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MACWORLD

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The Macintosh™ Magazine

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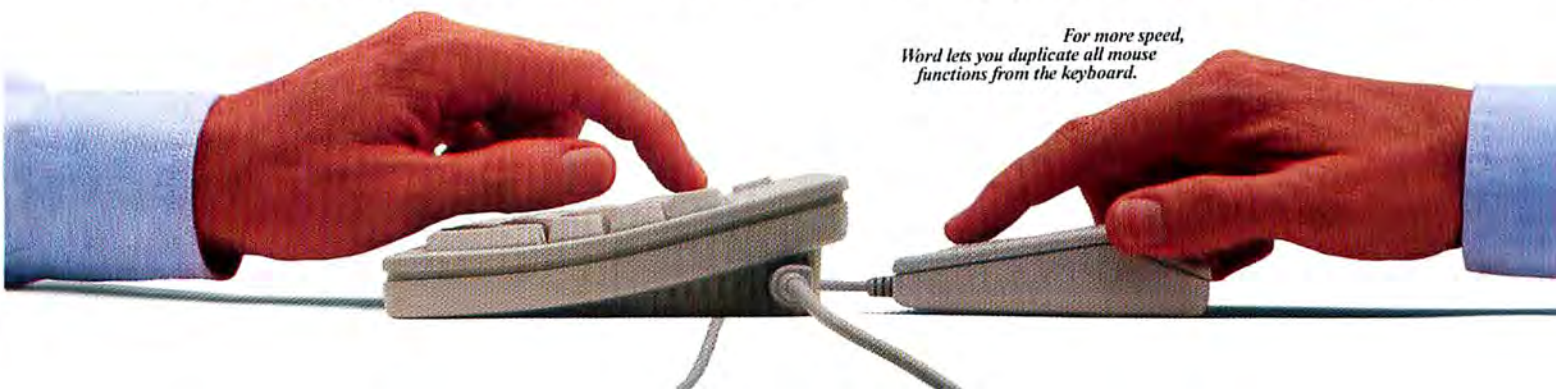
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Relative to population in each age group, sales indicate that there is above average interest in bicycle products in the 15-44 age categories. Sales are relatively lower, at 27.6 percent, for the younger segment (age 15-24); this is significant given the fact that the population in this segment is almost half that of the 25-44 segment.

The discrepancy between the information from Lake City's warranty registrations and the current research finds may be due to the following:

Since the 25-44 age group had the highest concentration of our single age group with 12.7 percent. The combined age group of 25-44 accounted for the greatest concentration of total bicycle sales with 55.4 percent.

Relative to population in each age group, sales indicate that there is above average interest in bicycle products in the 15-44 age categories. Sales are relatively lower, at 27.6 percent, for the younger segment (age 15-24); this is significant given the fact that the population in this segment is almost half that of the 25-44 segment.

The discrepancy between the information from Lake City's warranty registrations and the current research finds may be due to the following:

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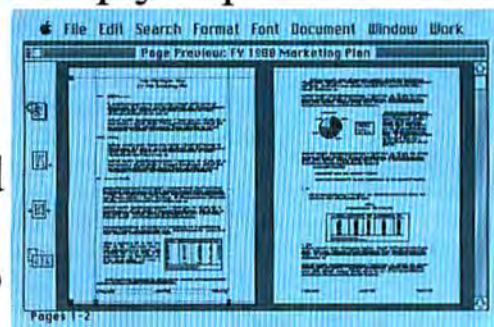
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MACWORLD

December 1987

The Macintosh™ Magazine



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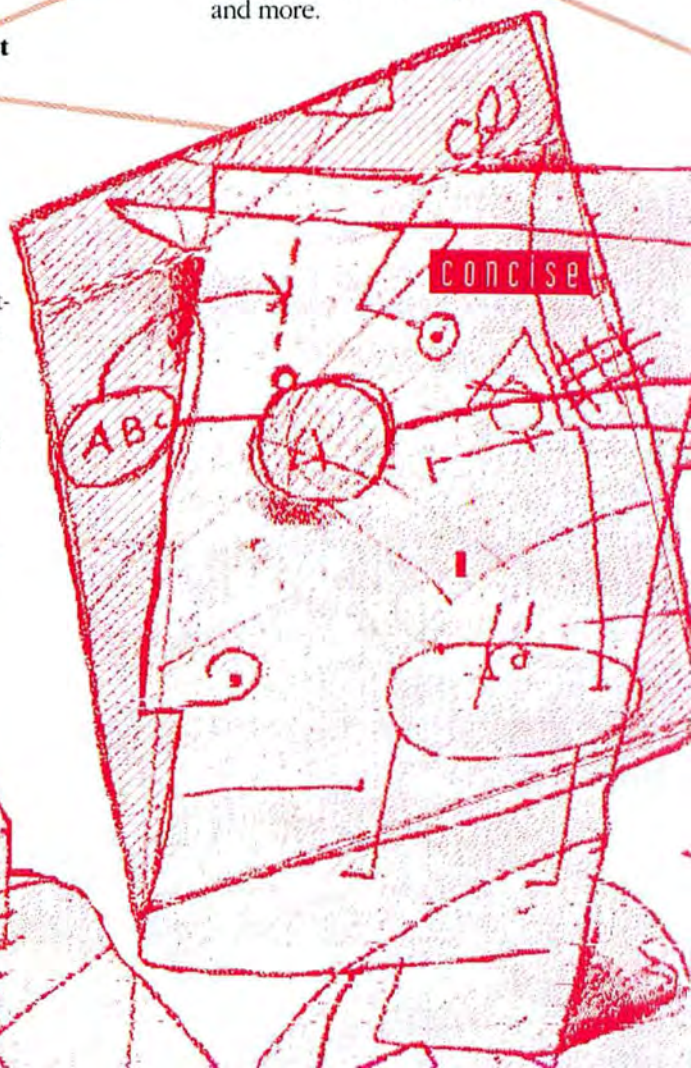
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MACWORLD

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December 1987**Volume 4, Number 12**

Macworld™ (ISSN 0741-8647) is published monthly by PCW Communications, Inc., 501 Second St., San Francisco, CA 94107. Subscription rates are \$30 for 12 issues, \$60 for 24 issues, and \$90 for 36 issues. Foreign orders must be prepaid in U.S. funds with additional postage. Add \$6 per year from Canada and Mexico; add \$12 per year for surface mail or \$80 per year for airmail from all other countries. Second-class postage paid at San Francisco.

POSTMASTER: Send address changes to *Macworld*, PO Box 54529, Boulder, CO 80323-4529. For dealer inquiries call 800/621-5461, in California 800/521-8455. Editorial and business offices: 501 Second St., San Francisco, CA 94107, 415/243-0505.

For subscriber service questions call toll-free 800/525-0643 (in Colorado 303/447-9330) or write: Subscriber Services, P.O. Box 54529, Boulder, CO 80322-4529.

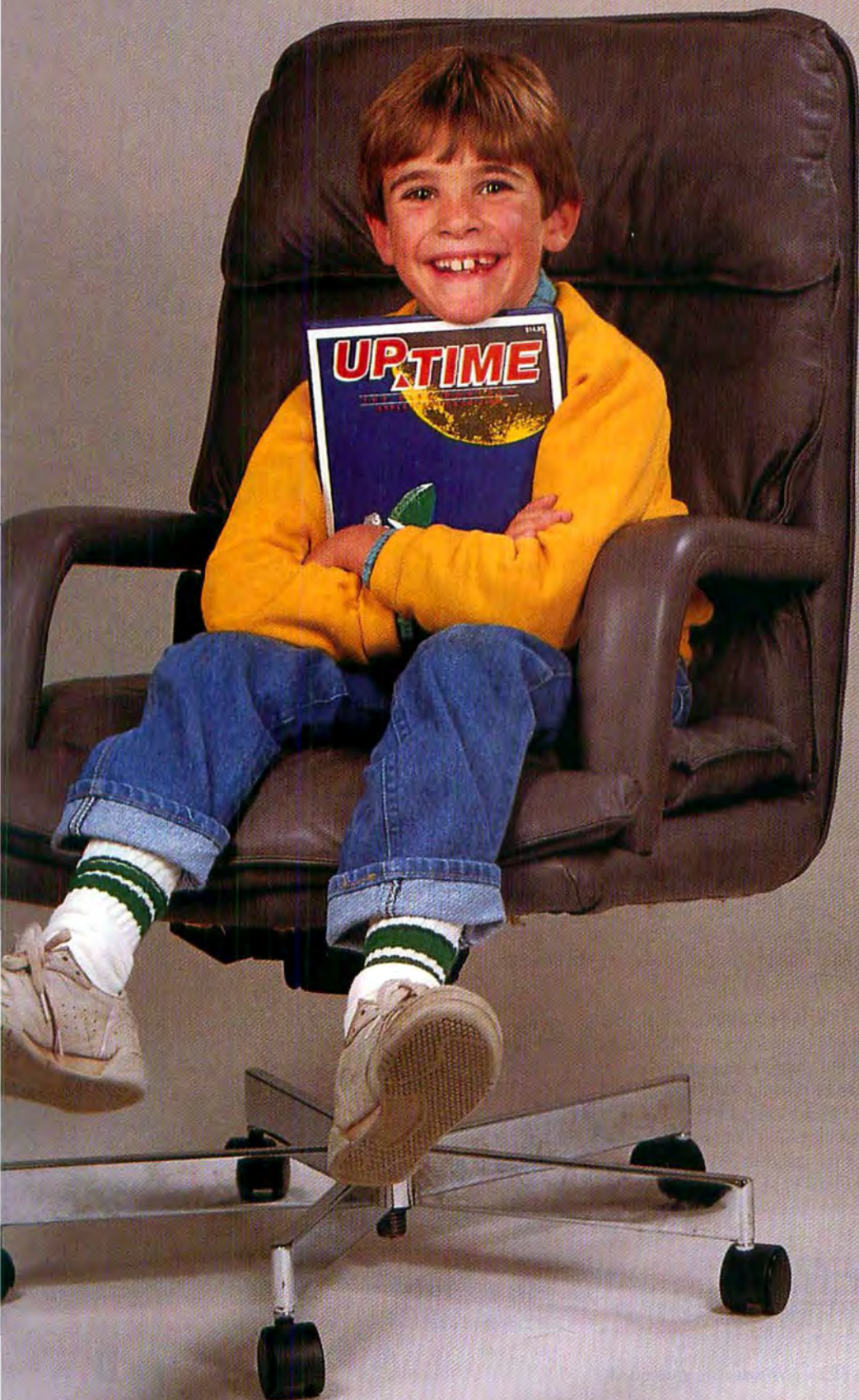
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"UpTime comes in the mail every month. I like the games. Dad likes the games, but he says he gets it for the business stuff. My sister thinks she's a genius so she gets into all the educational parts.

"Mom laughs a lot. She says it makes her happy to see us happy. Mothers go for that kind of stuff.

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*Tommy Douglas
Student
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For those of you going places, here's a little something that solves big storage problems in the time it takes to say "who has the Farnsworth financial files?"

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A rather revolutionary Bering 20 mb Bernoulli compact disk drive system for Macintosh computers. And, the first truly *portable* 5¼" system. One that lets you tote around 10,000 pages of data on a sleek cartridge about the size of a piece of bread.

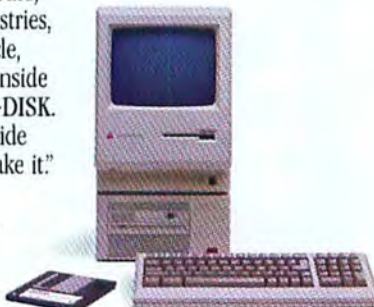
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Yet unlike floppies, the Totem is no slouch for speed. It's just as fast as a hard disk. In fact, your computer will think it's a hard disk. You can even share it with co-workers. And its advanced Bernoulli aerodynamics make it resist head crashing. If you've ever used hard disks, you know what a pain that can be.

But the real beauty of Totem is that it fits perfectly right under your Mac. No mess. No fuss. And no extra hardware to buy. To add storage, just pick up another Totem cartridge.

Last, but certainly not least, there's a whole family of Totem drives to choose from. They're all in the brochure. To get yours, write or call Bering Industries, Inc., 280 Technology Circle, Scotts Valley, CA 95066. Inside California, call 800 533-DISK. Call 800 BERING 1 outside California. Just say "I'll take it."

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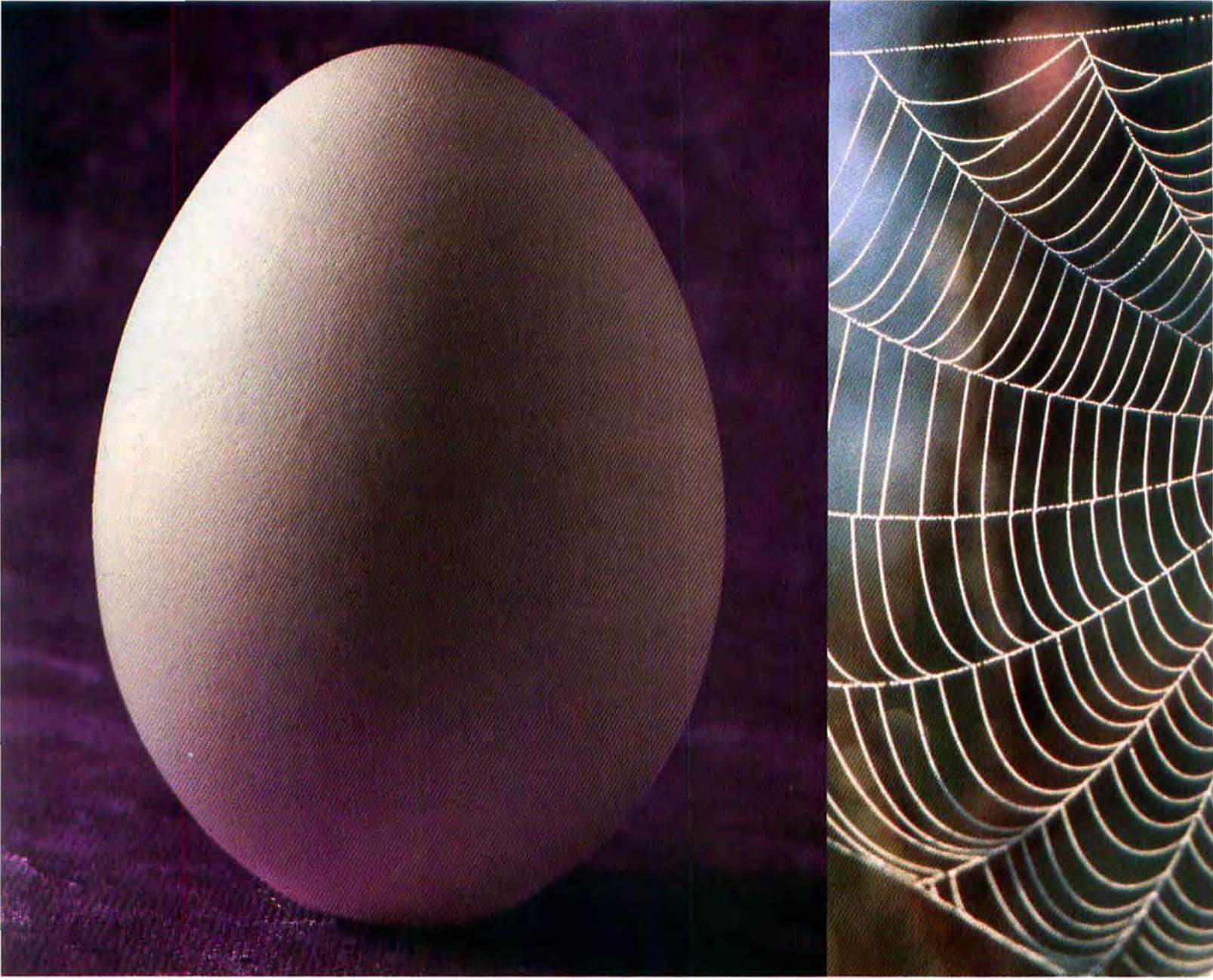
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to create a variety of special graphics.

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For example, RSG! 4.0 comes equipped with full-function word processing and a built-in 100,000-word spell checker that can suggest correct spelling alternatives. Style

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Goodbye Separator, Hello Color Cutter

▶ Last month *Macworld* featured an article comparing the color-separation features of *Quark XPress*, *Cricket Draw*, *LaserPaint*, and *Adobe Separator*. The winner in the tests was *Separator*, a desk accessory that converts *Adobe Illustrator* and other EPS files into four-color separations. Shortly before the article went to press, Adobe postponed *Separator*'s release indefinitely.

In the meantime, People's Publishing has filled the gap with its *Color Cutter System*—a combination software and service package that creates color files from PostScript documents. Like *Separator*, *Color Cutter* uses the color and tint information specified in an *Illustrator* document to generate four-color separations. *Color Cutter* can also create separations based on the Pantone Matching System. Users send separated files to People's Publishing in Atlanta for processing. Color-separation negatives are returned, with a choice of Chromalin or color-key proofs. —Jim Morton

More Fax

▶ Look for the fax market to become a hot one for the Macintosh following Apple's delivery of its AppleFax Modem and accompanying software. Solutions, Inc., of Montpelier, Vermont, has already introduced *MacFax*, software that provides full background processing sup-

port of the AppleFax modem whether or not the system is running MultiFinder. This means that other applications can be run at the same time a fax document is being sent or received.

MacFax also includes *Glue*, which allows AppleFax-equipped users to exchange, at 9600 baud, documents created with almost any application, even if the recipient doesn't have the application that the sender used to create the document. In addition, *MacFax* works with Solutions' own *Desktop Express*.

Raster Goes Vector

▶ Look for Silicon Beach Software of San Diego to make a real splash at January's Macworld Expo in San Francisco by introducing *Digital Darkroom*, an image-processing application that can convert raster images, like *MacPaint* documents, to vector images, like those created with *MacDraw*. It's a breakthrough for any computer, and it's happening to the Macintosh.

Digital Darkroom works with images captured by black-and-white scanners and handles up to 256 levels of gray. With *Digital Darkroom*, which will be shipped in the first quarter of 1988, you can heighten or soften the contrast between a defined area and its background by changing the gray-scale value of many individual pixels. Other possible effects include posterization and screening.

MacWar?

▶ Another first for the Macintosh: Apple has teamed up with Magnavox Electronic Systems Company to seek a five-year, \$800-million contract from the U.S. Army. It's the first time Apple has entered a bid for a major U.S. government contract since opening its Washington, D.C., office in 1986.

Army purchasing agents are seeking both hardware and software to be integrated into a Command and Control System. Some of the computers will be ruggedized to withstand transportation in all climates.

A MacService?

▶ A new 44-page manual about how to create newspaper-style graphics on the Mac is now available for \$10. *Graphically Sound and Factually Fit: A Newspaper Guide to Information Graphics on the Apple Macintosh* was written (and heavily illustrated) by Steve Segal, a graphic designer for the *Lawrence Eagle-Tribune* in Lawrence, Massachusetts.

Segal's book provides hundreds of tips for using programs like *MacDraw* and *Cricket Draw*, including how to use some advanced features that are not documented elsewhere. The book also includes instructions for making color separations with the Mac; tips for illustrating graphs, statistics, and maps; and recommendations for assembling a Macintosh-based information graphics system.

Orders may be sent to Steve Segal, Graphics Department, *Lawrence Eagle-Tribune*, Box 100, Lawrence, MA 01842.

Adobe's PostScript—In or Out at Apple?

▶ All of a sudden, Adobe's PostScript is so "in" that perhaps a dozen companies are developing software that makes printers PostScript compatible. Several new PostScript-compatible printers are to be available during the first quarter of 1988.

But with so many companies eager to come to the PostScript party, what happens if Apple decides not to throw one?

Steve Jobs, now spearheading a "next-generation" computer at NeXT, raised this possibility when he announced an agreement with Adobe to produce Display PostScript.

Display PostScript will function much like PostScript, except that it will write to the computer's screen. According to Jobs, using the same language for both the printer and the display means that a single piece of hardware can serve both outputs, and that no translation from one language to another is necessary.

If Apple decides to use the same description language for both the Mac's screen and the printer, Apple's printers could be less expensive than PostScript printers because they wouldn't have to include a computer to handle page pro-

(continues)

cessing. And Apple could eliminate royalty payments to Adobe.

An Apple representative recently indicated that the company intends to upgrade QuickDraw to serve as a display-description language for its upcoming computers. QuickDraw already serves as a page-description language in General Computer's Personal LaserPrinter. Could an upgraded QuickDraw equal, or even surpass, PostScript's functions? Most observers agree that it's quite possible.

The Videodisk Connection

► One of the more exciting possibilities of *HyperCard* is its ability to drive a videodisk player. Thousands of video images then become "playable" by the Macintosh, which can send still frames to the television screen either one by one or so rapidly that they become movies.

Now there's a simple way to connect a Mac to a videodisk player. LaserTalk, a single cable from Optical Data Corporation of Florham Park, New Jersey, works in place of previous videodisk-player drivers (peripheral devices or complex computer cards).

Lesson Maker and *Laser Write*, LaserTalk's companion software, speed the assembly of videodisk lessons for group or individualized teaching—the Mac version operates with *HyperCard*. With LaserTalk, the Mac can access Optical Data's *The Living Textbook* and *Windows on Science*, two videodisk lessons used in hundreds of schools nationwide. For more information, call Optical Data at 201/377-0302.

Three Mergers

► The acquisitions game continues with Phoenix Technologies' purchase of SoftStyle, a Hawaii-based publisher of Macintosh and MS-DOS printer driver software.

To compete more effectively with its long-term competitors AT&T and IBM, 3Com Corporation has merged with Bridge Communications. Bridge is a vendor of local area network systems, and 3Com manufactures and markets work-group computing systems.

Scientific Micro Systems (SMS), a major producer of very large scale integrated (VLSI) circuits, has acquired Levco Corporation, a manufacturer of Mac accelerator boards. Levco's product line will be merged with Super-Mac Technology, an SMS subsidiary best known for its DataFrame hard disks.

FidoNet on the Mac

► Michael Connick's *Tubby* program, which will allow Macs to be used as FidoNet nodes using Connick's *Mouse Exchange BBS* software, is expected to be available in January.

FidoNet, a dispersed electronic-mail system written by Tom Jennings, now has over 2000 MS-DOS-based nodes in North America, Europe, and Australia. Once a night, each FidoNet node shuts down to send and receive electronic mail.

One major gap in Macintosh BBS software still remains: the lack of a multiuser, multiline bulletin board system. Even the Berkeley Macintosh User Group is turning to a DOS-based system to improve both the availability and performance of its popular BBS.

A Parade of PostScript Compatibles

► We'll call printer drivers being written to emulate Adobe's PostScript *compatibles* rather than *clones*—because they may not have exactly the same functionality.

If all goes well, these PostScript-compatible interpreters will take the PostScript output of various application programs and turn it into pages of copy that approximate as closely as possible what you see on a Mac screen.

Nearly a dozen companies are developing PostScript-compatible software because they feel that Adobe is doing too well to respond quickly enough to requests for new implementations, and that its licensing prices are too high. (Adobe responds that it's often able to meet a 90-day turnaround time and has dramatically lowered its fees for small-volume sales.)

PrintWare—with its 600-by-1200-dpi, plain-paper laser printer—decided, after negotiating with Adobe, to write its own page-description language, PrintScript (at press time it was about 95 percent complete). Other announced products include a Bell & Howell printer that will use a Phoenix PostScript interpreter and several Nissho Electronics laser printers with CCS-Page from Control-C Software. Other companies that are reportedly producing PostScript-compatible interpreters include Bauer Enterprises, Lincoln and Company, Conographic Corporation, Raster Images Processing Systems, and Eicon Technology Corporation.

Building It Right

► Wouldn't it be great to design pipes, beams, or reinforced-concrete structures on the Mac and then immediately discover their structural strengths and weaknesses?

You can do just that with *MacCOGO* (*COGO* stands for coordinate geometry) from Erez Anzel Software of Ontario, Canada. This new program, which also works in color on the Mac II, calculates over 30 geometric and structural characteristics, including inertia, section modulus, and composite modulus of elasticity.

Calculations can be made with 7-decimal digit precision, and diagrams and text can be printed on a LaserWriter or an ImageWriter. *MacCOGO*'s introductory price is \$95, and it may be returned within one month for a full refund if purchased directly from the publisher. Call Erez Anzel Software at 416/738-4601 for more information.

A DEC First

► For the first time, Digital Equipment Corporation (DEC) has endorsed a Macintosh-oriented product. DEC is joining forces with Odesta, publisher of the *Helix* database, to develop a version of *Helix* that runs on both VAX and the Mac.

DEC expects the resulting compatibility between VAX and the Mac to help DEC, the second-largest computer manufacturer, sell more VAX units to Macintosh-oriented businesses, since manipulation of *Helix* will be almost transparent to users. However, DEC is still silent about endorsing connections to the Macintosh itself. □

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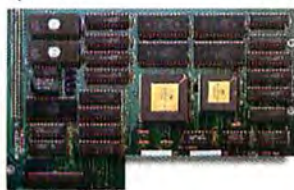
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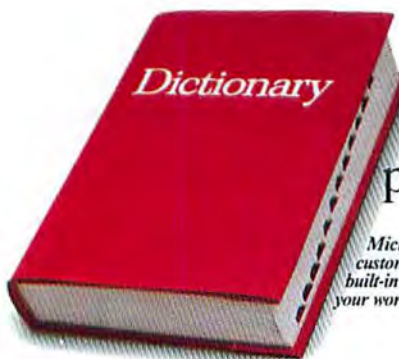
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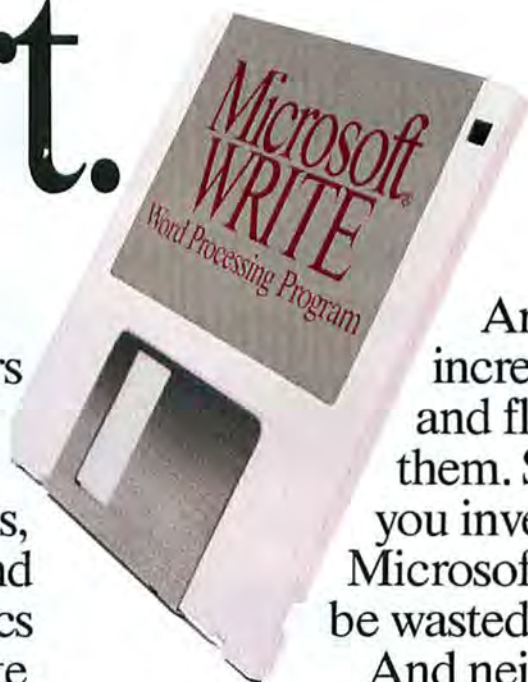
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In Search of Apple's Achilles' Heel



||||| Apple's got the present in its pocket. But will its magic spell last as we move into the next generation of computing?

Dig around deep enough and you're sure to uncover a worm or two somewhere at Apple—and I'm trying to find out where it is.

Don't get me wrong. I'm not a nihilist who harbors ill feelings toward the computer maker. I stood by Apple in its darkest days when the conventional thinking was that the Macintosh would bite the dust and perhaps Apple would have to make an IBM-compatible machine.

It's just my natural inclination to be skeptical. And right now there's an almost fundamentalist fervor surrounding Apple Computer and everything it does. The fact that nearly every computer guru and opinion maker in the personal computer industry thinks that Apple is really smart, that it's outgunning IBM, that it's playing all its cards right—frankly, this has me worried. Because these people have never been right about anything in the past.

So I think we need to take a look at some areas of possible concern for people who use the Macintosh, as the old year draws to a close and 1988 begins. Here are some potential trouble spots in the Macintosh world that could escalate into major conflicts in the coming year.

First of all, I'm concerned about Apple's so-called strategic alliance with Digital Equipment Corporation (DEC) as Apple pursues its quest for connectivity with DEC's VAX line of minicomputers. How is that alliance truly going to benefit the Mac user? Does Apple really believe that it's gaining an advantage by linking up with DEC? Or is it merely being used by a much more sophisticated company that has a history of buying expertise and innovation when it can't succeed on its own in the marketplace?

Apple should heed the lessons of Ramtek and Tektronix. Remember how DEC used those companies' technologies as a front end for its graphics terminal until it finally got its act together and built its

own VAX workstation? After that, DEC kissed Ramtek and Tektronix good-bye.

More to the point, DEC has shown that it can't build its own personal computers. Witness the disastrous DEC Rainbow and the improbable Pro. Not to mention DEC's puny Z-80-based PC with its two lackluster disk drives. DEC has now had three generations of bad machines. It could be that Apple presents an enormously tempting takeover target for the industry giant.

I have to wonder if the VAX is really DEC's Trojan horse in Apple's connectivity stable.

I also have to worry about Apple's strategic planning and product teams. Do they have the right stuff to propel Apple to the \$5 billion level? Apple's senior vice president of research and development, Jean-Louis Gassée, and his cohorts are doing some things right. They've developed the Mac II, and a lot of people say it's a better computer than the 386 machine. They've expanded the definition and capability of the Mac's operating system—they have MultiFinder and *HyperCard*. But what are their flaws? What is the quantum leap they still need to make?

At the recent Seybold Desktop Publishing Conference, Apple's arch-nemesis Steve Jobs predicted that Macintosh technology would peak by 1991 and be replaced by a new breed of workstation, as exemplified presumably by his own NeXT, Inc.'s future product offering. "The Macintosh software architecture will reach its limits then," Jobs warned.

Apple has shown that it can take the existing Macintosh technology, extend it, build on it, and make it much more sophisticated. But can Apple create a whole new technology of computers—and make the right choices?

(continues)

Decisions, I

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Or will Apple be stuck in the same bind that IBM is in today—where everything has to be compatible back to the old software base? Is that going to be the ultimate limitation?

It will be interesting to see what choices Apple makes vis-à-vis NeXT, Inc.—or, for that matter, how it stacks up against the company I perceive to be its real contender, Sun Microsystems.

In fact, I think that Sun could emerge as a much bigger player than it's been in the past. Its strategy of using different processors and building its own RISC chip could turn out to be very effective. One major difference between Sun and Apple is that Sun has taken the RISC technology and has opted to share it with developers so that other companies can build computers that are compatible with the Sun system.

This, too, could be an important lesson for Apple Computer. It reminds me of the early days when IBM shared its PC BIOS with other manufacturers, thereby ushering in the age of PC clones. That established the PC as the industry standard.

To my mind, therefore, Sun could very well prove to be Apple's Achilles' heel, especially as Apple scrambles to position itself in the workstation market. 1988 will definitely be the Year of the Workstation, no question about it. It's really going to happen. I wonder if the Mac II can make the necessary inroads into that market to become a really solid product.

I asked Sun Microsystems' president, chairman, and CEO, Scott McNealy, what he thought about Apple's prospects in this growing field.

"I think that over time, customers could get very frustrated with the closed, proprietary Apple user-interface," McNealy observed. "A couple of things could go wrong for Apple in the long term. One is that it wouldn't be able to get the whole personal computer industry behind it. Second, the software vendors might decide that they can be more successful with a noncontrolled, nonproprietary interface. Time will tell whether that will happen."

"It has happened in just about every other area of computer technology," McNealy noted. "It's happened in networks, it's happened in CPUs, it's happened in operating systems, it's happened in graphics. I see no reason in the world why the industry won't move to a non-proprietary look and feel in the long term. History has shown that this, not competition, is the real pitfall."

(continues)



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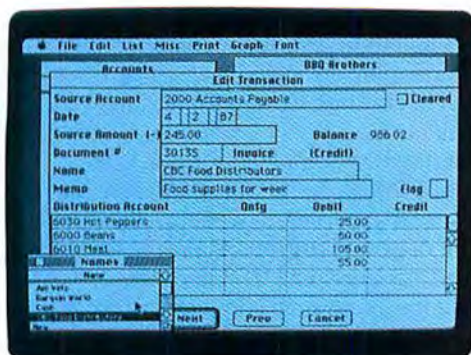
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One of the obvious drawbacks to Apple's proprietary system is that since other companies aren't able to make Mac clones, there is no low-cost Macintosh. In my opinion, this is possibly the biggest Black Hole in Apple's strategy.

At Stewart Alsop's Agenda '88 personal computer industry symposium, which was held in San Diego recently, T/Maker president Heidi Roizen asked CEO John Sculley when Apple was going to come out with an affordable Macintosh. He replied that since the power users are the ones who are financing the industry, Apple does not feel compelled to bring out a low-cost machine. He suggested that the Mac Plus and the Mac SE were, in fact, Apple's low-cost Macs.

Well, I don't buy that. They are not low-cost Macs. And at the rate Apple is going in its pursuit of the corporate market, it can't possibly build a big enough customer base to reach its goal of becoming a \$5 billion company. To do that, Apple will need to have an installed base of 5 million—not the 1.2 million or so that it now has.

A lot of first-time customers will be tempted to buy an MS-DOS Tandy computer for under \$1000 just to get started.

I have concerns about Apple's pricing policy. Apple may be making a serious mistake by ignoring the low end of the market. By building more expensive, more complicated, and more advanced Macs, it runs the risk of cutting off a lot of potential customers.

At the recent AppleFest in San Francisco, I heard a lot of people complain that they were disappointed by the small amount of new software and products available for the Apple IIGS line. They thought it was abysmal compared to what was available for the Mac. Some of them told me they really wished they had bought a Mac instead, because they just

(continues)



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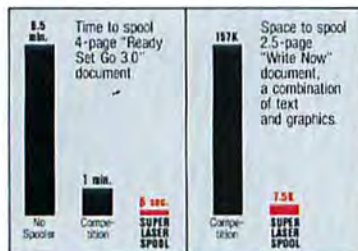
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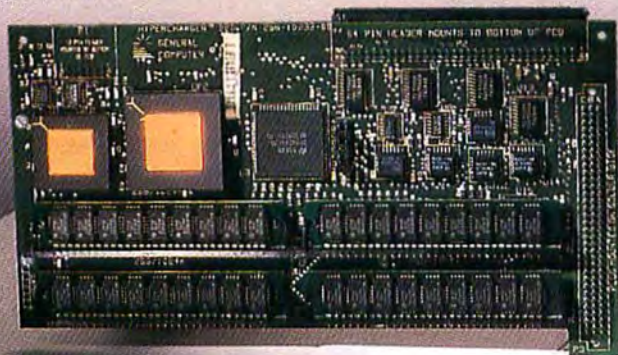
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continued on page 12

Technical Analysis: Science or Sorcery? See page 6

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continued on page 5

The Rising Fortunes of the Humble Apple

Consumer demand has mushroomed in recent months for fresh fruit and produce.

