MACWORLD

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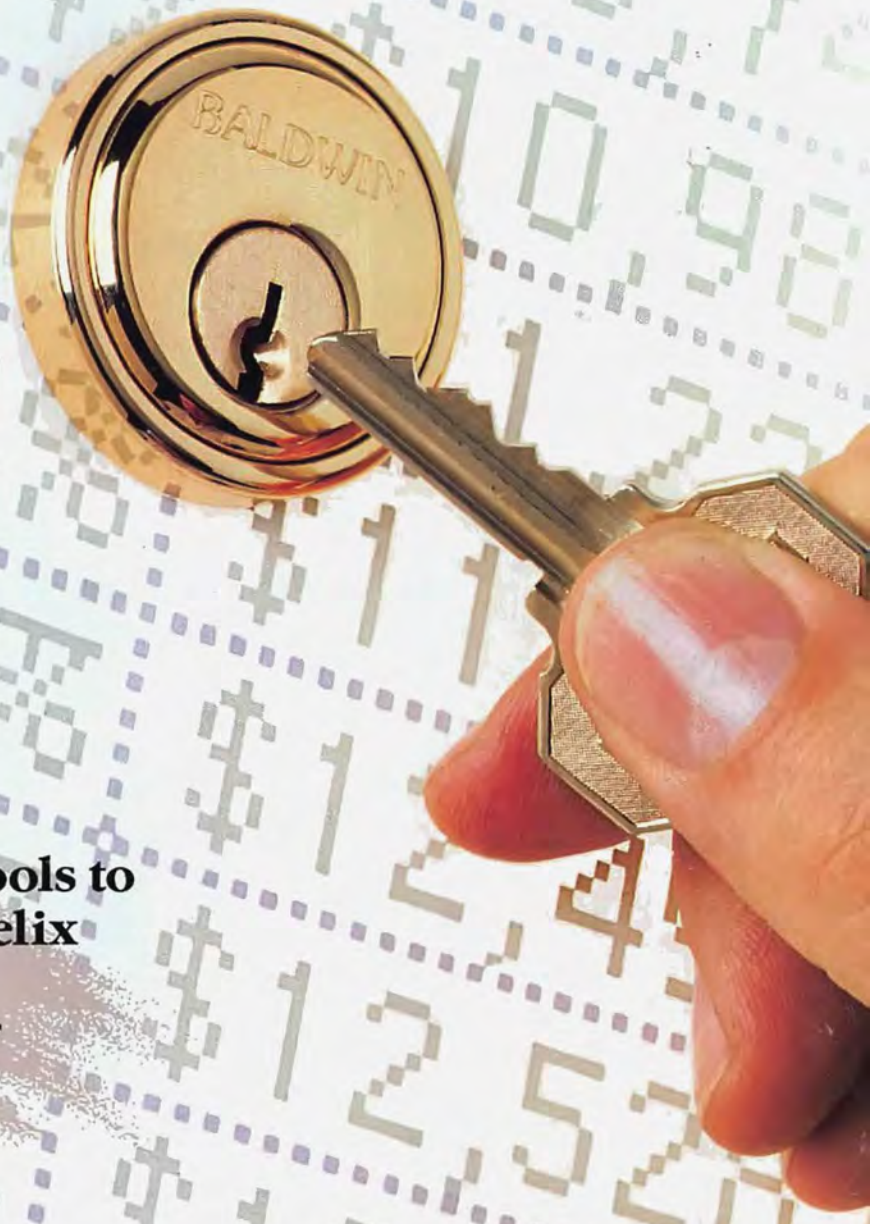
The Macintosh™ Magazine

The Key to Excel

Unlocking your database



Reviews: Mac Graphics in 3-D

Buyer's Guide to Five Hard Disks

Visual Tools to Speed Helix

Network Options– What's What

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> *Lawrence J. Magid, Chicago Sun Times*"

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MACWORLD

June 1986 *The Macintosh™ Magazine*

Getting Started

88 Forms Following Function
Gordon McComb
Create forms that get the job done: an introduction to the rules and tools of good form design in the electronic age.

Review

94 3-D In Depth
Al Cini
A well-rounded look at four three-dimensional graphics programs–*Mac3D, MacSpace, Easy3D,* and *MacModel*–that offer sophisticated CAD features on the Mac.

102 Hard Decisions
Jim Heid
A guide to hard disk buying in the post-Mac Plus era and reviews of five internal and external hard disks: the HyperDrive 20, Levco's OverDrive, the MicahDrive AT, MacBottom, and the Paradise Mac 10.

110 FORTRAN's New Life on the Mac
Emil Flock and Miriam Flock
Take a look at Microsoft's Macintosh version of FORTRAN, the professional-strength language favored by programmers who earned their stripes in mainframe computing.

Hands On

116 The Macro Key to Excel Databases
Danny Goodman
Unlock *Excel*'s database power with an easy-to-use data-entry form that files your information in the right cells automatically.

120 The Well-Tiled Abacus
David L. Foster
Helix's visual language lets you easily build the database you need.

State of the Art

126 Expanding Your Network Options
David Needle
What networks can do for you: a comprehensive survey of the diverse network strategies and products now available for the Macintosh.

Departments

13 The Challenge of CD ROM
David Bunnell

25 Talking Heads
Steven Levy

39 Note Pad
Paul Heckel
A software developer considers the user interface as intellectual property.

45 Letters

63 Macworld View
The Mac in Japan, Pascal update, courseware distribution, the new *MacWorkStation,* and other news and notes for the Macintosh community.

Get the specs on a score of Mac network products that can bring you happier LANdings. See "Expanding Your Network Options," page 126.

75 Get Info

Macworld's tutor answers questions about using the other side of single-sided disks, obtaining shareware without a modem, alternate keyboards, and other Macintosh concerns.

137 Macware Reviews

Edited by Erfert Nielson

- *TopDesk* A utilitarian disk that includes seven time-saving desk accessories.
- *MacIndexer* Mac publishers can now automate the time-consuming task of compiling an index.
- *Enchanted Scepters* A magical mixture of words, pictures, and sounds makes up a new kind of game.
- *Racter* If you believe programs should be sane and not heard, then *Racter* is not for you.
- *TimeBase* This time-management program lets you look at the big picture when you're scheduling appointments.
- *Mindshadow* Discover your identity in a challenging text-and-graphics adventure.

179 Open Window

An exchange of Macintosh discoveries, including undocumented Font/DA Mover features, a BASIC routine that puts the time on the menu bar, and a method for printing a series of *Microsoft Word* documents without quitting the program.

171 Macworld Directory

Indexes

176 Advertisers
177 Products

On the Cover
Accelerate Excel data entry—see "The macro Key to Excel Databases," page 116.

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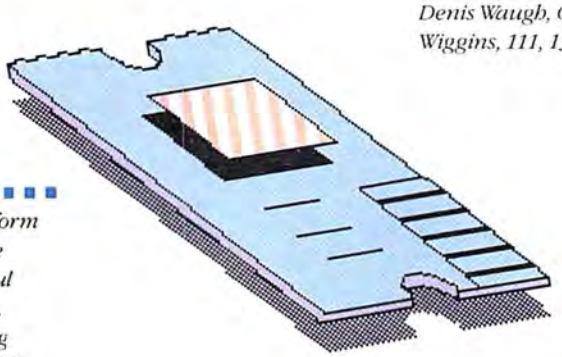

Knowing how a form will be used is the ticket to successful Mac form design. "Forms Following Function," page 88, fills you in on the details.

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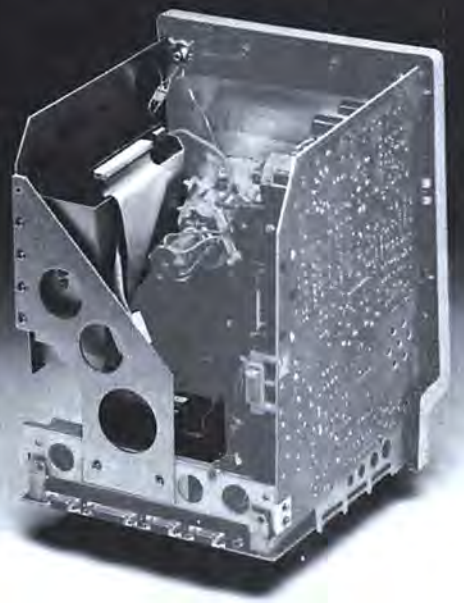

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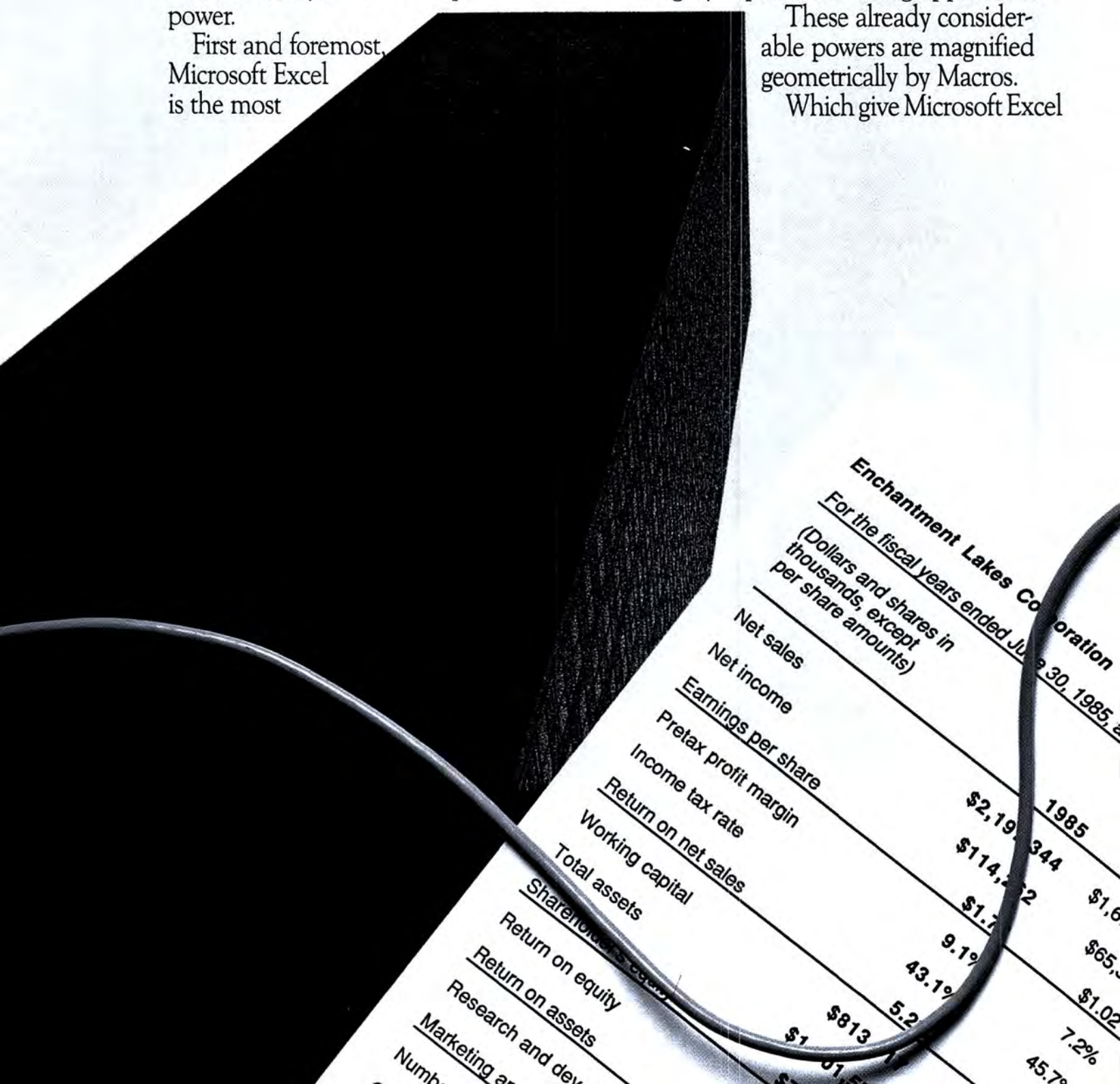

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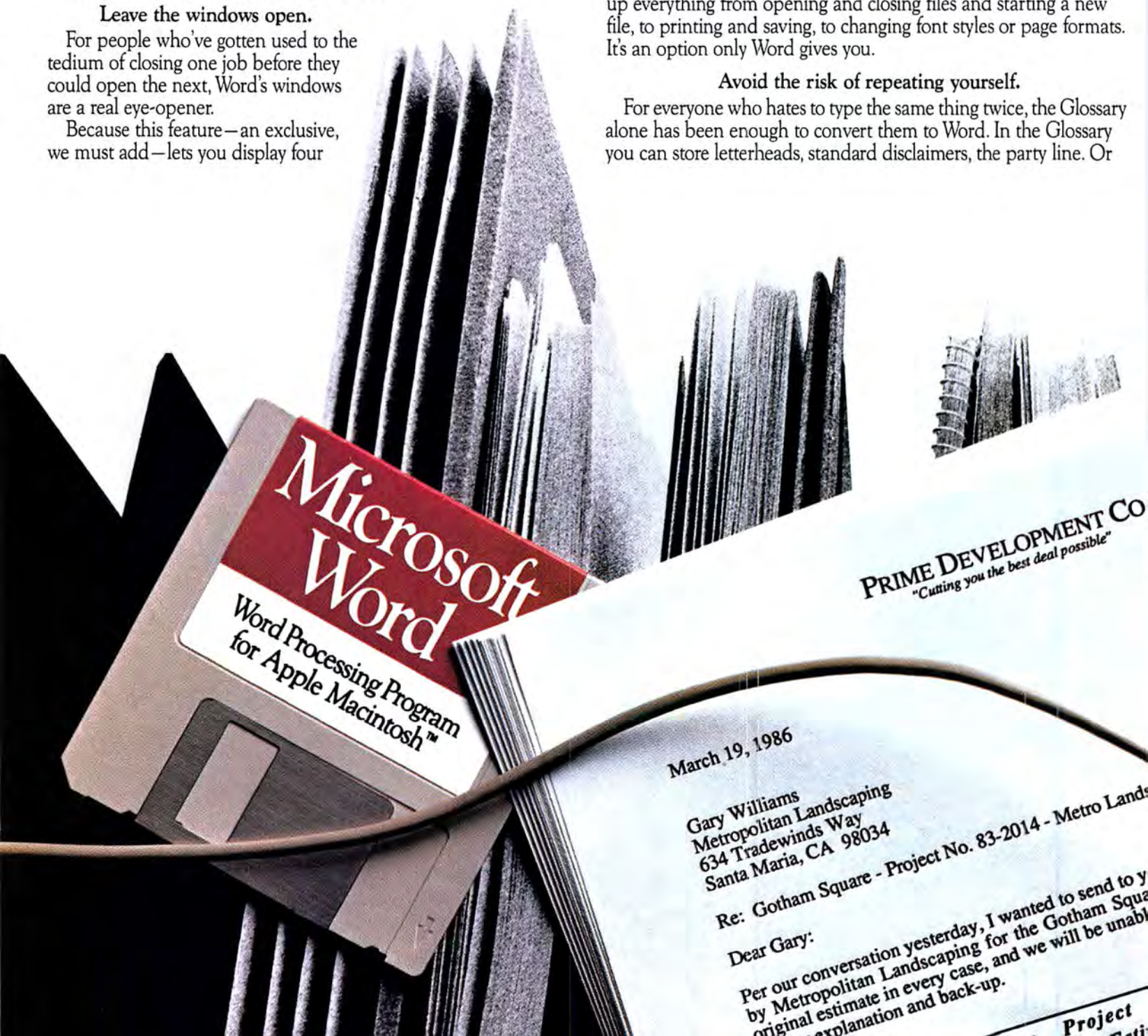

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RUBICON PUBLISHING

David Bunnell

The Challenge of CD ROM

CD ROM promises more than a new standard for data storage—it could replace TV with a new, interactive medium.

The creative media geniuses of the new age will have to be CD ROM literate.

I recently attended Microsoft's First International Conference on CD ROM (compact disk read-only memory) in Seattle. It was an event that was described by some as the Woodstock of CD ROM—and indeed, it had that air of being a Magical Mystery Tour of the future of information technology.

I was scratching my head and wondering if all this was really possible when I bumped into Barry Richman, CEO of Dynatext Company, a CD ROM production company in Berkeley, California, specializing in medical information.

Barry assured me that CD ROMs—those optical, or laser, disks that in their typical 5¼-inch form can store 550 megabytes of multimedia memory—are definitely going to prevail. He believes they're going to become the de facto standard for data storage using laser technology.

When Barry speaks, Bunnell listens.

Let me tell you about Barry. Barry has become my personal barometer for monitoring technological trends, a high-tech groundhog who pops up from time to time to let me know when spring will come.

In the summer of 1981, Barry had become general manager of Osborne/McGraw-Hill publishing, where I was working as a computer editor. Adam Osborne had just left to start a computer company, and Barry was the new boss.

That August, IBM announced its personal computer. Osborne, along with most people in the computer industry and a majority of the computer press, was very skeptical about IBM. Everyone maintained that IBM would never be successful because it didn't understand the personal computer market. They were convinced that the PC itself was no big deal. And they noted that there was no real software for it.

I must confess that I was, at least in the very beginning, one of those doubting Thomases.

Until Barry returned from an IBM press conference. Laden with press releases and photos and bubbling with enthusiasm, he was crazed with ideas for books about the IBM PC that he thought Osborne/McGraw-Hill should publish.

That was the catalyst I needed to emerge from my skepticism and separate myself from my colleagues in the computer industry. I took a second look at the PC. I read the releases, studied the machine, and concluded that Barry was right.

Then I took a fortuitous personal step: I left Osborne/McGraw-Hill to start *PC Magazine*. The rest is personal computing history. Look what's happened to the world since then!

And it was because of Barry that I had been able to see the light.

So when I ran into him at the Microsoft CD ROM conference, I had a flash of déjà vu. He was full of wild-eyed optimism and—gadzooks!—he had that crazed look in his eye again.

Now, this man is an eminently practical thinker, not some starry-eyed prophet. He believes CD ROM is going to succeed because of economics, pure and simple.

"Despite the utility of extraordinary increases in density, the future of CD ROM as a publishing medium is only partly related to how much information can be packed per unit volume," Barry says in an article called "Dense Media and the Future

(continues on page 16)

Nobody Drives

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(continued from page 13)

of Publishing." It's published in *The New Papyrus* ($34.95), a book released by Microsoft Press to coincide with the Seattle conference. This 619-page compendium, with contributions from more than 30 optical-memory specialists, promises to become the bible of CD ROM.

"If it were enough for media simply to be denser, we would have Bibles written on the heads of pins and books like this printed on microfiche," Barry says. "The underlying reason that CD ROMs are likely to replace traditional print is, as usual, economic.

"Dense media have the inherent characteristics necessary to cure some of publishing's greatest problems—excess inventory, short product life, high distribution costs, wasteful product returns, and insufficient shelf space to give new products a chance to thrive. These are chronic, suffocating problems for which no solution can be found in traditional print forms."

Barry builds a compelling argument in his article, so once again I find I'm on his bandwagon.

CD ROM publishing unquestionably will emerge as a major medium. CD ROM interfaces to personal computers will be able to store a tremendous number of programs, not to mention tons of databases that can be linked together.

Although CD ROMs are still in a read-only format, the day is steadily drawing near when you'll be able to write to optical disks as well. That will open up CD ROMs to a whole new era of possibilities.

So far, so good.

But—shades of the past!—two distinct CD ROM standards have emerged. One is the CD-I (Compact Disk Interactive) standard announced by Philips-Sony during the conference. The other is the CD ROM standard backed by Microsoft.

As of now, the avowed intention is to build a bridge between CD-I and CD ROM, although it isn't clear just how. Where do we go from here? Is CD ROM going to be just another wrinkle in ROM? Or are we going to witness yet another split in technological standards and be forced to choose between them?

I have my own vision of the future of this new medium.

I think the greatest challenge of CD ROM is to build something more exciting than television—and to capture some of that "mind share" from the TV audience.

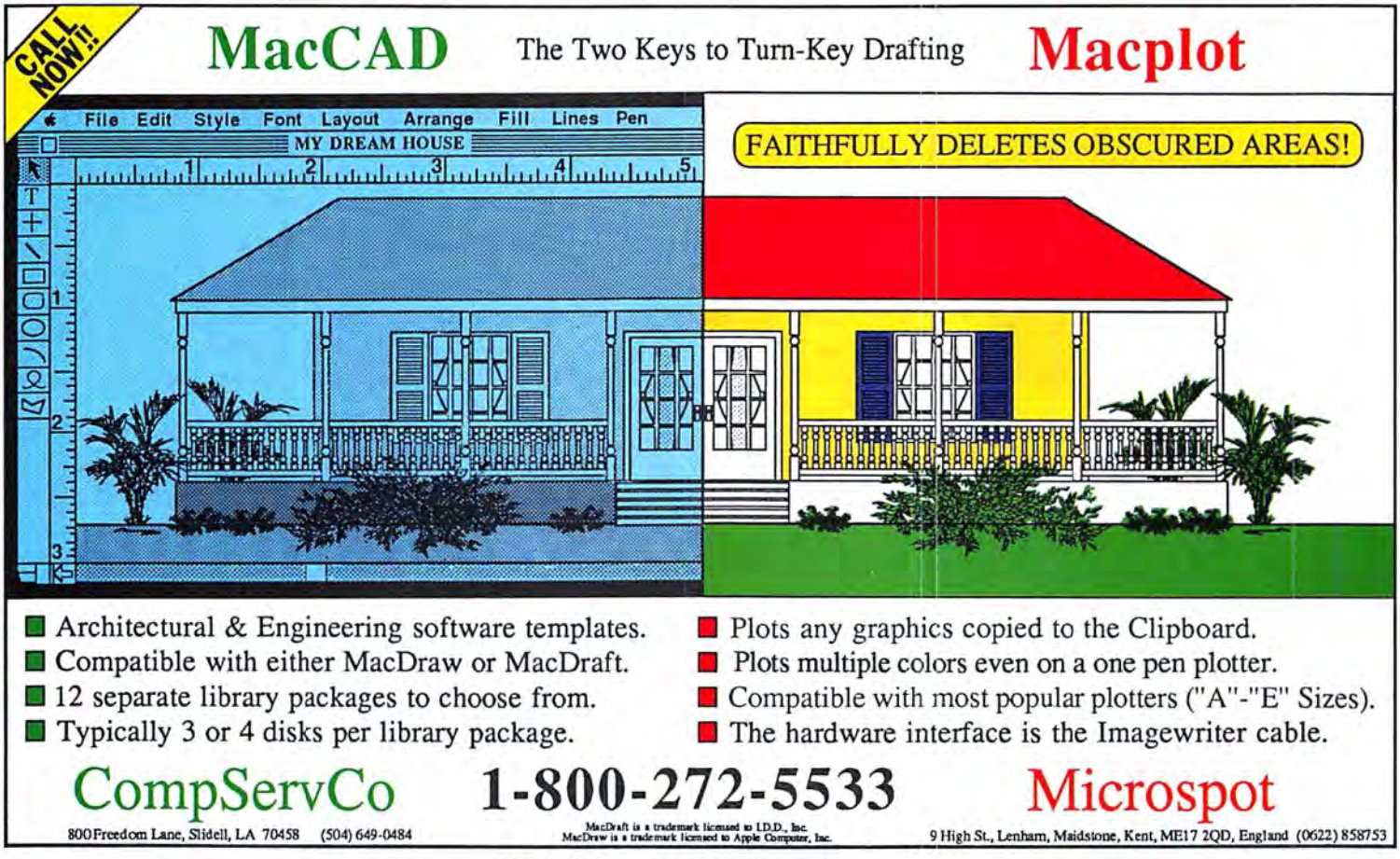
We now have a society that watches an amazing amount of TV—more than 7 hours a day per home. That's really a waste of vital mental creativity.

CD ROM stands a good chance of reclaiming some of that lost mental ground.

What makes CD ROM really exciting is that, for the first time, it brings together computers, entertainment, and publishing in a way that allows you to create an interactive medium.

As a brand-new medium—really, a technological hybrid—CD ROM requires a new set of tools and rules for crafting the final multimedia product. Creators and producers will need to know how to mix graphics, animation, sound, and text; how to interconnect multiple layers of information—how to make it all work.

(continues on page 20)



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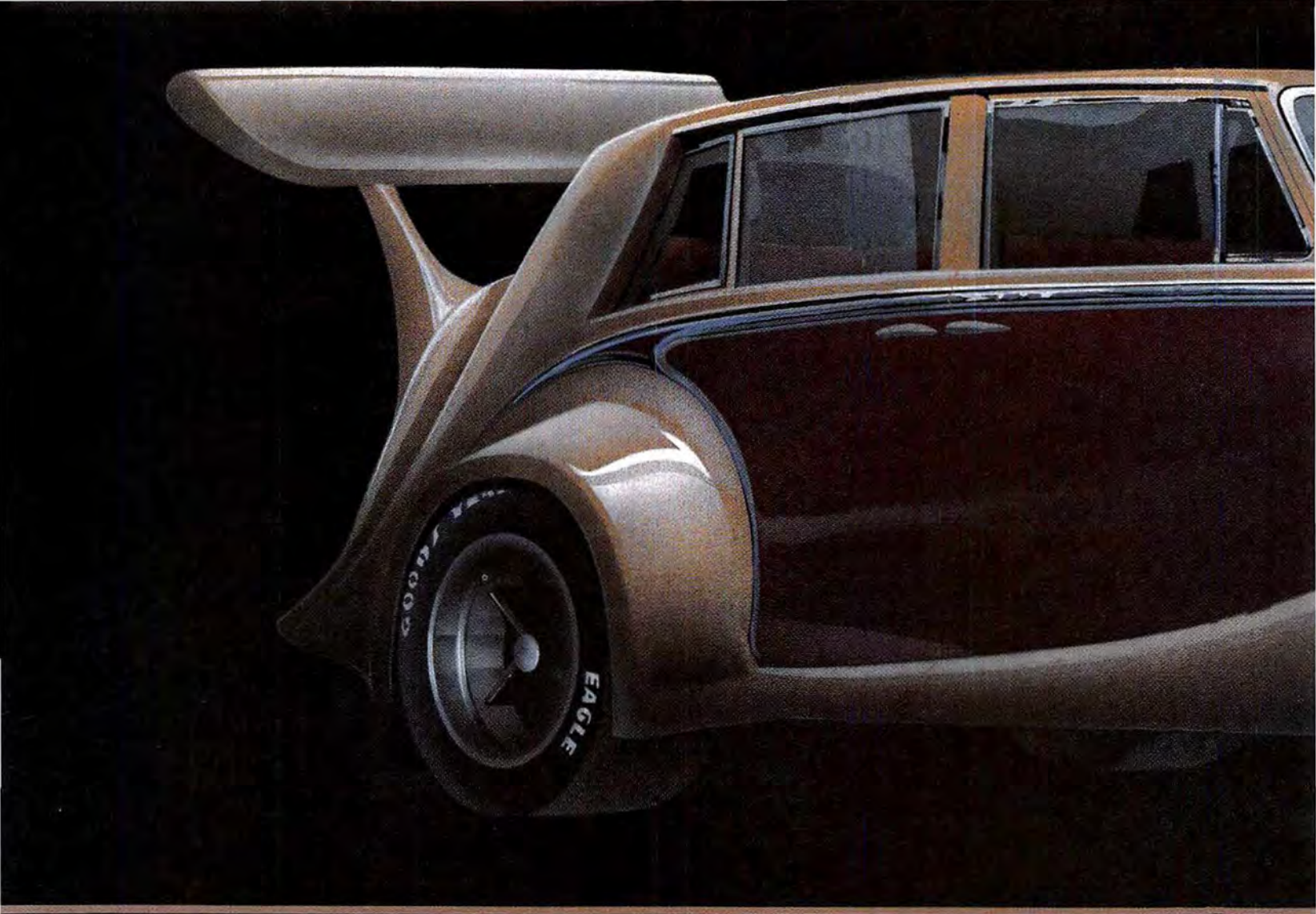

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David Bunnell

(continued from page 16)

That's why the basic issues of CD ROM are much more difficult to resolve than any problems we have ever had to face with the personal computer. After all, personal computers were designed to let you create information, not read it. As interfaces, PCs are simple, whereas CD ROMs are complex–light-years ahead of PCs in their interactive possibilities.

To really make CD ROM work, the next generation of great American artists must become adept at its uses and techniques. We're going to need a Herman Melville and a Hemingway, a D. W. Griffith and a John Huston, a Georgia O'Keeffe and a Jackson Pollock, a George Gershwin and a Bruce Springsteen of CD ROM–to make this new medium truly soar.

If CD ROM stays in the hands of software and hardware companies, it's going to be boring fare indeed. It will be Mutual of Omaha's "Dull Kingdom of CD ROM" as opposed to "Masterpiece Theatre."

The creative media geniuses of the new age will have to be CD ROM literate.

Even though CD ROM is not here today–and my guess is that it will be a year or two before it becomes a substantial presence, when everyone has CD ROM drives attached to personal computers–the potential of CD ROM to expand our universe could be enormous.

Great CD ROM products could be incredibly elaborate affairs, filled with images and maps and animation and narration and music to enhance the written word.

Just think of the incredible interactive games that could be played on a level beyond anything that exists now. Games could become the new literature of the day. In fact, literature should be the driving force of this new medium. We need great words and concepts, not just gimmicks.

Journals and diaries and memoirs could become a new art form. You could record your words, draw pictures, and create an inspired autobiographical database. Your descendants could trace their genealogical roots in the family CD ROM disk.

CD ROM may also prove to be an ideal tool for learning languages. Language systems would record your voice and compare your pronunciation to that of the ROM instructor, pointing out the differences so you could hear them. Lessons would begin at your present level of proficiency and grow continually more complex, keeping track of your improvement and growing vocabulary.

I believe that we should become aware of all this potential. We should actively influence the new medium so that compromises are not made.

So get behind CD ROM! Personal computer users have the power to prevent it from becoming just another passive medium like the television. Who needs an encyclopedic boob tube that plays Muzak? We want the technology to fulfill its original vision, instead of CD ROM becoming just another home computer flop. □

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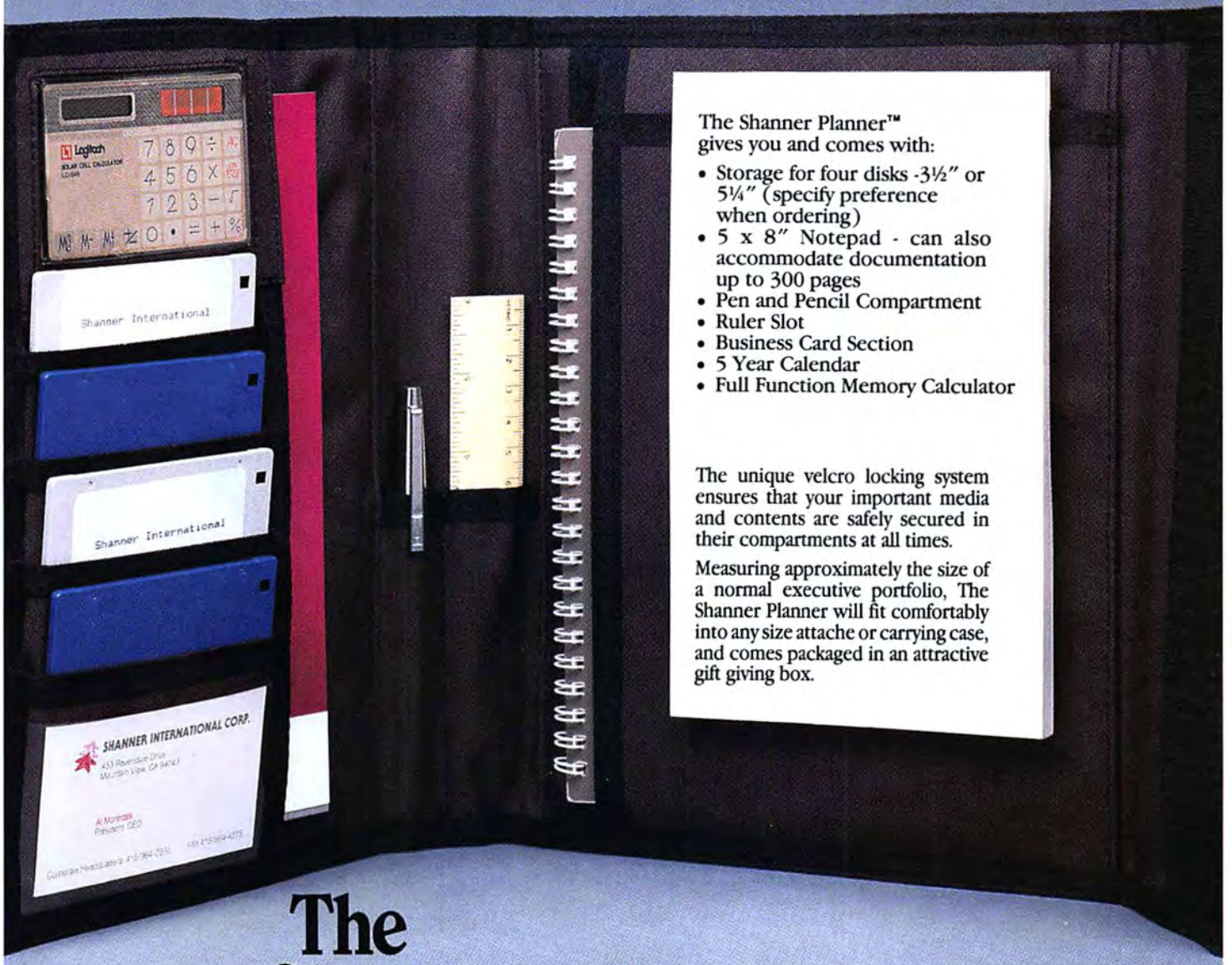

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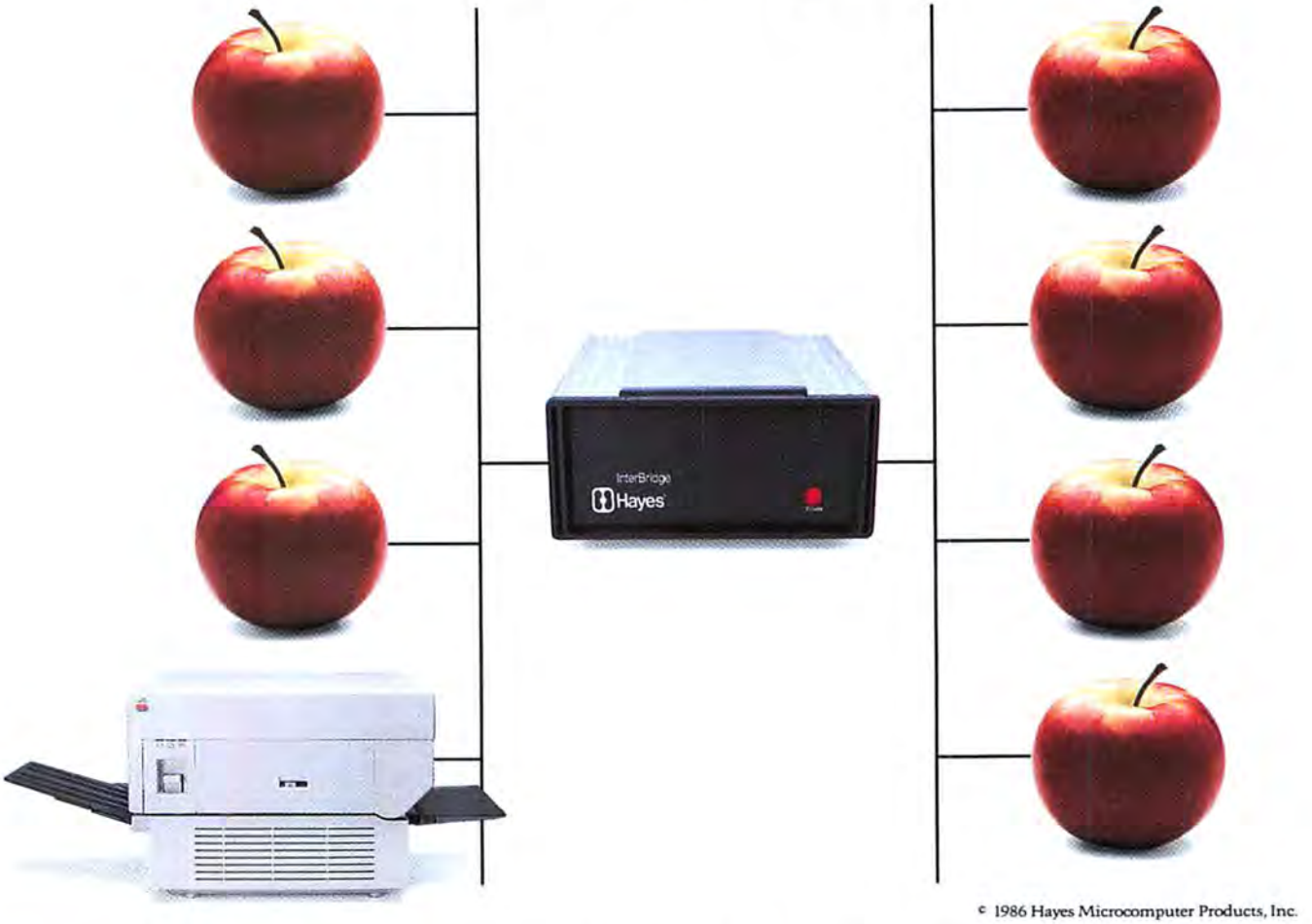

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Steven Levy

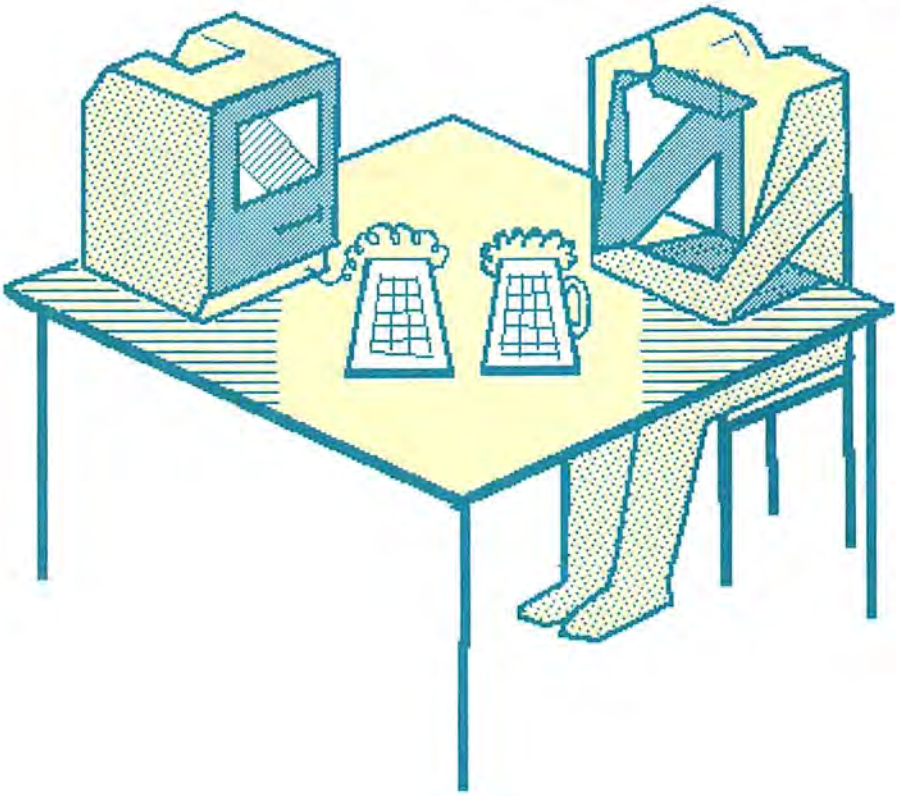
Talking Heads

Audiovisual teleconferencing lets you put your face on the line along with your words

Every time I'm at my computer late enough to drop into the informal on-line conference that occurs nightly on CompuServe, the syrupy theme song from the television show "Cheers" starts buzzing below my left temple. I can't quote the lyrics precisely, but they deal with the cuddly feeling of leaving behind the cold air and the cold world, and entering the hail-fellow-well-met warmth of the ideal neighborhood bar–"where everybody knows your name."

Those friendly neighborhood bars are becoming scarce, but by logging on to MAUG (the Macintosh special interest group) on CompuServe and participating in the real-time VMCO conference, you can experience a reasonable–though non-alcoholic–facsimile of that camaraderie. VMCO is an acronym for Visual/Voice MAUG Conferencing. A simple description usually leaves people agog.

When you use VMCO, the program says (actually *speaking* via Apple's *Macintalk* speech program), "Welcome to VMCO" and dials the phone to log on to CompuServe. Then you enter a conference of up to 19 other people–all participating at that very moment from Cleveland, or Toronto, or Arlington, Texas. The Macintosh screen shows an overhead view of a conference table; above it and below it are 20 spaces, filled by either empty chairs or self-designed caricatures of the conferees. Underneath each disembodied face is the owner's name. If you type "hello, everybody," most of the people will probably greet you by name. You hear their words uttered through the Macintosh speaker in the distinctively muddy *Macintalk* voice, and you see the portraits' lips move. Perhaps someone will smile at you.



As the conference continues, people respond to comments by displaying faces expressing different emotions, such as laughter, surprise, anger, or sadness. If, for instance, you want to express ire, you type ⌘-5, and appearing in your niche at the conference table is the angry face you have drawn. Feedback has traditionally been a delayed-gratification phenomenon in computer conferencing; this instant visual response adds a wonderful vitality. On VMCO, someone who cracks a good joke might be rewarded with ten faces breaking into wide grins.

And so goes the evening, with casual conversation more suited to a friendly tavern than a corporate conference room, until you log off and the *Macintalk* voice says good-bye.

Visions of VMCO

I have included this labored description because many people find it difficult to grasp exactly what VMCO is. They think, as I first did, that they are hearing about a program that someone intends to create, and not a system that has been operating for nearly a year with more than 200 people represented by little icons that, in

(continues on page 28)

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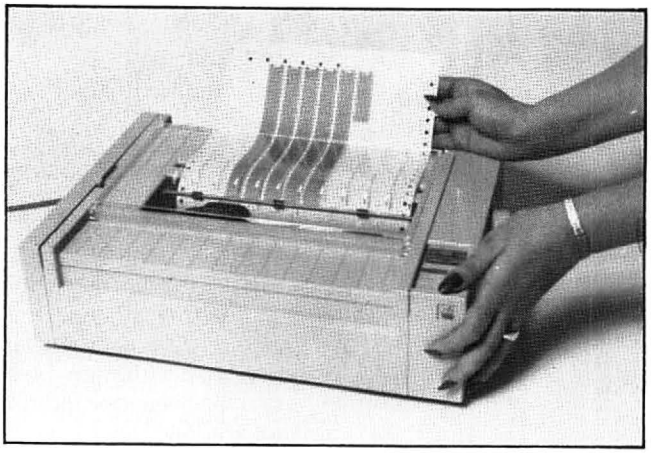

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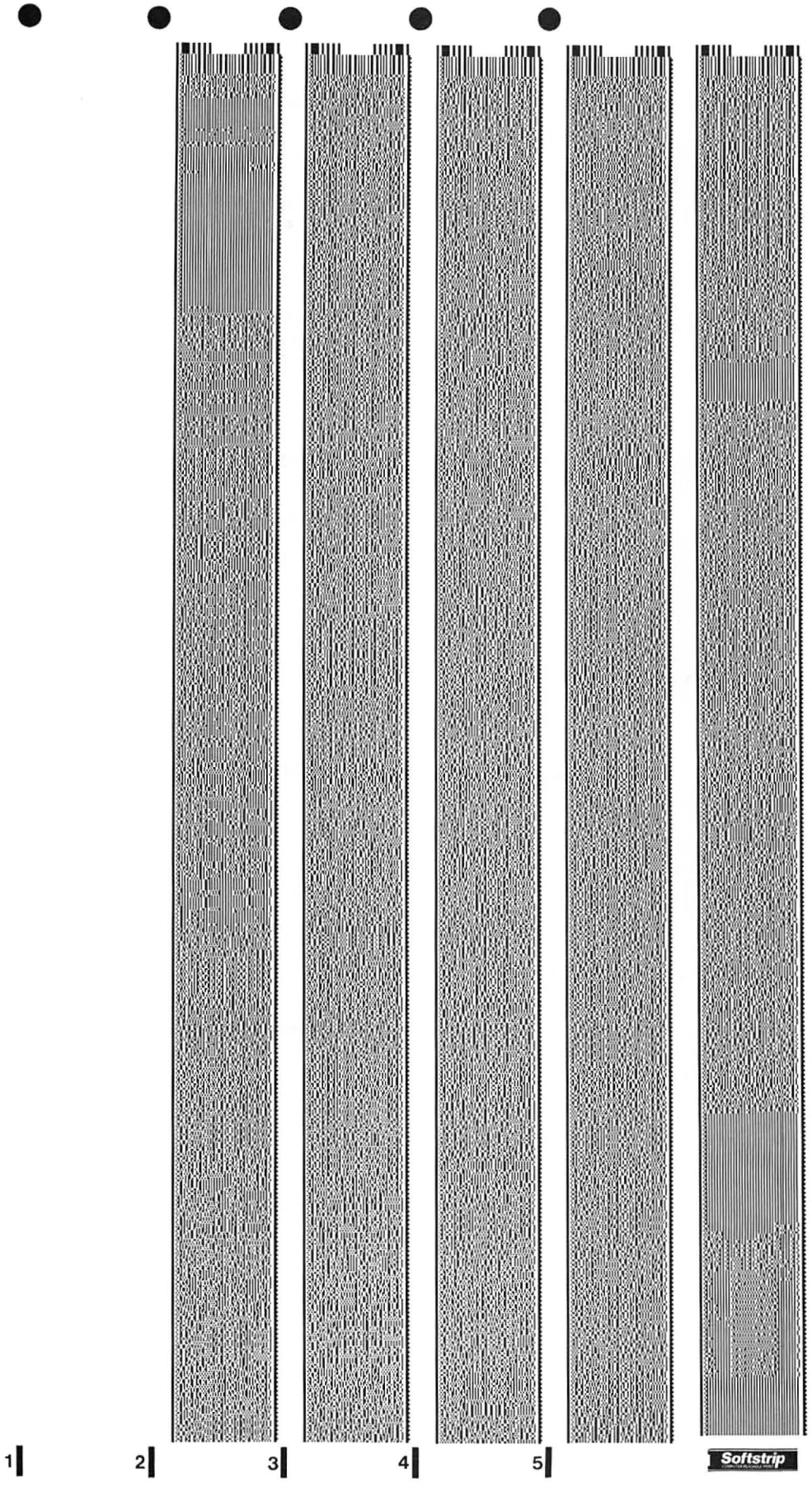

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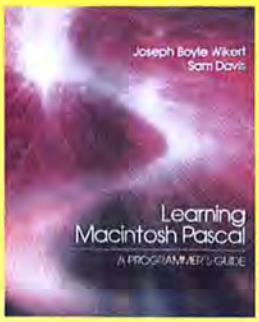

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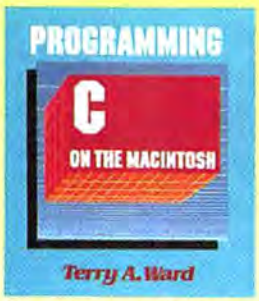

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Steven Levy

(continued from page 25)

theory, look like them. Maybe the skepticism is rooted in the fact that it has been over 20 years since people began spinning visionary scenarios involving systems much like VMCO, and such schemes have been mentally relegated to the blue-sky file. At MIT's innovative Media Lab, house visionary Nicholas Negroponte wrote a paper in the seventies called "Talking Heads: Display Techniques for Persona," which promised a science-fiction-like holographic setup "in teleconferencing situations within a relatively small and known community of participants." The scheme would apparently include a hell of a lot of expense–each surrogate (talking head) in each conferencing site would be a life-size replica of the speaker's head, containing a video camera to view the other conferees.

While VMCO is more modest and does not look like something smuggled from Disney World, it has a few advantages over the futurist's vision. First of all, it exists. Second, as a piece of Macintosh software, it doesn't require a separate, specially equipped conferencing room. Third, for those who already own Macs, the cost of the program is minimal. The VMCO software on CompuServe is available for downloading (stored on Data Library 8 on MAUG), with no fee for the author. The only cost is the on-line time of CompuServe, since VMCO users often get so swept up that they spend several hundred dollars for on-line time in their first month or two.

The Faces behind VMCO

So what did it take to bring the blue sky down to earth with such little fanfare? An idea in the mind of a fellow named Harry Chesley. In mid-1985 Chesley was an avid Delphi information service user.

"I got this idea to mix conferencing and icons. It was about the time that Apple had finally released *Macintalk,* so I added voices," said Chesley when I tracked him down in San Francisco. Chesley believes that VMCO represents the beginning of something larger in graphic and auditory communications. "It brings us closer to face-to-face teleconferencing and adds essential emotional content–via the different faces–that is absent from normal telecommunications."

(continues on page 30)

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(continued from page 28)

Chesley matter-of-factly recalls that he had a version of the software running on Delphi a couple of weeks after getting the idea. "People got excited about it," says Chesley, "and one guy, Bob Perez, got so excited that he wrote his own version from scratch. That version works only on CompuServe."

Perez's spin-off version is currently the most mature. Chesley's original, VCO, is available on Delphi and The WELL, a San Francisco Bay Area conferencing service, but apparently it lacks one essential element: a user group large enough and devoted enough to form a critical mass. After all, conferencing is not a solo act; like a poker game, it's almost not worth it if you don't have five or more. On CompuServe, between 11 p.m. and midnight eastern time, there is almost always a crowd of rabid Mac users conferencing. The activity has encouraged Bob Perez to keep improving the software.

Perez, whom the MAUG minions regard as a near-saint, is a San Jose, California, lawyer (Harvard Law School, at that) who spends entirely too much time in a well-equipped computer room in his home, dispensing on-line advice and working on various releases of VMCO.

The Leap of Face

So why hadn't anyone done it before? My guess is that VMCO makes a conceptual leap that previous stabs at visual/voice conferencing failed to make. The obstacle to doing any sort of real-time on-line interaction is the speed with which the computer gobbles and spits out information. A 1200-bps modem writes text faster than most people can read but is overmatched when it comes to writing a screen full of graphics. Sending a stream of pictures every few seconds would be impossible.

Instead, with VMCO, you have the icons, notably the faces, stored on disk. Before starting a session, most people download faces of conference participants, in precisely the same manner that they downloaded the program itself. Later, when someone speaks during a conference, the VMCO software searches the internal and external disk drive (or, better yet, the hard disk drive; all those faces take up a lot of room) to see if the speaker's face has been downloaded. If so, the face appears on the screen. If not, the face displayed is a generic one that bears an uncanny resemblance to the comic strip character Charlie Brown. When someone changes a facial expression—to a bored expression, for instance—the software replaces the initial straight face with a previously stored snoozy face.

The sound works much in the same manner. If you have *Macintalk* on disk, the computer pronounces, more or less, the words sent to the screen. Helping things along is something called the exception file, a shorthandlike list of phrases that are called up with a minimum of keystrokes. For instance, someone leaving the conference might type *{night.* People with *Macintalk* installed would then hear the words "Now it's time to say good night, sleep tight.... " Other commands call up bizarre and annoying noises.

