach Tech, 175
- 554 Spectra Micro Development, 158
- SuperMac, 80-81

Reader
Service
Number

- 549 Univation, 26
- 439 Warp Nine Engineering, 45
- 539 Western Computer, 151

Miscellaneous

- 452 Cauzin Systems, 56-57
- 271 Computer Friends, 46
- 323 GTCO Corp., 52
- 517 GridComm, 33
- 529 Honeywell/Disc Instruments, 141
- 434 Human Touch Computer Products, 7
- 395 Mac Doctor Electronics, 153
- MacMemory, 180, 182
- 470 Microtech Peripherals, 150
- 353 N2 Products, 40
- 509 Peripheral Land, 35
- 544 RH Electronics, 181
- SuperMac, 80-81
- 383 Videx, 163

Accessories

Floppy Disks/Holders

- 193 Echo Data Services, 189
- 255 Sony, 107

Miscellaneous

- 490 Bede Tech, 195
- 373 Best Computer Supplies, 72
- 496 CompuCover, 182
- 11 Kensington, 38-39, 41
- 28 Linebacker, Inc., 154

Reader
Service
Number

- 291 MPH Computer Products, 166
- Microsoft Press, 76-77
- 353 N2 Products, 40
- 450 Panamax, 196
- 400 ScanCoFurn, 31

Mail Order

- 373 Best Computer Supplies, 72
- 272 Icon Review, 48-51
- 4 MacConnection, 84-87
- 368 MacRentals, 178
- 16 MacStore, 187
- 215 Northeastern Software, 168-171
- 4 PC Connection, 84-87
- 45 PC Network, 68-69
- 194 Programs Plus, 74-75
- 334 Public Domain Exchange, The, 172
- 545 Software Library, 196
- 483 Tissey Computer Products, 173
- 134 USA-Flex, 138, 160
- 459 Vision Technologies, 134

The Product Index is published as a service to our advertisers and may be discontinued at the publisher's discretion. Every reasonable effort is made to categorize advertisers correctly. If a listing should be changed, please write us at Macworld, 555 De Haro Street, San Francisco, CA 94107, so that we have the opportunity to change it.

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Open Window

An exchange of Macintosh discoveries

Edited by Jim Heid

This month, a hint that will put you on better terms with your Brother: a modification of the Microsoft Word printer driver that improves the printer's bold-face text. Also, tips on laser-printing both sides of the paper, selecting paper, writing equations with MacDraw, and stretching MacDraw text for special effects. A MacPaint trick improves shadow text, and a reader's clever adaptation of the Finder and the MiniFinder lets you switch between programs quickly. Of interest to Microsoft Chartographers: a reader uncovers a LaserWriter printing problem and offers a solution. But first, news of a shareware utility that modifies programs to show long file names when you open and save documents.

Looking at Long Names

One advantage the Mac has over many computers is that it lets you give documents long names: 1986 Budget Forecast instead of BUDG86.WKS, or Sales Memo to Duncan instead of MEMDUN.DOC. Often, however, this benefit backfires. If you begin more than one file with the same text—May Sales Forecast Memo and May Sales Forecast Report, for example—you may not see enough of the name in an Open dialog box to tell which is which.

You can tell documents apart by remembering that they're listed alphabetically (for example, the May memo before the May report), but a simple solution resides in the stacks of a MAUG data library

on CompuServe. It's a \$5 shareware application called *Window Changer*, which modifies Open and Save boxes to show document names as long as 56 characters. *Window Changer* modifies over a dozen of the most popular Mac applications, and its version 1.0 is stored in MACUS DL3 (Programming) as BIGWIN.BIN. For important information about which programs can be modified, download the documentation (BIGWIN.DOC), too. —Ed.

A Better Brother Bold

With my Mac and *Microsoft Word*, I use Brother electronic typewriters and the Brother printer driver included with *Word*. The bold text looks anemic to me, however. The Brother prints bold by double-printing the text, displacing the second pass by $\frac{1}{80}$ inch. Shadow text works the same way: the second pass is displaced $\frac{1}{20}$ inch, resulting in bolder text. I used John Mitchell's *Fedit* disk-editing utility to modify *Word*'s Brother driver, changing bold text to shadowed text.

- Make a backup of the Brother driver, start *Fedit*, and open the backup. Make sure the display is in hexadecimal (choose Display Sector in Hex from the Display menu).