What are the best plays in this trend for investors?

Dr. Vic Scallione, of the Washington State Department of Agriculture says

continued on page 3

Avoiding Wall Street's blind alleys: A Prudent Investor Special Report. See p. 9

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Commodities

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4 Real Estate

8 Special Report

12 Technical Analysis

13 Treasury Issues

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3. Gold bullion can be bought at all large brokerage houses. These firms also store and insure bullion.

continued on page 12



Technical Analysis: Science or Sorcery? See page 6

Picking Your Stockbroker

If you happen to be picking a stockbroker for the first time, a good way to begin is with some solid recommendations.

Ask your lawyer, accountant, or banker for the name of a stockbroker, or a brokerage firm, that could take on your account.

Some investors suggest you choose several brokers at different firms and let each handle a part of your portfolio until you decide on the right one.

The broker you choose should have a philosophy about investment that is as close as possible to your own. Find out how he

continued on page 5

The Rising Fortunes of the Humble Apple

Consumer demand has mushroomed in recent months for fresh fruit and produce.

What are the best plays in this trend for investors?

Dr. Vic Scallione, of the Washington State Department of Agriculture says

continued on page 3



Avoiding Wall Street's blind alleys: A Prudent Investor Special Report. See p. 9

Amer Stocks	4	Real Estate	14
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don't see Apple supporting its low-end machines.

That is really a strong case for having a low-cost Mac. And given Apple's incredibly high profits, I think the time for one is now. Otherwise, Apple runs the risk of letting Tandy and the PC clone makers take over the low-end market. A lot of first-time customers will be tempted to buy an MS-DOS Tandy computer for under \$1000 just to get started. And once they begin to make an investment in MS-DOS software and develop more sophistication, they will be inclined to buy more powerful MS-DOS machines.

Gradually, they'll work their way up to a 386 machine—and not to a Mac II. And Apple will have missed out on this huge market.

Other clouds on the happy Macintosh horizon: as I say, I don't want to be a naysayer, but when 90 percent of the personal computer world is clamoring about Apple's infallibility, that's when I feel compelled to step back and offer a contrarian's view.

Usually I'm right in my instinct to ride against the herd. I stuck by Apple when today's zealots were throwing brickbats at the Macintosh. Now, I find myself sticking more than ever by *Microsoft Windows* in spite of all the flack it's been getting.

I believe that the *Windows/386* operating environment, which was recently announced by Microsoft and Compaq, represents a truly formidable challenge to Apple—because suddenly the 386 machine has some power capabilities the Macintosh currently lacks. As good as the Mac II is, it can't really compete against machines that use *Windows/386*, a programming breakthrough that allows you to take a 386 PC and divide it up into any number of 640K workstations.

This is the first real taste of multitasking we have seen in personal computing to date. In fact, *Windows/386* creates a potential for doing things on a 386 machine that are even more Apple-like than Apple—such as cutting and pasting between several applications.

Although the challenge of *Windows* to Apple has been almost a joke in the past, at this point it's not exactly clear who is going to have the last laugh. The threat of *Windows/386* once again touches on the question of future power pathways for the Macintosh line.

When is Apple going to upgrade the Mac II to a 68030 machine? Is that where its strength and salvation lie?

(continues)

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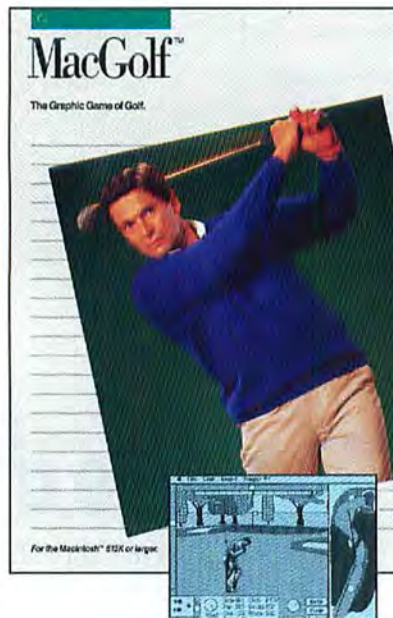


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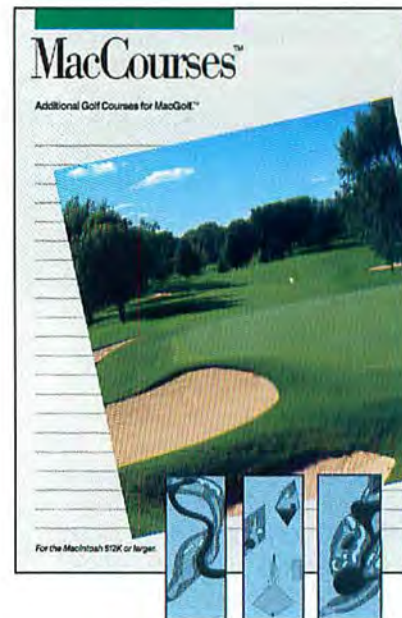


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David Bunnell

Beyond that, even if Apple upgrades the Mac to the level of, say, a 68050 machine—which Motorola is talking a great deal about these days—it's not clear whether that in itself would give Apple the power edge it needs to stave off competition from the 386 machines or from Sun Microsystems's RISC-based workstations.

If Apple wants to stay competitive with the emerging leading-edge technologies, it will have to seriously explore these new technologies—the way Sun uses RISC architecture or IBM is delving into superconductivity.

Whether or not Apple has the foresight to do these things isn't clear yet. We know that Apple is working with RISC architecture in its labs, but does it have the marketing wisdom to implement that correctly in a consumer machine?

That will be the do-or-die test for Apple as it moves into the post-Macintosh era that Steve Jobs foresees.

1988 promises to be a year of tremendous technological and marketing upheaval in the Macintosh world. That process is already well underway. In the past few months alone, we've seen merger-mania reach a fever pitch with 15 major companies merging, among them Forethought and Microsoft; Think Technologies, Living Videotext, and Symantec; SuperMac and Levco; Ansa and Borland. Just as I predicted in an earlier column, last August, the Macintosh software business has indeed come to resemble the airline industry with its mergers and alliances.

Now we're seeing late arrivals from the IBM world into the Macintosh world as IBM PC vendors retool their products for the Mac. How are all these changes going to affect us? What vital difference or improvements will they bring to the Mac user? Or will they just muddy the waters?

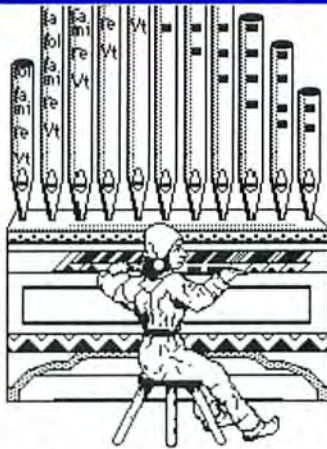
Do we really need software products like *dBase Mac* from Ashton-Tate? Isn't that a case of too little, too late, and who cares? Do we really need an explosion of graphics cards and monitors from Paleolithic PC peripheral makers who come lumbering into the market? Is our cozy little Macintosh neighborhood in danger of being swallowed up by corporate highrises?

We'll soon find out.

In the meantime, I'm still worried about how well Apple is doing. It makes me nervous because it's almost too good to be true. So if anybody out there knows where Apple's Achilles' heel is, please contact me right away. We really need to size up the situation. I'm desperate to find out. It's a real puzzle to me. And I need a solution. □

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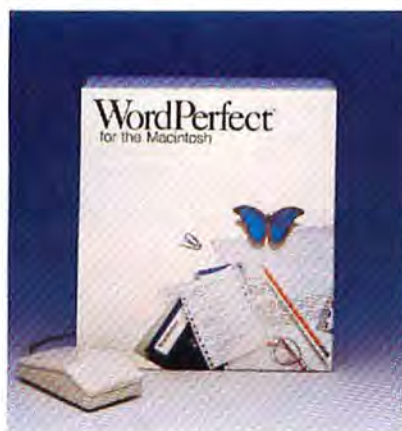


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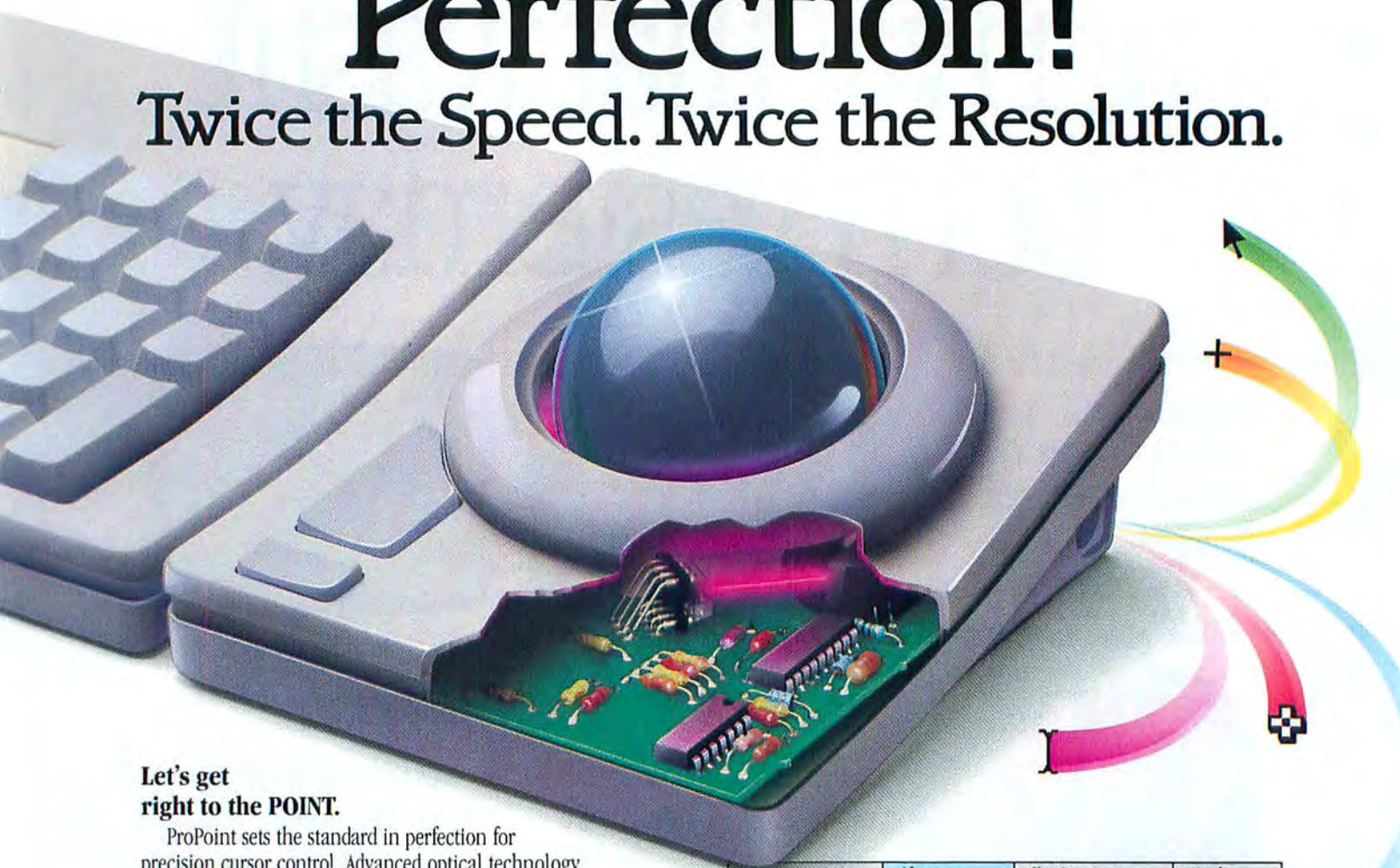
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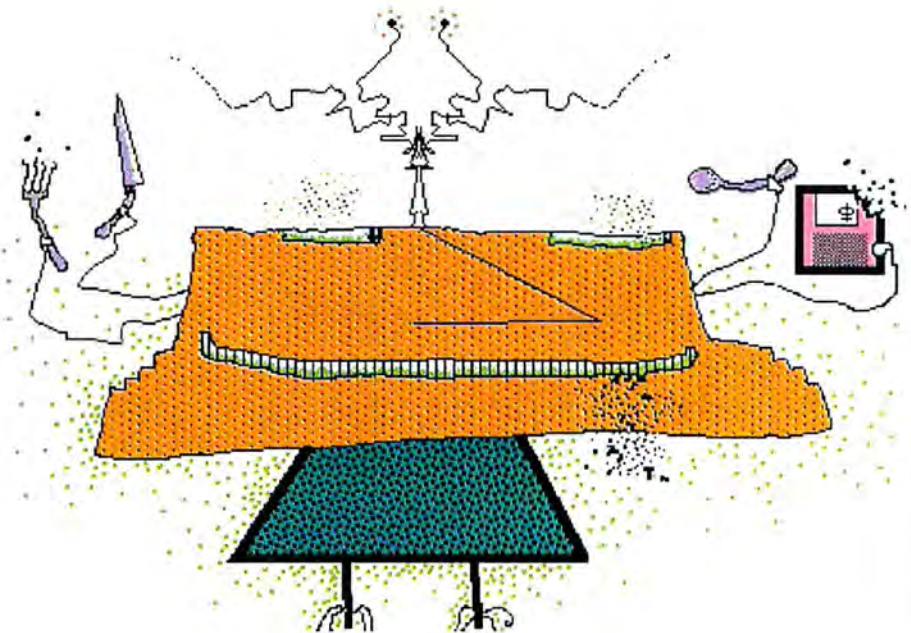
Bugs for Your Bucks

I'm tired of buying software that has not been fully tested and perfected. Invariably, developers say that bugs will be "fixed in the next release"—several months down the road. I wouldn't mind beta-testing a program, but I hate to pay for the privilege!

*Ben Weinberg
Sepulveda, California*

Show Your True Colors

I found your article on Macintosh II video monitors helpful ["Chasing Rainbows," July 1987], but the photos comparing the Apple 13-inch and SuperMac 19-inch color monitors were misleading. While you report that the Apple monitor was superior, the photos lead to the opposite conclusion. This was probably due to photographing unequal-size screen displays and reducing



DAVID POWALLITIS

Corrections

The price of MiniCad version 3.0 (Updates, August 1987) was listed incorrectly; it actually sells for \$495.

The illustration of the 8-pin minicircular plug (Quick Tips, August 1987) for converting an ImageWriter cable for the IBM PC was misnumbered. The correct order of pin numbers is, from left to right: (top row) 8, 7, 6; (middle) 5, 4, 3; and (bottom) 2, 1.

The address for Software Complement, maker of Client Mac ("Mastering Mail Merge," September 1987), is 8 Pennsylvania Ave., Matamoras, PA 18336.

Real Data, Inc. (Macworld Directory, September and October 1987) can be reached at 203/255-2732.

them to equal sizes for printing, which gives the SuperMac an apparent advantage. In the future, can't you show comparisons of actual-size windows as well?

*John C. Beaver
Grimmell, Iowa*

According to Macworld's Senior Technical Editor, David Usbijima, another article on color monitors is in the works and will reflect true screen-display sizes, as you suggest. —Ed.

Talent Scores

Some of what Christopher Yavelow says about using computers in film scoring ["Top of the Charts," August 1987] reflects a misunderstanding of the process itself. To say that professional film scorers need "to precisely correlate synthesized or recorded music events with selected on-screen events" is to imply that creating film music is primarily a high-tech problem of synchronization. Nothing could be farther from the truth. Film scoring is a matter of

creative coordination; the music fits because it's written to do so. Without talent and sweat, your Mac will never work in this town again.

*Ron Grant and Richard B. Grant
Auricle Control Systems
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Christopher Yavelow replies that his article, designed to address the use of the Mac in synchronizing music with film, did not intend to make any claims about the creative process. He applauds artistic integrity but asserts that it was not the issue here. —Ed.

A Tricky System

I appreciated your tips on using desk accessories ["A DA in the Life," August 1987], especially on how to get to them directly

(continues)

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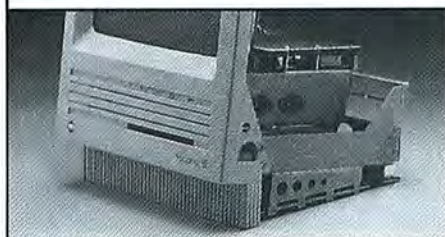
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Circle 439 on reader service card

when opening the Font/DA Mover. But a word of warning: If while holding down the Option key you open the Font/DA Mover in a System Folder other than the one from which the System is currently running, the new System becomes the active System. If you then go ahead and change the System DAs, you will find them missing when you go back to operating from the original System. You do have some warning that this has happened: because the Font/DA Mover opens with the fonts showing, it appears as if the Option-key trick hasn't worked.

Margaret Child
San Francisco, California

Fun without Games

In addition to the reasons Steven Levy gives for the relatively poor market in Mac entertainment software ("Where are the Heavy Hitters?," July 1987), I suggest another: Macintosh users have so much fun with "serious" applications that we need to escape less often than do the drudges who

work on less friendly machines. Personally, when I sit down with some free time, I'm as likely to enjoy tinkering with graphics or a spreadsheet as with a game. The Mac's ease of use has blurred the traditional distinction between work and play—a phenomenon alien to the MS-DOS world.

Peter McKnight
Lynbrook, New York

E's of Use?

I enjoyed Steven Levy's "Ask Dr. Upgrade" (*Macworld*, August 1987), but it raised a worrisome question. I think I bought a Mac 512K Enhanced, but the machine doesn't have 512E on the back as the Doctor says it should. It seems to behave like an enhanced model, but how can I tell for sure?

Tadasbi J. Mizoguchi
Riverdale, New York

If your Mac accepts double-sided, 800K disks, it has the enhanced ROM upgrade; if it also has the SCSI printer port on the back, which is round, not rectangular; and requires a different cable than the Mac 128K and the 512K, it has the Mac Plus upgrade.—Ed.

Graphics Not Included

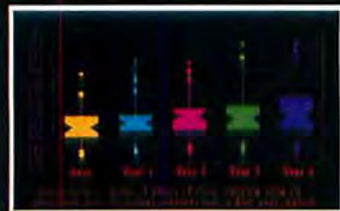
I recently purchased Doug Clapp's *Word Tools*, and though it is powerful, I feel burned. Although the program claims to support *Microsoft Word*, it doesn't work with version 3.0—not even text-only 3.0 files. Nor can it handle text with graphics. Aegis says they have no plans to add this basic Macintosh capability. I wish I had taken less for granted.

Frank L. Jaubert III
Houston, Texas

In response to suggestions from users, Aegis is now working to add text/graphics capability to the next release of Word Tools (due early next year), although they assume that most users normally edit text with the program before getting to the point of saving text with graphics. Aegis also reports that the program can save Word text files from any version and that compatibility with version 3.01 is being added to the update as well.—Ed.

(continues)

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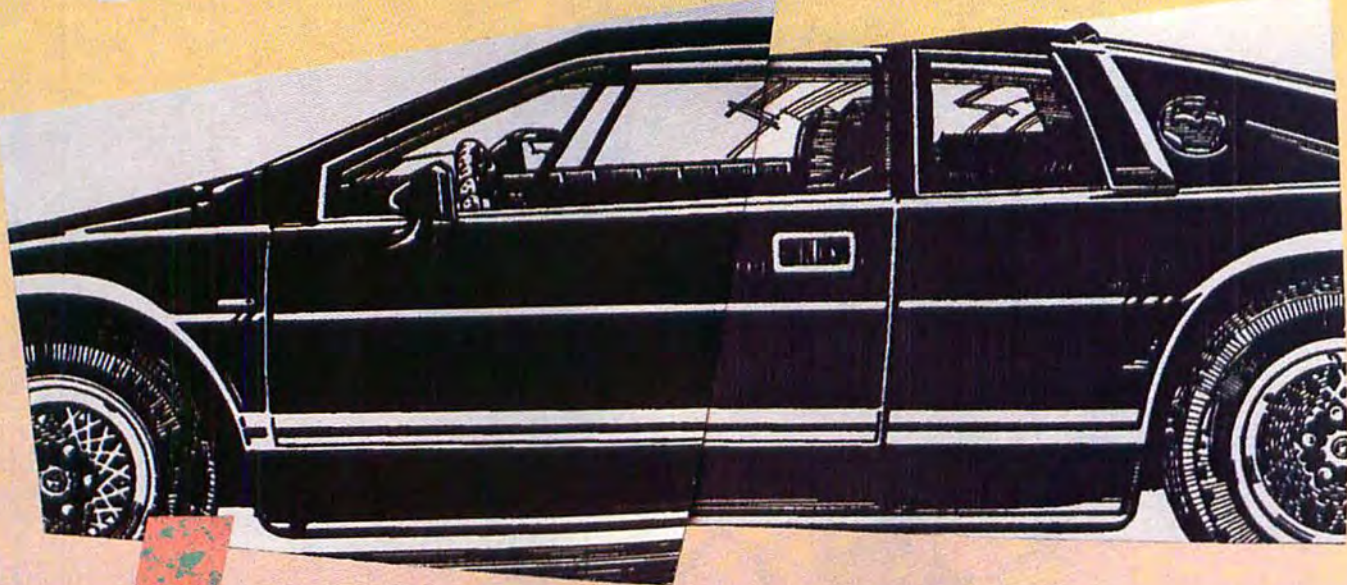


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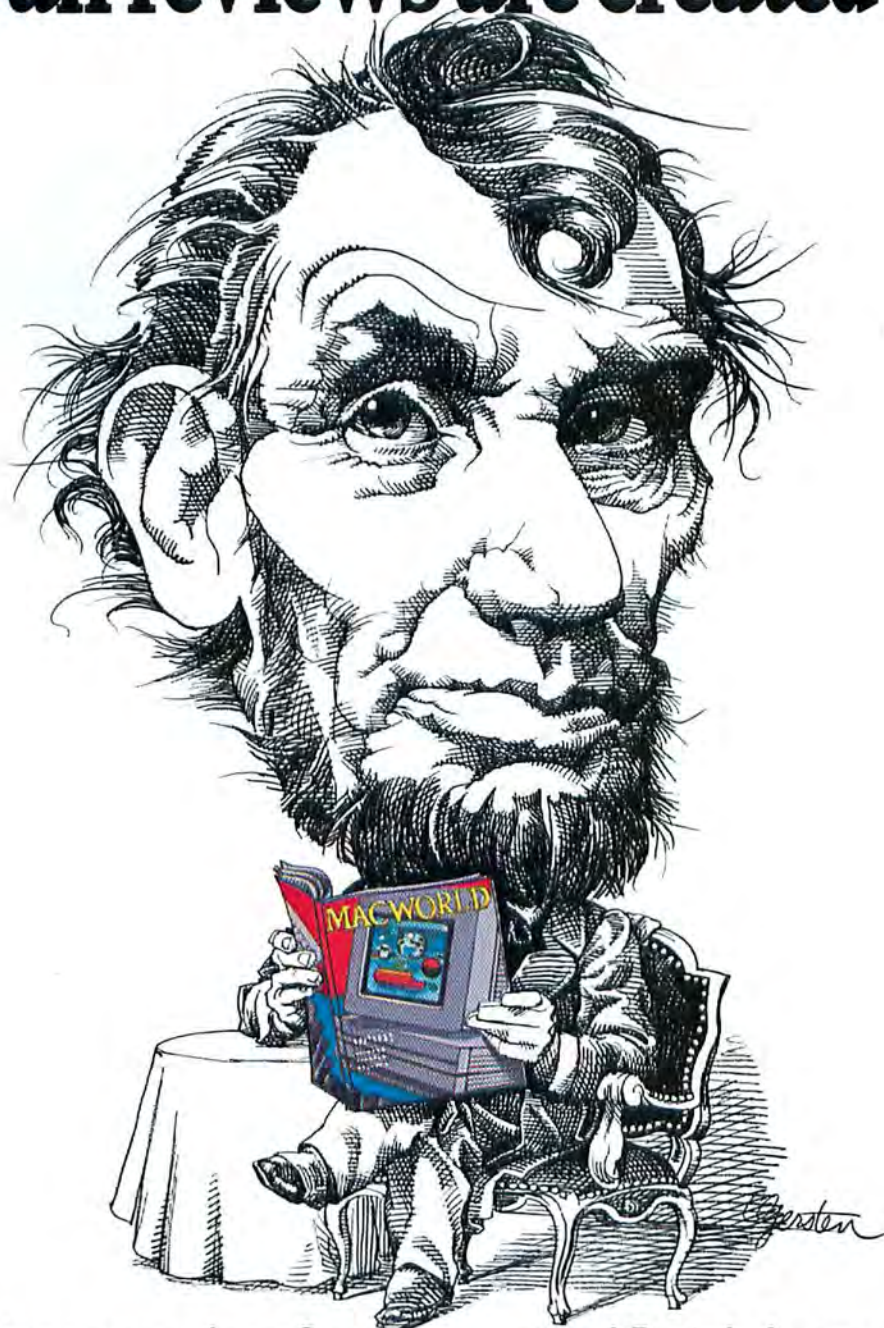
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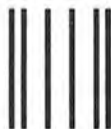


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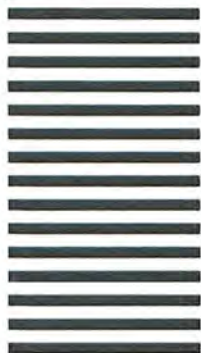
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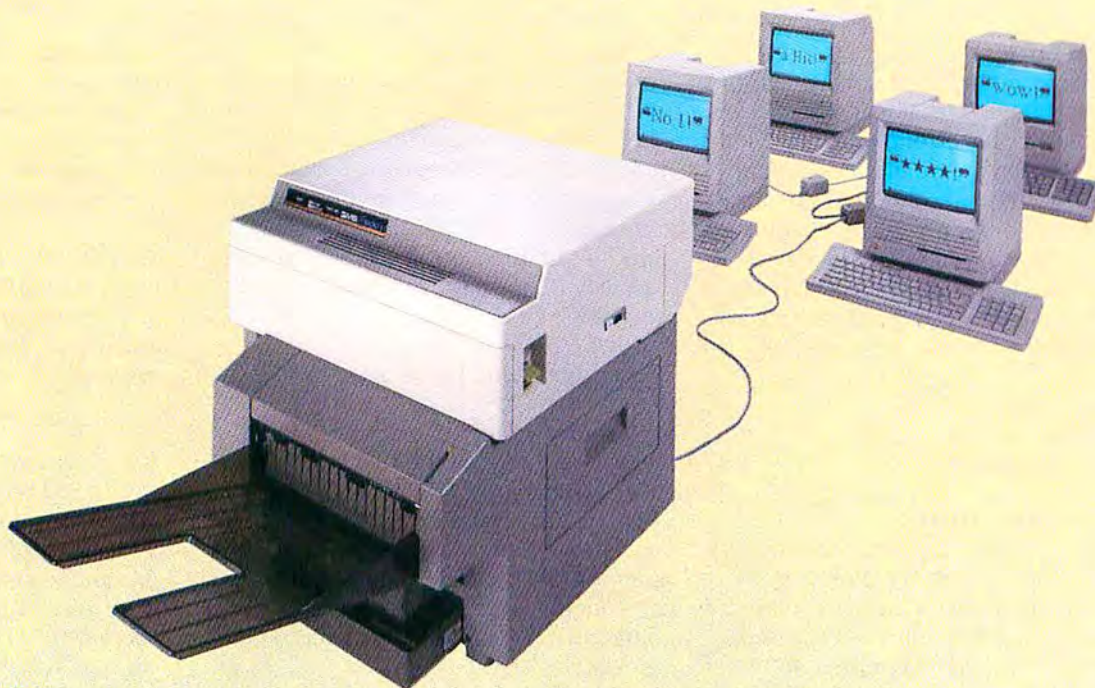
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A network sensation QMS-PS 800 II holds 500 pages, so operators aren't constantly refilling depleted paper trays. Users can even designate automatic switching between the two trays for doing letterhead/second page printing. Select faceup or facedown collation. And manually feed odd-sized paper stock.

With QMS ASAP™ (Advanced System Architecture for PostScript) proprietary technology, QMS-PS 800 II delivers outstanding performance. In fact, the more complex the page, the more it outperforms other PostScript printers. Two megabytes of memory, expandable to three megabytes, also add to the overall page processing speed when you are creating complex documents.

Type casting The QMS-PS 800 II comes with 35 resident typefaces (you can download more if you like). PostScript allows you to scale type to virtually any size, from minuscule to mammoth. PostScript also enables you to design, and redesign, your documents with exacting detail. You have total control over the final appearance of documents, with the ability to place text and graphics anywhere on the page. In short, you get the complete desktop publishing power that only PostScript can give you.

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We would like to publicly thank Alcoa for the \$1200 shareware fee it recently paid for our programs *DiskInfo* and *miniWriter*. It is the largest such fee we have received in two years, and the only one from a major corporation. There is practically nothing our little company could have done if Alcoa had decided to use our products without paying for them. It is gratifying to see a large company refute the stereotype of heartlessness.

Forrest Johnson
Maitreya Design
Goleta, California

Honesty in Advertising

In a couple of recent instances, commercial software was posted on bulletin boards and included in public domain or shareware libraries; presumably it was passed on by people who didn't realize it had been copied illegally. Neither product was

well known, nor did either carry a clear internal identification of its origin. To prevent this happening again, I propose that both shareware and commercial vendors include an ID in the About box that appears in the menu bar, stating whether the program may be copied or distributed electronically. In this way, BBS operators could learn when they have an illicit copy and remove it.

Jeff Hecht
Auburndale, Massachusetts

My Enemy's Face

I was shocked to see the IBM PC on the cover of the August 1987 issue of *Macworld*. It has been a long, difficult fight to convince an IBM world that the Mac is a viable tool. While cooperation between the two systems undoubtedly is needed, this is going too far. Would you put a Mac on the cover of *PC World*?

J. T. Buck
Farmington, Michigan

Great idea—we'll pass it on to the editors next door.—Ed.

Expo Info

I have some questions about the next Macworld Expo, in San Francisco. What are the dates and costs?