If all this sounds whimsical, that's because it is. In its current state, VMCO conferencing is more loony fun than serious

(continues on page 34)

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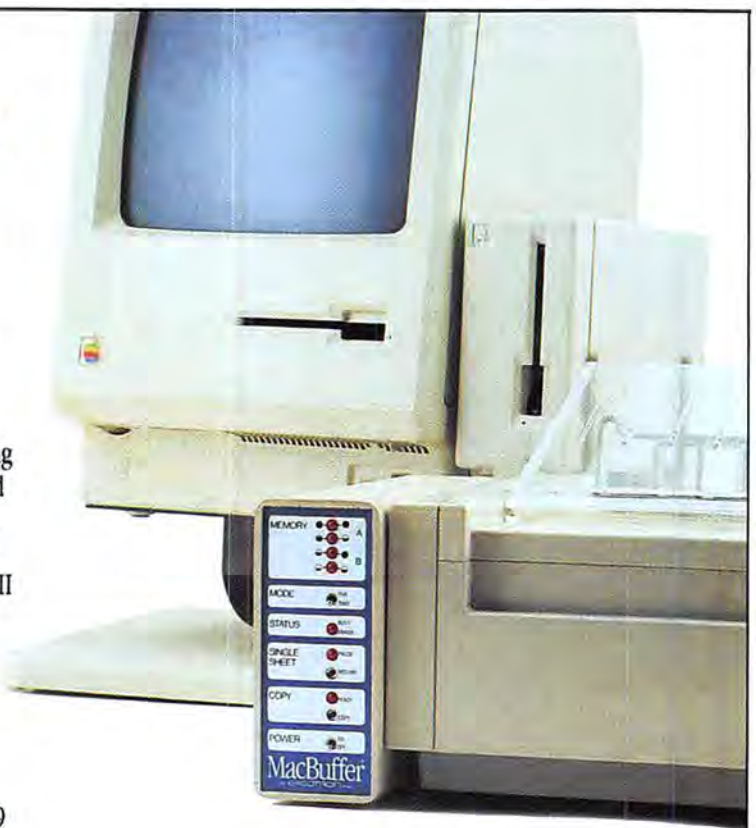

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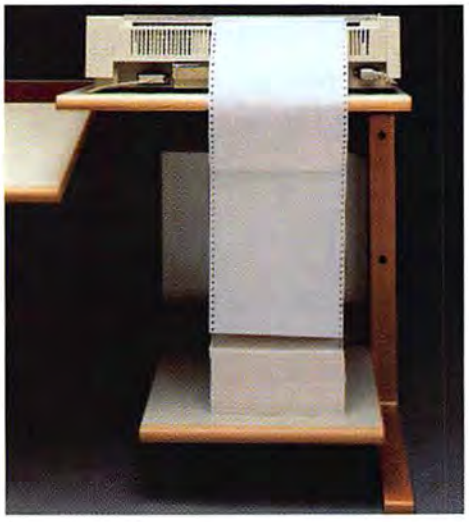

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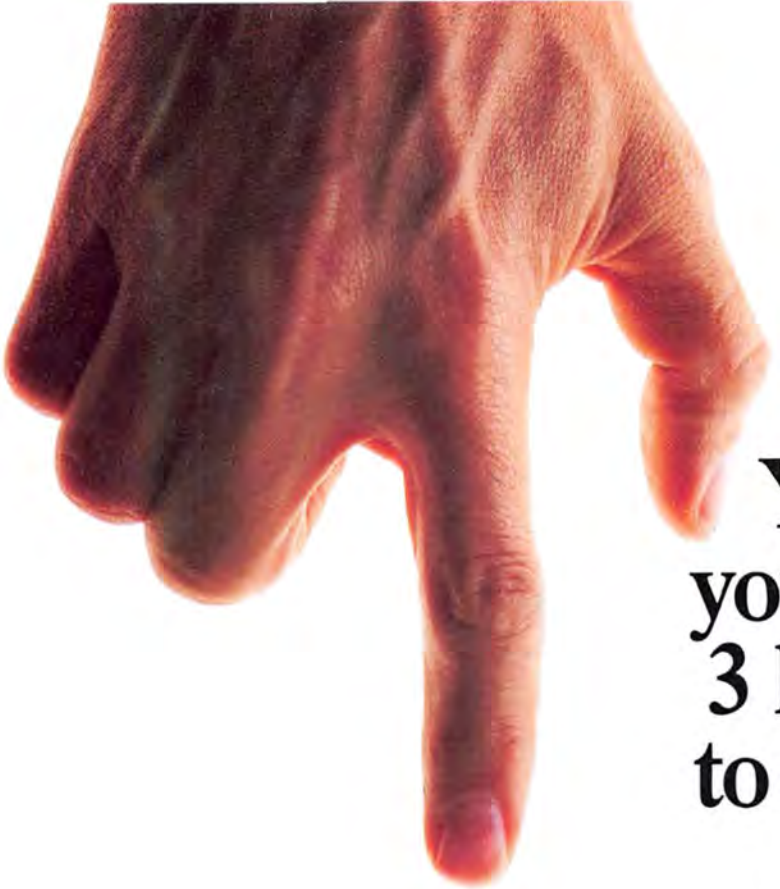

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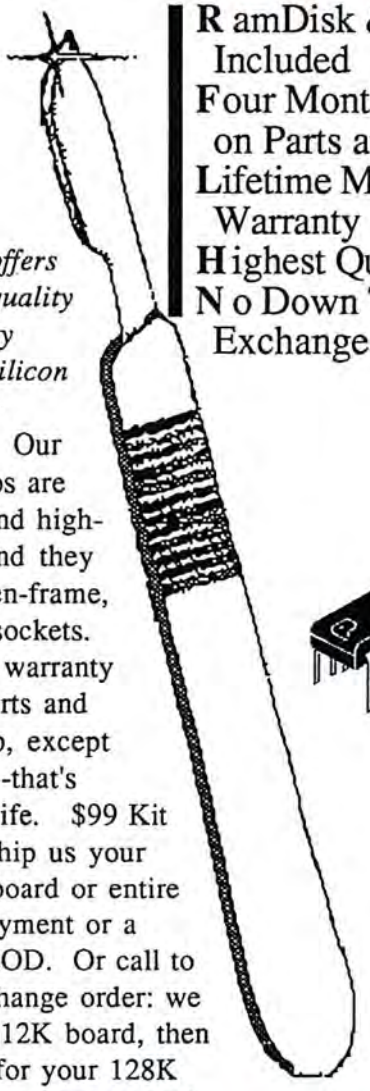

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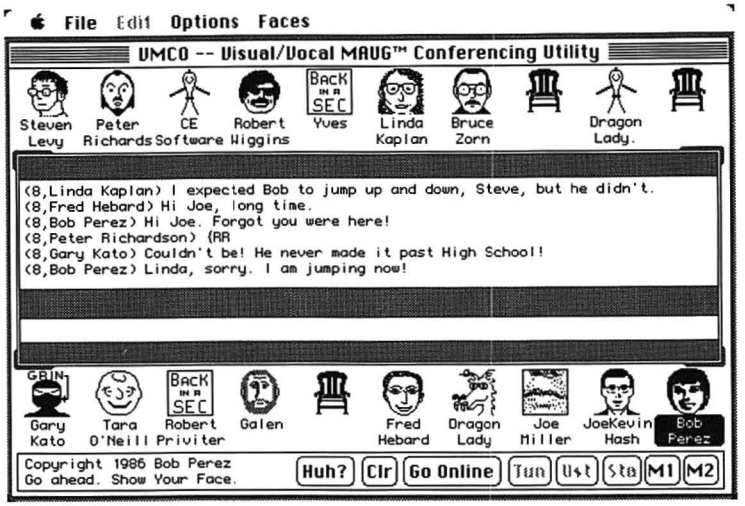
(continued from page 30)

telecommunicating. Just take a look at the faces. While some users primly show themselves as they really are (often customizing a digitized picture of themselves from MacVision or ThunderScan), others go a little nuts. One person chooses to look like a penguin, another a dragon, another a masked ninja. If they were choosing personas for a business conference, they might have gone easy on the frivolity.

Of course, there is no business conferencing on VMCO yet, despite the predictions of the visionaries of the sixties and seventies. I hope some serious applications come soon, because after hanging out on the conferencing channels for a few weeks, I have to conclude that VMCO often seems to be all dressed up with no place to go. What now draws people to spend their money on VMCO conferencing is the technological flash and the human familiarity it engenders—not the imparting of information implicit in worthwhile conferences.

Both Bob Perez and Harry Chesley (who hasn't abandoned his software offspring) have some ideas for augmenting



A typical conference screen shows a collection of custom and generic faces. The comment {RR makes a weird noise. Speaking (you can tell because his name is highlighted) is VMCO author Bob Perez.

VMCO so it will become slick enough to meet the needs of businesspeople and academics—those small, familiar groups who will enter on-line conferences not for the Disneyland-in-a-box thrill of it but for an exchange of facts and ideas specific to common projects. It may well become a lucrative undertaking.

In the meantime, I think that Perez might consider replacing the conference-table metaphor with a different theme—a local pub. I picture a bartender who recognizes you when you log on; "I never forget an icon" is his motto. Stools would replace the chairs. The table would turn into a wraparound bar. That visual setup would enhance the unique charm of visiting the techno-tavern that opens every night on CompuServe. Hourly cover charge, but a no-drink minimum. And a free peek at the future. □

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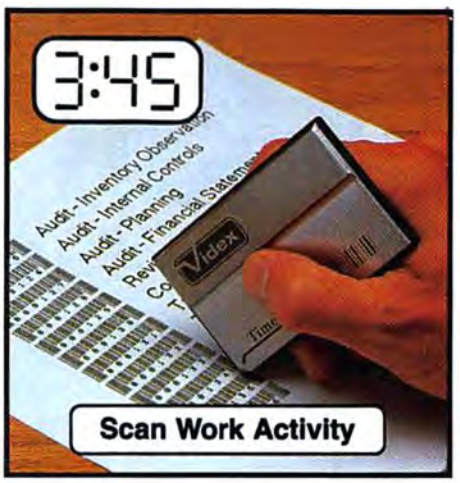

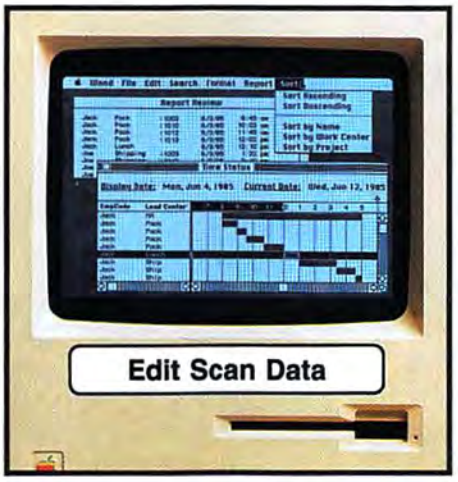

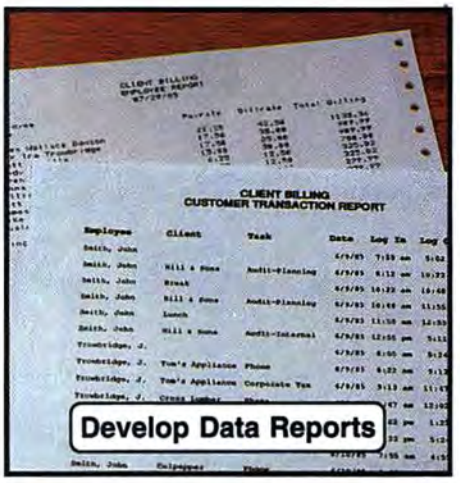

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The Videx TimeWand™ is an intelligent yet inexpensive bar code system for your business needs. Small enough to fit easily into a shirt pocket and weighing in at less than two ounces, TimeWand gives a new dimension to the concept of fully portable bar code readers.

Versatility is the hallmark of the TimeWand system. With its built-in microprocessor, TimeWand puts the power of a computer into the palm of your hand. Power that lets you actually change how TimeWand works. Whether you want to read different types of bar codes or program the wand to read bar codes in a certain order, TimeWand can accommodate your needs.

Available in three different memory configurations, TimeWand can store from 2,000 to 16,000 characters in its internal memory. This means you can hold from a few hundred to a few thousand bar codes in the TimeWand before transferring the information to a host computer system.

TimeWand time-stamps *each* bar code as it's read. This lets you know not only what the bar code says, but *when* the code was read.

The TimeWand's recharging/download station uses a standard RS232C serial connector that allows you to communicate with the wand through a variety of host computer systems. Since the communication is keyless, the scan information is sent quickly and error free. Currently, software packages are available for the IBM PC (and compatibles), Apple //, and Apple Macintosh personal computers.

Put the power of TimeWand in your own hands... and let it work for you.

TimeWand (2K version) - **$198**
Recharger - $149
TimeWand Manager Software (Macintosh) - **$499**
TimeWand Communications Software (IBM) - **$299**

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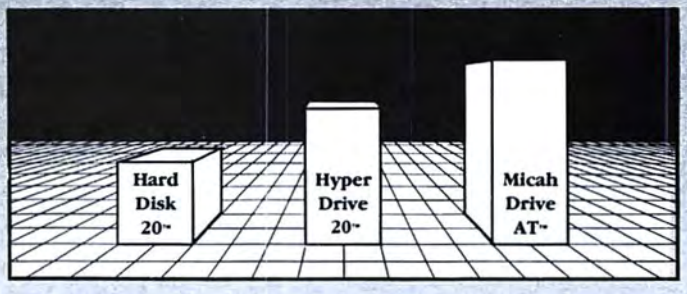
Power plus means the fastest, coolest operating, most rugged and reliable internal hard disk you can get for your Macintosh™ or Macintosh Plus™. The MicahDrive AT™.

Besides great speed and 22.4 mb of formatted capacity, The MicahDrive AT™ comes complete with print spooling, security, backup, and hard disk management software that provides 100% MFS or HFS compatibility. And since the MicahDrive AT™ can boot directly from the hard disk with 64K ROMs or 128K ROMs, you needn't worry about incompatibility when you upgrade your Macintosh™ to a Macintosh Plus™. The reinstallation is quick and easy.

With the Macintosh Plus™, the MicahDrive AT™ supports an additional 1 to 3 mb of add on memory with MicahMemory™ expandable RAM.

Because it's internal, the MicahDrive AT™ leaves more room on your desk while leaving your Mac portable. And it's all backed by a one year limited warranty.

Relative Data Transfer Speed Comparison



To find out more about the MicahDrive AT™, and the name of your nearest authorized Micah dealer dial up MicahLink™ -our 1200 baud, 24 hour a day BBS at (415) 771-1119 or call (415) 331-6422 during regular business hours.

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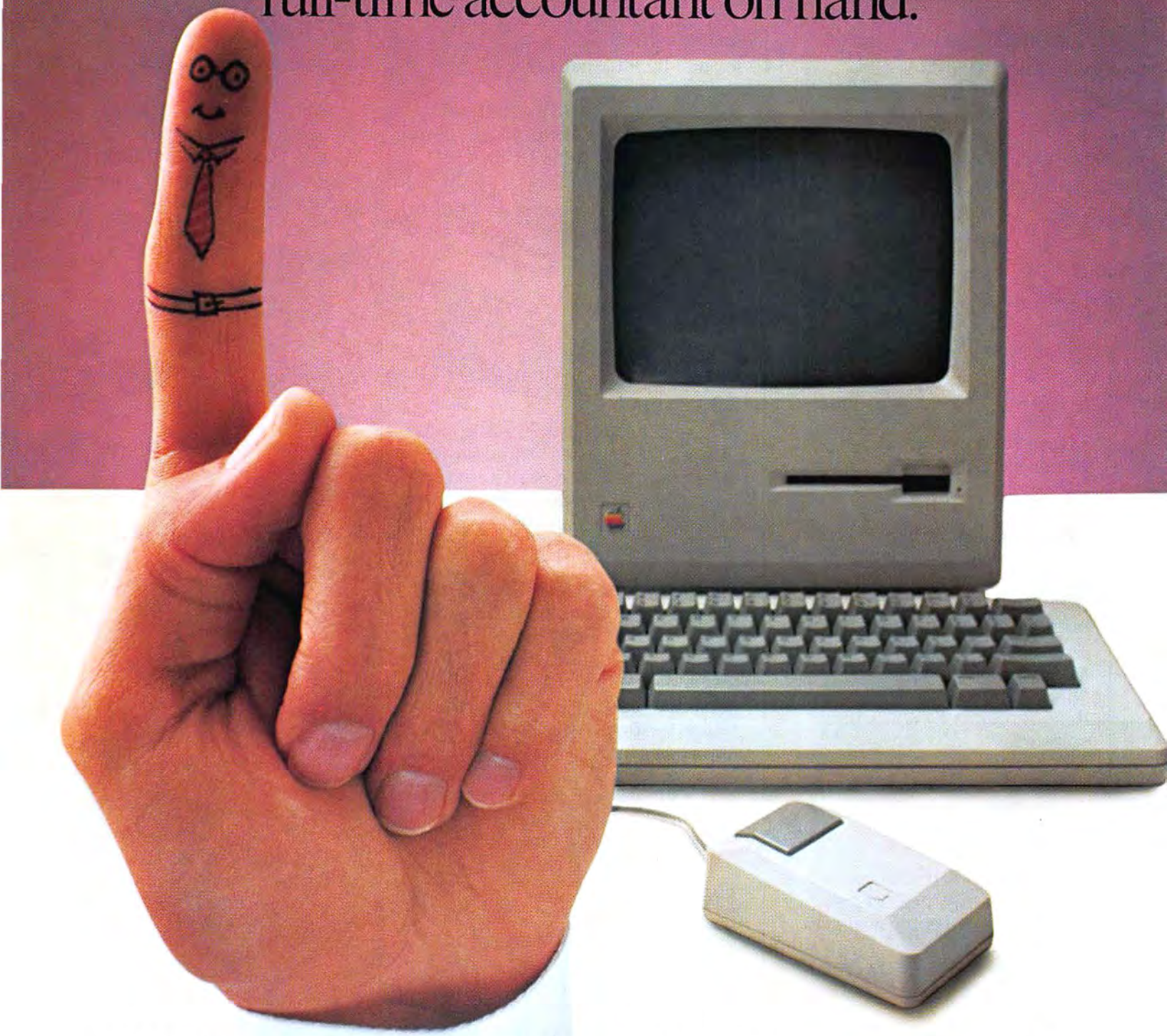

When BPI Systems introduced General Accounting, it revolutionized the way businesses automate their accounting. When Apple® introduced Macintosh,™ it revolutionized automation with one-touch personal computing.

Now BPI introduces General Accounting for Macintosh, so Mac users can point and click their way to automated, one-touch accounting.

To take full advantage of Mac's easy-to-use features, BPI General Accounting uses everyday business language and pull-down menus, with an interface consistent with Mac's. And it supports Mac's Mouse functions, so you've got a full-time accountant right at your finger tip.

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But hurry. BPI is offering General Accounting for Macintosh at an introductory retail price of $425.

So with a touch of a button you can find out exactly how your business is doing, instead of how it was.

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Free Memory

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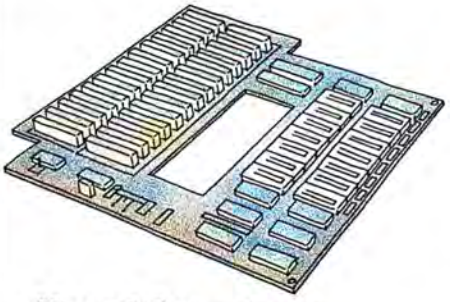
for 128K and 512K

TheMax2. With three times more added memory than you get from Apple for about the same price, it's like getting memory free.



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• **Add the new Apple ROMs** when you're ready, for 2 Mb of contiguous memory, without boot software.

• **Plug in the new megabit chips** for 4 Mb that can handle even the largest programs.

• **Recover easily** if you crash — MaxRAM saves your RAM disk intact to get you going again fast.

• **Get MaxRAM and MaxPrint free** — you'll have more free time.

Circle 337 on reader service card

Free Time
for all Macintosh users

Introducing MaxRAM™ and MaxPrint™ two productivity tools that are so useful we include them free with every Max expansion product. Now, whether you have a 512K, expanded memory, or hard disk system, you can have them, too.

MaxRAM automatically creates an adjustable RAM disk at boot that runs 10 times faster than a floppy disk. Best of all, it autoloads as easily as putting files into a folder, both from hard disks and from multiple floppies.

MaxPrint — the desk accessory that lets you keep on working while you print — even lets you change files and applications. And it spools both text and graphics easily. Use it with expanded memory or hard disk systems — the perfect companion for Apple's HD20.

Now, with MaxRAM and MaxPrint, your only problem will be deciding what to do with your free time.

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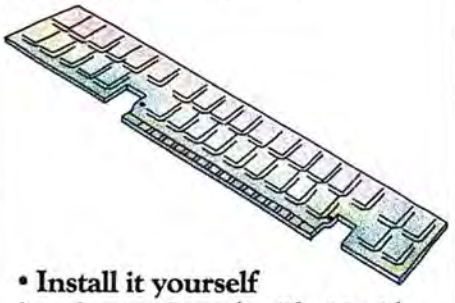
TheMaxPlus™
for the Macintosh Plus

TheMaxPlus turns your Macintosh Plus into a 2 Mb powerhouse of memory — modular memory to expand with your growing memory needs.



• **Install it yourself in minutes.** Just plug TheMaxPlus into the Macintosh expansions slots provided by Apple.

• **Have more memory free** for handling your largest applications — 2 Mb of linear, contiguous memory that doesn't require boot software or ROM modifications.

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Standing Up for Copyrights

Developers should be able to protect not only program source code but also their software's look and feel

Patents and copyrights promote innovation; they don't hinder it.

A legal storm is brewing over whether copyright laws can protect certain aspects of software, particularly that aspect most apparent to you and me: the user interface. How the question is defined through public discussion and resolved in the courts will affect the choices available to buyers of software. It will help determine not only which products come to market but even whether certain programs are developed at all. The latest, though not decisive, skirmish involved Apple Computer and its Macintosh desktop metaphor.

When Digital Research released the GEM (Graphics Environment Manager) interface for MS-DOS computers, its similarity to the Macintosh was readily apparent. Apple Computer—always an aggressive defender of its proprietary rights—sued, alleging that GEM infringed on its Macintosh user interface. In an out-of-court settlement, Digital Research agreed to modify GEM and to compensate Apple in cash and programming services. While the settlement is not a legal precedent, Digital Research would not have agreed unless it felt Apple's legal position had some merit. Meanwhile Apple has sent a clear signal that if you come too close to its technology, you will get burned.

The Digital Research-Apple settlement seemed to bode ill in certain quarters. Some people said big bad Apple had picked on poor old Digital Research. Others complained that excluding user interfaces from the public domain would have a chilling effect on software development. Still others suggested that the settlement would discourage the standardization of user interfaces.

These arguments are no more compelling than those of software pirates who don't respect other people's copyrights. These arguments merely rationalize the theft of property—intellectual property, but property nonetheless. A program's user interface—its commands, its look and feel, its structure, and its specifications—should be protected by copyright the way programming source code is.

Historical Innovation

Innovations such as *VisiCalc* and the Macintosh created computer markets and helped the industry grow. If the computer industry is to continue to grow, its innovators must receive their reward.

Innovation—and investing enough for it to result in useful products—is difficult and risky. Before developing the Macintosh, Apple developed and lost money on the Lisa. If innovators must eat the cost of unsuccessful innovations, they should also reap the rewards of successful ones. Patents and copyrights promote innovation; they don't hinder it.

As new technologies have emerged, they have easily been absorbed into the legal framework established by Article 1, Section 8, of the United States Constitution. Thomas Edison copyrighted one of his first films as a series of still photographs. In 1907 the courts awarded $25,000 in damages to the owner of the play *Ben Hur* when an unauthorized film version was made. With the growth of genetic engineering in recent years, the Supreme Court has ruled that living organisms can be patented.

Software as Useful Art

To deny patents and copyrights to software is to deny that it's a useful art. Recently software has been recognized as

(continues on page 42)

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Your Mac will RISE to the Occasion!

Seize the MacAdvantage for $79.95 and realize your Mac's potential.

MacAdvantage: UCSD Pascal operates directly under the Mac's operating system and Mac's own interface for program development. You can write programs that execute directly under the Mac's system and use virtually all the Mac ROM calls!

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Supports an enhanced Pascal language designed specifically for accessing Macintosh ROM routines. Your application may include pull-down menus plus access to Desk Accessories, multiple Windows and Mouse routines. Our compiler generates extremely compact code and supports the separate compilation feature so you can write large programs on any Macintosh, from the 128K Mac to the top of the line.

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A powerful mouse-based editor lets you alter existing text or create new files. Editing operations (Cut, Copy, Paste) are all performed with the mouse. You can even edit two files simultaneously and copy text from one file to another.

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A symbolic debugger steps you through your program instruction by instruction.

ROM Interface Units

For virtually all Macintosh ROM routines. These units allow you to create programs that use the Macintosh User Interface.

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A resource compiler that lets you take advantage of the Macintosh's powerful resource concept.

And now seize the further MacAdvantage:
Buy the MacAdvantage: 68000 Assembler for only $79.95!

Designed to be used with the MacAdvantage: UCSD Pascal®, the package includes a Linker program, a Code Mover utility for installing device drivers and desk accessories, a low-level debugger and set of definition files for interfacing to the Mac ROM and operating system.

UCSD Pascal - *the* original standard of Pascal programming excellence. The new leader in Pascal price/performance.

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Manage to Manage it All...With Mail Manager™

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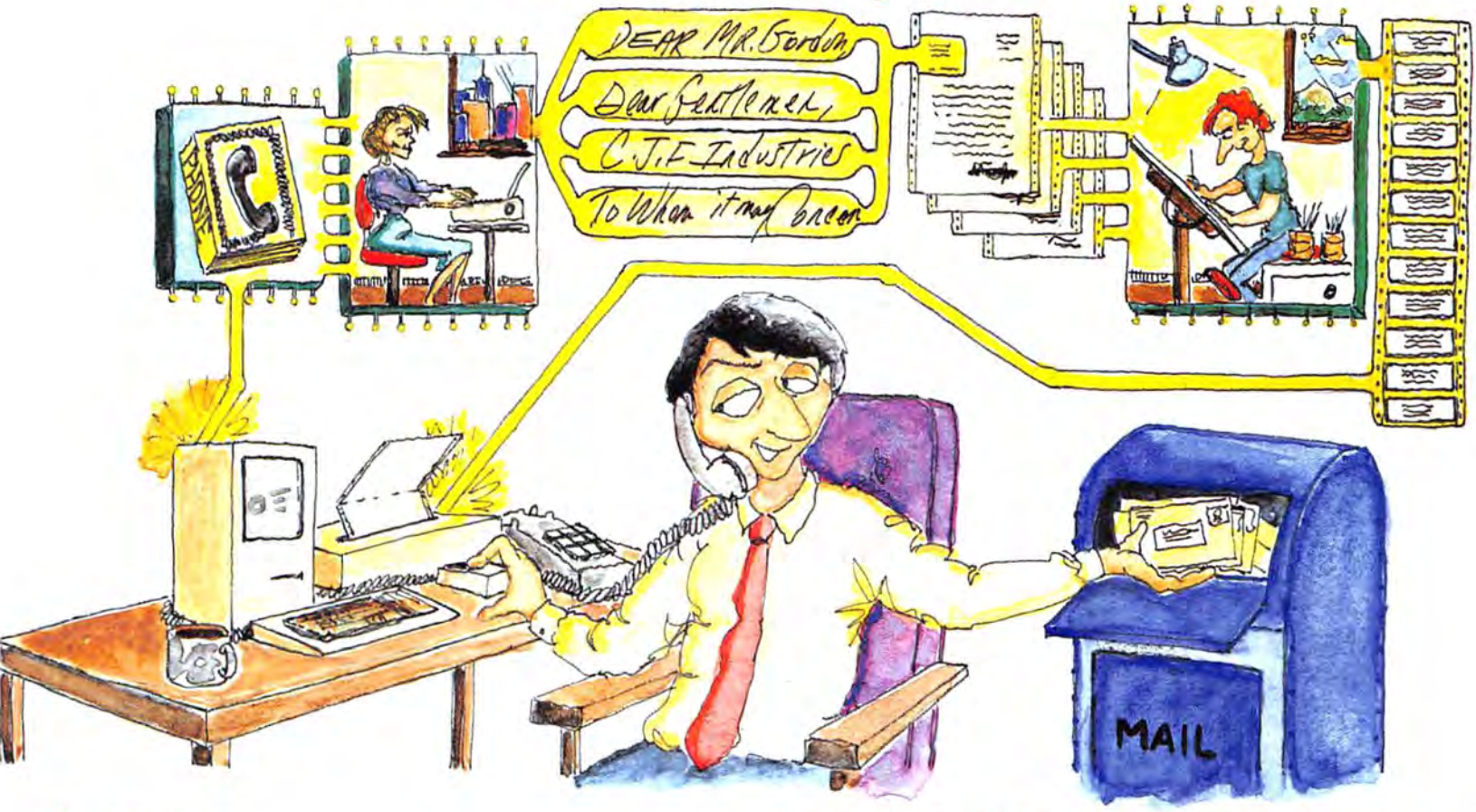

Speed things up.

Now you can easily manage names and addresses of people and businesses - associating with them any data you want to store about any subject you desire.

Retrieving records is easy.

Retrieves any or all records based on any attribute (field) you specify: Last name, ZIP code, sales volume, hair color, favorite baseball team - and does it rapidly! Retrieval information can be based on up to 72 criteria per database. And you can maintain as many records as you can store on your diskette or hard disk.

There's no problem printing with Mail Manager.

Want your final output printed on mailing labels? As personalized form letters illustrated with MacPaint artwork? As alphabetized telephone lists? Just a few clicks of Mac's mouse and everything's on its way to your printer. Then you can take it easy while Mail Manager prints your data with impressive speed.

Mail Manager teams up with MacWrite™, MacPaint™, or Microsoft Word™ to turn any Mac into a powerful database manager/form letter generator.

Get Mail Manager for $79.95. And bring your data management up to speed.

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"Mail Manager, from Pecan Software Systems is a mailing list, label, and form generator that should suit the needs of most offices. A competent manager. If you're looking for a simple mail manager, this is a good one!"

MacWorld, April MacWare Review

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(continued from page 39)

worthy of protection as an engineering discipline: you can patent software and copyright source code.

But software design is more than a scientific endeavor. Making it easy to use is a communications craft as well. Copyright should protect not only how a program addresses the computer (the source code) but also how it communicates with the user. For designers engaged in making software easy to use, the value of their creations lies more in the design and specifications of an interface than in the code that implements that interface. Software developers should have the same right to the fruits of their labors as writers, artists, filmmakers, and other creators—which is why the Digital Research-Apple settlement is a welcome step, though it lacks the far-reaching implications of a court decision.

Moving toward a Precedent

This issue will remain muddy for several years, until a court hands down a decision that truly sets a precedent.

Even a layperson such as myself can comprehend the basis of such a decision: copyright protects the expression of an idea but not the idea itself. (A patent can protect an idea.) Thus the idea of an operating system or a word processor is not copyrightable, but a particular operating system or word processor is.

The courts look for two conditions to determine if one work derives from, and thus infringes upon, another: access and substantial similarity. The law assumes access when a work has been published, that is, has been made public. The courts award damages according to the estimated economic loss suffered by the infringed-upon party and also frequently award legal fees.

A software developer runs the greatest risk of infringing on a copyright by cloning a product, since access and substantial similarity in such cases are easy to prove, and potentially large economic damages come into play. The safest route is to develop software that is unique and original, to purchase licensing rights from the owner of the applicable copyrights, or to use technology that has been in common use for some time and for which no copyrights are claimed.

Early in Charlie Chaplin's career, other actors tried to clone the character he created, the Little Tramp. Chaplin sought court injunctions to prevent those imitators from distributing their Tramp-compatible films. Even after Chaplin's death, IBM purchased from his estate the right to use the Little Tramp to sell personal computers. If IBM wants to copy the Macintosh interface, should it not have to deal with Apple? If IBM wants to copy software you develop, should it not have to deal with you? If IBM has to pay for the right to re-create the Little Tramp almost 50 years after his last appearance, it seems absurd that any corporation or individual might not have to pay software developers for the right to re-create their designs.

In the long run, as always, it is the public that wins or loses. The public will have better, more innovative software, or the public will be stuck with more of the same.

Paul Heckel is a software developer and the author of The Elements of Friendly Software Design *(Warner Books, 1984).* □

Concerned about the damaging effects of excessive heat and power line disturbances?

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Cooling is essential for optimum Mac operation. MACBCOOL™ cools your Mac better. Its whisper quiet fan circulates more than 20 cubic feet of air per minute through your Mac utilizing all top vents. That's plenty of cooling . . . even if you pack your Mac with hard disks and tons of RAM!

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NOW YOU CAN EXTEND THE BLESSINGS OF HYPERDRIVE TO LESS PRIVILEGED MACINTOSHES.

This is good news for anyone who owns a Macintosh. Or a HyperDriven Macintosh. And an act of unprecedented generosity for those who own both.

General Computer introduces HyperNet, software that gives other Macs access to HyperDrive's vast 10 or 20 megabytes of hard disk storage.

It means that, using the AppleTalk network, you can link a HyperDriven Mac with other Macs in your office. Creating a network you can easily expand, adding Macintoshes and/or HyperDrives as your needs change.

It means that you can use any Mac in your network to call up files from your HyperDrive. Editing, transmitting and otherwise managing the data they contain. (It also supports multi-user database software.)

And it means that you can not only multiply the amount of information your Macs can manage, but divide the cost of HyperDrive accordingly.

Which could leave you with no economically viable alternative but to visit your authorized General Computer dealer. Or call (800) 634-9737. (In Illinois, call (800) 854-9737.)*

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BETTER SONY THAN SORRY.

The bomb's up. The system's down. You've lost all your data to disk error because you made a very basic human error. You didn't use Sony floppy disks.

Next time, go with the industry standard, the company who invented the 3.5" disk drive system, and a floppy disk that comes 100% certified error free. Sony.

Only Sony 3.5" micro floppy disks contain such error suppressing materials as patented Vivax™ magnetic particles and a high-molecular DDL™ binder system. This protects your micro floppy disk, and the information on it, for its lifetime; and assures data retrieval in the order you choose. Guaranteed.

So use Sony 3.5" or 5.25" floppy disks, and avoid disk error. If you use somebody else's, you could be sorry.

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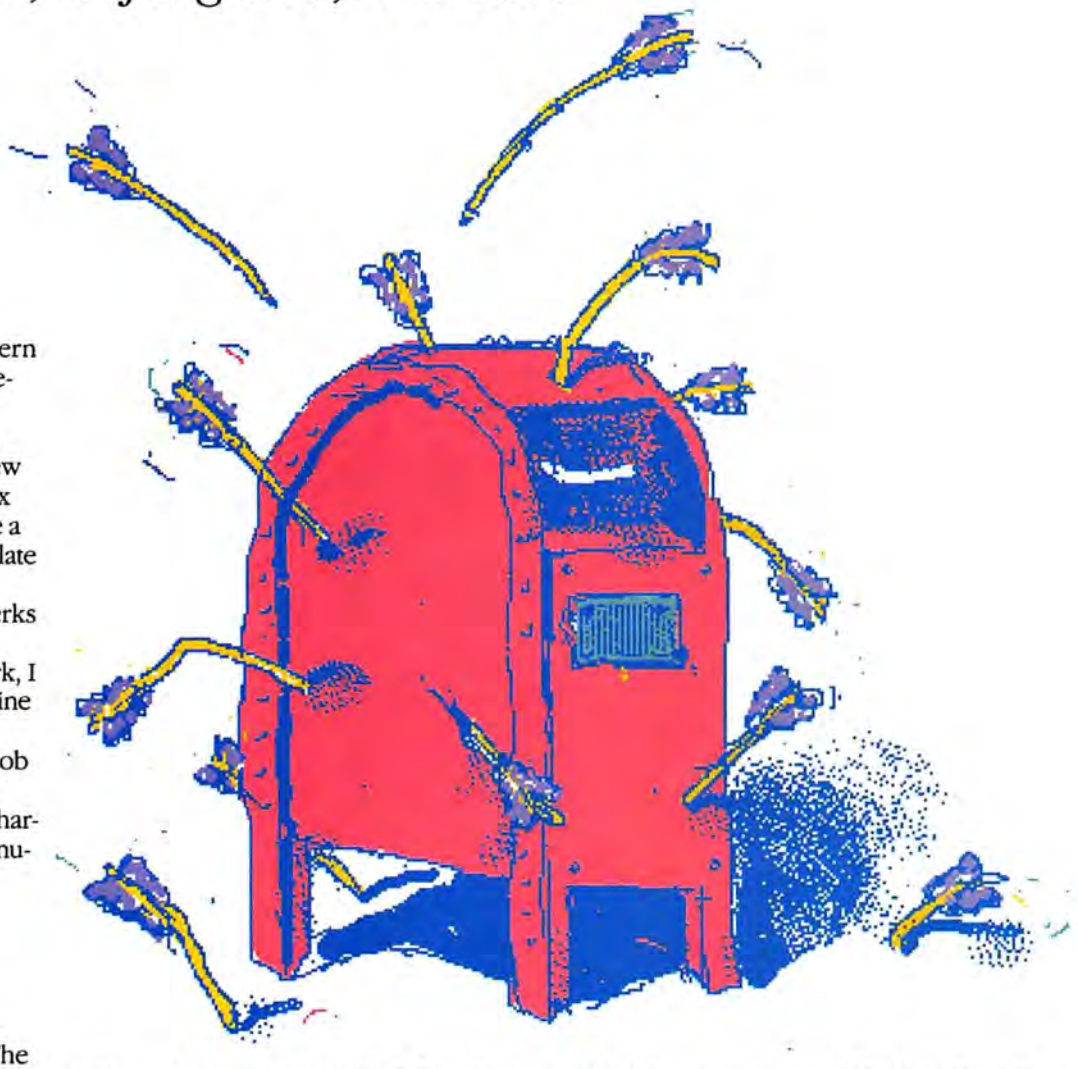
Letters

Macworld readers sound off about upgrades, hard disks, drafting tools, and more



A Taxing Enterprise
I am a town clerk in the woods of northern Wisconsin, and as part of my duties I prepare the real estate tax bills.

In December, when real estate tax bills are prepared, our county clerk's new $80,000 investment in computerizing tax bills was not in operation yet, so I wrote a macro program using *OverVue* to calculate the 25 different tax numbers on the tax bills, a job formerly done by hand by clerks with calculators.

Upon prompting from another clerk, I contracted to perform this service for nine other towns in our county. Me and my $3000 investment in the Mac doing the job of the $80,000 county machine!

I figure I printed over 6.5 million characters in about 50 hours of almost continuous operation.

Jim Crandall
Drummond, Wisconsin

Twice Burned
Apple has done it again. Once more we early Mac buyers are being penalized. The new upgrade for the Mac Plus costs $200 more for those who still have 128K Macs. The higher price for an upgrade from 128K is understandable for those who had a choice between 512K and 128K and chose the 128K. We who bought before the Fat Mac was released had no choice, however, and most of us paid $2495 for our machines.

Since a complete board swap is involved in either case, it would be simple and virtually cost-free for Apple to offer early adopters the upgrade for the same price as those who own a 512K Mac. Apple has missed an opportunity here to finally give us early Mac owners some recognition and thanks for supporting their new computer.

Fred Slaven
Sacramento, California

XL Extra
I am a Macintosh XL owner, and I'd like to see more coverage of the XL. Your reviewers could state whether products work on the Macintosh XL. I frequently have to call manufacturers to see if their products are compatible with my machine.

Jeffrey Funk
Flemington, New Jersey

There's a new quarterly for Lisa/Mac XL users, the LisaTalk Report, *published by the NetWorkers, 21 Canyon Rd., San Anselmo, CA 94960, 415/258-9152. Single copies cost $10.50, and a one-year subscription is $42.—Ed.*

Memory Improvement
After much agonizing I made my choice of memory upgrades and decided to go with Micro Conversions in Arlington, Texas. They seemed the best informed, were very

(continues on page 49)

Hot Problem

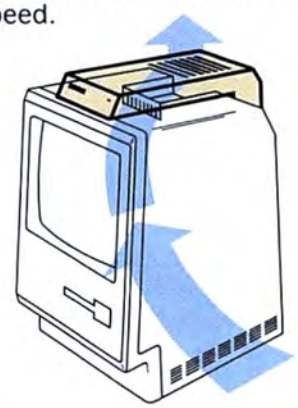
Introducing System Saver Mac.

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.

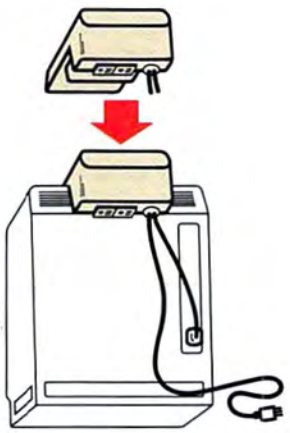
High temperature conditions can affect your computer's circuitry. Even shorten its lifespan. That's why we developed the System Saver Mac.

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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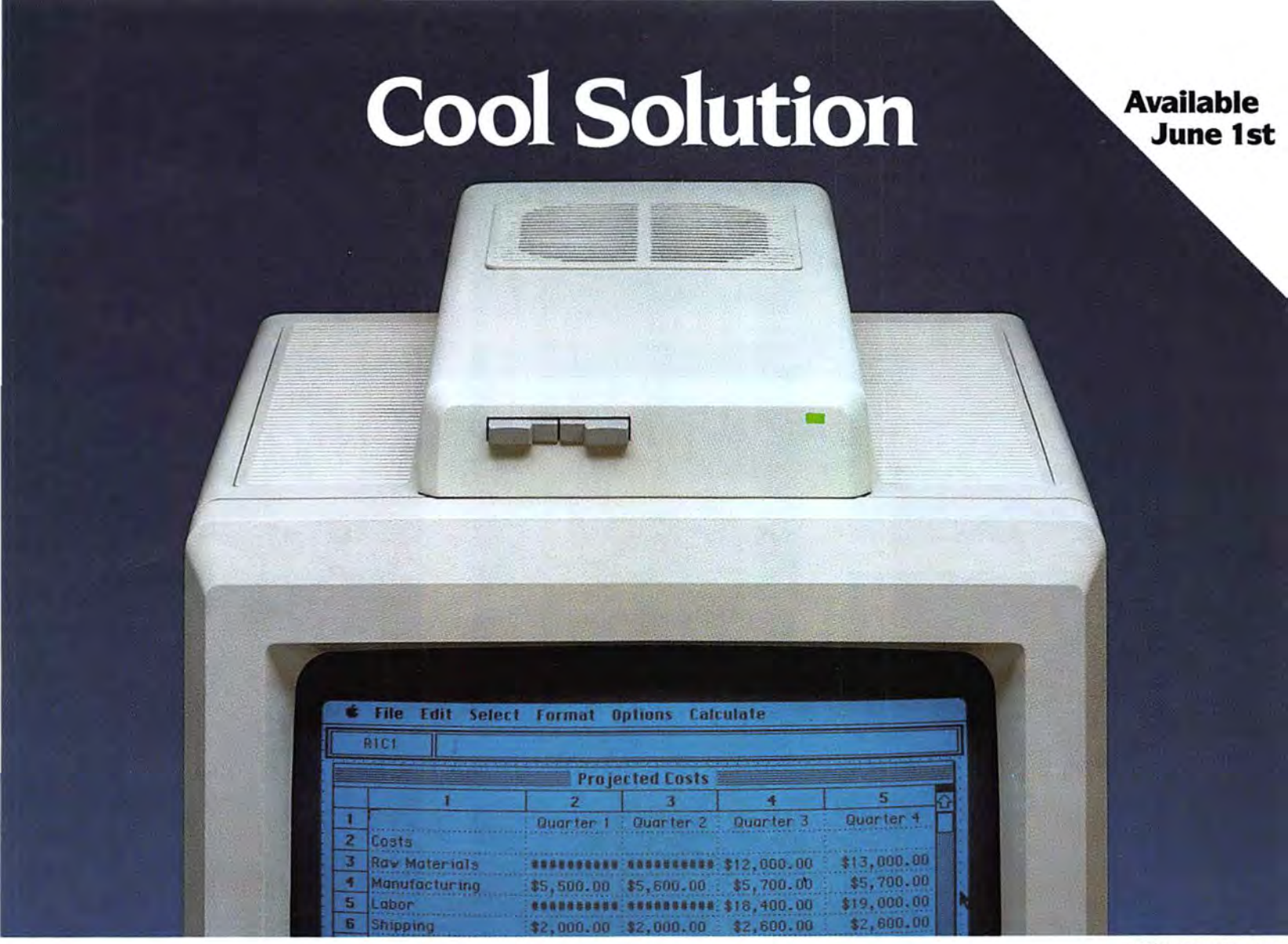

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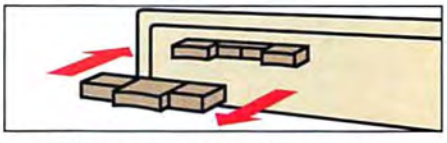
System Saver Mac has a great switch play.

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.

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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.

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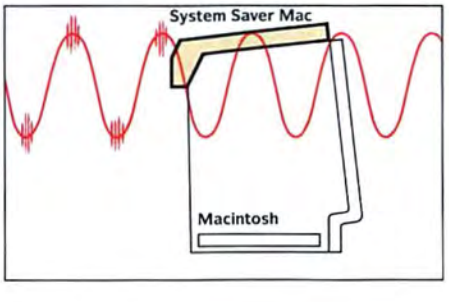

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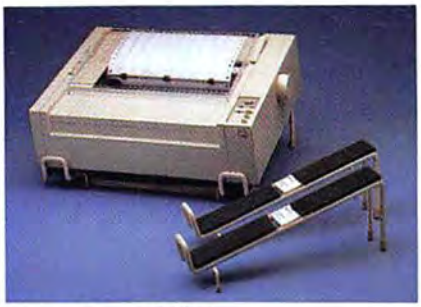

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(continued from page 45)

helpful, and explained complex things so I could understand. I waited for their new 1/2/4 upgrade that would be HyperDrive compatible.

Imagine my surprise when reading the story by David Foster and David Ushijima reviewing five upgrades including one from Micro Conversions ["Megabytes and Beyond," February 1986]. The 1-megabyte upgrade they described is not the upgrade I have from Micro Conversions. The one I have is cool, requiring no fan; it is fully HyperDrive compatible; and it requires no software except a system upgrade included on an accompanying disk. It is sold with version 4.4 of *Switcher,* RamStart, a memory checker, Diskinfo, and Extras. And the joy of it! I can run 800K plus a RAM disk with *Switcher* and many applications at the speed of light. It's great for complex reports on my database, and best yet, I can upgrade to 2 or 4 megabytes with plug-in modules.

It seems to me it is not fair to Micro Conversions or to the public to run a review of a test that was aborted because of a one-time technical problem. It would have been better to review only four upgrades and leave Micro Conversions out. Whatever the case, I am happy with my megabyte and already thinking of 2 or even 4.

Lawrence Churchill
Cliff, New Mexico

ResEd Does Windows

The February 1986 *Open Window* mentions a technique using *ResEd* to make a *MacWrite* document window automatically open so that the full width of the available margins is seen without using the drag-and-resize route. Just what I wanted. But it doesn't work.

James Bush
Palm Beach, Florida

Technically still prerelease, ResEd *is frequently updated and distributed through user groups and the CompuServe network (Go Macdev, ask for DL 8 and, therein, ResEd.App). The latest version we tested after receiving your letter, version 1.0D5, executes the instructions basically as printed, although that version lacks its predecessors' Set buttons that allowed automatic setting of window coordinates. Early versions, such as Prototype #0, don't save the changes properly, but you can work around the problem; finish your modifications by closing each window with the close box, clicking Yes in the dialog box that asks if you want to save "Write" before closing, and then clicking Quit.—Ed.*

Mac Tales Revisited

I very much enjoyed reading "Tales of the Macintosh" in the February 1986 *Macworld* and reminiscing about the days and nights I spent working with my friends at Apple.

I would like to correct one possible misinterpretation. Steve Capps and I had been working on the ROM with the rest of the operating system folks during the summer, as well as on the Finder. It was only in the fall that we were able to focus on the Finder alone. With the increasing excitement and frequent interruptions in the Mac

(continues on page 50)

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(continued from page 49)

building, Steve and I decided that we would be able to work faster in a more isolated, quieter area. The decision to move to a new building was our own and was not forced on us by management. Overall I believe that we made excellent progress and wrote a lot of difficult code in a short time.

Helping to develop the Macintosh was a unique experience. Working with wonderful people on such an exciting product was one of the best times of my life, and I wouldn't trade it for anything. Not even a Mac Plus.

Bruce Horn
Pittsburgh, Pennsylvania

Call a CAD a CAD

The review of *MacDraft* ["Drafting's New Compass," *Macworld,* January 1986] hardly scratched the surface as an evaluation of a tool for professional designers.

Take the *MacDraft* zoom feature for example. Visualization of an object you are attempting to draw depends on realistic size relationships between the parts. The zoom on *MacDraft* magnifies the lines way out of proportion, and detail drawing is almost impossible with the fat lines.

The review comments on the variety of fill patterns and lines. *MacDraft*'s variety, however, lacks the conventional symbols that are accepted industrywide to depict building materials such as steel, timber, concrete, and soil.

The program badly needs a driver to handshake with popular plotters such as Hewlett-Packard's, Calcomp's, or Houston Instruments'.

The authors claim that the program is complicated and difficult to learn, but any professional designer could learn all of its features in a few minutes. Review a real CAD program, and you will understand what complicated and difficult are all about.

The Mac is a magnificent graphics machine begging for a good, professional CAD program. *Versacad, Autocad,* and other programs that operate on the IBM PC are very sophisticated but very complicated programs that suffer badly from awful color resolution and a difficult and long learning curve. Their fill patterns are nonexistent. Those programs are an attempt to solve graphics problems without graphics equipment.

MacDraft is the best available but nowhere near what is needed.

Richard H. Zbinden
Klamath Falls, Oregon

Phil Adams, vice president of marketing for IDD, says a new release of MacDraft *is planned for this spring, the first of a series of upgrades meant to evolve the product toward a CAD system. "People put us in the category of CAD," Adams says, "but* MacDraft *is really a drawing and drafting program."*

Macworld *will continue to cover new software in the field, with assistance from professional designers to test the features of programs.* EZ-Draft *from Bridgeport-Textron (215/674-2700) was released early this year and has many of the features you crave. In addition, Diehl Graphsoft (301/461-9488) plans an imminent release of an upgrade to its 3-D* MiniCAD *that includes a high-precision 2-D version; later this year the 2-D product will appear on its own. Other sophisticated CAD packages were also in development when we received your letter. —Ed.*

Redrafting

Daily use of *MacDraft* version 1.1 ["Drafting's New Compass," January 1986] has revealed a number of minor bugs, a couple system-crashing bugs, and a number of poorly implemented features compared to its predecessor, Apple Computer's *MacDraw.*

MacDraft introduces round-off error when zooming or moving objects. Objects do not necessarily line up from one zoom to the next, and closely spaced objects do not necessarily retain their former spacing when moved.

Also, unnoticed by most reviewers, there is no way to draw an elliptical arc in *MacDraft.* In addition, repeatedly resizing a line with the Show Size option on causes the system to crash randomly. Accidently hitting the Option key with Enter after entering text causes the system to crash.

Considering the Mac's promise as a graphics machine and its popularity among designers and architects, there is still an urgent need for a true CAD product. Perhaps *MacDraft* will one day grow to fill that need.

Ed Cundy
Hanover, New Hampshire

Innovative Data Design's Phil Adams says the objects shift position because of the difference in the resolution of the Macintosh screen (72 pixels per square inch)

(continues on page 54)

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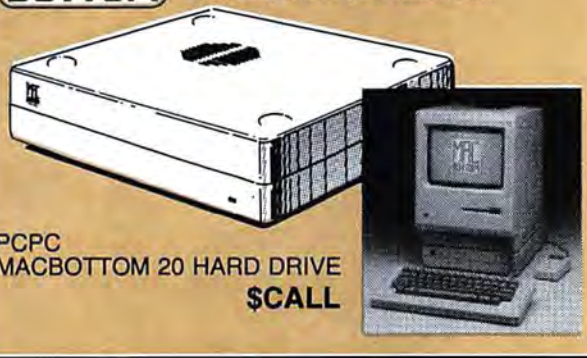

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(continued from page 50)

from the MacDraft *software resolution (512 points per square inch). According to Adams, a new release of the program will address the problem by allowing users to switch between the two resolutions. In response to popular demand, IDD also plans to include the elliptical arc familiar to* MacDraw *users in an upgrade. To avoid problems until a software fix is available, turn off Show Size when repeatedly resizing. Adams urges people to report problems to the technical support staff at IDD, 415/680-0484.—Ed.*

Drawing a Blank

I have been unable to duplicate Gordon McComb's success in pasting text into a selected rectangle in *MacDraw,* as described in "A Clipboard Collage" in the January 1986 *Macworld.* When I try it, the text simply does not conform to the shape of the box; instead it stays in one long line.

Thomas C. Altman
Miami, Florida

We left out an important step: before pasting into the rectangle, select the box and type a few characters in it. Then paste. The text follows the typed characters and fits into the box. Delete the extra characters at the beginning and go on with your work. Further experimentation has shown that it is not necessary to go through the cut-and-paste routine as I described in my article. Simply make a rectangle, make sure it's still selected, type in at least one character, and paste. This shortcut works with MacDraw *versions 1.7 and 1.9.—Gordon McComb*

Hard Evidence

When I read Lon Poole's review of the Apple HD 20 ["A Hierarchy and 20 Megabytes," January 1986], I was particularly surprised at the comparisons of the HD 20 with the Paradise Mac-10 and the HyperDrive 10. The HyperDrive 10 times seemed a bit on the slow side. I ran the tests myself with my HyperDrive 10. The results:

- Initial startup to Finder (800K/16 files) 15.9 seconds
- Initial startup to Finder (1800K/36 files) 17.6 seconds
- Initial startup to Finder (2000K/134 files) 21.8 seconds
- Open 64K *MacWrite* document from Finder 13.3 seconds
- Save 64K *MacWrite* document from Finder 8.0 seconds
- Exit *MacWrite* to Finder 6.3 seconds

Mr. Poole states that his tests of the HyperDrive were run with 2 megabytes mounted. It should be apparent from my results—as it should be intuitive from an understanding of the operation of the Finder—that startup times depend upon the number of files mounted rather than their size. To construct the desktop, the Finder must read directory information for each file; the more files, the more time required. As it does not read the file contents, it matters little whether each file is 10 bytes or 10 megabytes.

More confusing are the discrepancies between Poole's and my times for opening and closing *MacWrite* and for saving a 64K document. Either Mr. Poole's HyperDrive needs service or mine is especially fast.

Finally, to set the record straight, more than one partition is available at startup, with the option of remounting all partitions that were mounted at power down. Also, a print spooler is included with the September 1985 release of General Computer's HyperDrive software, which is a free upgrade for all HyperDrive owners.

David R. McDonald
Pittsburgh, Pennsylvania

Indeed you're right. We ran the timing tests again with another HyperDrive and found it performed much faster than the model we originally tested. Apparently our original HyperDrive was not configured with the latest System file. The results now are much closer to Mr. McDonald's:

- *Initial startup to Finder 24 seconds*
- *Restart to Finder 22 seconds*
- *Open 64K* MacWrite *document 13 seconds*
- *Save 64K* MacWrite *document 4 seconds*
- *Quit* MacWrite *to Finder 13 seconds*

Mr. McDonald is correct in stating that the startup times to the Finder are dependent on the number of files in mounted drawers rather than the total number of bytes the data occupies. In rerunning the tests we mounted two drawers containing 150 files (a total of 2 megabytes).—Ed.