- Choose Hex Search from the Options menu and type **1B4F** (the codes that activate bold text) and then click Find.

Fedit positions the cursor at the bytes you need to change.

- Choose Hex Modify from the Edit menu and type **1B57**. Double-check your work and then choose Write Sector from the Edit menu and OK from the dialog box.

*Ismail bin Mustapha
Petaling Jaya, Malaysia*

Two Sides to Every Page

I've figured out how to collate the paper in the LaserWriter's paper cassette so that documents can be printed on both sides, with pages in the right order. It seems trivial, but you'd be surprised how much paper you can waste until you know the secret.

- Print half the number of final copies you'll need. If you need ten copies, for example, print five. If you need seven copies, print four; you'll wind up with eight copies, but an extra is often handy.

- Arrange the printed pages so that all the copies of page 2 are on top, followed by all the copies of page 1, then of page 4, page 3, page 6, page 5, and so on (see "Two-Sided Printing"). If the last page of your document is odd-numbered, set aside the printed copies of that page and replace them on the stack with blank paper. Place the pages in the LaserWriter's tray with the printed side up and the top edge of the pages feeding into the printer.

- Again, print half the number of copies you'll need, then collate the pages from both printings into the proper order. If you end with an odd-numbered page, remember to include the single-sided copies from the first printing.

*Brian Lyngaas
Fond du Lac, Wisconsin*

This approach works for Microsoft Word documents, but MacWrite throws a wrench into things by printing documents in reverse order so that pages

(continues)

Open Window

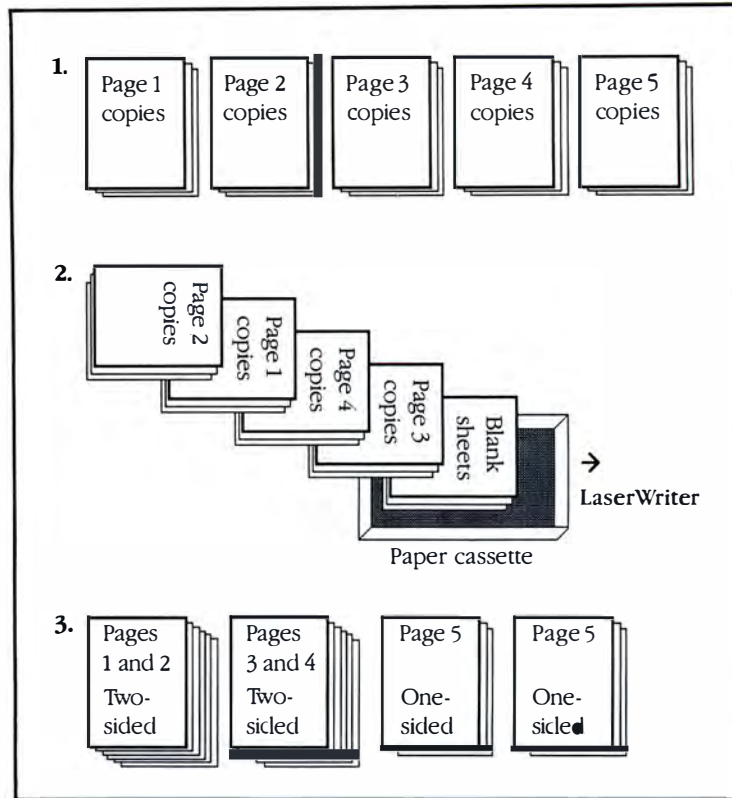
stack up in the proper order in the LaserWriter's output tray. To collate the first printing for a MacWrite document, start with all the copies of page 2 on the bottom and add all the copies of page 1 on top, followed by page 4 and then 3, 6, 5, and so on. —Ed.

Solving the Equation Problem

Despite the variety of software available for the Mac, I haven't found a word processor that lets me include engineering equations in reports. Until someone solves this admittedly complex problem, I've resorted to the following procedure to get acceptable results.

I set up *Switcher* to run *MacWrite* (or *Microsoft Word*) and *MacDraw*, with the Always Convert Clipboard option active. When I get to an equation, I switch from *MacWrite* to *MacDraw* and put together the equation. I then select the entire equation, copy it to the Clipboard, and switch back to *MacWrite* to paste the equation in the report (see "Drawing Equations"). This approach requires patience but allows me to align super- and subscript numbers, super-superscripts, sub-superscripts, and

(continues)



Two-Sided Printing

To laser-print a Word document on both sides of the paper, first print half the number of final copies you'll need (1). Next, rearrange the pages in the order shown: page 2 copies on top of page 1 copies, then pages 4 and 3, and so on (2). Print the document again on the blank sides and then collate the pages (3). See the text for the order for MacWrite documents.