Samuel L. Sharber III
Machesney Park, Illinois

The Macworld Expo will be held at San Francisco's Moscone Center, January 14 to 17, 1988. Admission: \$40 for conferences and exhibits, \$15 for exhibits only.—Ed. □

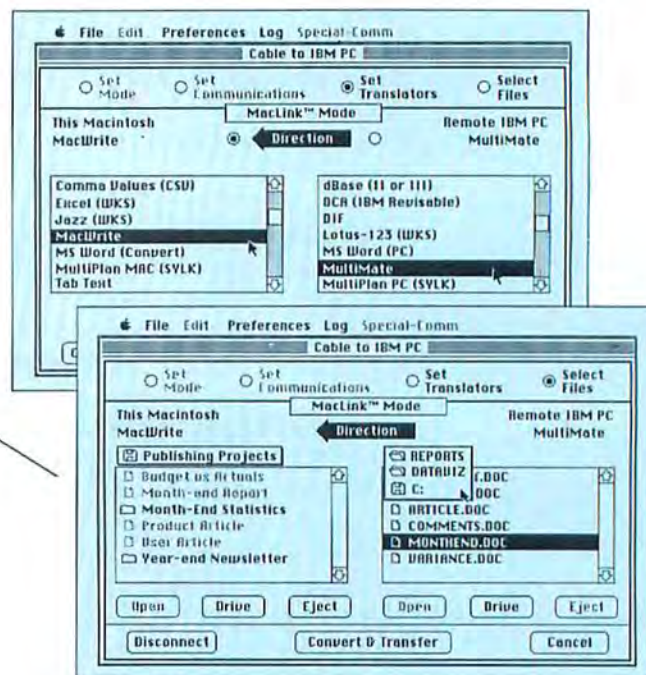
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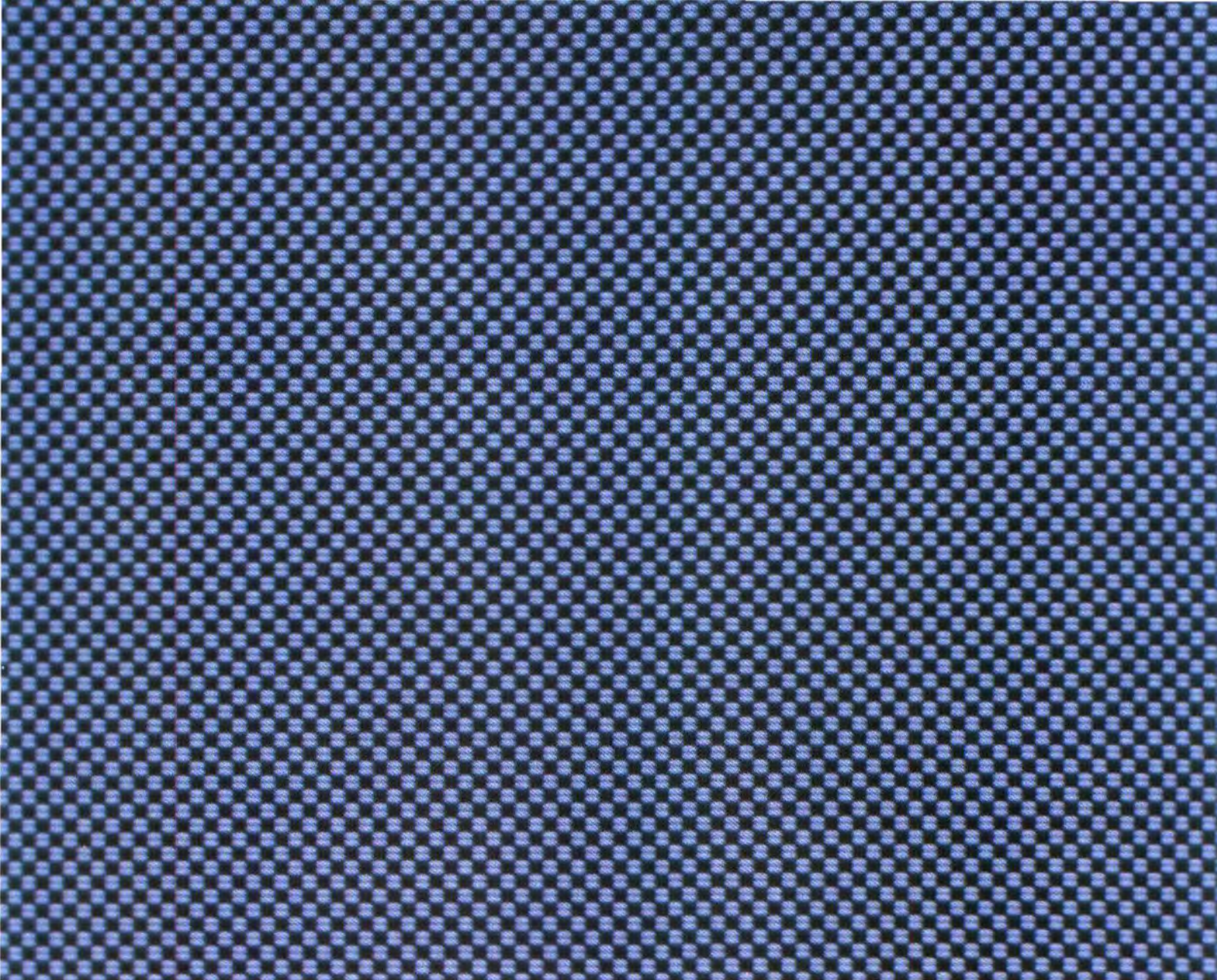


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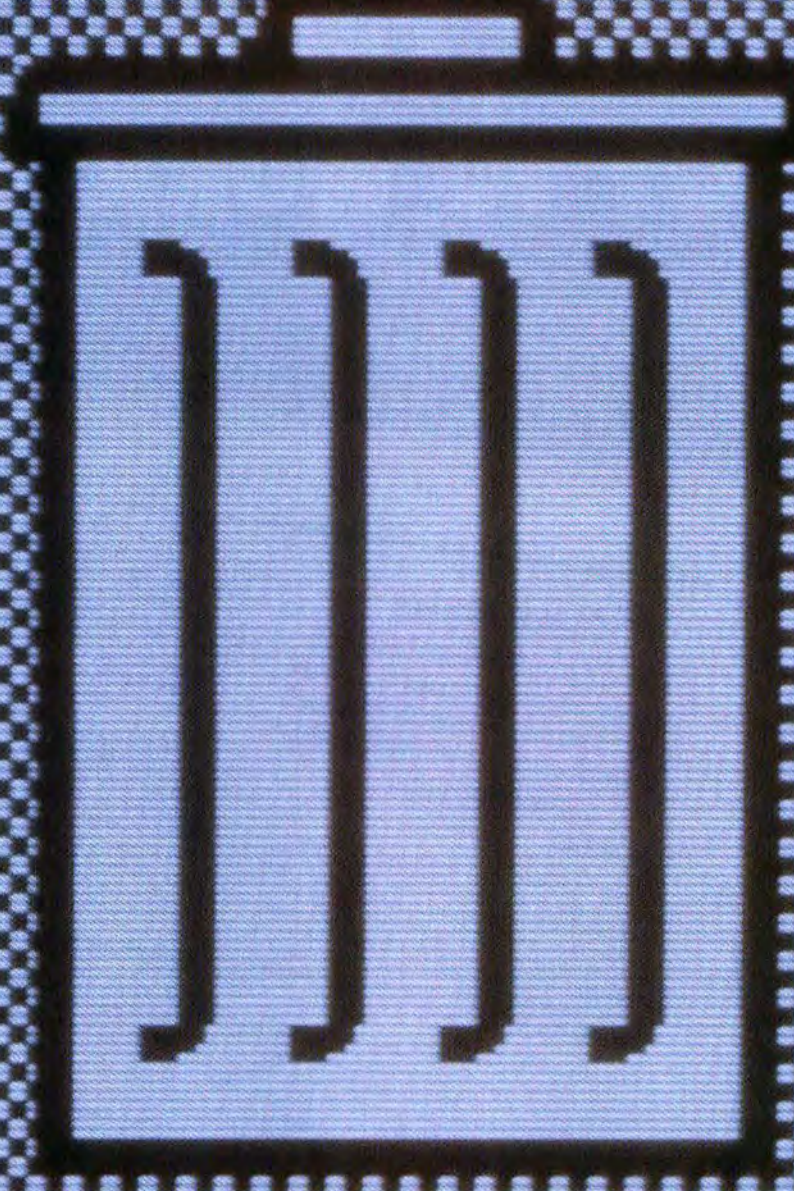
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Michael Day
The Macintosh Journal

The Macintosh Journal

Cirrus Drives

The Cirrus drives are exciting and excellent performers. They offer impressive speed, flexible software, attractive design and quiet operation.

Ease of Use

Running a Cirrus drive is very simple. It is just a matter of plugging the drive in and turning it on. The drives come pre-formatted and ready to go. The Cirrus has two DB 25 connectors on its case, so its cables are easier to work with than the "standard" SCSI cables that come with some drives. The design of the Cirrus drives contributes greatly to their ease of use.

The software that comes with the Cirrus drives is very flexible. It follows the Macintosh interface closely, and is well done. With the software, users can partition the drives into several volumes, or combine several drives into one single volume. Volume sizes can be changed or new ones added at any time without losing data. Password protection, manual or automatic mounting, automatic head parking, backup utilities, and disk repair utilities are all standard. In addition, the software performs several diagnostic tests including the ability to map out bad sectors and program the drive's interleave. In short, this is some of the most extensive and best written software available for Mac hard drives.

Most of the Cirrus' flexibility comes from their excellent software. However, the physical construction of the drives also contribute to their superior flexibility. Unlike other drives for the Mac, Cirrus drives can be placed vertically or stacked horizontally depending on your desktop requirements.

Performance

Cirrus drives were engineered to perform well in everyday situations. These drives are very fast when performing common operations such as going to the chooser or building the desktop. Reading and writing to and from files is also very fast. Using the Cirrus drives gave us an

appreciation of the importance of ergonomic design to performance. For instance, fan noise can increase fatigue in office workers. A drive that is built to be quiet and easy to work with may not increase the data transfer rate, but it will help to get more productivity out of the user. Cirrus drives are quiet and easy to work with which we consider to be a plus in their performance rating.

Because the Cirrus software is so good, users may want to use it to initialize drives from different manufacturers. In our tests, this worked well, and allowed drives of differing origin to be linked together as one volume. Since many of the older SCSI drives came with poor software, this is a good argument for buying a Cirrus drive and chaining it with other drives after they have been initialized with the Cirrus software.

Design and Construction

The Cirrus drives, though very small and lightweight, (about 4 lbs.), are constructed of quality materials designed to last. Their light weight is due to the small number of components in each drive and to their plastic case. The Cirrus drive is both sturdy and durable; the internal power supply is encased in aluminum, and the drives are shock mounted on rubber bearings.

The Cirrus drives have the most exciting, simple and elegant design we have seen in a hard drive for the Macintosh. The modular construction of the drives means that any repair work will be quick and easy. Simply put, Cirrus drives are a joy to work with.

Recommendations

Cirrus drives were designed for the professional user. They were not engineered to be low cost products, or to be "just adequate performers;" they are built with premium components. These are powerful drives with powerful software. Cirrus drives are an excellent solution for users who demand a lot. Readers should also note that several new products are in the pipeline and that a 40MB tape backup and 30MB hard drive are currently available. We give the Cirrus 20, 40 and 60 drives an excellent rating (8 on a scale of 10) and recommend that other drive manufacturers follow the Cirrus example, and design drives that are simple, elegant and impressive performers. -Michael Day

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Caveat Emptor

Mail-order problems continue

Not far from Beverly Hills' Rodeo Drive sits a stucco building, not very different from many in southern California. This one, however, used to be the home of CompuSystems—the latest and perhaps most successful of those companies that have taken hundreds of thousands of dollars from thousands of customers under the false pretense of supplying them with discount computer products by mail order.

How could that happen? Easy. Any company that passes a credit check will be accepted by most magazines as an advertiser. By the time we find out there's a problem, the scam perpetrators may be long gone, leaving nothing but—like CompuSystems—windows covered with newspapers, and a lot of angry customers and magazines.

Nor are fly-by-night con artists the only source of mail-order consternation. Many of the problems are caused by dealers that get caught up in a vicious cycle of cost-cutting and cash shortages. They're companies struggling to stay alive.

Does that mean that our readers should not buy from mail-order vendors? No. But it does suggest that we should exercise caution in our purchases. There are a number of warning signs that indicate the likelihood of problems with a vendor: it doesn't accept Visa or MasterCard; it does accept payment for products that it may not be able to send out within a reasonable time (the Postmaster says this is four weeks); or it doesn't provide the purchaser with information about missing products or partial shipments.

Three exemplary vendors stand out: MacConnection, Programs Plus, and Tussey Computer Products. Buried in the fine print of their advertisements is a one-line

statement that seems to make all the difference in the world: *We do not charge until products are shipped.* I recommend that you do not purchase products from a vendor that doesn't follow this policy. If you ignore this advice, you may join the 200-plus readers who have written to tell us of the problems they have had with mail-order purchases. The reasons behind all of this are explained in Jeff Chester's article in this issue, "What's Wrong with Mail Order?"

Macworld has waged a year-long campaign in behalf of our readers on this account. In February of this year, I pointed out in this column the problems with one particularly troublesome vendor, Northeastern Software, a company that filed for bankruptcy. We decided to identify a common cause of readers' trouble, even though Northeastern was a major advertiser in our own magazines.

Macworld has taken a lot of grief from our worthy competitors in the publishing industry—basically cheap shots from magazines that are willing to accept the advertisements, but not willing to take a stand on behalf of consumers. Print, as they say, is cheap. When ad revenues are on the line, the din from competing publications becomes considerably muted. Our stand on Northeastern left our parent company holding well over \$100,000 in unrecovered advertising costs.

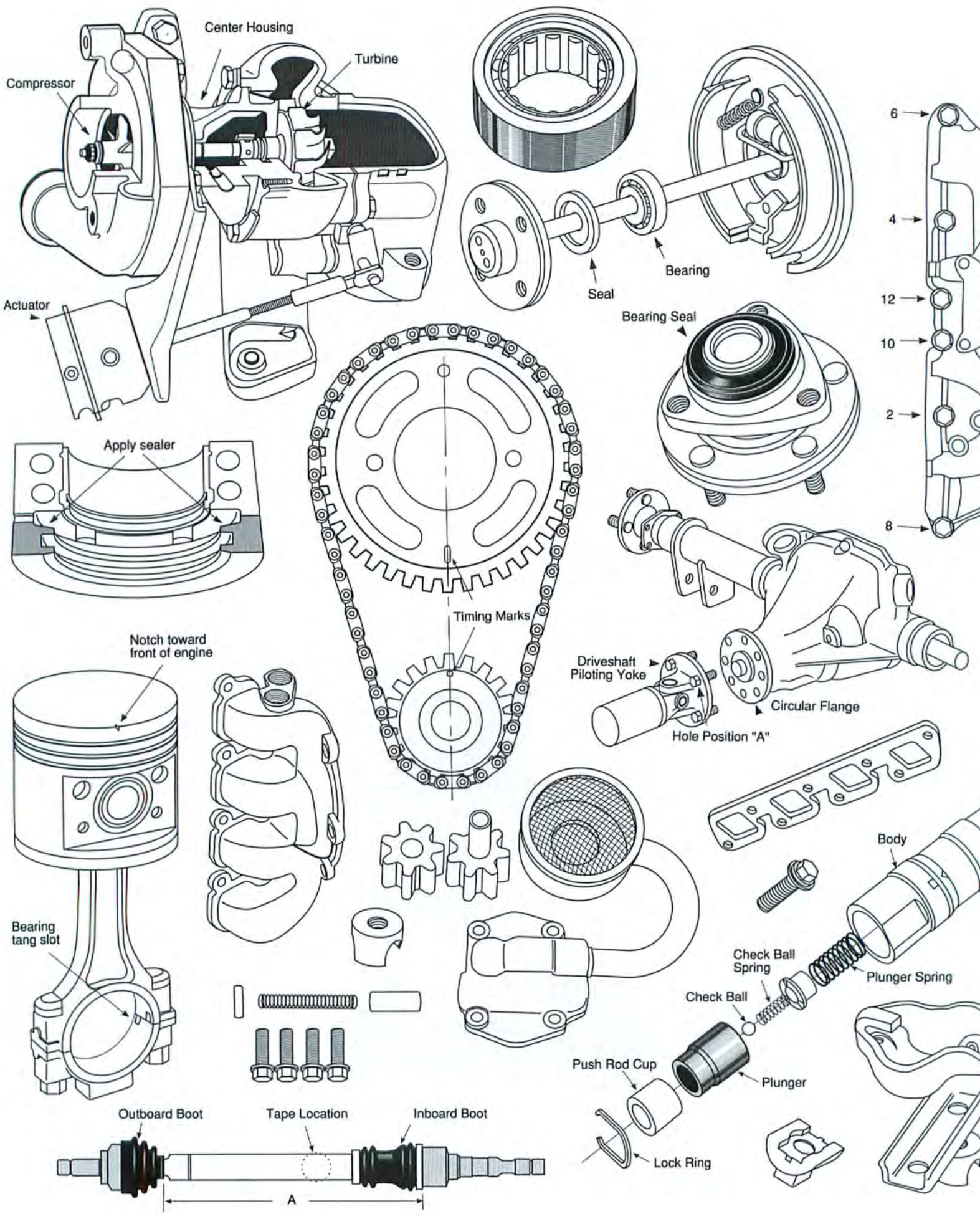
We followed up my column with an article by *Macworld* Associate Editor Nancy Dunn that made specific recommendations about how to avoid being burned by swindlers and what to do once stung. The result: even more letters from readers recounting their problems. We've received a steady stream over the last ten months, all telling us of problems with mail-order suppliers and other vendors. We've followed up, sending copies of your letters to the companies; using our position in the market on behalf of consumers who have had little success working through Postmasters, consumer advocacy groups, and Better Business Bureaus. In some cases we've had encouraging responses. For example, PC Network sought protection under Chapter 11, but responded when we intervened for our readers. Before its May filing, PC Network had satisfied some of the readers who complained about missing products.

We culminate this year-long campaign of mail-order monitoring with Jeff Chester's article and a call to action for mail-order vendors: *do not charge unless you are*

(continues)



David Beffa Negrini of MacConnection, which made its name as much by customer service as by its eccentric ads.



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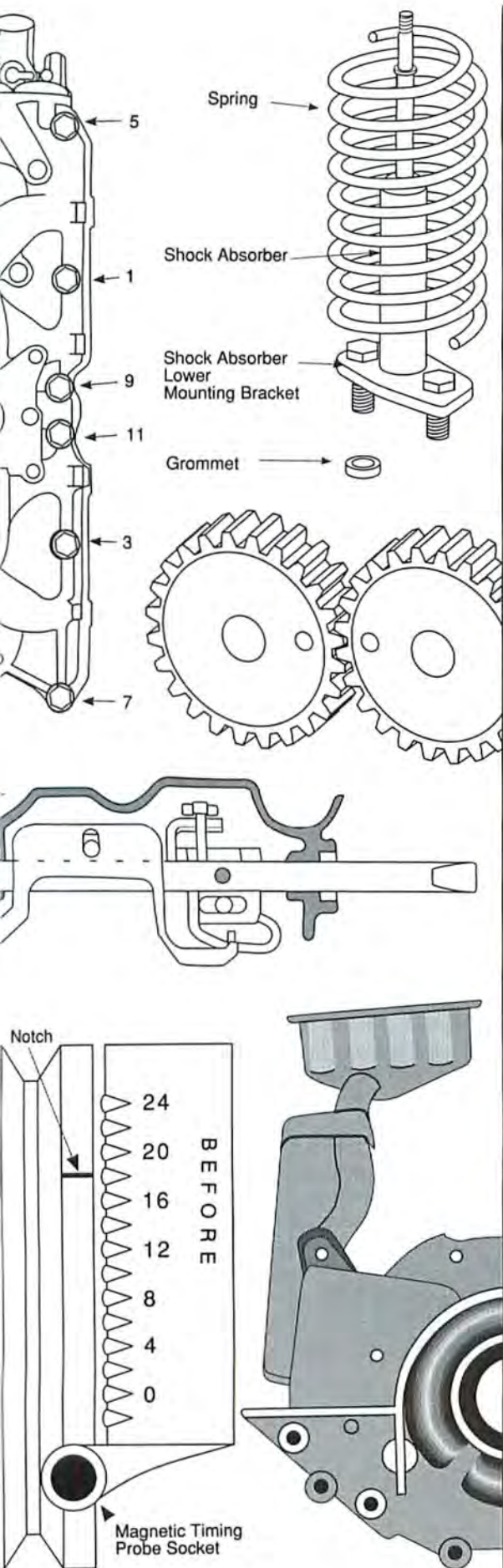


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"1st Aid Kit™ falls into that special category of 'must-have' products" (MACazine, April '87). It lets you handle every Mac problem from difficulties copying files, printing, and using AppleTalk networks, to recovering lost data from deleted or damaged files and unreadable disks.

Acclaimed by novice and expert alike, the 1st Aid Kit is much more than powerful software. At its core is a clearly written reference manual that:

- lists every imaginable error condition
- helps you quickly track down solutions to any problem
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Circle 628 on reader service card

Commentary/Jerry Borrell

able to ship. We also suggest that the Direct Marketing Association in New York institute a "certification" program: a self-policing program for fiscal soundness which would let consumers know that a given vendor meets some minimal requirements of solvency and performance. Any recommendation for action by Federal authorities seems futile in an era when even life-endangering situations (air traffic control, for instance) go unattended; some states have encouraged us by enacting legislation of their own.

By the way, we've also taken a lot of flak from other publications because we have identified companies that enter into Chapter 11 protection. We think this is our responsibility—letting you know that you should consider carefully before purchasing from a company that can take shelter in its Chapter 11 status, thereby avoiding repayment, warranty fulfillment, or shipment of product. You might consider the 15,000 outstanding customers of PC Network.

When we in the press cover problems like this, we ask ourselves, where do we fit in? Do we, by reporting on economic troubles that a company has, increase the likelihood that it will fail? In many cases the answer is yes. But if we withhold information from our readers that might have an impact on companies, how do we decide when to make our readers aware? Once the companies enter Chapter 11? Just before they go Chapter 11? After ten reader letters? One hundred?

Our answer is to print the information when we know it; in some cases this causes distress to both consumer and vendor alike. It's like cursing when you encounter a detour on a road that has a large pothole. Everyone has to go out of the way to avoid the problem. Our only alternative is to let drivers use the road and then let them try to collect money from some local government if they break an axle.

So in fairness we report what we know, after it has been verified. We attempt to be objective, not sensationalist; candid, not clever; and compassionate where compassion is due. □

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Circle 559 on reader service card

System Requirements:
512K Macintosh Computer.

*If purchased directly from
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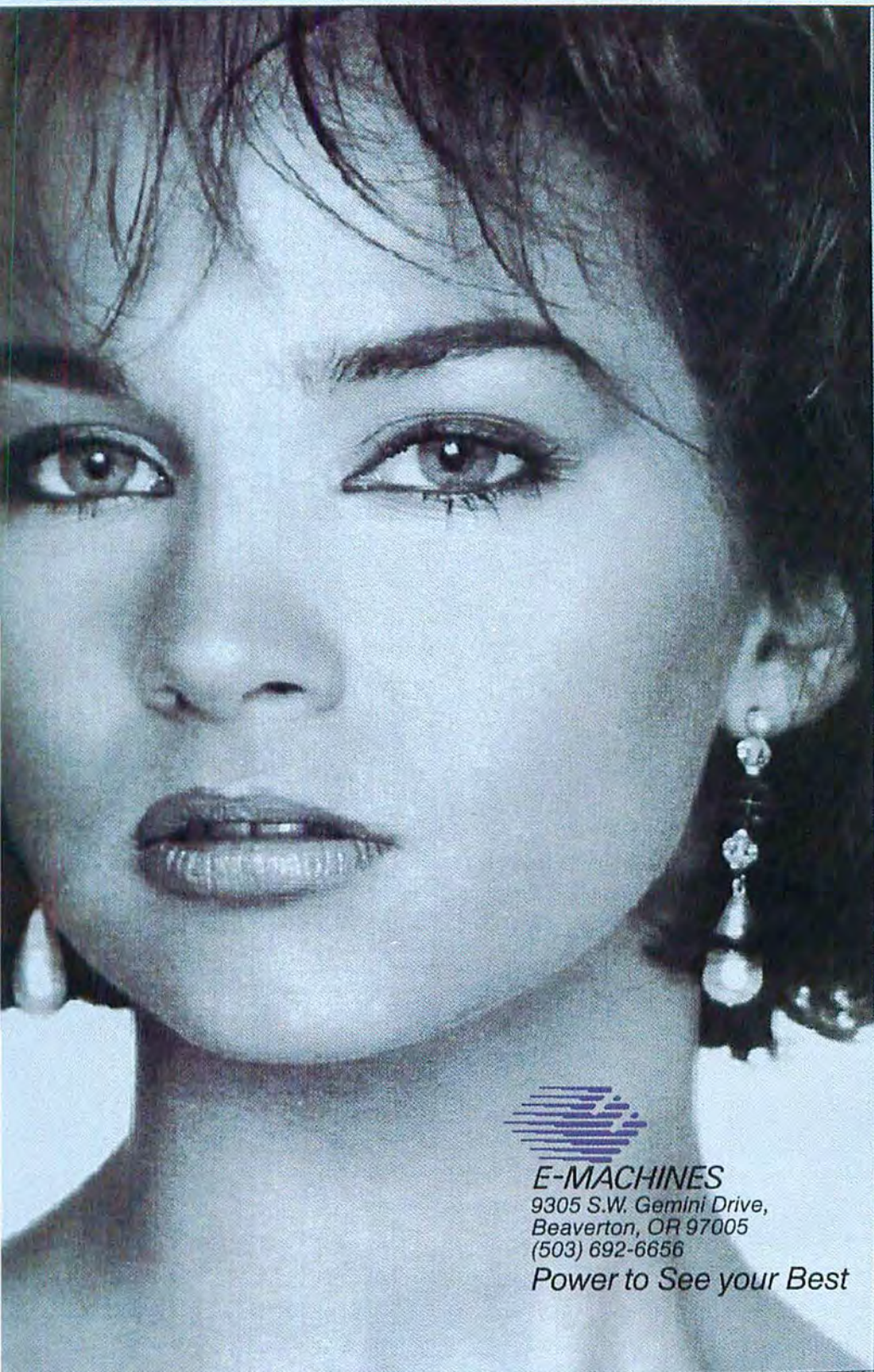
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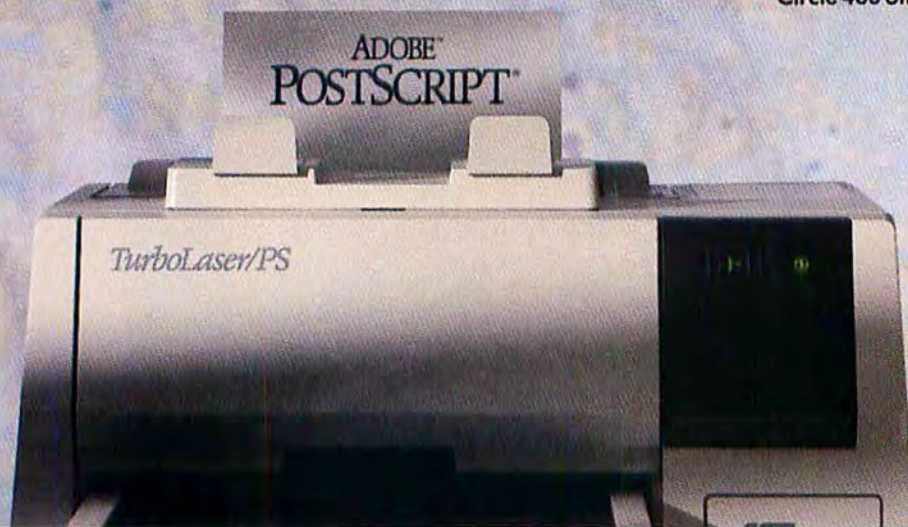
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Circle 463 on reader service card



Contributors Notes

Jeff Chester ("What's Wrong with Mail Order?") is an investigative reporter whose work has appeared on the Public Broadcasting System, on National Public Radio, and in publications such as The Nation, the San Francisco Chronicle, and the Oakland Tribune. He is also a producer for the "MacNeil-Lehrer NewsHour." His specialty is computer-related fraud and crime.

Robert C. Eckhardt ("Inside Outliners") is a Macworld contributing editor and the author of Free (and Almost Free) Software for the Macintosh, published by Crown, and The Fully Powered Macintosh, forthcoming from Brady.

Danny Goodman ("Business Clinic") is a contributing editor of Macworld, the author of ten computer books, including The Complete HyperCard Handbook, published recently by Bantam Books, and the creator of the stackware programs Business Class and HyperDesk.

Jim Heid ("Getting Started with PostScript") is a contributing editor of Macworld. Each month he turns his attention to a different topic on Mac fundamentals. He is the author of dBase Mac in Business, published this year by Asbton-Tate Publishing.

Prasad Kaipa ("The Disk Shopper's Guide to Storage") is an assistant professor of radiobiology at the University of Utah, where he has been researching the effects of radiation fallout. He consults on Mac application programs through his firm, MacWiz Consulting.

Steven Levy ("Why I Use What I Use" and "The Game Hall of Fame Annex"), whose column appears each month in Macworld, is the author of Hackers: Heroes of the Computer Revolution, now published in paperback by Dell.

Erfert Nielson ("Macintosh-Aided Design" and "Insights on SuperPaint"), a founding member of the Macworld staff, is now a Macworld contributing editor who specializes in graphics.

Bangs L. Tapscott ("The Disk Shopper's Guide to Storage") is a professor of philosophy at the University of Utah. He is the author of several books and articles in the field of mathematical logic, a founding officer of the Utah Macintosh Users Group, and the editor of its newsletter, MacFUG News.

Franklin Tessler ("Mac System Tools") is a contributing editor of Macworld and a founder of the Los Angeles Macintosh User Group. He also uses the Mac in his other life as a radiologist.

Bruce Webster ("Looking through the Mac II Kaleidoscope") is a Macworld contributing editor and widely published writer who specializes in personal computer topics. He's been watching the Mac since its 128K days. □

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Programs & Peripherals

Picks of the Month



The Madson Line Professional Series Macintosh Carrying Cases

Madson Line Computer Luggage is designed for those seeking the professional look & feel of black ballistic nylon accented with leather on the hand grid, shoulder pad, and identification pocket. The interior pocket for the keyboard is made with laminated foam and there are pockets for a modem, mouse and folders. Fitting the Mac128/512, MacPlus, Mac SE, Imagewriter I or II and carrying a lifetime guarantee, the *Madson Line* cases are the best we've ever seen at any price!



Professional Macintosh (Plus) Carry Case	79.
Professional Macintosh SE Carry Case	99.
Professional ImageWriter I (II) Carry Case	75.

Utility Software

ALSoft Disk Express	27.	Icon-It! (Assign Icons to Menu Items)	52.
Berkeley System Design		Read It! TS (For ThunderScan)	99.
Stepping Out (Macintosh Screen Extender)		Read It! (For Image Scanners)	189.
CE Software Disk Top 3.0	35.	Personal Computer Peripherals Corp.	
Central Point Software		HFS Backup V2.0	32.
Copy II Mac (Includes MacTools)	20.	Softstyle Printworks	49.
Centram Systems West, Inc.		SuperMac Software SuperSpool (ImageWriter Print Spooler Utility)	49.
Tops For The Macintosh	125.	Diskfit (Backup & Restore Utility)	49.
Fifth Generation Systems		SuperLaserSpool	99.
FastBack For The Macintosh	59.	Multi-User SuperLaserSpool	259.
Ideaform Mac Labeler (Version 2.2)	29.	Sentinel	99.
DiskQuick (Disk Librarian)	29.	THINK Technologies HFS Navigator	39.
Infosphere		LaserSpeed (Single User)	59.
MacServe (Network Software)		Williams & Macias myDiskLabeler	24.
LaserServe (LaserWriter Print Spooler)	165.	myDiskLabeler w/Color	33.
ComServe (Modem Sharing Software)	125.	myDiskLabeler w/ LaserWriter Option	38.
Olduvai Software DA-Switcher (Switch Multiple Sets of DA's)	32.	Working Software, Inc.	
		Findswell (Document Finder)	37.

MacTilt & MacTilt SE by Ergotron



MacTilt raises the Macintosh 4 inches, providing 30° tilt, and 360° rotation providing the increased height and adjustability needed to reduce glare, and to ease eye, neck, and back strain. **MacTilt SE** is designed especially for the Mac SE. The original **MacTilt** comes standard with a universal drive bracket and fits the 128K, 512K, and the MacPlus. Get **MacTilt** and bring your Mac up to eye level!

MacTilt or MacTilt SE	74.
Mouse Cleaner 360°	14.

Turbo SE, MaxPlus Mega, & MultiSIMMs by MacMemory

Turbo SE, MaxPlus Mega, and MultiSIMMs are products unsurpassed in quality and compatibility. All MacMemory products are stringently manufactured using 100% fully inspected chips with a 72-hour burn-in, and final quality check in test Macintoshes producing the highest-quality memory products on the market. All MacMemory products carry a full two-year warranty and are designed to make your Macintosh fly higher and faster than ever before!



Turbo SE (16 Mhz, 68000 accelerator for the Macintosh SE. Doubles the SE's speed while offering complete compatibility. Allows an optional 68881 math coprocessor)	395.
MaxPlus Mega (Expands the MacPlus to 2MB with CMOS Megabit chips. Not for use with big screens)	345.
MultiSIMMs are Apple-standard, megabyte SIMMs for the MacPlus, Mac SE, Mac II, TurboMax and Turbo SE equipped Mac using low-power-consumption, surface-mounted CMOS chips:	
MultiSIMMs 2MB Set (1MB to 2.5MB Upgrade)	629.
MultiSIMMs 4MB Set (1MB to 4MB Upgrade)	1299.

Desk Accessory Programs

Affinity Microsystems Tempo Batteries Included	55.	Imagine Software Smart Alarms & Appointment Diary	Special 35.
Battery Pak (9 Desk Accessories)	32.	Multi-User Appointment Diary with Smart Alarms	Special 95.
Borland SideKick V2.0	59.	Solutions, International SmartScrap & The Clipper (New Scrapbook DA)	41.
Cortland Top Desk (7 New Desk Accessories)	34.		
Greene, Inc. QuickDex (Computerized Address Book)	24.		

Languages

Apple Computer MacPascal	99.	Microsoft Microsoft Basic Interpreter 3.0	64.
Borland Turbo Pascal	59.	Microsoft Basic Compiler 1.0	119.
Turbo Pascal Database Toolbox	59.	Microsoft Fortran Compiler 2.2	169.
Turbo Pascal Numerical Methods	59.	THINK Technologies Lightspeed C	99.
Turbo Pascal Tutor	49.	Lightspeed Pascal	65.
Consular		CAPP for Lightspeed C	54.
Macintosh 68000 Development System	59.	CAPP for Lightspeed Pascal	36.
Mainstay		TML Systems TML Pascal V2.0	68.
V.I.P. (Visual Interactive Programming)	85.	Zedcor, Inc. ZBasic 4.0	69.

Communications Software

Apple Computer MacTerminal	99.	Think Technologies, Inc. InBox-Starter Kit V2.0 (3 Personal Connections)	219.
Compuserve Compuserve Starter Kit	24.	InBox-Additional Personal Connections	79.
DataViz MacLink Plus with Cable	159.		
Software Ventures			
Microphone I.I (Includes Glue)	119.		

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Lookup by Working Software

Lookup is a new desk accessory spelling guide that can be accessed at any time to find the spelling of a single word, in any Macintosh program! Just highlight a word in your document and **Lookup** will check it against its 93,000 word dictionary. If **Lookup** finds the word you hear a beep and can continue working. If it's unknown, a screen appears, allowing you to correct the word by using **Lookup's** suggestions. When a word doesn't look right, look it up with **Lookup**!



Lookup 31.

MacCalligraphy 2.0 by Enzan-Hoshigumi USA



MacCalligraphy 2.0 is a totally new kind of software that can make you a master of the ancient art of calligraphy in a matter of minutes. With a choice of brush sizes and control over brush touches, shades of gray, speed of ink flow and "tail" lengths you can enter a realm of graphics creativity that simulates the medium of brush and ink on paper. **MacCalligraphy** simulates painting in the real world and can artistically give you results as personal and expressive as your own signature!

MacCalligraphy 2.0 115.
Japanese Clip Art Scroll 1 "Heaven" or Scroll 2 "Earth" 59.
Japanese Clip Art "Borders" Scroll 69.

ThunderScan 4.0 with Power Port by Thunderware

Ever since **ThunderScan** started zipping back and forth inside the ImageWriter, it's been famous for eye-popping graphics. Now, the most popular Macintosh scanner is better than ever with true half-tone capabilities, special effects, and more. **ThunderScan** images can now be saved in a variety of formats providing complete compatibility with PageMaker 2.0 and other desktop publishing programs. Grace the pages of your publications with honest-to-goodness halftones from **ThunderScan** and its software palette that lets you alter any image to your art's desire!



ThunderScan 4.0 with Power Port 199.

Smart Alarms & Appointment Diary by Imagine Software



Smart Alarms is a unique desk accessory that makes it easy to remember things you can't afford to forget. With **Smart Alarms**, when a reminder comes due, your message comes up on screen on top of whatever application you're running. And, the included **Appointment Diary** makes it easy to write notes about important events as they occur. Best of all, the **Appointment Diary** is integrated with **Smart Alarms**, making it easy to set automatic reminders for all your upcoming events.

Smart Alarms & Appointment Diary 35.
Multi-User Appointment Diary with Smart Alarms 95.