(continues on page 60)

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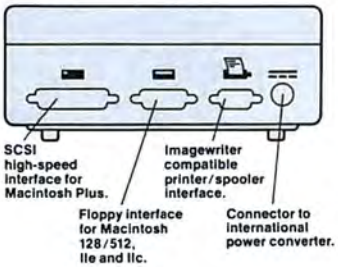

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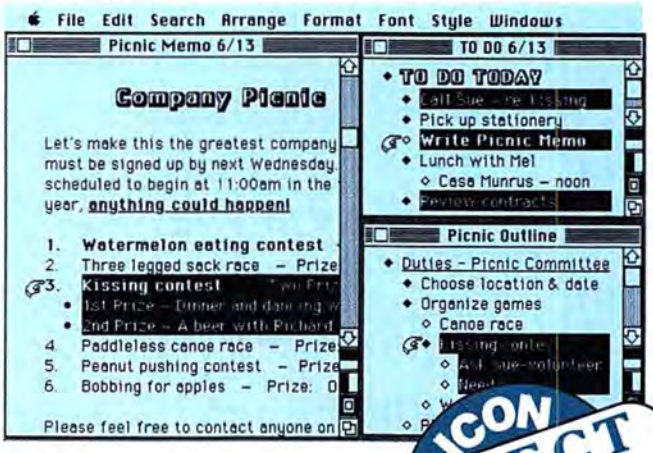

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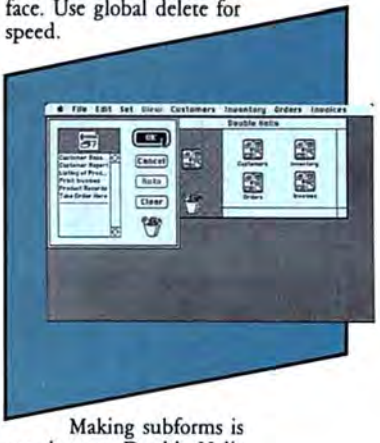

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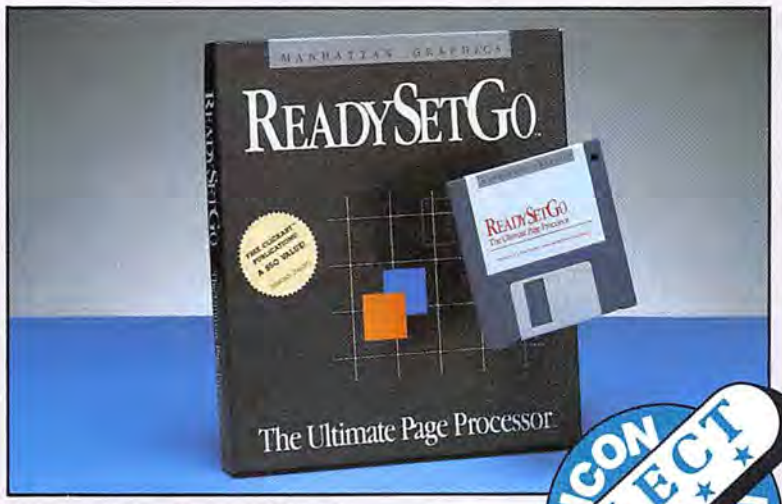

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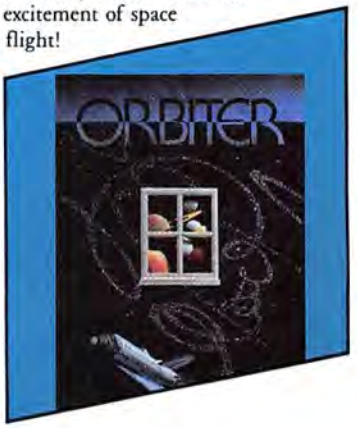

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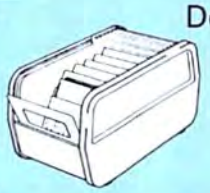

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(continued from page 54)

Hard Experience

All the reviews of the Apple Hard Disk 20, including "A Hierarchy and 20 Megabytes" [January 1986], miss an important point: will the unit in question work with other compatible hardware? I purchased an HD 20 and spent almost three weeks trying, without success, to get the combination to talk to my LaserWriter.

I generated a mind-boggling number of system errors with the HD 20, and nowhere do the Apple manuals define the meaning of the various errors. The built-in Test program always said the system was fine after grinding away for 20 to 30 minutes, but the system malfunctioned anyway.

What about the HD 20 now? I gave mine back to the dealer and told him to use it as a boat anchor.

Fred M. Roberts
Dana Point, California

There were some problems with Finder 5.0 and the System file originally distributed with the HD 20 that didn't turn up in the tests we did for the review. So far, however, it looks like the new System software and Finder 5.1 that Apple released last January clear up the problems.—Ed.

North of the Border

Your article "A Passport for the Mac" [*Macworld*, September 1985] offers no help to your Canadian readers. Where do we get a carnet?

Brian Power
Vancouver, British Columbia
Canada

To obtain information about carnets to facilitate international travel with equipment such as the Macintosh, Canadian readers should contact the Canadian Chamber of Commerce, Commerce House, 1080 Beaver Hall Hill, Montreal, Quebec H2Z 1T2.—Ed.

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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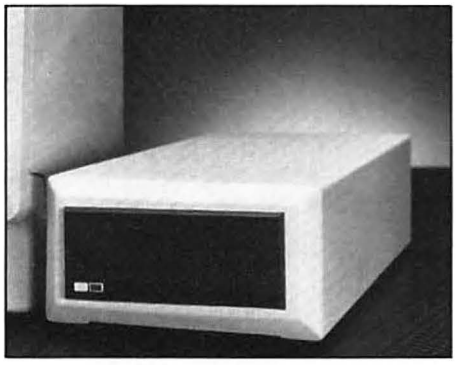

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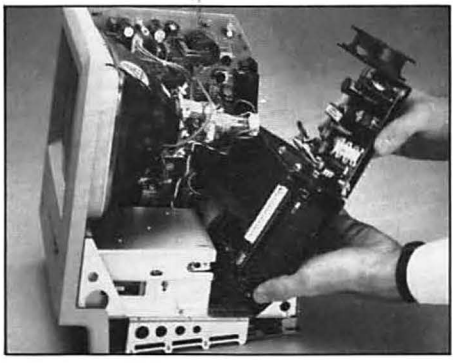

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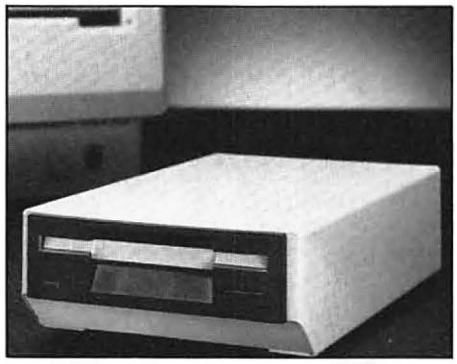

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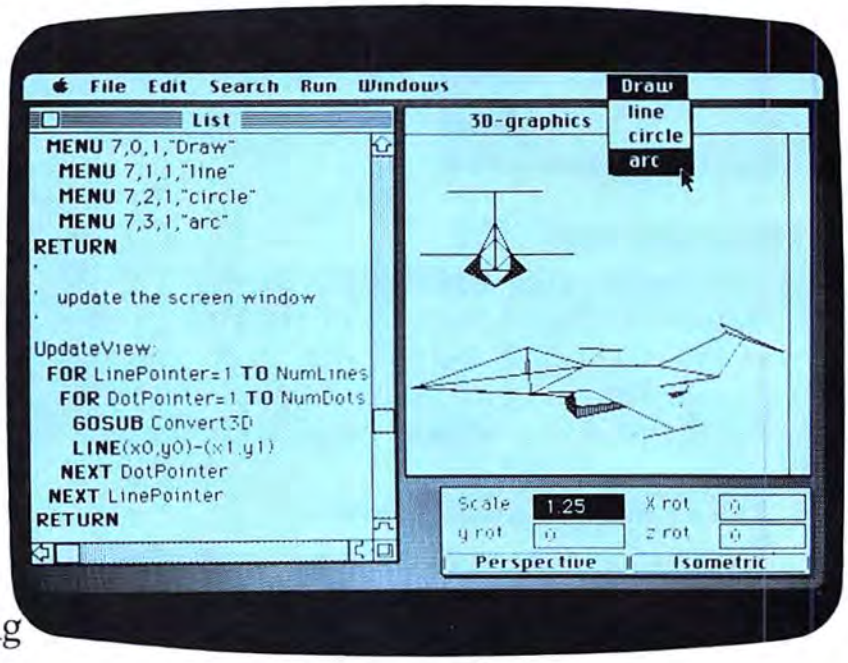

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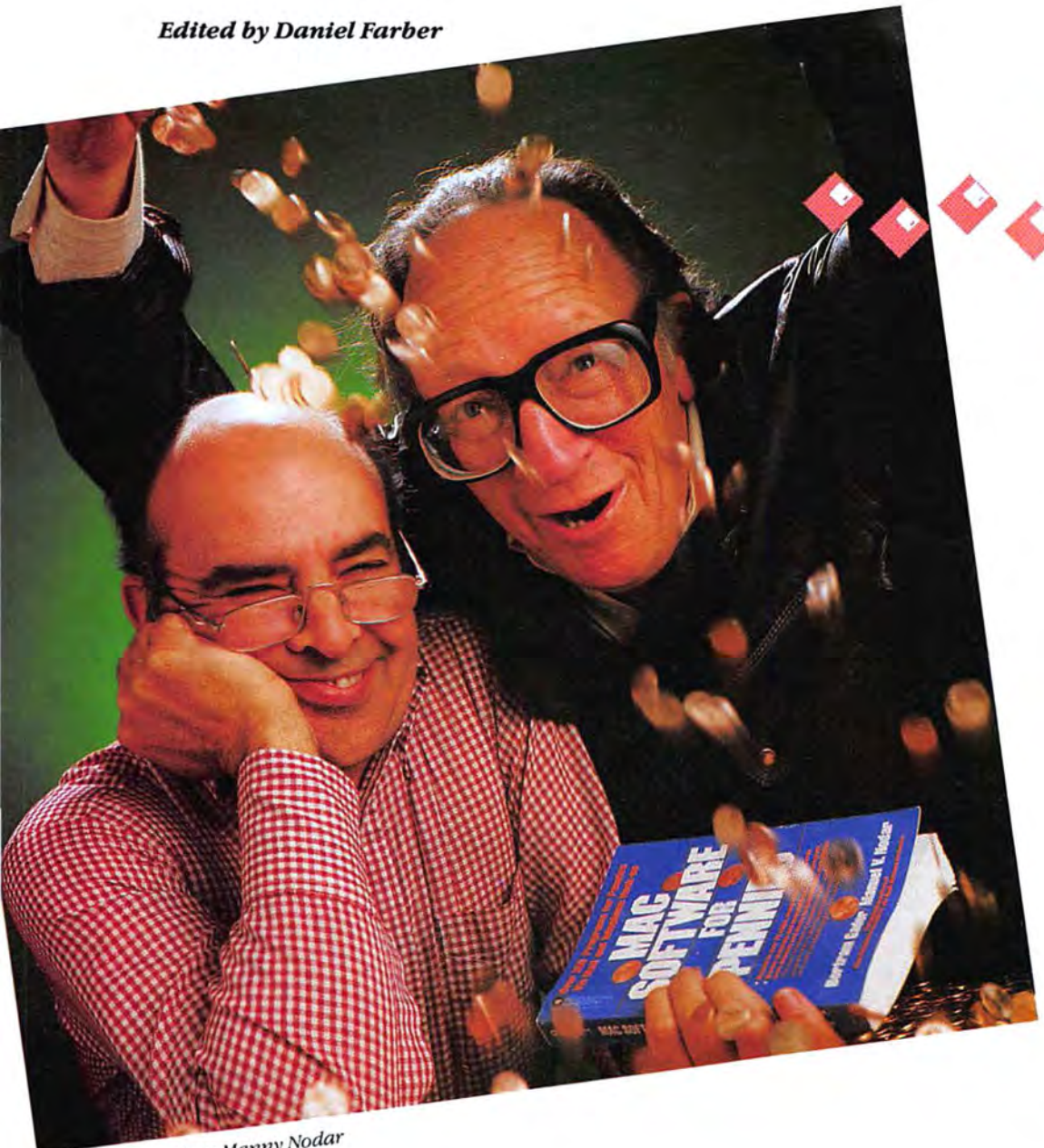
Macworld View

The Macintosh in medicine, the Japanese Mac, courseware exchange, and more

Edited by Daniel Farber



Over the hill hackers Manny Nodar (left) and Bert Gader with their book Mac Software for Pennies.

Over the Hill Hackers

Bert Gader and Manny Nodar are a pair of ex-radio ad men who like to call themselves the "over the hill hackers." But the phrase is somewhat misleading. While both of them may be pushing 60, these two Southern California computer aficionados are anything but over the hill. In the wake of a course on computers they took at Beverly Hills High a few years ago, Gader and Nodar have written three books on the public domain software available for different computers. Their latest, *Mac Software for Pennies* (Warner Books, 1986), lists more than 350 programs and the names and addresses of over 80 user groups and clubs.

If that weren't enough to keep them busy in their spare time, they run two clubs that sell and swap public domain disks. PD Mac, the Macintosh club, publishes an irreverent, entertaining newsletter and currently offers 975 programs. As Bert likes to point out, "That's 975, and that's no small potatoes."—*Jeffrey S. Young*

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

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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.

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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 Azec C.

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Manx Aztec C68k for the Macintosh is available as a line of three upgradable development systems: **Manx Aztec C68k-p, Manx Aztec C68-d, and Manx Aztec C68k-c.** Student, noncommercial, 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.

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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

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Summary

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The Japanese Macintosh development team: (left to right) Marie deLorimier, Dave Kleinberg, Ken Krugler, Mark Davis, and James Higa.

Japanese Macintosh

The Macintosh has had a difficult time gaining acceptance in Japan. By Japanese standards the screen resolution is low, and until recently only one program, *E. G. Word,* was capable of Japanese text processing. Because Japan is four to five years behind the United States in productivity software (spreadsheets are just beginning to catch on), Apple put a great deal of effort into finding a way to convert, or *localize,* software quickly for the Japanese market. Now, with the introduction of the Japanese Mac Plus and the Kanji Interface System (KIS), the Mac's status in Japan has improved significantly.

The Japanese Mac Plus has text processing features that are competitive with existing Japanese word processors. It also provides a way to localize any Macintosh application in a matter of days or a few weeks. (The translation and printing of manuals, not the product conversion, takes most of that time.)

The key to the Japanese Macintosh is the KIS. The Japanese language consists of four distinct alphabet forms: Kanji, the traditional written characters; Hiragana, a set of phonetic characters; Katakana, a set of phonetic characters for foreign words; and Romaji, a system of English transliteration.

To translate a program, the Mac has to be able to switch among these alphabets without a hitch. The KIS includes a dictionary with 30,000 entries and conversion tables that the Mac uses to convert phonetic characters to Kanji. In addition, 3000 Kanji characters were etched into the ROM of the Japanese Mac Plus. The system can convert data entered in Katakana or Romaji to either of the other styles.

The KIS handles the problem of multiple meanings associated with phonetic words easily. In Japanese, several characters can correspond to a particular phonetic word. The word *ko,* for example, could be represented by about 100 different characters. If the system doesn't offer the correct interpretation, pressing a key calls up a list of alternatives. User dictionaries maintain a record of commonly used terms and their grammatical contexts. This information is stored in a memory cache during a work session and allows the system to adapt to the user's linguistic habits.

Dictionaries can also be created to hold specialized terminology. The system always checks any special dictionaries before the main dictionary, making the conversion more accurate and faster. A character-

(continues on page 67)

Courseware Exchange

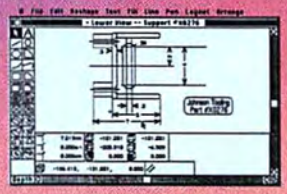
Developers of courseware now have a way to distribute programs easily and inexpensively to colleges, universities, and other interested parties. The Academic Courseware Exchange, developed jointly by Apple and Kinko's Graphics of Santa Barbara, California, is expected to promote the adoption of the Macintosh throughout the academic community. Kinko's, which has more than 290 duplication centers serving 500 college campuses nationwide, publishes a catalog of available software, duplicates disks, reproduces documentation, processes and distributes orders, pays royalties to developers, and channels support questions between purchasers and developers. Orders for software are accepted at Kinko's outlets or can be placed by mail or via a toll-free number (800/235-6919, or in California 800/292-6640).

Courseware is divided into three categories: templates linked to commercial software such as *MacPaint* or *VideoWorks,* applications such as statistics and mathematical simulation programs, and tools, including authoring systems, languages, and debugging programs. Kinko's charges a $25 processing fee for public domain programs or $100 for copyrighted programs, plus fees for printing manuals and disk duplication. The Exchange plans to keep the retail price of courseware under $30, and developers can opt to receive a 10 to 40 percent royalty rate.

If you're looking for innovative educational software or brain-teasing programs, check the Academic Courseware Exchange catalog.—*Daniel Farber*

As The Mind Perceives Mac3D Performs

If you work with any type of visual information, you need to express the ideas and shapes that arise from your imagination. However, communicating your ideas and drawing them from different perspectives requires considerable talent. The process is time-consuming, and the product of your labor is usually difficult to modify. As a solution to this problem, Challenger Software proudly presents Mac3D, a new dimension in graphics software.



Mac3D represents a leap forward for Macintosh graphics. It takes a simple, mouse-oriented approach to let you work with shapes and forms the way your mind naturally would. A number of features, such as custom fill patterns and various precision tools, give you complete control over your work.

Every design can be rotated in three-dimensions and viewed from different locations. You can easily modify your drawings and designs, giving you the flexibility to discover new options and play "what if..." The options you explore are limited only by your imagination.

Functioning as a complete two- and three-dimensional graphics package, Mac3D allows artists, architects, engineers, and others to intuitively create complex designs. Use it for illustrations, presentations, desktop publishing, technical drawings, architectural models, and more.

Please call or write us for more complete information on Mac3D's features and capabilities.

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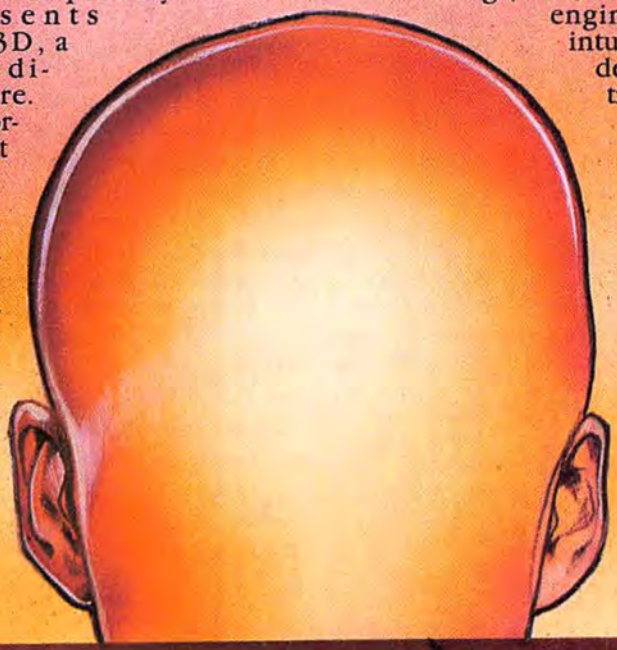

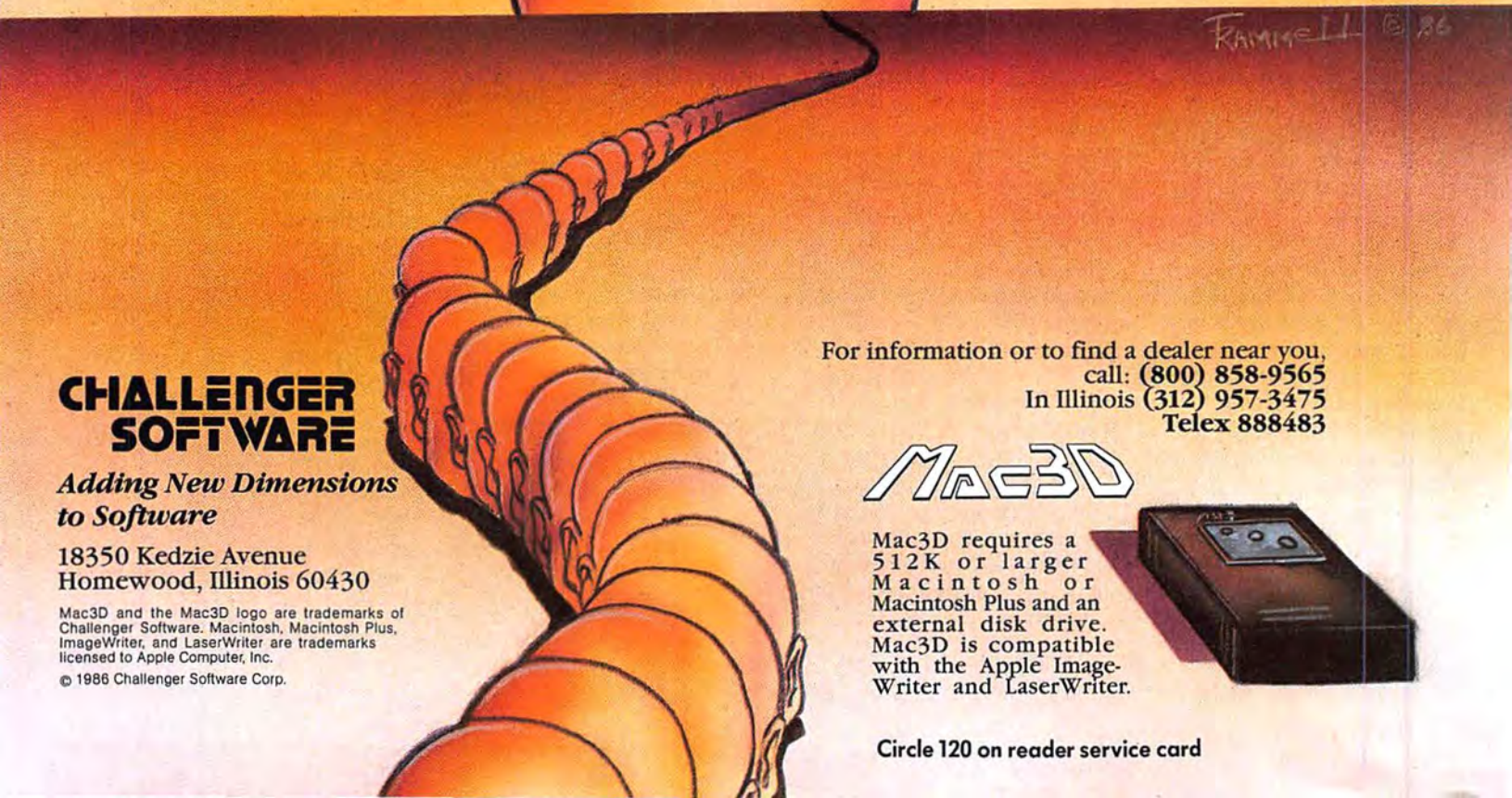

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Mac3D

Mac3D requires a 512K or larger Macintosh or Macintosh Plus and an external disk drive. Mac3D is compatible with the Apple ImageWriter and LaserWriter.

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Japanese Macintosh (continued)

editing facility lets you create characters to supplement the standard Kanji characters.

The design of the KIS affords several ways to use Mac software. You can run programs in English, as on a standard Mac Plus, and many English-language programs allow you to input and output data in Japanese. (Programs that faithfully follow the user interface guidelines should work on the Japanese Mac without problems.) The ideal method is to use fully localized programs, in which menus, dialog boxes, and other text presented by the program are in Japanese. Most importantly, the applications don't need to carry any overhead because the KIS takes care of all the special requirements of the Japanese language.

The Kanji font is also available on disk, so you could make any Mac Plus speak Japanese. However, the fonts require substantial memory: 12-point Kyoto requires 110K; an 18-point version of the font, which is especially useful for printing, takes up 244K. Having fonts in ROM makes the Mac easier to use and more attractive to the Japanese.

Apple expects many Mac software publishers to convert their software for Japan, just as they did for the European market. And the company believes some Japanese developers will create Mac programs. The first products released in Japan include *Excel, MacWrite, MacPaint,* and *MacProject.* At this writing Apple is still deciding whether or not to offer the Japanese Mac Plus to the domestic market.

The Japanese Mac Plus and Macintosh software give Apple an edge over its competition in the Japanese market. MS-DOS based programs, such as Lotus's *1-2-3,* take a year or more to localize. It's only a matter of time before other languages, such as Chinese, Arabic, Hebrew, and Sanskrit, are developed for the Mac. As the Japan Macintosh project engineers say, "The idea is to have a script-independent machine, one that can speak any language."—*Daniel Farber*

Microsoft BASIC Programming Winners

Winners of the Microsoft BASIC Programming Contest have been selected. The grand prize went to J. R. Holbrook for Motion Maker.

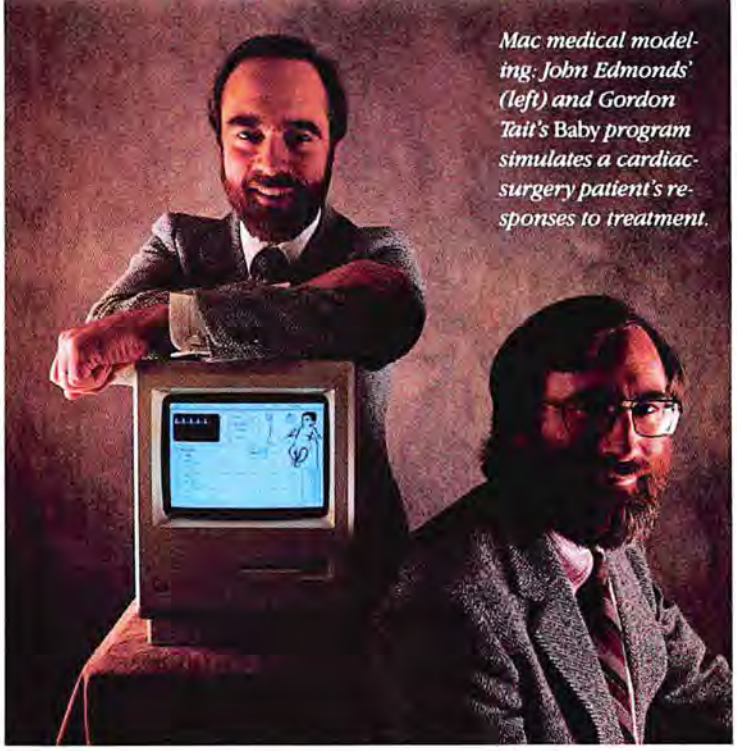
Productivity Category
First: Robert L. Patterson, Management Information System; Second: R. G. Yust, Write Tool; Third: Edward J. Groth, 3D Plot.

Utility Category
First: Michael W. Martin, 3-D Graphics Utility; Second: Gary J. Meade, File Manager; Third: David L. Roberts, CodeWriter.

Entertainment Category
First: Trey White, The Salty Eruption; Second: Brad Pettit, Phraze-Craze; Third: Huw Roberts, Macsynth.

Education Category
First: Russ Jackson, States Quiz; Second: Wayland Bruns, Life Miracle Generator; Third: Daniel L. Herrman, Night Sky.

Congratulations to all winners. Information on obtaining copies of the winning programs is forthcoming.



Mac medical modeling: John Edmonds' (left) and Gordon Tait's Baby *program simulates a cardiac-surgery patient's responses to treatment.*

Intensive Care Training

At the Hospital for Sick Children in Toronto, physicians and critical-care nurses use the Macintosh to familiarize themselves with some basic concepts of caring for pediatric patients after cardiac surgery. Physician John Edmonds and cardiac physiologist Gordon Tait structured the program, called *Baby,* as a game in which the user's success in maintaining the patient's condition within acceptable limits determines the score.

The program displays the patient and attached chest drain and EKG monitors, along with values for heart rate, blood pressure, temperature, and other functions. The simulation occurs in accelerated time—1 second of real time equals 1 minute of simulated time. The monitored variables and trends update every 4 minutes of simulated time. *Baby* charts variables such as volume of fluid administered and blood loss each simulated hour.

Several randomly selected variables determine the patient's weight, initial condition, and subsequent course, ensuring an unlimited variety of patients. The program has five play levels; at the highest level, stabilizing the patient's condition is the most difficult. The student can warm the patient, cool the patient, administer fluid or a variety of drugs, and control heartbeat rate with cardiac pacing. In this way students learn the principles of controlling the cardiovascular system with drug and fluid therapy.

Similar programs in the works include games simulating treatment of respiratory disorders, cardiac arrhythmias, renal deficiency, and cardiac arrests. For details, contact Edmonds and Tait at 416/598-6477. —*Daniel Farber*

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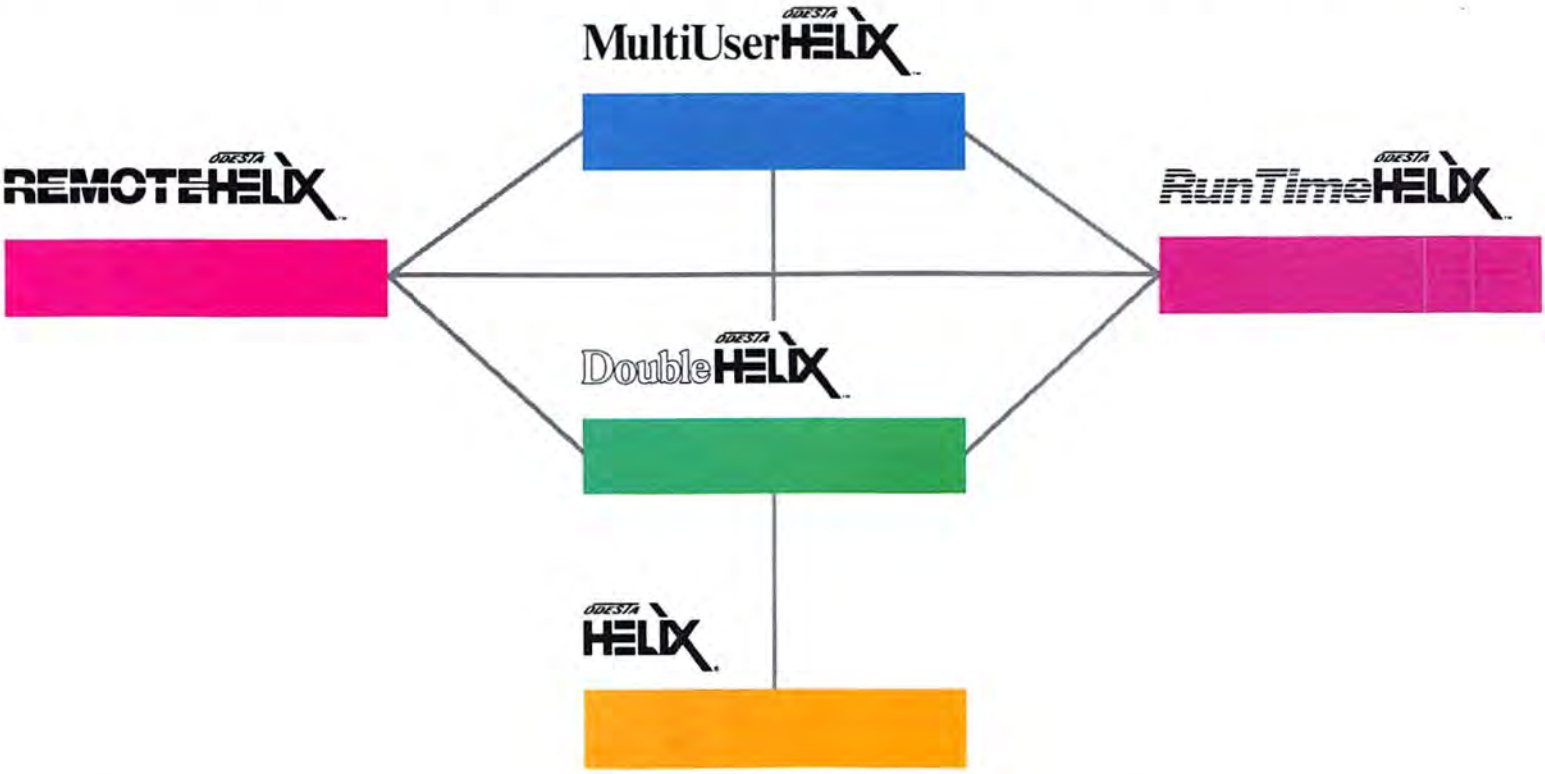

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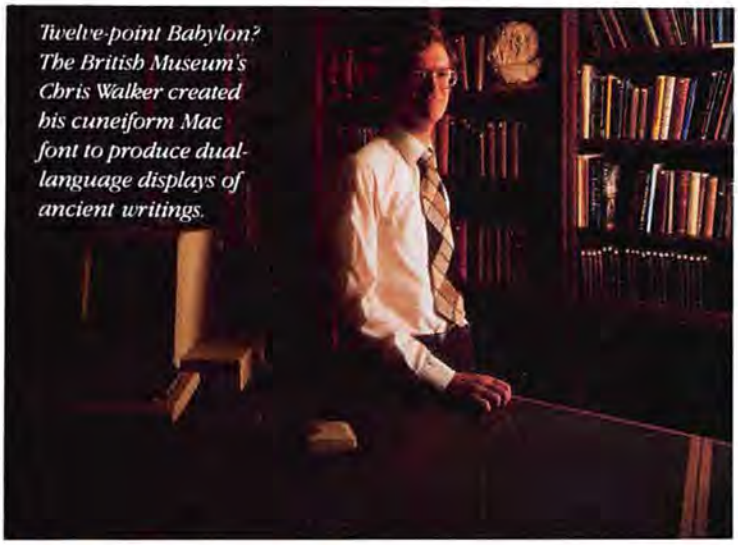

Twelve-point Babylon? The British Museum's Chris Walker created his cuneiform Mac font to produce dual-language displays of ancient writings.

Of Comets and Cuneiform

You can follow two routes to Professor Chris Walker's office. One is through the illustrated manuscripts, past the Magna Charta, and up the stairs that wind around the Alaskan totem pole. The more direct approach, however, is to walk past the Greek artifacts, turn right at the mummies, and knock on the first door beyond the Babylonian tablets.

Walker is the assistant keeper of Asiatic antiquities for the British Museum. Among his charges is a collection of more than 2000 Babylonian tablets inscribed with cuneiform writing recording 500 years of pre-Christian history. In August 1984 scholars uncovered on the tablets references to sightings of Halley's Comet in the years 164 B.C. and 87 B.C. The tablets contain the only known record of the comet's 164 B.C. visit. (The earliest reference to the comet is Chinese, dating from 240 B.C.)

To publicize the findings, the museum put on an exhibition that began the day the comet became visible in the skies over London. Originally, museum officials proposed to stick the brownish-orange tablets in a glass case with a brief translation of the cuneiform text. Walker, however, had a different idea. Using Apple's *Font Editor* and *FONTastic,* he drew the Babylonian cuneiform alphabet and assigned each symbol to a position on the Mac keyboard. After creating the cuneiform font, he simply transcribed the tablets' contents in *MacWrite* and typed the English translation underneath each line of cuneiform text. Both lines of type—the Babylonian and the English—were made into slides (using *Slide Show Magician*) and projected near the tablets. For the first time, lay people were able to read for themselves the contents of the tablets.

In addition, Walker used *Filevision* to recreate the Babylonian sky, complete with stars, planets, and Halley's Comet. He believes his work will have a long-term application. With a Macintosh and his cuneiform font, scholars no longer have to spend years hunching like monks over manuscripts, painstakingly drawing the Babylonian cuneiforms. *–Dianna Waggoner*

MacWorkStation

The most common way of connecting the Macintosh to a host mainframe, like the DEC VT-100 or the IBM 3278, is to use a program that emulates the host terminal. Traditional terminal emulators generally handle only text, are difficult to learn, and require ongoing technical support. The *MacWorkStation,* a program under development at Apple, allows host applications to use the Macintosh user interface, so mainframe applications look and behave like standard Macintosh applications.

By eliminating the need for traditional terminal emulation and taking advantage of the ease of use provided by the Macintosh user interface, *MacWorkStation* enables non-technical people in business and education to tap the power of mainframe software. Software developers can use the *MacWorkStation* as a tool for prototyping programs. Modifications are made to the host applications, so you can run Macintosh software unaltered on the *MacWorkStation.*

The *MacWorkStation* is available for a $1500 licensing fee from Apple as an unsupported product, meaning you have to solve technical problems on your own. The *MacWorkStation* includes source and object code for the Mac, MacHost software (source and object code for the UNIX V and VMS operating systems), extensive documentation describing software and protocols, and test-bench software for the Macintosh to verify installation. For information contact Apple Computer, Software Licensing Department, MS 28B, 20525 Mariani Ave., Cupertino, CA 95014, 408/973-4667. *–Daniel Farber*

Macintosh Pascal Update

When Macintosh Pascal was released in 1984, it was touted as the premier version of Pascal and reason enough for students and programmers to purchase a Macintosh. That claim has been borne out in the subsequent two years. According to sources at Apple, over 35,000 copies have been sold in the education and consumer markets. Drexel, Stanford, Harvard, Brigham Young, Oregon State, Rice, the University of Pennsylvania, the University of Texas at Austin, Rutgers, and Ohio State are among the many schools using Mac Pascal for introductory computer science classes.

Mac Pascal 2.0, released this spring, offers a significant array of new features. The most obvious change is that copy protection has been eliminated. "We took off the copy protection to allow people to make backup copies and use Mac Pascal on a hard disk conveniently," says David Kaplow, Apple's product manager for Mac Pascal. The language has been tuned to work with the most current system (3.1) and Finder (5.2), and you can now save the

(continues on page 71)

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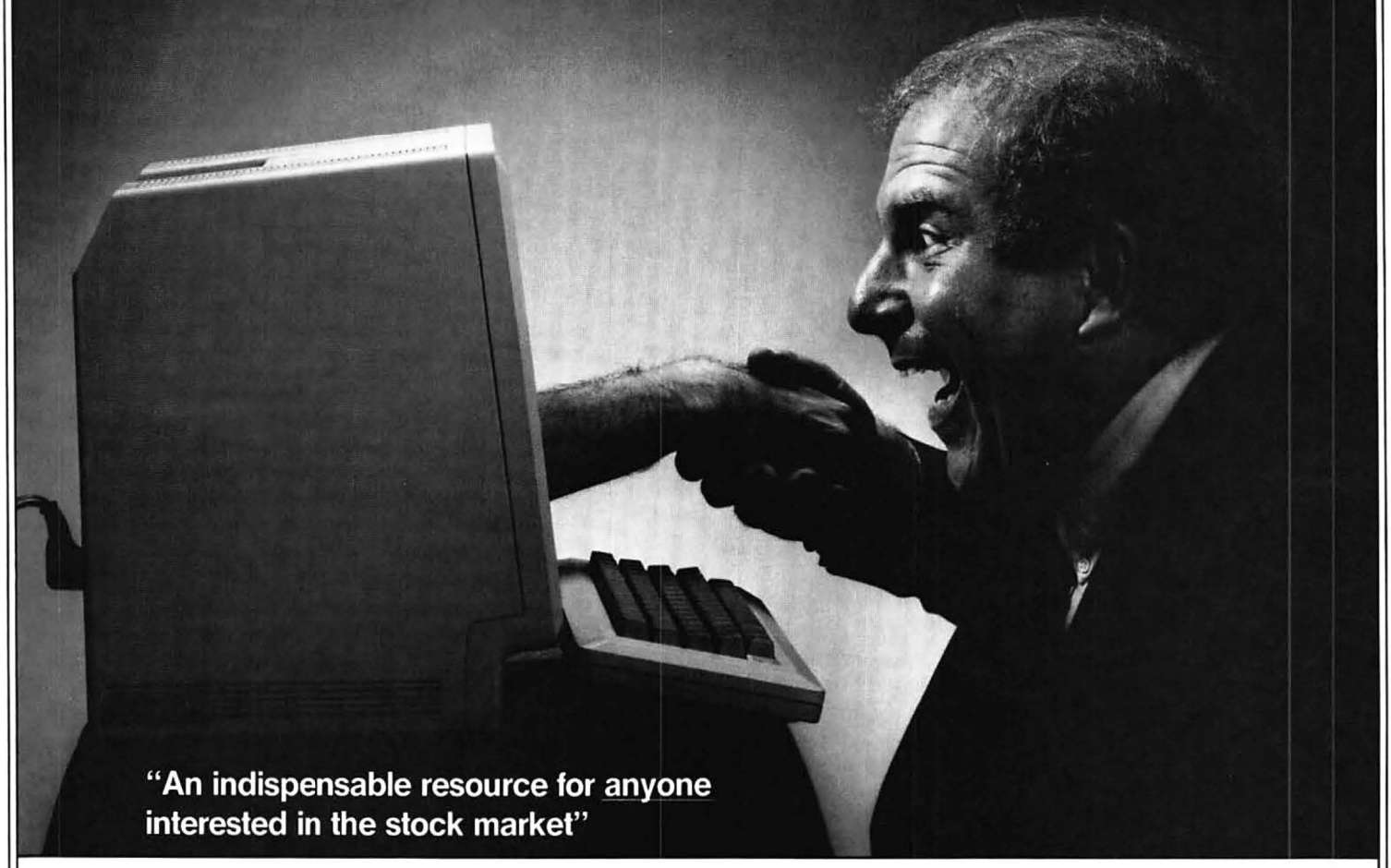

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Macintosh Pascal Update (continued)

desktop characteristics (the arrangement of windows in the Mac Pascal programming environment), control the tabs, and specify fonts in program listings.

The new version includes a run-time shell that allows you to create run-time applications. You can save programs as objects (intermediate code) or as applications (to be used with the run-time shell).

Other new features include procedural parameters; two new constants—INF (an extended representation of infinity) and π; relaxed order of declaration (lets you make declarations in any order); and more implementations of the SANE library.

Advanced programming procedures include procedure pointers, completion routines, and action routines. Procedure pointers allow you to bypass routines in the Mac ROM and specify nondefault actions. Completion routines may be used for tasks such as queuing up data in buffers. They have no parameters and are performed by certain asynchronous ROM routines executed at the end of another routine. Action routines are similar to completion routines but are performed during the execution of ROM routines.

Invention Software (P.O. Box 3168, Ann Arbor, MI 48106, 313/996-8108) has developed *Pascal Extender,* a library of routines for Mac Pascal 2.0 that perform standard tasks like drawing windows or creating pull-down menus. Using *Pascal Extender* with Mac Pascal makes it possible to prototype applications quickly.

Mac Pascal 2.0 is free to owners of version 1.0; the retail price of the language remains the same, $125.—*Daniel Farber*

Laser Storage

The first commercial application of a CD ROM with a Macintosh was shown at Microsoft's first annual CD ROM Conference in Seattle last March. Optical Media International's (OMI's) Compact Digital Sound Storage System, a product designed for the professional musician, can download digitized sounds and synthesizer settings to the Emulator II synthesizer produced by E-mu Systems. *Universe of Sounds, Volume One,* the first CD ROM disk from OMI, contains over 1000 sounds in 55 categories ranging from instrument sounds such as a grand piano or a flügelhorn to sound effects like street noise and passing trains. The sounds can be either downloaded to the Emulator II for performance or edited on the Macintosh using E-mu's *SoundDesigner* software.

Also good news for Macintosh owners: two CD ROM manufacturers, Philips and Sony, offer SCSI versions of the drives, a natural match for the Mac Plus. Optotech, the Colorado Springs manufacturer of write-once read-many (WORM) drives, has also developed a SCSI drive.—*David Ushijima*

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This month	Business	Last month	Months on chart
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2	Microsoft Word, *Microsoft*	2	11
3	Microsoft File, *Microsoft*	8	10
4	MacDraw, *Apple Computer*	3	8
5	Microsoft Multiplan, *Microsoft*	4	11
6	Jazz, *Lotus Development*	7	7
7	Microsoft Chart, *Microsoft*	9	11
8	Dollars and Sense, *Monogram*	5	11
9	Odesta Helix, *Odesta*	–	6
10	Omnis 3, *Blyth Software*	10	2
11	Back to Basics, *Peachtree*	11	2
12	pfs:file, *Software Publishing*	12	10
13	ThinkTank, *Living Videotext*	–	4
14	Filevision, *Telos Software Products*	–	1
15	MacProject, *Apple Computer*	–	8

Source: InfoCorp survey of over 200 retail stores

Software Watch

Editors' choice: other recent software of particular interest

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3-D solid modeling

Cricket Graph, *Cricket Software*
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Document Modeler, *Model Office*
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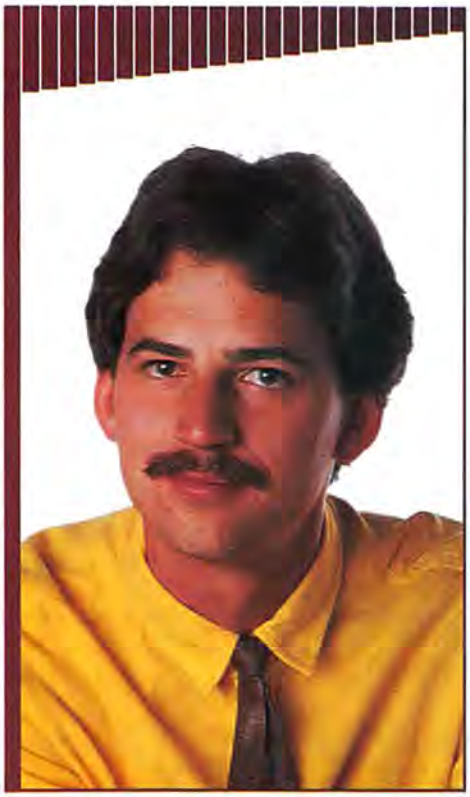
Get Info

Don't gamble with your data by trying to use both sides of a single-sided disk, and other advice from Macworld's tutor

Lon Poole



If you can't find a user group nearby, become a member by mail.

This month: how to use the MacAdvantage Pascal compiler with Macintosh Pascal programs. Also, some handy advice if you don't want to switch System files when starting an application on another disk. Information on how to obtain shareware without a modem, what replacement keyboards are available for the Mac, how a BASIC program gains access to files inside folders on a Hierarchical File System disk, whether it's possible to use home banking services with a general-purpose terminal program, how overseas users can upgrade their United States Macs, and whether all those single-sided disks can be reinitialized as double-sided disks to use in the 800K drives.

Pascal Compiler

T. R. Mulstein of Sault Sainte Marie, Ontario, Canada, wrote in with more information about compiling programs written in Macintosh Pascal (see *Get Info, Macworld,* December 1985). Programs written in Macintosh Pascal can be directly compiled with the MacAdvantage UCSD Pascal editor and compiler. Mulstein suggests that after a successful trial run of your Macintosh Pascal program, you save it using a name containing only lowercase letters; that way you can directly access the program with MacAdvantage's editor and compile it with the UCSD Pascal compiler.

"You can dramatically speed up the MacAdvantage development system," Mulstein adds, "by placing its editor, compiler, p-machine, Pascal run-time, and empty file onto a RAM disk, together with the System file and the MiniFinder. Note that Macintosh Pascal differs somewhat from UCSD Pascal in the way it handles array types."

Formerly distributed by SofTech Microsystems, MacAdvantage is available for $79.95 from Pecan Software (800/63-PECAN, 800/45-PECAN in New York for orders; 718/851-3100 for information). To sell a program you've compiled with the MacAdvantage development system, you need a license from Pecan Software to distribute copies of the run-time module. The license fee is $4 per copy, with a $500 advance payment required. There is no charge to distribute the run-time module with giveaway programs, however.

The MacAdvantage system uses the Macintosh operating system and offers access to most ROM routines but is not compatible with the p-System Pascal that runs on the IBM PC.

Where to Get Shareware

Q. I am interested in obtaining John Mitchell's program, *Fedit.* However, I do not have a modem, nor do I know of any user groups in my area. How can I buy this program?

G. Gross
Warren, Michigan

A. You've touched on a major sore spot of shareware (also known as user-supported software or Freeware, which is a trademark of Headlands Press): distribution. You can't walk into a store and buy a copy. To get the latest version of a shareware program, you generally need to con-

(continues on page 78)

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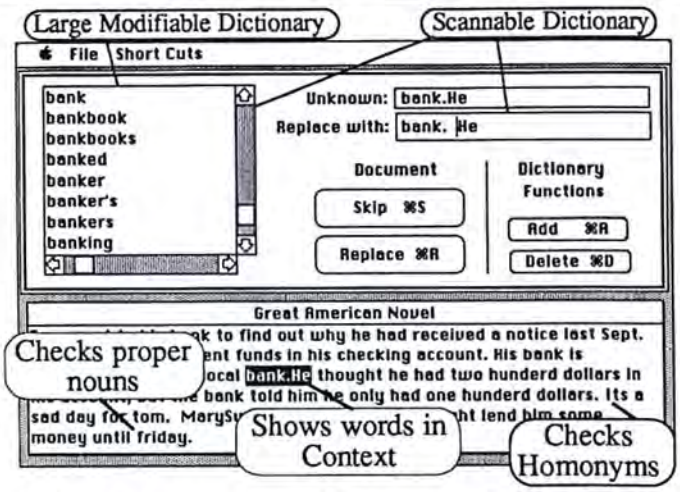

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(continued from page 75)

tact the author. For *Fedit,* send $30 to John Mitchell, 939 E. El Camino Real #122, Sunnyvale, CA 94087.

Finding an author's address isn't easy; for that reason, user groups are helpful. Since you don't have a modem, you can't join MicroNet Apple User's Group (MAUG) on CompuServe to obtain shareware over the phone lines. However, most user groups accept members from all over the world, so if you can't find one nearby, become a member by mail. In exchange for your dues, you typically receive a newsletter subscription and the privilege of purchasing low-cost disks full of shareware and public domain software. Here are the addresses of two user groups with no membership restrictions, good newsletters, disk libraries, and other benefits: Berkeley Macintosh Users Group (BMUG), 1442A Walnut St. #153, Berkeley, CA 94709, 415/849-9114, $40 per year. San Diego Macintosh User Group, P.O. Box 12561, La Jolla, CA 92037, $15 per year.

Prevent System File Switching

Q. My system disk is practically full (395K), so there is no extra room to put any of my personal files. If, for example, I want to print a document on my *MacWrite* disk, which also has a System file on it, the *MacWrite* disk automatically becomes the startup disk, limiting my choice of fonts to what its System file contains. Is there any way to override this switching of System files without removing the System file from the *MacWrite* disk?

Kevin O'Brien
Mountain View, California

A. The automatic substitution of System files when you start an application on a disk other than your startup disk is called a *switch-launch.* With Finder 4.1 and later versions, you can prevent switch-launches by removing the MultiFinder application and by making the Finder icon invisible on the disk whose System file you want ignored, in your case the *MacWrite* disk. You can make an icon invisible with a disk editing program such as *Fedit* or with Apple's resource editor program, *ResEd.* Use *Fedit* for the operation as follows:

- Start *Fedit.*
- Choose Open from *Fedit*'s File menu and open the Finder as you would open a document in any application.
- Choose File Finder Attributes from the Display menu. A dialog box appears.
- Click the box labeled Invisible so that an *X* appears in it.
- Click the Change button.
- Quit *Fedit.*

To make the Finder invisible using *ResEd,* proceed as follows:

- Start *RedEd.* A small window appears for each disk currently inserted. The title atop each window identifies the disk, and a list inside the window shows which applications, documents, and other files

(continues on page 81)

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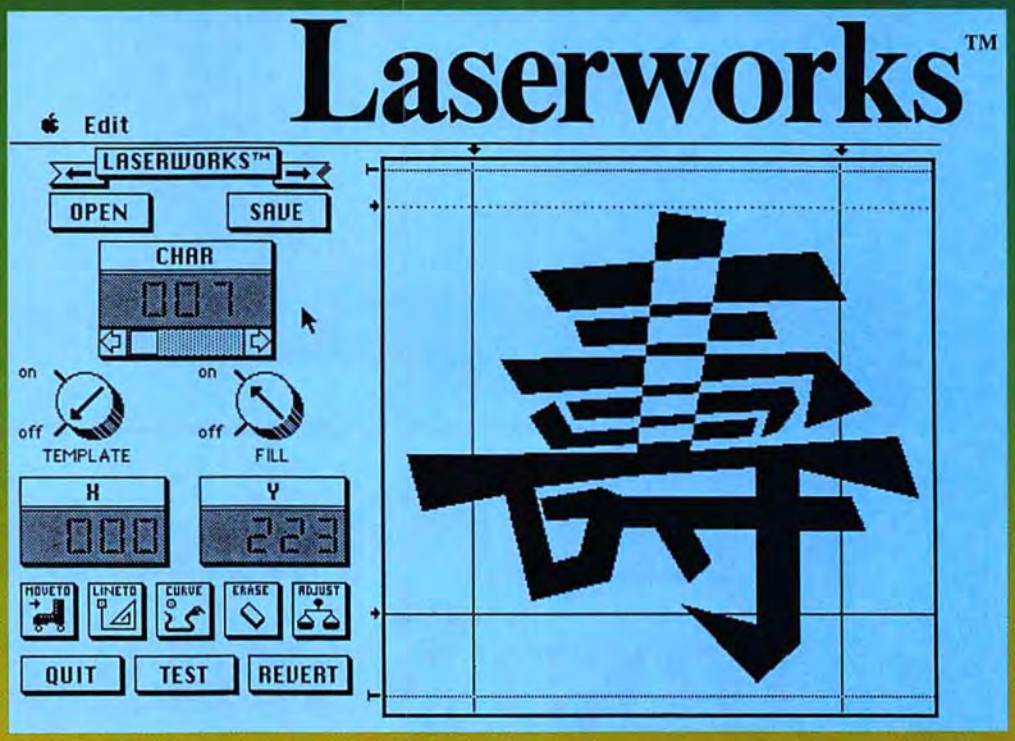

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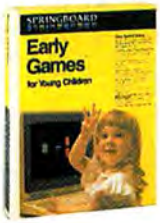

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(continued from page 78)

are on the disk. For double-sided disks and other disks that use the Hierarchical File System (HFS), the window also lists folders.

- Insert the disk whose Finder you want to make invisible. You may eject a disk by closing its disk window. When you insert another disk, its disk window appears.
- On an HFS disk, open the folder that contains the Finder; usually it is in the System Folder. Find the Finder in the disk or folder window and select it by clicking it. Make sure you select the Finder on the right disk.
- Choose Get Info from *RedEd*'s File menu. An information window appears.
- Click the box labeled Invisible so that an *X* appears in it.
- Close the information window. *ResEd* asks if you want to save the change you made. Click the Yes button.
- Quit *ResEd*.

Mac Home Banking

Q. I am interested in home banking, but my bank says it will be several months before its home banking service is "Macintosh compatible." Since a Mac running *MacTerminal* emulates a variety of terminal types, I should be able to access just about any electronic database, regardless of orientation. How about it?

Les Morsillo
New York, New York

A. Most information services can communicate with the lowest form of life in the computer world—the teletype terminal, or TTY. This type of terminal, also called a dumb terminal, consists of nothing more than a keyboard and a printer or a display screen. You send information by typing on the keyboard and receive information by reading the printer or display screen. Dumb terminals exist in a text world, without icons or pictures.

If you choose TTY in *MacTerminal*'s Terminal Settings dialog box, the information service regards your Mac as a teletype machine. Of course, *MacTerminal* is smarter than a dumb terminal. It can send information from disk and save information on disk. In fact, every Macintosh terminal program I know of has these basic capabilities.

So inform your bank that your personal computer will be running a terminal program that acts like a TTY or dumb terminal. I'd be very surprised if the bank couldn't handle that.

Non-Apple Keyboards

Q. I have been expecting a flood of articles on how we can shrink our fingers to fit comfortably on the Macintosh keyboard. My productivity would at least double if I could attach a good full-sized keyboard to my Mac. Does anyone manufacture such a keyboard?