New

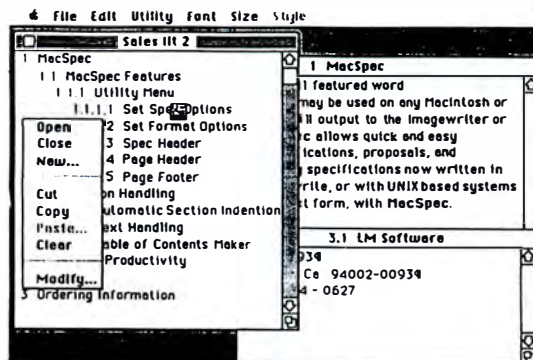
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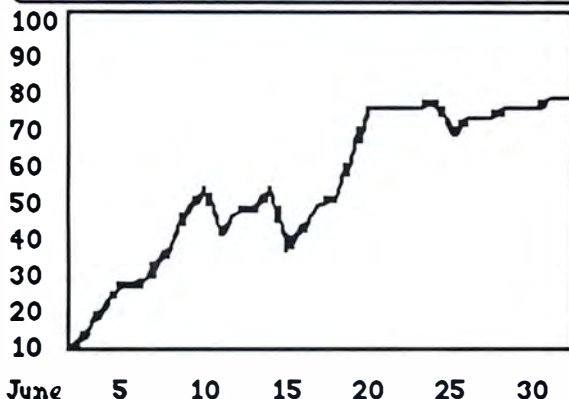
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Drawing Equations

To add complex equations to documents, create an equation with MacDraw, then select the equation, copy it to the Clipboard, switch to the word processor, and paste.

anything else you can imagine. The Send to Back and Bring to Front commands are more and more useful as the equation grows; choose the No Fill background to avoid obscuring the bottom layers. Finally, enter the equation number on the same line in MacDraw, too.

Richard J. Nielsen
Menlo Park, California

Text Stretching

Text pasted from MacDraw into word processing documents behaves differently depending on the copying method. If you se-

lect the text with the I-beam pointer, it's copied as text and can be edited once it's pasted. If you select text with the arrow pointer, the type is treated as a graphic object you can stretch by dragging its handles to achieve special effects for banners or signs.

Jess Dorsey
Lubbock, Texas

Stretching type is even more useful for LaserWriter fonts. Stretched or otherwise resized MacDraw text looks ragged on the screen but, through the magic of PostScript, prints beautifully on the LaserWriter, making this an excellent technique for customizing condensed or expanded headline type styles. This trick doesn't work with stretched MacPaint text, since MacPaint creates bit-mapped graphics, while MacDraw creates QuickDraw images—mathematical descriptions of an object's appearance. (For more information on cutting and pasting Macintosh graphics, see "A Clipboard Collage," Macworld, January 1986.)

Don't go overboard with text stretching, however; a typeface is designed to look best in its original proportions, and

the more it's altered, the less attractive it becomes. Generally, don't expand or condense a font more than 10 or 15 percent. —Ed.

Swapping MiniFinder and Finder

Previous Open Window columns described two MiniFinder shortcuts: pressing the Enter key to start the Finder, and holding an Option key while quitting an application to bypass the MiniFinder and go straight to the Finder. I found the tips useful, but for file management, I'd rather quit to the Finder most of the time, with the option of quitting to the MiniFinder when I want to move quickly between applications. My solution: I change the Finder's name to MiniFinder and the MiniFinder's name to Finder, so that I quit to the Finder unless I hold down an Option key while quitting. The following procedure lets you swap the two files' names:

- Install the MiniFinder, then duplicate both the Finder and the MiniFinder (because the Finder doesn't let you change the original files' names).

(continues)

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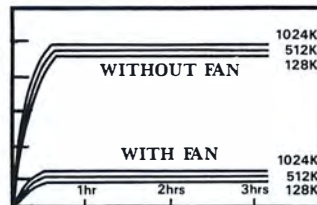
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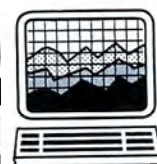
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Open Window

• While running with a different disk as the startup disk, throw away the original Finder and MiniFinder. To avoid the "Are you sure. . ." queries, hold down an Option key while dragging the files to the trash.