Scoop by Target Software

Scoop is a new desktop publishing program designed to run circles around the competition. For one thing, **Scoop** can wrap text around circular or irregular shaped objects with a click of the mouse. **Scoop** also allows you to create text and graphics simultaneously from within a totally self contained program. It comes complete with the features you'd find in SuperPaint and MacDraw, an excellent word processing program, and a 140,000 word dictionary. Point is, even if you bought all the supplementary programs needed to "soup-up" another desktop publishing pack-



age it still wouldn't do what **Scoop** can do!
Scoop 379.

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AST-2000	1395.	Motorola 68881	
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AST-4000	3695.	MaxPlus Mega	
74 MB External Hard Disk with 60-MB Cartridge-Tape Backup for the Macintosh Plus & SE.		(2MB Upgrade with 1MB Chips for MacPlus)	<i>Special</i> 345.
Central Point		Megabyte SIMMS for the MacPlus, Mac SE, Mac II, TurboMax and Turbo SE equipped Mac:	
Central Point 800K External Drive	185.	MultiSIMMS 2MB Set	
Dove Computer Corporation		(1MB to 2.5MB Upgrade)	<i>Special</i> 629.
MacSnap Model 524 or 524E (512K to 1MB Upgrade)		MultiSIMMS 4MB Set	
MacSnap Model 524S (512K to 1MB Upgrade w/SCSI Port)	239.	(1MB to 4MB Upgrade)	<i>Special</i> 1299.
MacSnap Model 548 or 548E (512K to 2MB Upgrade)	369.	Network Specialties	
MacSnap Model 548S (512K to 2MB Upgrade w/SCSI Port)	459.	Jump! Board 020	779.
MacSnap 2s (1MB to 2.5MB Upgrade for MacPlus or Mac SE)	695.	Jump! Board 020 with 1MB Ram	929.
MacSnap 4s (1MB to 4MB Upgrade for MacPlus or Mac SE)	1395.	Jump! Board 020 with 1MB Ram & 68881	1089.
MacSnap Toolkit (Wrench, Case Cracker & Grounding Set)	14.	Personal Computer Peripherals	
Ehman Engineering		Beige or Platinum Color. Optional Built-In Modems Available.	
Ehman 800K External Disk Drive	189.	MacBottom HD-21	
First Class Peripherals		(20+Mb SCSI Hard Disk)	789.
Sider C-46 (40MB Hard Drive with 60MB Tape for MacPlus/SE or Mac II)	1629.	MacBottom HD-32	899.
		(32Mb SCSI Hard Disk)	
		MacBottom HD-45	1189.
		(45Mb SCSI Hard Disk)	
		MacBottom 20 (20+Mb Serial Hard Disk for Mac 512K & MacPlus)	859.

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TurboScan		Magic Digitizer (Mac 128/512k or MacPlus Version)	249.
(Optically Scans & Digitizes at 300 Dots-Per-Inch)	1395.	Summagraphics	
Impulse		MacTablet 12x12 size	379.
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Audio Digitizer V2.0 w/SoundCap	149.	with Power Port (Mac 512K, 512K Enhanced, MacPlus, and Macintosh SE)	<i>Special</i> 199.
Koala Technologies Corp.			
MacVision (Digitizer)	169.		

Accessories

Bech-Tech		Disk Drive Cleaning Kit	20.
Fanny Mac	69.	Tilt/Swivel	22.
Cambridge Automation		Universal Copy Stand	24.
Numeric Turbo	99.	Polarizing Filter	34.
Central Products		Printer Muffler 80	39.
MacOpener (All In One Mac Tool)	16.	Printer Muffler 132	52.
Curtis Manufacturing		Control Center	64.
Diamond-Surge Suppressor-SP-1	29.	System Saver Mac	
Emerald-Surge Suppressor-SP-2	36.	(Beige or Platinum)	64.
Ruby-Surge Suppressor-SPF-2	55.	A/B Box (MacPlus Only)	64.
Sapphire-Surge Suppressor-SPF-1	47.	Turbo Mouse	85.
Ergotron		Moustrak	
MacTilt or MacTilt SE		MousePad 7"x9" Size	8.
(Platinum Color)	<i>Special</i> 74.	MousePad 9"x11" Size	9.
Mouse Cleaner 360°	<i>Special</i> 14.	Nuovotech	
I/O Design		EasyNet (Specify Din 8 or DB-9)	29.
Mac Luggage Available in Navy or Platinum Gray		Nutmeg 15" Monitor	
Macintosh Plus Carrying Case	69.	(Displays One Full Page)	1449.
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Micro Cabinet (holds 45 disks)	14.	ImageWriter Ribbon-Black	4.50
Double Micro Cabinet (holds 60 disks)	21.	ImageWriter Ribbon-Color	5.
Triple Micro Cabinet (holds 135 disks)	29.	ImageWriter Rainbow Pack (6 Colors)	25.
Kensington		ImageWriter II-Four Color Ribbon	12.
External Disk Drive Cover	8.	SoftStyle MacEnhancer	175.
Mouse Pocket	8.	The Madson Line	
Mouseway (Mousepad)	8.	Professional Series Carry Cases In Black Ballistic Nylon	
ImageWriter or ImageWriter II Cover	9.	Mac(Plus) Carry Case	<i>Special</i> 79.
Macintosh (Plus) Dust Cover	9.	Mac SE Carry Case	<i>Special</i> 99.
Mouse Cleaning Kit w/ Pocket	17.	ImageWriter I (II) Carry Case	<i>Special</i> 75.

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Bulk (Sony) 3 1/2" SS/DD Disks (10)	12.	Bulk (Sony) 3 1/2" DS/DD (10)	16.
Sony 3 1/2" SS/DD Disks (box of 10)	14.	Centech 3 1/2" DS/DD Color Disks (box of 10)	19.
Centech 3 1/2" SS/DD Color Disks (box of 10)	16.	Sony 3 1/2" DS/DD Disks (box of 10)	19.
Fuji 3 1/2" SS/DD Disks (box of 10)	14.	Fuji 3 1/2" DS/DD Disks (box of 10)	20.
Maxell 3 1/2" SS/DD Disks (box of 10)	13.	Maxell 3 1/2" DS/DD Disks (box of 10)	20.
Verbatim 3 1/2" SS/DD Disks (box of 10)	13.	Verbatim 3 1/2" DS/DD Disks (box of 10)	20.
3M 3 1/2" SS/DD Disks (box of 10)	14.	3M 3 1/2" DS/DD Disks (box of 10)	20.
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Smartmodem 2400	449.	Promodem 2400	
Transet 1000-128K	269.	(Hayes Compatible)	309.
Transet 1000-512K	359.	Mac Pack w/Procom M and Cable	
Transet 1000 Mac Accessory Kit	29.	(Specify Mac or MacPlus)	49.
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C.A.T. Contacts*Activities*Time	239.	Software Discoveries	
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Deneba Software Comment		Microsoft Chart 1.02	72.
(Attach Electronic Notes to Files)	64.	Microsoft Excel 1.04	224.
Forethought PowerPoint	209.	Micro-Systems Software	
Layered		Analyze! (New Spreadsheet)	99.
Notes For Excel, Jazz, PageMaker,		Satori Software Legal Billing	369.
Microsoft Works or Word 3.0 (each)	42.	Legal Billing II	539.
Legisoft/Nolo Press		Project Billing	439.
WillWriter V2.0	31.	Bulk Mailer 3.0	85.
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Word & Outline Processors

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Doug Clapp's Word Tools	42.	WorksPlus Spell	39.
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(Webster's/Medical/Legal/Hyphenation)	64.	Spellswell Medical Dictionary	
Spelling Coach 3.0 Professional		(35,000 Medical Terms)	59.
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Allan Bonadio Associates		Laser FX (Special Effects for Desktop Publishing)	119.
Expressionist (Equation Processor)	52.	Quark, Inc. QuarkXPress	499.
Boston Publishing Systems		Solutions, International	
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Graphics Software

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Apple Computer MacPaint	99.	Taking Care of Business (each)	27.
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Dubi-Click Software		Silicon Press	41.
World Class Fonts! (Both Volumes)	49.	Solutions International	
WetPaint (Both Volumes)	49.	The Curator (Catalog Your Art)	95.
Enzan-Hoshigumi USA		Springboard Certificate Maker	35.
MacCalligraphy 2.0	Special 115.	Symmetry PictureBase V1.2	44.
Japanese Clip Art Scroll I		T/Maker	
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"Borders" Scroll	Special 69.	Business Image, Holidays or	
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LaserPaint	319.	Click Art Laser Fonts: Plymouth,	
LaserWorks	199.	Bombay, or Seville (each)	46.

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Game Software

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Activision Shanghai or Hacker II	24.	Zork Trilogy	45.
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Portal	32.	Flight Simulator 1.0	32.
Artworx Bridge 5.0	22.	Miles Computing Inc.	
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Ballyhoo, Beyond Zork, Bureaucracy,		Simon & Schuster	
Hollywood Hyjinx, Leather Goddesses		Star Trek (The Kobayashi Adventure)	24.
of Phobos, Moon Mist, Nord & Bert,		Sir-Tech Mac Wizardry	35.
Plundered Hearts, Stationfall,		Sphere, Inc.	
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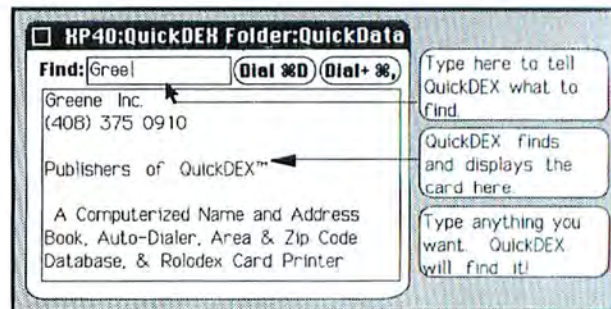


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Why I Use What I Use

These are a few of my favorite things



In 1984, when I first purchased my Macintosh, decision making was easier—much in the way the culinary options of hostages are limited. If your captors serve you rolls and water, you eat the rolls and drink the water. If croissants are on the bill of fare, you are grateful. With the original Mac you had water (*MacWrite*) and a croissant (*MacPaint*), followed by hard-boiled egg (*Multiplan*). If you wanted more, you had to write your own programs or find them from user groups—the equivalent of scrounging around your cell for insects.

Now of course there is a cornucopia of software available—everything from cheesesteaks to filet mignon. But there are also excruciating decisions to make. Almost everything you'd want to do on the Macintosh requires a process of elimination. Flip through the pages of this magazine and you are bombarded by conflicting claims of the various contenders in each application. Some of them are so bold as to say, Don't buy *that* pig of a program—buy ours! How do you choose?

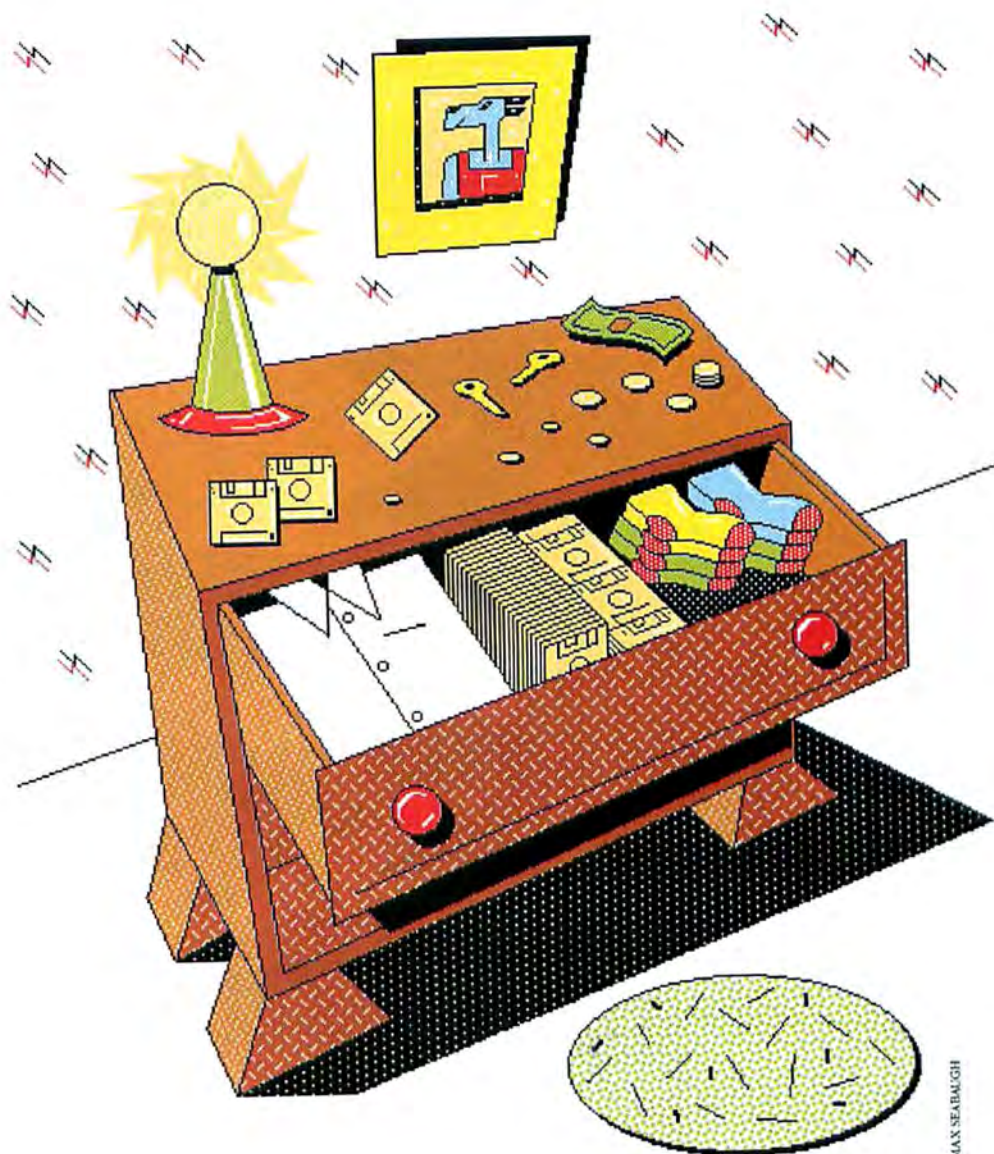
The standard answer is simple. You figure out your needs, get literature from the companies selling software that seems to address those needs, scan the features the programs offer and the way they perform those features, narrow your search down to a short list, and then try those programs out to see which one is best for you. Somewhere in that process you also seek out people already using the software to get the benefit of their experience.

So much for fantasy. Reality is much more complicated. If people did things as described above, they would be spending almost as much time and energy *choosing* the software as using it. Assuming they find a dealer willing to let them diddle around with expensive applications for hours until the winner is apparent. (At which point they may thank the dealer and go home to call Mac Connection.) No, in

my experience people choose software more haphazardly. Most often, they buy whatever is offered up as the "best" when they buy the computer. What they buy later depends on many less-than-scientific factors. Maybe something strikes them in an ad or a review. Or a friend recommends something. Or—this is not something I endorse, but it happens—someone slips them a pirated program.

I suspect that everyone wonders whether the software they use is really the best for the job. Perhaps it once was, but something new has eclipsed it. When do you know if a new program is good

(continues)



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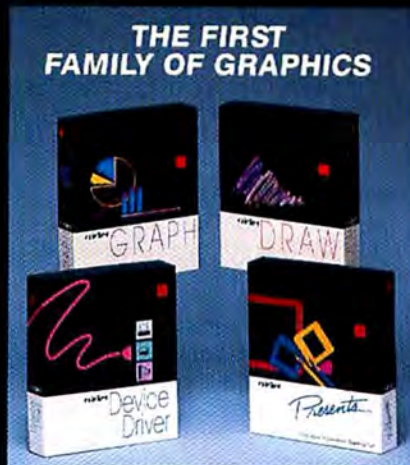
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When it comes to Macintosh graphics software, there's just one name to remember — Cricket Software. Your local dealer will be happy to introduce you to the entire family: Cricket Graph, Cricket Draw, Cricket Presents..., and Cricket Device Drivers.

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enough to make you abandon the one you're already familiar with? What if you change and find the new one is worse? No matter how happy you are with your current software, you will never know if it's the very best for your particular needs, simply because it is virtually impossible to give the others detailed tryouts.

I don't want to sound apocalyptic about this: the vast majority of Macintosh programs are terrific. The difference between a decent Mac application and a great one is insignificant when compared to the difference between using a computer to perform a task and not using one. So it boils down not to a matter of whether you're winning or losing, but how big you win.

That said, I thought it might be instructive to share some of my personal experiences with Macintosh software, along with some of the conflicts I have concerning whether to switch or ditch certain programs. Since I have access to both software and experts, I presumably have more freedom to play the field when it comes to ap-

plications. Yet since I am as immobilized by inertia as the next guy, I resist software promiscuity.

One warning: please do not mistake my naming a given piece of software as a full endorsement of any product. As you will see, the reasons I stay with a given piece of software are not always the most rational.

What's the Good Word?

First I'd better explain a bit about what is important to me as a Mac user. Partially to develop some insights for this column, I try using my computer for every task I can think of. But my bread and butter lies in words. So the most important program to me, by far, is my word processor and its attendant paraphernalia. In fact, my whole system setup is dictated by the amount of power I can muster in handling words with a Macintosh. If a 128K Mac with single-sided disks had been able to satisfy all my writing needs, I might have yawned at developments such as double-sided disks, hard disks, and Macintoshes with one or even two megabytes of memory. But as it turns out, word processing and handling the information I need for my writing re-

quire a lot of power. So I have found it worthwhile to upgrade my hardware constantly, at what turns out to be considerable expense.

In 1985 I submitted my original 128K Macintosh to a 512K upgrade, primarily to create *MacWrite* documents longer than laundry lists. When the Mac Plus came out I bought one, giving away my earlier model. This helped me to run *Microsoft Word* 1.0 with more reasonable speed. By then my documents were piling up, so I purchased a DataFrame XP20 hard disk. Incidentally, the recipient of my original Mac—who uses it only for word processing—has found it necessary to upgrade to double-sided disks and a new ROM, install a Dove SCSI port, and purchase an XP20 (which is much noisier than mine—horribly so).

What is the word processing software that drives all this power? At the moment, *Microsoft Word* 3.01. Over the years, I have developed a real love-hate relationship with this program. At first, frustrated by the inadequacies of *MacWrite*, I eagerly awaited *Word*, and at its arrival in early 1985, I was as happy as an Alaskan pros-

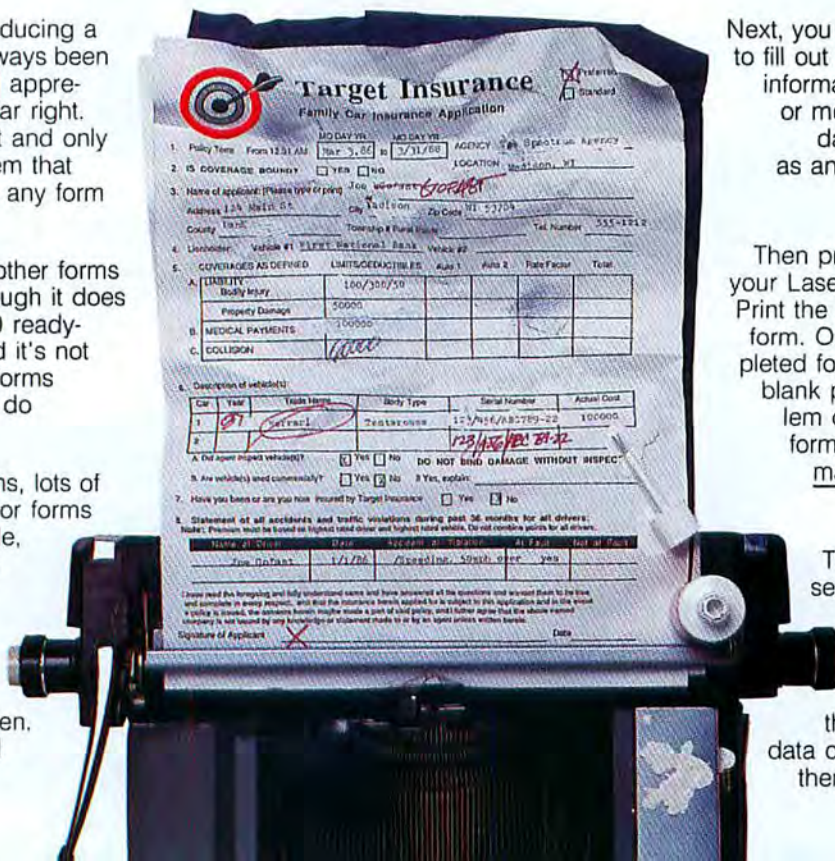
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Well, the bride snored. The original *Word* was infuriatingly slow, especially in saving files. It was also cumbersome, with a list of commands as long as your arm. Yet the transition from *MacWrite* was worth it, since I gained features like multiple screens, use of long files, and cursor controls. Not entirely happy, I tested other programs as they were released. The best of those, *WriteNow*, gave me the speed I missed, but obstinately refused to give me keyboard control of the cursor—it didn't even support the arrow keys on the Mac Plus! Yet I might have switched if the Translator procedure to move my files over to *WriteNow* had not been clumsy and slow. So I stumbled along with *Word* until Microsoft's long-promised version 3.0 came along.

the Mac, and that means a lot to someone who makes a living by writing. So I stuck with it until Microsoft belatedly released a new version that, in theory, fixed the bugs.

Blind Data

My requirements for a database manager are less demanding. I have little need for the very powerful programs like *Omnis 3*, *Double Helix*, or *4th Dimension*. All I

want is something that will keep lists of my sources and various information about them (name, address, phone, comments) and allow me to search through the list and print things out in different ways.

My first Mac database was *OverVue*, and it seemed ideal at the time. I kept my source list on it and found its spreadsheetlike display perfect for tracking receipts for my tax returns. (In fact, when an IRS auditor came to my office demanding proof of my claims, I dazzled her with an *OverVue* presentation that put to rest any doubts of my veracity.) But as I used the Macintosh more, and the software base matured, *OverVue*'s annoying failure to use many of the standard features of the Mac interface—particularly the ⌘-Z key to undo a command—grew to loathsome proportions in my estimation.

After tinkering with some other options, I basically threw in the towel and switched my files to a program I knew to be adequate, but not much more: the database component of *Microsoft Works*. I think I might have made an error in not trying out *FileMaker Plus*, which some

(continues)


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1. Policy Term From 12:01 AM	MO DAY YR <u>9/31/88</u> to <u>9/31/88</u>	AGENCY <u>The Spectrum Agency</u>
2. IS COVERAGE BOUND?	<input type="checkbox"/> YES <input type="checkbox"/> NO	LOCATION <u>Haddon, NJ</u>
3. Name of applicant: (Please type or print) <u>Joe Gafet</u>		

	<h1 style="margin: 0;">Target Insurance</h1> <h2 style="margin: 0;">Family Car Insurance Application</h2>	<input type="checkbox"/> Preferred <input type="checkbox"/> Standard
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Property Damage	50/5000				
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Macintosh SE, and Macintosh II.
(Scanner requires a SCSI interface.)

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If you want to know why FullWrite



Within the next ten minutes, your entire concept of word processing will be turned upside down.

FullWrite Professional™ sets new standards for word processing.

It lets you handle words better, faster, more powerfully, with more versatility than any other word processing program. But competing in today's world requires even more. Now, documents need the persuasive power of text and graphics combined.

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- **Change bars.** Visually highlights changes

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- **Outlining.** Sophisticated, powerful outlining that rivals the best stand-alone products.

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- **Power word processing features.** All the stan-

Professional really is so damn good.



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standard editing features plus: user definable outlining styles; base style sheets; custom style sheets; find and replace by virtually any attribute; large screen support; spelling checker; thesaurus; automatic hyphenation; automatic table of contents and index generation; full undo of all options; bookmarks; references; glossaries; variables; mailmerge; full header and footer support with graphics; automatic renumbering of footnotes, endnotes, pictures and other user defined items; kerning; leading; guttering; column rules; strikeouts; small caps; multiple windows; show pages; full keyboard shortcuts; true laser grey scales; intelligent left/right formatting of pages; flexible printing; directly import other word processing documents and more!

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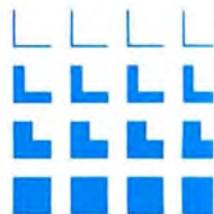
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From NuData

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Shouldn't you trust your data to NuData?

2154 • Requires SCSI port & SCSI Device Cable #1656; 1-yr. warranty

\$1,999

FREE

New
Winter
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The Data Cell 40 x 40T gives you a speedy, rugged 40-meg hard disk plus 40 megs of secure, easily accessible tape storage — all in one compact unit. Order yours today.

New Products from Icon Review

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Canvas	integrated graphics program	#2106/\$119
Capetronic Modem	unique wall mount	#2159/\$129
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From Borland International

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2084 • Works w/512K, Plus, SE & II;
requires HFS

Tempo

From Affinity Microsystems

\$53



Use Tempo to become more efficient in almost any Mac application by automating repetitive operations that are tedious or time consuming. Simply record your activities (such as entering text or clicking on menu commands), then replay the sequence as one command.

Insert boilerplate text, format lengthy documents, or move data among programs with a single keystroke. We use Tempo with Page-Maker to automate routine type formatting. By assigning keystrokes to sequences of point size, leading, and tabs, we avoid thousands of tedious manual commands.

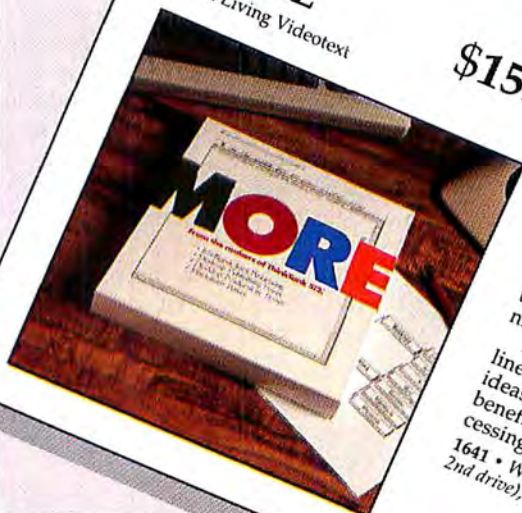
What will you do with all the time you save using Tempo macros?

1307 • Not compatible w/Mac SE & II

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From Living Videotext

\$159



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1641 • Works w/512K & Mac Plus (requires 2nd drive), SE & II

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Circle 272 on reader service card

SOLU



Question: When you use your LaserWriter or LaserWriter Plus, do you ever wish that:

- You could download more than three fonts at one time
- Your Laserwriter would take less printing time
- You used less disk space in your workstation
- You could find a quality expansion card to increase desktop publishing productivity

Solution: MASS ♦ FONTS™ for your LaserWriter™ LaserWriterPlus™

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- Run up to 8 programs at once
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- Never say "NEED MORE MEMORY"
- Take full advantage of the new HyperCard™

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MASS ♦ MICRO

CERTIFIED APPLE DEVELOPER

Circle 764 on reader service card

Steven Levy

people swear by, but at the time I was writing about *Works*, and it seemed very easy to transfer my *OverVue* files to see how the other database worked. It worked OK, so I stuck with it, figuring that one day I'd get a real database—one that not only did what I wanted, but was more powerful and so easy to use that I would be challenged to work with the program more creatively and get more out of it than simple manipulation of lists.

I think I might have found what I wanted in *HyperCard*. The only problem is a lack of good report-generation. I hope some sharp third-party developer comes up with an add-on program that gives *HyperCard* some simple-to-use yet flexible and varied printing capabilities.

Another database of sorts that I've been using, with much satisfaction, is the Rolodex-style desk accessory of *SideKick*. But my electronic Rolodex will probably be handled by *HyperCard* in the future, too.

Apply with Care

I also use spreadsheet, page-layout, and paint/draw programs. Though my spreadsheet needs are not terribly extensive—mainly running baseball statistics—I find that it's worth it to use the (high-priced) Cadillac of spreadsheets, *Excel*. Even with my modest demands, I can sense the benefits of *Excel*'s superior power and speed. And the macros are so easy to create with *Excel* that I often find myself thinking about where a macro might help me—because it's fun to devise ways to use them.

With page-layout programs, again my needs are casual. I do biweekly newsletters for my baseball league. I like them to look great, but by no means do I aspire to professional quality. I find *PageMaker* does everything I want it to. Often I find myself forced to use it in inelegant ways, but I think the strength of the program is its ability to give publishing power to those uninitiated into the world of art direction, so its superior ease-of-use makes me choose it. If I were charged with producing an annual report for a large corporation, though, I would more thoroughly check out the field: *ReadySetGo*, *Scoop*, *XPress*, and the neglected professional-quality *Just Text*.

For painting and drawing, *SuperPaint* does the the job for me. But with the advent of cheaper laser printers, color dis-

(continues)

plays, and new contenders in this field, I have no idea what I'll be using this time next year.

Utility Player

Finally, I have a complement of favorite utilities and desk accessories tailored to my work habits. I have to admit that I am not one of those who hungers for so many desk accessories that they require *Suitcase*, the admirable solution to those who surpass Macintosh's nominal 15-DA limit. But beside the important standards—Alarm Clock, Control Panel, Calculator, Key Caps, Chooser, and Scrapbook—I have found a couple of others to be essential. First of all, one would be caught short without a more powerful note pad than the one included in *SideKick*. Then one needs something to instantly snatch a graphic from a paint program; I use *Art Grabber+*, a MacroMind creation. I've also found *Tempo*—the program that lets you store keystrokes and mouse movements as macros—useful. But as the applications I use get more powerful, *Tempo* seems less advantageous and its limitations become more apparent. (Maybe *Tempo II* will rekindle the affair.)

The desk accessory I'm most infatuated with, though, is called *DiskTop*, from CE Software. From within a program, it allows me to search the hard disk for any file and to perform all kinds of Finder-like functions. As I become more comfortable with the MultiFinder—which allows instant access to the Finder no matter what application you're using—some of *DiskTop*'s virtues may be obviated, and then I can get by with something simple like Apple's *Find-File*. But by then I suspect those wizards at CE Software will have come up with a new version of *DiskTop* that does even neater things.

Looking over this summary, I am not surprised to find—when I compare it to the best-seller charts in the back of the magazine, or to popular polls like the *Macworld* World Class Macintosh awards—that it bears strong resemblance to what you use. In the Macintosh world, heavy on word of mouth, cream rises to the top. But significantly, my allegiance to some of my most-used software—most notably the word processor—is soft. Even as I write this, some hot programmers are writing the applications, utilities, and desk accessories that will be my meat and potatoes next fall. Or if not meat and potatoes, at least chocolate mousse or fruit salad.

Making the decisions, as always, won't be easy. But it certainly beats the meager diet we all faced in 1984. □

TIONS



Question: Did you ever wish you could have a hard drive system that would:

- Give you a 30-day trial, money back guarantee
- Have a full public domain, shareware library
- Allow you to expand from 20 to 130 Mb
- Have each unit fully tested before shipping
- Tilt your Mac back for optimum viewing
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- Not have to use unreliable tape back-ups
- Include 2' of cable with every purchase
- Have a 24 hour tech support hotline
- Have built in shock absorption

Solution: MASS ♦ STORAGE™ family. The Power2 EXPAND!™

Your Macintosh was made for expansion, and now you can have **THE ABILITY TO EXPAND** your hard drive system! The MASS ♦ 20e™, MASS ♦ 40e™ and MASS ♦ 65e™ **Power2 EXPAND!** These sleek and elegant drives sit perfectly under your Mac 512K, Mac Plus or Mac SE delivering power and speed. A blazing average access time of only **28 milliseconds** is only one of the impressive features of these superior hard drive systems. Purchase a MASS ♦ 20e and you may **increase your system to as much as 130 megabytes** of power at any time. Because inside this attractive case is **the room to expand!** Plug in a second drive at any time with **no additional power supplies or extra software**. Use the second drive as a storage device or **the most reliable back-up device available**. All in a distinctive angled case to give you optimum viewing of your Mac's screen.

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- Have a 24 hour tech support hotline
- Have the ability to be installed in minutes
- Allow you to add a second drive at any time
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- Have the ability to use a 2nd drive for back-up
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Would you buy a big screen with your eyes closed?

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There is a big difference between big screens.

75 x 75 d.p.i.	Laser Output	82 x 82 d.p.i.
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If you want your big screen to show accurately what will be printed, you need our 75 x 75 d.p.i. resolution.

ably. MegaScreen lets you select screen resolutions. For example, when you work with graphics, you'll want accurate proportions. Our 75 x 75 d.p.i. resolution displays sizes and shapes perfectly. When you work with a big spreadsheet, select maximum resolution: 75 x 87 d.p.i. (1024 x 900) and get even more data on the screen. You control it all with a menu.

There are one and two-page MegaScreens

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MegaScreen 2001 lets you display 300% more data than the Macintosh II monitor.

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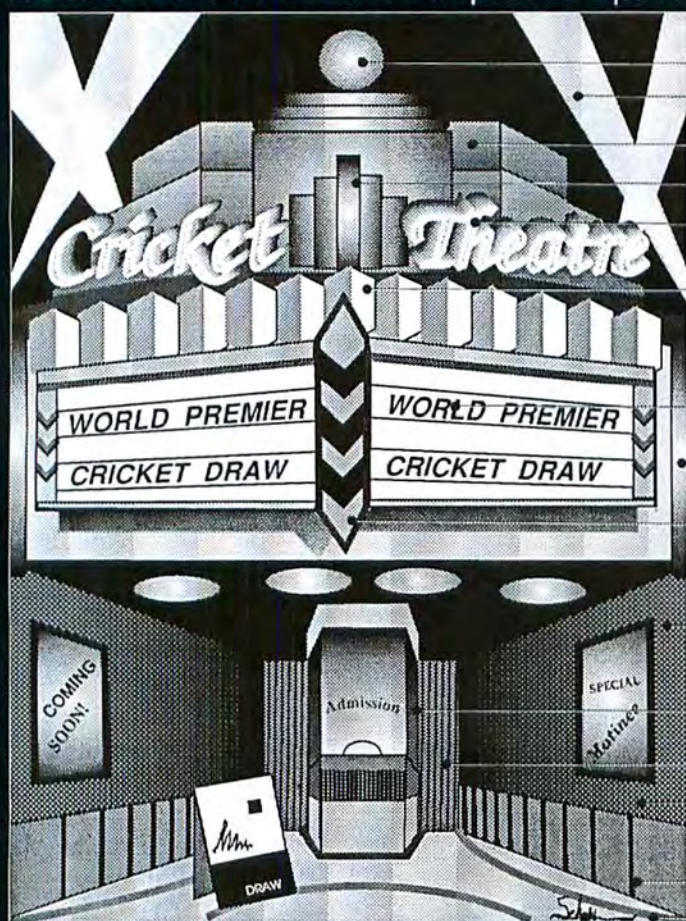
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Printed with an Apple LaserWriter™

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Cricket Draw's most universally acclaimed capability is its special effects generation. A quick glance at the example at left will give you a feeling for what can be accomplished with a little imagination and Cricket Draw. Graded Tones (fountains), Shading, Text on any path — all these effects and more are simple with Cricket Draw.