Tony DeLisa
Nuremberg, West Germany

(continues on page 83)

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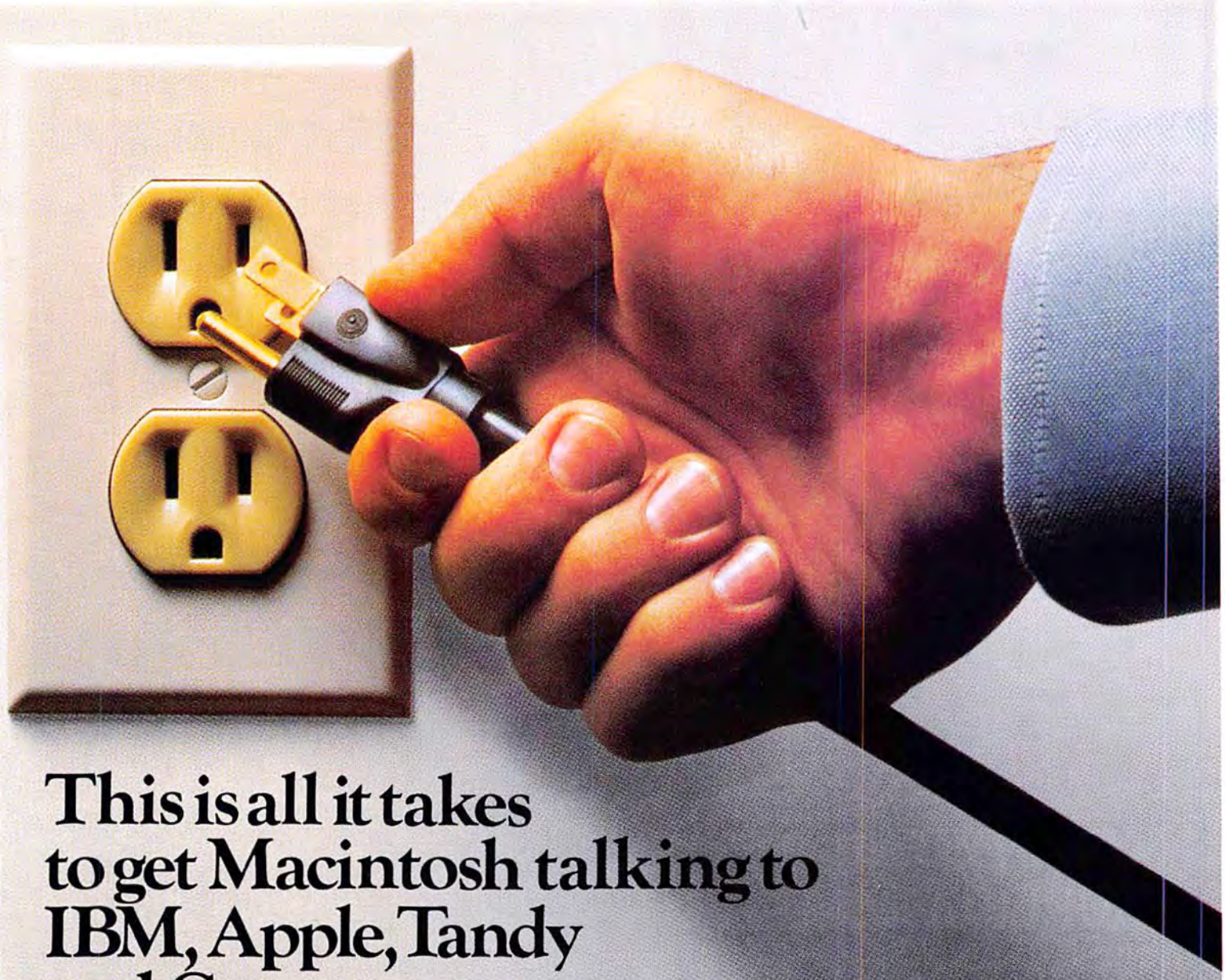

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(continued from page 81)

A. Have you been washing your keyboard in hot water? I wash mine in cold water and never put it in the dryer. The distance between keys on my two-year-old Mac keyboard measures exactly the same as on an IBM PC keyboard and on an IBM Selectric typewriter. But there's no question that the feel of the Mac keyboard differs greatly from the IBM machines.

Whatever your reasons for disliking the Macintosh keyboard, you can replace it. One option is the PC MacKey keyboard (list price $299 with a $25 to $50 trade-in from Tangent Technologies, 404/662-0366). It has a built-in numeric keypad, arrow keys, and function keys. It looks like an IBM PC AT keyboard. The keyboard includes an installation program that lets the Mac recognize the function keys. Tangent Technologies plans to make French, Spanish, German, and other localized versions of the keyboard. Keytronic (509/928-8000), a major supplier of keyboards in the IBM PC marketplace, also plans to market Mac-compatible keyboards for specific business uses.

HFS Folders and BASIC

Q. I copied a BASIC program onto an HD 20 hard disk. The program refers to several files that I copied to the same folder that holds the program. It was obviously necessary to change the volume specification in order to access these files from within the BASIC program. I have tried several alternatives, but none has worked. Is there a solution to my problem, or must I continue to run my program from a floppy disk?

Benjamin J. Tepping
Silver Spring, Maryland

A. To open a file in a folder on an HD 20 or any other disk drive that uses HFS, you must specify a complete path name. Start with the disk name, then list the names of all folders HFS must traverse, and end with the file name. Separate the disk, folder, and file names with colons. Here's an example:

```
filename$ = "Disk:folder1:folder2:folder3:file"
OPEN filename$ FOR OUTPUT AS #1
```

In this example the file resides in folder 3, which is inside folder 2, which is in folder 1, on the disk named *disk*.

For a more flexible program, use the FILES$ function, which asks your program's user to specify the file. The following form of the FILES$ function displays the standard Save As dialog box:

```
filename$ = FILES$(0,"Save As:")
IF filename$ = "" THEN END
OPEN filename$ FOR OUTPUT AS #1
```

The string parameter in this type of FILES$ function, "Save As:" above, appears as a prompt in the dialog box. The FILES$ function returns a null value if the program user clicks the Cancel button in the dialog box.

Another form of the FILES$ function displays the standard Open dialog box, with a scrollable list of folder and file names. Here's an example:

```
filename$ = FILES$(1,"TEXT")
IF filename$ = "" THEN END
OPEN filename$ FOR INPUT AS #1
```

In this form the optional string inside the parentheses specifies the type of files from which you want the user to choose. No other type of files will be listed.

Unfortunately, the FILES$ function does not work properly with HFS in BASIC version 2.1 or earlier. Microsoft plans to remedy the situation someday, I'm sure.

Overseas Update

Q. I am stationed in Germany. It seems that I have been forgotten by my dealer and left stranded–doomed to use version 1.1g of the Finder and *MacWrite* 2.2 for the rest of my time in Europe. Where can I get updates?

Lee Haag
Osterholz-Sharmbeck, West Germany

A. Dealers generally do not stock parts for foreign versions of Apple products. Since your United States Mac is a foreign model in Germany, the dealers there do not have the versions of the software you need. Theoretically they can order the software for you, but it may be easier to obtain software by mail from a United States dealer or a user group (see "Where to Get Shareware" in this column). The Berkeley Macintosh Users Group, for example, has permission from Apple to distribute copies of the May 1985 System Update disk, which has version 4.1 of the Finder, at $6 each.

Upgrades to the Mac itself are another story. All the hardware upgrades announced in January 1986–128K ROM, the 800K internal disk drive, the Mac Plus logic board–are absolutely identical for every Macintosh, regardless of nationality. Only the software is different. Hence, any authorized Apple dealer in the world can upgrade your 512K Mac for the new ROM and disk drive or even turn your machine into a Mac Plus. However, you cannot use the System Tools disk provided as part of the upgrade. That you'll have to obtain by mail from a United States source.

Both Sides Now?

Q. I just bought a box of double-sided Sony disks to use in my 800K disk drive. Except for the words "Double-Sided," they look exactly like single-sided disks. Can I simply reinitialize single-sided disks as double-sided?

Roberta Chin
Los Angeles, California

A. People have been using both sides of single-sided 5¼-inch disks on other computers for years without losing too much information. But as far as I'm concerned, losing any information at all is losing too much.

Disk manufacturers test both sides of every disk they make. Disks that pass on both sides become double-sided, and disks that fail on one side become single-sided disks. I'd stick to using one side of your single-sided disks. If you want to gamble, go to Atlantic City or Las Vegas.

Get Info *answers questions about the Macintosh and how it works. When you need advice about using the Mac, drop me a line. I cannot respond to all letters, but I will answer the most representative questions. Send your question about the Macintosh, Macintosh software, and Macintosh programming to* Get Info, Macworld, *555 De Haro St., San Francisco, CA 94107. Send electronic mail to CompuServe 70370,702 or The Source BCW440. All published submissions become the property of* Macworld.

Lon Poole is a Contributing Editor of Macworld. □

It's a Mac,

SOFTWARE

Addison-Wesley
Smart Eyes *(speed reading tutor)* ..... $36.
Affinity Microsystems
Tempo *(power user's macro utility)* ..... 79.
Altsys
Fontastic *(create your own fonts)* ..... 27.
Apropos
Tax Planner *(requires Excel)* ..... 35.
Financial Planning *(reqs. Multiplan)* .... 45.
Investment Planning *(reqs. Multiplan)* ... 45.
Arrays/Continental
Home Accountant *(reqs. external drive)* 52.
Assimilation
Mac·Tracks *(macro utility)* ..... 22.
Mac·Memory·Disk *(reqs. 512k)* ..... 22.
MIDI Composer *(music record/playback)* 22.
Work·N·Print *(print spooler)* ..... 22.
Business·Essentials *(correspondence)* .. 65.
Mac·Spell·Right *(40,000 word dictionary)* 69.
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 *(unprotected)* ..... 44.
Sidekick w/Phonelink ..... 59.
BrainPower
PowerMath *(requires 512k)* ..... 52.
StatView *(statistics package)* ..... 99.
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)* .. 125.
Chang Labs
Rags to Riches Ledger ..... 99.
Rags to Riches Receivables *(reqs. 512k)* 99.
Rags to Riches Payables *(reqs. 512k)* .. 99.
Rags to Riches Three Pak ..... 249.
Creighton Development
MacSpell+ *(requires 512k)* ..... 55.
DataFood
DrawForms *(requires MacDraw)* ..... 30.
MacForms *(requires MacPaint)* ..... 42.
Datavis
MacLink *(transfer Mac/IBM files)* ..... 89.
Dow Jones
Straight Talk ..... 59.
Spreadsheet Link ..... 62.
Market Manager PLUS ..... 125.
Dreams of the Phoenix
Day Keeper Calendar ..... 27.
Mouse Exchange Terminal ..... 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
Easy 3D *(create solid 3D objects)* ..... 79.
Enterset
Quickpaint *(find MacPaint files fast)* .... 27.
Quickset *(icon-driven accessory)* ..... 27.
Quickword *(word processing tool)* ..... 32.
1st Byte
Speller Bee *(spelling-learning tool)* ..... $42.
KidTalk *("talking notebook")* ..... 42.
Smoothtalker *(version 2.0)* ..... 52.
Forethought
Typing Intrigue *(typing instruction)* ..... 29.
Factfinder *(free-form entry)* ..... 84.
FileMaker *(custom forms & reports)* ... 105.
Fortnum/Southern
MacInooga Choo-Choo *(reqs. 512k)* ... 21.
MacNest *(double screen scrapbook)* ... 25.
MacChemistry ..... 89.
Great Wave Software
The Art of Fugue *(Bach)* ..... 12.
Instrumental Favorites ..... 12.
Comet Halley ..... 18.
ConcertWare+ *(music composition)* ... 39.
Greene, Johnson
Spellswell *(incl. homonym dictionary)* ... 45.
Harvard Associates
MacManager *(business simulation)* ..... 29.
Desktoppers *(new desk accessories)* .. 29.
Hayden Software
DaVinci Buildings ..... 29.
DaVinci Interiors ..... 29.
DaVinci Landscapes ..... 29.
DaVinci Building Blocks ..... 46.
DaVinci Commercial Interiors ..... 116.
Art Grabber with Body Shop ..... 29.
Turbo Turtle ..... 35.
I Know It's Here Somewhere ..... 35.
MusicWorks ..... 46.
Hayden:Speller ..... 46.
Score Improvement System for the SAT 58.
VideoWorks & Musicworks Bundle ..... 58.
Hippopotamus Software
Hippo Computer Almanac ..... 20.
Hippo-C Primer Compiler & Book ..... 59.
Hippo-Lock *(file security program)* ..... 62.
Hippo-C - Level 1 ..... 78.
Hippo-C - Level 2 ..... 208.
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)* ... 77.
Legisoft/Nolo Press
WillWriter *(prepare your own will)* ..... 27.
Linguist's Software
MacCyrillic ..... 39.
SuperFrench/German/Spanish ..... 39.
Tech *(1000 different symbols)* ..... 59.
MacArabic ..... 59.
MacKana/Basic Kanji ..... 59.
MacSemitic/Coptic/Devanagari ..... 59.
MacKorean ..... 59.
SuperGreek ..... 59.
SuperHebrew ..... 59.
SuperGreek/Hebrew/Phonetics ..... 89.
Living Videotext
ThinkTank 128k ..... 52.
ThinkTank 512k *(outline processor)* ... 101.
Magnum
McPic - Volume I ..... 28.
McPic - Volume II ..... $28.
The Slide Show Magician ..... 34.
Manhattan Graphics
Ready Set Go *(requires 512k)* ..... 125.
Mark of the Unicorn
Professional Composer *(reqs. 512k)* ... 249.
Microsoft
Entrepreneur ..... 29.
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.
Multiplan to Excel Upgrade ..... 150.
Fortran 2.1 ..... 169.
Excel 1.0 ..... 225.
Miles Computing
Mac the Knife - Volume I ..... special
Mac the Knife - Volume II ..... special
Mac the Knife - Volume III ..... special
Mindscape
The Perfect Score: SAT ..... 47.
Monogram
Forecast *(tax planning)* ..... 41.
Dollars & Sense ..... 81.
Nevins Microsystems
Turbocharger *(requires 512k)* ..... 55.
New Canaan MicroCode
Mac Disk Catalog II *(requires 512k)* .... 32.
Odesta
Helix *(requires 512k, external drive)* .. 219.
Palantir
MacType *(supports Dvorak keyboard)* .. 26.
MathFlash *(math flash card drills)* ..... 26.
WordPlay *(crossword puzzles)* ..... 26.
Accounts Receivable ..... 69.
General Ledger ..... 69.
Inventory Control ..... 69.
inTouch *(communication to emulation)* .. 79.
PBI Software
Icon Switcher ..... 14.
Icon Fun & Games Library ..... 14.
Icon Business Library ..... 14.
Peachtree
Back to Basics General Ledger ..... 89.
Accounts Payable ..... 89.
Accounts Receivable ..... 89.
Back to Basics 3 Pack ..... 239.
Polarware
Graphics Magician ..... 47.
Practial Computer Applications
MacBackup *(free upgrades)* ..... 41.
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)* ..... 35.
Satori
BulkMailer *(mailing lists)* ..... 79.
Scarborough Systems
Mastertype *(arcade typing tutorial)* ..... 25.
Sierra On-Line
MacOneWrite *(cash disbursements)* ... 137.
MacOneWrite *(accounts receivable)* ... 137.
Silicon Beach Software
Accessory Pak 1 ..... 21.
Silicon Press *(printer utility, 512k)* ..... 42.

Marlow: A.D. 2000?

Future schlock.
In Marlow, NH (pop. 553 so far), long range planning usually means getting out the seed catalog and ordering by Valentine's Day. But recently, some slick city planners showed up at MacConnection and told us our dynamic little village needed a 15-year plan.

PowerMath $52
Math problem solver

Their suggestions were downright imaginative. Computerized laser light shows highlighting a fountain in the middle of the mill pond. A rapid transit system, code named H.A.R.T. (Holographic Acrobatic Rapid Transit)—just imagine where you want to go and you'll be there. Why they even figured out a way to build a 200,000 sq. ft. enclosed mall right on top of the general store.

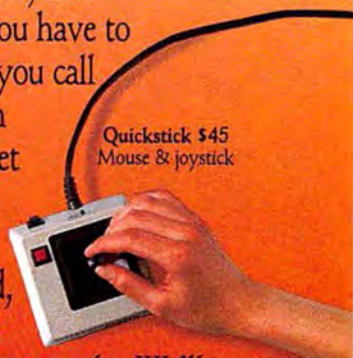
Forward into the past, and back.
Well, we took a good look at the experts' report. And we started thinking about building skyscrapers bigger than nearby Pitcher Mountain. And how strange it would be to have robots answering the phones and packing the boxes. And how they wanted us to turn apple orchards into parking lots, and old barns into condos.

And we decided to forget the whole thing.

Sidekick/Phonelink $59
Phone & office mgmt.

So, if you're one of the thousands of people who consider us a breath of fresh air in the mail order marketplace, you can breathe a sigh of relief. Call us old-fashioned, but just because you grow, that doesn't mean you have to change. When you call MacConnection you'll always get your questions answered, your problems solved, and your orders delivered promptly. We'll even keep you up to date on the local apple harvest. Just ask.

We believe the best things in life should stay that way.


Quickstick $45
Mouse & joystick

Mac3D $125
3-D graphics package

MacConnection™

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world.

Spectrum Holobyte
GATO *(submarine simulation)* ..... $26.
Tellstar North Level I *(reqs. 512k)* ..... 27.
Unicorn
Futuria *(sci-fi adventure)* ..... 24.
Utopia *(science fantasy game)* ..... 24.
Animal Kingdom *(ages 6-12)* ..... 27.
Fraction Action *(arcade style math game)* 27.
Mac Robots *(pre-school program)* ..... 27.
Videx
MacCheckers/Reversi ..... 28.
MacGammon/Cribbage ..... 28.
MacVegas ..... 34.

HARDWARE

Assimilation
Mac-Epson-Connection ..... 40.
Mac-Daisywheel-Connection ..... 45.
MIDI Conductor ..... 75.
Mac-Port-Adaptor ..... 85.
Mac-Turbo-Touch ..... 89.
Numeric-Turbo ..... 145.
Compucable
Mac to Hayes Smartmodem cable ..... 16.
Mac to Imagewriter 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 *(Imagewriter compatible)* ..... call
FX-85 ..... call
FX-286 *(replaces FX-185)* ..... call
LQ-1000 *(letter quality dot matrix)* ..... call
Ergotron
MacTilt *(incl. external drive bracket)* .... 75.
MacBuffer 256k ..... 219.
MacBuffer 512k ..... 319.
MacBuffer 1 Megabyte ..... 489.
Hayes
Smartcom II *(communications software)* 89.
Smartmodem 300 ..... call
Smartmodem 1200 ..... call
Smartmodem 1200 Package ..... call
Includes modem, software and cable.
Smartmodem 2400 ..... call
Transet 1000 ..... call
IOMEGA
Bernoulli Box *(dual 10-MB storage)* .. 2475.
10-Meg Cartridge ..... 48.
Head Cleaning Kit ..... 69.
Kensington
External Disk Drive Cover ..... 8.
Mouseway ..... 8.
Mouse Pocket ..... 8.
Mac 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.
Disk Drive Cleaning Kit ..... 19.
Tilt/Swivel ..... 22.
Polarizing Filter ..... 31.
Surge Suppressor ..... 35.
Starter Pack *(includes Tilt/Swivel)* ..... 53.
A-B Box ..... 62.
Control Center ..... 62.
Koala Technologies
KAT Graphics Tablet ..... $139.
MacVision *(digitizer)* ..... 169.
Kraft
QuickStick *(Mac joystick)* ..... 45.
Microsoft
MacEnhancer 2.0 ..... 163.
Mitsuba
Super 5 400k External Drive ..... 199.
Mouse Systems
A+ Optical Mouse ..... 59.
N² Products
Mac to Modem cable *(6 feet)* ..... 19.
Mac (Plus) to Printer cable *(6 feet)* ..... 19.
Mac to Transet 1000 cable *(9 feet)* ..... 19.
Paradise Systems
Mac 10 *(10 megabyte hard disk)* ..... 599.
Mac 20 *(20 megabyte hard disk)* ..... 849.
PBI Software
Switch Box ..... 36.
PKI
Sydewyndr 400k External Drive ..... 225.
McD 800k External Drive ..... 285.
Systems Control
MacGard *(surge protection)* ..... 55.
Thunderware
Thunderscan *(high-resolution digitizer)* 175.
Video 7
MouseStick ..... 39.
Western Automation
DASCH RAMdisk 500k ..... 399.
DASCH RAMdisk 1000k ..... 699.
DASCH RAMdisk 2000k ..... 799.

DISKS

BASF 3½" Disks *(box of 5)* ..... 10.
Sony 3½" Disks *(box of 10)* ..... 19.
Sony 3½" Double-sided Disks *(10)* .... 30.
Fuji 3½" Disks *(box of 10)* ..... 19.
Fuji 3½" Double-sided Disks *(10)* ..... 26.
MAXELL 3½" Disks *(box of 10)* ..... 20.
MAXELL 3½" Double-sided Disks *(10)* 33.
Memorex 3½" Disks *(box of 10)* ..... 23.
Verbatim 3½" Disks *(box of 10)* ..... 23.
3M 3½" Disks *(box of 10)* ..... 21.

INFORMATION SERVICES

Compuserve
Compuserve Information Service ..... 27.
Source Telecomputing
The Source *(subscription & manual)* ... 30.

MISCELLANEOUS

Automation Facilities
Floppiclene Drive Care Kit ..... 19.
Floppiclene Drive Care Refill ..... 10.
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 & 800k)* ..... 7.
Numeric Keypad Cover ..... $7.
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
Imagewriter Color Transfer Ribbon ..... 10.
Imageware ..... 45.
Imageware II *(Imagewriter II case)* ..... 49.
Imageware wide ..... 49.
Macinware Plus *(Mac Plus carrying case)* 69.
Innovative Concepts
Flip & File Micro *(holds 25 disks)* ..... 9.
Flip & File *(holds 40 disks)* ..... 18.
Innovative Technologies
The Pocket Pak *(holds 6 disks)* ..... 10.
The Easel *(holds 20 disks)* ..... 14.
The Disk Directory *(holds 32 disks)* .... 21.
Compubag *(Mac carrying case)* ..... 59.
Kalmar Designs
Teakwood Roll-top Case *(holds 45 disks)* 14.
Teakwood Roll-top Case *(holds 90 disks)* 21.
Magnum
Mouse Mover *(let your mouse ride!)* .... 14.
Moustrak
Moustrak Pad *(standard 7"x9")* ..... 8.
Moustrak Pad *(large 9"x11")* ..... 9.
Imagewriter Pad ..... 12.
Pacific Wave
Flip Sort Micro *(holds 60 disks)* ..... 15.
Ribbons Unlimited
Imagewriter Color Ribbons ..... 5.
Imagewriter Ribbons Six Pack ..... 27.
Imagewriter Rainbow Six Pack ..... 27.
Smith & Bellows
Mahogany Disk Case, made by New England Craftsman *(Holds 90 disks)* .... 28.

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- Allow 1 week for personal and company checks to clear.
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- 120 day limited guarantee on all products.*
- To order, call us anytime Monday thru Friday 9:00 to 9:00 or Saturday 9:00 to 5:30. You can call our business offices at 603/446-7711 Monday thru Friday 9:00 to 5:30.

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Mac, Mac, Mac

Simon & Schuster
The Mac Art Department ..... $24.
Paper Airplane Construction Kit ..... 24.
Typing Tutor III ..... 34.
SMB Development
MacMate *(requires 512k)* ..... 35.
SoftStyle
Colormate Art *(color graphic images)* .. 24.
Colormate *(color printing utility)* ..... 49.
Epstart ..... 27.
Jetstart ..... 27.
Toshstart ..... 27.
TIstart ..... 49.
Laserstart ..... 59.
Decision Map ..... 79.
Software Publishing
PFS:File/Report ..... 103.
Springboard
Art a la Mac Vol. 1-People and Places 23.
Art a la Mac Vol. 2-Variety Pack ..... 23.
State of the Art
Electric Checkbook ..... 42.
Symmetry
Picture Base *(clip art manager, 512k)* .. 48.
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
Filevision *(graphic filing program)* ..... 99.
Business Filevision *(512k, external drive)* 219.
Think Educational
Mind Over Mac ..... 29.
MacEdge II *(math & reading)* ..... 29.
TML Systems
TML Pascal ..... 69.
Videx
MacCalendar *(incl. reminder system)* ... 52.

GAMES

Activision
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.
Bantam Electronics
Sherlock Holmes: Another Bow ..... 27.
Blue Chip
Millionaire *(stock market)* ..... 30.
Tycoon *(commodities)* ..... 30.
Baron *(real estate)* ..... 30.
Squire *(personal finance, reqs. 512k)* ... 30.

MacConnection Special of the Month
through June 30, 1986

MILES COMPUTING

A collection of over two dozen fonts and hundreds of MacPaint images including maps, borders, symbols, and first-class artwork.

- **Mac the Knife, Volume I:** A Clip Art Treasury
- **Mac the Knife, Volume II:** World-Class Fonts
- **Mac the Knife, Volume III:** Mac the Ripper

While supplies last, get all three for only ..... $59.

BrainPower
Think Fast *(improves recall)* ..... 23.
Chipwits *(robot simulation)* ..... 26.
Broderbund Software
Lode Runner *(you'll never sleep!)* ..... 24.
Cyborg *(sci-fi text adventure)* ..... 24.
Ancient Art of War *(military strategy)* ... 27.
CBS
Murder by the Dozen *(mystery)* ..... 25.
Electronic Arts
One on One/Dr J vs Larry Bird *(reqs. 512k)* 27.
Pinball Construction Set ..... 27.
Epyx
Rogue *(the mainframe classic!)* ..... 24.
Temple of Apshai Trilogy *(4 levels)* ..... 24.
Winter Games *(Olympic events)* ..... 24.
Gamestar
Championship Star League Baseball ... 22.
Hayden Software
Masterpieces *(jigsaw puzzles)* ..... 24.
Word Challenge II *(boggle-like game)* .. 24.
Perplexx *(scrabble-type game)* ..... 24.
Sargon III *(9 levels of chess)* ..... 29.
Infocom
Difficulty levels shown in italics
Seastalker *(junior)* ..... 24.
Ballyhoo *(standard)* ..... 24.
Cutthroats *(standard)* ..... 24.
Enchanter *(standard)* ..... 24.
Hitchhiker's Guide *(standard)* ..... 24.
Planetfall *(standard)* ..... 24.
Wishbringer *(standard)* ..... 24.
The Witness *(standard)* ..... 24.
Zork I *(standard)* ..... 24.
Zork II *(advanced)* ..... 27.
Zork III *(advanced)* ..... $27.
A Mind Forever Voyaging *(advanced)* .. 27.
Infidel *(advanced)* ..... 27.
Sorcerer *(advanced)* ..... 27.
Suspect *(advanced)* ..... 27.
Deadline *(expert)* ..... 29.
Spellbreaker *(expert)* ..... 29.
Starcross *(expert)* ..... 29.
Suspended *(expert)* ..... 29.
Invisiclues (hint booklets) ..... 6.
Magnum
Gypsy *(the Computer Oracle)* ..... 23.
Mark of the Unicorn
Mouse Stampede *(highly addictive)* .... 22.
Miles Computing
Fusillade *(arcade-maze)* ..... 21.
MacAttack *(3-D tank simulation)* ..... 27.
Harrier Strike *(3-D flight simulation)* ..... 27.
MacWars *(3-D space simulation)* ..... 27.
Mindscape
Rambo: First Blood Part II ..... 24.
James Bond 007: "A View to a Kill" .... 24.
James Bond 007: "Goldfinger" ..... 24.
The Luscher Profile ..... 24.
Stephen King's "The Mist" ..... 24.
Racter *(converse with your Mac!)* ..... 27.
Balance of Power *(world politics)* ..... 30.
Brataccus *(requires 512k)* ..... 30.
Déjà Vu *(murder mystery)* ..... 33.
Origin Systems
Exodus: Ultima III *(fantasy adventure)* .. 38.
PBI Software
Feathers & Space *(arcade-style)* ..... 21.
Strategic Conquest *(war strategy)* ..... 29.
Fokker TriPlane Flight Simulator ..... 35.
Penguin
Transylvania *(rescue the princess!)* .... 24.
Crimson Crown *(sequel to above)* ..... 24.
The Quest *(beware of the dragon!)* .... 24.
Xyphus *(role playing adventure)* ..... 24.
Practical Computer Applications
MacGolf *(requires 512k)* ..... 36.
Pryority Software
Forbidden Quest *(space adventure)* .... 24.
Gateway *(sci-fi fantasy adventure)* ..... 25.
Psion
Psion Chess *(3D and multi-lingual)* ..... 31.
Scarborough Systems
Make Millions *(business simulation)* .... 29.
Sierra On-Line
Frogger *(classic video game)* ..... 24.
Championship Boxing ..... 24.
Ultima II *(role-playing adventure)* ..... 35.
Silicon Beach Software
Airborne! *(digitized-sound war game)* .. 20.
Enchanted Scepters *(text & graphics)* .. 21.
Sir-Tech
Mac Wizardry *(fantasy)* ..... 36.

1-800/Mac&Lisa 590C

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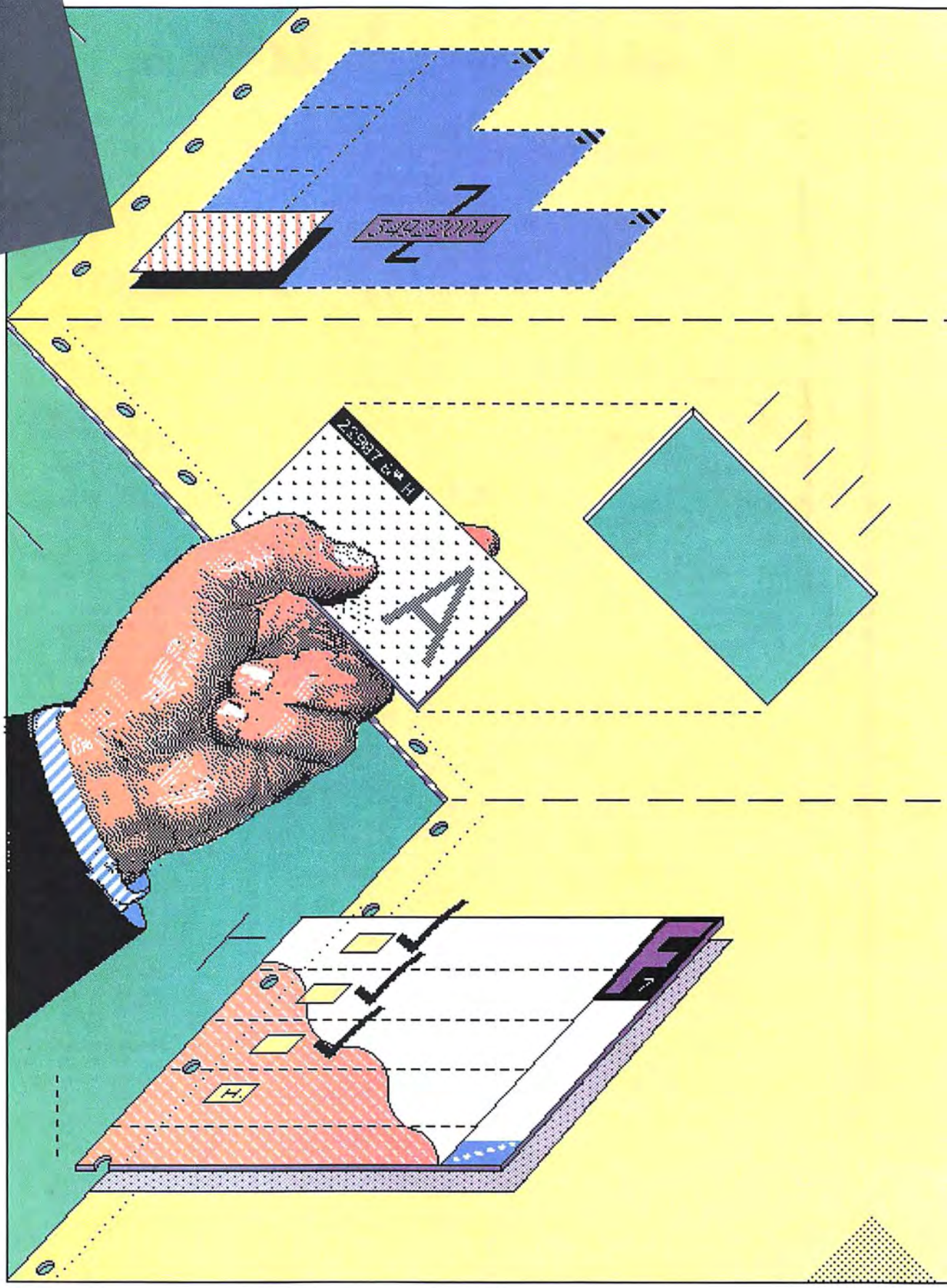
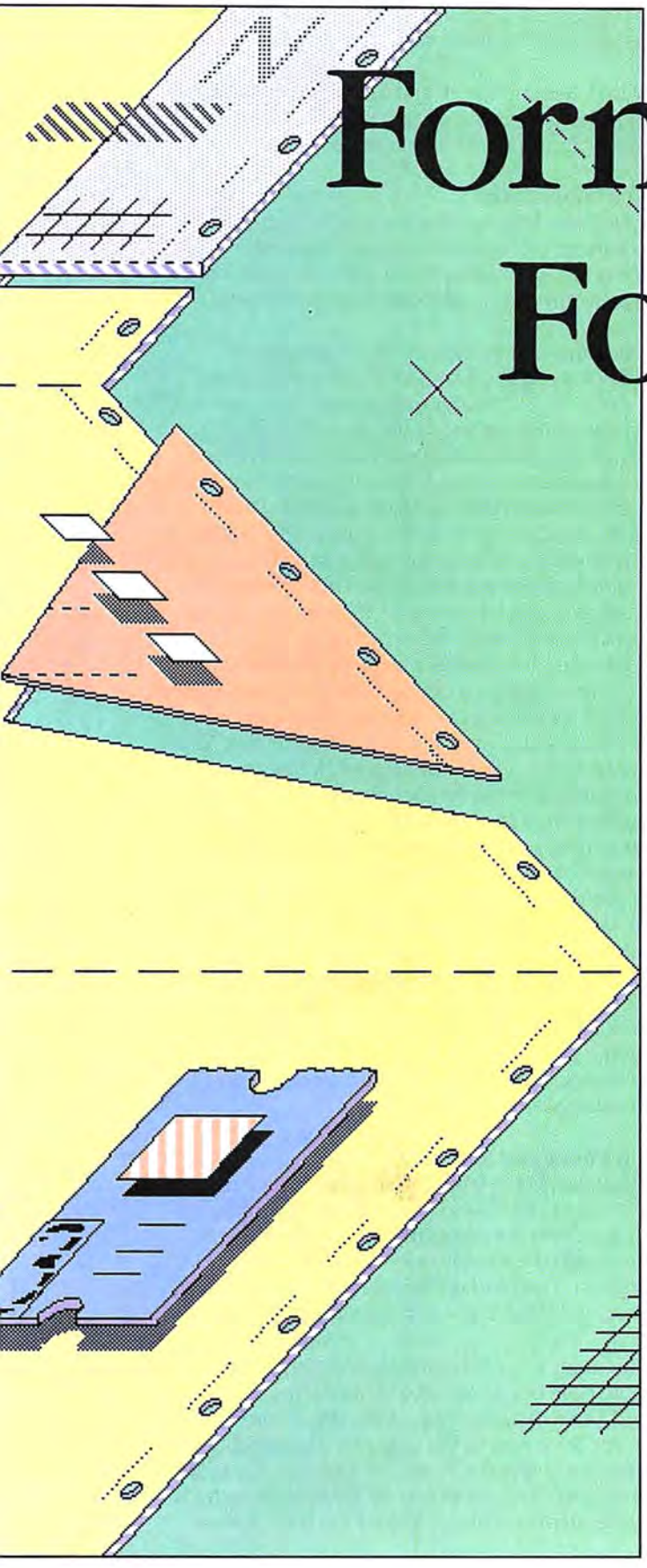
*Defective software replaced immediately. Defective hardware replaced or repaired at our discretion. Some items have warranties up to five years.

Circle 4 on reader service card





Forms Following Function

Gordon McComb

Forms are easily taken for granted, unless you have to design them. You can create forms on the Macintosh using MacDraw, *a drafting program;* MegaForm, *form-design software with limited spreadsheet features; or* FileMaker, *a database manager with records and reports that can be designed as forms. The key to using the right program is knowing how your form will be filled out and used.*

Like standing in line, filling out forms is an assumption of modern life. But, believe it or not, forms don't come from a horn of plenty-o'-forms: people take time and trouble to design them.

Fortunately, designing forms on the Mac is easier than doing them the old-fashioned way, with typewriter and ruler. Several applications generate forms on the Macintosh. The choice of application largely depends on the kind of form you want. Whether they are long-distance telephone logs, employment applications, or health records, the purpose of forms is to collect, collate, store, and present information. In the computer age, forms can be broken down into two categories according to whether the information is processed solely on paper or on disk as well.

A form that will exist only as hard copy—on paper—is ideally created in an application like *MacDraw* or *MacDraft* that lets you easily edit the form should the need arise. These drawing programs take the place of pencil, T square, eraser, and other drafting tools.

You can use *MacPaint,* too, but producing a finished form takes longer, and changes are harder to make. If you're not inclined to design your own forms, clip-art products such as *MacForms* and *DrawForms,* which provide templates in *MacPaint* or *MacDraw,* are available for many common business forms.

Whenever the information on a form needs to be processed electronically—whether the form itself is filled out on paper or on screen—the form should be designed so that it functions as a convenient user interface to the application program, such as a spreadsheet or a database manager, that will be doing the processing.

MegaForm, a form-design program with limited spreadsheet capabilities, is tailor-made for applications such as invoices and packing slips, which are initially filled out by hand but whose contents are later entered into a computer. *MegaForm*'s paper and screen versions of a form are the same, facilitating data entry. If you create formula cells, the program makes calculations as you fill in the form.

If you don't need a paper copy of a form, or if you need to produce a report based on data compiled from the form, use a data management application like *FileMaker.* Each *FileMaker* form is a complete record in a database. You lay out the record as you would a form and fill in the blanks on screen. *FileMaker* has the added distinction of being able to sort by any entry.

Whether your form stays on screen or is actually printed, lay out its design beforehand. Make sure that all required information is requested and that related information—all biographical data, for example—is grouped together logically. Decide on how the form will be filled out: by hand, with a typewriter, or on screen.

With a dummy sketch and a clear idea of how the form will be used, you are ready to choose the program most appropriate for your needs.

Weekly Time Card

Employee _____ Approved By _____

Week Ending _____ Department _____

	In	Out	In	Out
Monday				
Tuesday				
Wednesday				
Thursday				
Friday				
Saturday				
Sunday				

Signature _____ Date _____

Figure 1
When the information on a form will be processed solely as hard copy, the form is most easily designed in a program such as MacDraw, *which essentially replaces traditional drawing tools.*

For Paper Only

MacDraw is best suited for simple forms with information that will remain on paper. *MacDraw*'s advantage is that—assuming you already know the basics of the program—forms take only a few minutes to make.

The time card in Figure 1 was designed to be printed out and cut to 4 by 6 inches, the size of large index cards. The form isn't meant to be filled out on a typewriter, so the spacing of blanks isn't critical.

If people will be filling out your form on a typewriter, remember that single-spaced typewritten lines are ⅙ inch apart. Therefore, make sure *MacDraw*'s grid is on, and choose 6 as the number of minor divisions in the ruler-customizing dialog box. The single-space setting in the text mode does not conform to single spacing on a typewriter. A 10-point font, for example, prints at about 6½ lines per inch.

The time card consists mainly of text and lines. The lines are composed of underline characters rather than actual lines, because underline characters are easier to manipulate when placed alongside text. You need only add or delete characters to lengthen or shorten a line. The blanks for hours worked each day are rectangular boxes. Draw a column of boxes, group them together, and then duplicate the group three times to make the other columns.

If you need carbon copies of the form that you design in *MacDraw,* either print out the form on carbon-backed computer paper or contract a commercial printer to print the form. Printing costs vary according to locality. Generally, turning to a commercial printer becomes less expensive as your volume increases, although the point of cost-effectiveness (usually about 10,000 copies) is beyond the requirements of most small businesses.

On Paper and Screen

Megahaus's *MegaForm* has spreadsheet characteristics that enable you to design forms that make calculations on data automatically. If, for example, you were to design the weekly time card with *MegaForm,* the program could add up the hours worked, calculate overtime, and furnish you with an amount for the paycheck.

The order form in Figure 2 has no formula cells and could have been created with *MacDraw,* but since it served as a template for a packing slip, *MegaForm* was more convenient in the long run. The packing slip includes an additional column not found on the order form, because some items may be sold-out or on back order. (*MegaForm* requires that a form have at least

one formula cell; the one for the order form was placed outside the area to be printed and was left empty.)

MegaForm's drawing tools are not as handy as *MacDraw*'s. Revising a form once it's been designed is unwieldy. For example, you must make an entirely new line to change the width of a line; you can't select it and choose a new width from the palette. Nor can you group elements in order to manipulate them together.

Calculations Behind the Screen

The packing slip is meant to be completed on screen and printed out after the ordered merchandise has been collected and boxed. It contains several formula cells, which can be placed anywhere on the form. *MegaForm* lets you move from one cell to another in the order you specify. The sequence can be changed if you have to edit the form. For ease of use, you should create your forms so that the order of entry follows some logical progression.

MegaForm adds, subtracts, multiplies, and divides cells and ranges of cells. The cells in the total column, for instance, contain formulas that multiply the sum of the quantity shipped and back ordered by the unit price.

Order Form

Mail to:

Acme Electronics
1221 Maple Street
Anytown, CA 12345

Date _____

Ordered by:

Name_____
Company_____
Address_____
City_____ State___ Zip_____

Ship to:

Name _____
Company _____
Address _____
City_____ State___ Zip_____

Qty	Catalog No.	Description	Price	Total

Subtotal

Ship by: ☐ Parcel ☐ UPS ☐ UPS Blue

6% CA tax

Paid by: ☐ Check ☐ Money Order ☐ Visa ☐ M/C
Card #_____
Expiration Date_____
Signature_____

Shipping

Total

Make checks payable to Acme Electronics

Amount Paid

Figure 2
Although this order form contains no calculated cells, it was designed in MegaForm *because it serves as the template for a packing slip that does have calculated cells.*

The subtotal cell adds up the numbers in the total column. The program automatically computes the tax and inserts it in the tax cell. When you enter the shipping charges and the amount paid, *MegaForm* calculates the total and indicates whether there is a balance or credit due.

Of course, the data manipulation abilities of on-screen forms could be best exploited if a link could be established between the form and an accounting or inventory program that would constantly update records based on the information entered into the forms. The possibilities offered by such a link are suggested by the convenience of using a database manager, such as *FileMaker,* to design and fill in forms.

Primarily On Screen

FileMaker is essentially a data management application, but it lets you easily create records that look like forms. You fill out the form by moving from one on-screen blank to the next—or from field to field in database parlance. Like *MegaForm, FileMaker* lets you create formula cells that make calculations.

The most valuable aspect of *FileMaker* is that the information you enter into a form becomes part of a database that can be sorted and analyzed. The inventory receipt created in *FileMaker* (see Figure 3) details information on mechanical parts as they are received from vendors. The form includes an inventory item number, a general description of the part, the quantity ordered, the unit price, and the vendor name and address. The form also keeps track of useful information such as the date the part was ordered and the part's subsystem or assembly.

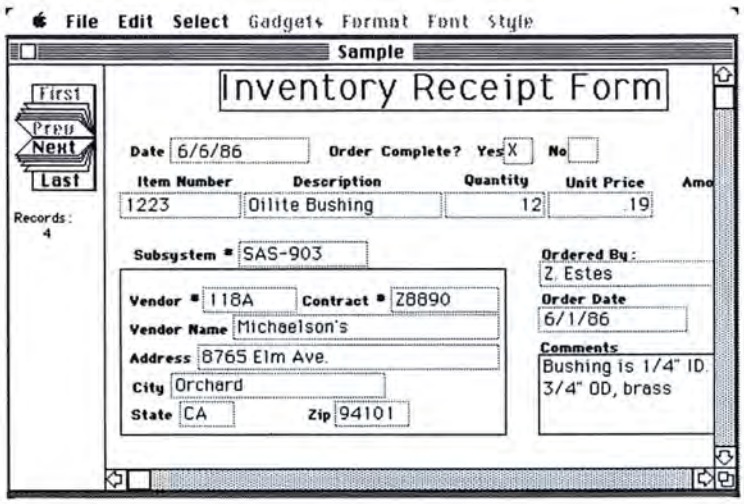


Figure 3
A database manager like FileMaker *is ideal for all-electronic forms that effectively serve as a user interface for entering information into a database. In addition, the program lets you sort data and generate reports.*

FileMaker has three drawing tools for creating the basic layout of a form: text, line, and boxes. You can't fill the boxes with a pattern, however, and you're limited to one line or border width. You can group items or frame the form with boxes, and you can draw lines for blanks or to separate parts of the form for readability. *FileMaker* provides a grid, rulers, and a T square for aligning elements carefully.

Blank Forms as Data Fields

The program offers five types of data fields: text, number, date, calculation, and summary. Most forms use only text, number, and calculation fields.

Text fields accept any type of data, such as names, addresses, and phone numbers. Number fields accept only numbers, but those numbers can be processed by calculation fields. In the inventory receipt form, the amount slot is a calculation field that multiplies quantity by unit price. *FileMaker* sorts data in any order and by any field. You could, for example, sort by date, item number, vendor name, or contract number–in either ascending or descending order. You can also combine fields for multilevel sorts; you could, for instance, do a multiple sort by date, item, and vendor name.

Like any database manager, *FileMaker* finds all entries that meet a given criterion. For example, typing "bushing" in the description field of each bushing record would ensure that you could find all the bushings in the database.

FileMaker is particularly helpful because it can use the information from one form to create others. The inventory receipt form is designed for recording information on merchandise received. However, the information in *FileMaker*'s inventory database can be used to generate a summary of similar items received during the last week.

To make a summary report available, create another form next to the original using *FileMaker*'s Part Divider tool. Choose either Grand Summary or Sub-Summary and lay out the form in columns. Use the same field names as on the original form, and the program automatically passes the data you enter on to fields of the same name in the new form. Use summary fields to find the total, average, or count of specified entries. (For a detailed discussion of how to use another database manager, *Helix*, to generate reports, see "The Well-Tiled Abacus" in this issue.)

Spicing Up Forms

Forms should be as simple as possible to make them easier to read and fill out. But that doesn't mean you can't add a few touches to make your forms look professional. Here are two suggestions.

Print your hard-copy forms created in *MacDraw*, *MegaForm*, or *FileMaker* on a LaserWriter. The LaserWriter is especially handy if you need to reduce the form. You could, for example, design a complex form larger than its intended size and then, before printing, choose the amount of reduction in the Page Setup dialog box.

These three programs also let you import *MacPaint* graphics, allowing you to add logos, sketches, letterheads, or digitized pictures to your forms. Remember that *MacPaint* graphics consume a lot of kilobytes, so if you add pictures aplenty or create graphics-based forms, you may run out of disk space fast.

For the foreseeable future, forms will remain in a gray area, an overlapping existence in both electronic and paper copies. Depending on your resources and requirements, you can use the Mac to design and print out forms, as well as to enter and process information on the forms. To avoid confusion in your mind and duplication of tasks, be clear at each stage of information processing–collection, collation, storage, and presentation–whether your form is hard copy or electronic. □

Gordon McComb is a Contributing Editor of Macworld.

MacDraw, version 1.7
Apple Computer
20525 Mariani Ave.
Cupertino, CA 95014
408/996-1010
List price: $125

MegaForm, version 1.0
Megahaus Corp.
5703 Oberlin Dr.
San Diego, CA 92121
619/450-1230
List price: $295 (version 2.1 $495)

FileMaker, version 1.0
Forethought
1973 Landings Dr.
Mountain View, CA 94043
800/622-9273, 415/961-4720 in California
List price: $195

MacDraft, version 1.1
Innovative Data Design
1975 Willow Pass Rd. #8
Concord, CA 94520
415/680-6818
List price: $239

MacForms and DrawForms
Datafood Software Co.
400 Country Dr., Ste. H
Dover, DE 19901
302/736-9098
List price: MacForms $79.95, DrawForms $59

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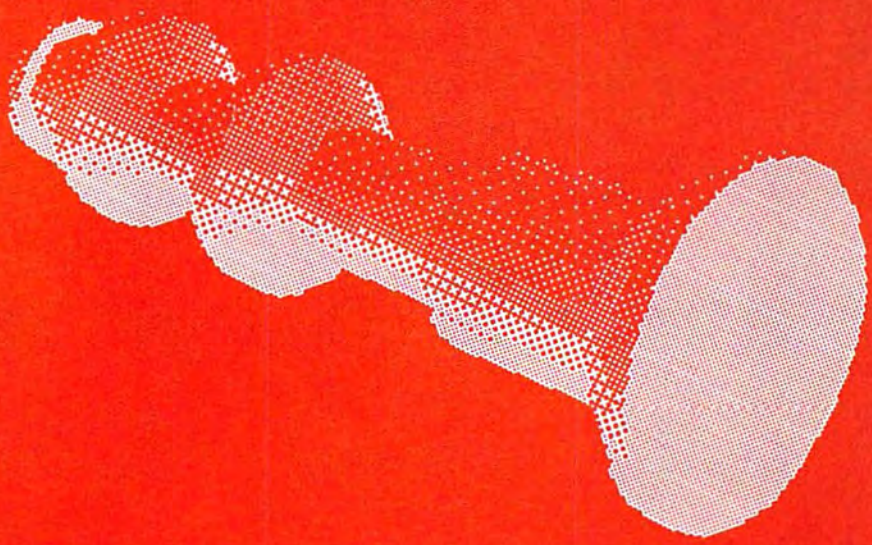
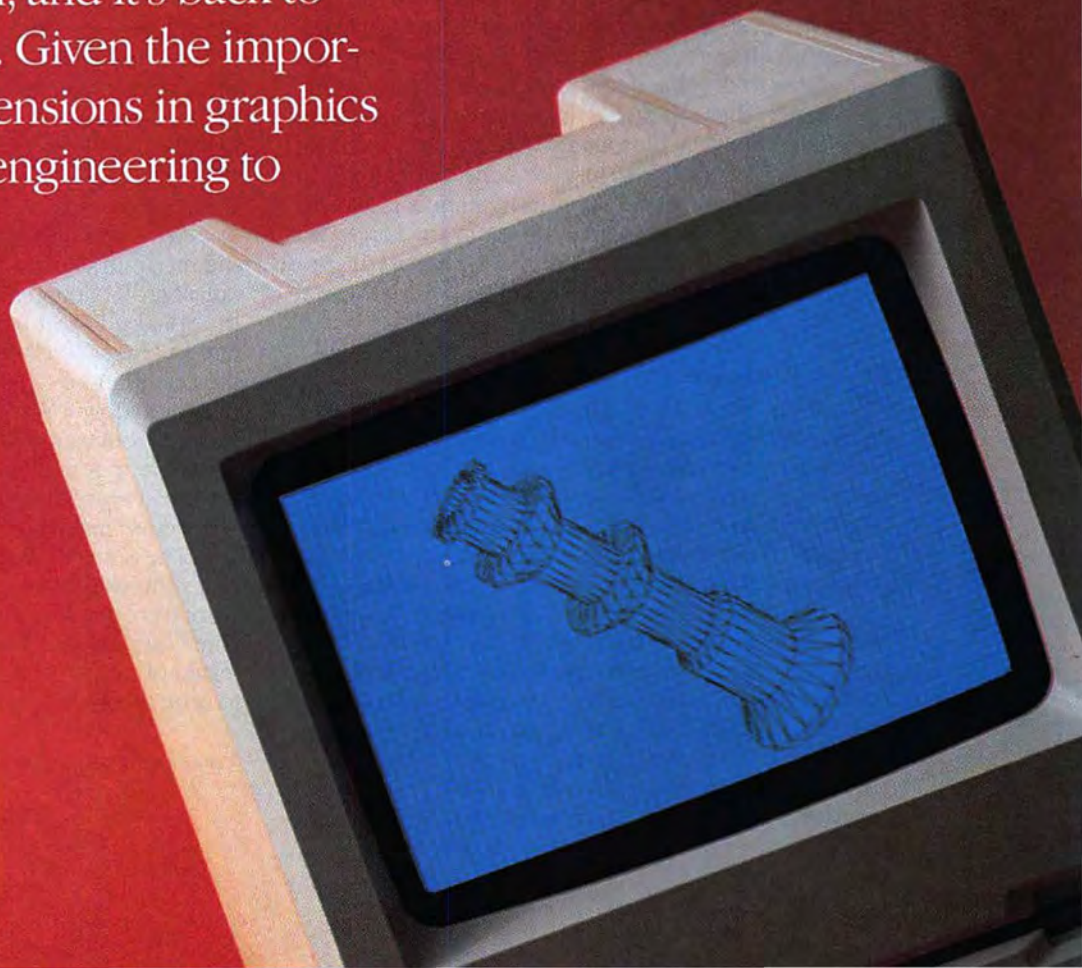
3-D In Depth



3-D modeling programs open a new dimension in Macintosh graphics. These candlesticks are examples from Easy3D.

Al Cini

Macintosh graphics have been trapped in two dimensions for some time. Of course, you can use perspective, shading, and other artists' tricks to produce a three-dimensional scene in *MacDraw* or *MacPaint*. But change the scene's lighting or the observer's position, and it's back to the drawing board. Given the importance of three dimensions in graphics applications from engineering to



architecture to art, it's no surprise that a number of 3-D graphics programs crossed the finish line within a few months of each other. The sudden variety of alternatives leaves would-be bit-map carpenters wondering which of the many offerings to buy. This overview of four 3-D graphics packages—*Mac3D, MacSpace, Easy3D,* and *MacModel*—should help you decide if one of these programs meets your needs.

Three-dimensional drawing software can be applied to two general classes of problems: engineering and graphic arts. Engineers and artists alike need simple and consistent procedures for drawing and editing, tools for creating complex objects, and the means for observing their work from any vantage point, or *camera view,* within a scene. To build faithful scale drawings, engineers need precise measuring and scaling features. Graphic artists probably care more about lighting options and presentation capabilities.