• Change the name Copy of Finder to MiniFinder, and Copy of MiniFinder to Finder.

Shut down and then restart the Mac with the modified disk. The Finder appears as usual, although the Mac thinks it's running the MiniFinder, since that's the Finder's new name.

R. W. Zehr

Sausalito, California

A slick trick, but a caveat is in order: once you've switched the names, you can't use the MiniFinder's Finder button to start the real Finder because the Mac thinks it's already running the Finder. Also, you can't use the Open Other button to start the Finder, since the MiniFinder file doesn't appear in the scroll box. To get to the real Finder, you have to start an application and then quit.

The fact that the Mac always looks for a program called MiniFinder upon quitting has another benefit. Once you've renamed a program MiniFinder, it starts automatically after every quit unless you hold down an Option key to bypass it. For the most flexibility, check out a desk accessory called Launch (stored on CompuServe's MAUG Data Library 1 as LAUNCH.BIN), which lets you quit one application and directly start another.
—Ed.

Open Window welcomes your contributions. Please send submissions on disk (which we will return) along with a brief description on paper to Open Window, Macworld, 555 De Haro St., San Francisco, CA 94107. Or send your contribution electronically to CompuServe 70370,702 or The Source BCW440. We pay \$25 to \$100 for each Open Window item published. All published submissions become the property of Macworld.