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If you use your Macintosh to create graphics, then you certainly want the industry's most comprehensive set of drawing tools. You want the industry's most advanced text manipulation tools. And you want the ability to take full advantage of PostScript equipped devices. With the Power of Cricket Draw, you can finally unleash your true creative potential.

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Graphic Arts? Desktop Publishing? Cricket Draw allows you to create prescreened, camera-ready art, complete with typeset copy.

THE FIRST FAMILY OF GRAPHICS



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INTRODUCING THE NS8/16 MEMORY EXPANSION BOARD FOR THE MACINTOSH II

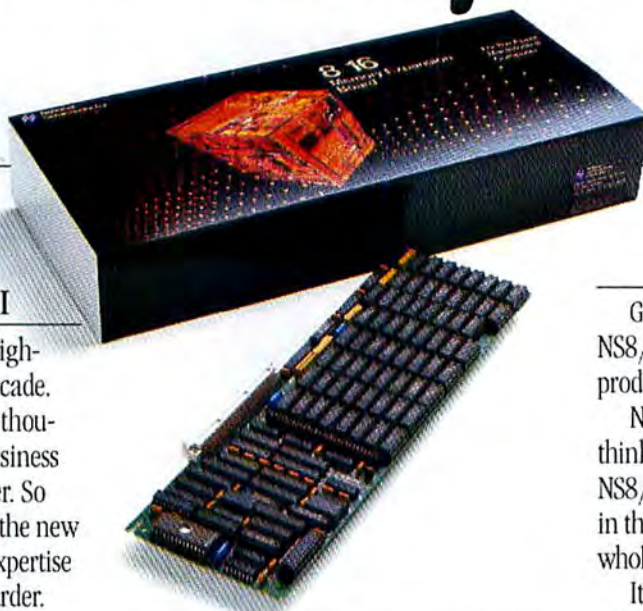
National has been providing high-level add-in products for over a decade. We've helped well over a hundred thousand multi-tasking, multi-user business environments run faster and better. So even before Apple was ready with the new Mac™ II, we were ready with the expertise and technology to help it work harder.

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National is the company you should think of for add-in products. Now, with our NS8/16 Memory Expansion Board. And in the future — you can expect to see a whole line of add-in products for the Mac II.

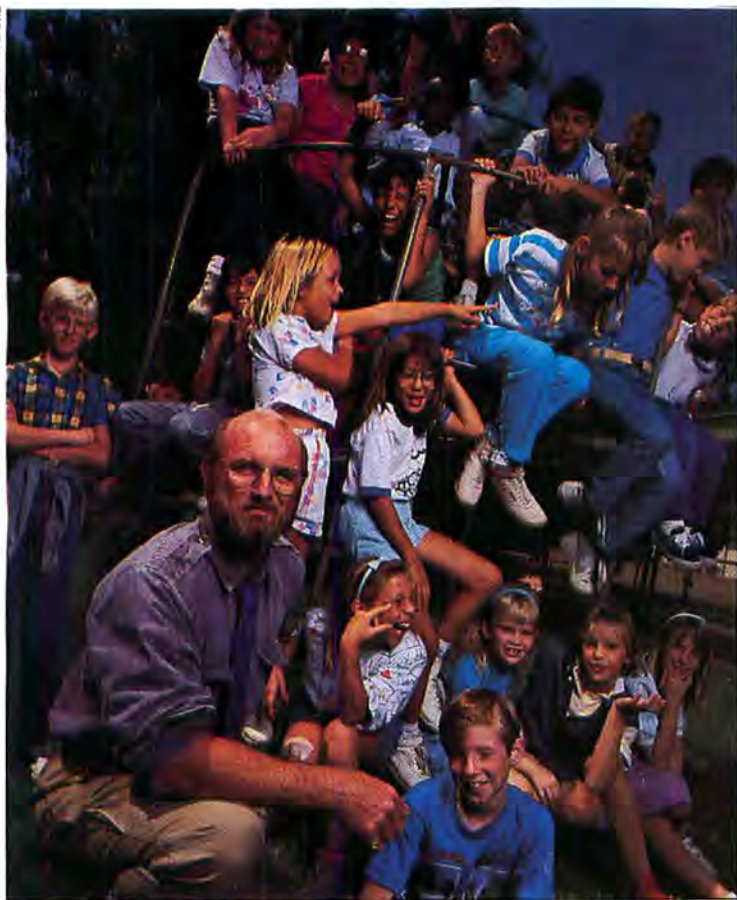
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Macworld News

by Gil Davis



Bruce Fleury's students use the Macintosh to learn from an expert writer 30 miles away—distance is no barrier to their education.

Coaching Writers via Modem



Somewhere in San Diego sits writer Clarence Evans, a retired businessman with plenty of expertise and time. Thirty miles away his students know him only as their expert writer.

Evans is a key figure in the Writer Emeritus Project developed by sixth-grade teacher Bruce Fleury. Fleury uses retired writers who can't spend time in the classroom to assist his students with the content and the development of their written ideas. It's all made possible with the Mac.

Students do their writing on a portable computer and save their files on a Macintosh that remains connected overnight

to Red Ryder Host communications software. Each writer emeritus downloads student files via modem and makes appropriate comments.

The writer then uploads the files to the classroom Macintosh, and students can revise their original drafts on their portable computers the following day. Revised versions are then returned to the writer emeritus for further comments.

Fleury, who has received awards from California educators for his innovative use of computers in education, developed the Writer Emeritus Program based on research that says writing is at its best when students go through multiple revisions involving interaction with others.

Navigator to the Rescue



One of the most popular online hang-outs for Macintosh users has been MAUG, a special interest group (SIG) on the CompuServe Information Service.

MAUG is an electronic repository of goodies. You can swap information, tips, and gossip with fellow users, as well as download software from one of the most extensive Mac shareware and public domain collections around. But until now, it has been rather hard to maneuver around CompuServe's SIGs.

Mac users in particular, accustomed to the intuitive interface of their computers, have been frustrated with the unforgiving commands and editing protocol CompuServe requires. Since online time is costly, Mac users have found themselves wasting money just getting the hang of things.



That's changed. *Navigator*, a shareware program written by Michael C. O'Conner, allows you to automate not only your MAUG visits, but all your CompuServe activities. Before logging on, you plan your session using the familiar Mac interface.

Navigator then performs all the tasks you'd otherwise fumble around with. It receives your mail, sends letters, searches libraries for new software, and leaves messages for your friends.

When the session is over, you can use this new information for your next session. For instance, if you got electronic mail from a business associate, you could reply to it offline, using standard Mac editing commands. The next time you send *Navigator* to CompuServe, it posts the reply.

(continues)



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Circle 397 on reader service card

Navigator performs your on-line sessions in a fraction of the time they usually take. If you use CompuServe often, the \$40 fee for *Navigator* (\$35 if you download it from the MAUG data library and register later) is a good investment. Contact Leptonic Systems in White Plains, New York, at 914/682-0377.—Steven Levy

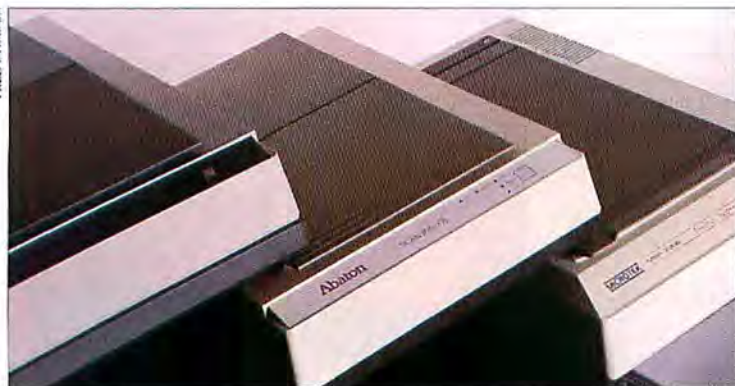
Gray-Scale Scanning

The big talk among scanner manufacturers these days is about gray-scale scanners. In the past, scanner output was limited to 300 dots per inch. That was fine for laser-printed copy, but not for Mac documents printed on

2540-dpi resolution. Using such a scanner, you can produce halftones that compare favorably with traditional PMT-type photostats.

Microtek, Datacopy, and New Image Technology have announced new scanners to be released by the end of the year. Abaton is shipping its new 4-BPP software for the Scan 300/FB, along with a SCSI interface for increased speed. Most of these new scanners are compatible with *ImageStudio*, Letraset's powerful image-processing program, and support TIFF and EPS formats.

Scanner-created negatives and prints could conceivably take over the stat business. But there are problems. Besides the fact that an 8-BPP scan of an 8-by 10-inch image takes more than 1MB of memory, the biggest stumbling block is the Linotronic's slowness when



Scanners from Datacopy, Abaton, and Microtek bring a new level of reality to desktop publishing by reproducing gray levels.

Linotronic phototypesetting equipment.

New scanners (or, in some cases, simply new software) record several levels of gray-scale information for each pixel. The scanners interpret this information based on the desired screen ruling, contrast, and brightness, and the type of output device being used.

An 8-bits-per-pixel (BPP) scanner can produce 256 shades of gray, taking full advantage of the Linotronic 300's

producing digitized photos. A large image with lots of gray-scale information can take several hours to produce. Given the high cost of renting time on a Linotronic, it's still much more economical to convert photos to halftones at a stat house rather than print digitally on finished pages.

But since halftone production is one of the last big hurdles to attaining affordable desktop publishing, it's sure to be the focus of new products.

—Jim Morton



Phil Lundeen knows how *Works* works because he coauthored the popular integrated software—which now has macros.

Macros for Works

Lundeen and Associates has announced *Command*, which

opens automatically with *Microsoft Works* and provides each module with macro capabilities comparable to *Excel*'s. This will be a valuable asset in *Works*' upcoming competition with Lotus's new integrated package, code-named *Galaxy*.

Over 100 functions are included on the *Command* disk, in addition to the ability to address all the database and spreadsheet functions included with *Works*. A macro recorder is provided, allowing you to perform a task and then generate a macro to do it automatically.

While most *Works* users will never write a macro, very likely they will still want *Command*. Several macros will be included in this \$99.95 package, and more are certain to become available. For more information, call Lundeen and Associates in Oakland, California, at 415/893-7587.—Scott Beamer

1200 DPI on Paper?

Many of us are more than pleased with 300-dpi laser printer output for letters, memos, and illustrations.

But 300 dpi can definitely lower the quality of a well-printed publication because the jaggies become apparent under a magnifying glass. That's why some professionals are looking more closely at higher-resolution printers like the Varityper VT-600, which offers 600-dpi resolution and lists for \$18,500.

Printware has taken another step forward in the quest for near-typeset-quality resolution with its 1200- by 600-dpi laser printer, the 720IQ.

Although the list price of this PostScript-equipped printer is expected to be about \$16,500, its output quality is said to come close to that of typesetting equipment costing twice that much.

The 600-dpi resolution gives the printer an 8-pages-per-minute (ppm) output, compared with 2 or 3 ppm if the vertical resolution is set at 1200 dpi. However, 1200 dpi for the



horizontal mode greatly increases the appearance of the type.

So far, the greatest interest in Printware's 720IQ printer has come from publishers and typesetters who must pay a minimum of \$1 per page for typeset-quality output. With the 720IQ, there is no need for the costly photographic papers

(continues)

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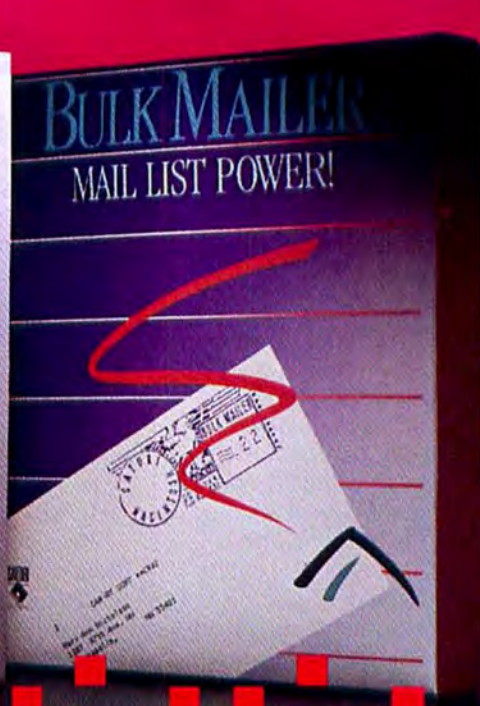
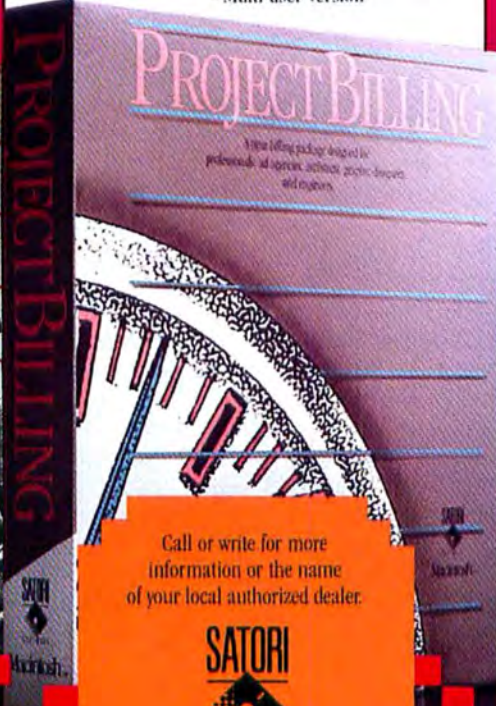
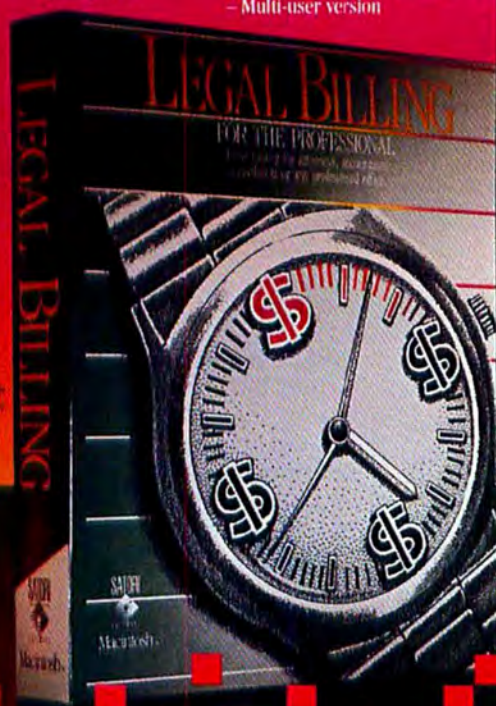
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and chemicals required for phototypesetting.

In addition to its much higher resolution, the 720IQ differs from most other laser printers in another important respect: its built-in PostScript interpreter and fonts don't come from Adobe. It seems PrintWare decided to write its own PostScript-compatible interpreter when it was unable to reach a satisfactory royalty agreement with Adobe.

The 720IQ includes 5MB of RAM and a 20MB internal hard disk. Can we now look for near-typeset-quality laser printers at lower and lower prices? For more information, call PrintWare in Saint Paul, Minnesota, at 612/454-9522.

Flying High



"Free-lance aircraft designer" is the unusual job description belonging to Martin Hollmann of Cupertino, California: the home of Apple. Given Hollmann's proximity to Apple, it's not surprising that the Macintosh has become an important member of his design team.

In fact, Hollmann is so enthusiastic about using the Mac to engineer airplanes that he's written and published a 260-page book called *Modern Aircraft Design*, which tells how to write aeronautical engineering software and how to use the Macintosh as an aircraft-design workstation. The book is so popular that he sold 100 copies at this year's experimental aircraft convention in Oshkosh, Wisconsin.

According to Hollmann, the Macintosh enables him to do a preliminary evaluation of an aircraft design in three weeks and to complete the structural design in two to three months. Last year Hollmann and his company, Aircraft Designs, con-

tributed to the plans for 20 planes, using an unenhanced 512K Mac, a 10MB hard disk, and assorted engineering software.

He's written some of that software himself and sold it to many other experimental aircraft enthusiasts. For example, Hollmann wrote a program called *Composite Wing Optimization*, which determines the wing structure: its sparring, ribbing, and skin thickness. Other software packages he uses calculate the aerodynamic

analyzed include the aerobatic Rebel 200 Prowler, a two-person, 300-mph airplane powered by a Chevrolet engine.

Hollmann is waiting for more engineering software packages to become available before he switches to the Mac II. The absence of FORTRAN compilers for the Mac II has really slowed development of such programs. Meanwhile, the 512K does just fine. For more information call Aircraft Designs in Cupertino at 408/255-2194. —Brita Meng



Martin Hollmann's Mac-based aircraft designs take him to new heights, while on the ground his 512K Mac awaits a new challenge.

center of a plane and print out full-size airfoils on the ImageWriter.

Another mainstay of Hollmann's software arsenal is *MSC Pal2*, from MacNeal Schwendler of Los Angeles. *MSC Pal2* solves stress problems, such as determining the strength of a welded-tube structure.

Among the planes Hollmann has analyzed is the two-person, 230-mph, Lancair 200, the most popular kit plane on the market. Other planes he has an-

Apple File Exchange



Apple File Exchange (AFX) is a new and important part of Apple's strategy to link the Macintosh with the rest of the computer world.

Using AFX, you can quickly and easily convert files or documents between Macintosh, MS-DOS, and ProDOS systems.



AFX translates files or documents created by one application into the format required by another application, saving the time and effort of reentering information into a new application.

While the Apple PC 5¼-inch drive and 800K 3½-inch floppy drive can be used to share data between Mac, PC, and Apple II environments, AFX can translate the documents between formats. That means a document created in *WordPerfect* on the IBM PC can be read and translated into *Microsoft Word* on the Mac and to *AppleWorks* on the Apple II.

You are not limited to using floppy drives for transferring data—you can use AFX with data files transferred to the Mac via networks such as AppleTalk, 3COM+, and *AppleShare* or modems.

AFX comes with an Apple PC card and a Mac II PC card. This utility is being given away as part of the system software. You can write your own translators for transferring data from one system to another.

You can save translator configurations to customize the conversion process for commonly exchanged documents, and you can translate large batches of files at a time—even documents from different applications.

The AFX software includes three translators: a bidirectional translator for text-only (ASCII) formats of MS-DOS, ProDOS, and Macintosh; a binary translator for transferring

(continues)



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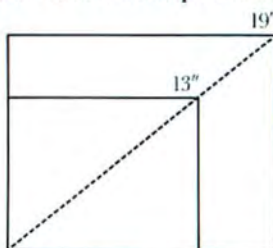
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documents without modification and importing them directly into another application; and a DCA-RFT/MacWrite translator that works bidirectionally between IBM Document Content Architecture and Revisable Form Text (commonly used in the PC environment and in MacWrite).

AFX is essentially a platform on which enthusiasts and developers can build translators. One such translator is *MacLink Plus* from DataViz, which provides translations from popular PC word processing, spreadsheet, and database programs. The standard architecture provided by AFX assures compatibility with other translators developed for the Mac.

While Apple doesn't mention this, there is no reason why you can't build a translator for Wang, NBI, or DEC. This integrated approach to computing and data sharing will certainly propel Apple way ahead of the competition. Apple File Exchange works on a Mac 512K Enhanced, a Mac Plus, an SE, or II. Centram and Ungermann-Bass offer similar products.

—Prasad Kaipa

Undercover at the Factory

"Automate the factories!" has been a rallying cry for American manufacturers trying to compete in world markets. Their goal is computer-integrated manufacturing (CIM), which brings all aspects of a manufacturing operation—engineering, manufacturing, purchasing, and finance—under the control of computers.

Although over one hundred fifty versions of PC-compatible computers are available for factory use, there hasn't been a Macintosh version—until now.

Dubbed the AI 90, the first industrial Mac has emerged from the robot-populated basement of Automatrix in Billerica, Massachusetts.

The AI 90 is actually a Macintosh II that's been repackaged to work in the much harsher environment of a factory, where grease, dirt, vibration, and electrical interference thrive. Some factory computers are even regularly hosed down with water. The AI 90 NEMA-2 cabinet keeps the Mac II internals safe from such hazards.

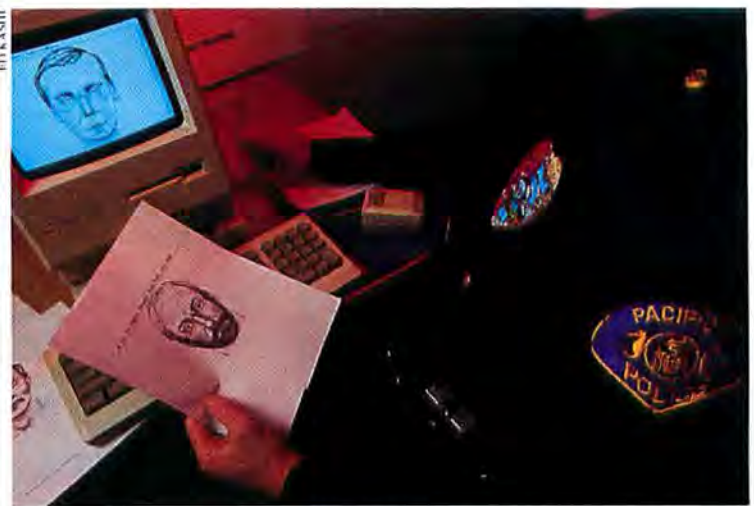
Automatrix, an Apple VAR, has a lot of experience in the factory automation business. The company's robots and vision systems are already used in automobile, electronic, and aerospace factories for assembly, welding, and inspection.

The ruggedized Mac II is expected to be successful for the same reason Macs have proliferated in less hostile environments—ease of use. According to Joe Campbell, Automatrix's general manager of industrial control, the PC interface is difficult for factory floor workers to



This hardened cover hides an industrial-strength Mac II ready for tough conditions.

learn and use because they're accustomed to panels of buttons and flashing lights—not a cryptic set of commands. The Mac interface offers an easy-to-use alternative for those who have traditionally been unable or unwilling to interact with personal computers.



A police officer holds one of the 137 trillion faces available from a new program that facilitates drawing composite sketches.

A typical AI 90 configuration includes 1MB of RAM, a 3½-inch 800K floppy drive, and a monitor. It costs about \$8500—some \$1000 less than the IBM 7552 industrial computer. For more information call Automatrix at 617/667-7900.

—Brita Meng

The Eyes Have It



Supposedly, there are 14,580 noses, 6576 mustaches, and 864 mouths contained in Visatex's *CompuSketch*, a program that stores over its 110,000 individual facial features capable of generating 137 trillion distinct faces for creating composite sketches of criminal suspects. But no other features even come close to the total number of eyes: 85,000.

The drawing process begins with a police officer asking a witness questions prompted by *CompuSketch*, then using the mouse to select various facial features.

Although *CompuSketch* is simple to operate and requires no artistic experience, its size is staggering. There are 23 double-sided disks that contain the

program and its 110,451 facial features. Once all the features are selected, *CompuSketch* pulls together a composite sketch and prints it in about 30 seconds. Subsequent feature changes take about 3 seconds to redraw.

The recommended system for *CompuSketch* is a Macintosh Plus, a 20MB hard disk, and an ImageWriter II printer; the total cost is about \$3500. For more information, call Visatex in Campbell, California, at 408/866-6562.

Desktop Newspapers



Weekly and small daily newspaper publishers across the country are turning to Macintosh and LaserWriter systems to create their broadsheets and tabloids. As new equipment is introduced—such as larger-format, higher-resolution laser printers and file-server networks able to link hundreds of Macs together—the Mac becomes a practical alternative to current, more expensive systems on increasingly large newspapers.

(continues)

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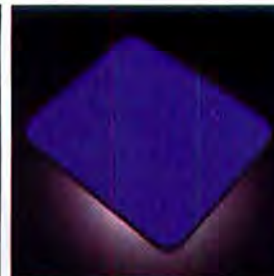
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Circle 373 on reader service card



Hot type has no place at Jim Whelpton's weekly newspaper, which uses cool Macs to produce stories, pictures, and ads.

A recent conference of the National Newspaper Association attracted 120 publisher and editor members, who shared their fascination with desktop publishing. Jim Whelpton of Tennessee, publisher of the *Bolivar Bulletin-Times*, described how an \$11,760 basic plain-paper system, built around two Mac Pluses and two LaserWriter Pluses, can produce a weekly broadsheet of about 30 pages. During the past year, his deluxe \$13,600 system has shaved \$4000 off the cost of phototypesetting papers and chemicals alone.

Also reported at the conference: due mostly to major flooding that wiped out their old typesetting systems, one third of all newspapers in West Virginia now use the Mac; without it, in fact, some of them would actually have gone under.

But desktop publishing is not just for small publishers, a point driven home by the presence of a *New York Times* representative at the conference. Attendees extolled the advantages of being able to typeset an ad while the advertiser waits for a proof, and using a program like *Cricket Draw* to create a circular logo in less than two minutes instead of the usual two hours.

Conference attendees also acknowledged that the low cost of desktop publishing systems can be a double-edged sword—in that it invites competitive start-ups. A typesetting and printing system that 20 years ago cost up to \$100,000 now runs about \$25,000 with a CompuGraphic and offset press.—*Stuart Silverstone*

Color In, Color Out



Here's a Mac II program to keep your eye on. It's *Pixel Paint*, a bit-map paint program from SuperMac, which will be available in time to add color to the Christmas holidays.

Pixel Paint gives you full access to the Mac II's 16.8 million colors. It can display up to 256 colors and 256 shades of gray at any one time, and it reads and writes files in the Paint, PICT, and EPS formats. The program can print to an ImageWriter, a LaserWriter, or a film recorder.

Especially noteworthy is *Pixel Paint*'s airbrush. Its pattern can be changed in three dimensions and its color blending capabilities are based on a wide selection of standard palettes

that can be quickly modified. Other special effects include fountain shading between two colors, edge-smoothing, a shadow effect, and a number of paint-blending techniques.

Another Mac II color paint program that's available now from Computer Friends is *Modern Artist*. Computer Friends has offered color to Mac owners for some time with its \$2000 SuperChroma Color System, which comes with a program called *ChromaPaint*. *ChromaPaint* and *Modern Artist* are the same, except that *Modern Artist* runs on the Mac II (the files are not interchangeable).

An optional \$99 program from Computer Friends called *Color-Sep* creates a four-part PostScript file from a screen image for producing color separations on the LaserWriter or other PostScript devices.

Shinko's CHC-335 200-dpi thermal printer can be interfaced to the Mac with a Computer Friends driver. Color illustrations created with Visual Information's *Dimensions* can be generated with CalComp's 200-dpi PlotMaster thermal plotter/printer, as well as with JDL's 850 GL+ plotter/printer, a 14-color, 180-dpi device. *Dimensions* also interfaces to Matrix Instruments' SlideWriter digital film recorder to produce high-resolution slides.



Colors come to the Mac II in a big way: 16.8 million of them.

And this is only the beginning. Drivers for other color output devices will appear in coming months. For further information on the products listed above, contact CalComp in Anaheim, California, at 714/821-2142; Computer Friends in Portland, Oregon, at 503/626-2291; JDL in Westlake Village, California, at 805/495-3451; Matrix Instruments in Orangeburg, New York, at 914/365-0190; Visual Information in La Puente, California, at 818/918-8834; and SuperMac in Mountain View, California, at 415/968-8884.

Convenience with Power



Some things just get better and better. Witness the offerings of Donald Brown's CE Software, which is renowned for such early and popular shareware as *MockPackage*, *Calendar Maker*, and *Icon Mover*.

The company is now offering a powerful program called *QuicKeys*, which simulates a whole series of mouse clicks, drags, and typing following a single keystroke. In addition, *QuicKeys* fosters consistency across applications by letting you assign the same keystrokes to similar menu and mouse functions.

Although *QuicKeys* will be available commercially, Brown's legacy is a raft of shareware beginning with *Desk Accessory Mover*, which came out just a few months after the Mac's March 1984 introduction. It was supplanted by Apple's Font/DA Mover.

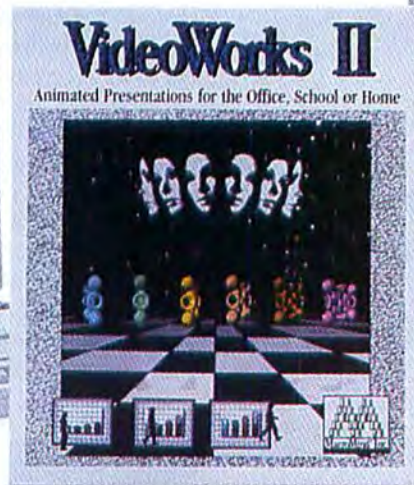
Next came *MockWrite*, *MockPrinter*, and *MockTerminal*, which provided (respectively) text, print, and telecommunications functions. *Mock-*

(continues)

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Circle 781 on reader service card



Package Plus is currently in version 4.3.4, and it's priced at \$35. It remains indispensable for many Mac owners.

Subsequent offerings from CE Software include *Calendar Maker 3.0* (\$39.95), which uses icons to represent events within a calendar that can be customized both by graphics and text; and *MacBillboard 4.0.1* (shareware with bonuses, \$35), which is an important paint program that includes zoom features and split-window editing capabilities. *Mass-Copier 1.2* (shareware with bonuses, \$20) allows you to copy disks for multiple distribution.



Don Brown's latest program lets everyone be a power user.

Brown is a firm believer in making computers available to everyone, and he continues to demonstrate his dedication to this philosophy.—Linda Joan Kaplan

HyperCard Courseware



Will college students of the future carry lightweight, portable Macs complete with gigabytes of CD ROM *HyperCard* courseware? Could be, for there are



Dartmouth's HyperTeam is developing educational software using HyperCard, which "plays" text, graphics, and sound.

strong indications that higher education will play a key role in developing far-reaching instructional materials using *HyperCard*'s "stackware."

Stackware holds this fascinating promise because it links information using numerous associations rather than presenting facts rigidly and serially, as textbooks do. And *HyperCard*'s multimedia capabilities will certainly change the way instructors present their course materials to students. Using *HyperCard*, scholars will be able to customize information from their particular subject areas to accommodate many ways of interpreting and delivering information.

Academic stackware is already being developed through various *HyperCard* projects quietly seeded by Apple. Dartmouth University, for example, recently demonstrated some of the courseware developed by its "HyperTeam": a group of academicians representing different disciplines, dedicated to the practical application of *HyperCard* technology to create entirely new concepts in courseware. In collaboration with Apple, Dartmouth is also conducting a series of workshops for academic *HyperCard* users.

Then there is the Perseus Project—a collaboration among Harvard, Boston University, and

other universities to build a multimedia database about classical Greek civilization. In addition, Stanford University's Shakespeare Project—a "Hypermedia" display combining the Mac, *HyperCard* software, and laserdisk technology—allows students to see the many elements that go into developing a play for the stage.

The results of much of this stackware development will be cataloged and distributed by organizations such as Kinko's Academic Courseware Exchange, following a full term of use in the classroom. The latest *HyperCard* courseware will appear in Kinko's spring catalog, which will be available on disk in *HyperCard* format. For more information, call Kinko's at 800/235-6919, in California 800/292-6640.—Valerie Kuletz

Breaking the \$4000 Barrier



It seems everybody wants an affordable laser printer with the PostScript page-description language that can be used with *PageMaker*, *MacDraw*, and many other programs.

That's understandable, since a single 300-dpi printer can deliver high-quality text and images for a whole network of Macs. Although prices for PostScript laser printers remain high, they are coming down.

For example, AST Research is now selling its TurboLaser/PS for \$3995—the lowest price for any PostScript printer. It prints 300 dpi at 8 pages per minute, contains 35 resident fonts, and has three ports: RS-232C serial, Centronics parallel, and AppleTalk.

This compares favorably with Apple's LaserWriter Plus, which costs \$5799, and with the LaserWriter, which lists at \$4999 but contains only 13 resident fonts. The TurboLaser does have two disadvantages when compared to the LaserWriters: it contains no manual-feed mechanism and doesn't print on 8½-by-14-inch paper as the LaserWriters do.

Instead, the TurboLaser contains 3MB of RAM, has a 250-sheet paper capacity, and works with MS-DOS and DEC



AST Research offers this laser printer with many features.

computers. Its printer engine is a Ricoh, compared with the Canon engine used by Apple.

Other lower-cost laser printers that include PostScript compatibility are NEC's SilentWriter LC 890 (\$4795); Qume's ScriptTEN printers (\$4795 and \$5295); The Laser Connection's PS Jet and PS Jet Plus (\$4995 and \$5495 respectively); QMS's PS 800 Plus and PS 800 II (\$5494 and \$6495); Texas In-

(continues)



***“Can you believe it? Our team got picked
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because they found out
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The fast-moving, fast-thinking people in today's competitive corporate world are the people pushing for the highest standards. For example, Sony diskettes.

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strument's OmniLaser 2108 (\$5995); and DEC's ScriptPrinter (\$6295).

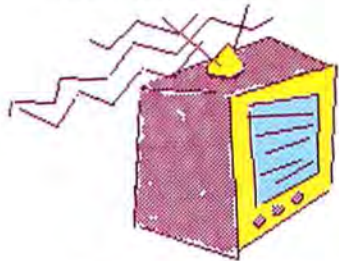
Buyers can also choose a non-Postscript printer like General Computer Corporation's new Personal LaserPrinter, which lists at \$2599.