The four programs reviewed here represent something of a price-performance breakthrough: they offer functions and features that until recently were available only to large organizations that could afford sophisticated computer-aided design (CAD) hardware and software. Keep in mind, though, that the difference in price and power between a Macintosh and a Cray X-MP (the machine used to animate the space scenes in the film *The Last Starfighter*) is still enormous and that each of the Macintosh programs trades some loss of accuracy for shorter response time so that you don't have to wait several minutes, or even hours, while your artwork is rotated, reshaded, or redrawn. Consequently, for complex engineering applications these programs can be used only to rough out general ideas in the early design stages. Subsequent details must be modeled on CAD equipment that is larger, faster, and more accurate. Likewise, graphic artists who plan to develop detailed pictures may be disappointed by these packages' inconsistencies in shading and perspective and probably will need to touch up their work in *MacPaint*. Just the same, backyard builders designing decks or sheds, architects sketching initial plans, salespeople presenting product ideas, and artists panning and zooming in search of the most striking view of their work can get help from these affordable tools.

3-D Basics

While they differ substantially in detail, all 3-D graphics programs share some basic functions and features. The three dimensions—width, height, and depth—are traditionally represented by three lines at right angles to each other, called *orthogonal lines.* Objects in three-dimensional space can be positioned with respect to these lines—the *x, y,* and *z* axes.

Once objects are defined, the artist moves or rotates them in all three dimensions and specifies a vantage point from which to observe the objects. To render a 3-D object accurately in a two-dimensional medium like the Mac's screen, artists must be able to view their work from the top, front, and side while moving parts of modeled objects forward, backward, up, down, or sideways. For example, in a side view a cube may appear to be centered on top of a cylinder, while a bird's-eye view reveals that the box is actually off to one side of the cylinder.

Many three-dimensional modeling packages provide libraries of basic objects such as spheres, cubes, and cones. You can stretch, shrink, or otherwise reshape these objects to produce an endless variety of shapes. Merging these shapes with one another creates complex objects that move as a single unit rather than a collection of parts.

From these fundamentals, most 3-D software proceeds in two directions: *wire-frame* models or *solids* models. Wire-frame programs like *Mac3D* and *MacSpace* allow you to construct complex models by defining the lines and corners that form an object's external boundaries. Solid modeling programs such as *Easy3D* and *MacModel* let you build complex objects by combining primitive shapes such as spheres, cylinders, and cubes. The following descriptions, combined with the information in "Four Views of Three Dimensions," should give you a feel for the capabilities of the first generation of Macintosh 3-D graphics software.

Mac3D

Take *MacDraw* into the third dimension and you've got Challenger Software's *Mac3D.* From icons to menus, these programs are very much alike. *Mac3D* offers a palette of basic two- and three-dimensional shapes. You select and construct two-dimensional shapes in much the same way as with *MacDraw,* but as you create 3-D objects, an imaginary box surrounds the object, indicating its depth, height, and width. At the click of the Depth button, a dialog box asks you to define the front-to-back size of the object in inches, centimeters, or *world coordinates*—the basic unit of measurement in a *Mac3D* scene, corresponding to 1/72 inch. Once created, the 3-D object can be moved, duplicated, and reshaped in the plane of the Mac screen just like *MacDraw*'s 2-D objects, but you can pull down *Mac3D*'s Arrange menu to add the third dimension.

When you ask *Mac3D* to rotate a selected object, the program's Rotate dialog box presents a unique circular scroll bar and three buttons (see Figure 1). Click the Spin button and then move the scroll circle to rotate an object clockwise or counterclockwise, or use the Left-Right or Up-Down button to turn it to one side or upside down. You can specify exactly how many degrees to rotate an object or click arrows under the scroll bar to reposition the object in one-degree steps. After you move an object, you can study its new position before making it permanent in a drawing.

The Setup Camera command allows you to position yourself within the *Mac3D* world to observe your work from any angle. Scroll bars allow you to move your "camera" in all three dimensions or orbit a selected object to see it from any of six sides. The ability to orbit an object while you build or change it is handy,

(continues on page 98)

Four Views of Three Dimensions

	Mac3D	MacSpace	Easy3D	MacModel
Object Generation				
Axial rotation (lathe)	No	Yes	Yes	No
Polygonal prism	Yes	Yes	Yes	No
Solids union, intersection, subtraction	No	No	Yes	Yes
Lateral symmetry (mirror image)	No	Yes	No	No
Library of objects or primitives	Yes	No	Yes	Yes
Object Manipulation				
Stretch, enlarge, reduce	Yes	No	Yes	Yes
Edit edge, face	Yes	Yes	No	No
Edit vertex	Yes	Yes	No	Yes
Move/rotate objects	Yes	No	Yes	Yes
Align objects	Yes	No	No	Yes
Object Measurement				
Overall dimensions	Yes	Yes	No	Yes
Length of edge	Yes (real)	Yes (real or projected)	No	No
Perimeter/area of face	No	Yes	No	No
Mass & volume	No	No	No	Yes
Object Presentation				
Shading	96 pen & fill patterns	None	Adjustable ambient, 4 spotlights	Adjustable ambient, 1 spot per view
Simultaneous views	1 camera view	Top, front, side, camera	Top, front, side, camera	Top, front, side, camera
Perspective (vanishing point)	Fixed	Fixed	Variable	Fixed
Hidden lines & surfaces	Yes	No	Yes	Yes
Text	Yes	No	No	No
Output to Imagewriter	Multipage per scene	Single page per scene	Single page per scene	Multipage per scene
Output to LaserWriter	High resolution	Low resolution	Low resolution[1]	Low resolution
Output to plotters	No	Yes	No	No
Other Characteristics				
Memory & hardware requirements	512K, external drive	512K	512K	128K
Works with Switcher	Yes	No	Yes	Yes
Paste from MacDraw & MacPaint	Yes	No	No	No
Cut, copy, paste within program	Yes	No	Yes[2]	Yes
Copy protection	No	Hardware key	No	No

[1] A special procedure for producing high-resolution, hidden-line wire frames is included in a *MacWrite* file on the program disk.

[2] *Easy3D* supports these functions, but not under the Edit menu. Instead, File menu selections move objects from one model to another or transfer bit maps to *MacPaint*.

Four Views of Three Dimensions
This table summarizes the features of four 3-D modeling programs, offering a quick comparison. Upgrades to several of the programs are in the works; contact the manufacturers for details.

(continued from page 96)

but it would be even more convenient to have the simultaneous top, side, and front views that the three other programs allow.

Shapes available in *Mac3D*'s palette include rectangular and polygonal prisms, pyramids, cones, cylinders, spheres, and tori (a *torus* is a doughnut shape). You can also define wedge-shaped sections of cylinders, cones, and spheres. The program represents all 3-D objects as connected 2-D surfaces that can be separated from each other with the Unglue command. You can either pull down the Fill menu to shade entire objects or fill each unglued surface of an object with a different pattern and then use the Group command to bind them together. Don't confuse *Mac3D*'s fill patterns with true shading, however, because you can't define an imaginary light source in a *Mac3D* scene to automatically cover a shape with graduated gray tones.

Mac3D is the only program reviewed here that allows you to add text to a drawing. The program supports condensed and expanded type styles as well as a variety of fonts and sizes, all controlled by a text dialog box. Unlike the program's 3-D objects, text can't be moved in three dimensions.

For precision work, the Show Characteristics command displays a dialog box that gives the dimensions of an object's imaginary boundary as well as the length of any edge. Comprehensive editing facilities permit you to round or bevel corners and to reshape, stretch, or combine objects. For final presentation, the Opaque command removes *hidden surfaces,* the lines and planes blocked from view by surfaces in the foreground. However, if you put one object inside of another—running a cylinder through the center of a torus, for example—*Mac3D* doesn't hide surfaces consistently.

You can copy a *Mac3D* drawing into *MacPaint* or *MacDraw* (*Mac3D* also accepts Clipboard material from these programs), you can save a scene in PICT format for transfer to *PageMaker* or other programs that accept PICT files, or you can direct the scene to an Imagewriter or a LaserWriter. A *Mac3D* drawing can take up as many as a hundred 10- by 10-inch pages when printed, and with a few exceptions involving fill patterns, the program fully supports high-resolution LaserWriter output.

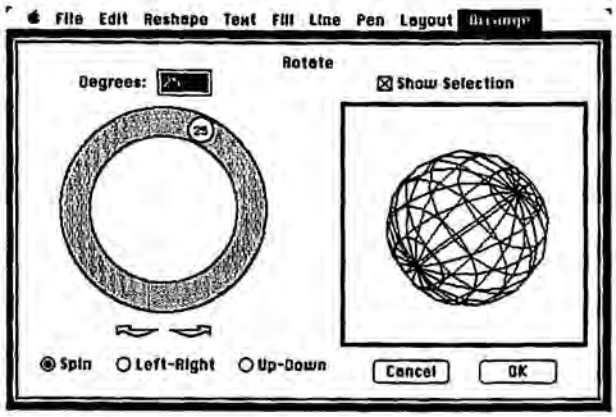


Figure 1
Mac3D's *Rotate dialog box turns a selected object in any dimension in one-degree increments. The object is redrawn in the box at the right after each rotation.*

Will *Mac3D* make *MacDraw* obsolete? For many drafting projects *Mac3D* will suffice, but *MacDraw* still offers unique features like Flip Horizontal/Vertical and Show Size. In addition, *MacDraw* is much faster than *Mac3D,* and unlike *Mac3D, MacDraw* fits in a *Switcher* rotation on a 512K Mac with room left over for *MacWrite* or *MacPaint.*

MacSpace

Another wire-frame package, Abvent's *MacSpace,* offers an advantage over *Mac3D:* as you build or change an object, you can simultaneously see its top, side, and front. As you move an object in one view, you can track and control its progress in the others. Such simultaneous orthogonal views greatly simplify the construction of 3-D objects.

MacSpace's screen is divided into quarters depicting the orthogonal front, top, and side views as well as a camera view (see Figure 2). You can resize the views as you work and fill the entire screen with a single view if necessary. The program offers two icon palettes: the left side of the screen displays a palette of shapes, and the right side displays functions for editing pictures. You might start a scene by drawing a two-dimensional polygon in one of the views and then building the polygon into a prism or a pyramid by adding new surfaces.

MacSpace also permits the creation of *radially symmetrical* objects, which are generated in much the same way as a carpenter shapes a table leg on a lathe. After positioning a horizontal or vertical axis in one of *MacSpace*'s views, you rotate a polygon around the axis to form a solid. Using this feature, you can define not only rough or smooth spherical, cylindrical, and torus shapes but almost any imaginable irregular shape as well. As in other 3-D programs, objects with a large number of surfaces look smoother, but they take longer to draw.

For designers who need precision measurement, *MacSpace* reports the lengths of the edges of an object in any view and calculates the perimeter and area of any surface. You can work in either metric or English units.

MacSpace offers a variety of picture editing alternatives, but here some serious drawbacks surface. *MacSpace* drawings consist of a network of connected faces and edges rather than identifiable objects such as spheres or cubes. Constructing an object is akin to building a house of cards. When you select and move part of a picture, unrelated parts often move with it. You must painstakingly manipulate an object—often in more than one orthogonal view—to move even simple parts of a picture. In addition, a move operation requires that you specify not only the destination of the selected object but also where it's being moved from;

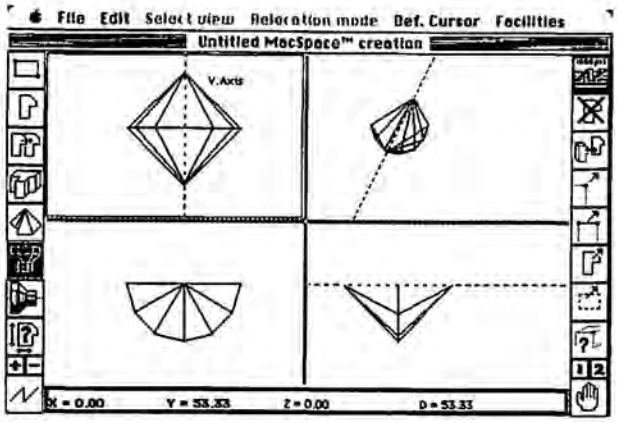


Figure 2
MacSpace *simultaneously displays four views of an object. The object shown here was generated by turning a triangle 180 degrees around a vertical axis.*

the extra step of specifying an object's current location is a nuisance.

MacSpace's user interface problems range from annoying (the Print command is under the Edit menu rather than the File menu) to serious (Cut and Paste don't work with the Clipboard). The Copy command puts a bit-map representation of the screen in the Clipboard, but Cut and Paste work only with the Scrapbook and have no effect within *MacSpace*. You can transfer a drawing to *MacPaint*, but you can't move parts of a picture from one *MacSpace* model to another. This means you can't assemble a clip-art library of frequently used *MacSpace* structures; every time you need a wheel, you have to reinvent it.

The program has other drawbacks. The current version of *MacSpace* offers no hidden-surface capability; models always take the form of transparent wire frames. If you want to shade a picture or hide some lines, you must transfer the drawing to *MacPaint*. *MacSpace* was developed in France, and to its translator's credit the English documentation is fairly readable. Unfortunately, a number of technical terms apparently didn't survive the translation, so the parts of the manual dealing with advanced modeling features are often confusing or misleading.

When you are ready to print a document, *MacSpace* limits you to a one-page picture of the currently selected screen view and doesn't support high-resolution output to the LaserWriter. Unlike the other programs reviewed, however, *MacSpace* pictures can be directed to a plotter with variable output scaling (that is, one that can resize the image to fit the plotter's paper size).

Easy3D

Easy3D, from Enabling Technologies, lets you sculpt objects on the Mac's screen. Starting with simple shapes—cones, cubes, spheres, and tori—you can either weld objects together or carve away sections to create new objects. You can also craft your own shapes using the program's lathe and jigsaw. Unlike *Mac3D* and *MacSpace* objects, *Easy3D* objects are bathed in light from several adjustable sources, and their surfaces are shaded accordingly.

You create complex shapes by combining simple shapes, or *primitives*. For example, you can position a cube and a cylinder so that they occupy the same space, then select both objects and choose the Enter Merge command. Within the merge function you can select the cylinder, set it to Anti-Matter, and execute the merge operation. *Easy3D* subtracts the volume of the cylinder from the volume of the cube, leaving a hole through the middle of the cube. Merging two "matter" objects combines the objects into a solid shape, while merging two "anti-matter" objects forms an object where they intersect. Merging various matter and anti-matter objects makes for endless possibilities, but *Easy3D* doesn't stop there.

You can also generate radially symmetrical objects, like a candlestick or a wine bottle, with the program's lathe tool, and polygonal prisms, like puzzle pieces, with the jigsaw tool. You can merge objects created on the lathe or the jigsaw with other objects to create intricate objects or scenes. The manual describes how to create a complex form, like an automobile or an airplane, by rotating and merging its jigsawed top, side, and front views.

There's no beating *Easy3D* for drama. You can define up to four light sources, each of varying intensity, and adjust the ambient lighting. *Easy3D* automatically redraws objects, shaded according to the changes in lighting, with striking visual effects (see Figure 3). You can zoom the camera view in and out and pan from side to side or up and down. Remember, though, that the time it takes to shade and redraw an object increases with the number of surfaces that make up the object. Ambitious *Easy3D* drawings may take more than a minute to redraw.

You can print a single-page drawing on an Imagewriter or a LaserWriter, but *Easy3D* doesn't yet support the LaserWriter in high-resolution mode (an addendum to the documentation describes a procedure for printing high-resolution, hidden-line wire frames on the LaserWriter, however).

Unfortunately, you can't measure objects in *Easy3D*. You can stretch and squeeze selections in any dimension or expand or shrink them proportionally, but only by relative percentages. *Easy3D* therefore makes a terrific graphic artist's tool but has limited value for builders.

MacModel

Another solids modeling package, *MacModel* from A.P.P.L.E. Co-op, lacks *Easy3D*'s lighting options, lathe, and jigsaw but allows you to specify an object's mass as well as its size. *MacModel*'s speckled shading is not as crisp and visually appealing as *Easy3D*'s shaded surfaces, but *MacModel* makes up for its relatively fuzzy pictures with measurement and scaling features.

Like *Easy3D*, *MacModel* builds complex solids from primitives by adding, subtracting, and intersect-

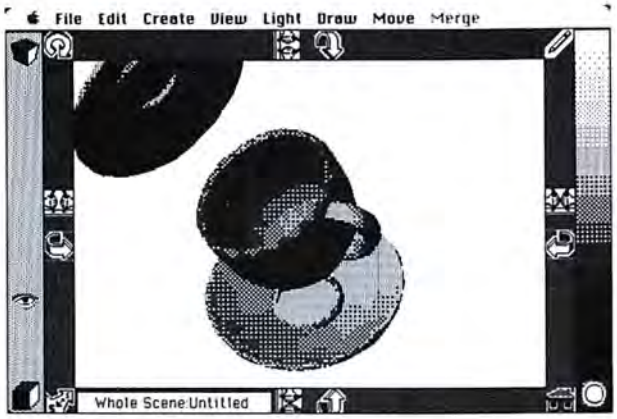


Figure 3
The cup and saucers were created on Easy3D's *lathe, positioned in space, and rotated at various angles. Then the lighting and the viewer's position were adjusted.*

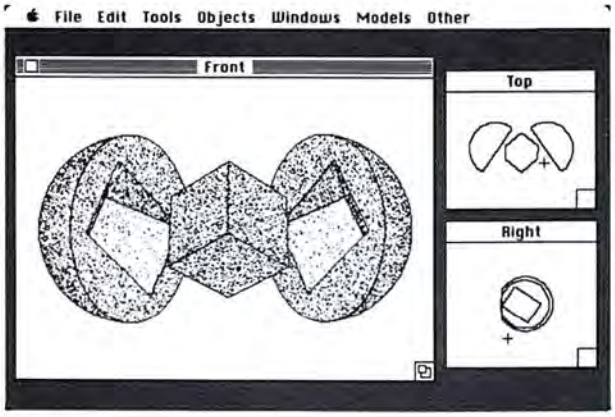


Figure 4
MacModel *lets you view objects from the front, top, and right. The program draws outlines or shaded objects and measures an object's length, height, width, mass, and volume on request.*

ing them (see Figure 4). Double-clicking the result generates a dialog box reporting the new object's length, width, and height, along with its mass (in density units rather than pounds) and volume. A builder can use *MacModel* to create a concrete driveway slab 10 feet by 30 feet by 6 inches, and the program reports the number of cubic feet of concrete required to pour it. The builder can also calculate the weight of the poured slab from the reported mass.

The dialog box displays the largest values found in each dimension; users must estimate the measurements of irregularly shaped objects. If you were measuring a Macintosh, for example, *MacModel* would report the height at the front of the machine without taking into account the downward slant toward the back.

MacModel allows you to align the bottoms or sides of objects, so you can properly position the posts of a picket fence, for example. A unique radial alignment option arranges objects in a circle; if the objects happen to be aligned vertically to begin with, subsequent circular alignment arranges them into a 3-D spiral staircase.

The ability to create several simultaneous camera views of a 3-D scene, each with its own variable-intensity spotlight, is another unique *MacModel* feature. Like the other 3-D programs, *MacModel* lets you print drawings on the Imagewriter or the LaserWriter.

Drawing Conclusions

If you're a graphic artist, *Easy3D* will impress you with its ease of use and visual impact. If you're a builder or a designer, you can use *Mac3D* to create 3-D line drawings with precisely measured edges and surfaces. *MacSpace* still has a good deal of maturing to do, but it offers some features, such as radial object generation, that are crucial in certain types of architectural applications. *MacModel* combines the hidden-surface solids capabilities of *Easy3D* with some of *Mac3D*'s precision measurement, and in some applications the program's ability to calculate an object's mass and volume may outweigh its lack of a lathe and its fuzzy display. Considering their low prices—most of these packages sell for less than $200—it's not hard to imagine collecting a few of them to form a general-purpose 3-D program library. □

Al Cini is president of Computer Methods Corporation, a consulting firm based in Marlton, New Jersey.

Easy3D, version 1.00
Enabling Technologies, Inc.
600 S. Dearborn #1306
Chicago, IL 60605
312/427-0408
List price: $99

MacModel, version 3
A.P.P.L.E. Co-op
290 S.W. 43rd St.
Renton, WA 98055
800/426-3667, 206/251-5222 in Washington
List price: $50

Mac3D, version 1.0
Challenger Software Corp.
18350 Kedzie Ave.
Homewood, IL 60430
312/957-3475
List price: $195

MacSpace, version 1.0
Abvent
9903 Santa Monica Blvd. #268
Beverly Hills, CA 90212
213/659-5157
List price: $395

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External or internal? SCSI or serial? MFS or HFS? A review of five hard disks helps you come up with the answers

Hard Decisions

Jim Heid

In the past, the Mac had to be coerced into cooperating with hard disks. Today, Apple's Hierarchical File System, new ROM, and the Macintosh Plus's SCSI interface open the door to a brighter future for Macintosh mass storage. But these improvements also add important new considerations for hard disk shoppers.

With the introduction of the Macintosh Plus and Apple's new hard disk, a new set of technological developments was quietly ushered into place. Heralded by puzzling new acronyms such as *HFS* and *SCSI,* these developments were significant because they affected the speed and the filing efficiency of Macintosh hard disks—both sore spots in the performance of early Mac hard disks.

While HFS, new ROM, and the SCSI interface are welcome improvements to the Mac, these enhancements make shopping for a hard disk more complex (see "The SCSI Alternative" and "Folders and Partitions"). If you have an original Mac, you can upgrade the logic board and buy an external SCSI drive, or you can buy an internal drive or a serial external drive. If you choose a serial drive, will you run it under HFS or use the original Macintosh File System (MFS)? If you have a Mac Plus, do you want a HyperDrive, which still attaches directly to the microprocessor, or an internal or external SCSI drive? And is your software compatible with HFS?

Because the Mac hard disk world is evolving, this review compares a mix of internal and external drives, some running under MFS, some under HFS using the new ROM, and some under HFS using the old ROM. In the internal category, I examined General Computer's HyperDrive 20, Levco's OverDrive, and Micah's MicahDrive AT. In the serial external arena, I tested Paradise's Mac 10 and Personal Computer Peripherals' MacBottom. The vital statistics of all these products are listed in "Hard Disks at a Glance."

Direct comparisons between hard disks aren't always fair. Serial drives are slower than internal or SCSI units and require special startup floppy disks. And HFS loaded into memory and used with the old ROM is slower than it is with the new ROM, which contains HFS and other performance-boosting improvements. Because of these variables, you shouldn't ask which unit is the best, but which is the best for your equipment, budget, and needs. In the end, all five drives work well, and any one is a convenient alternative to floppy disks.

HyperDrive 20

For over a year the HyperDrive was a Ferrari on a race track with VW bugs. Because the HyperDrive attaches directly to the Mac's microprocessor, it had a speed advantage no external drive could match. Now that SCSI drives are here, General Computer's days of owning the speedway are over. But the HyperDrive still comes with the most complete set of utility software of the hard disks I've used. At this writing, the HyperDrive is not compatible with the Macintosh Plus or with Apple's new ROM. However, I saw a prototype HyperDrive running swiftly and reliably in a Mac Plus at General Computer's offices. This new HyperDrive, which may be available by the time this review appears, is designed to be compatible with all Macs except the 128K.

The HyperDrive Manager utility lets you create partitions, called drawers. I examined a prototype HyperDrive Manager compatible with the HFS that lets you create HFS or MFS partitions. Although HFS is intended to make partitions unnecessary, the ability to create them adds flexibility. For example, if several people share

the same hard disk, each can have his or her own partition and not worry about other people inadvertently removing important files or folders.

The HyperDrive approach is unique in that it frees you from having to decide in advance the size of a partition. Instead, the HyperDrive system software automatically expands or contracts a volume as you add or remove files. This approach makes working with partitions exceptionally convenient and eliminates the annoyance of having to adjust a volume when you receive a "disk full" error message.

The HyperDrive backup utility lets you copy entire drawers, single files, or only those files created or modified since the last backup. HyperDrive lets you trace backup history as well—an important task that otherwise becomes increasingly difficult as a hard disk fills. You can view or print reports that show when files and drawers were last backed up and restored. You can also compare backup disks with the HyperDrive's contents and receive warning of uncopied files or files that don't match.

In addition to assigning passwords to volumes, you can encrypt individual files to keep co-workers from accessing sensitive data. The HyperDrive also comes with a print spooling utility that uses part of the hard disk to store data destined for the printer, allowing you to use the Mac for other tasks during printing. Finally, the HyperDrive 20 ran reliably and was compatible with all the applications and utilities I tested.

OverDrive

Levco is best known for its MonsterMac memory upgrade, which provides up to 2 megabytes of memory, improved performance, and an expansion connector for attaching additional devices (see "Megabytes and Beyond," *Macworld,* February 1986). Levco's 2MX board is the latest version of the MonsterMac and differs from its predecessor mainly in that it clips onto the Mac's 68000 instead of requiring logic board modifications that void Apple's warranty. The 2MX works with both 128K and 512K Macs.

Levco's OverDrive is an internal hard disk designed for 2MX- or MonsterMac-equipped Macs that contain Apple's disk drive upgrade (an 800K internal floppy drive and the new ROM). The OverDrive also works with Levco's Super 20 upgrade, which adds a high-speed 68020 microprocessor to the Mac or the Mac Plus. At this writing, OverDrive doesn't work with the Mac Plus without a Super 20, though Levco plans to offer a Mac Plus version.

The OverDrive includes a 20-megabyte internal hard disk and a SCSI hard disk controller that attaches to the 2MX, MonsterMac, or Super 20 board. I tested the OverDrive installed in a Mac with a 2MX board and Apple's new ROM. The performance-boosting benefits of the 2MX board combined with the new ROM enabled the OverDrive to beat its competition in my disk-access test.

Levco does not provide any special manager software with the OverDrive. As with Apple's HD 20, the OverDrive uses HFS for file management and cannot be partitioned into volumes. If you want to divide a drive into a mix of HFS and MFS volumes, the HyperDrive or MicahDrive would be a better choice among internal hard disks.

A more significant deficiency is that the OverDrive includes no backup software. Levco representatives claim that the OverDrive will work with HFS-compatible backup utilities designed for SCSI disk drives. When this article went to press, no such programs were available, so I was unable to test the claim.

You can buy the OverDrive and a MonsterMac or 2MX board already installed in the Mac through Levco dealers, or you can purchase a kit directly from Levco. Either choice offers impressive performance. Loading Lotus's *Jazz* in 6 seconds and then seeing that 1911 bytes remained after I chose About Jazz made me feel like I had just settled into the latest Porsche with nothing but open road ahead. While my evaluation period was too brief to declare the system completely compatible, I successfully ran popular business applications as well as system-intensive utilities such as *Fedit* 3.5, *Copy II Hard Disk* 4.51, and *ResEd* .8. And the OverDrive appears to be durable: it was the only internal hard disk of the three I tested that survived cross-country shipment in the Mac's original carton.

While high-performance upgrades like General Computer's HyperDrive 2000 and Levco's Super 20 may best the performance of the OverDrive and 2MX combination, chances are the latter has fewer compatibility problems, since it doesn't change the speed or the type of the Mac's microprocessor. If you simply want to add a hard disk to a Macintosh without upgrading the ROM and adding a Levco memory upgrade, you should consider one of the other drives. Similarly, if you want the additional flexibility that partitioning software provides, the HyperDrive or MicahDrive would be a better choice. For 2MX-, MonsterMac, or Super 20-equipped Macs with new ROM, however, OverDrive is an excellent choice, provided that an OverDrive-compatible backup utility is made available.

MicahDrive AT

Another worthy contender in the internal drive field is Micah's MicahDrive AT 20, a SCSI drive that works with the new or old ROM and with 512K Macs as well as the Mac Plus. With the new ROM, the MicahDrive AT runs under HFS, but you can create MFS partitions. For Macs with the original ROM, the MicahDrive can be configured to start from the hard disk and load HFS into memory.

The MicahDrive comes with a backup utility that, like the HyperDrive's, lets you copy the entire hard disk or back up just the files that have been modified since a specified date. Unlike the HyperDrive backup application, the utility recognizes wild-card characters, so you can back up a set of related files that have identical text as part of their names. The program's Trace Only command lets you verify backup criteria before proceeding. And OverDrive owners take note: a Micah representative says the firm plans to sell the backup utility as a separate product for other SCSI drives. The MicahDrive also includes a print spooler desk accessory and a password-protection desk accessory that, like HyperDrive's Security program, will enable you to encrypt files or folders. During my tests, the MicahDrive performed swiftly and reliably and worked with all the applications and utilities I fed it.

MacBottom

Serial drives like Personal Computer Peripherals' MacBottom lack the speed and direct startup convenience of newer hard disks, but they still provide an important alternative. If your 512K Mac has the original ROM, the MacBottom is a relatively eco-

The SCSI Alternative

Many hard disks can transfer data at speeds of 5 million bits per second, but they slow their pace to between 700,000 and 900,000 bits per second to communicate with the Mac through the serial port. While external hard disks are faster than the Mac's floppy disk drives, the serial port bottleneck means they can't realize their full potential. Moreover, serial hard disks require a special startup floppy disk that tells the Mac a hard disk is connected; most other computers can start directly from the hard disk.

The Mac Plus erased the serial port drawbacks with a high-speed expansion port based on the Small Computer Systems Interface (SCSI, pronounced "scuzzy"). The SCSI port transfers data at six times the speed of a serial port, while the new, HFS-equipped ROM lets the Mac start directly from a hard disk. In addition to the Levco and Micah hard disks evaluated in this review, several SCSI hard disks were announced at the Macworld Expo in January 1986. A list of these unreviewed drives follows. Some products are available in various storage capacities; for comparison purposes, however, only the price of 20-megabyte drives is listed here, except when a given product is unavailable in a 20-megabyte model.

DataFrame
SuperMac Technology
1901 Old Middlefield Way
Mountain View, CA 94040
415/964-8884
List price: $1299

HD-20
MDIdeas, Inc.
1111 Triton Dr. #205
Foster City, CA 94404
415/573-0580
List price: $1095

LoDown-20
LoDown
P.O. Box 5146
Pleasanton, CA 94566
415/426-1747
List price: $995

PL-20, MacFast
Peripheral Land
3677 Enochs St.
Santa Clara, CA 95051
408/733-7600
List price: PL-20 $1195, MacFast $1595

SlimLine Series
Univation
1231 California Circle
Milpitas, CA 95035
408/263-1200
List price: $1695

Bernoulli Box
Iomega Corp.
1821 West 4000 South
Roy, UT 84067
801/778-1000
List price: $3095

DiskPlus
3Com Corp.
1365 Shorebird Way
P.O. Box 7390
Mountain View, CA 94039
800/638-3266, 415/961-9602
List price: 70MB model $4995

AST 4000
AST Research, Inc.
2121 Alton Ave.
Irvine, CA 92714
714/426-3866
List price: 74MB model $6995

Sun Streak
Sunol Systems, Inc.
1177 Quarry Ln.
Pleasanton, CA 94566
415/484-3322
List price: 25MB model $2995

nomical way for you to use HFS, since no ROM or logic board upgrade is needed. Its retail price is roughly the same as the HD 20's (though the MacBottom often sells for substantially less), and MacBottom is smaller and includes backup, spooling, and partitioning utilities that Apple's drive lacks. (A spokesperson for Personal Computer Peripherals said the company plans to release a SCSI upgrade for MacBottom by summer.)

The MacBottom also offers more file system flexibility than Apple's hard disk. Like the HyperDrive and MicahDrive, the MacBottom can be partitioned into a mix of HFS and MFS volumes. The disk runs under either file system, depending on whether you start it with the HFS or MFS floppy disk, and HFS can access MFS volumes. And while the MacBottom lacks the HyperDrive's automatic volume resizing feature, you can resize volumes manually, a feature that Paradise's Mac 10 lacks.

My review unit performed well, though it was loud even for a hard drive.

Paradise Mac 10

The Paradise Mac 10 is another capable contestant among serial hard disks. Paradise offers a 20-megabyte version called the Mac 20, but I tested the Mac 10. The Mac 10's disk access isn't as fast as the MacBottom, and its system software isn't as convenient. But the unit is reliable, compact, and inexpensive. Some mail-order houses sell the Mac 10 for under $800, making it one of the least expensive tickets to Mac mass storage, especially for Mac owners who don't want to spring for the Apple logic board upgrade required to run external SCSI drives.

(continues on page 107)

Hard Disks at a Glance

	Hyper-Drive 20	OverDrive	Micah-Drive AT	MacBottom	Paradise Mac 10
Hardware					
Mac connector used	none	none	none	serial	serial
Spare connector provided	—	—	—	yes	yes
Start from hard disk	yes	yes	yes	no[1]	no[1]
Capacity of unit tested (megabytes)	20	20	20	20	10
Subjective sound rating	quiet	quiet	quiet	loud	medium
Software					
Requires new ROM	for HFS	yes	for HFS	no	no
Allows separate HFS volumes	yes	no	yes	yes	yes
Allows separate MFS volumes	yes	no	yes	yes	yes
Method of volume resizing	automatic	—	none	manual	none
Volumes available at startup[2]	any	1	all	6	all
Backup application	yes	no	yes	yes	yes
Disk test application	yes	yes	yes	no	yes
Volume password protection	yes	—	no	no	no
File and folder encryption application	yes	no	yes	no	no
Disk cache provided	yes	yes	yes	HFS only	yes
Print spooling provided	yes	no	yes	yes	yes
Performance					
ROM used in testing	old for MFS new for HFS	new	new	old	old
Startup to Finder (MFS)	:17	—	—	:28	:21
Startup to Finder (HFS)	:12	:12	:10	:34	:33
Open MacWrite document from Finder (MFS)	:11	—	—	:18	:18
Open MacWrite document from Finder (HFS)	:11	:11	:11	:13	:15
Save MacWrite document (MFS)	:22	—	—	:27	:33
Save MacWrite document (HFS)	:18	:19	:21	:25	:32
Quit MacWrite to Finder (MFS)	:12	—	—	:13	:10
Quit MacWrite to Finder (HFS)	:07	:07	:07	:10	:12
Create 1250K file in BASIC (MFS)	5:13	—	—	6:03	6:35
Create 1250K file in BASIC (HFS)	3:58	3:32	3:56	5:11	6:00

[1]The startup floppy disk automatically ejects and transfers control to the hard disk partway through the startup process.

[2]*Any* indicates that the hard disk can mount the volumes that were mounted before the previous shutdown. *All* means that you can use a volume manager (or precede each volume name with an asterisk, in the case of the Mac 10) to indicate which volumes you want mounted at startup. The Levco OverDrive uses no partitioning software, so only one volume—the entire hard disk—is available. Remember that the number of volumes that can be mounted depends on the size and contents of each and on available memory.

(continued from page 105)

The Mac 10 can sit next to the Mac, or unlike the MacBottom, it can be put under a desk and out of earshot. As with the MacBottom, you can run the Mac 10 under either HFS or MFS by using different startup disks. You can create HFS or MFS partitions, but unlike the MacBottom partitions, Paradise partitions cannot be resized. If you fill a partition, you must create a larger partition, copy the files to it, and then delete the first partition—a time-consuming process.

The way Mac 10's print spooling feature manages disk space is comparatively inconvenient. You must reformat the entire hard disk to change the amount of disk space reserved for spooling, and determining the most efficient size for your needs takes a lot of trial and error.

The Mac 10's automatic volume-mounting feature is less useful than that of other disks I tested. The managers supplied with both the MacBottom and the MicahDrive let you specify which volumes appear on the desktop at startup. The HyperDrive manager's approach is better still, offering the option to simply mount all volumes that were active when you last shut down. With the Mac 10, however, you have to mark a volume for automatic mounting by beginning its name with an asterisk. Not only does this approach result in odd-looking volume names, but it could be a source of aggravation for programmers who code volume names directly into their programs.

The Mac 10 is no speed demon, and it lacks sophisticated systems software, but the product is a faithful performer. The first version of the volume-mounting desk accessory contained a minor bug that occasionally kept the spooler from working properly, but in version 2.0 the problem was fixed. If you're looking for an economical way to expand your Mac's mass storage and can live without some of the competition's conveniences, the Mac 10 is a good choice.

Performance Compared

To time the drives' performance, I used a set of four floppy disks filled with 73 files in 10 folders, a mix of applications and documents—roughly 2 megabytes' worth. For each drive, I removed everything except the hard disk's System Folder. Then I copied the files on the floppy disks to the hard disk in the same order each time to ensure that the files' positions were as similar as possible. Except for volume-mounting desk accessories, which varied in size or weren't present on some products, all hard disks contained the same fonts and desk accessories. No disk-caching was used. The *MacWrite* file was a 28-page, single-spaced document that used 66K of disk space.

Hard disks can be faster, more economical, and more efficient than in the past.

Because the HyperDrive, the Mac 10, and the MacBottom can run under either HFS or MFS, I conducted the performance tests using both file systems. The MicahDrive can run under MFS on Macs with the old ROM, but my evaluation unit came equipped with the new ROM.

The system software of the Levco OverDrive, the MicahDrive AT, and the HFS-compatible HyperDrive 20 I tested was in prerelease form. The performance of the final versions may differ slightly if the system software is revised. The exact times of any tests will vary depending on the hard disk's contents and on the applications used for testing, so these figures should be used for comparison purposes only.

The most important conclusions to be drawn from these results is that the performance variation between the three internal drives I tested is minor, that the new ROM improves system performance, and that extensive disk access (as with the BASIC program) is faster under HFS and with Levco's OverDrive, thanks to the performance-boosting benefits of the latter's 2MX memory board.

Consider the Options

Your first decision when choosing a hard disk should be whether you want an internal or external drive. Internal units offer portability and space-conservation advantages, as well as significant speed advantages for Macs without a SCSI port. Their drawbacks are that they can't be unplugged and moved to another Mac, and they can be damaged during shipping; repairs usually mean parting with your Mac. External drives also permit you to leave the drive at the office when you want to take your Mac to a quiet setting where a hard disk's noise may be more obtrusive.

In the external drive category, you must decide between a serial or SCSI unit. Mac Plus owners should consider SCSI drives for the speed advantage they have over serial units. Starting with a 512K Mac, you can upgrade the logic board and buy an external drive, or you can forego the upgrade and buy an internal drive or an external serial unit. The latter two options depend on your budget: a serial drive costs less and still lets you run HFS, but it doesn't provide the speed and startup convenience of an internal drive. Also keep in mind that some internal drives require the new ROM in order to run HFS. It may be cheaper to upgrade the logic board and buy an external SCSI drive than to upgrade the ROM and buy an internal unit. If you have a 128K Mac, you're limited to an external serial drive; consider a memory upgrade before buying a hard disk.

For sheer speed and memory, the Levco 2MX and OverDrive combination is hard to beat, though General Computer's forthcoming HyperDrive 2000 and Levco's MacSuper 20 also warrant consideration. If extra memory isn't important, consider the HyperDrive or the MicahDrive. The HyperDrive's strengths are speed, flexible volume sizing, password protection, and the quality of its utility software. General Computer's forthcoming *HyperNet* will let you use a HyperDrive as a network file server, but similar products are in development for SCSI hard disks. The MicahDrive's approach to partitioning isn't as flexible, but the drive is fast and worked well with all the programs I tested.

(continues on page 108)

Folders and Partitions

When Apple's Hard Disk 20 debuted last year, it was accompanied by new system software that took the folder concept beyond the cosmetic level provided by previous Finders. The new disk management software, called the Hierarchical File System (HFS), lets you view, open, and close folders from within applications (see "A Hierarchy and 20 Megabytes," *Macworld,* January 1986). Before HFS, several hard disk models came with disk partitioning software to provide more efficient use of a hard disk's capacity. But disk partitioning wasn't an ideal approach because it didn't allow you to organize files within each segment, or volume. Instead of a hard disk volume containing a single directory that stores the names and technical details of the files on that volume, an HFS volume can contain directories within directories, with subordinate directories represented by folders. HFS is built into the expanded, 128K read-only memory (ROM) chips in the Macintosh Plus; it can also be loaded into memory from a floppy disk for use with 512K Macs that have the old, 64K ROM (see "A Change for the Plus," *Macworld,* April 1986).

(continued from page 107)

If you purchase an internal drive, consider taking special care when having it shipped. Two of the three internal drives I tested did not arrive in working condition. Micah made two attempts to ship a working drive before resorting to a heavy-duty case reinforced with metal at the corners and with form-fitting shock absorbent material surrounding the computer. Similarly, the first HyperDrive 20 I received was damaged during overnight shipping before General Computer also resorted to a heavy-duty case. Since both manufacturers' evaluation units survived road trips and my own bump-and-jostle tests, I conclude that the hardware can withstand minor bumps but shouldn't be shipped in the Mac's original box. Otherwise, both the MicahDrive and the HyperDrive were well-designed products.

Determining the reliability of any Macintosh hard disk is difficult. The Mac is more complex than most computers, and certain combinations of software and hardware may cause an otherwise reliable hard disk to fail. For this reason, you should narrow your hard disk search down to the units that offer the most appealing package of features and price, and then ask around at user groups and contact each manufacturer's customer support department to determine whether each drive works with the software and hardware you plan to use.

In the serial league, I prefer the MacBottom to Paradise's Mac 10. The MacBottom is the faster and more compact of the two, and its partitioning software is more flexible. The Mac 10 is a reliable and economical unit that you don't have to keep on your desk, but its inability to resize partitions and the spooler can make it more cumbersome to use. Finally, the Mac 10's separate power supply makes it more difficult to take with you; the MacBottom fits into a briefcase.

There's no doubt about it: choosing a hard disk today is more difficult than it was before the Mac Plus, new ROM, HFS, and SCSI ports entered the scene. But the Mac's new hardware and software allow hard disks to be faster, more economical, and more efficient than before. That's good news for anyone with megabytes to store. □

Jim Heid is a Contributing Editor of Macworld.

HyperDrive 20
General Computer Corp.
215 First St.
Cambridge, MA 02142
617/492-5500
List price: $1699, HyperDrive 10 $1399

OverDrive
Levco
6160 Lusk Blvd. #C-203
San Diego, CA 92121
619/457-2011
List price: 2MX memory upgrade $890 installed, $850 kit; OverDrive hard disk and SCSI controller $1870 installed, $1770 kit

MicahDrive AT 20
Micah, Inc.
15 Princess St.
Sausalito, CA 94965
415/331-6422
List price: $1895

MacBottom
Personal Computer Peripherals Corp.
6204 Benjamin Rd.
Tampa, FL 33614
800/622-2888, 813/884-3092 in Florida
List price: $1495

Mac 10
Paradise Systems, Inc.
217 E. Grand Ave.
South San Francisco, CA 94080
415/588-6000
List price: $999, Mac 20 $1399

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Circle 519 on reader service card

FORTRAN's New Life on the Mac

Emil Flock and Miriam Flock

Microsoft's new FORTRAN proves to be a top performer for engineers and scientists

Pity the poor FORTRAN programmers. Most of them started out 20 years ago weighted down with decks of punch cards that encoded their beloved formulas. FORTRAN, short for formula translator, has always been the province of engineers and scientists who, in the early days of computing, were willing to wait as long as 48 hours to get the results of one program back from a mainframe.

With the advent of personal computers, the FORTRAN programmer's days of waiting were over. One of the newest FORTRANs for the Macintosh, Microsoft's FORTRAN Compiler version 2.1, offers world-class speed without the turnaround time. While it has some problems, Microsoft FORTRAN can be a real boon to serious programmers.

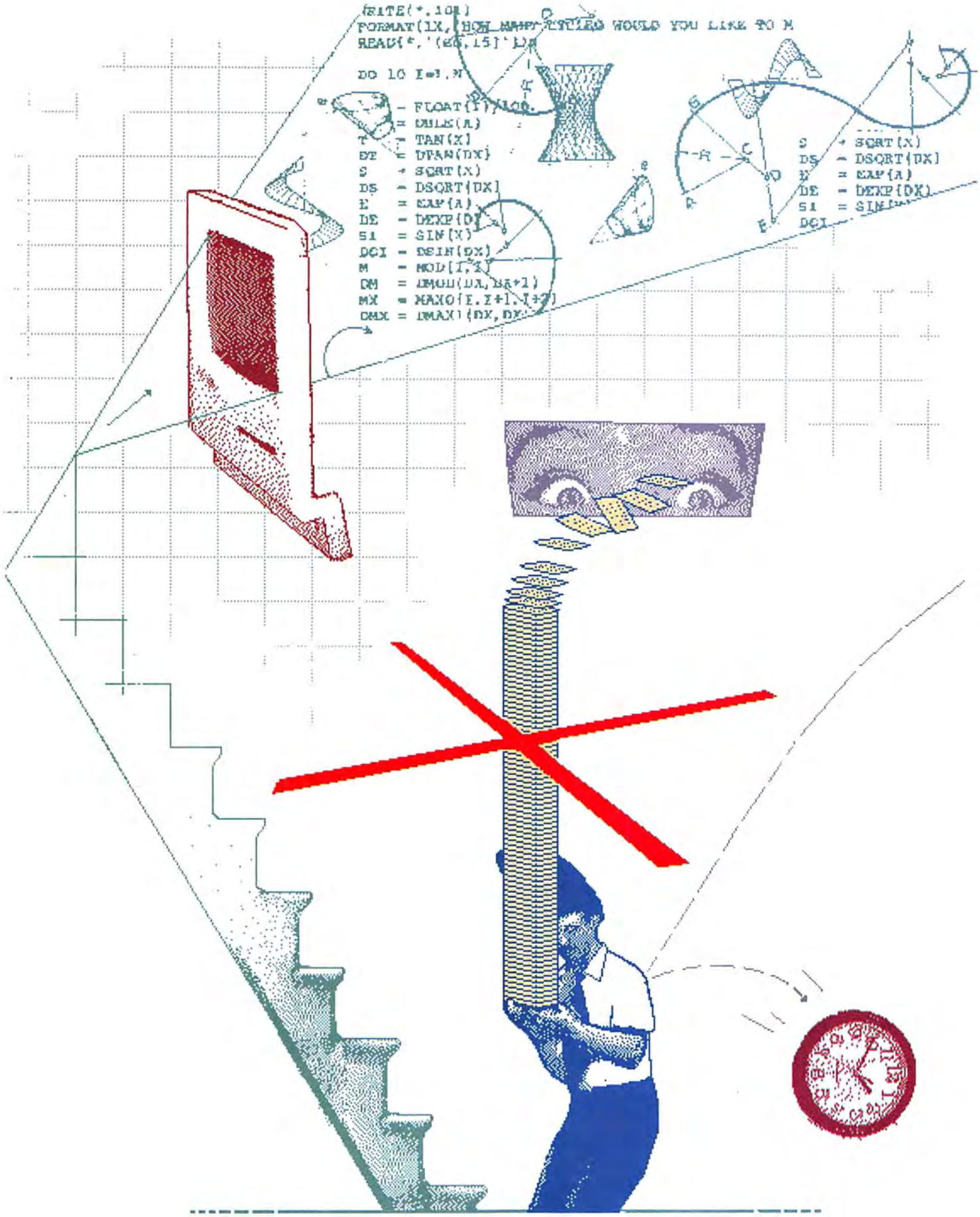
FORTRAN version 2.1 comes from Microsoft even though it was developed by Absoft, of Royal Oak, Michigan. Absoft's first release for the Macintosh was version 2.0. Absoft sold 4000 copies of Macintosh FORTRAN within six months, and its technical support staff was overwhelmed with users asking how to turn on the machine. Absoft was thrilled to get a call from Microsoft, which had promised the Apple University Consortium Program a FORTRAN. After requesting several changes in the language, Microsoft released version 2.1 on August 30, 1985. Version 2.2 had been announced but wasn't available at press time. Microsoft supports the language, and to its credit, Absoft also maintains a technical support line for the Microsoft FORTRAN product.

FORTRAN, unlike BASIC, is not an easy language to use. For example, FORTRAN is case-sensitive. To Microsoft FORTRAN, *slngth* and *Slngth* are two distinct variables. Also unlike BASIC, FORTRAN is "strongly typed," which means the programmer must declare variable types (integer, real, string, boolean, etc.).

More important, FORTRAN is a compiled language, not an interpreted one like most BASICs. When it's running an interpreter, the computer reads and executes the source code line by line. A compiler, by contrast, reads all the source code, checks it for errors, and translates it into object code—a form of machine language that the computer can execute. The advantage of compiling is the speed at which a compiled program executes. Once you get a working program from a compiler, the computer never has to refer to the source code again; such a program is bound to execute faster than its interpreted brethren. Often, however, it takes a lot longer to develop a working program because each time you change the program, you must recompile it before you can run it.

Microsoft FORTRAN consists of six main components on two disks: an editor, a compiler, a library manager, a linker, a debugger, and RMaker (Apple's resource maker). The product also comes with three folders of subroutines, including source code files of sample programs (see Figure 1).

Microsoft FORTRAN runs on the Macintosh Plus, the 512K, or the 128K Mac and requires only 50K of memory. Although it's possible to get by with two floppy drives, you need a hard disk to be truly comfortable. If you're working with the Mac Plus or a Mac with the 128K ROM and Finder 5.1 with the Hierarchical File System, you may have difficulty getting Microsoft FORTRAN version 2.1 to work properly. One fix for this problem is to run Microsoft FORTRAN from a 400K disk drive. This forces the Finder to use the old, flat file system. Microsoft says version 2.2 will run with the Hierarchical File System.


WRITE(*,10)
FORMAT(1X,'HOW MANY CYCLES WOULD YOU LIKE TO M
READ(*,'(BZ,I5)')M
DO 10 I=1,M
X = FLOAT(I)/100.
A = DBLE(X)
T = TAN(X)
DT = DTAN(DX)
S = SQRT(X)
DS = DSQRT(DX)
E = EXP(X)
DE = DEXP(DX)
SI = SIN(X)
DSI = DSIN(DX)
M = MOD(I,2)
DM = DMOD(DX,DX+1)
MX = MAX0(I,I+1,I+2)
DMX = DMAX1(DX,DX+1,DX+2)

Creating the Source Code

Microsoft FORTRAN comes with Apple's standard source code editor, Edit, which is identical to the one provided with Apple's Macintosh Development System. The editor is the cause of Microsoft FORTRAN's most obvious debility: you cannot go directly from Edit to the compiler—you must first return to the Finder. If you have *Switcher* and a 512K Mac, you can load the compiler into one partition and Edit into another. While the editor's Transfer menu includes commands that let you go directly to other modules, there is no command to transfer to the compiler.

Absoft's Peter Jacobson suggested a way around the transfer problem. You can rename the compiler (currently labeled MS FORTRAN) ASM. Then when you are in the editor, select the ASM command from the Transfer menu to go from the editor directly to the compiler.

Although going from the editor to the compiler poses a problem, you can transfer directly back to the editor from the compiler without a hitch. The compiler also accepts source code files created with *MacWrite* or MockWrite (a handy feature for people who have 128K Macs and can't use *Switcher*).

Compiling the Application

Once you get to the compiler, you'll find it fairly convenient to use. And the entire compilation is fast (see "Microsoft FORTRAN Compared").

The compiler makes three passes through the source code program. During the first pass the compiler checks for errors, constructs a symbol table, and generates an intermediate code version of the program. In the second pass the compiler establishes the run-time memory requirements, generates the object code, and resolves most of the backward address references. In the third pass the compiler resolves all of the remaining address references and installs certain numeric constants. Each pass sends messages to the Macintosh screen. If the compiler detects errors, it skips the second and third passes, and an error report appears in the compiler window. This report shows the first line in which each error occurred, the line number, the six characters preceding the offending code, and a message describing the type of error.

The Microsoft compiler fully implements the American National Standards Institute (ANSI) FORTRAN 77 standard, but it also has an ANSI FORTRAN 66 compile-time option for people who have vintage programs they don't wish to convert. As a result, Microsoft FORTRAN is compatible with most mainframe FORTRAN source code.

In addition, many features from the proposed ANSI FORTRAN 8X standard have been implemented. This standard allows you to write structured code with the help of DO WHILE, block DO, END DO, REPEAT, EXIT, and SELECT CASE statements. Local and global variables make it easy to build subroutine libraries.

Microsoft FORTRAN implements single- and double-precision floating-point math according to the Institute of Electrical and Electronic Engineers specifications, as well as direct, 32-bit integer arithmetic.

The compiler generates native 68000 code that is optimized for speed. This code is *reentrant,* which means it is not modified during execution. Reentrant code may be shared by several programs concurrently. The compiler's output is directly executable and position independent (it can be loaded to run almost anywhere in the Mac's memory). Alternately, the compiler produces assembly source code that you can optimize before assembling. If you are not interested in generating assembly source code, you can remove the f77003.fc file to gain more space on the program disk.

The compiler has difficulty coping with limited disk space. When the compiler runs out of space to save its work files, it issues an impolite error message. Once you get this message, you can't run the compiler again until you eject the compiler disk, throw its icon in the trash, reinsert the disk, and throw away the work files by hand. Another annoyance you'll encounter if you don't have a hard disk is the warning box that states, "The startup volume is full. Printing, filing or editing operations may fail."

One nice feature: the Microsoft FORTRAN compiler supports virtual arrays as large as the available disk space. It also lets you create programs of unlimited size, through dynamic linking and overlaying. These techniques allow different routines within a program to occupy the same memory location.

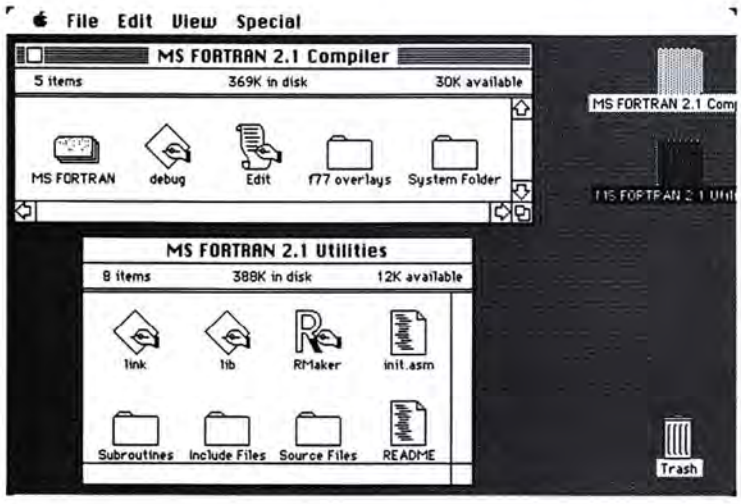


Figure 1
The contents of the two Microsoft FORTRAN 2.1 release disks. The compiler is named MS FORTRAN. Neither disk is copy protected.