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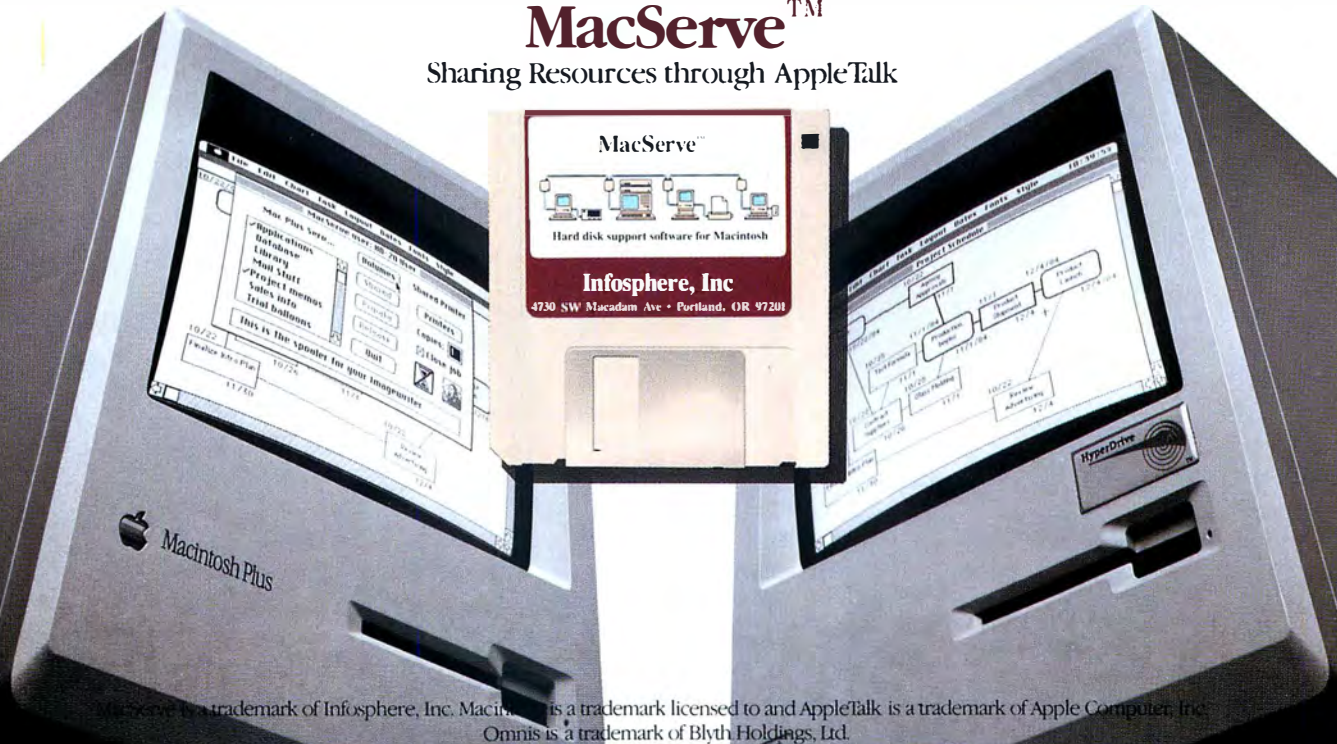
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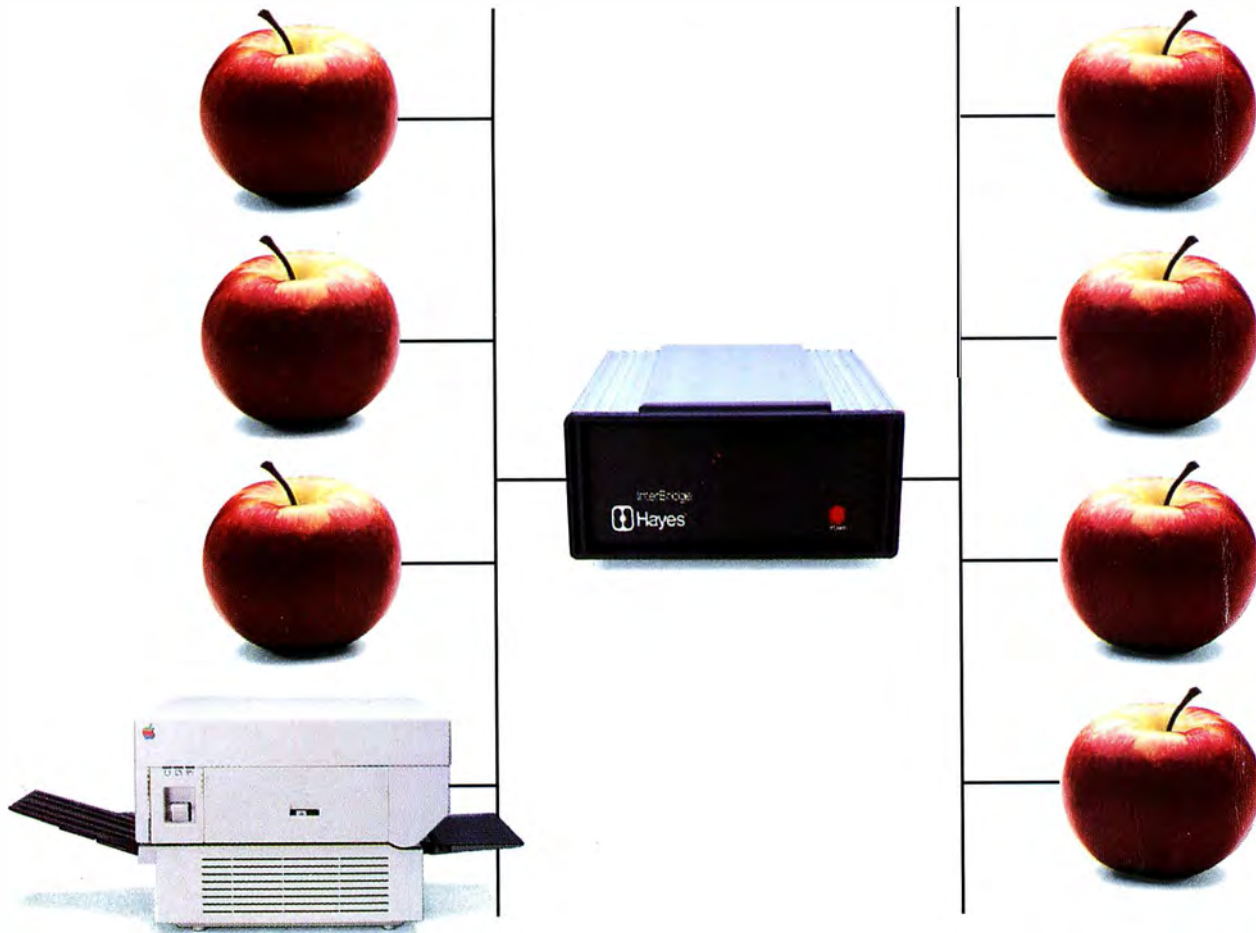


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