For further information on the new AST TurboLaser printer call AST Research in Irvine, California, at 714/863-1333. For more information about the new Personal LaserPrinter call General Computer in Cambridge, Massachusetts, at 800/634-9737.

Videodisk Played by HyperCard



Remember the videodisk? A few years ago it briefly gained popularity and then became all but extinct after the VCR was introduced. But history may yet be kind to the videodisk. *HyperCard* can now "play" a videodisk like Isaac Stern plays the violin—very well.



This *HyperCard* technology is being offered by Optical Data Corporation in the form of three \$39.95 *LaserCard* programs (earth science, life science, and physical science), plus five \$400 videodisks that work with them. Videodisk players used by *LaserCard* include Pioneer models LD-V4200 and LD-V6000, Hitachi 9500, Panasonic TQ2024F, and Sony 1500.

Here's how *LaserCard* works. Specially designed *Hy-*

perCard stacks contain cards that offer predetermined tours. Using some of the 108,000 discrete images contained on a videodisk, the tour might show the earth's weather, volcanoes, or geology. To begin a tour, just click on a *HyperCard* button that's labeled with a caption and icon. Suddenly you're watching a hurricane swirl across the Atlantic Ocean or the formation of a volcano over millions of years.

Your *HyperCard*-based program presents these effects on your television. The program tells the videodisk player to select a series of single scenes or to play those scenes so fast that they create a movie. You get all this, and stereo sound, too. And with *HyperCard*'s English-like scripting language, *HyperTalk*, you can even create your own video shows by giving commands to the videodisk player. For further information, call ODC in Florham Park, New Jersey, at 800/524-2481.

Give Me a Hand



You're lying on an operating-room table while a physician repairs your damaged hand. You can rest a little easier, because your surgeon has practiced this procedure many times—on a Macintosh—before actually performing surgery in an operating room.

This unique use of Macintosh graphics capabilities was devised by Robert Markison, M.D., assistant professor of surgery and cofounder of the Health Clinic for Performing Artists at the University of California, San Francisco, and chief of hand surgery at the UCSF-affiliated San Francisco General Hospital.

Markison uses the Macintosh as the basis for his hand-surgery curriculum. To teach students the surface anatomy of a hand,



Dr. Robert Markison's innovative use of the Macintosh for teaching hand surgery has led one publisher to back his research.

he first shows the hand in its intact state, using scanned line drawings or digitized photographs of live hands, cadaver hands, and plaster casts or clay models.

Next his students view the deeper anatomical layers of the hand: muscles, nerves, blood vessels, tendons, and bones. For these structures, Markison uses digitized *MacVision* images from cadaver dissections and from hand-surgery cases in the operating room.

He then converts those images, with damage superimposed, to *Slide Show Magician* format. Using the mouse, the students can simulate the repair of an injured hand. At the same time, Markison's program asks medical questions and gives comments about medical decisions.

At a more advanced level, surgical residents view operating-room sequences, animated with *VideoWorks* and *MacMovies*, to perfect techniques such as the placement of sutures for tendon repair.

Markison also uses the Mac to determine how musical in-

struments should be customized for musicians with injured hands.

Markison plans to make his material available through Kinko's Academic Courseware Exchange and through the Apple University Consortium. —Beverly Kane □

Your Best Stacks



Send a disk of your best *HyperCard* stacks to: News Editor, Macworld, 501 Second St., San Francisco, CA 94107. We'll pay \$25 for every entry selected for a monthly story called "Your Best Stacks." Please describe how you developed your stack, its features, who would use it, and how readers can obtain more information. We'll also need to know if it's free, shareware, or a commercial product.

QUICKEYS

- The most important feature of QuicKeys™ is ease-of-use. Just select, point and you're done. "QuicKeys is the sort of outstanding product that you recognize instantly as a Mac classic; an essential product for every Mac in your office" -Bob Perez, Business Evangelist, Apple Computer, Inc.

It's a macro program for everyone. So easy to use you'll want to use it with everything! Assign keys for repetitive text, programs, commands, desk accessories and more. You are unlimited in what QuicKeys can do for your Mac...and your speed.

This is the program you've wanted for your Mac. An absolute MUST for hard drive users. Doubles your speed on the Mac, easily. "QuicKeys made me forget my mouse." Steven Bobker, Editor-In-Chief, MacUser

Works with: 512E, Mac Plus, SE, Mac II. QuicKeys gives your new extended keyboard something to do. Works with standard keyboards, too. "QuicKeys brings new life to old and new keyboards" -Neil Shapiro, Editor-At-Large, MacUser, Chief Sysop: MAUG

How fast can you learn to use QuicKeys? How fast did you read this sentence? "Extended keyboards...they do have those lovely, but useless, function keys. Hmm. Sure would be nice to be able to assign desk accessories to them." Mac The Knife, MacWeek

The easiest, fastest way from one program to another on a Macintosh is with QuicKeys. "QuicKeys offers the most clever, accessible way of assigning actions to command, option or function keys." Bob LeVitus, Editor-In-Chief, MACazine

"QuicKeys is the only reason for buying an extended keyboard." David Beidney, Editor At Large, Computer Graphic Magazine

QuicKeys also works within programs. Assign command keys for operations like: Save, print, typeface selection and more. Any commands you want can be assigned with QuicKeys. Just \$99.95.

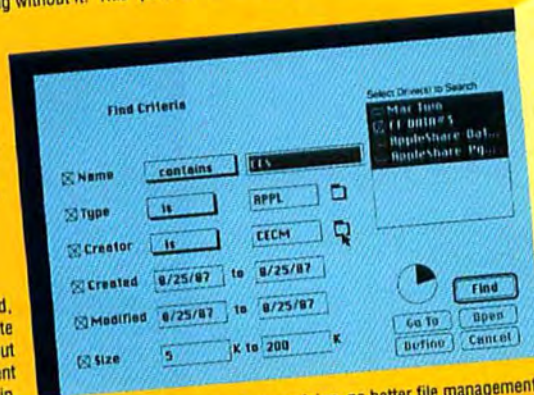


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- "There is, in my opinion, no better file management desk accessory for the Macintosh"
-MacWorld, August 1987

4-1/2 Mouse rating-MacUser, August 1987

- DiskTop saves time because you can do it...NOW!

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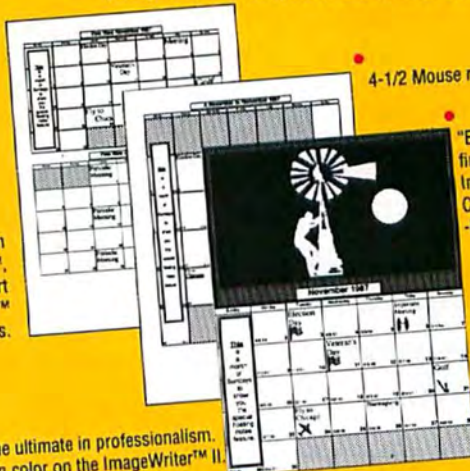
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Everybody ought to have CalendarMaker™. Make interesting, unique and attention getting calendars...with pictures and icons for even more visual excitement.

- CalendarMaker makes keeping track of time easier (and lots more fun)!

- Enter events manually or import files from programs including: MORE!™, SideKick™, BatteryPak™, SmartAlarms™, Export calendars to MacWrite™, MacPaint™, MacDraw™, PageMaker™ and others.



4-1/2 Mouse rating, MacUser, December 1986

"Every year I have the same problem: finding the ideal calendar... In answer to this universal dilemma, CE Software has published CalendarMaker."
-MacWorld, March 1987

- Makes calendars for years to come with perpetual dates and periodic events. It's the most professional, versatile calendar presentation program on the Macintosh. Just \$49.95.

- Print to laserprinters for the ultimate in professionalism. Print in color on the ImageWriter™ II.

CE SOFTWARE

Visit your retailer or call (800) 523-7638 for VISA or MasterCard orders. To purchase by mail send VISA or MasterCard number with expiration date, check or money order with appropriate amount plus \$2.00 shipping and handling for each product ordered to CE Software, 801-73rd Street, Des Moines, Iowa, 50312. For information call: (515) 224-1995.

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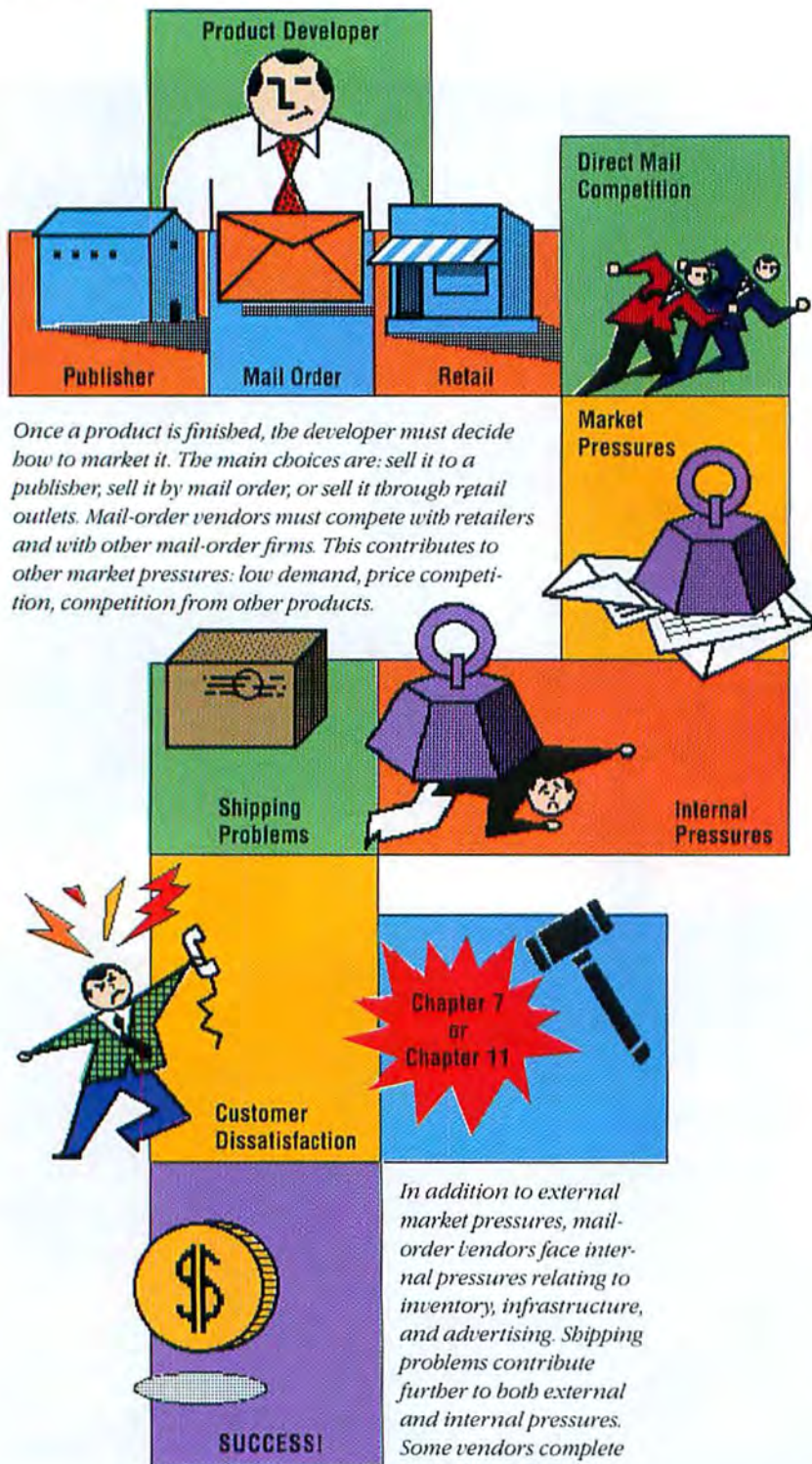
Lhe overnight success of the personal computer created a sharp demand for computer-related products, which mail-order businesses quickly stepped in to meet. But it wasn't long before thunderclaps were heard. While we realize that most mail-order firms are reliable companies run by professionals who sell computer products at discount prices, we're concerned with how well Macworld's readers are actually being served by mail order businesses, many of which advertise with us. Now, after several spates of troubling letters from readers, we felt obliged to investigate this turbulent—and important—industry.

Mail Order?



Compusystems of Beverly Hills—a fly-by-night computer mail-order scheme—actually had its headquarters (shown here) in a Torrance, California, shopping mall.

Mail Order Maze



Once a product is finished, the developer must decide how to market it. The main choices are: sell it to a publisher, sell it by mail order, or sell it through retail outlets. Mail-order vendors must compete with retailers and with other mail-order firms. This contributes to other market pressures: low demand, price competition, competition from other products.

In addition to external market pressures, mail-order vendors face internal pressures relating to inventory, infrastructure, and advertising. Shipping problems contribute further to both external and internal pressures. Some vendors complete the trail and succeed. Others give up, declaring bankruptcy.

A series of bankruptcies and scams in computer mail order over the last 18 months has stuck software and hardware developers with unpaid bills reaching into the tens of millions of dollars and has left thousands of would-be buyers with unfulfilled orders. Failing and sometimes bogus companies have sent consumers on a stomach-turning roller coaster ride, billing credit cards for products never sent, ignoring letters and phone calls. Many unfortunate customers will be lucky to get back even a few cents on the dollar.

Even more troubling is a new rash of "bust-out" schemes run by computer-savvy con artists who have entered the computer mail-order business. They set up hit-and-run companies that advertise, take orders, and then disappear. These crooks have discovered that the computer supply business provides a rich new territory for ripping off consumers.

At the heart of the problem is the increasingly controversial, but perfectly legal, practice of billing consumer credit cards at the time of order rather than when a product is actually shipped.

An Industry Careens Out of Control

Mail order is an attractive business, promising easy profits from minimal capital investment. Between 1980 and 1986 the number of companies selling computer products by mail quadrupled, with business accelerating at an average rate of 55 percent per year. According to Future Computing, \$1.1 billion in software was sold through the mail last year; the Dallas market research firm projects \$2 billion in hardware sales by the end of 1987. Double-digit growth is predicted at least until the early 1990s. Most people expect record years to follow—especially in the Macintosh market, because of new add-on products for the Mac II and the Mac SE. The boom is further aided by the nationwide trend toward armchair shopping. Macintosh owners are particularly attracted to mail order because the Mac's ease of operation means less dependency on retail store support.

But success has its curses as well as its rewards, judging from the comments of mail-order executives we contacted. Intense price competition brings in tens of millions of dollars but leaves some companies desperately strapped for cash. Unable to pay for products, they may lose credit with suppliers and be forced to operate on a cash-only basis, using the cash from new orders to pay for back-ordered items. When the inevitable delays occur, these companies may blame the back orders on suppliers. But the truth is that many mail-order firms have not installed adequate accounting procedures or systems. Sometimes they even invest their profits in disastrous hardware or software ventures; a sudden downturn in the market can plunge those ventures into an irreversible tailspin.

Such problems are further aggravated by the lack of experienced managers in this new industry. Maxwell Sroge, a nationally known expert in mail order, observes that this volatile business tends to attract people without the skills and experience necessary to run a successful operation—small-business owners "selling out of their apartments with the dream of hit-

ting the big time" who are often unable to cope with a complex business environment. Even the bigger companies sometimes suffer from bad management. This combination of low profit margins, bad management, and market instability has plagued many computer mail-order companies.

Troubling Trends

While most computer mail-order companies try to provide fast, reliable service, an increasing number of consumer complaints reveal troubling trends. The long list of problems ranges from irritating delays to downright fraud. Company ads may promise hundreds of products when warehouses are actually empty, and customers often face frustrating delays after placing their orders. Customers' credit cards may even be billed for goods whether or not the products are in stock, frequently forcing them to wait months for products already paid for. Worse, the company may declare bankruptcy in the meantime; customers faced with this situation often get back only a small portion of their outlay, if anything at all.

Even more disturbing, the computer mail-order industry is attracting a number of skilled fly-by-night con artists who set up an operation, advertise, accumulate cash, and then disappear without a trace. One of these, Compusystems, got off to a spectacular start after Los Angeles-based crooks created a dummy company, along with financial records that showed it to be worth \$6 million. Having fooled normally parsimonious credit managers, they scored tens of thousands of dollars before either consumers or publications discovered the hoax. When investigators got to the scene, all they found was an empty storefront.

Developers Are Hurting Too

Product developers often feel caught in the middle. Heidi Roizen, president of T/Maker, is so frustrated by mail-order companies with long-overdue bills that she now requires full payment before shipping them products. Roizen cites one case in which a customer of Icon Review (Monterey, California) called her up to complain about T/Maker not producing enough software. The customer claimed to have been told that T/Maker couldn't deliver its products on time. But the truth, according to Roizen, was that the mail-order company had been switched to C.O.D. status and hadn't paid for anything.

Cynthia Garcia, sales manager of Thunderware, experienced similar feedback from customers about months-long delays in obtaining her company's products. "Northeastern Software would order from us three to four weeks after they received a customer order," she says. "So if we had a 10-day backlog, it meant a several-week delay for the customer. We finally had to stop selling to them."

15,000 Buyers Still Waiting

Fifteen thousand customers are still owed product or money by PC Network, the "membership-based" organization established in 1983 and now operating



"Visa is so concerned about phone- and mail-order problems that the company has set up procedures this year to monitor those transactions."

—Thomas Clouthut, credit card operations analyst, Visa

under Chapter 11 with assets of \$3.9 million. In return for the price of membership, which has ranged from \$8 to \$45, consumers are supposedly able to purchase products for 8 percent over dealer wholesale prices. The pitch was so successful that sales climbed to \$46 million for the fiscal year ending June 1986. The company even imported its own PC clone.

During its first two years in business, PC Network violated Federal Trade Commission (FTC) rules governing the timely delivery of products and refunds. In 1985 FTC officials began an investigation. A consent decree was signed in 1986, in which the company did not admit guilt but agreed to pay fines and make amends. Unfortunately for consumers, problems continued, and in May 1987 the beleaguered PC Network filed for Chapter 11. The company currently owes \$4.4 million in products to approximately 15,000 consumers and \$2.4 million to about 20 hardware and software vendors.

According to Alan Krause, a consumer protection specialist in the FTC's Chicago office, the PC Network case was a typical violation of the mail-order statutes. He points out that the company wasn't shipping within 30 days of receiving an order, nor was it informing its customers that purchased products could not be shipped. FTC regulations say that customers have the right to wait, agree to comparable merchandise, or receive a full refund under those circumstances.

PC Network's defense, Krause told *Macworld*, was that it wasn't aware of the FTC rule. According to Krause, the company advertised a guarantee of full refunds to customers who were dissatisfied either with



"The Federal Trade Commission under the Reagan administration has dropped the ball on enforcement, which has ground to a screeching halt."

—Jack Gillis, Consumer Federation of America

their memberships or with specific purchases. Yet consumers encountered delays of several months in receiving those refunds.

PC Network was fined \$30,000 by the FTC, to be paid in two installments, the second half due next March. Krause says that while the company did cooperate with FTC investigators "it was doomed to failure from the start" because he doubts whether PC Network's strategy of selling at 8 percent over wholesale ever really covered the company's operating costs.

Richard A. Koril, executive vice president of PC Network, says his company has straightened out its problems. He points out that the episode with the FTC relates to PC Network's first two years in business, and that the company knew nothing at the time about sending out delay notices. "We had tremendous growth and got behind in processing our paperwork," he explains. "Money moved through at a very high velocity. Every unanswered letter escalated into a major case—which could have been dismissed in fifteen minutes. You always have customers who want to return their products, vendors shipping the wrong product, and products with bugs." Koril added that although his company still owes consumers and trade creditors about \$6.5 million, the vast majority of the 15,000 customers left without product were able to get refunds from their credit card companies.

Fortunately, not everyone in the mail-order industry has a grim story to tell. Leading computer mail-order companies, such as MacConnection and Programs Plus, have set a good example for the industry.

Both companies bill a customer's credit card only after the product is handed over to shippers.

"The worst thing you can do is have mail-order customers receive a credit card bill and not have received the product yet," says Joe Bonnazo, president of Programs Plus. "Our whole reason for starting MacConnection was to give users reliable service and good prices," says David Hall, that company's CEO. "Mail-order companies should also give consumers liberal warranty protection and efficient delivery."

So Who's Going to Protect the Consumer?

Unfortunately for consumers, the FTC's action against PC Network was a rare exercise in government regulation of the mail-order business. One reason for this, according to Ken McEldowney of San Francisco's Consumer Action, is that the FTC has shifted away from making rules that clean up an entire industry and now examines only individual companies. The FTC will only launch an investigation after receiving a tremendous number of customer complaints. And even then, the federal agency is seriously hampered in its efforts because of cuts in staff and budget in an era of deregulation. According to Jack Gillis, an official with the Consumer Federation of America, the country's largest consumer organization, "The Federal Trade Commission under the Reagan Administration has dropped the ball on enforcement, which has ground to a screeching halt."

PC Network and Northeastern Software are just two examples of mail-order companies that have racked up big bills but are allowed to stay in business by the bankruptcy courts. James Ray Streinz, a Portland, Oregon, attorney who represented the creditors of Conroy-LaPointe (another computer mail-order company that was liquidated by a bankruptcy court), notes that while failing businesses receive protection under bankruptcy laws, consumers are often left virtually defenseless. Even with Chapter 11 protection, Conroy-LaPointe soon went out of business. "Sometimes these companies should be forced into liquidation so people don't lose money in the interim," Streinz observes.

Ever since 1872, when Congress enacted the mail fraud statute to combat a rash of swindles after the Civil War, the U.S. Postal Service has tried to crack down on con artists involved in mail-order fraud. At least six computer mail-order companies operating in the western United States are currently under investigation by the Postal Inspection Service. Neil Shorr, a postal inspector for the northeast region, reports that similar investigations, aimed mostly at "bust-out" scams, are underway in his area. These involve companies that advertise, get your money, and then move on. But according to one postal inspector, the postal service has a difficult time convincing U.S. Attorneys to prosecute many of the cases that they've investigated. "The Los Angeles area is particularly known for such rip-offs," says the inspector. "But we've been told not to ask for any federal prosecution unless there's at least \$250,000 in losses."

Risky Business: A Case Study in Mail-Order Mayhem

Michael Mulvena crisscrosses Arizona selling students class rings, school T-shirts, and supplies. Last June—attracted by ads that talked of discounts of up to 60 percent—he ordered a disk drive, some software, a bottle of green ink, and one red and one green ribbon from Icon Review.

Mulvena's credit card was immediately billed \$259.05, and he recalls being told that "everything was in stock and they would ship immediately." Four days later, he received a big box containing the bottle of green ink and a red ribbon: \$8.00 worth of his order.

On calling the company, Mulvena discovered that he would have to wait five to six weeks, since everything else was back-ordered. He was told that a refund would take eight weeks, so he decided to wait. A letter of protest to the company president went unanswered. He began calling two or three times a week to find out about his order. "I needed that disk drive for my business. I even gave a different name, but the switchboard still wouldn't put me through to the president."

Finally, five weeks after he placed his order, Mulvena got a second shipment—a green ribbon. Furious, he kept on calling until, eight weeks after his order, he was able to convince a

disgruntled employee to take pity on him and issue a credit on his bank card. Mulvena eventually found a mail-order company that could deliver his disk drive immediately, but he's still bitter over the whole episode. "These people were playing the float by using my money," he says.

Icon Review, the Carmel, California, Mac mail-order and catalog company, puts through card charges immediately because "when your order enters the system...we can reserve your products at the prices quoted," says Dennis Moncrief, CEO of Icon. He maintains that his company's order processing software requires the practice.

Moncrief was unaware that two of Icon Review's competitors bill only after shipping, but noted that he plans to install software during the first quarter of 1988 that will enable his company to adopt that practice.

Despite Moncrief's pride in Icon Review (the only Macintosh-specific catalog), his stated attitude of consumer advocacy, the millions of dollars in sales, and his bullishness on the company's prospects, the company is experiencing serious cash-flow problems. Moncrief says these are due to rapid growth and a "robust market where we've continually underestimated the response that we get

from our own promotions."

Queried about a growing number of customer complaints, he says, "Our ability to ship doesn't keep up with our intentions. We're continually plagued with bottlenecks and shortages relating to our rapid growth. Earnings are inadequate to allow inventory to grow at the same pace as sales."

One reason for Icon's cash-flow problem may be its investment of about \$750,000 in a software venture (*MindWrite*) that did not bring in anticipated profits. Moncrief admitted that the cost of supporting a start-up company from the profits of Icon, a start-up itself, were burdensome.

Last spring Moncrief took complete control of Icon, selling *MindWrite* at a modest sum to his brother-in-law, who developed the software. He also brought in new management and created additional information systems controls. While the CEO claims that Icon Review is profitable, he admits that it needs additional financing to survive.

Consumers, however, vote with their money, and it remains questionable whether they'll be willing to wait while Icon puts itself in proper running order.

Tales of Computer Woe

Conroy-LaPointe (Bellevue, Washington): Forced into liquidation last April. This company made millions of dollars for its husband-and-wife owners, with sales zooming from \$31 million to \$70 million between 1983 and 1985. An attorney familiar with the case says "they just kept losing money but didn't know it."

PC Network (Chicago): Bankrupt. Founded in 1983, this "discount buying club" claimed to have 125,000 members. In 1985 PC Network told industry analyst Maxwell Sroge that it was able to offer its customers greater discounts than the smaller companies, which are "ultimately forced under." Operating since April 1987 under Chapter 11, the company left more than 15,000 customers still waiting for goods that were paid for but never delivered.

First Software (Methuen, Massachusetts): Chapter 11 filed in 1986. Owed 89 creditors about \$9.6 million, including Borland Int'l (\$177,734), Brøderbund (\$417,188), and MicroPro (\$1,254,000). First Software distributed software and accessories to mail-order companies. First is back in business; MicroPro has already written off the loss.

Northeastern Software (Shelton, Connecticut): Bankrupt. One of the country's largest, this mail-order house filed for protection under Chapter 11 in October 1986—fleecing customers coast-to-coast and owing \$3.5 million to business creditors.

Tascom, Inc. (Vineland, New Jersey): Doing business as Scott Tasso Associates, this company was the target of a U.S. Postal Inspection Service investigation and signed a consent decree in January 1987. Tascom's ads in Yellow Pages throughout the country promised hefty discounts. "Customers sent in their checks and got nothing in return," says an inspector.

Compusystems (Torrance, California): Owners' whereabouts unknown. Known as a "bust-out," this bogus operation made a spectacular entrance to the mail-order scene last August. Its full-page ads offered products at rock-bottom prices. The company fooled consumers and creditors alike, listing a fake number for bank credit references. At least 200 people sent hundreds of dollars worth of orders. The company never paid for the ads it placed, either.

Software-to-Go: Owners fled the country with attorneys general from three states in hot pursuit. The Dixons advertised as Micro Hotline, Programming International, Continental Micro, and Programming Innovations. Their ads in *The New York Times* offered a nonexistent software package; credit card firms lost hundreds of thousands of dollars when customers refused to pay. Bank of Boston lost \$161,000; a California bank lost \$176,000.

Federal and state regulations do offer some protection against companies that engage in outright fraud. However, even in these cases, government actions are inadequate, particularly since an increasing number of fraudulent operations have recently descended upon the computer mail-order scene.

One recent case so outraged lawmakers in California that they tightened their own state regulations governing mail order. Software-to-Go stung consumers nationwide, leaving attorneys-general in California, New Jersey, and New Hampshire in hot pursuit of the company's owners, James and Heather Dixon. Before they fled to Europe, the couple—whose other mail-order scams included Micro Hotline (Delaware), Programming Innovations (California), Continental Micro (Delaware), Optimal Software (California), and Programming International—advertised lavishly and sold software they knew they couldn't ship. They took out ads in major newspapers and promoted their own software package called *The Database Accelerator*—a product that never even existed.

California lawmakers were wary about problems in the mail-order industry, but the case of the Disappearing Dixons "blew us out of the water. AB 3076 was passed to protect consumers from the sales of bogus software," says Assemblyman Robert Frazee (R-Carlsbad). "The Dixon case showed us we needed to not only tighten our own state regulations about mail order, but also to give the state Attorney General an additional avenue of prosecution for those who sell bogus mail-order material."

Will the Situation Improve?

In any new industry, one can expect a certain amount of poor management, bankruptcy, and even fraud, according to David Vogel, professor of business at the University of California, Berkeley, and editor of the respected *California Management Review*. He offers a strong warning to the fledgling computer mail-order industry: "The leading companies should develop some codes of conduct and take a dominant role in policing the industry. The whole mail-order industry rests on trust, and if it becomes common knowledge that consumers can't trust companies, the whole industry will dry up."

In the meantime, consumers need to take special care. Before ordering from mail-order companies, check on the quality of their service and avoid any with dubious reputations. People who use credit cards need to be aware of a little-known provision of the federal government's Fair Credit Billing Act that requires banks to remove unauthorized or unacceptable charges from customers' accounts (you need to make a written complaint within 60 days after receiving the bill).

Both Visa and Mastercard are now setting up procedures to catch companies that accrue an excessive amount of charge-backs from customers. "We just



"The Dixon case showed us we had to tighten our regulations about mail order and provide an additional avenue of prosecution for those who sell bogus mail-order material."

—Robert Frazee, Assemblyman, California State Assembly

started tracking mail- and phone-order transactions this year," says Thomas Clouthut, an analyst for Visa, which is running risk-management software to help its merchant banks flag problem areas or problem accounts.

Programs Plus's Joe Bonnazzo maintains that industry and consumer magazines like *Macworld* have a role to play as well. "They should police this industry," he says, encouraging readers to write to publications with their complaints.

But increased self-regulation in the mail-order and banking industries still may not be enough. Existing agencies like the FTC and the Postal Inspection Service need support to provide consumers with adequate protection. A federal law prohibiting mail-order companies from billing your credit card prior to shipping merchandise is now needed, say consumer advocates. In the absence of new federal laws, states may be forced to require that mail-order companies deposit cash bonds as a way of protecting consumers from unscrupulous practices.

Ordering by mail can be an efficient and economical way to purchase computer supplies and equipment. And although most computer mail-order companies are honest and dependable, there is still much progress to be made if this topsy-turvy business is to grow into a mature, healthy, and reputable industry. □

Looking through the Mac II Kaleidoscope

Comparing Mac II color monitors reveals some glaring differences in picture quality

by Bruce F. Webster

Who would have thought it? The Macintosh, the original "appliance" computer, is awash in an ever-increasing flood of hardware options. The Mac II, with its six slots and modularity, is the most inundated of all. Perhaps of greatest interest are color graphics displays. Color in computers is what everyone wants but nobody is really sure how to use.

Apple, of course, was first out of the gate with the Macintosh II Video Card, the High-Resolution Monochrome Monitor, and the AppleColor High-Resolution RGB Monitor. The Mac II Video Card occupies one of the six slots and presents a DB-15 connector in the back. The card itself supports a 640-by-480 display, with the 1:1 ratio and the "square pixels" we've all come to know and love in the earlier Macs. However, the standard Apple card supports a mere 4 bits of information per pixel. This allows for just 16 different gray shades or colors (depending on the type of monitor)—out of a possible 16 million. In other words, at any one time the screen can display only 16 different shades or colors, but you're allowed to say what those might be.

If 16 simultaneous colors aren't enough, you can buy the Macintosh II Video Card Expansion Kit for \$149. The kit consists of eight video RAM chips that plug into the eight empty sockets on the Mac II Video Card. Apple brochures state that

dealer installation is required for these chips. Horse hockey. All you have to do is line up the notches on the chips with the notches on the sockets and show a little caution and good sense when pushing them in. Warning: the chips do not seat all the way down, so don't force them. This kit expands the video card to 8 bits per pixel, which gives you 256 colors or grays on the screen simultaneously. If you're going to use a color monitor with this video card, do yourself a favor and buy the expansion kit.

The Apple High-Resolution Monochrome Monitor is a standard 12-inch high-resolution monochrome monitor. It's cheap, reliable, and has a crisp display. It also has been the standard monitor for the Mac II until recently, and it's terminally boring, so we'll move on to the next monitor.

The AppleColor High-Resolution RGB Monitor is built by Sony and uses Trinitron technology—the same technology that makes David Letterman look so clear and crisp on my TV set. This monitor has been nigh impossible to get ahold of during the past few months, so I was surprised when one arrived from Apple (I wasn't sure *they* even had any available). And surprise turned to delight when I plugged the





AppleColor monitor into the Mac II. The display is clear, sharp, crisp, steady, easy on the eyes—all those adjectives that folks who spend hours in front of screens like to hear. And the colors are brilliant and rich.

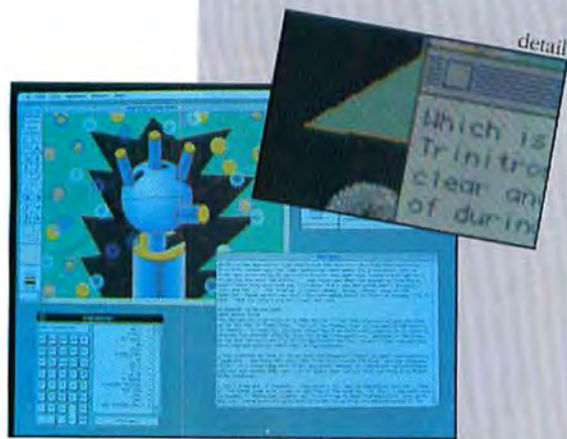
Alternate Color Monitors

The AppleColor High-Resolution RGB Monitor is not the only monitor you can hook up to the Mac II Video Card. You can, in theory, hook up any analog RGB monitor. In theory. In reality, you need a monitor with sufficient resolution to display clearly the 640-by-480 image that the video card puts out. Because of the high price and low availability of the AppleColor Monitor, several other manufacturers have started pushing their CRTs as replacements.

I had a chance to look at three such replacements, loaned by their manufacturers: the Sony CPD-1302, the Taxan Multivision 770 Plus, and the Thomson UltraScan 4375M. All three come with video and power cables. All three can switch between digital and analog RGB input, which means that you can also use them with Those Other Machines.

I won't keep you in suspense. The verdict is this: get an AppleColor monitor.

PHOTOGRAPHS BY FRED STIMSON



SuperMac Spectrum card with Sony GDM-1950



PCPC II video card with Sony GDM-1950

None of the three substitutes came even close in display quality. In fact, I was beginning to wonder if Apple had somehow set all this up to make the AppleColor look good. But no—these monitors were sent straight to me from the manufacturers at *Macworld's* request.