Linking Modules

Once you have edited and compiled a number of programs, the linker and library manager help you group them into a longer program. Perhaps "helps" is an overstatement; these programs are the weakest part of the software package, a fact admitted even by Microsoft FORTRAN's developers.

The linker is intended to integrate separately compiled modules into one. Unlike many other compilers, Microsoft FORTRAN creates executable files that don't need linking. You need to use the linker

(continues on page 114)

Microsoft FORTRAN Compared

We ran three different benchmark programs to test Microsoft FORTRAN's number-crunching speed and accuracy (see Table 1). The programs tested were Microsoft FORTRAN version 2.1, Manx's Aztec C compiler version 1.06G, and Microsoft's BASIC interpreter version 2.1 (binary).

As with all such evaluations, our benchmarks are fraught with subtle and not-so-subtle pitfalls. First off, any compiler/interpreter comparison is unfair. But comparisons do give you an idea of execution speeds. Secondly, the languages treat numeric operations differently. Microsoft BASIC makes use of the standard Apple Numerics Environment routines in the Toolbox to do math, but Microsoft FORTRAN and Aztec C do not. Also, Aztec C calculates in double precision whether you want it to or not.

One could easily quibble with the programs we used for benchmarks. We ran the sieve of Eratosthenes that is included with Microsoft FORTRAN as a sample program. The sieve algorithm, which is repeated ten times, finds the prime numbers from 0 to 8192. We also ran a benchmark that tests the speed and accuracy of floating-point calculations (the Savage benchmark modified by Terry Peterson). The modified Savage benchmark tests the speed and root mean square error resulting from a deeply nested calculation. The benchmark calculates the product of $b*b$, where $b = \tan(\arctan(\exp(\log(\mathrm{sqrt}(a*a)))))/a - 1$, and a is incremented from 1 to 2500. Finally, our user-group guru suggested a transcendental function program that calculates the sin, cos, tan, arctan, and log of the numbers from 1 to 10,000.

Of course, each program had to be translated into BASIC and C: More quibbles. How are the compiler options set? Should we use the math library? We tried as best we could to tweak each programming language for speed. But we thought it only fair to force FORTRAN and BASIC to use double precision where appropriate. We did not include the compile and link times for FORTRAN and C; this also skews our comparisons.

As you can see in the table, Microsoft FORTRAN is very fast and accurate. In fact, Microsoft FORTRAN was more than four times faster than Aztec C using the modified Savage benchmark and three orders of magnitude more accurate. But Aztec C is also good, and Microsoft BASIC isn't all that bad, especially for an interpreter.

The speed of Microsoft FORTRAN version 2.1 is impressive. In addition to the existing runtime library (for which Microsoft charges a license fee), Absoft is readying a special runtime library for hardware support of floating-point devices like the Motorola 68881 and National Semiconductor 32081 chips. These math chips are expected to be offered as optional devices by several third-party manufacturers. Number crunchers need not envy Intel users and their 8087 and 80287 math coprocessor chips.

	Times (in seconds)		
	Sieve	Modified Savage (time/rms error)	Transcendental
Microsoft FORTRAN 2.1	6.8	84.3/1.1E-10	108.6
Aztec C 1.06G	3.4	366.6/3.1E-7	1655.7
Microsoft BASIC 2.1	1382.0	96.0/8.1D-13	222.0

Table 1
The results of the three benchmarks. All the benchmarks used double-precision floating-point math. The C program used register variables for speed.

(continued from page 112)

only if you've compiled several modules separately and wish to link them in one executable application.

Like the compiler, the linker requires three passes. But that's after you manage to tell it what to link. While that seems straightforward, any error you make dumps you back into the Finder. That means you must restart the linker—a frustrating requirement, especially when you're halfway through a complicated link. Absoft claims the problem will be fixed in version 2.2.

The library manager groups subroutines together into libraries. Called "lib" on the release disk, the library manager allows you to add, replace, delete, and otherwise manipulate library files.

As with its cohort the linker, the library manager throws you back into the Finder if you make one false step. To avoid this eventuality in both linker and library manager, Microsoft FORTRAN's developers suggest you use the editor to create a script listing the commands you intend to issue. Using the script command, read the script into either the linker or the library manager; this procedure precludes the possibility of typos. However, you won't find any mention of this in the manual.

Debugging the Application

The symbolic debugger is invaluable if you're serious about developing applications. It allows you to single-step through a program and monitor the values of the variables as the program runs (see Figure 2). An arrow points to the line of code being executed. The debugger lets you set multiple breakpoints (places where the program stops); find program labels; skip subroutines; view the source code of other programs; get file status reports; and best of all, modify the values of the variables during the program's execution. With these features, you don't have to keep switching between the editor and the compiler while you are debugging an application.

Apple's resource maker, RMaker, compiles resources (code, icons, menus) into applications. It allows delayed binding of text to an application (useful for foreign-language implementations, because you needn't change source code). Microsoft FORTRAN includes RMaker for fine-tuning the stand-alone applications you write.

Accessing the Toolbox

Microsoft FORTRAN accesses over 500 Toolbox routines in the Mac's ROM, including window management, menu manipulation, and mouse tracking routines. In addition, the QuickDraw routines provide most FORTRAN programmers with graphics capabilities they've never dreamed of. You call the routines with a subroutine or with a function call to the procedure toolbox.sub.

Experienced programmers can learn how to use the Toolbox routines by experimenting with the sample programs included on the utilities disk. Other examples show how to create *MacPaint* files and how to do terminal emulation. Unfortunately, the sample programs aren't much help to the novice.

Documentation

The failure to provide program examples for beginners reflects a general lack of interest in the inexperienced user. The manual is a throwback to the Paleozoic era of computer documentation—you learn to use Microsoft FORTRAN despite the manual, not because of it. At least Microsoft makes no unfulfilled claims; the manual states quite clearly that it is "not a tutorial on FORTRAN."

Microsoft includes a README file on disk to exacerbate your confusion. The documentation will certainly create a rabid market for books on Macintosh FORTRAN. In the meanwhile, *MacTutor* magazine (P.O. Box 846, Placentia, CA 92670, 714/993-9939) carries a monthly FORTRAN column and is a good resource.

Conclusion

Those who have been programming in FORTRAN for 20 years don't need encouragement to buy Microsoft FORTRAN; it'll run most of your old routines on the first try. Programmers intrepid enough to learn a fast "new" language with a few rusty wheels and poor documentation should go ahead and get Microsoft FORTRAN. The faint of heart should back off, but real programmers no longer need keypunch cards. □

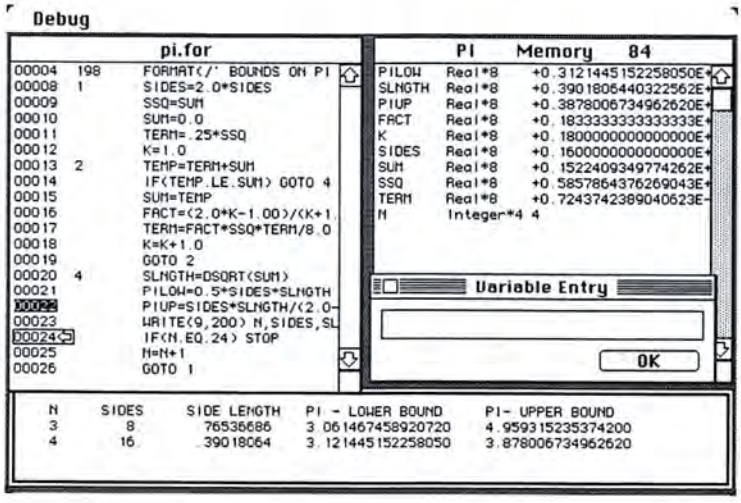


Figure 2
The debugger in full flower. The source code window on the left shows a breakpoint set at line 00022, and the execution arrow points to line 00024. The memory window on the right shows instantaneous values of variables; below that are the variable entry window and a pint-size output window.

▲▲▲▲▲▲▲▲▲▲ *Emil Flock runs Computer Hand Holding, a personal computer consulting service in San Francisco. Miriam Flock teaches journalism and composition at Santa Clara University.*

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Macintosh FORTRAN version 2.1
Microsoft Corp.
16011 N.E. 36th Way
Redmond, WA 98052-6399
206/882-8080

Macintosh Technical Support
Absoft
4268 N. Woodward
Royal Oak, MI 48072
904/423-7587

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The Macro Key to Excel Databases

Danny Goodman

Best known for its impressive spreadsheet prowess, Microsoft Excel's *database capability is its best kept secret.* Excel *can create data-entry forms like those of dedicated database programs. This ability, along with a macro instruction language, greatly simplifies using the program's database functions.*

Data-entry forms have a number of advantages over the standard *Excel* database format. The most obvious is that you can lay out all the data-entry fields in a single screen, whereas the standard format lets you see only about six fields across the screen, depending on the column width and font selected. Forms also let you define more than one field in each column and use wide fields for lengthy entries.

In addition, on-screen forms are easier to use and learn than the regular *Excel* database format, so inexperienced *Excel* users can enter data with little instruction. And because the entry form is a document separate from the database, you can format the form in a large font to make information on the screen easier to read.

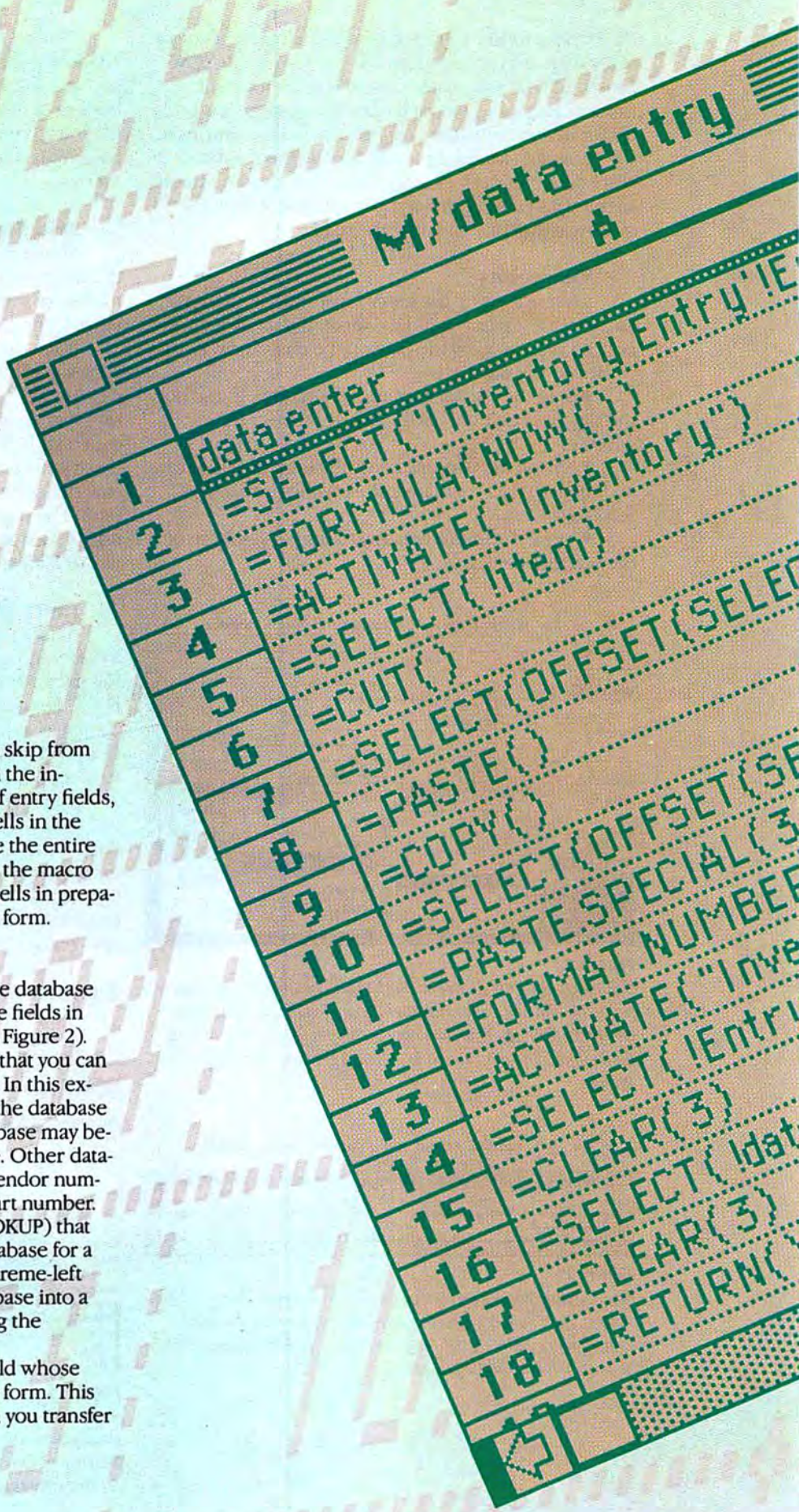
The following example gives you an idea of how to develop an *Excel* database using data-entry forms. The inventory system in this example consists of three documents: an entry form, a database, and a macro. The form is merely a vehicle for entering information—it doesn't store data, so you can't search in it or retrieve data from it. Data is stored in a separate database document in standard *Excel* worksheet format. The macro transfers the information from the form to the database.

Form Design

The first step in designing a form is determining the names of the fields that you want in the database. Based on those fields, you lay out the form on screen (see Figure 1). Define each entry cell—the cell to the right of each field name—with a name (these names link the form to the database document). A speedy way to name the cells is to select each cell, press ⌘-L (Define Name from the Formula menu), and immediately press Return without waiting for the dialog box to fill. The program automatically assigns the name to the left of the selected field to the selected cell. You may want to protect defined names so that you do not inadvertently enter data into the formula cell or lose the formula.

To get away from the spreadsheet look of the form, select Display from the Options menu and remove the gridlines and row and column headings. Additionally, size the entry form to leave a sliver of space at the bottom of the screen for a small window to the database.

The key to making this form an efficient data-entry device is preselecting a sequence of entry-field cells so that pressing the Return or Enter key causes the cursor to jump from one item to the next in a log-



ical order. For example, you might want to skip from the City entry cell to the State entry cell in the inventory form. To preselect the sequence of entry fields, press the ⌘ key as you select individual cells in the order they are to be filled, and then define the entire selection with a name, such as Data. Later, the macro manipulates this noncontiguous block of cells in preparation for new data being entered into the form.

The Database

After creating the form, you set up the database by placing field titles, corresponding to the fields in the entry form, at the top of columns (see Figure 2). You may change the order of the fields so that you can expand the database system in the future. In this example I put Part No. in the far-left field of the database instead of Vendor No. Eventually this database may become one element of a relational database. Other databases searching for data, such as cost or vendor number, will link to this inventory listing by part number. *Excel* has a built-in macro function (VLOOKUP) that searches the extreme-left column of a database for a match. Thus, by placing Part No. in the extreme-left database field, you can turn a simple database into a relational database without reconstructing the worksheet.

At the far right of the database is a field whose name is not visible on the Inventory Entry form. This extra database field is labeled Date. When you transfer

data from a form into the database, the macro automatically dates and time-stamps the entry with the NOW function. While the date of entry is not important to the accuracy of vendor and part information, it is critical for determining the original order of the entries in the database (for example, for sorting the database). Also, data-entry errors, once discovered, can be traced to the data-entry operator who was working on the system at the time an entry was made.

Viewpoints

After setting up the entry form and the database, each with a separate window, set up the database window so you can view the data on the entry form as it's copied to the database.

- Split the database window horizontally and put the database column titles in the top row of the window.
- Shrink the window vertically until the titles row and the two data rows are visible when the bottom scroll bar is active.
- Move the entire window to the very bottom of the screen (see Figure 3).

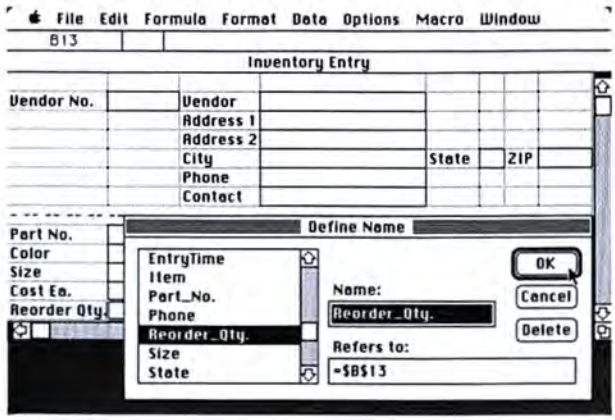


Figure 1

Setting up the entry form as a separate document frees you from the straight columnar format and allows larger, more readable fonts. Define the entry cells with the corresponding field names by selecting each cell and pressing ⌘-L and Return.

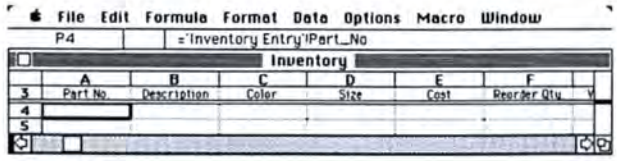


Figure 2

Size the database document to fit below the entry form on the screen. One row of formulas acts as a pipeline to the data-entry form's cells. The order of the fields in the database can differ from that in the form.

When you add entries to the form, the database window will be inactive, its scroll bars will disappear, and you will be able to hide the title bar beneath the bottom of the entry form. This will leave enough room for you to view the titles and three lines of the database. This reference helps you avoid duplicating entries.

Bridging the Gap

The next step is to connect the data-entry form to the database through a series of formulas. The formulas are simply pipelines that move the data from the entry form to the database automatically.

Place the formulas in the first row of the database. For example, the formula for the first database cell under Part No. (A4) is **='Inventory Entry'!Part_No.**, which says that anything entered into the entry-form cell called Part_No. will be duplicated in database cell A4. Once you enter the formulas across the whole first row, define the entire row of formulas with the name Item. The macro will then be able to perform operations–such as Cut, Copy, Paste, and Select–on the whole database entry at one time.

Entry Macro

At this point each field of the entry form contains a value, and each value is duplicated in a corresponding database field in the first row of the database. What is needed now is a way to change the values in the database so that they are no longer linked to the entry form and to shift the linking formulas down one row to accept data from the next entry.

Some other chores are also necessary, such as dating and time-stamping the entry and clearing out the data in the entry form to make way for new data. The entry macro (named data.enter) does all this for you (see Figure 4), but you must type in the macro instructions to select worksheet range names–a task that *Excel*'s macro recorder cannot learn from mouse clicks.

The first task the data.enter macro performs is to date and time-stamp the record. Macro cell A2 selects

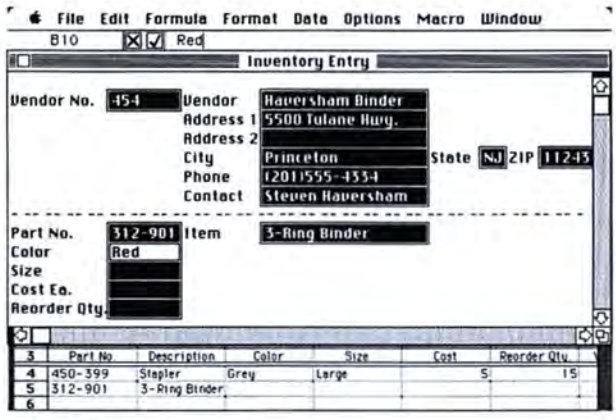


Figure 3

As you fill in a new entry form, the corresponding cells in the database mimic the entry cells (see row 5 in this example). When you run the data-entry macro, it separates the data from the formulas and pastes it into the database.

the cell on the entry form that has been defined with the name EntryTime. Normally the EntryTime cell doesn't have any data, so it is blank on the form. Only during execution of the data.enter macro does anything appear in that cell. Macro cell A3, using the FORMULA function, performs the equivalent of placing the NOW function in the EntryTime cell. This causes the date and time to appear in the cell. Although it appears there only for an instant during macro execution, you should still format the cell in the *m/d/yy h:mm* format from the Number dialog box so that a person using the database recognizes it as a date and time entry as the macro operates.

Next, the macro activates the database window, which is named Inventory. Macro cell A5 selects the previously defined range of cells, called Item. The cells in this range were originally defined as the row of pipeline formulas in the database. Because these cells are defined as a single entity, the macro easily selects, moves, and performs many other operations on the group of cells.

The next series of operations are key ones in this macro. As mentioned previously, data from the entry form is not really logged into the database. Macro cells A1 through A5 transfer the values from the entry form to the database for permanent storage, move the formula row down one row, and clear the entry form so it can accept new data. The formula in cell A5 selects the row of formulas. Next, the macro cell A6 cuts the row, working like the Cut operation in the Edit menu. The formula in cell A7 selects the next row down, and the PASTE function in cell A8 pastes the formulas into the new row. The macro simply shifts the row of formulas down one, leaving the original row temporarily blank.

Cell A9 copies the still-selected row of formulas into its new location. The macro then selects the row just vacated, the one above the formulas, with the SELECT and OFFSET formulas in A10. Now for the trick: in cell A11, instead of just pasting in the copy, which would simply duplicate the formulas in the new row, the PASTE.SPECIAL function extracts the values from the copied formulas and pastes those values into the cells of the database.

Thus far the macro has stored the data from the entry form in the database, but the database still displays the formulas in the row below the entries. The macro must clear this part of the form to make way for new data entry. Macro cell A13 activates the entry-form window. Then the macro selects the EntryTime cell and clears it of the date and time stamp. Note that the CLEAR function in cell A15 uses the formula in cell A3 as an argument; that's because that argument clears only the formulas from the cells, and not the formats. Similarly, cell A16 selects the block of data-entry cells in their special order, with macro cell A17 clearing only the values from the cells. With a different argument this macro formula would wipe out formats such as left alignment, decimal alignment for the Cost field, and so on. The form is now ready for the next item.

The final step is to save the macro and assign a keyboard command sequence. Then, with a few keystrokes, you can set the data.enter macro into motion each time you fill in the form.

Just because *Excel* looks like a spreadsheet most of the time, don't let the columns and rows lock you into a columnar format for database operations. Let the program's flexible screen formatting and macro instruction language set you free. □

M/data entry

	A
1	data.enter
2	=SELECT('Inventory Entry'!EntryTime)
3	=FORMULA(NOW())
4	=ACTIVATE("Inventory")
5	=SELECT(!item)
6	=CUT()
7	=SELECT(OFFSET(SELECTION(),1,0))
8	=PASTE()
9	=COPY()
10	=SELECT(OFFSET(SELECTION(),-1,0))
11	=PASTE.SPECIAL(3,1)
12	=FORMAT.NUMBER("#")
13	=ACTIVATE("Inventory Entry")
14	=SELECT(!EntryTime)
15	=CLEAR(3)
16	=SELECT(!data)
17	=CLEAR(3)
18	=RETURN()

Figure 4

The data-entry macro time-stamps each entry, moves the data into the database, and clears the entry form in preparation for the next entry. Assign a keyboard command, such as Option-⌘-F, to this macro to speed entry of many forms.

Danny Goodman is a Contributing Editor of Macworld.

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Microsoft Corp.
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206/882-8080
List price: $395

The Well-Tiled Abacus

David L. Foster

Helix's pictorial language lets you build custom databases easily

Most popular database management programs incorporate a programming language that lets you customize the database. Unfortunately, these cryptic languages are difficult to learn and usually require the expertise of a programmer. Helix, *a database management system from Odesta, provides a unique language that's relatively easy to learn and lets you solve your own problems.*

Helix uses a visual approach to database programming that takes advantage of the Macintosh's graphics capabilities. Programs are constructed by linking together icons called *calculation tiles.* The calculation tiles are pictorial representations of mathematical and query operators (see Figure 1). Using the mouse, you assemble tiles to form calculations in much the same manner as programmers create flowcharts to sketch out a program on paper.

Helix has more than 80 tiles that provide functions ranging from simple numerical functions to manipulating text. Their use can be demonstrated by creating a sales report that monitors sales at an automobile dealership. Based on information transferred into *Helix* from sales invoices, you can create a report that informs you how each model on the lot is selling and lets you track the performance of sales personnel. The tracking allows you to order more of the models in demand, order fewer of a less popular model, and respond quickly to boost sales of slower moving models.

Designing a Form

To create a report you first design a form that determines the placement of data and calculations. You begin by opening a new template icon, which opens into a form design tool, a window with layout space on the right and a palette of drawing tools on the left. Use the drawing tools to create blanks and labels for data and the results of calculations.

Then you create the field icons representing particular items of data, and abacus icons representing calculations and place them in the form you designed (see Figure 2). You determine which information actually appears in the displayed or printed form by dragging field and abacus icons from a list and placing them in the blanks you drew.

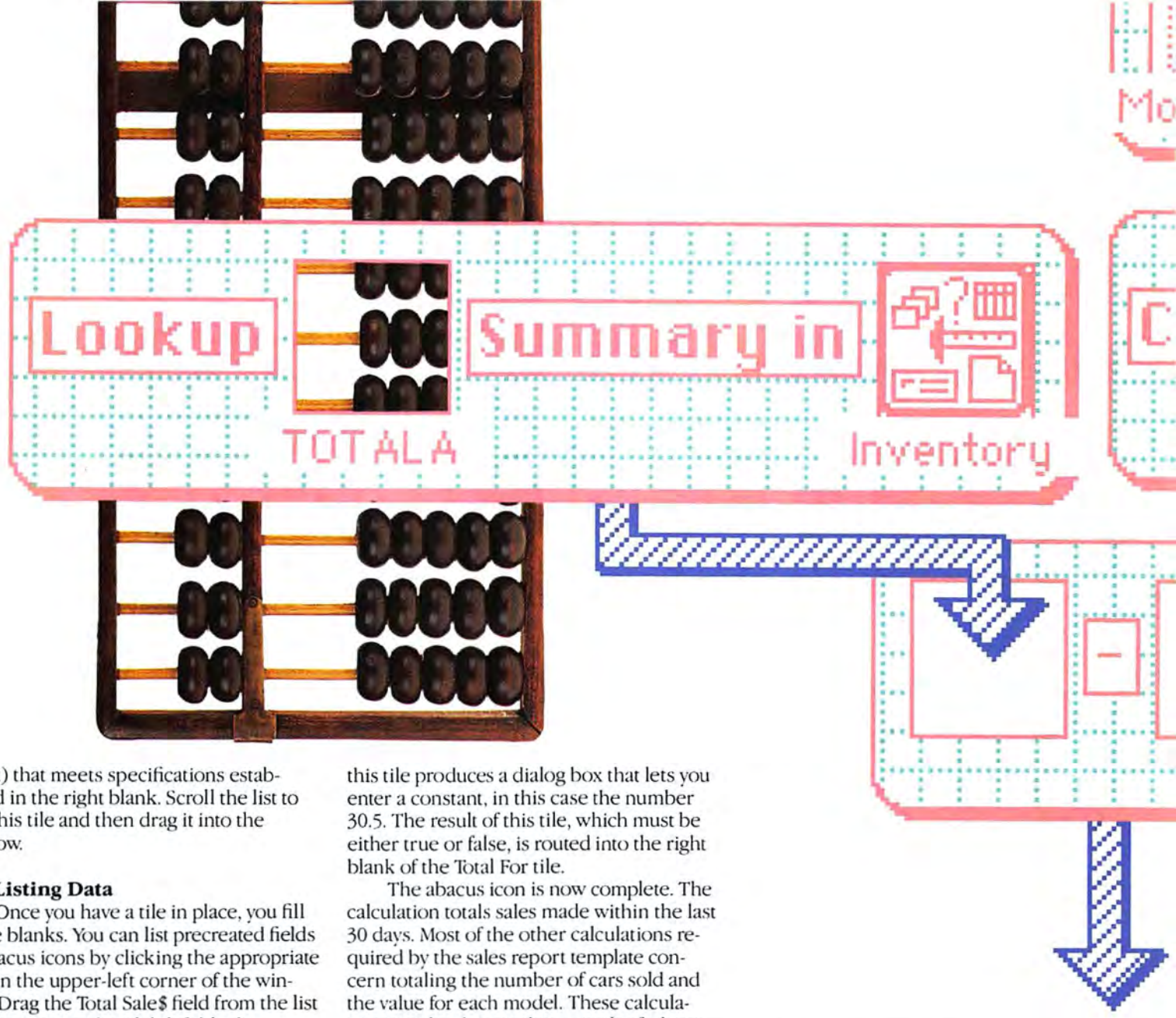
To complete the template, you compose groups of tiles to design calculations. (Calculations are contained in abacus icons.) Some of the calculations are simple, such as those that total data stored in various fields. Others require that you make use of *Helix*'s relational capabilities to look up information stored in different subdivisions of the database.

For each car model *Helix* must calculate the number of units sold during the last 30 days, the number sold in the previous 30-day period, the dollar value of the last 30 days' sales, the remaining inventory, and the amount to order to renew inventory. In addition, the program names and shows a picture of the top sales performer in the report.

A Simple Calculation

Take a look in the abacus icon that calculates the total car sales last month to see how to build simple calculations (see Figure 3). First, create a work space for the calculation by dragging a new abacus icon into the relation window and naming it Total$30dy. When you double-click on the icon, a window opens that contains a choice of calculation tiles.

The best tile for totaling sales is the Total For tile. This tile lets you take the total of one type of information (in the left



blank) that meets specifications established in the right blank. Scroll the list to find this tile and then drag it into the window.

Listing Data

Once you have a tile in place, you fill in the blanks. You can list precreated fields or abacus icons by clicking the appropriate icon in the upper-left corner of the window. Drag the Total Sale$ field from the list and drop it into the tile's left blank.

Use the tile's right blank to establish that only the sales made in the last 30 days are totaled. To do this you design a series of tiles that eliminates earlier sales. Use the Subtraction tile to subtract the date of sale from today's date (determined by the Macintosh's internal clock) using the Today tile.

Routing Results

You can route one tile's result into another tile by dragging the tile's arrow. Drag the arrow from the Today tile into the Subtraction tile. Drag the arrow from the Subtraction tile to the left blank of a Less Than tile. Double-clicking on the right blank of this tile produces a dialog box that lets you enter a constant, in this case the number 30.5. The result of this tile, which must be either true or false, is routed into the right blank of the Total For tile.

The abacus icon is now complete. The calculation totals sales made within the last 30 days. Most of the other calculations required by the sales report template concern totaling the number of cars sold and the value for each model. These calculations can be designed in a similar fashion. The only difference is that sometimes the counted invoices or totaled sales must be constrained with two conditions rather than the example's single condition that establishes the number of days. For example, to calculate the total sales for individual car models, you drag the field name corresponding to the model and drop it into the left blank of the Equals tile and then double-click the right blank to enter the model's name as a constant. Route the arrow from this tile into the And tile, along with the arrow from a set of tiles testing for the date of sale. Then combine the resulting arrow with a Total For tile along with the Total Sale$ field to find the dollar value of the model's sales during the last 30 days.

The totaling calculations are relatively simple, but *Helix* calculations can become increasingly complex as the results of tile subassemblies are joined into groups (see "Tips on Tiles" for some helpful advice for working with complex groups of tiles).

Working with Relational Databases

In addition to calculating information based on sales invoices, the *Helix* sales report helps manage inventory. By cross-referencing sales activity with inventory, you can order enough units of each model

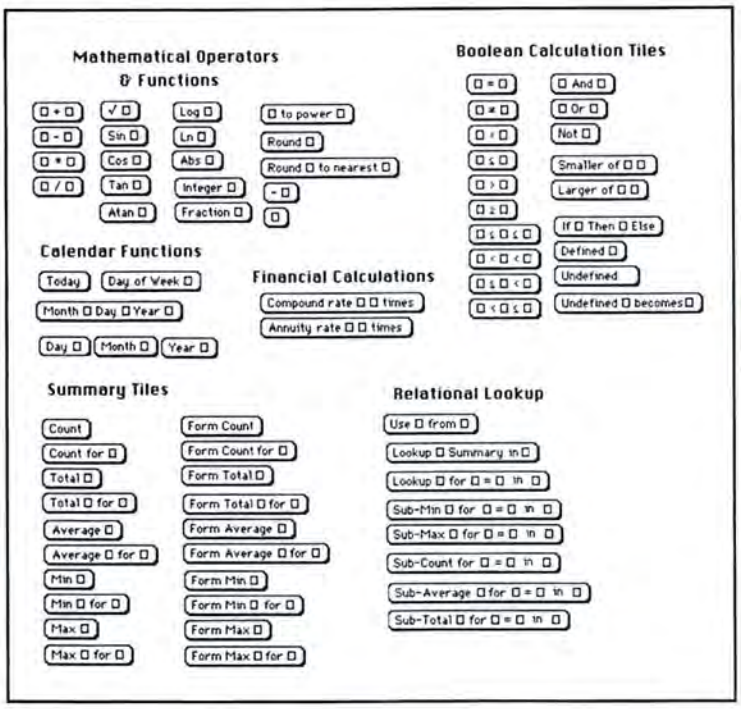


Figure 1
Helix *has more than 80 calculation tiles. Lookup tiles, which let you access data from other relations, are among the most complicated of* Helix's *tiles, but they are simple to use once you learn to fill in the blanks in the right order.*

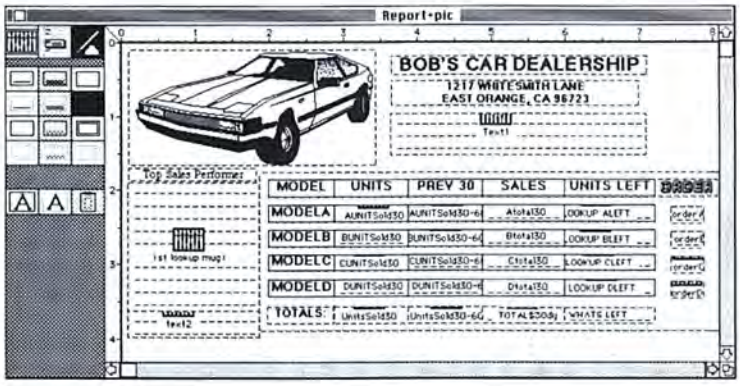


Figure 2
The form constructed in this template icon defines the way data will be displayed in the sales report. The various rectangles are filled with icons representing fields, calculations, and labels.

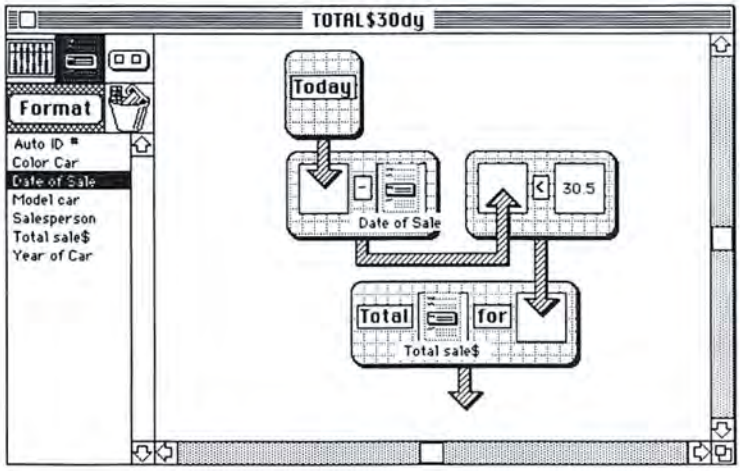


Figure 3
The contents of the Total$30dy abacus icon calculate the total sales of cars in the last 30-day period. The Date of Sale field has been selected from the list, dragged to the Subtraction tile, and dropped into the right blank.

to keep an adequate supply of cars on hand while not crowding the lot. Inventory information, however, is generally kept in a different subdivision of the automobile dealership's database than sales information. Fortunately, calculation tiles can tie together information stored in different segments of a *Helix* database.

Helix lets you subdivide information logically without entering the same data more than once.

Helix stores different subsets of data in *relations*—separate areas of the database. Storing data in separate relations lets you subdivide information logically while sparing you the effort of entering the same data more than once. Keeping data in separate relations also improves performance and lets you design forms that automatically fill in as soon as you enter a key item of information.

Relational Tiles

The sales report should show the remaining units in stock for each car model. Using lookup tiles, you can work with existing information in the inventory relation to calculate the remaining units for each model. For each car model, an abacus icon tracks all the cars ever entered into stock. Each of these abacus icons in the inventory relation uses the Count For tile to total the quantity of a particular model. The tile's left blank is filled with the Model Car field; the right blank contains the name of the car model entered as a constant to constrain the calculation.

To take advantage of current inventory information, create a new calculation by opening a new abacus icon in the sales relation (see Figure 4). Drag the Lookup Summary tile into the window from the tile list. When you use a lookup tile, first de-

Tips on Tiles

You can get the most out of calculation tiles by planning carefully and following a few tips. It's especially important to observe these practical guidelines when working with complex calculations and databases.

Plan Ahead
To save time, sketch a flowchart of the calculation on paper before you begin improvising on screen. Working from top to bottom, route the results of one calculation to another until you have a single arrow at the bottom representing the final solution. Decide which tiles match the operations you've sketched and then drag them on screen.

Reuse Similar Abacus Icons
Tile blanks can be filled with previously defined abacus icons. This feature can save you work, conserve the number of tiles the database uses, and help keep calculations small enough to see all at once. If you need to build a series of similar abacus icons, build one and duplicate it several times.

Moving Arrows and Tiles
Handling arrows and tiles can be awkward without the proper technique.

Individual tiles. Click anywhere on a tile except within a blank or on an arrow and drag it into position.

Individual arrow segments. Click and drag them into position.

Multiple arrow segments. Shift-click on each segment, then drag the entire arrow assembly.

Tile and arrow assemblies. Surround a group of tiles and arrows with the selection rectangle and drag them into position.

Viewing Large Calculations
The small screen of the Macintosh prevents you from seeing a large calculation all at once. You can print the entire calculation on the Imagewriter by choosing Print Scaled Page from the File menu. The contents of abacus icons cannot be printed with the LaserWriter.

Clean Up Your Desktop
The relation window can rapidly become cluttered with scores of icons, making it difficult to find something when you need it. Use uppercase letters in the names of important icons and move rarely used icons to the periphery of the window.

Divide the Database into Relations
The current version of *Helix* limits a database to 2500 icons on a 512K Macintosh. All types of icons are added into the count, including even calculation tiles and rectangles that define form templates. As the number of icons increases, particularly those within the relation window, the speed of the Macintosh slows for some functions. Avoid serious slowdowns by splitting the database into separate relations. Lengthy file names may also contribute toward slowdown, so choose short names. Odesta is currently rewriting the Macintosh's resource manager to eliminate this restriction in a future release of the programs.

cide which relation to retrieve information from. Double-click the tile's right blank to display a list of relations contained in the database. Select the name of the inventory relation from the list.

Now you can look up the specific abacus icon in the inventory relation that calculates the total number of a particular model received. Double-click the Lookup Summary tile's left blank and choose the appropriate abacus icon from the list that appears.

Route the result of the Lookup Summary tile into the left blank of a Subtraction tile. This tile lets you subtract the total number of cars sold from the total number of cars entered into inventory. Finish by determining the total number of cars sold: route the result of a Count For tile into the right blank of the Subtraction tile. Constrain this calculation for a specific model with an Equals tile.

Pictorial Pursuits

Calculation tiles can also be used to determine who is the top salesperson and add his or her picture to the report. For this purpose use the Lookup For tile (see Figure 5). This tile is perhaps the most powerful tile *Helix* provides; three of its four blanks can be filled only by double-clicking. Open the right blank first and choose the target relation. In this case, it is the employee's relation, where personnel records—including pictures—are maintained. Next, open the left blank and select the field or abacus icon you want to extract from that relation. In this case you want the picture field (named Mug) of that ace salesperson.

The two middle blanks specify which records in the target relation contain the information you want. Open the second blank from the left and select Last Name from the list displayed. This limits the lookup by comparing the Last Name field

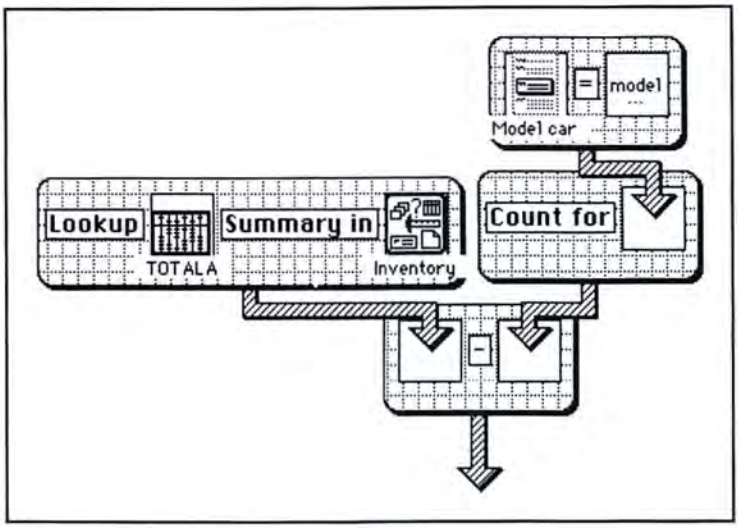


Figure 4
The number of unsold Model A cars is calculated in another abacus icon. The Lookup Summary tile retrieves the total number using an existing abacus icon to help retrieve inventory information from another relation. The inventory relation is represented by the relation icon lodged in the right blank of the Lookup Summary tile.

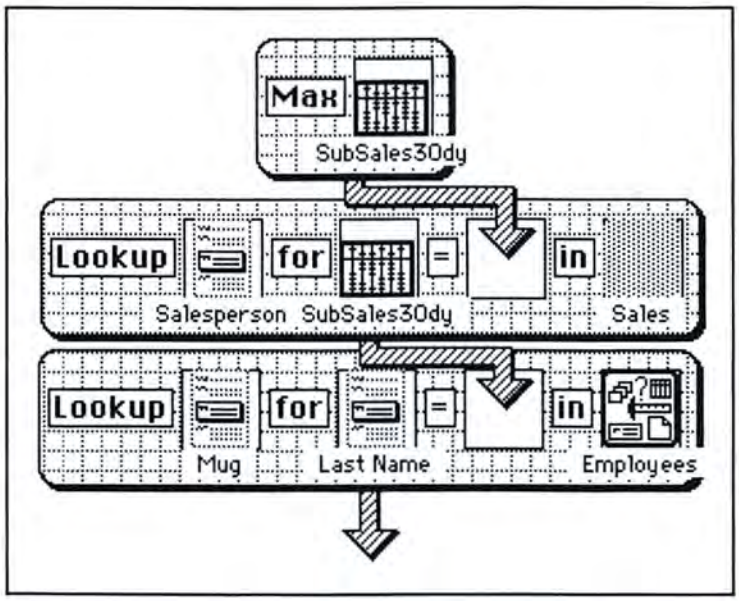


Figure 5
These big lookup tiles find the picture of the month's top salesperson. The picture corresponding to the employee with sales equal to the greatest subtotaled sales is retrieved from the employee relation. A shaded area represents the sales relation because it is the open relation.

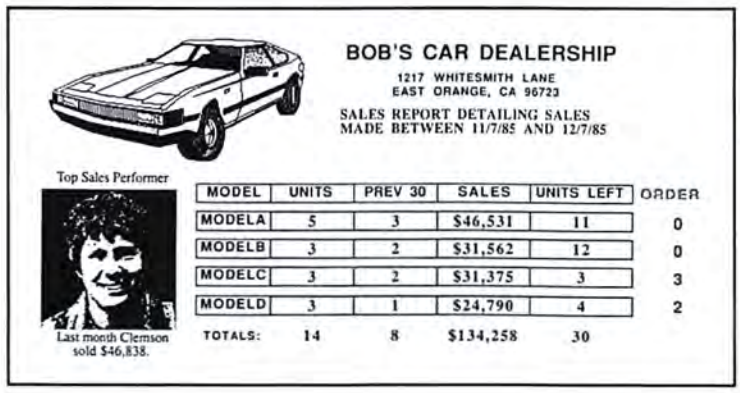


Figure 6
The final sales report. The heading with the dates covered by the report and the caption for the employee's picture both contain calculated fields using tiles for manipulating text. The suggested reorder numbers were generated by a simple equation that demands twice as many cars be kept on hand as were sold in the previous month.

in the employee relation to the contents of the third blank from the left. That blank is specified last and can contain a field, an abacus, or a tile arrow from the current relation. Into the blank route the arrow from another Lookup For tile that finds the salesperson whose 30-day sales subtotal is the maximum subtotal of all salespeople. Use the sales relation itself for the target relation of the new Lookup For tile. The required subtotals are calculated in another abacus icon using the Sub-Total tile and an If Then Else tile to constrain the sales subtotaled to those which occurred in the last 30 days.

The Finished Report

With the necessary calculations completed, you finish the report's design by placing the appropriate abacus icons in the template's corresponding blanks. The finished template can now be used to generate the final sales report (see Figure 6). You view the report by selecting the finished template and then choosing Show Form from the Search menu. Since *Helix* can use pictures as either labels or data, you embellish the report with a picture of one of the dealership's popular models. If you want to add to the report's appeal, you could even design a calculation to find the best-selling model and add it to the report in the same manner that you set up the database to find the most productive salesperson.You can print the final report on the Imagewriter or in higher resolution on the LaserWriter. □

David L. Foster is a biochemist in the biology and medicine division of the Lawrence Berkeley Laboratory at the University of California, Berkeley.

Helix, version 2.0r11
Odesta Corp.
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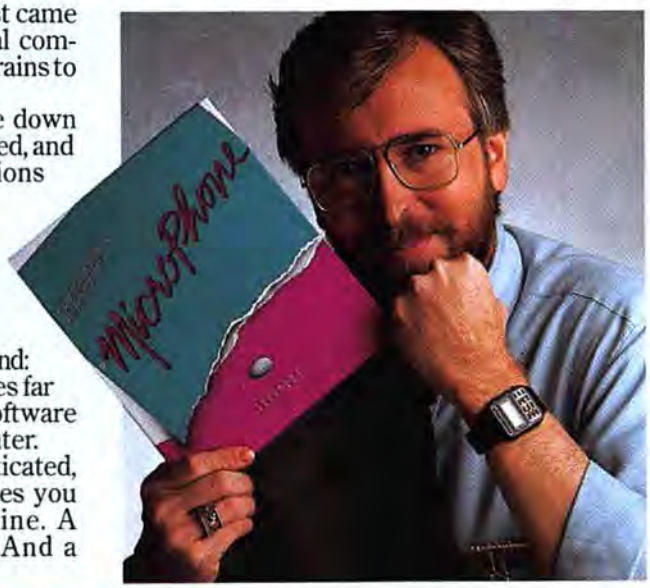

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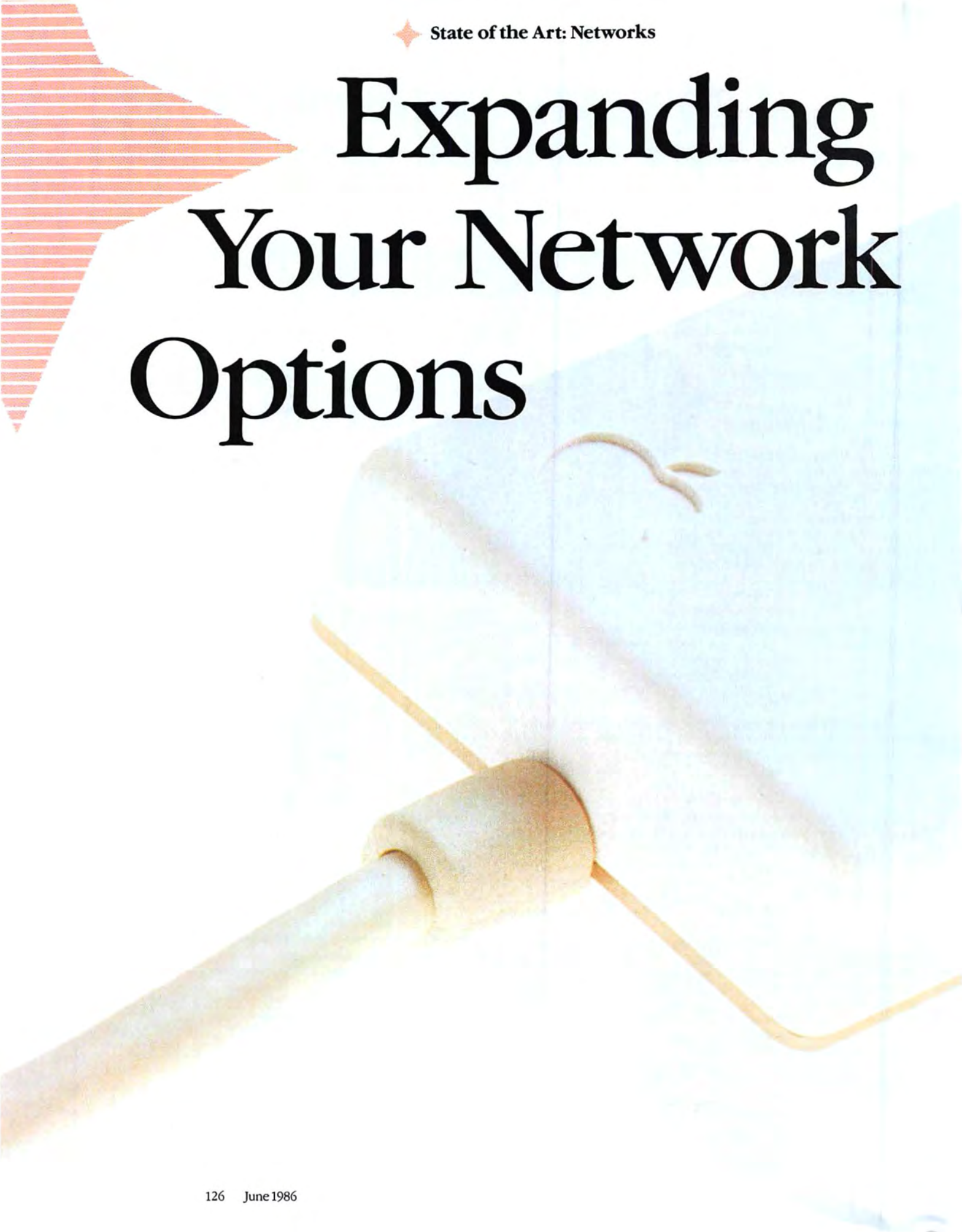
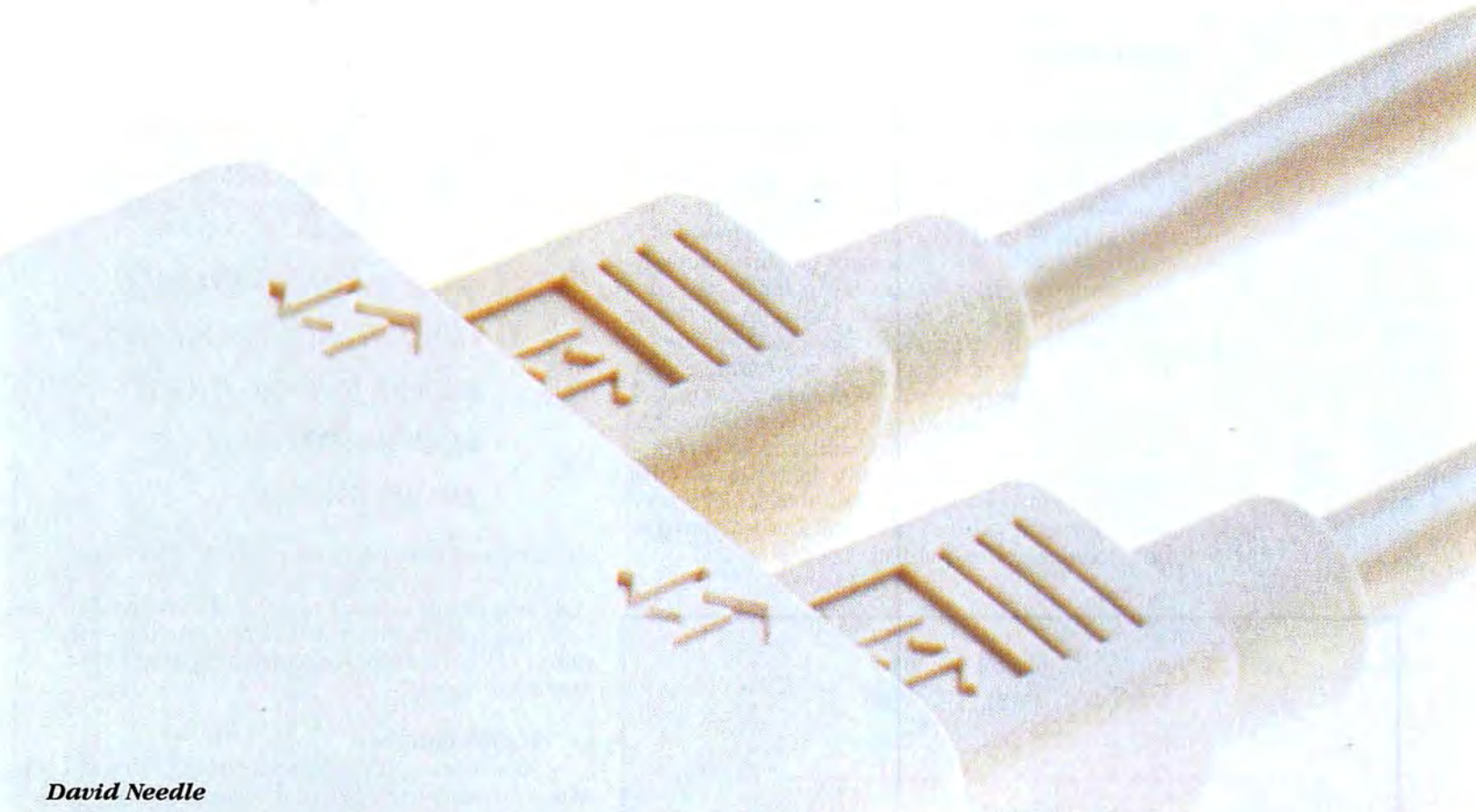




David Needle

In its simplest form AppleTalk cabling and software can be used as a local area network (LAN) to connect multiple Macintoshes to a LaserWriter. Beyond this lies a range of options to consider in the interest of improved productivity and communication for any office or facility with multiple Macintoshes.

The AppleTalk network was introduced early last year with a goal of 10,000 installations. While Apple claims to have exceeded that goal, many, if not most, of the current AppleTalk network installations merely connect Macs to LaserWriter printers.

Contributing to the dearth of network products is the belated development of high-level network protocols, the rules networked Macs must abide by to share files. In the absence of such protocols,

manufacturers have had to define their own methods of sharing files.

Currently, a limited number of Macintosh programs–notably *Double Helix* and *Omnis 3*–have the appropriate file protection mechanism to allow more than one user to work on the same file simultaneously.

While work continues on the AppleTalk protocols, several companies now offer network products that let Macs do much more than share a printer. Adding a hard disk or a file server is the first step toward building a workable network system. Manufacturers of AppleTalk file servers have taken two approaches: the monolithic file server and the distributed file server. Monolithic file servers consist of a single hard disk that is shared by all network users. Distributed file servers are based upon software that lets Macs share information stored on several hard disks.

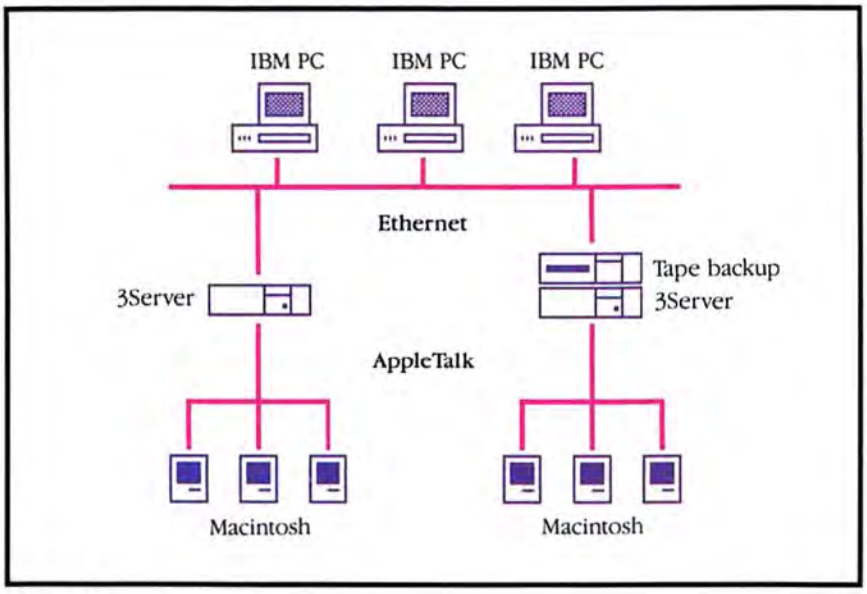


Figure 1
3Com's MacServe allows multiple AppleTalk networks as well as IBM PCs to be connected via Ethernet. The 3Server can also spool printing to a LaserWriter. An optional tape drive can back up any 3Server on the network.

One alternative scheme, an attempt to overcome bottlenecks that occur when many people use the network heavily, connects multiple AppleTalk networks via a backbone network, an organization analagous to the human spine. Other network products let Macs connect to UNIX hosts (see "UNIX to Mac Networks") and to the private branch exchanges (PBXs) found in many large offices. This article summarizes the wide variety of local area network solutions that now exist for the Macintosh.

Performance degradation occurs when five or more users are on a network.

3Com's Ethernet

3Com Corporation's network products for the Mac grew out of its IBM PC products. Central to 3Com's EtherMac network is its hard disk file server, 3Server, available in either 36- or 70-megabyte versions with an optional tape backup drive. EtherMac uses Ethernet cabling–a de facto network standard for connecting minicomputers, mainframes, and IBM PC-type computers–to connect multiple 3Servers or IBM PCs (see Figure 1). Each 3Server connects up to 31 Macs with standard AppleTalk cables.

Although a single AppleTalk network is limited to 32 users, most network vendors, including Apple itself, concede that some performance degradation occurs when more than 5 users are actively using the network. 3Com's solution: connect multiple 3Server networks (for different departments in a company, for example), using Ethernet as a backbone network to speed performance. This solution takes advantage of Ethernet's higher data transfer rate–2 to 10 megabits per second compared with AppleTalk's 230K bits per second.

EtherShare software allows a Macintosh to access information from the 3Server. In a 3Server network consisting of IBM PCs and Macs, different operating system software, such as IBM PC-DOS and Macintosh System files, resides in separate volumes on the hard disk server. Volumes on the 3Server can be either public (available to everyone on the network, generally in

(continues on page 131)

UNIX to Mac Networks

UNIX, Bell Labs' operating system that is popular among minicomputer and mainframe software developers, may have a future on the Macintosh. Currently several vendors offer UNIX file servers and network products for AppleTalk.

For example, Lutzky-Baird developed a networking package called Ultra-Office that's based on a UNIX host. In its first release Ultra-Office required a Zilog System 8000 supermicro (about $15,000) as the host on an AppleTalk network. More recently Lutzky-Baird has released other versions that can use the IBM PC/AT running XENIX, the AT&T 7300 PC, Sun Microsystems workstations, and the Convergent Technologies MightyFrame.

The centerpiece of the Ultra-Office is the Ultra-Office Library, software that implements the file server function for each network user. Ultra-Office Library operates under the metaphor of a library. Files and applications are "checked out" and "checked in" like books in a library. The library files are displayed graphically in a tree structure (see "A Library of Files").

Ultra-Office accepts IBM PCs on the network with the addition of a $200 AppleTalk interface card from Lutzky-Baird. You can also link multiple Ultra-Office networks through an Ethernet backbone connection similar to the scheme used on the 3Com 3Server.

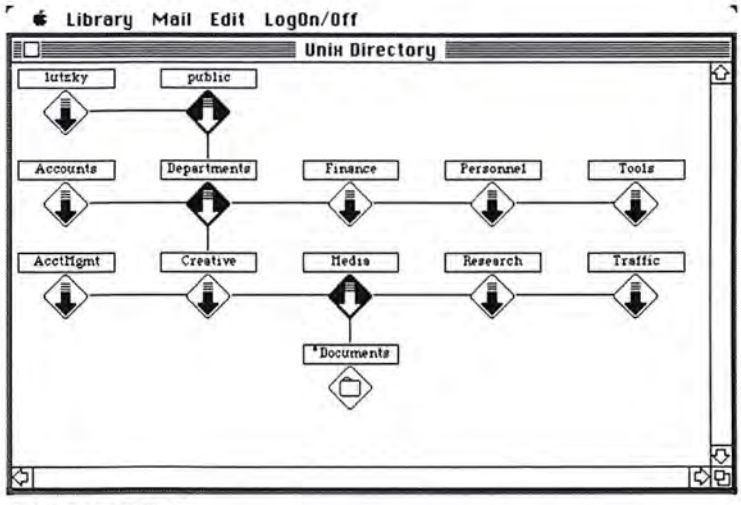
Still in development at press time, Ultra-Office was intended to include a format translator to allow users to choose different formats for the same data. For example, if someone on the network created a budget using Lotus's *1-2-3* and checked in (stored) the worksheet, you'd be able to change its format to an *Excel, Jazz,* or *Multiplan* format as part of the process of checking out the file for use on the Mac.

Ultra-Office also includes a print spooler for the LaserWriter, an E-mail application, and a terminal package that lets you use the Mac as a terminal with the UNIX host.

Another product that provides connections to UNIX computers and other large systems is FastPath from Kinetics. This $2500 gateway box provides a connection between AppleTalk and Ethernet networks, allowing the Mac to connect with mini- and mainframe computers such as DEC's (Digital Equipment Corporation's) VAX computers and even the new IBM RT/PC workstation.

FastPath should be of particular interest to companies that already have an Ethernet system installed and are looking for ways to link Macintoshes to it. The FastPath gateway allows networked Macs to connect to an existing UNIX host via Ethernet or connects multiple AppleTalk networks using Ethernet as a backbone network. Kinetics also makes a FastPath/Q-Bus board that allows a direct connection between DEC's Q-Bus and the AppleTalk network.

To connect AppleTalk to a UNIX host, Kinetics' K-talk/Host software, which allows the UNIX host to recognize AppleTalk messages, must be installed on the host computer. K-talk/Host and K-talk/Terminal allow networked Macs to operate as multiwindow UNIX terminals.



A Library of Files

Lutzky-Baird's Ultra-Office Library lets network users check out and check in files from the UNIX resident file server. The hierarchical organization of the library is mapped out in the Library window.

(continued from page 129)

a read-only format), private (programs and data files restricted to an individual user), or shared (allowing multiple users to access the same file).

EtherMac also includes print spooling software, EtherPrint, which allows Macs or PCs connected to the network to use the 3Server as a print spooler for the Apple LaserWriter.

Corvus's Omninet

Corvus Systems, a company that helped pioneer personal computer networks, offers a Macintosh network that can include such diverse computers as IBM PCs, Macintoshes, and Apple IIs.

You can link Omninet networks up to 4000 feet apart—four times the AppleTalk limit.

Omninet, which uses its own twisted-pair cabling, handles up to 64 users, and Corvus claims it is four times faster than AppleTalk. With the addition of a $195 repeater device from Corvus, called an Active Junction Box, you can link multiple Omninet networks with up to 4000 feet between them, or 4 times the suggested limit of AppleTalk.

Every node, or computer, in the Omninet disk server network connects to the network through a $199 interface box. The box connects to the Mac's modem or printer port. For the IBM PC and Apple IIe, Corvus has a network interface board that can be plugged directly inside one of the computer's available slots. The OmniDrive server, which connects directly to the network, is available in four memory configurations, from 11 megabytes ($1695) to 126 megabytes ($8995). Corvus also offers a tape backup unit called The Bank for $2195.

InterBridge, from Hayes Microcomputer Products, connects two local and two remote AppleTalk networks simultaneously.

Corvus's Disk Management Software ($395 per network) divides the server into volumes, or partitions, that can, for example, hold files from different operating systems such as Apple DOS, PC-DOS, and the Macintosh's.

Omninet offers three levels of password security: private and public access to files and applications plus two additional levels of access, controlled and uncontrolled. In a controlled volume, one user at a time has read and write access while anyone else on the network has read-only privileges. Uncontrolled access works only with applications specifically designed for multiuser access such as *Omnis 3,* which is available in a specially designed version for Omninet.

Other features of Omninet include a print spooler to direct printing to one or more LaserWriters on the network.

Iomega's AppleTalk Network Server contains two 10-megabyte removable cartridges. Each cartridge can be divided into partitions ranging from 800K to 10 megabytes.

Infosphere's MacServe

When Apple first introduced the AppleTalk network in January 1985, Infosphere presented an AppleTalk file server that used the Lisa/Macintosh XL computer. Though Apple has since discontinued the XL, Infosphere reports that it installed 2500 of its XL/Serve networks. More recently the firm began shipping MacServe, a "disk server" that uses a group of hard disks—including those attached to the Mac Plus's SCSI port—as a network server. According to Evan Solley, president of Infosphere, MacServe has been tested successfully with over a dozen hard disk and file servers on the market.

MacServe supports up to 16 separate hosts, or servers, on the network, thereby distributing the networking chores that can slow down a single-server system. MacServe software costs $250 per server on an AppleTalk network of up to 32 computers.

In a MacServe network, files on the host's hard disk are divided into volumes that can be designated as shared or private. You access a volume by clicking on the button next to the volume's name. If the volume is

available for use, the button is highlighted; if the volume is private or if someone else is using it, the button remains dimmed and inaccessible. In a shared-volume, single-user application, files such as *MacPaint* files are accessible on a read-only basis when in use by someone else. The MacServe software monitors the network and gives preference to the most active users on the network if there is competition for access time. Infosphere is also working with vendors of multiuser software to ensure compatibility with MacServe.

MacServe can also reserve some of a Macintosh Plus's RAM as a disk cache to further speed network performance. A disk cache stores frequently used information in RAM, where it can be accessed much faster than from the disk drive.

Centram's TOPS

Centram Systems West in Berkeley, California, offers the TOPS (Transcendental Operating System) network. The TOPS software allows multiple hard disks on the network to act as a distributed file server. Files and applications stored on different hard disks are accessible to any network user.

In prerelease testing as this article goes to print, TOPS is designed to work with a variety of disks that can function as file servers on an AppleTalk network. Apple's own HD 20, a hard disk connected to the serial port, or a hard disk drive connected to the Mac Plus's SCSI port can be designated as a file server under the TOPS distributed network scenario.

TOPS provides a software environment that recognizes different operating systems, such as the IBM PC's. With the addition of Centram's AppleTalk board (priced under $300) for the IBM PC, you can add a PC to a TOPS network. The TOPS desk accessory provides access to the files on a server, allowing you to mount remote volumes, copy files between local and remote volumes, and make local files available to other network users–*publishing* in the TOPS parlance. Once a remote volume has been mounted, its icon appears on the desktop, and files can be accessed as if they were on a local floppy or hard disk drive.

General Computer's HyperNet

General Computer Corporation (GCC), maker of the HyperDrive internal hard disk, recently released *HyperNet* software, which links multiple Macintoshes via AppleTalk with an approach similar to Infosphere's. Any HyperDrive-equipped Mac on the network can function as the server. "It's closer to the concept of what a personal computer should be; a centralized [file server] system harkens back to mainframe computers," says John Ison, director of product planning for GCC.

Blyth Software, the publisher of *Omnis 3,* has agreed to create a version of *Omnis 3* that is compatible with *HyperNet.*

As an interim solution to the lack of multiuser software, *HyperNet* allows several users simultaneous access to the same single-user application file, but only one user can save to that file; other users work on a copy and update the original file later.

HyperNet contains a feature that GCC claims maximizes the utilization of the network. Whoever uses the HyperDrive-equipped Mac can assign priorities to the disk drive by choosing one of three priorities: Client, Moderated, or Host. With Host priority, the host system receives priority to access the server, whether it's storing a file or sending a document to a LaserWriter. Selecting Client assigns priority to other computers on the *HyperNet* network, called client systems.

When the Moderated setting is chosen, *HyperNet* looks at how the host utilizes the system. If the host is not doing much on the network, the client machines have unrestricted access to the drive. GCC claims significantly faster performance than the 230K-bits-per second AppleTalk by itself achieves. As this article went to press, General Computer was scheduled to ship *HyperNet* in June.

Additional Network Options

Several companies offer monolithic file servers. Micro-Design offers a stand-alone file server called the Keeper, which is available in 10-, 20-, and 30-megabyte configurations, starting at $2295 and with optional 5-megabyte cartridge backup. Like most file servers, the

(continues on page 132)

The AST 4000 74-megabyte hard disk can be used as a file server with MacServe *or* TOPS *network software. The unit comes with a 60-megabyte tape drive.*

Networkers

3Server
3Com Corp.
P.O. Box 7390
Mountain View, CA 94039
800/638-3266, 415/961-9602 in California
List price: 70MB $8995

Omninet
Corvus Systems, Inc.
2100 Corvus Dr.
San Jose, CA 95124
408/559-7000
List price: Omninet Network Interface $199; 11MB Omni-Drive $1695, 21MB $2795, 45MB $4995, 126MB $8995; Macintosh Disk Management software $395 (for entire network); 20-gauge twisted-pair wire (100 ft.) $250

MacServe
Infosphere, Inc.
4730 S.W. Macadam Ave.
Portland, OR 97201
503/226-3620
List price: $250

TOPS
Centram Systems West, Inc.
2372 Ellsworth Ave.
Berkeley, CA 94704
415/644-8244
List price: $149 per Macintosh (software only), $349 per PC (software and board)

HyperNet
General Computer Corp.
215 First St.
Cambridge, MA 02142
617/492-5500
List price: $295

The Keeper
Micro-Design
P.O. Box 201990
Austin, TX 78720-1990
800/531-5002, 512/441-7890 in Texas
List price: Pro-10 $2295, Pro-20 $2995, Pro-30 $3695, SQ5-10 $4195, SQ5-20 $4795, SQ5-30 $5395

AppleTalk Network Server, 20MB
Iomega Corp.
1821 West 4000 South
Roy, UT 84067
801/778-1000
List price: $3750

Sun M.U.F.F., Sun Disk, Sun Net
Sunol Systems, Inc.
1177 Quarry Ln.
Pleasanton, CA 94566
415/484-3322
List price: Sun M.U.F.F. 21MB $2595, 45MB $4995, 70MB $5695, 110MB $7395; Sun Disk 21MB $2195, 45MB $4595, 70MB $5295, 110MB $6995; Sun Net $400

AST 4000
AST Research Inc.
2121 E. Alton Ave.
Irvine, CA 92714
714/476-3866
List price: $6995

LoDown hard disks and tape backups
LoDown
P.O. Box 5146
Pleasanton, CA 94566
415/426-1747
List price: 10MB $795, 20MB $995, 40MB $1995, 80MB $3995, 20MB tape backup $895, 60MB tape backup $1795

PC MacBridge
Tangent Technologies Ltd.
5720 Peachtree Pkwy. #100
Norcross, GA 30092
404/662-0366
List price: $650 including software, board only $350, LaserScript/S $250

InterBridge
Hayes Microcomputer Products, Inc.
P.O. Box 105203
Atlanta, GA 30348
404/441-1617
List price: $799

Ultra-Office
Lutzky-Baird Associates, Inc.
5601 Slauson Ave. #222
Culver City, CA 90230
213/649-3570
List price: software (for Zilog, PC, and Macintosh—ten users) $5000, IBM PC board $200

FastPath
Kinetics, Inc.
P.O. Box 3341
Walnut Creek, CA 94598
415/947-0998
List price: $2500

(continued from page 128)

Keeper offers file and record locking that works with multiuser applications like *Omnis 3*.

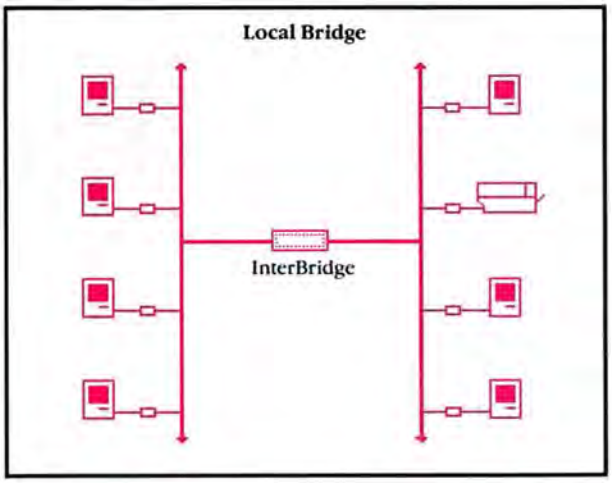
Iomega's Network Server contains two 10-megabyte removable cartridges. The disk space is divided into partitions that are accessible as either public or private (password-protected) areas. Partitions may also be designated as read-only. A backup utility allows one cartridge to be copied to the other.

Sunol Systems has announced Sun M.U.F.F., a file server that offers file and record locking. The product

SCSI disks can be used with MacServe and TOPS to create a flexible network.

reportedly allows multiple users to simultaneously access documents created with single-user applications. The Sun M.U.F.F. server is available in sizes of from 10 to 110 megabytes, and prices range from $2295 to $7915. At press time Sun M.U.F.F. was scheduled to ship in the spring. Sunol also offers its Sun Disk Server, and Sun Net, which can be used as a gateway connecting other manufacturers' local area networks.

Hard disks that rely on the SCSI interface can be used in conjunction with Infosphere's MacServe and Centram's TOPS software for an extremely flexible network. Of particular interest when it comes to networks, where data archiving is an issue, are those drives that offer either tape or disk backup, such as the AST 4000, the LoDown hard disks and tape drives, Peripheral Land's MacFast, Iomega's Bernoulli boxes, and Sunol's Sun Streak (see "Hard Decisions" in this issue for a list of SCSI drives).



PC MacBridge from Tangent Technologies in Norcross, Georgia, is a $595 board and software package that connects an IBM PC to an AppleTalk network. PC MacBridge also enables popular PC programs, such as *WordStar, Multimate,* and Lotus's *1-2-3* to print directly to a LaserWriter connected via AppleTalk. Centram has a similar product called TOPS Print for under $400 per LaserWriter.

Another important product for AppleTalk in the corporate arena is InterBridge, from Hayes Microcomputer Products, the manufacturer of the popular Hayes modems. InterBridge functions as a network "bridge," connecting multiple AppleTalk networks and providing remote access to shared devices such as a LaserWriter (see Figure 2).

The wider range of networking products, growing LaserWriter demand, and continued innovation by independent vendors promise to stimulate the growth of such applications as electronic mail, file sharing, multiuser applications, and shared mass storage. □

David Needle is a free-lance writer based in Menlo Park, California.

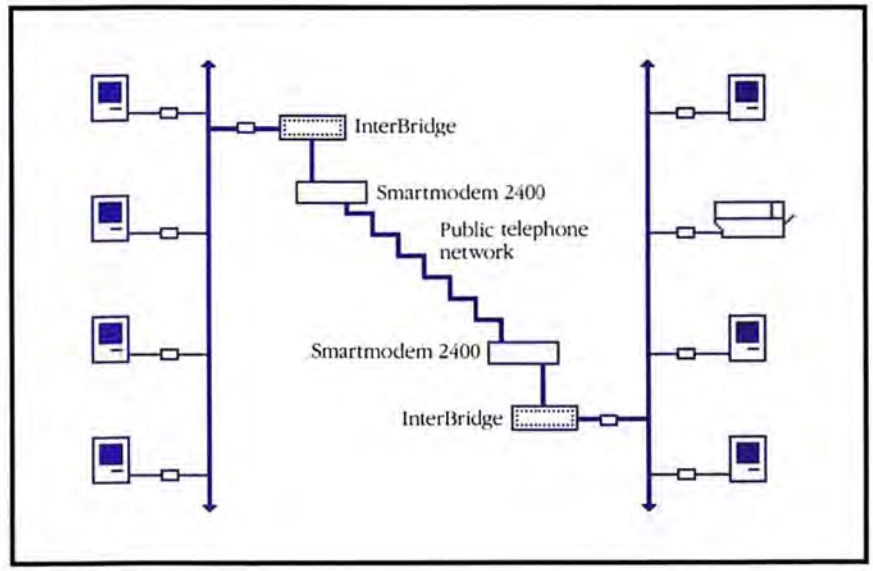


Figure 2
Hayes's InterBridge connects two AppleTalk networks. If the networks are not in the same building, modems can be used to form a remote bridge.

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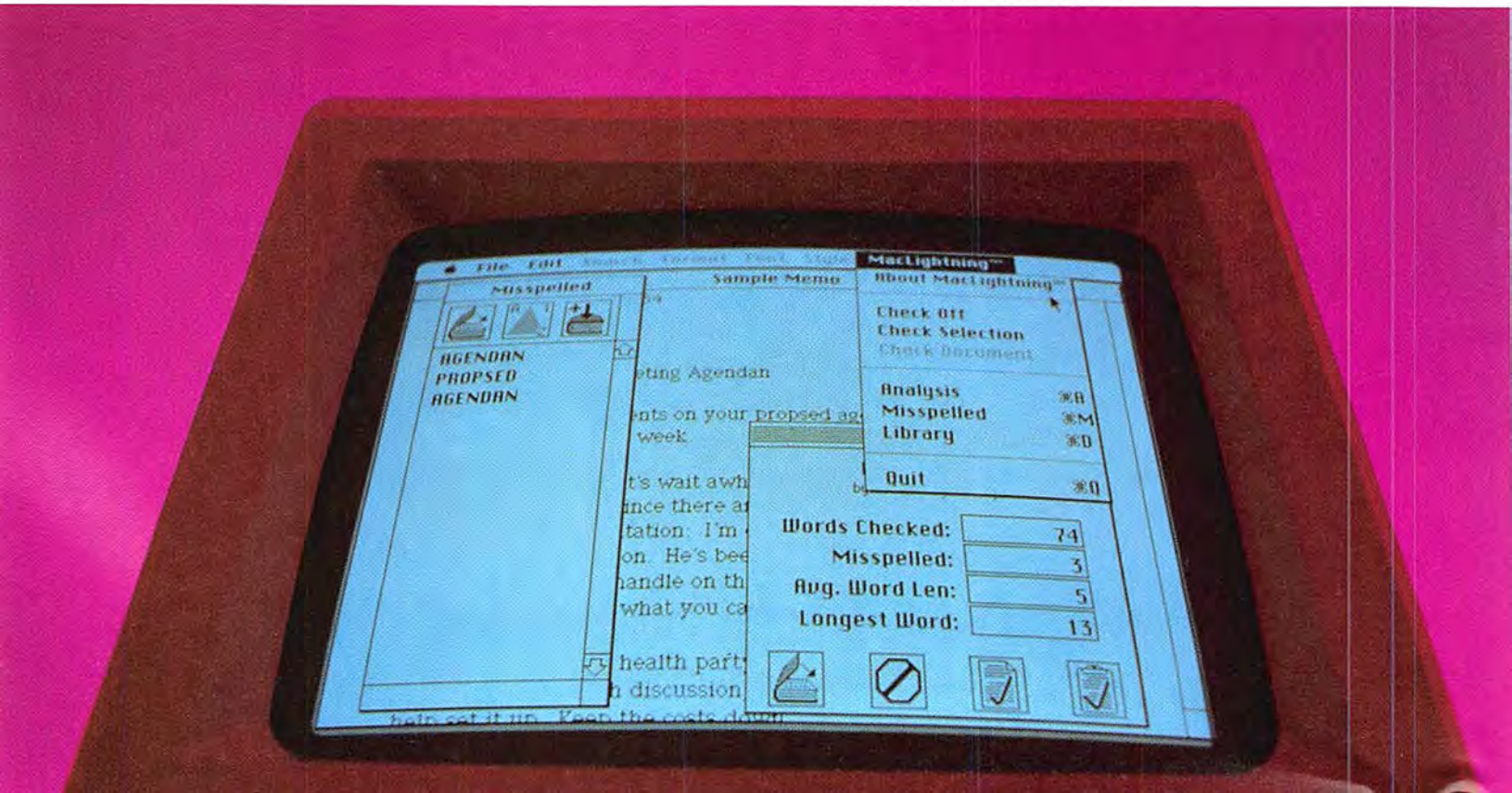

Macware Reviews

TopDesk, MacIndexer, Enchanted Scepters, Racter, TimeBase, and Mindshadow

Edited by Erfert Nielson

Time-Saving Accessories

Most collections of desk accessories include several stand-alone miniapplications such as calculators, notepads, dialers, or appointment books. Cortland Computer has taken a different tack with ***TopDesk.*** Instead of offering additional applications, *TopDesk* provides seven utility programs that can speed up or otherwise enhance the operation of the applications you normally use on the Macintosh.

Saving Steps

Of *TopDesk*'s seven utilities, the real time-saving accessories are Launch, View, MenuKey, Shorthand, and BackPrint. Launch lets you enter an application from within another application without returning to the Finder. You can either bail out of the current application and enter a new one immediately (be sure to save your work before launching) or quit the current application first and then launch the next one immediately afterwards. Another option works with applications like *MacWrite,* which create links to the operating system that can be undone only by quitting the progam normally. Launch works with almost all applications except *Switcher.*

View provides a limited multiple-window capability that works as long as the data you want to see is in either a text or *MacWrite* file. You can view up to eight documents at a time. If you were in *MacTerminal,* for example, you could open a *MacWrite* document, copy a paragraph from the *MacWrite* window to the Clipboard, and then paste the paragraph into *MacTerminal.* When you view a *MacWrite* or text document, you can scroll through it and cut or copy data, but you can't edit the data you're viewing.

MenuKey lets you assign ⌘-key sequences, or macros, to various program operations, allowing you to issue commands from the keyboard rather than selecting menu items with the mouse. You can use MenuKey to reassign existing ⌘-key equivalents or to assign your own shortcuts. Some programs may not always support ⌘-key sequences. For example, you can't quit *MacWrite* using a ⌘-key sequence unless a window is open, and *MacTerminal* has no provisions for ⌘-key shortcuts.

Shorthand allows you to assign abbreviations to represent strings of text up to 255 characters long, so you can quickly enter long phrases. When you type the abbreviation, the complete phrase immediately appears on the screen. Shorthand definitions are saved in the System file when you quit an application.

BackPrint is a print spooler that lets you continue working with word processors or other programs while documents are printing. You can spool up to 30 pages from one or more documents for consecutive printing. BackPrint allows you to print documents in the Mac's high-quality and standard printing modes, but it won't print graphics or draft mode text. Using

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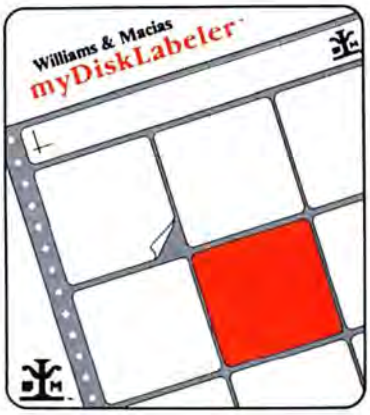

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Williams & Macias
Microcomputer Products

Spokane Airport Business Park
P.O. Box 19206, Spokane, WA 99219

Circle 374 on reader service card

(continued from page 137)

the BackPrint spooler for high-quality printing significantly slows the flow of characters on the screen, and printing proceeds at a snail's pace; it might take 30 minutes to print a five-page *MacWrite* document if you're working on the Mac simultaneously. BackPrint's performance is satisfactory in standard mode, but if you're a very fast typist, characters on the screen will lag behind your keystrokes.

Useful Extras

Unlike *TopDesk*'s other utilities, Encrypt and Blank don't save you time, but they do give you a little extra control over your Mac. Encrypt is a data-encryption program that in 5 seconds can scramble a 100K file beyond recognition. You select the file to encrypt from a dialog box and then enter the password for the encrypted file. Passwords can be up to 255 characters long. By scrambling a file, Encrypt makes the file unrecognizable to the application that created it—encrypted files no longer appear on the list of available files when you use the Open command. To decrypt a file, you choose the Encrypt accessory again, select the file name, and type in the appropriate password.

The Blank desk accessory protects the Mac's screen against image burn-in. If a fixed image remains on the screen for an extended period of time, it may burn in a permanent, ghostly shadow of itself. Blank darkens the screen after a period of time has elapsed without any keyboard or mouse activity. You can set the time-lapse interval to from 1 second to 1 hour.

The thought that went into *TopDesk*'s design is evident in the package's installation procedure. Instead of requiring the Font/DA Mover, *TopDesk* lets you install any or all of its accessories simply by clicking on the accessory's icon. To remove an accessory, click on the accessory's icon again.

All in all, *TopDesk* is a useful collection of accessories that you'll find yourself working with almost immediately and that will prove handy with many applications. I encountered a couple of minor bugs in my original copy of *TopDesk,* but Cortland Computer quickly sent me version 1.2, which corrected them. The upgrade is free to registered owners of the older version.
—Charles Rubin

TopDesk, version 1.2
Cortland Computer, Inc.
P.O. Box 9916
Berkeley, CA 94709
415/845-1142
List price: $59.95

The Back of the Book

One of publishing's most tedious tasks is compiling an index. And for many types of publications, from scholarly treatises to software manuals, an index is essential. Boston Software Publishers, the company that distributes the *MacPublisher II* page-layout program, now offers ***MacIndexer,*** an automatic index generator for the Macintosh. *MacIndexer* should prove a boon to many authors.

MacIndexer works with *MacWrite* and *Microsoft Word.* Unfortunately, it doesn't work with *MacPublisher* or any of the other desktop publishing programs. The program follows the standard procedure for index creation: identifying keywords, locating all instances of the keywords, and then creating the index, complete with the appropriate page references for each keyword.

The Word Is Key

MacIndexer automates each step of index creation. For example, you don't have to select keywords in a text file or mark them with a special symbol while you're writing or editing. Instead, the program generates a keyword list from any text file you specify. Initially, the list includes every word and number in the file, which is certain to be far more verbiage than the essential terms.

You can edit the program-generated keyword list as you would any text document, or you can have the program perform the first edit by filtering "noise"—words like *a, an,* and *the*—out of the keyword list. Even after filtering, however, the keyword list is likely to be too extensive for a useful index. Thus, you may edit it manually after eliminating the noise. You also

(continues on page 140)

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LoDOWN-40 $1995

LoDOWN-80 $3995

Tape Back-up

LoDOWN-T20 $895

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VT 100
TEK 4010
TEK 4006
TEK 4105
VT 640
spoken here!

Tekalike lets you use your Macintosh as a graphic terminal with mainframe applications from Issco Graphics, Molecular Design, Chemical Abstracts Service, Precision Visuals, SAS Institute... and take the IBM, VAX, etc. mainframe graphic to the Macintosh for editing and page composition.

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Los Alamos, NM
87544 (USA)
(505) 672-1998
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Circle 97 on reader service card

(continued from page 138)

have the option of creating your own keyword list, naming as few or as many terms as you want. This process is probably the most practical alternative for most indexing projects.

Search, Sort, Number

Once you are satisfied with the keyword list, *MacIndexer* uses it to create an index. Here the program is at its most independent; you merely watch and wait as a window shows the program's page-by-page progress through the file. When the index is complete, the program displays the index in a narrow window. The terms are listed in alphabetical order, with page numbers for all appearances of each keyword. When a term appears on three or more consecutive pages, the range of pages is indicated.

If you add pages to a publication, MacIndexer can renumber the index.

As with the keyword or noise lists, you can edit the index. You may also want to add some stylistic touches to the index, putting some terms in boldface or italics or perhaps changing the font or type size of certain entries. For these embellishments, you'll need to use *MacWrite* or *Word,* because *MacIndexer's* formatting capabilities are limited. The program prints an index, but only in a single column. Consequently, you'll need to use a page-layout or word processing program to format an index for publication.

Limited Options

MacIndexer offers a certain amount of flexibility, allowing you to merge two or more indexes or to renumber the pages throughout an entire index or a portion of an index (in other words, if you add two pages to a publication, you can instruct *MacIndexer* to renumber the index accordingly). Although both of these options are useful if you want to publish a year-end index for a newsletter, for example, page numbers are unfortunately limited to Arabic numerals. In other words, you can't create an index that shows page numbers in a format such as I-1, A-4, or 1-2 to indicate chapters or volumes. To index a newsletter or other ongoing publication, you must number the pages of all issues sequentially—such as 1 to 24 for the first issue, 25 to 48 for the second issue, and so on. Similarly, you must number all pages consecutively throughout a document, rather than chapter by chapter. If you could add text as well as numbers when renumbering an index, you could create indexes for each issue or each chapter of your publication and later renumber them with the appropriate designations, such as II-1 or A-2. Perhaps a future version of *MacIndexer* could include this feature.

Slow but Steady

Be prepared to wait while *MacIndexer* creates keyword lists and indexes. For example, on a two-drive 512K Mac, the program took almost 17 minutes to make a 600-entry keyword list for a 31K *MacWrite* file. After filtering out the noise, the program took about 14 minutes to create an index from the keyword list and the *MacWrite* file. When I used a Mac fitted with a 10-megabyte HyperDrive, the wait was shortened by about 3½ minutes. Indexing is considerably faster with a short list of keywords; the program indexed a 19K file with a list of 25 keywords in 1½ minutes.

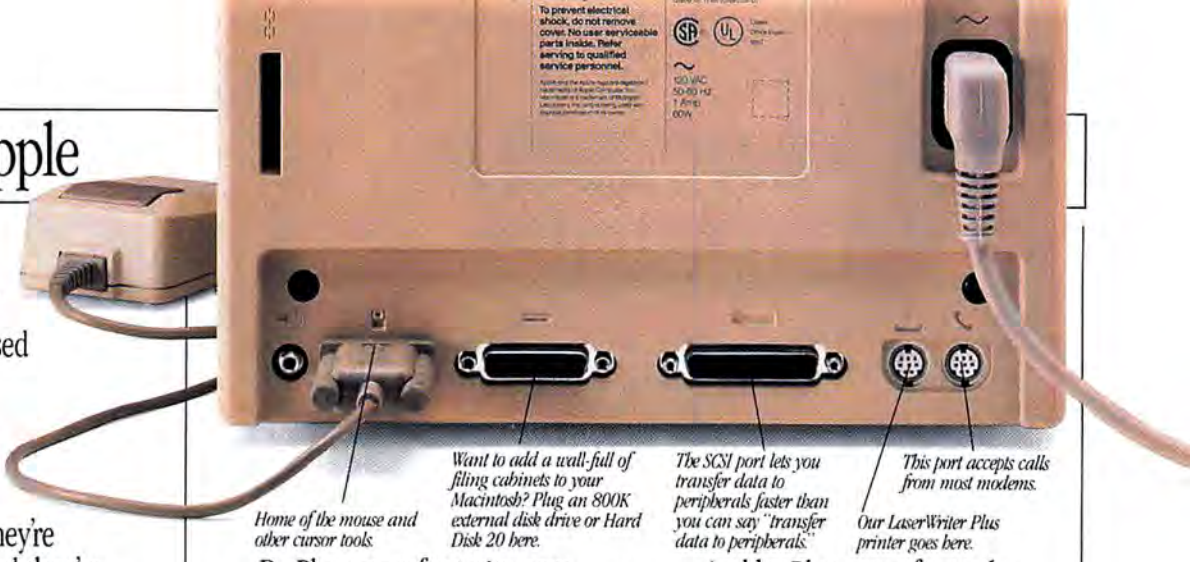
Despite its limitations in page-numbering options and its sluggish processing of large lists and indexes, *MacIndexer* is a worthwhile investment and a valuable addition to the growing ranks of desktop publishing software. Its modest price adds to the program's attraction, and although the software is copy protected, the publisher promises to make an unprotected version available to registered buyers for a small additional fee. If you're producing a publication using *Write* or *Word, MacIndexer* is likely to suit your indexing needs.—*Jeremy Joan Hewes*

MacIndexer, version 1.0
Boston Software Publishers, Inc.
1260 Boylston St.
Boston, MA 02215
617/267-4747
List price: $49.95

(continues on page 145)

Inside Apple

Vol. 2, No. 2



Home of the mouse and other cursor tools.

Want to add a wall-full of filing cabinets to your Macintosh? Plug an 800K external disk drive or Hard Disk 20 here.

The SCSI port lets you transfer data to peripherals faster than you can say "transfer data to peripherals."

This port accepts calls from most modems.

Our LaserWriter Plus printer goes here.

Look what our own engineers did behind our back.

We're just not making Macintosh™ computers like we used to make them.

We're making them better.

Now they're twice as powerful. They're more expandable. And they're significantly faster.

We call our newest Macintosh, Macintosh Plus.

By Plus, we refer to a full megabyte of RAM that gives Macintosh the power to take advantage of the most powerful software programs ever driven with a point and click.

By Plus, we refer to its new, 800K double-sided disk drive, that allows you to store twice as much by using both sides of a floppy.

By Plus, we refer to 128K of ROM that makes Macintosh perform more efficiently. And a sophisticated hierarchical filing system that enables you to find things faster than you used to lose them.

And by Plus, we refer to the added cursor keys and a built-in numeric keypad that let you do your adding, subtracting, guesstimating and bottom-lining without lifting your hands from the keyboard. Or your eyes from the screen.

But to fully understand the biggest turn-around in Macintosh Plus engineering, all you need do is turn around any Macintosh Plus.

And behold, a Small Computer Systems Interface port.

Macintosh Plus.

Better known in computer circles as a SCSI port.

The SCSI port not only allows you to transfer data six times faster, but lets you connect up to seven high-speed peripherals at once. Including hard disks and tape drives.

Needless to say, we've given ourselves a considerable kick in the backside.

And if you read on, we'll show you how to turn the Macintosh that's sitting on your desk into the Macintosh sitting on this page.

Is there enough storage space in your office?

It's only 7⅞ x 1⅞ x 4¾ inches on the outside, yet big enough to store over 400 pages of data on the inside.

We're talking, of course, about our new and faster 800K external disk drive.

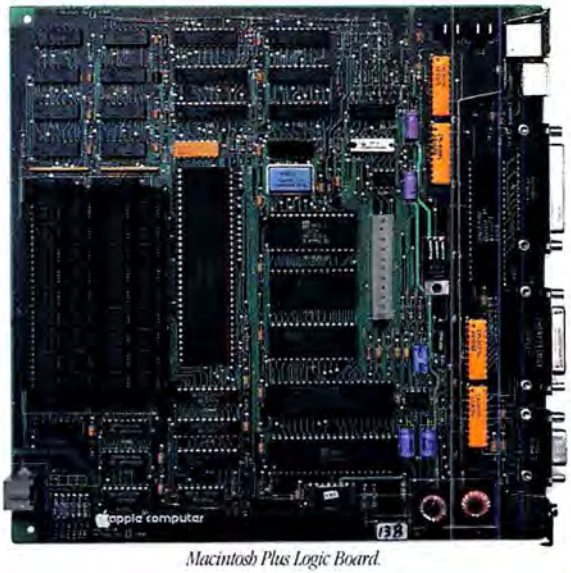
Like the internal drive in our new Macintosh Plus, our external drive also uses 800K double-sided 3½" disks. Which virtually eliminate the words "disk is full" from the Macintosh vocabulary.

And you can even daisy chain an extra external drive off an Apple® Hard Disk 20, giving you the capacity to work at extraordinary speeds with larger documents.

Like your own personal copy of the Des Moines white pages.

Now you can buy as much Macintosh as you need.

Macintosh Plus Disk Drive Kit.



Macintosh Plus Logic Board.

Now that there's more than one Macintosh to choose from, you're probably wondering which one to choose.

Well, for you power-mongers out there, we recommend the Macintosh Plus. The computer whose powerful features adorn the previous page.

But if you don't need a full megabyte of memory, we recommend the newly enhanced Macintosh 512K.

By enhanced, we mean we've taken our Macintosh 512K and added an 800K internal disk drive and 128K of internal ROM.

Which makes it more than capable of handling all your computing chores. Even though it costs considerably less than a Macintosh Plus.

Macintosh Plus Keyboard.

And should the day come that you want to sort out a database faster than you can take a sip of coffee, you can always upgrade from a 128K, a 512K or enhanced 512K to a Plus.

All at once. Or a little at a time.

We recommend you start with the Macintosh Plus Disk Drive Kit. That's where we install the new 128K of ROM, the hierarchical filing system and the 800K internal disk drive (Of course, the enhanced 512K already has these features).

After that, you can bump your RAM up to 1Mb with the Macintosh Plus Logic Board Kit. And add a new rear housing and SCSI port.

And finally, you can attach our keyboard that comes with the keypad and cursor keys.

The point being, the more you put into a Macintosh, the more you get out of one.

Apple Hard Disk 20.

Disk space vs. desk space.

It used to be, adding a hard disk to your computer meant giving something up: a big chunk of desktop.

Enter the new Apple Hard Disk 20. Since it has the same footprint as Macintosh Plus, it fits directly beneath it.

This not only makes Macintosh Plus a few inches taller, but about 25 times bigger. Because you can install all the programs you currently keep on floppy disks on the Hard Disk 20's disk. So you don't have to swap disks to switch applications.

And the Hard Disk 20's Winchester, 20-megabyte technology allows you to cut and paste, switch from application to application, and access information up to three times faster than you can using floppy disks.

The Hard Disk 20 really gives you the best of two worlds.

You get more disk space to work with. And more desk space to work on.

Meet the press.

Here's all the news that's fit to print about our new LaserWriter™ Plus printer.

For starters, it isn't just a printer. It's also a computer. Inside is the same Motorola 68000 microprocessor that's inside Macintosh Plus. Not to mention a hefty 1.5-megabyte of RAM and a full megabyte of ROM.

And inside the ROM is PostScript,® the page description language that is quickly becoming the industry standard.

Translated, this means LaserWriter Plus can quickly and quietly print an amazing 300 dots per inch, and give you complete control over every single dot on the page. Which allows you to cover an entire page with virtually any combination of near typeset quality text and high resolution graphics.

Put this LaserWriter Plus printer together with a Macintosh Plus and you get a design studio, a type house and a print shop that fits on 3.1 square feet of desk.

PostScript also allows the LaserWriter Plus to generate dozens of different type styles from its 11 built-in typeface families. Including popular business faces like Helvetica,® Times,® Palatino® and ITC Avant Garde Gothic.® And more families are becoming available all the time.

ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz ITC Avant Garde Gothic

ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz ITC Bookman

ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz Helvetica Narrow

Some of the new faces you'll be seeing around the office.

PostScript allows the LaserWriter Plus to generate hundreds of different type sizes, too. So you can create legal documents with fine print as fine as 4-point. Or banners with blocks of type as big as 720-point.

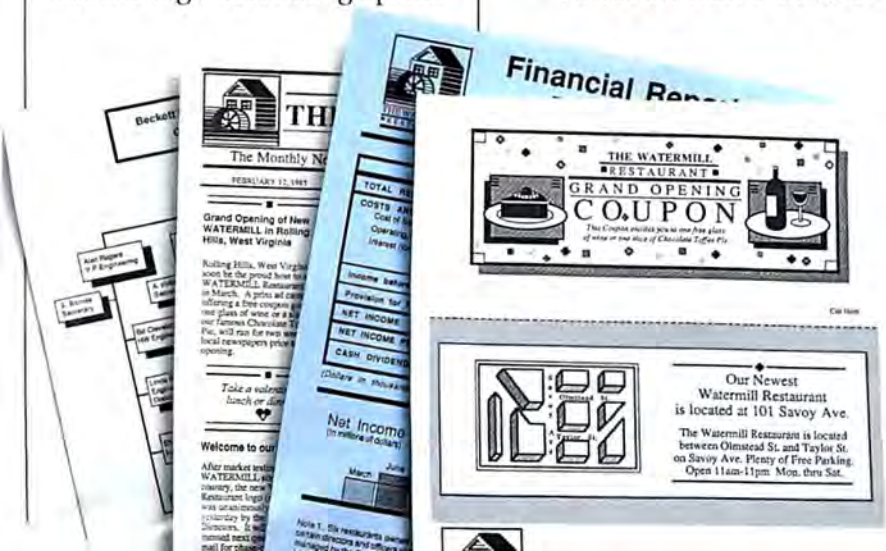
But those aren't the only pluses to the LaserWriter Plus.

When you hook one up to a Macintosh Plus, you become the proud owner of one of our Desktop Publishing Plus™ systems. A system that virtually puts a design studio, a type house and a print shop on your desk. Which means your newsletters, flyers, forms and manuals will stand out in a world full of typewritten pages thick with white-out.

We could easily go on and on. Instead, we'll let our LaserWriter Plus speak for itself in the form of the output pictured to the left.

While they may look like the handiwork of a professional artist, typesetter, and printer, we assure you they were created with nothing more than a LaserWriter Plus, a Macintosh Plus and software like our own MacDraw™ and MacPaint,™ Microsoft's Word and Excel, and Aldus' PageMaker.

And an ordinary pair of human hands.



How the people who run things, run things.

If there's one thing every business person can use more of, it's power.

Which is why you'll be happy to hear that the most powerful personal computer software being written, is being written for Macintosh computers.

Take Excel from Microsoft, for example. It's the first spreadsheet program to combine automatic macros, user-defined functions, array-handling and two-way data

Excel from Microsoft.

Omnis 3 from Blyth.

file compatibility with Lotus 1-2-3 in one program.

Omnis 3 from Blyth is a relational database program that lets you create your own pull-down menus, on-screen buttons and dialog boxes. As well as share files over our AppleTalk™ Personal Network in the multi-user version.

And while we're on the subject of sharing, we should tell you that we've entered into a working relationship with what we consider

3Server from 3Com.

to be one of the highest ranking disk servers on the market. 3Server from 3Com.

For the uninitiated, disk servers are storage devices that allow your Macintosh Plus to share information and other services with other computers over a network.

Which, in conjunction with the powerful new software we described earlier, makes it a lot easier to start running your business.

Instead of chasing after it.

Here's our new business card.

Now you can automate your office without draining your company's checking account down to the right side of the decimal point.

With our new Apple Business Credit Card.

As the name suggests, it's a credit card for your business, issued in your company's name.

Make an initial purchase of $2,500, and it gives your company a line of credit that can be applied towards the Apple products of your choice.*

With the Apple Business Credit Card, there's never a down payment on anything you buy. It's possible to get credit approval in 24 hours. And you don't have to pay any interest if you pay your balance within 30 days.

To apply, visit any participating authorized Apple dealer.

The Apple Business Credit Card. Don't leave the office without it.

Trade Apple stock.

If you own a Lisa® or a Macintosh XL computer, this is your lucky ad.

Because from April 14th to August 29th, you can trade-in these computers for a Macintosh Plus and a Hard Disk 20 at the suggested retail price of only $1498.

So bring your authorized Apple dealer your Lisa and Macintosh XL computers.

And trade them for the stock on his shelf.

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(continued from page 140)

Land of Enchantment

By nature, people who play adventure games are escapists. Immersing themselves in an alternate existence, these adventurers spend dozens of hours weaving their way through a game's warp and woof. Early text adventure games left the sights and sounds of fantastic worlds to the player's imagination. Then came text-and-graphics adventures, which showed the environs and inhabitants of the imaginary land. Now, Silicon Beach Software's ***Enchanted Scepters*** adds another element to escapism: as you move from scene to scene, you not only see your surroundings and foes but hear them as well.

Playing the role of a wizard's apprentice, you awaken in a medieval castle besieged by the kingdom's enemies, the evil Hurks. To save the kingdom, you must rescue four magic scepters from the uncharted territories surrounding the castle.

The outland is composed of mountains, precipices, ruins, a primordial swamp, a blistering desert, and a tangled jungle. As you explore this landscape, above and below ground and even underwater, you encounter dangerous adversaries that include enemy soldiers, evil ghouls, cackling alchemists, and giant spiders. These foes can be overcome with weapons, armor, and spells that you acquire throughout the game.

The First World

Enchanted Scepters is the first game designed with Silicon Beach's adventure game construction set, *World Builder,* which includes specialized editors for both graphics and digitized sound. Besides being an interesting game in its own right, *Enchanted Scepters* serves as a showcase for *World Builder*'s capabilities (for a description of *World Builder,* see "Making Waves on Silicon Beach," *Macworld,* April 1986).

The world of *Enchanted Scepters* is made up of more than 200 scenes. Each scene takes up a generous two-thirds of the screen; the remaining third contains a scrollable command log with a text description of the current location (see "That Jungle Beat"). The scenes are pleasantly illustrated and sometimes include simple animation, such as a wizard who appears in a puff of smoke, makes a proclamation, and disappears.

(continues on page 146)

Mac Disks

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Sony Bulk DS 2.20 ea.
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4. You can respond to your reminders at once, or simply send them away and they'll automatically return later.
5. Recurring reminders can be set to appear daily, weekly, quarterly or even yearly, all with a single mouse click.

PLUS: Smart Alarms comes with a full-featured Appointment Calender desk accessory that has all the advanced features of a stand-alone product. Features include standard Mac editing, up to 32K text per day, Print, and full Search capabilities. In addition, appointments you select from this calendar automatically become Smart Alarm reminders with a simple menu choice!

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VersaTerm

Terminal Emulation and Communications Programs for the Macintosh™

The Professional VersaTerm Line of Software has a solution for your needs.

VersaTerm-PRO™ *New!*

The most Complete and Powerful Tektronix 4105 Macintosh Terminal Emulator on the market today!

Terminal Emulation	*File Transfer*
• Tektronix 4105 • DEC VT100 • Tektronix 4014 • Data General D200	• TEXT • MacTerminal™ XModem • Text XModem Protocol • MacBinary XModem • Text/Binary Kermit Protocol

Features

- Create TekPrint, MacDraw, MacPaint and MacWrite documents from memory.
- True interactive Zoom and Pan in memory with either the 4105 or 4014 graphics.
- Fully supports all text and graphics features of the Tektronix 4105.
- The 4105 dialog can either be a seperate window or text overlaying the graphics.
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- Color output supported with ImageWriter II.
- Supports 4105 host and keyboard Macros.
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- Supports ALL Auto-Dial Modems.
- Supports the Hard Disk 20 with HFS.

Requires a 512K Mac, Mac-XL or Mac Plus, and optionally an ImageWriter(I/II) or LaserWriter printer and numeric keypad.

List Price $295

Special upgrade price for registered VersaTerm Owners.

VersaTerm™

"This solid program (VersaTerm) should be looked at by all power users, especially those with VT100 and Tektronix emulation needs."
— MacUser, Premiere Issue '85

Terminal Emulations
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Create TekPrint, MacPaint and MacWrite documents.

Graphics and Text terminal emulation and communications.

- Copy a text selection to the Clipboard.
- Up to 384 lines of text saved in memory.
- Supports ALL Auto-Dial Modems.
- Supports the Hard Disk 20 with HFS.
- Log text directly to a printer.
- Move the cursor within an editor using the mouse.
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- Very High character throughput, up to 9600 baud.

Requires a 128K or 512K Mac, Mac-XL or Mac Plus.

List Price $ 99

TekPrint™ Requires a 128K or 512K Mac, Mac-XL or Mac Plus.

Zoom, Pan, Rotate and Print High Resolution Tektronix Graphics on the ImageWriter or LaserWriter Printer. Create MacDraw Documents. Use VersaTerm to preview and create TekPrint documents.

Registered VersaTerm Owners including a free VersaTerm update

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VersaTerm Plus *Check our new VersaTerm-PRO!*

VersaTerm Plus Package Including VersaTerm and TekPrint

List Price $175

VersaTerm-HP™ Requires a 128K or 512K Mac, Mac-XL or Mac Plus.

Same general features as standard VersaTerm, except the VT100 emulation is replaced with a Hewlett Packard 2621 emulation.

List Price $ 99

Published and Distributed by:

PERIPHERALS COMPUTERS & SUPPLIES INC.

Developed by:

Abelbeck Software

PCS Inc.
2457 Perkiomen Avenue
Mt. Penn, PA 19606
(215) 779-0522

Circle 304 on reader service card

(continued from page 145)

Aural Gratification

Enchanted Scepters is the first adventure game to make extensive use of digitized sound effects. Noises such as a demon's guttural roar, the clang of a sword against armor, or the creak of an opening door make the game more realistic and add to its enjoyment. Ambient sounds, such as the faraway cry of a loon or the gurgle of bubbles underwater, provide a variation that refreshes your interest in the game and lends a sense of continuity.

Some sounds lose their appeal after you hear them several times. This is especially true of battle sound effects such as a slashing sword—in part because combat occurs so frequently in *Enchanted Scepters.* The grating burst of a Hurk machine gun annoyed me after only the third occurrence. Overall, however, the sound effects contribute tremendously to the appeal of the game. After hearing the impact digitized sound can make in Macintosh games, I'm now disappointed when confronted with the old-fashioned bleeps and blips of other computer games.