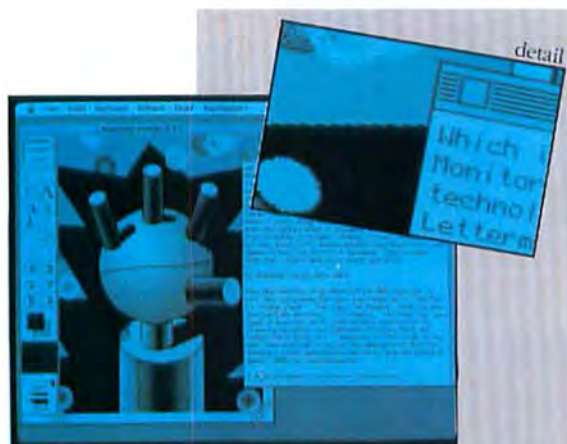
If you can't get the AppleColor monitor, you might look at the Thomson 4375M. It has the best display of the three non-Apple monitors: crisp, good colors and minimum distortion. It did require a fair amount of tweaking to get the display centered and correctly proportioned. Unlike the Taxan 770 Plus and Sony CPD-1302 monitors we received, the Thomson Ultra-Scan had no tint bias. The lower price makes this an attractive alternative to the AppleColor monitor.

The Taxan Multivision 770 Plus was the second best of the three. The display had no ghosting (faint images appearing to one side of the true image), and it was crisp—though not as crisp as the AppleColor. There was no apparent interference from the Mac II. There was a slight reddish tint to the display, and I found no way to adjust it. This meant that "black" actually had a slight amount of color in it, which became apparent when brightness and contrast were turned up full. Also, under certain circumstances, a horizontal green line appeared in the bottom left corner of the screen. I had difficulty getting the display itself correctly proportioned (using the adjustment controls in the back). Despite all my fiddling, the sides of the display bowed inward. The Taxan is a

tolerable substitute for the AppleColor, but I still know which I'd prefer.

The Sony CPD-1302 came in last. This surprised me because I had previously used a CPD-1302 on a Mac II and had been pleased with it, for the most part. This monitor, however, was not satisfactory. It had a strong reddish tint, more pronounced than that of the Taxan. The CPD-1302 also had a problem with ghosting. For example, when I drew a vertical line, a fainter version of that line appeared a few millimeters to the right of it. And, like the CPD-1302 I had used before, this monitor was very susceptible to interference from the Mac II. With the CPD-1302 sitting on top of the Mac II, white streaks appeared on the screen every time the Mac II read from or wrote to the hard disk. Putting the monitor to the left side cleared the interference a little but caused a great deal of jumpiness in the display, making it tiring to look at. I also had to do a fair amount of adjusting to get the display set up. I was never really happy with it.

In contrast, the AppleColor Monitor gave an extremely clear, sharp display, with true blacks and reliable color representation. It's not quite as sharp as the Apple Monochrome Monitor, but the difference is negligible. No adjustments were needed, and there was no interference from the Mac II. I would have no problem spending long hours working at this display.



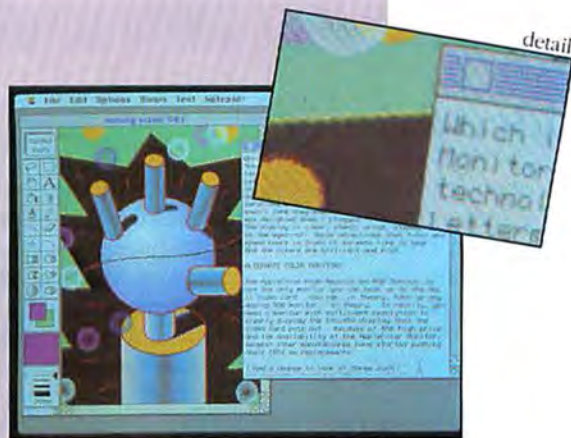
Apple High-Resolution Monochrome Monitor

Alternate Video Cards

The Mac II Video Card is nice, but it only supports a 640-by-480 display. The Mac II system software can support a much larger display, as well as multiple displays. So far, Apple has left it to other developers



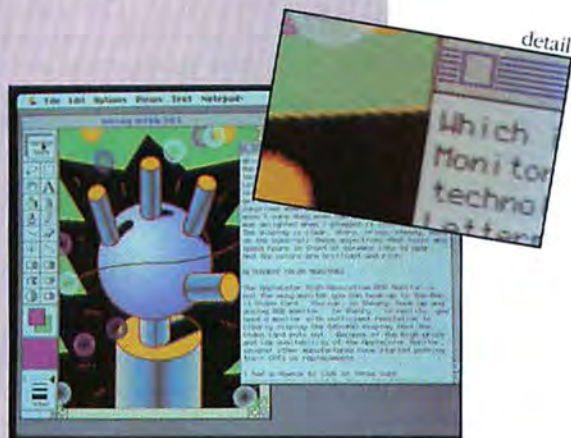
AppleColor RGB High-Resolution Monitor



Thomson UltraScan 4375 M



Taxan Super Vision 770



Sony CPD-1302

to provide that additional support. Many monochrome displays have come out for the Mac II; now some color cards and displays are showing up.

Perhaps the best known is the SuperMac Spectrum. This color graphics board for the Mac II does everything the Mac II Video Card does, and more. The Spectrum 1000/1 comes with enough RAM to drive a 1024-by-768 display with 2 colors. You can buy an upgrade kit to display 256 colors. In the Monitors section of the Mac's Control Panel, you select 2, 4, 16, or 256 colors. This flexibility is useful for those software packages (such as certain paint programs) that currently run with only a 1-bit-per-pixel display.

The Spectrum 1000/1 card lists for \$749. The upgrade kit sells for \$759. SuperMac also offers three RGB monitors: a 16-inch Sony Trinitron (\$2495); a 19-inch Sony

Trinitron (\$3695); and a 19-inch non-Sony monitor (\$2995). So a 1024-by-768, 256-color system with a Sony 19-inch monitor costs \$5203.

A recent arrival on the scene is the PCPC II color graphics system, from Personal Computer Peripherals Corporation. This is an entire system, board plus monitor. The board has the same resolution as a fully loaded Spectrum: 1024 by 768, with 8 bits per pixel (256 colors). PCPC offers a choice of either a Mitsubishi or a Sony 19-inch RGB monitor. Suggested retail price for the complete system is \$4995. PCPC also sells the card alone for \$1595.

The PCPC II (with Sony monitor) has a slight edge over the SuperMac Spectrum (with Sony monitor) in terms of color quality; however, this judgment is highly subjective. The PCPC II Sony monitor was a clear winner over the PCPC II Mitsubishi monitor; the Mitsubishi display seemed washed out by comparison.

The Spectrum card is somewhat more flexible than the PCPC II, but the PCPC II is

less expensive when both systems are configured with a Sony 19-inch monitor. Given that base line, it's pretty much a draw between the two. However, if you can cope with a 16-inch monitor (instead of a 19-inch one), you can knock \$1200 off the price of a Spectrum system.

Multiple Video Cards

What happens if you plug more than one video card into a Mac II? You get a Mac II with multiple displays. The operating system defines a large virtual desktop, then lets you position each display within that desktop. You do this via the Monitors section in the Control Panel.

When you bring up the Monitors section, you see the displays (numbered 1 through whatever) in their current relative virtual positions. Using the standard click-and-drag technique, you slide the screens

A Video Primer

It annoys me to read articles where the author freely uses terminology that I don't understand. It annoys me even more when I do it. So here's a quick explanation of how video cards and monitors on the Mac II work.

The video display on the Macintosh (any Macintosh) is composed of pixels, a cute word that's derived from the phrase *picture elements* and refers to the little dots that make up the display itself. When a program writes text or draws images, it is just setting pixels to be certain colors—on a Mac, mostly black and white.

Pixels are represented inside the computer by bits in memory. In the closed Macs, each pixel is represented by 1 bit. Since the bit can have only one of two values—0 or 1—the pixel can have only one of two colors—white or black. However, most video cards for the Mac II represent each pixel with multiple bits, which increases the number of colors you can use. For example, if you have 4 bits per pixel, then you can have 16 colors; if you have 8 bits per pixel, you can have 256 colors.

There are two types of monitors: monochrome and RGB. A monochrome monitor displays just black and white. Sort of. It

can also (with the right video card) display shades of gray; that is, different tones ranging from black to white. Monochrome monitors are cheaper to build and easier to read, but they lack the sizzle of color.

An RGB (red-green-blue) monitor displays colors. The monitor shoots three electron "guns" at each dot (pixel) on the display. One gun determines how much red; the next, how much green; and the last, how much blue. Your eye and mind combine the three colors to form one. By varying for each pixel the amount of energy going to the red, green, and blue guns, you make the monitor display many different colors.

The question is, which colors? That's where the concept of a palette comes in. To the artist, a palette is a flat board on which are many different colors of paint; the artist mixes colors on the palette to form the desired hues. A video card's palette is defined by the range of values it can drive for the red, green, and blue guns of the RGB monitor. For example, if the video card can use 8 bits for the intensity value of red, green, and blue, then the total number it can generate is $2^8 \times 2^8 \times 2^8 = 2^{24} = 16,777,216$ different colors.

But wait, there's more. Given that we have, say, 16 million colors to choose from but only 256 (or even 16) to display at one time, how do we decide which colors can be displayed? For that, we use a color look-up table (affectionately known as a CLUT). Suppose we have 4 bits per pixel. That means that we can display 16 colors, because each pixel can have a value from 0 to 15 (0000_2 to 1111_2). We set up a CLUT with 16 locations, numbered 0 through 15. Each location contains a 3-byte RGB value, which defines the color corresponding to that location. So, if a given pixel has the value 1011_2 (11_{10}), and location 11 in the CLUT contains the 3-byte RGB value corresponding to light blue, then that pixel will appear as light blue on the screen.

Note that there are two ways to change the color of a pixel. First, you can change the value (2 bits, 4 bits, 6 bits, whatever) associated with that pixel. That causes the video card to pick the corresponding value from the CLUT and send the RGB value to the monitor. Second, you can change the value in the CLUT itself. This changes the color displayed on the screen without modifying the pixel value.

Kaleidoscopes on Display

Monitors	Price	Diagonal Size	Dot Pitch	Maximum Resolution	Vertical Scan Rate	Horizontal Scan Rate	Input
AppleColor RGB High-Resolution Monitor	\$999	13 in.	0.25mm	640 by 480	66.7 Hz	35 KHz	analog RGB
Taxan Multivision 770 Plus	\$895	13 in.	0.31mm	640 by 480	50 to 90 Hz	15 to 34 KHz	analog and TTL RGB
Thomson UltraScan 4375M	\$895	13 in.	0.31mm	800 by 560	45 to 75 Hz	15.6 to 35 KHz	analog and TTL RGB
Sony CPD-1302	\$945	13 in.	0.26mm	900 by 560	50 to 100 Hz	15 to 34 KHz	analog and TTL RGB
Sony GDM-1950	\$2995	19 in.	0.31mm	1024 by 768	60 Hz	48.8 KHz	analog RGB

Video Cards	Price	Resolution	Colors	Upgrade Price	Upgraded Colors
Macintosh II Video Card	\$499	640 by 480	2 or 4	\$149	2, 4, 16, or 256
SuperMac Spectrum 1000/1	\$749	1024 by 768	2	\$759	2, 4, 16, or 256
PCPC II Video Card	\$1595	1024 by 768	256	none	n/a

around in a manner reminiscent of playing the old Puzzle desk accessory (and often equally frustrating). The screens are "sticky"—you can't drag them apart and position them in disjoint locations. The numbers correspond to where the cards are plugged into the NuBus slots, with number 1 being the card in the left-most slot, and so on to the right.

While you're laying things out, you can pick up and drag the menu bar from one display to another. This determines which screen will have the menu bar when you reboot, which is when all these changes go into effect. You can also set each screen for color or black and white, and with some cards (such as the Mac II Video Card and the Spectrum) you can select the number of colors. These last features go into effect immediately; you need not reboot to see the results.

With your system configured for multiple screens, you just pretend that you're working on one giant desktop, dragging items here and there. For example, as I type this on one 19-inch display, I have documents open on each of the other three displays. To move from document to document, I simply move the cursor around with the mouse. When the cursor reaches the side of one display, and there is an adja-

cent display, then the cursor moves onto the next screen.

What are the disadvantages of multiple displays? First, trying to keep track of the cursor. With one Mac II Video Card, one Spectrum, and two PCPC IIs, I've got 15 times the display area of a Mac Plus. And it's laid out in an irregular pattern. Getting from place to place can be a chore.

Second, arranging the monitors in a meaningful way. How do you set things up so that you can actually use all those screens? And where do you put them? These 19-inch monitors are tall, wide, and very deep; they weigh a lot and take up a great deal of space. On top of that, you can't place certain monitors too close to each other. For example, putting the AppleColor monitor too close to the Sony 19-inch monitor causes jittering and waving in the larger display.

Third, making use of the extra display area. How many windows, applications, and documents do you really need open at the same time? How many can you have open? There are certain limits to the number of open windows, as I discovered when laying out the Finder desktop.

Fourth, cost. The four displays I'm using right now have a combined list price of over \$16,000. That's in addition to the price of the Mac II itself, so you're looking at a \$20,000-plus system. But it's a nice \$20,000-plus system.

Conclusions

Do you really need a Macintosh II with four screens? Especially if three of those are 1024-by-768 displays, running on 19-inch RGB monitors? Probably not, though there are situations—such as simulation and modeling—where you might want multiple color displays. One large screen is probably sufficient, though having one large and one small display is very useful.

If I had to have just one display on the Mac II, it would be a fully loaded (768K) Spectrum card with a Sony 19-inch RGB monitor. That would give me a large work area (1024 by 768) and full color support (256 colors, configurable). Of course, said display would set me back about \$5200. Barring that, I'd get a fully loaded (307K) Mac II Video Card with an AppleColor RGB monitor. My ideal configuration would have both, with the small screen sitting on top of the Mac II and the large screen on the table to its right. □

See *Where to Buy* for product details.

Macintosh-Aided

Slowly but surely, the Mac is gaining ground in the engineering world



Pee-Wee Herman fans know these pint-size premeval playmates from Herman's offbeat TV show. Designer Joe Lewis drew the stop-action figures' aluminum skeletons in MGMStation—as well as the rear-projection system for special-effects work on the facing page.

PHOTOGRAPHS BY MAX AGUILERA-HELLWEG

by Erfert Nielson



Macworld 97

at some of the new arrivals, see "CAD Expands."

File Transfer and Expandability

A healthy selection of CAD programs will help push the Mac toward Apple's goal of an engineering workstation, but other obstacles exist. For example, connectivity is another issue on the minds of Mac CAD experts. The Mac doesn't exist in a vacuum, especially in large firms, where it may work in conjunction with minicomputer- or mainframe-based CAD workstations. Also, like it or not, many companies have already invested a good deal of time and money in IBM PC-based CAD software, and many Mac users have expressed a desire to transfer graphics to and from *AutoCAD* and other PC programs. Finally, many engineers and designers would like to transfer graphics files between Macintosh programs, combining the capabilities of, for example, 2-D and 3-D packages. For a summary of current file-transfer options, see "How CAD Gets There from Here."

Even the new crop of Mac CAD programs won't satisfy everyone. Many engineers mentioned *AutoCAD* as an example of a good CAD package. What does *AutoCAD* have that the Mac programs don't? First and foremost, *AutoCAD* has an extensive complement of add-on modules: because of its open-architecture software (and its installed base of 100,000), third-party developers offer hundreds of add-on applications for civil, mechanical, electri-

cal, structural, and chemical engineering—you name it. In addition, *AutoCAD* allows users to attach information such as a bill of materials to a drawing. Finally, *AutoCAD* offers programmability: users can write programs with the built-in AutoLISP language to add macros and otherwise customize the program.

How can Macintosh CAD programs meet this challenge? The Mac's hardware is now expandable; its software should be, too. So far, solutions are somewhat piecemeal. For example, a program such as Affinity Microsystems' *Tempo* can be used to add macros to a CAD program. Developers of future Mac CAD software will have to take expandability into account as the competition grows.

Enough speculation. Let's look at how engineers and designers are putting the Mac to work in varied phases of the design process, in projects ranging from NASA's space station to animated dinosaurs.

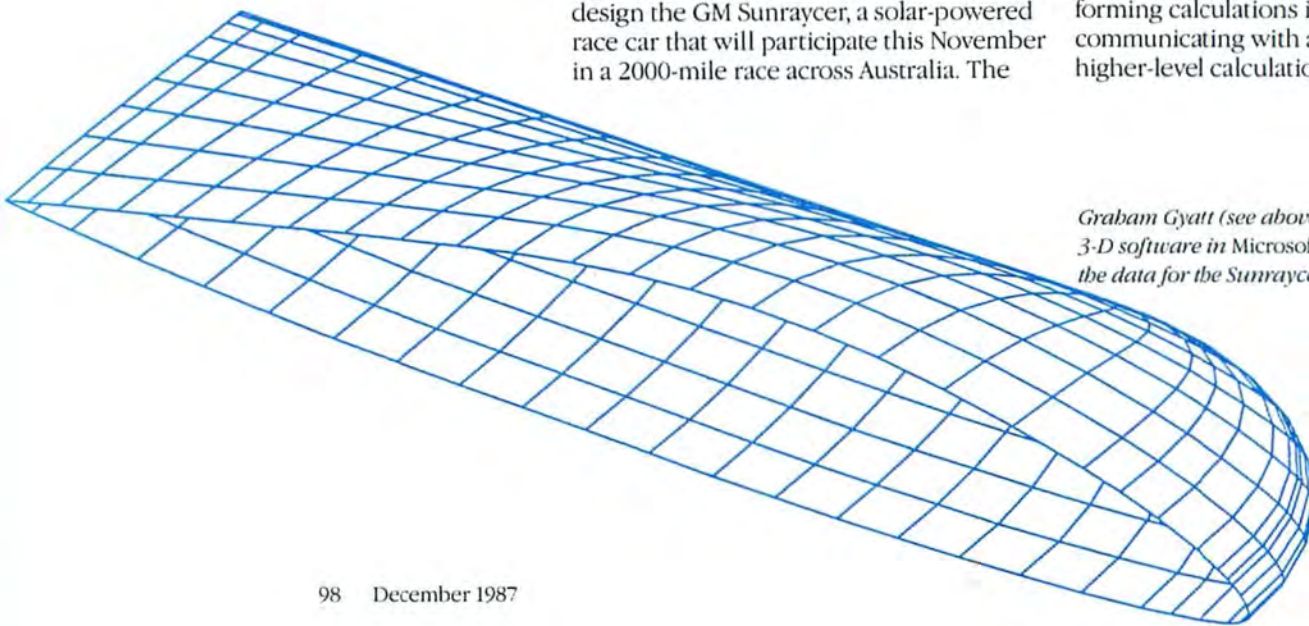
Dinosaurs and Racing Cars

At AeroVironment, a small company in Monrovia, California, the Mac helped design an extraordinary flying machine: a radio-controlled pterodactyl with an 18-foot wingspan. AeroVironment specializes in unusual aircraft: the company's creations include two human-powered aircraft, the Gossamer Condor and the Gossamer Albatross, as well as the aforementioned pterodactyl. The Mac's contributions to the pterodactyl's design included spreadsheet calculations to help design a wing-flapping mechanism, a BASIC program that demonstrated the flapping with a 30-frames-per-second animation, and a pterodactyl flight simulator to help determine optimum steering strategies.

AeroVironment's latest project is equally unusual. The company is helping design the GM Sunraycer, a solar-powered race car that will participate this November in a 2000-mile race across Australia. The

body of the Sunraycer is being designed by AeroVironment, the electric motor by General Motors, and the solar panels and batteries by Hughes Aircraft. According to AeroVironment's manager of the solar-powered car project, Alec Brooks, the Mac is involved in several facets of the project, from producing documentation to performing calculations in *Excel* and BASIC to communicating with a VAX that performs higher-level calculations. In addition, full-

Graham Gyatt (see above photo) wrote his own 3-D software in Microsoft Basic to help visualize the data for the Sunraycer shell.





Engineers Graham Gyatt and Bart Hibbs (with beard) of Aero Vironment used the Mac to calculate the shape of the Sunracer solar car and to plot full-scale plans.

sized plans for the car's body shell were produced in *MacDraw* and output on a Hewlett-Packard plotter via *MacPlots II*. During the race, a motor home housing a Mac SE will follow the car, collecting data with a telemetry link.

Oddly enough, AeroVironment isn't the only company using the Mac for dinosaur design. At the Hollywood-Tokyo Film Consortium, motion-control and special-effects designer Joe Lewis is working on, among other things, the Dinosaur Family of "Pee-Wee's Playhouse," a Saturday-morning kiddie show with a somewhat surrealistic bent.

The Hollywood-Tokyo Film Consortium is neither in Hollywood nor in Tokyo, but in a warehouse in a Chatsworth, California, industrial park. The building houses a machine shop, a staff of model makers, and camera equipment used to film TV and movie animation sequences and special ef-

fects. Lewis uses his Mac to design the metal armatures inside the Dinosaur Family. He first makes a sketch by hand, then uses *MGMStation* to draw each segment of the aluminum "skeletons" that allow the latex dinosaurs to be moved for frame-by-frame animation. He plots the armature drawings on a Roland DG eight-pen plotter, then takes them to the Film Consortium's machine shop, where the parts are manufactured and assembled.

On the whole, Lewis is satisfied with *MGMStation*. "In the film business you have to be fast," he says, "and *MGMStation* lets me design components quickly." His wish list for *MGMStation* includes macros, an isometric view, and the ability to easily transfer graphics files to and from other programs.

Space Station Design

Now we leap from dinosaurs to spacecraft. At Martin Marietta's Denver aerospace facility, the Mac is taking part in

the design of NASA's space station. Gerry Simonson, manager of technical and management information systems for the space station project, was recently involved in putting together a proposal for Work Package 1, one of four sections of the space station. Much of the word processing and graphics for the proposal were done on the Mac; the files were then transferred to a Sun workstation running *Interleaf* page-makeup software to produce the final document.

Many of the technical drawings for the space station are produced on a VAX-based Intergraph 751 CAD workstation. Since Martin Marietta has to pay by the hour for Intergraph time, it's often more cost-effective to create drawings on the Mac and then transfer them to the Intergraph. Similarly, if an Intergraph-produced drawing has to be modified, it can be transferred to the Mac, edited, and then returned to the Intergraph.

Inside the space station mockup at Johnson Space Center in Houston, Richard Hayner (left) and Chipp Walters examine the storage lockers they designed for NASA using MGMStation.



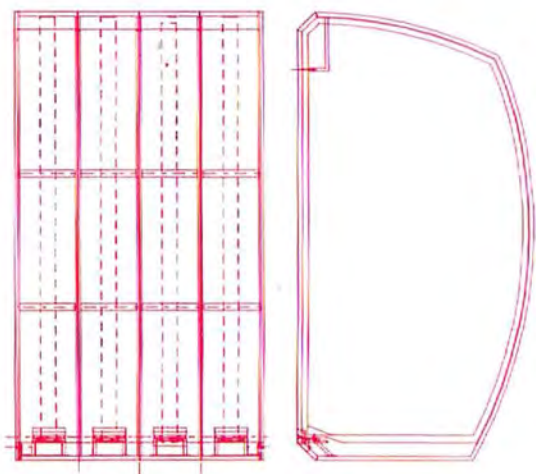
When faced with the problem of moving graphics files between the Mac and the Intergraph system, computer lab manager Allan Barsody first tried *MGMStation's* IGES translator. Then he came across Data Basics' *Snap*, which offers an optional Intergraph translator. Drawings are created in *Snap* on the Mac and sent to the Intergraph without the intermediate step of converting them to IGES format. "An added advantage of transferring Mac files to Intergraph is that you can then print the drawings on a Versatec electrostatic plotter," says Barsody. (Fortunately, such a roundabout printing method is unnecessary; Versatec recently released a Macintosh driver for its 7000 series electrostatic plotters.)

The Mac's involvement in the space station project isn't limited to proposal publishing. According to Simonson, engineers at Martin Marietta are using Macs for applications such as thermal and structural analysis of space station components. De-

partmental staff engineer Bob McMordie uses *Excel* for number crunching in thermal analysis "what-if" calculations. "The thing that makes *Excel* appropriate for this type of problem is the ability to copy parts of equations along with cell locations. Engineers used to do this type of analysis with a slide rule; with *Excel*, you can change any constant or variable and see the results almost immediately."

Industrial Design

Martin Marietta isn't the only company that employs the Mac in space-station design. Design Edge, a Houston-based high-tech industrial design firm, is using the Mac to design storage shelves for the space station. The firm's founders, Chipp Walters and Richard Haner, were committed to making the Mac an integral part of their company. Design Edge now has seven Macs, three of which are equipped with large monitors, as well as a LaserWriter and a Houston Instrument DMP 52MP pen plotter. "I decided we should be a Mac-based company," says Walters, "in part because of



Front and side elevations for a different locker concept from the one pictured above. This simplified assembly drawing is one of over 120 layouts created for this design.



the Mac's ability to integrate text and graphics." He points out that design is only one part of an engineer's job. "At Design Edge," explains Walters, "the research phase culminates in a document. We use a combination of *ReadySetGo*, a CAD program, a scanner, and the LaserWriter to prepare proposals."

After looking at the available CAD programs, Walters chose *MGMStation*. "I was up and running on *MGMStation* in a week, compared to about a month to get up to speed on *AutoCAD*," he says. In addition, Walters claims he can draft 100 to 150 percent faster with *MGMStation* than with *AutoCAD*. Richard Haner agrees with Walters's assessment of *MGMStation*: "I wouldn't consider going back to *AutoCAD*—unless they put a Mac interface on it," he says.

Even though Design Edge's founders are sold on the Mac, it's a fact of life that the IBM PC is entrenched in the engineering world. In addition to Macs, Design Edge uses IBM PCs running programs such as *AutoCAD*, *VersaCAD*, and *CADkey*. To meet the needs of its working environment, Design Edge developed a program to transfer files between *AutoCAD* and *MGMStation*. For those who aren't inclined to write their own file-transfer program, Kandu Software's \$495 *CADMover* should do the trick.

Computer-aided design often involves more than simply drawing components and sending the plans to a machine shop. For a construction such as the space station racks, which must support a load as well as stand up to incredible g-forces during take-off and landing, structural analysis is in order. Ronnie Haws, a Houston-based mechanical engineer, used *Frame Mac* from Erez Anzel Software to do preliminary stress analysis for the racks. Much of his work involves analysis for oil-industry machinery. "In the past," says Haws, "I did stress calculations by hand. A lot of the time, it was easier to add more metal than to do more calculations....but when you're working on an aircraft, keeping it lightweight is important." Walters presented Haws with several proposals for storage racks, and Haws analyzed the designs to make sure they were feasible. "*Frame Mac* showed that we had room to put a strong, lightweight structure in the space we had," says Haws. "It not only makes analysis easier and faster than by hand, but it also makes a nice presentation. *Frame Mac* output several drawings showing deflection and stresses. We presented them to NASA, and they were impressed."

Finished Products: CAM

Computer-aided manufacturing is often the final step in the CAD process. Not

CAD Expands

The announcement of *VersaCAD/Macintosh Edition* has caused a stir in the Mac community. Many industry experts have remarked that the entry of an established company like Versacad lends credibility to the concept of Macintosh-based CAD. But *VersaCAD* isn't the only new CAD program on the scene; several more have recently been announced or released.

One new arrival is Data Basics' \$695 *Snap*, a two-dimensional CAD program modeled after Intergraph's mainframe-based *Interactive Graphics Design Software*. *Snap* can be

used to transfer files to an Intergraph system or as a stand-alone design program. Another promising newcomer is Computer Shoppe's *PowerDraw*, announced at the August Macworld Expo. Built on a *MacDraw*-like interface and moderately priced (\$595 introductory), *PowerDraw* offers enough features to make it a contender in the professional CAD arena.

Another product to watch for is a Mac version of Microtek's *CADmate*, a \$995 raster-to-vector conversion program already available for the IBM PC. *CADmate* provides an alter-

native to redrawing designs that must be transferred from one CAD program to another; bit-mapped images produced by a scanner are converted into vector-based data that can be read by a number of CAD programs.

Rumors of Autodesk's entry into the Mac market abound, but at press time Autodesk was still denying that it had a Mac product in the works. Whether or not Autodesk jumps on the bandwagon, it looks like there will be no shortage of Mac CAD software.

every designer is as fortunate as dinosaur designer Joe Lewis, who has a machine shop a few doors down the hall. Many send their drawings to Mac-equipped machine shops that use computer numerical control (CNC) programs such as Bridgeport's *Mac-EZ-CAM*, Micro CAD/CAM's *MGMStation CAM*, or Gibbs and Associates' *ncCAD/ncCAM* to drive lathes, milling machines, punch presses, and other machine tools. Because a CNC program can be generated on the Mac from the CAD data, the step of

entering instructions at the machine tool's console is eliminated, thus freeing up the tool and increasing productivity.

At Rimo Manufacturing in Canoga Park, California, a Mac running *MGMStation CAM* is connected to five machine tools. An A-B switch shifts operation from a tool's console to the Mac. Rimo's customers range from aerospace companies to Disney's EPCOT Center, but they have one thing in common: few of them produce drawings on the Mac. Therefore, a Rimo

draftsman converts the customers' blueprints into an *MGMStation* drawing, which is then converted into a CNC program by *MGMStation CAM*.

What's Next?

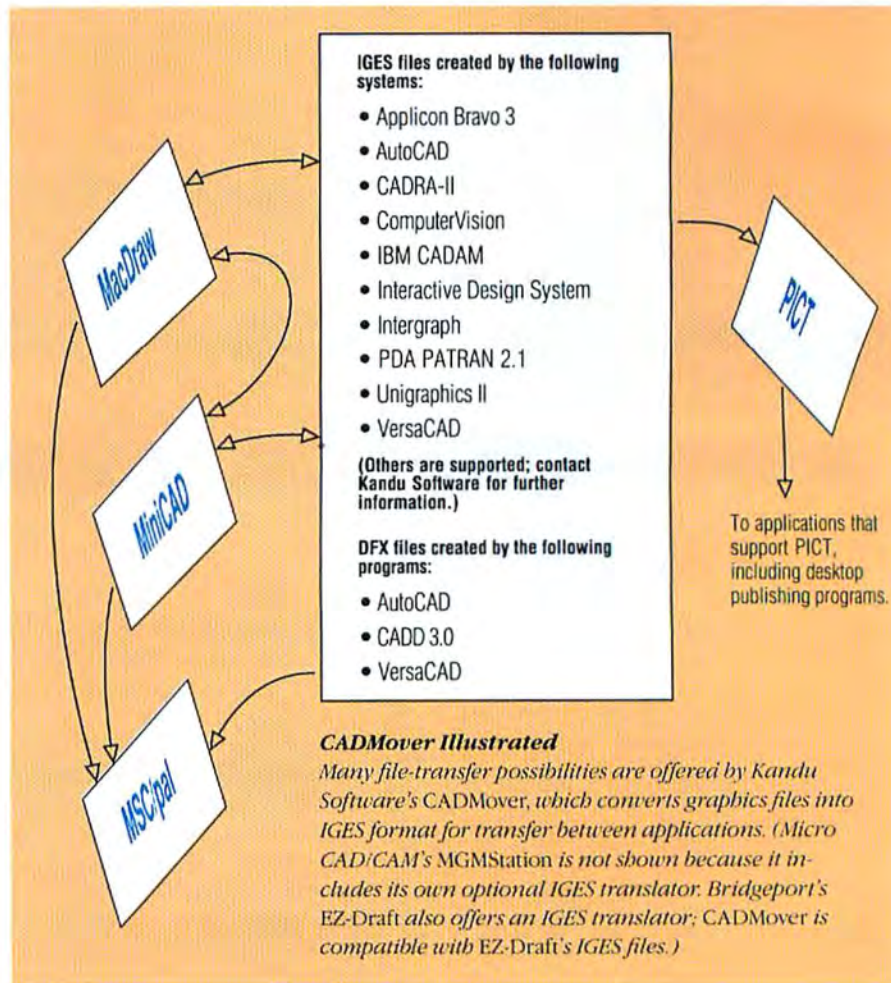
Where is Macintosh CAD headed in the coming year? *The CAD/CAM Journal's* Shawn Hopwood believes the development of CAD software can be divided into three stages. The first stage was reached some time ago with the introduction of

How CAD Gets There from Here

The recent boom in Mac CAD programs is heartening—unless you want to transfer drawings from one program to another. More programs means more file formats. And a good number of file formats already exist on the Mac and on other computers.

How do you transfer files? One solution is IGES. (IGES stands for International Graphics Exchange Standard or Initial Graphics Exchange Specification, depending on whom you talk to.) Bridgeport's *EZ-Draft*, Micro CAD/CAM's *MGMStation*, and Enabling Technologies' *Pro3D* offer IGES translators, which convert graphics files to ASCII or binary format, allowing them to be transferred among different programs and computers.

Many professionals are dissatisfied with IGES as a file-transfer medium, however. IGES files are larger than the original graphics files; in addition, information is sometimes lost in the translation. According to Allan Doane, project manager for Telos Software's *VAXDraw* IGES translator, IGES



programs like *MacDraw* and *MacDraft*, which are suitable for basic drawings but lack precise dimensioning and other features necessary for engineering applications. The Mac has now entered the second stage, with the arrival of enhanced programs suitable for architects and mechanical engineers. But yet to appear is the third generation of CAD software, which will allow nongraphics information (a bill of materials, for example) to be attached to a drawing. If Macintosh CAD packages are to

compete with the likes of *VersaCAD* and *AutoCAD* on the IBM PC, this stage is a logical next step.

How does Apple plan to support the Mac as an engineering workstation? It has already taken several steps in that direction (over and above a marketing campaign, that is). First, Apple's insistence that *VersaCAD* adopt the Mac's user interface is an indication that Apple intends to encourage developers to uphold the established user-interface guidelines.