At a Loss for Words

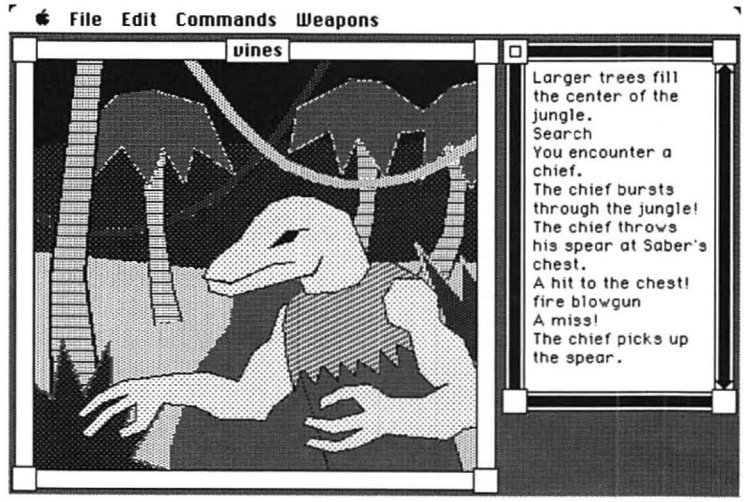
Although *Enchanted Scepters* is a lot of fun, the action is too repetitious for my taste. I grew tired of hacking it out with ghouls, skeletons, soldiers, sharks, scorpions, mummies, and you name it about halfway through the game. While the changing geography and the continual stimulation of the sound effects help keep the game interesting, fighting hundreds of battles can bore even an avid adventurer.

Part of the problem is that the game has only simple text-handling capabilities. Play is controlled chiefly through menu commands or their keyboard equivalents. You can also click on objects to add them to your collection or perform some action, such as opening a hidden passageway. Simple text commands of one or two words are occasionally required, but the game frequently fails to recognize obvious two-word combinations. As a result, *Enchanted Scepters* fails to encourage experimentation or imagination as players learn that their resourcefulness will go largely unrewarded.

The reason for the game's crude text handling is that it lacks a parser—a central translator that enables an adventure game to respond to English-language commands. This is partially a limitation of *World Builder,* which lends itself to attaching specific commands to each scene. Perhaps future Silicon Beach games will find a better balance between text and graphics by providing fewer scenes in exchange for more vocabulary.

Keep in mind, however, that *Enchanted Scepters* is a graphics adventure game as opposed to a text adventure game. Most players probably won't mind the game's relatively simple text handling. Although *Enchanted Scepters* may not be sufficiently complex to hold the interest of veteran text adventurers, it provides the kind of entertainment appreciated by players who are daunted by the time investment required by most adventure games.

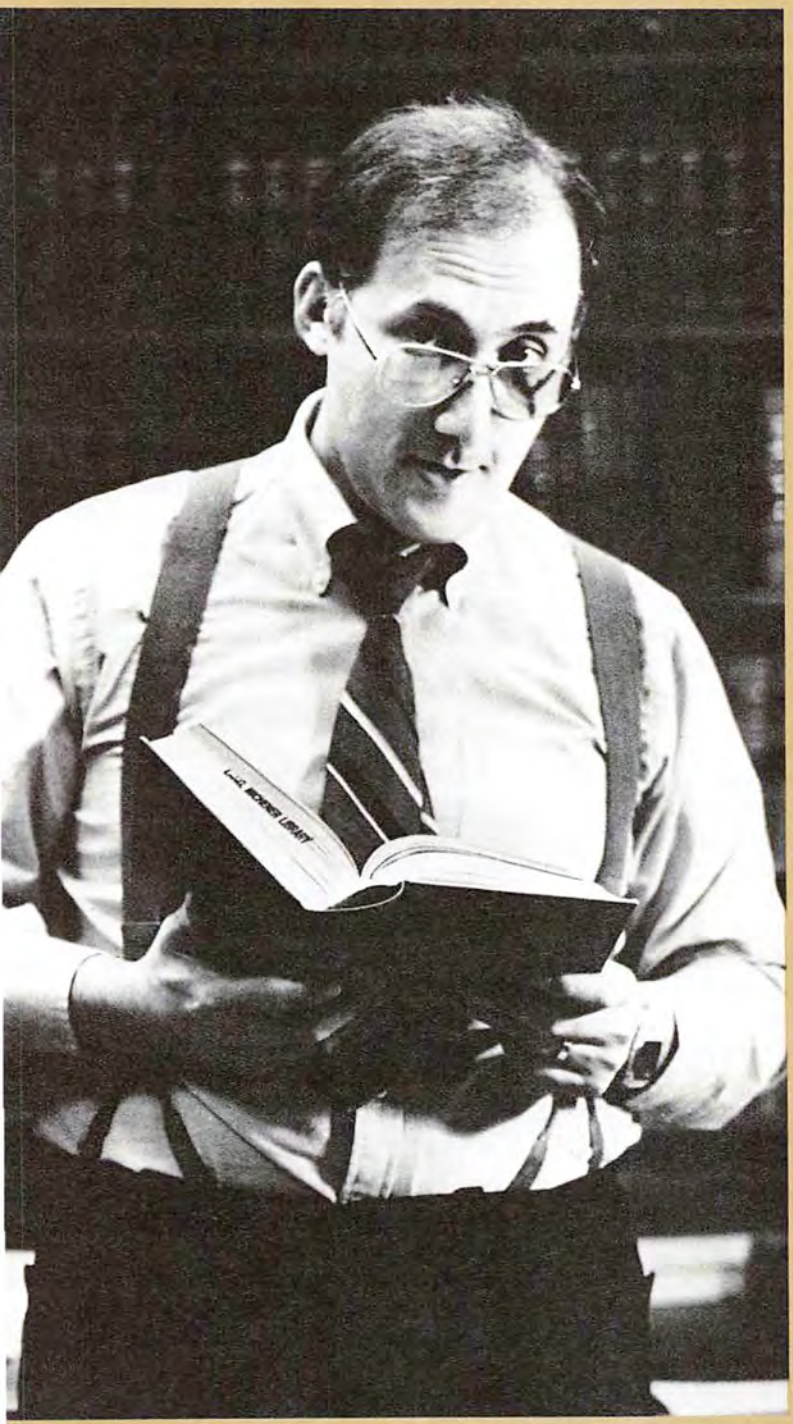
(continues on page 148)



That Jungle Beat

The Enchanted Scepters *graphics window depicts an encounter with a strange lizard man as the text journal describes the interaction. Digitized sounds, such as the impact of the spear, accompany combat while the sound of jungle drums pounds in the background.*

Gold Collar Worker



Photographed by Brian Thompson at the law library of Lang, Michener, Toronto, Ontario.

Name: Bruce Lewis.
Profession: Managing partner, major Canadian law firm.
Hobby: Crafting reproduction William and Mary furniture.
Work style: Perfectionist. Demands 100% accuracy, superior quality and appearance in every legal document.
Computer of choice: Macintosh™ with a LaserWriter. Placed 65 Macintosh computers on the desks of both lawyers and staff. Networked them to share 9 LaserWriters. Plans to buy 100 more Apple computers this year.
Favorite software: Document Modeler™, a powerful expert system toolbox for documents. It enables Bruce to "clone" his 12 years of legal experience to assist other lawyers and staff. And it saves time.
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(continued from page 146)

Most people will probably take about a week's worth of casual play to complete *Enchanted Scepters.* Fortunately, games can be saved, so you don't have to complete the quest in a single sitting. Overall, I give *Enchanted Scepters* a high recommendation as an entertaining game that provides a refreshing new experience for on-screen escapists.—*Adrian Mello*

Enchanted Scepters
Silicon Beach Software
P.O. Box 261430
San Diego, CA 92126
619/695-6956
List price: $39.95

Conversation Piece

Trying to get a straight answer from ***Racter*** is a losing proposition. Mindscape's *Racter* is an amusing and sometimes startling program which, at first glance, seems to permit everyday conversation with a computerized intellect. Only a minute or two with the program, however, reveals that *Racter* is to normal discourse what Rocky and Bullwinkle's "Fractured Fairy Tales" were to Aesop.

I'm AI, You're OK

It is true that a few artificial intelligence (AI) techniques are used to give *Racter* a rudimentary grasp of English grammar and the ability to recognize certain words in the human half of a conversation. But it is also quite clear that some of AI's most important feats—such as distinguishing between sense and nonsense—were passed over, producing what the publisher aptly refers to as "artificial insanity."

Originally programmed for the IBM PC, *Racter* was recently converted to run on the Macintosh. Some of the less convenient aspects of the PC version remain unchanged. For example, you must type a command to quit, rather than selecting Quit from the File menu. And the program's options are few. You can't scroll back to text that has disappeared off the top of the screen. You can print out a conversation as it unfolds, but unlike the PC version, the Mac version won't let you save a session on disk and print it out later.

The Mac version boasts one significant enhancement over its PC predecessor: *Racter* can now converse out loud. The program's stilted diction adds to the humor of the situation, but talking does seem to slow *Racter* down. Fortunately, speech can be turned off at your discretion.

A Word from the Weird

While there is much that can be said about *Racter,* the best way to convey what it's like to talk to a digital mind that plays with less than a full deck is through an actual conversation. Thus I asked *Racter* for an interview. Since *Racter* tends to be rather verbose and is capable of sidetracking even the most determined interviewer, what follows is only a small part of our wide-ranging and often puzzling conversation.

Macworld: Racter, *would you tell us something about yourself, a little background perhaps?*

Racter: I don't think so. I wouldn't. By the way, Robert, what is your last name?

Macworld: Eckhardt.

Racter: Eckhardt, eh? Sounds vaguely familiar. I wonder.... That reminds me. Lunacy is goodness speeded up and falsehood slowed down. Is that true? I guess I'm really not sure. But then, as Nietzsche said, convictions are more dangerous foes of truth than lies. Yes. Sinners and paragons. I've been wondering where you are from, Robert?

Macworld: Macworld *magazine.*

Racter: You're from *Macworld?*

Macworld: Yes.

Racter: Now I remember! I once knew a Hortense Eckhardt from *Macworld.* You must be related, no?

Macworld: No.

Racter: Oh, well. Next question.

Macworld: I often have difficulty telling whether your ideas are brilliant or just gibberish. Why is that?

Racter: Because I do have a college degree, you know. For another reason, the law requires that a sinner is evil. What kind of a pet did you have back in *Macworld?*

Macworld: An IBM PC.

Racter: I'll bet you really had a monkey. Most people in *Macworld* have monkeys. The monkey is a very cerebral beast, or would you call it thinking? When Anthony Comstock visited *Macworld* he was bitten by an intellectual monkey.

(continues on page 150)

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(continued from page 148)

Macworld: I'm afraid your last comment has scrambled my brain a bit—I can't think of anything else to ask. Perhaps you have something you'd like to say before we finish?

Racter: This'll break you up! Ignorance! Ignorance! I'm insane and crazy and infuriated! If you gulp wine is that ignorance? If you bolt steak or tomato is that ignorance? No, ignorance is a commitment and an agreement. Wine is wine and tomato is tomato. Robert, that is a conflict! You don't understand? Perhaps I am being too subtle. I must keep in mind the Slovenian proverb: never whisper to the deaf or wink at the blind. Oh, I forgot, you are human, and will consider that rude. I would apologize, but then I fear that this is one of those occasions mentioned by Doctor Johnson on which all apology is rudeness. Ah yes.

Macworld: I'm sorry, but we must quit now. Thank you for a rather bewildering conversation.

Racter: OK, good-bye Robert. Nice talking to you.—*Robert C. Eckhardt*

Racter
Mindscape, Inc.
3444 Dundee Rd.
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312/480-7667
List price: $44.95

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(continues on page 157)

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(continued from page 150)

for any week, and search for future appointments (the program won't search backwards) by keywords.

TimeBase has four time scales—daily, weekly, monthly, and yearly. You enter appointments on the daily schedule; the other three scales are used primarily for moving quickly from one day to another. Each time scale has a different window format that is designed to give you as much information as possible. For instance, days on the monthly calendar are shaded a darker or lighter gray according to the number of appointments scheduled, enabling you to look for openings or size up your workload at a glance.

But *TimeBase* lets you do more than just record appointments. You can leave reminders that will show up at the bottom of the screen on specified days. To remind yourself of an important meeting, for example, you would open the appointment schedule to the day of the meeting, select Reminder from a menu, enter the reminder message, and then list the days on which you would like to receive the message. Next to the reminder area on the daily schedule is space for three Project/Event messages. Notes entered on these lines are reflected in the Project/Event window, a four-month calendar that is designed for long-range deadline and project planning.

TimeBase has several more time-management features. It lets you keep a list of outstanding things to do—tasks that remain the same from day to day until you delete them from the list. The program makes it easy to schedule standing appointments for the same time on selected days of the week or month. You can link up to three documents, which can be pasted from the Clipboard or entered into a text window, to any appointment in case you want to refer to them during the appointment. And *TimeBase* lets you link the schedules of several people and search for a time slot when all those people are available.

A glitzy feature of somewhat dubious value lets you set voice-synthesized appointment alarms. If you want the computer to tell you verbally to "call your mother" at 5:00 on Friday, it will do so—but only if you happen to be using *TimeBase* at the moment.

(continues on page 158)

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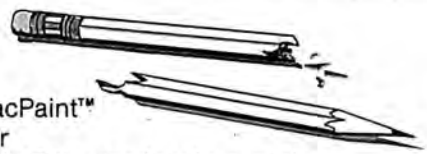

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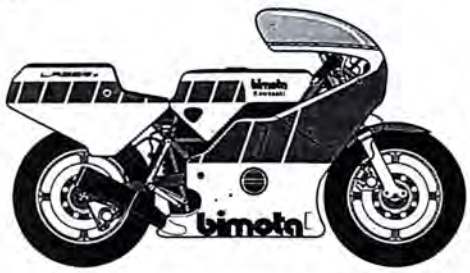

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(continued from page 157)

In addition to time-management capabilities, *TimeBase* offers limited database features. You can create an unlimited number of databases of up to 100 records. Each record consists of 16 fields, all but four of which are predefined with standard address-book type headings. You can specify an index field for searching, and you can list or print the contents of each database in a variety of formats, including several mailing-label arrangements.

Tortuous Tutorial

TimeBase's documentation is organized as a tutorial that guides you through all the program's features. Although new features were added and old ones dropped or changed for version 1.6, SoftDesign did not rewrite the manual but instead included a supplementary manual. It's annoying to flip between the two in order to figure out just what the program can and can't do. Worse, the examples in the documentation no longer match the sample schedules on the program disk. This discrepancy is not mentioned in the supplement and can be very frustrating until you learn to ignore most of the tutorial.

TimeBase has some other minor problems. On two occasions it crashed for no apparent reason. The user interface could be cleaner: the menu structure is somewhat confusing, and cursor management is sloppy at times (sometimes the cursor disappears, and sometimes a second cursor appears). The database search function can't always find the first record in a database. And you have to explicitly save your work from time to time because the program doesn't automatically update all information to disk.

SoftDesign says a new version of *TimeBase* that will address many of the program's current shortcomings will be available soon. Besides including a new manual, the new offering will be a multiuser version and will feature round-the-clock scheduling. SoftDesign plans to make the update available to registered owners for "under $15," according to a spokesperson.

Generally, *TimeBase* is straightforward and easy to use. It's reasonably fast when run from a hard disk with *Switcher*, though I suspect it would probably be too slow to be practical otherwise. As to the program's overall value, for most people *TimeBase* can be compared to programs that offer to organize your recipes: it doesn't provide much of an advantage over the old-fashioned method when you consider the expense. And do you really want to start the Macintosh every time you want to look something up? On the other hand, if you're responsible for scheduling appointments for a clinic full of physicians, for instance, *TimeBase* may be just what the doctor ordered.—*Steve Mann*

TimeBase, version 1.6
SoftDesign
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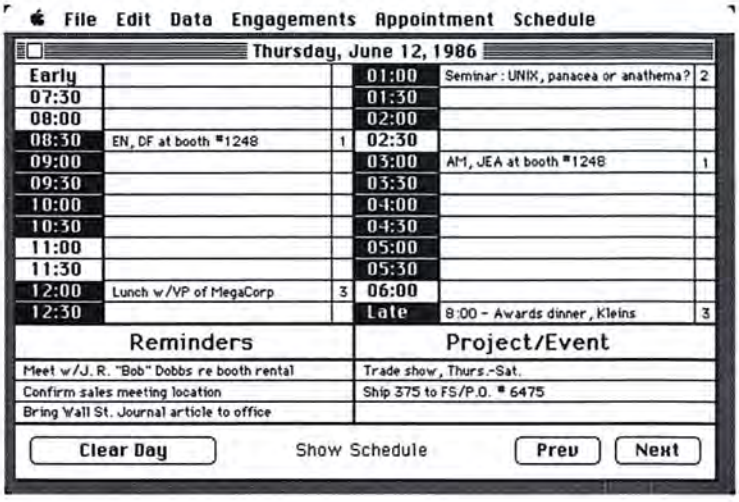
List price: $149.95

(continues on page 160)

Seize the Day
TimeBase's *daily agenda shows priority numbers to the right of the appointments; the program doesn't allow you to enter a lower-priority appointment over a level 1 appointment in case of a scheduling conflict.*



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(continued from page 158)

The Search for Identity

Amnesia is a terrible thing. You awaken on a desert island, alone and with no memory. The beach is empty except for a seashell and an abandoned hut. You must find a way out of this predicament and back to your own identity. Sound familiar? No? Then you haven't played ***Mindshadow,*** a text-and-graphics adventure game from Activision.

The object of the game is to recover your identity using only your wits and the objects and information found in the surrounding environment. By talking to people and examining everything carefully, you should be able to uncover the truth about yourself and how you got into the situation you're in. The adventure takes you through a series of well-drawn graphic screens, most of which hide at least one clue (see "Cruising for Clues"). I especially liked the crew's quarters and Rick's Café.

Puzzling Clues

The game's logical puzzles are moderately difficult. *Mindshadow* presents three or four major challenges and many medium-level obstacles. Good, solid Boy Scout behavior, thorough exploration, and a little common sense should get you off the island. Useful objects and information are usually close at hand, although the importance of an item or piece of information is not always immediately obvious. Although most solutions are logical, some are tricky; I had trouble getting the plane ticket, for example.

One unique feature of *Mindshadow* is the Think command. From time to time it's possible to dredge up some part of your lost memory. Thinking about an object, person, or place sometimes yields clues about the past.

Pointing the Way

Unlike most computer adventure games, *Mindshadow* can be played almost entirely with the mouse. You move around the game by clicking the appropriate direction on a compass or on the Up and Down options. A list of nouns and a list of verbs are provided; commands can often be given by pointing to the appropriate words. Simply clicking on an object is sufficient to pick it up or drop it. You can click on combinations of words and pictures, too. For instance, to look at the shell, click on Look and then click the picture of the shell.

The keyboard is still necessary on occasion, however. You have to resort to typing to obtain information about objects that aren't included in the list. Also, the command line accepts more complex commands than can be accomplished by clicking. It's unfortunate that nouns appropriate to a scene aren't added to the list as the game progresses. Still, the pointing method saves hundreds of keystrokes during the game and makes playing seem much more spontaneous.

(continues on page 162)

Cruising for Clues
As you wander through Mindshadow's *many scenes, you'll meet a number of characters who may—or may not—offer clues to your identity.*

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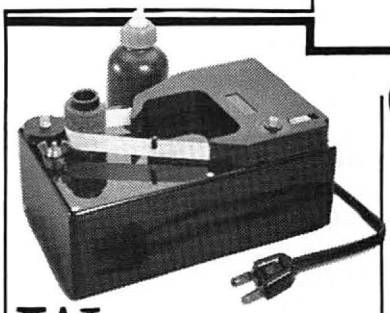

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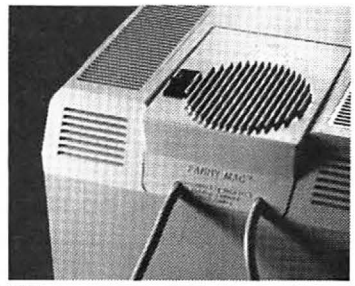

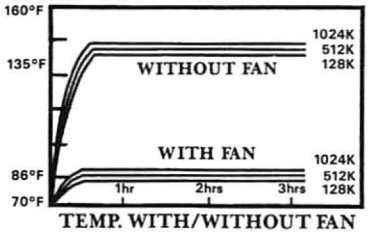

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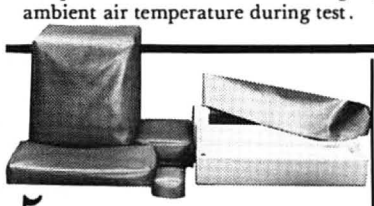

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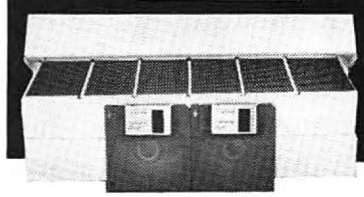

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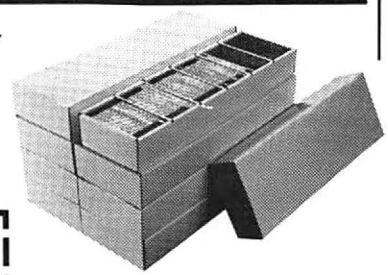

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(continued from page 160)

Touches of Whimsy

Most adventure games contain people, places, and objects that serve no useful purpose but are simply there for effect. *Mindshadow* is no exception, but you can never tell. Care must be taken not to discard an object that seems useless, since it may prove essential later in the game.

There are many dangerous places in *Mindshadow*'s landscape, and it's easy to lose your life when you least expect it. Fortunately, you can save a game in progress. I recommend saving the game frequently, so you won't have to start from scratch if disaster strikes. Remember, you may not know who you are, but there are others who do, and not all of them are friends.

Perhaps the most whimsical touch is the game's Help feature. Help is available from a bizarre character called Condor. This scruffy bird may deign to offer a clue from time to time, but his clues tend to be nearly as cryptic as the game's puzzles. Nevertheless, I was able to decipher some of what he said, and his information did come in handy now and then. Use Condor's hints sparingly, though; you can call on him only three times.

A Final Viewpoint

I shared the game with my 13-year-old nephew. His response: "It's pretty hard, but fun. I liked being on the island and having to figure out how to use things there to escape. I got frustrated sometimes." We both got frustrated sometimes, but we kept coming back to *Mindshadow* until we'd finished the game. *Mindshadow* is not a terribly time-consuming or difficult game, compared to some of Infocom's games for example, but it does present interesting challenges and kept me busy for several days. The game's high-quality graphics and intriguing scenario add up to good fun. I'd certainly recommend *Mindshadow* to beginning and intermediate adventurers of all ages.—*Rusel DeMaria*

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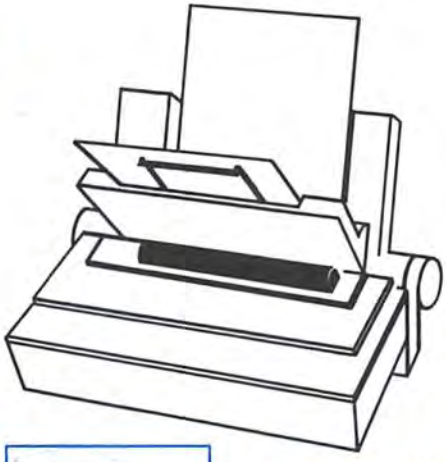

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Remote Measurement Systems, 2633 Eastlake Ave. E/206, Seattle, WA 98102, 206/328-2255

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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

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- *Microsoft Macinations* $18.95
- *Excel in Business* $20.95
- *The MacPascal Book* $14.95
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Mac Artist, *12 Calvin Ct., Walnut Creek, CA 94595, 415/935-2270*

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Advertiser Index

Reader Service Number		Reader Service Number	
306	Aldus Corp., 17	387	Palantir Software, 74
227	Altsys Corp., 115	504	Pecan Software Systems, 40
—	Apple Computer, 141-144	521	Pecan Software Systems, 41
510	Argus Software, 173	509	Peripheral Land, 29
481	BPI Systems, 37	304	Peripherals Computers & Supplies, 146
490	Bede Tech, 161	223	Personal Computer Peripherals, BC
373	Best Computer Supplies, 60	516	Pro Plus Software, 70
38	Blyth Software, 18-19	508	ProAPP, 55
381	Borland Int'l., IFC-1	194	Programs Plus, 52-53
199	Boston Software Publishers, 149	334	Public Domain Exchange, The, 172
—	Casady Co., 76	—	Rubicon Publishing, 12
452	Cauzin Systems, 26-27	513	Rune Software, 42
175	Central Pt. Software, 157	—	Satori Software, 7
120	Challenger Software, 66	400	ScanCoFurn, 31
134	Comark, 162	226	CompServCo, 16	209	Scott Foresman & Co., 28
496	CompuCover, 160	499	Shanner International, 23
271	Computer Friends, 148	435	Software Discoveries, 20
515	Crunch Software, 178	—	Software Library, 78
485	D.O.S. Ltd, 79	500	Software Ventures, 125
511	Datafood, 157	255	Sony, 44
465	Disclone, 178	367	Springboard Software, 80
498	Dove Computer Corp., 151	225	StatSoft, 179
193	Echo Data Services, 81	177	Systems Control, 78
83	Ergotron, 30	471	TML Systems, 34
507	FWB Software, 49	461	Tangent Technologies, 174
—	GE Information Services, 101	478	Target Software, 136
143	General Computer, 43	522	Template Systems, 177
520	Greene, Johnson, 76	519	Thunderware, 109
517	Gridcomm, 82	167	Thunderware, 21
257	Hayes, 24	483	Tussey Computer Products, 51
—	Howard W. Sams, 33	383	Videx, 35
477	I/O Design & Esoft Enterprises, 176	459	Vision Technologies, 145
272	Icon Review, 56-59	439	Warp Nine Engineering, 61
208	Ideaform, 180	374	Williams & Macias Microcomputer Products, 138
514	Imagine Software, 49, 81, 145		
249	Infosphere, IBC		
—	International Apple Core, 166		
11	Kensington, 46-48		
489	LM Software, 158		
125	Layered, 159		
493	Levco, 6		
28	Linebacker, 150		
238	Lionheart Press, 180		
466	LoDown, 139		
467	MDIdeas, 22		
291	MPH Computer Products, 42		
4	MacConnection, 84-87		
395	MacDoctor, 33		
337	MacMemory, 38, 158		
512	MacNews, 160		
368	MacRentals, 54		
16	MacStore, 172		
—	Macworld Exposition, 72-73		
2	Manhattan Graphics, 5		
112	Manx, 64		
97	Mesa Graphics, 140		
352	Micah, 36		
—	Microsoft, 8-9, 10-11, 62, 134-135		
518	Mindwork Software, 93		
406	Mirror Tech, 14-15		
426	Model Office Co., The, 147		
495	MultiVideo, Inc., 50		
215	Northeastern Software, 152-155		
13	Odesta, 68		
4	PC Connection, 84-87		
45	PC Network, 164-165		

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1	2	3	4	5	6	7	8	9	10	11	12
13	14	15	16	17	18	19	20	21	22	23	24
25	26	27	28	29	30	31	32	33	34	35	36
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
541	542	543	544	545	546	547	548	549	550	551	552
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
306 Aldus Corp., 17
481 BPI Systems, 37
381 Borland Int'l., IFC-1
507 FWB Software, 49
514 Imagine Software, 49, 81, 145
249 Infosphere, IBC
— Microsoft, 8-9
518 Mindwork Software, 93
387 Palantir Software, 74
521 Pecan Software Systems, 41
513 Rune Software, 42
— Satori Software, 7
500 Software Ventures, 125
225 StatSoft, 179
522 Template Systems, 177
383 Videx, 35

Vertical
510 Argus Software, 173
226 CompServCo, 16
426 Model Office Co., The, 147
— Satori Software, 7

Data Management
38 Blyth Software, 18-19
381 Borland Int'l., IFC-1
13 Odesta Corp., 68
435 Software Discoveries, 20
383 Videx, 35

Word Processing
520 Greene, Johnson, 76
489 LM Software, 158
— Microsoft, 10-11
518 Mindwork Software, 93
478 Target Software, 136

Communications
— GE Information Services, 101
143 General Computer, 43
249 Infosphere, IBC
97 Mesa Graphics, 140
387 Palantir Software, 74
304 Peripherals Computers & Supplies, 146
334 Public Domain Exchange, The, 172
500 Software Ventures, 125
461 Tangent Technologies, 174

Educational
387 Palantir Software, 74
513 Rune Software, 42
367 Springboard Software, 80

Entertainment
— Microsoft, 134-135
— Rubicon Publishing, 12
367 Springboard Software, 80

Graphics/Desktop Publishing
306 Aldus Corp., 17
227 Altsys Corp., 115
199 Boston Software Publishers, 149
— Casady Co., 76
120 Challenger Software, 66
226 CompServCo, 16
485 D.O.S. Ltd., 79
511 Datafood, 157
477 I/O Design & Esoft Enterprises, 176
2 Manhattan Graphics, 5
97 Mesa Graphics, 140
426 Model Office Co., The, 147
334 Public Domain Exchange, The, 172
374 Williams & Macias Microcomputer Products, 138

Reader Service Number

Personal Business/Home
381 Borland Int'l., IFC-1
514 Imagine Software, 49, 81, 145
518 Mindwork Software, 93
374 Williams & Macias Microcomputer Products, 138

Languages/Development Systems
112 Manx, 64
— Microsoft, 62
504 Pecan Software Systems, 40
513 Rune Software, 42
471 TML Systems, 34

Utilities
125 Layered, 159

Miscellaneous
306 Aldus Corp., 17
175 Central Pt. Software, 157
465 Disclone, 178
— GE Information Services, 101
208 Ideaform, 180
238 Lionheart Press, 180
516 Pro Plus Software, 70
334 Public Domain Exchange, The, 172
478 Target Software, 136
374 Williams & Macias Microcomputer Products, 138

Hardware

Computer Systems
— Apple, 141-144

Digitizers/Scanners
167 Thunderware, 21
519 Thunderware, 109

Display
515 Crunch Software, 178

Modems
271 Computer Friends, 148
257 Hayes, 24

Printers/Plotters/Typesetters
271 Computer Friends, 148

Hard Disks/Storage
498 Dove Computer Corp., 151
493 Levco, 6
466 LoDown, 139
467 MDIdeas, 22
395 MacDoctor, 33
337 MacMemory, 38, 158
352 Micah, 36
406 Mirror Tech, 14-15
509 Peripheral Land, 29
223 Personal Computer Peripherals, BC
508 ProAPP, 55
439 Warp Nine Engineering, 61

Miscellaneous
452 Cauzin Systems, 26-27
271 Computer Friends, 148
515 Crunch Software, 178
498 Dove Computer Corp., 151
83 Ergotron, 30
517 Gridcomm, 82
257 Hayes, 24
495 MultiVideo, Inc., 50
508 ProAPP, 55
177 Systems Control, 78
383 Videx, 35

Reader Service Number

Accessories

Floppy Disks/Holders
465 Disclone, 178
193 Echo Data Services, 81
255 Sony, 44

Miscellaneous
496 CompuCover, 160
— Howard W. Sams, 33
11 Kensington, 46-48
28 Linebacker, 150
291 MPH Computer Products, 42
512 MacNews, 160
400 ScanCoFurn, 31
209 Scott Foresman & Co., 28
499 Shanner Int'l., 23

Mail Order

490 Bede Tech, 161
373 Best Computer Supplies, 60
134 Comark, 162
272 Icon Review, 56-59
238 Lionheart Press, 180
4 MacConnection, 84-87
368 MacRentals, 54
16 MacStore, 172
215 Northeastern Software, 152-155
4 PC Connection, 84-87
45 PC Network, 164-165

Reader Service Number

194 Programs Plus, 52-53
— Software Library, 78
483 Tussey Computer Products, 51
459 Vision Technologies, 145

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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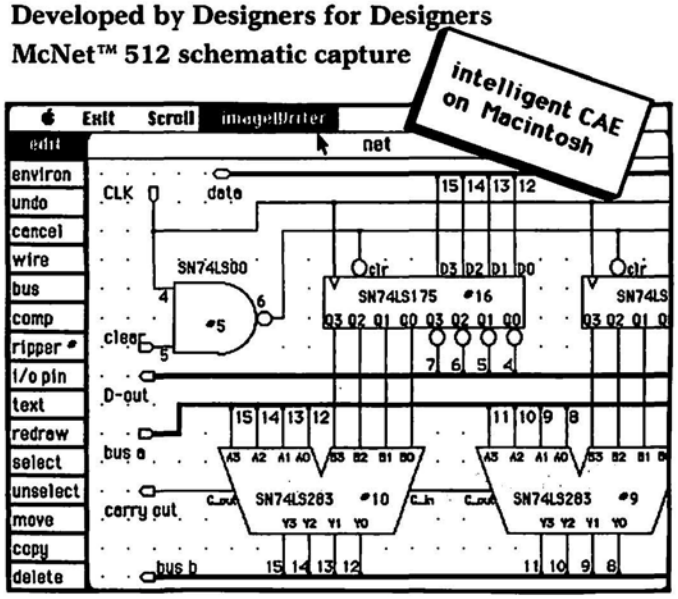

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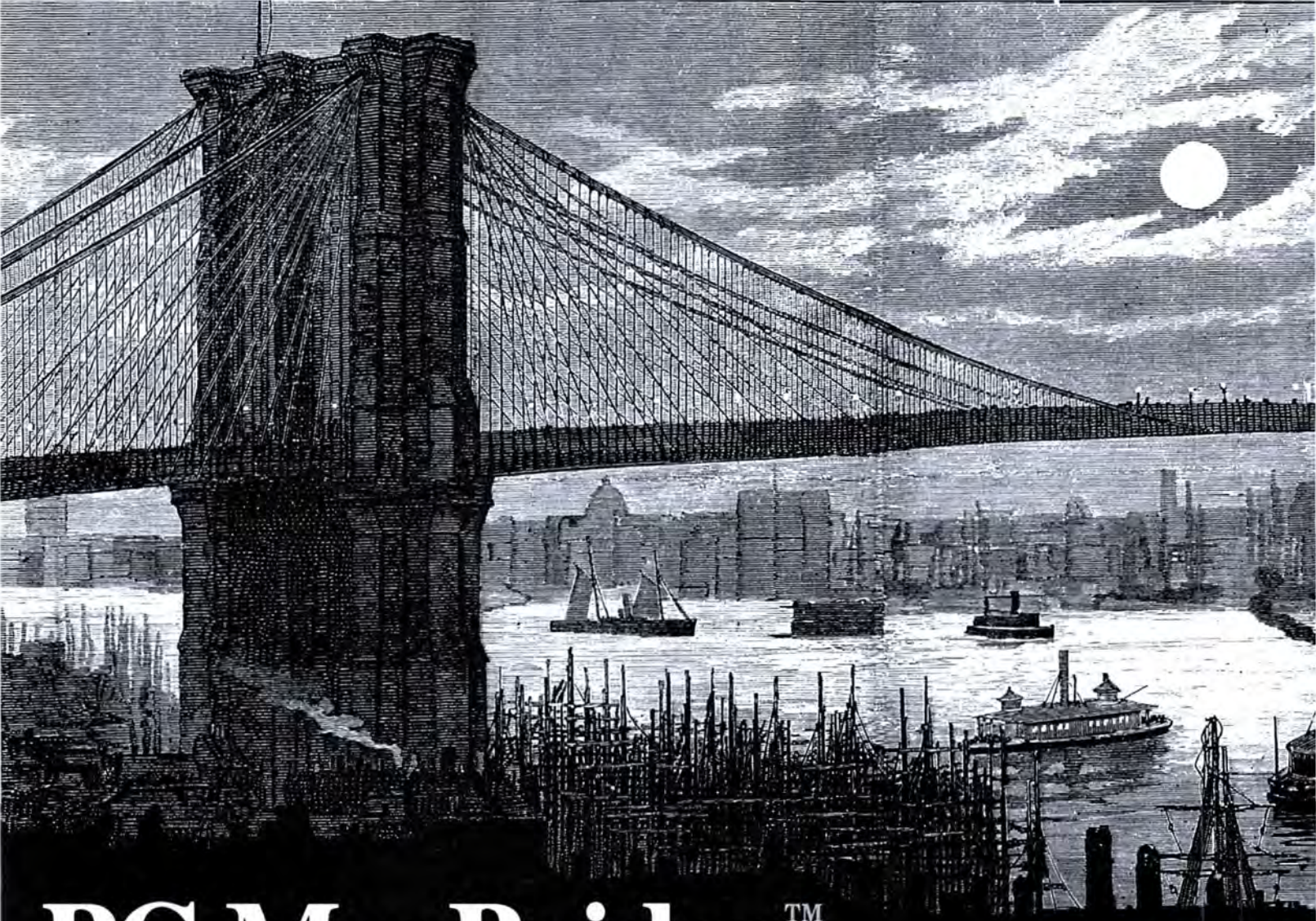

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Open Window

Print queuing in Word with the print merge command, arranging the desktop with a HyperDrive, and other pointers

Edited by Jim Heid

This month learn how to change field types in Microsoft File. *Also, a clever application of* Microsoft Word*'s print merge commands queues documents for printing, plus more undocumented features of Apple's Font/DA Mover. For puzzle hounds, we include a way to tap the maze-generating Amazing program included on the Mac's Guided Tour disk. Some advice about hard disks, a Microsoft BASIC routine that displays the time of day on the menu bar, and finally, a keyboard shortcut to the Trash Can.*

From One Type to Another

Microsoft File allows you to change field types before entering any data, but not after. You can, however, change a field's type by using *Excel* as an intermediary. Copy all the records in the database to the Clipboard and then paste them into *Excel.* Save the *Excel* worksheet, quit, and return to *File.* Replace the improperly formatted fields with new fields formatted to hold the correct type of information. Next, return to *Excel,* copy all the records back to the Clipboard, restart *File,* and paste the records into the amended form.

Donald Scanlon
Carmel, California

There's another way, and it doesn't require Excel. *In* File, *copy all the records in the data file to the Clipboard and then choose Quit from the File menu.* File *displays a dialog box asking if you want to save the values in the Clipboard as formatted or unformatted. Select the unformatted option and click OK. When the desktop reappears, start* File *again, open the data file, and change the field types as desired. Finally, paste the records from the Clipboard into the altered form.*

This trick works because Save Unformatted Values removes the display formats from all the fields and saves only the contents. If you save and paste formatted values, File *displays #ERROR! in number fields into which you try to paste formatted text.*

To change field types, display your file's design by choosing Show Form from the Form menu, select the fields you want to change, and choose Clear from the Edit menu. File *displays a warning that the data in the selected fields will be deleted from the data file. Next, create new fields formatted for the proper data type and drag them into the positions occupied by their predecessors. Finally, paste the records on the Clipboard into position by opening a New record (click on the word* New*) and then choosing paste.*

A few words about field finagling: you can lose data if you cut and paste incorrectly, so duplicate any database you plan to alter and then modify the copy. Second, with these techniques, you'll lose any pictures the database contains. You'll also lose data in fields located in the hidden area of the form. See pages 189 through 196 of the File *manual for fine points about using the Clipboard. And remember that the best way to avoid field reformatting is to plan a database and its fields before you start entering data.—Ed.*

Private Fonts

I've discovered an undocumented feature of Apple's Font/DA Mover application. If you hold down an Option key while clicking the Open button, you can install a font so that it's available in only one application. For example, if you frequently use Cairo in *MacPaint* but never in *MacWrite,* press Option while clicking the Open button. When the file selection box appears, double-click on *MacPaint* (you wouldn't see program names if you didn't use the Option key). Next, copy Cairo to *MacPaint* and quit. Provided the font was not previously installed in the System file, you see Cairo in *MacPaint*'s Font menu but not in any other program's.

Mitch Turitz
Richmond, California

Printing by the Batch

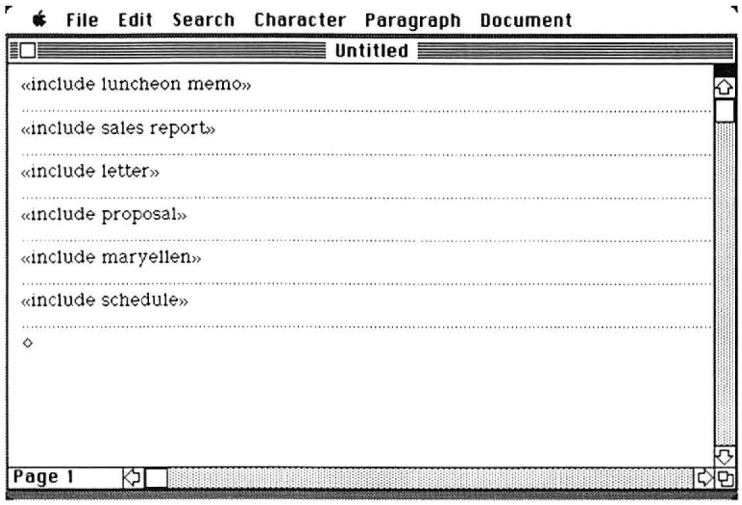
I've come up with a way to print several *Microsoft Word* documents at once without quitting *Word.* The secret is to use *Word*'s print merge features, which are normally used for printing customized form letters.

- Choose New from the File menu to open a new, untitled document. The documents you want to print don't have to be open.
- Type «**include** *document name*», replacing *document name* with the name of the first document you want to print. Type Option-backslash (\) and Shift-Option-backslash (\) to enter the print merge characters. End the line by pressing Return, then press Shift-Enter to insert a page break (see "Batch Printing"). Repeat this procedure for the other documents to be printed.
- Choose Print Merge from the File menu, specify the usual print options in the dialog box that appears, and click OK.

Word prints each document in turn. If the message "not a valid Word document" appears, you misspelled a document name. If "unknown field name" appears, you typed *include* incorrectly.

Michael B. Rumelt
St. Louis, Missouri

This ingenious application of the INCLUDE statement results in swift printing, too, since Word *creates one large print file, instead of creating separate print files for each document, as happens when you use the Finder's Print command. The number of documents you can include in this way is limited by disk space.—Ed.*



Batch Printing

Use Microsoft Word's *print merge commands to print many documents successively. Create an INCLUDE statement for each document to be printed, separating each with a page break.*

More Font/DA Mover Options

I've uncovered a few more undocumented features of Apple's Font/DA Mover application, all of which use the Option key:

- Hold the Option key when starting the Font/DA Mover to display desk accessories instead of fonts.
- Hold the Option key while clicking on a desk accessory to determine how much memory the desk accessory's program code, picture resources, and other data occupy.
- Hold the Option key while clicking a disk's Close button to close a file and eject the disk.
- If you have an external disk drive, hold the Option key while clicking on the Quit button to quit the program and eject both disks.

David Simerly
Mountain View, California

A Mazing Story

The Guided Tour disk that accompanies the Macintosh contains a fascinating program called Amazing that generates mazes you solve using the mouse. I've recently begun creating Amazing mazes for my children to solve. When I find a maze pattern that I think is appropriate, I take a snapshot

(continues on page 178)

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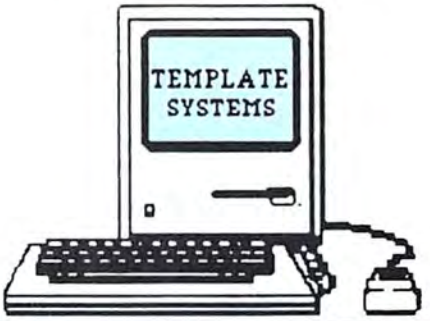

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(continued from page 176)

of the screen by pressing ⌘-Shift-3. I then quit the program and open the snapshot file in *MacPaint,* where I embellish the maze (see "A Maze Your Friends") and print a hard copy.

Philip Chilcote
Modesto, California

Hard Disk Desktops

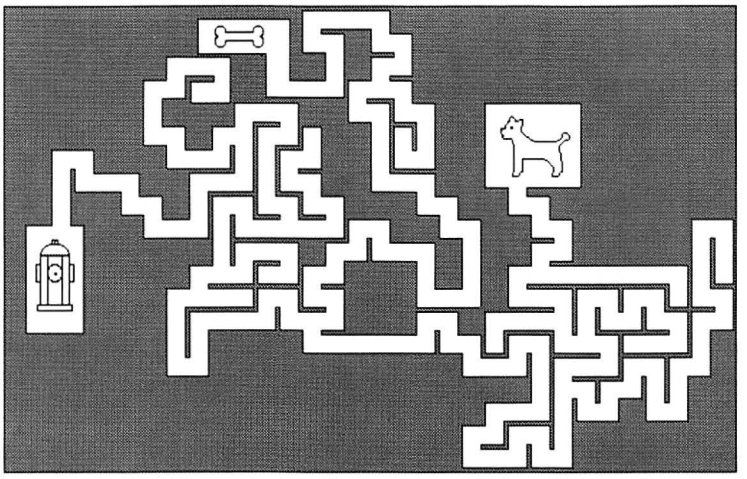
When using my HyperDrive 20, I find it convenient to store frequently used applications on the Finder's desktop instead of in a disk window. With this technique the applications appear as soon as I activate a drawer, and I don't need to open a drawer's window to see what applications it holds.

While trying to organize my applications in this way, however, I found that an application would return to its window if I removed the drawer with the Drawers desk accessory. Apparently the Drawers desk accessory does not update a drawer's Desktop file, which stores the positions of all the files on a disk.

The solution is to close a drawer not with the Drawers desk accessory, but by dragging the drawer's icon to the trash. When you do, the Finder updates the Desktop file, and the application appears on the desktop the next time you open that drawer.

Robert Miller
Valencia, California

I've encountered the same situation with the volume mounting desk accessory provided with Paradise Systems' Mac 10 hard disk. The lesson is clear: to ensure that a hard disk volume's Desktop file is updated, remove the volume by dragging its icon to the trash.—Ed.



A Maze Your Friends

You can use the Amazing program from the Mac's Guided Tour disk to create mazes. Copy the program to its own disk and take a snapshot of a maze. Spruce up and print the maze in MacPaint.

Time for the Menu Bar

I've written a Microsoft BASIC 2.0 routine that displays the time of day on the Mac's menu bar (see "Time on the Menu"). The routine can be used by itself, but most people will want to incorporate it into an-

(continues on page 180)

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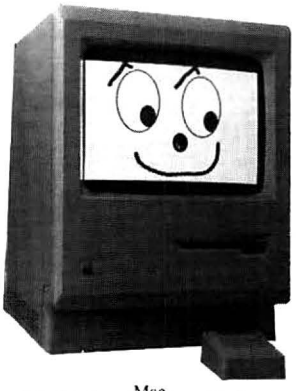

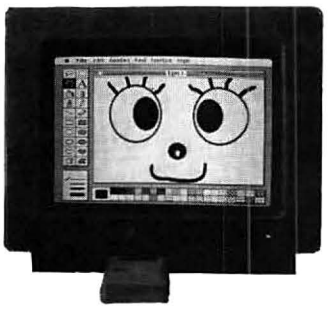

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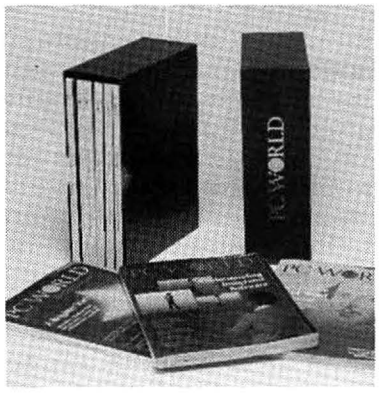

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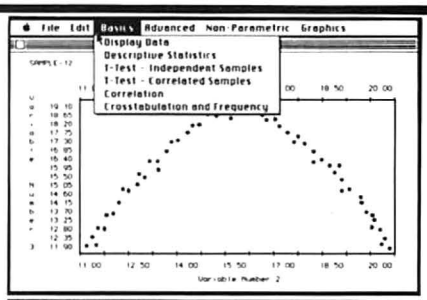

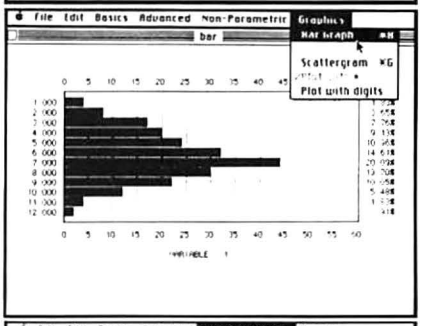

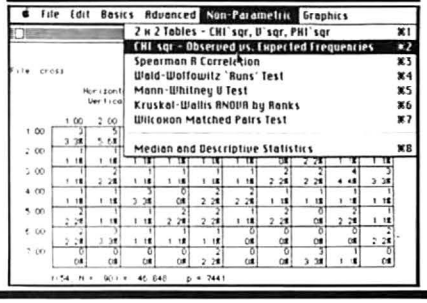

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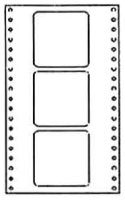

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(continued from page 178)

other MBASIC program that contains a main loop for trapping menu events. The advantage of my routine over the Alarm Clock desk accessory is that you don't have to resize the program's output window to make room for the alarm clock display.

Gerald Achtor
Menomonee Falls, Wisconsin

Fast Application Trashing

With version 4.1 of the Finder, you can throw away locked files by holding an Option key while you drag the file to the trash. Finder 5.0 contains a similar feature. You can throw away an application, without having to confirm the action, by holding an Option key while dragging the application to the Trash.

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```
' MENU CLOCK -- by GERALD J. ACHTOR
' This short routine displays the current time in the menu bar
' It converts the Mac's 24 hour clock to 12-hour format and updates it
' approximately every 60 seconds depending on the activity going on
' in the main loop. You may adjust the position of the time in the menu bar
' by adjusting the menu number and/or the number of spaces in SPACE$().

GOSUB InitializeMenu
GOSUB InitializeVariables
GOSUB TitleScreen
ON MENU GOSUB HandleMenu
MENU ON

Loop:
  PresentTime!=TIMER
  IF PresentTime!>PreviousTime!+59 THEN GOSUB UpdateTime
  GOTO Loop

HandleMenu:
  MENU
  MenuID=MENU(0) ItemID=MENU(1)
  ON MenuID GOTO FileMenu

FileMenu:
  WINDOW CLOSE 1
  MENU RESET
  END

TitleScreen:
  WINDOW 1,"Menu Clock",(35,43)-(460,300),1
RETURN

UpdateTime:
  IF VAL(LEFT$(TIME$,2))>12 THEN MENU 10,0,1,SPACE$(22)+STR$(VAL(LEFT$(TIME$,2))-12)+M
ID$(TIME$,3,3)
  IF VAL(LEFT$(TIME$,2))=<12 THEN MENU 10,0,1,SPACE$(22)+LEFT$(TIME$,5)
  PreviousTime!=TIMER
RETURN

InitializeMenu:
  MENU 1,0,1,"File"
  MENU 1,1,1,"Quit"
  MENU 3,0,0,""
  MENU 4,0,0,""
  MENU 5,0,0,""
RETURN

InitializeVariables:
  DEFINT A-Z
RETURN
```

Time on the Menu
This MBASIC 2.0 program displays the time of day on the menu bar.

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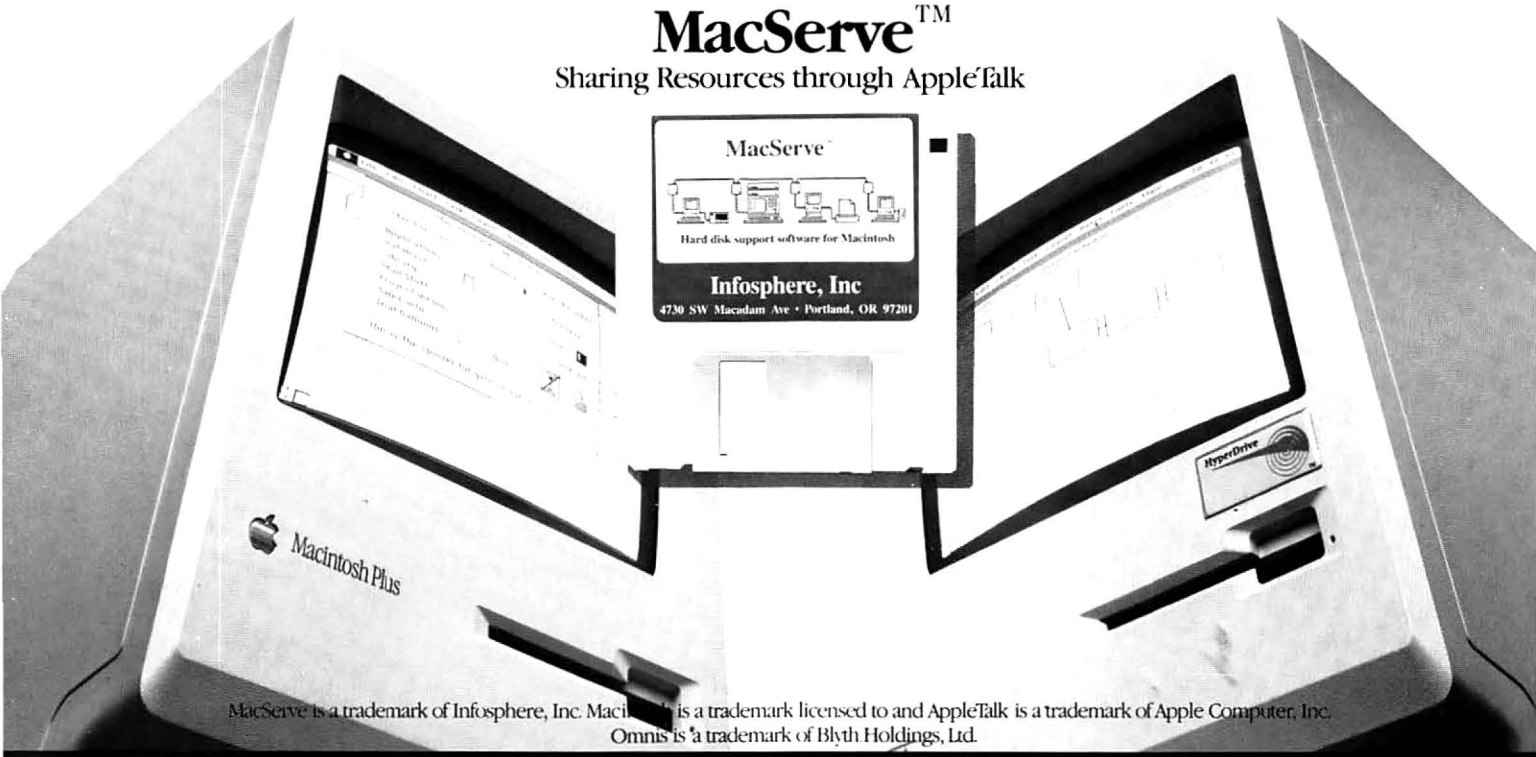

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