Second, Apple has at last made a commitment to appear at CAD-related conferences and trade shows. This year, Apple was present at the June A/E/C Systems '87 Conference and Trade Show and the August SIGGRAPH computer graphics conference (Apple's SIGGRAPH display was located between the Sun and Apollo booths, appropriately enough). According to David Kulbarsh, manager of marketing for the Engineering and Scientific Marketing Group, Apple plans to attend eight to ten CAD- or engineering-related trade shows in the coming year, including Autofac and the National Design Engineering show.

Third, Apple is beginning to realize that a new level of marketing expertise is needed to sell Macs as engineering workstations. According to Kulbarsh, Apple has recently hired several CAD consultants, as well as full-time marketing staff members with backgrounds in various areas of engineering.

Engineering is a new field for Apple, and for many Macintosh software developers as well. In the near future, we'll see not only a proliferation of CAD programs but also a trend toward specialized applications, such as programs that analyze *kinematics*, the movements of a mechanism's parts. With the advent of graphics accelerator boards, real-time animation of 3-D models will be feasible. More output devices will be supported; at SIGGRAPH, Mac-produced drawings were output on Shinko and CalComp color thermal transfer printers, a JDL 200-dpi plotter/printer, film recorders from Dunn Instruments and Matrix Instruments, and a Versatec electrostatic plotter. As the number of CAD programs grows, more CAD-specific publications like *The CAD/CAM Journal* will appear.

The Mac, it seems, is no longer a computer for nebulous groups such as "knowledge workers" or "the rest of us"—it's for professionals, including engineers. □

See *Where to Buy* for product details.

is far from ideal as a file-transfer method. "IGES tries to be all things to all people," says Doane. "It would be more effective to come up with several specific formats [for transferring graphics files]. At best we can hope for a reasonable number of file formats."

But for now, IGES is one of the only options. *VAXDraw* can transfer *MacDraw* or *MacDraft* files to *AutoCAD*, which fills one part of the file-transfer bill.

A versatile program called *CAD-Mover*, from Kandu Software, translates IGES files from mainframe-based CAD systems to several Macintosh file formats, and vice versa. *CAD-Mover* also translates files to and from various Macintosh CAD programs and *AutoCAD*'s DXF format. (For a more comprehensive look at file-transfer options, see "CAD-Mover Illustrated.")

A few forward-looking application developers are addressing the issue of file transfer. Visual Information's *Dimensions* accepts *AutoCAD* files,

which can be enhanced with *Dimensions*' 3-D modeling capabilities. *Dimensions* also transfers files to MacNeal-Schwendler's *MSC/pal* finite-element-analysis program, providing stress-and-vibration analysis for structures designed with *Dimensions*. According to Ken Blakely, MacNeal-Schwendler's marketing manager for PC products, "Using a graphical preprocessor to build a model is a distinct improvement over the traditional method of input—a text file containing the geometry of a structure."

But Visual Information president Nick Pavlovic is not content to stop at *Dimensions*' current level of connectivity. "We've cut down on R & D in order to work with everybody we possibly can [on file compatibility]," he says. A link to *VersaCAD/Macintosh Edition* is being considered, for example. Combining those two applications would produce a long-awaited development: a sophisticated 2-D/3-D design environment.



MICK WIGGINS

The Disk Shopper's Guide to Storage

Before you start shopping, get the facts on more than 200 hard disks for the Mac

by Prasad Kaipa and Bangs L. Tapscott

The hardest thing about a hard disk purchase isn't the disk; it's the decision: which one shall I get? If you're contemplating buying a hard disk, you'll soon realize that the field offers an embarrassment of riches. In January 1987, *Macworld* compared over a hundred hard disks. Since then, a few have dropped by the wayside, many new entries have emerged, and others have been changed to accommodate the Mac SE and Macintosh II (see "Hard Disks Compared"). Currently there are nearly 250 hard disks to choose from, in various models, sizes, and styles, not counting those containing tape backups.

If you're like many Mac users buying your first hard disk, you'll need a guide to begin sorting out this mind-glazing array. Let's begin by dividing it into some manageable categories: type, size and speed, and features.

Three General Types

Freestanding

Most available hard disks are of the external type, designed to sit either under or beside the Macintosh (some of the industrial-strength models actually sit on the floor nearby). Nearly all freestanding models can be configured to run with any Mac that has a SCSI port: Mac Plus, SE, Mac II, or even a modified 512. If you need to carry your data and applications between a Mac

at home and one at work, one of the lightweight externals will fill the bill nicely. But if you intend to use your hard disk with different types of Macs, be sure to find out what reconfiguration is required or whether the drive will work at all with more than one type of Mac. Besides portability, a main virtue of almost all freestanding hard disks is immediacy. Just plug them in, start up the Mac, and they're ready to run.

Internal

Internal hard disks mount inside the Mac and have two main virtues: they use no desk space, and they make for one less piece of equipment to tote when transporting your Mac. Although a few internal hard disks are still built for the Mac Plus (by Micah, Mass Micro, Rodime, and Levco), most of the current ones are designed for the SE or the II. In normal installation on the SE, an internal hard disk replaces one of the two internal floppy drives. If you hate the thought of losing one of your floppies, some disk manufacturers offer a kit (case and cord) that will house your replaced floppy drive externally. Also, several companies produce an internal SE hard disk that mounts behind the floppy drives, leaving both intact. (Some of these hard disks can sit uncomfortably close to the CRT and intrude into space normally reserved for an internal card. If that concerns

you, check with the manufacturer before buying.)

Unlike freestanding hard disks, the internal models require opening up the Mac for installation. Unless you are a technician or a fearless experimenter, be prepared for a trip to your local Macintosh mechanic to get your new drive up and running.

A unique hard disk for the Mac Plus, combining most of the virtues of internal and external drives, is Jasmine's BackPac. It attaches directly to the back of the Macintosh case, adding about an inch and a half to the depth of the machine; when latched down it forms an integral unit with the Mac. You can install this one yourself (it even comes with a special Torx wrench for removing two of the Mac's screws). There is no BackPac for the Mac SE because of the SE's fan vent and because it's easy to install an internal disk on the SE.

Removable-Media

Removable-media hard disk drives have a modus operandi familiar to every Mac user: when a disk gets full, you pull it out and insert an empty one. Strictly speaking, most removable-media drives aren't hard disks (only one manufacturer, Amcodyne, uses removable hard media) but their large storage capacity—10 or 20 megabytes per disk—and relatively fast access speed put them in the same ballpark as regular Winchester disks. Instead of a metal platter, the removable cartridge uses a

medium that looks very much like the stuff an ordinary floppy is made of. They come in two forms: Bernoulli cartridges and so-called big floppies.

There are numerous advantages to a removable-media hard disk drive. You never have to worry about filling it up, you can maintain tight data security (at the end of the day, pull the cartridge out and take it home with you), and different jobs can be stored on different cartridges. Additionally, they are relatively crashproof. Offsetting all this is the expense of the removable disks themselves; they are not cheap and tend to wear out after a certain number of uses.

Many hard disk users find that a removable-media drive provides a convenient way to back up large files that won't fit on a floppy—at a price that is easier on the pocketbook than a tape backup unit. Several manufacturers are now producing units that combine a hard disk and a removable-media disk in the same case.

Size and Speed

The Large and Small of It

When you're talking size, you're talking two kinds: inches and megabytes. The physical dimensions of an external hard disk can be important if you are concerned



SuperMac's DataFrame XP 60 drive, combining RLL encoding with a 28-ms access time, reflects the trend toward higher-capacity personal drives.



Racet's Administrator, available in 150MB or 300MB capacities, is one of the few drives available with a data cache.

about portability (Will it fit in my Mac carrying case?) or worktable clutter (Can I squeeze it between the modem and the air purifier?). But the primary concern for most hard disk buyers is this: how much data will it hold? Depending on how much you want to spend, hard disks are available in capacities ranging from 20 megabytes to over 2 gigabytes. You have no shortage of choices. Manufacturers are constantly finding ways to pack more data into less space, so drive cabinets don't always grow physically when disks increase their capacity.

Bigger Is Better

Don't be modest in estimating your needs when you set out to purchase a hard disk. Data and programs have a way of growing to fill all available space, and Fzot's law says: By the time you get your new hard disk home, it won't be big enough.

Not too long ago a 20MB hard disk was the largest drive you could get. Nowadays it's the low end of the product line. With programs getting bigger and bigger, you would be well advised to buy the largest hard disk your pocketbook will permit. Portability is not an issue here; there are many 30- and 40MB units no larger and no heavier than their 20MB counterparts. There are differences in speed; large disks tend to perform faster than small ones.

If you can't afford as large a hard disk as you would like now, take comfort in the fact that SCSI drives can be daisy-chained together via their SCSI ports. If you buy a

smaller one now, you can expand your storage capacity later with a second drive (see "Spinning Platters").

Speed

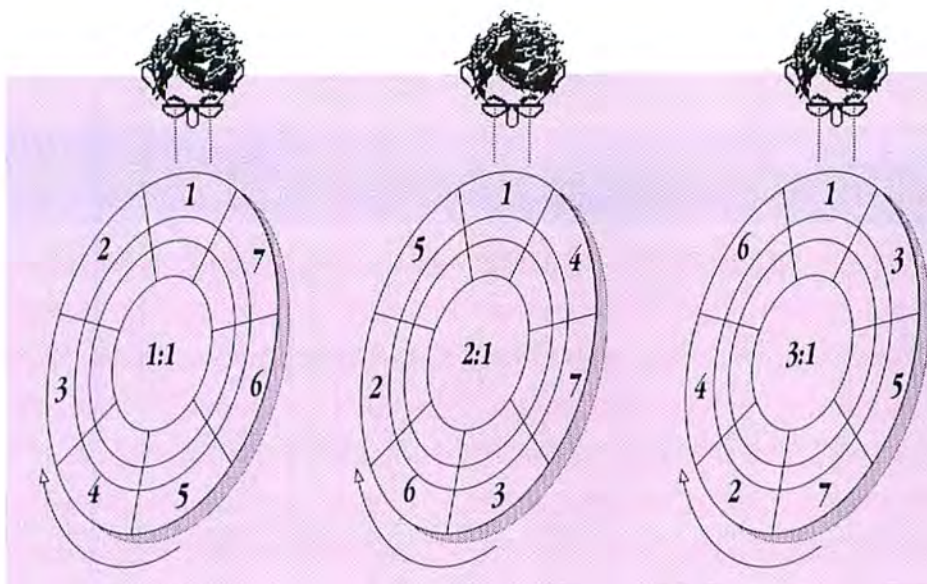
For most of us speed is a major factor when evaluating hard disks. It's also the most difficult criterion to define. The speed of a hard disk measures how quickly it responds to a call for data. Most hard disk specifications include average access time (AAT), given in milliseconds. AAT measures how long it takes, on the average, from the moment the computer asks for the data until the read-write head locates the track on which it is stored. Another speed rating factor is the extended data-transfer rate, which measures how quickly data is transferred over a fairly long period of time (AAT only tells you how long it takes to locate the information). The interleave ratio for a hard disk is yet another speed variable; it indicates how many disk sectors are skipped between consecutive reads or writes. The lower the ratio, the faster data is collected or written (depending on how well the ratio matches the speed of a particular computer).

All of the previous technical indicators are relevant to a disk's speed and performance, but many other factors can also affect the functional speed of a hard disk in operation. The technical indicators can serve as a tentative guide, but there is no simple numerical rating system that can capture all the things that determine the actual operating speed of a hard disk.

When files are scattered in little pieces all over the disk, a condition called fragmentation, the effective speed of the drive is greatly reduced. The more fragmented the disk is, the longer it takes to read the file. Fragmentation is a natural result of using a hard disk a lot, deleting old files and adding new ones. That's why hard disks tend to perform more slowly the more you use them. One solution to the fragmentation problem is to run *Disk-Express*, *MacZap*, or a similar utility program to reorganize your disk periodically.

A more cumbersome solution is to back up the entire hard disk onto floppies or tape, reformat the hard disk, and then recopy the files back onto it. The copying process regroups the files into contiguous sectors.

A second factor that can affect performance speed (this time to your advantage) is data caching, a feature built into some



The Interleave Factor

On a disk rotating in the direction shown (arrow), the order in which disk sectors are read varies with the interleave ratio. With 1:1 interleaving, each sector gets read in sequence. With 2:1 interleaving, every other sector is read. With 3:1 interleaving, every third sector is read. Mac II disks perform fastest with a 1:1 interleave ratio.

hard disks. Instead of reading a single sector and going in search of the next one, the drive reads an entire track and stores the unused data in a memory cache. If the next sector on its agenda lies on that same track, the disk retrieves it from the memory cache instead of looking for it on the disk, saving considerable time.

Features to Look For

Head Parking

A hard disk is a precision instrument. Like any delicate instrument it is subject to damage, and whenever it gets damaged you lose data. Look for features that minimize the likelihood of damage and maximize the ease of backing up data.

The single most common type of hard disk damage is the head crash. This happens when the read-write head comes into contact with the platter. In normal operation, the head never actually touches the spinning disk. If it does touch it, the result is obliterated sectors and lost files. (Never jostle a hard disk while it's in operation.) Similar if less dramatic damage can happen when the disk is standing still.

Most hard drives have a way to position the head over a safe area of the disk when it's not in operation. This is called head parking. Some drives lock the head in the parked position. The safest ones park the heads automatically whenever power is turned off. A few go even further: if there is a power failure, the spinning motor becomes a generator, creating the needed electricity to park the heads.

Some drives park the heads when you select the Shut Down command from the Special menu in the Finder; others provide a special utility program that parks the heads. However, there's no guarantee that you'll remember to run the program. We don't advise buying a hard disk that lacks a head-parking facility—it's an accident waiting to happen.

The removable-media hard disk drives that are based on floppy-disk technology seem relatively immune to head crashes. Bernoulli-type drives are designed to let the disk flex away from the head in case of an imminent crash; in the big floppy-type drives the head actually rides on the surface of the disk. A head-parking facility is unnecessary, since you always remove the cartridge before transporting the drive.

Backing Up

Head crashes aren't the only way to lose data on a hard disk. Computers and disks are subject to occasional software crashes that can wipe out an entire hard disk, or trash important parts of it (the boot blocks or the volume directories, for instance). Once you've experienced a "fatal" disk crash, you will become a true believer in the importance of backing up your hard disk regularly.

An efficient and easy-to-use backup



FWB Software's 155MB and 300MB Hammer drives utilize the 16.5-ms-access-time drives from Control Data Corporation, and are designed for reliability and long life.



NuData's GigaCell, available in capacities up to 1.2 gigabytes, can contain either a 40MB tape drive or the new 10MB floppy disk drive.

Hard Disks Compared

Manufacturer	Product	Type	Capacity (megabytes)	List Price	Cost per Megabyte	Warranty
Amcodeyne	PhD	HDR	80	\$5495	\$68.69	1 yr.
Apple Computer	Hard Disk 20-SC	HD	20	\$1299	\$64.95	3 mo.
Apple Computer	Hard Disk 40-SC	HD	40	\$1999	\$49.98	3 mo.
Apple Computer	Hard Disk 80-SC	HD	80	\$3199	\$39.99	3 mo.
Apple Computer	Internal 20-SC Hard Disk	HDI (SE, II)	20	\$999	\$49.95	3 mo.
Apple Computer	Internal 40-SC Hard Disk	HDI (II)	40	\$1599	\$39.98	3 mo.
Apple Computer	Internal 80-SC Hard Disk	HDI (II)	80	\$2699	\$33.74	3 mo.
AST Research	FAST-20	HD	20	\$1199	\$59.95	6 mo.
AST Research	AST-4000	HD	70	\$3699	\$52.84	6 mo.
AST Research	AST-4000	HD	140	\$5999	\$42.85	6 mo.
Bering Industries	Totem 1020F	HD	20	\$795	\$39.75	90 days
Bering Industries	Totem 1040F	HD	40	\$1795	\$44.88	90 days
Bering Industries	Totem 1080F	HD	80	\$2795	\$34.94	90 days
Bering Industries	Totem 10140F	HD	140	\$3895	\$27.82	90 days
Bering Industries	Totem 1220R	HDR (Dbl./20B)	40	\$2995	\$74.88	90 days
Bering Industries	Totem 1220C	Comb (20F/20B)	40	\$2295	\$57.38	90 days
Bering Industries	Totem 1240C	Comb (40F/20B)	60	\$2995	\$49.92	90 days
Bering Industries	Totem 1280C	Comb (60F/20B)	80	\$3995	\$49.94	90 days
Bering Industries	Totem II	HDR (B)	20	\$1195	\$59.75	90 days
CMS Enhancements	MacStack 20	HD	20	\$795	\$39.75	1 yr.
CMS Enhancements	MacStack 40	HD	40	\$1495	\$37.38	1 yr.
CMS Enhancements	MacStack 43	HD	43	\$1295	\$30.12	1 yr.
CMS Enhancements	MacStack 80	HD	80	\$1795	\$22.44	1 yr.
CMS Enhancements	Compact 20a	HD	20	\$795	\$39.75	1 yr.
CMS Enhancements	Compact 40	HD	40	\$1395	\$34.88	1 yr.
CMS Enhancements	High Capacity Series 140	HD	140	\$3495	\$24.96	1 yr.
CMS Enhancements	High Capacity Series 240	HD	240	\$4695	\$19.56	1 yr.
CMS Enhancements	High Capacity Series 320	HD	320	\$6495	\$20.30	1 yr.
CMS Enhancements	Pro Series 40-SE	HDI (SE)	40	\$1295	\$32.38	1 yr.
CMS Enhancements	Pro Series 20-II	HDI (II)	20	\$695	\$34.75	1 yr.
CMS Enhancements	Pro Series 40-II	HDI (II)	40	\$1295	\$32.38	1 yr.
CMS Enhancements	Pro Series 43-II	HDI (II)	43	\$1195	\$27.79	1 yr.
CMS Enhancements	Pro Series 80-II	HDI (II)	80	\$1695	\$21.19	1 yr.
Cutting Edge	Cutting Edge 30	HD	30	\$679	\$22.63	6 mo.
Ehman Engineering	HD-20	HD	20	\$895	\$44.75	1 yr.
Ehman Engineering	HD-40	HD	40	\$1295	\$32.38	1 yr.
Everex	EMAC-20D	HD	20	\$995	\$49.75	1 yr.
Everex	EMAC-40D	HD	40	\$1295	\$32.38	1 yr.
Everex	EMAC-91D	HD	91	\$1695	\$18.63	1 yr.
Everex	EMAC FS 100	HD	261	\$10,000	\$38.31	1 yr.
Everex	EMAC 20ID	HDI (II)	20	\$895	\$44.75	1 yr.
Everex	EMAC 40ID	HDI (II)	40	\$1195	\$29.88	1 yr.
Everex	EMAC 91ID	HDI (II)	91	\$1595	\$17.53	1 yr.
FWB Software	Hammer 91	HDI (II)	91	\$2495	\$27.42	1 yr.
FWB Software	Hammer 155	HD	155	\$3495	\$22.55	1 yr.
FWB Software	Hammer 300	HD	300	\$4595	\$15.32	1 yr.
FWB Software	Hammer 91 + 10	Comb (91F/10BF)	101	\$3595	\$35.59	1 yr.
FWB Software	Hammer Disk10	HDR (BF)	10	\$1325	\$132.50	1 yr.
General Computer	HyperDrive FX-20	HD	21	\$1199	\$57.10	1 yr.
General Computer	HyperDrive FX-40	HD	40	\$1799	\$44.98	1 yr.
General Computer	HyperDrive FI-40	HDI (SE)	40	\$1599	\$39.98	1 yr.
General Computer	HyperDrive FI-40	HDI (II)	40	\$1399	\$34.98	1 yr.
Hard & Soft	Silver Server 103	HDI (II)	103	\$2995	\$29.08	1 yr.
Hard & Soft	Silver Server 145	HDI (II)	145	\$3495	\$24.10	1 yr.
IBNC	IBNC 20	HD	20	\$560	\$28.00	1 yr.
IBNC	IBNC 20	HD	20	\$560	\$28.00	1 yr.
IBNC	IBNC 40	HD	40	\$850	\$21.25	1 yr.
IBNC	IBNC 80	HD	80	\$1350	\$16.88	1 yr.
IBNC	IBNC 40 Internal	HDI (SE)	40	\$850	\$21.25	1 yr.
Iomega	Bernoulli Box 10	HDR (B) (Plus)	10	\$1299	\$129.90	90 days
Iomega	Bernoulli Box 10 + 10	HDR (B)	20	\$1999	\$99.95	90 days
Iomega	Bernoulli Box 20	HDR (B)	20	\$1799	\$89.95	90 days

Legend:

AP = automatic park
 APL = automatic park and lock
 B = Bernoulli cartridge
 BF = big floppy

Comb. = combination drive
 Dbl. = double
 F = fixed
 HD = external hard disk

HDI = internal hard disk
 HDR = removable media
 Mod. = adapter module
 PD = public domain

Average Access Time (milliseconds)	Head Parking	Backup Software	Spooler Software	Utility Software*	Other Goodies
25	AP on powerdown	yes	no	c,h,i	format as 4 vol. or 1
85	AP on powerdown	yes	no	a,b,i	
30	AP on powerdown	yes	no	a,b,i	
30	AP on powerdown	yes	no	a,b,i	
85	AP on powerdown	yes	no	a,b,i	
30	AP on powerdown	yes	no	a,b,i	
30	AP on powerdown	yes	no	a,b,i	
65	AP on powerdown	yes	yes	i,j	
28	AP on powerdown	yes	yes	i,j	
28	AP on powerdown	yes	yes	i,j	
65	AP on powerdown	costs extra	no	costs extra	
40	AP on powerdown	costs extra	no	costs extra	
30	AP on powerdown	costs extra	no	costs extra	
30	AP on powerdown	costs extra	no	costs extra	
37	n/a	costs extra	no	costs extra	
65F/37B	AP on powerdown	costs extra	no	costs extra	
40F/37B	AP on powerdown	costs extra	no	costs extra	
30F/37B	AP on powerdown	costs extra	no	costs extra	
37	n/a	costs extra	no	costs extra	
65	software	no	no	d (Apple)	
28	software	no	no	d (Apple)	
28	software	no	no	d (Apple)	
28	software	no	no	d (Apple)	
65	software	no	no	d (Apple)	
29	AP on powerdown	no	no	Apple	rugged
18	software	no	no	d (Apple)	
18	software	no	no	d (Apple)	
18	software	no	no	d (Apple)	
29	AP on powerdown	no	no	Apple	
65	software	no	no	d (Apple)	
29	AP on powerdown	no	no	Apple	
28	AP on powerdown	no	no	Apple	
28	AP on powerdown	no	no	Apple	
29	APL on powerdown	yes	no	i	y-cable for daisy-chaining
65	APL	yes	no	e,i	y-cable for daisy-chaining
26	APL	yes	no	e,i	y-cable for daisy-chaining
65	AP on powerdown	yes	yes	c,i	
28	AP on powerdown	yes	yes	c,i,j	
18	AP on powerdown	yes	yes	c,i,j	
23	AP on powerdown	yes	yes	c,i,j	
65	AP on powerdown	yes	yes	c,i,j	
28	AP on powerdown	yes	yes	c,i,j	
18	AP on powerdown	yes	yes	c,i,j	
18	APL on powerdown	yes	no	e	hard disk util. included
16.5	APL on powerdown	yes	yes	e	hard disk util. included
16.5	APL on powerdown	yes	yes	e	hard disk util. included
16.5	APL on powerdown	yes	yes	e	hard disk util. included
65	n/a	yes	yes	e	hard disk util. included
65	software	yes	yes	c,d,f,h,i,j	
29	AP on powerdown	yes	yes	c,d,f,h,i,j	
29	AP on powerdown	yes	yes	c,d,f,h,i,j	
40	software	yes	yes	c,d,f,h,i,j	
28	APL on powerdown	yes	opt.	c,i,j (opt.)	
28	APL on powerdown	yes	opt.	c,i,j (opt.)	
65	software	Apple	no	d, i (Apple)	
65	software	Apple	no	d, i (Apple)	
29	AP on powerdown	Apple	no	i (Apple)	fast cache
26	AP on powerdown	Apple	no	i (Apple)	
29	AP on powerdown	Apple	no	i (Apple)	
35	n/a	yes	no	c,i	
38	n/a	yes	no	c,i	
38	n/a	yes	no	c,i	

*Utility Software:

a = file search
b = file recovery
c = diagnostics
d = park heads
e = partitioning

f = security
g = mount volume
h = format
i = backup
j = spooling

Hard Disks Compared

Manufacturer	Product	Type	Capacity (megabytes)	List Price	Cost per Megabyte	Warranty
Iomega	Bernoulli Box 20 + 20	HDR (B)	40	\$2299	\$57.48	90 days
Jasmine	Direct Drive 20	HD	20	\$649	\$32.45	1 yr.
Jasmine	Direct Drive 80	HD	80	\$1399	\$17.49	1 yr.
Jasmine	Direct Drive 40	HD	40	\$999	\$24.98	1 yr.
Jasmine	Direct Drive 50	HD	50	\$1159	\$23.18	1 yr.
Jasmine	Direct Drive 160	HD	160	\$3499	\$21.87	1 yr.
Jasmine	MegaDrive	HDR (BF)	10	\$999	\$99.90	1 yr.
Jasmine	BackPac	HD	40	\$1299	\$32.48	1 yr.
Jasmine	InnerDrive 90/II	HDI (II)	90	\$1499	\$16.66	1 yr.
LaCie	Cirrus 20	HD	20	\$549	\$27.45	1 yr.
LaCie	Cirrus 30	HD	30	\$699	\$23.30	1 yr.
LaCie	Cirrus 40	HD	40	\$799	\$19.98	1 yr.
LaCie	Cirrus 60	HD	60	\$999	\$19.98	1 yr.
LaCie	Cirrus 90	HDI (II)	90	\$1399	\$15.54	1 yr.
LaCie	Slot Machine 20	HDI (SE)	20	\$449	\$22.45	1 yr.
LaCie	Slot Machine 30	HDI (II)	30	\$599	\$19.97	1 yr.
LaCie	Slot Machine 40	HDI (II)	40	\$699	\$17.48	1 yr.
LaCie	Slot Machine 60	HDI (II)	60	\$899	\$14.98	1 yr.
Levco	OverDrive 20	HDI (Plus)	20	\$1399	\$69.95	3 mo.
Levco	OverDrive 40	HDI (Plus)	40	\$2699	\$67.48	3 mo.
LoDown	LoDown-20	HD	21	\$995	\$47.38	3 mo.
LoDown	LoDown-30	HD	31	\$1295	\$41.77	3 mo.
LoDown	LoDown-40	HD	40	\$1995	\$49.88	3 mo.
LoDown	LoDown-60	HD	60	\$2495	\$41.58	3 mo.
LoDown	LoDown-80	HD	80	\$2495	\$31.19	3 mo.
LoDown	LoDown-155	HD	155	\$3995	\$25.77	3 mo.
LoDown	LoDown-234	HD	234	\$6595	\$28.18	3 mo.
MacProducts USA	Magic 20 Internal	HDI (SE, II)	20	\$449	\$22.45	1 yr.
MacProducts USA	Magic 30 Internal	HDI (SE)	30	\$599	\$19.97	6 mo.
MacProducts USA	Magic 20	HD	20	\$545	\$27.25	6 mo.
MacProducts USA	Magic 30	HD	30	\$699	\$23.30	6 mo.
MacProducts USA	Magic 40	HD	40	\$899	\$22.48	6 mo.
MacProducts USA	Magic 60	HD	60	\$1099	\$18.32	6 mo.
MacProducts USA	Magic 65	HD	65	\$995	\$15.31	6 mo.
MacProducts USA	Magic 91	HD	91	\$1595	\$17.53	6 mo.
MacProducts USA	Magic 155	HD	155	\$1899	\$12.25	6 mo.
MacProducts USA	Magic 300	HD	300	\$2595	\$8.65	6 mo.
MacProducts USA	Magic 750	HD	750	\$50,000	\$66.67	1 yr.
MacProducts USA	Magic 2300	HD	2300	\$70,000	\$30.43	1 yr.
Mass Micro Systems	Mass 20	HD	20	\$589	\$29.45	1 yr.
Mass Micro Systems	Mass 40	HD	40	\$899	\$22.48	1 yr.
Mass Micro Systems	Mass 65	HD	65	\$1199	\$18.45	1 yr.
Mass Micro Systems	Mass 65i2	HDI (SE)	65	\$1599	\$24.60	1 yr.
Mass Micro Systems	Mass 65i2	HDI (SE)	65	\$1599	\$24.60	1 yr.
Micah	AT 20	HDI (512K, 512KE, Plus)	20	\$1295	\$64.75	2 yr.
Micah	AT 30	HDI	30	\$839	\$31.00	2 yr.
Micah	AT 40	HDI	40	\$899	\$53.17	2 yr.
Micah	AT 60	HDI	60	\$1159	\$42.11	2 yr.
Micah	AT 100	HDI (II)	100	\$1549	\$27.92	2 yr.
Micah	AT 150	HDI (II)	150	\$1999	\$22.48	2 yr.
Micah	AT 220	HDI (II)	220	\$3599	\$19.32	2 yr.
Micah	AT 310	HDI (II)	310	\$4999	\$15.49	2 yr.
Micah	AT 45	HDI	45	\$1395	\$13.33	2 yr.
Micah	XT 20	HD	20	\$649	\$16.36	2 yr.
Micah	XT 30	HD	30	\$1595	\$16.13	2 yr.
Micah	XT 40	HD	40	\$999	\$28.30	5 yr.
Micah	XT 45	HD	45	\$1895	\$32.45	2 yr.
Micah	XT 60	HD	60	\$1199	\$24.20	5 yr.
Micah	XT 100	HD	100	\$1699	\$24.98	2 yr.
Micah	XT 150	HD	150	\$2399	\$19.98	2 yr.
Micah	XT 220	HD	220	\$3899	\$16.99	2 yr.
Micah	XT 310	HD	310	\$5499	\$15.99	2 yr.

Legend:

AP = automatic park
 APL = automatic park and lock
 B = Bernoulli cartridge
 BF = big floppy

Comb. = combination drive
 Dbl. = double
 F = fixed
 HD = external hard disk

HDI = internal hard disk
 HDR = removable media
 Mod. = adapter module
 PD = public domain

Average Access Time (milliseconds)	Head Parking	Backup Software	Spooler Software	Utility Software*	Other Goodies
38	n/a	yes	no	c,i	
65	software	yes	yes	g,d,i,j	9MB PD software
26	AP on powerdown	yes	yes	g,d,i,j	9MB PD software
40	AP on powerdown	yes	yes	g,d,i,j	9MB PD software
26	AP on powerdown	yes	yes	g,d,i,j	9MB PD software
26	AP on powerdown	yes	yes	g,d,i,j	9MB PD software
65-70	AP on powerdown	yes	yes	g,d,i,j	9MB PD software
29	AP on powerdown	yes	yes	g,d,i,j	9MB PD software
16	APL on powerdown	yes	yes	g,d,i,j	9MB PD software
68	AP on shutdown	yes	no	e,f,i	dynamic resizing
65	AP on shutdown	yes	no	e,f,i	
65	AP on shutdown	yes	no	e,f,i	
30	AP on shutdown	yes	no	e,f,i	
18	AP on shutdown	yes	no	e,f,i	
68	AP on shutdown	yes	no	e,f,i	keep both internal floppies
65	AP on shutdown	yes	no	e,f,i	
65	AP on shutdown	yes	no	e,f,i	
30	AP on shutdown	yes	no	e,f,i	
85	AP on powerdown	no	no	a,e,g,h	
29	AP on powerdown	no	no	a,e,g,h	
65	AP on shutdown	opt	no	c,g,h,i (opt.)	PD software
65	AP on shutdown	opt	no	c,g,h,i (opt.)	PD software
29	AP on shutdown	opt	no	c,g,h,i (opt.)	PD software
29	AP on shutdown	opt	no	c,g,h,i (opt.)	PD software
29	AP on shutdown	opt	no	c,g,h,i (opt.)	PD software
16.8	AP on shutdown	opt	no	c,g,h,i (opt.)	PD software
18	AP on shutdown	opt	no	c,g,h,i (opt.)	PD software
65	software	yes	no	i	
30	software	yes	no	i	includes MacZap pkg.
65	software	yes	no	i	
65	software	yes	no	i	includes MacZap pkg.
28	software	yes	no	i	includes MacZap pkg.
28	software	yes	no	i	includes MacZap pkg.
30	AP on powerdown	yes	no	i	voice-coil drive, includes MacZap pkg.
20	software	yes	no	i	includes MacZap pkg.
18.5	software	yes	no	i	includes MacZap pkg.
18.5	software	yes	no	i	includes MacZap pkg.
16.5	AP on powerdown	yes	no	i	includes MacZap pkg.
16.5	AP on powerdown	yes	no	i	includes MacZap pkg.
45	software	no	no	d	8MB of PD software
45	software	no	no	d	8MB of PD software
45	software	no	no	d	8MB of PD software
26	software	no	no	d	keep both internal floppies
26	software	no	no	d	
45	AP on powerdown	yes	no	i	
40	AP on powerdown	yes	no	i	keep both internal floppies
40	AP on powerdown	yes	no	i	
40	AP on powerdown	yes	no	i	
35	AP on powerdown	yes	no	e,f,i	
28	AP on powerdown	yes	no	e,f,i	
28	AP on powerdown	yes	no	e,f,i	
26	AP on powerdown	yes	no	e,f,i	
26	AP on powerdown	yes	no	e,f,i	
16.5	AP on powerdown	yes	no	e,f,i	
16.5	AP on powerdown	yes	no	e,f,i	
65	APL on powerdown Apple	no	Apple		
35	AP on powerdown	yes	no	e,f,i	
65	APL on powerdown Apple	no	Apple		
28	AP on powerdown	yes	no	e,f,i	
28	AP on powerdown	yes	no	e,f,i	
26	AP on powerdown	yes	no	e,f,i	
26	AP on powerdown	yes	no	e,f,i	

*Utility Software:

a = file search
b = file recovery
c = diagnostics
d = park heads
e = partitioning

f = security
g = mount volume
h = format
i = backup
j = spooling

Hard Disks Compared

Manufacturer	Product	Type	Capacity (megabytes)	List Price	Cost per Megabyte	Warranty
MicroTech International	microMAC 30	HDI (SE)	30	\$849	\$17.72	2 yr.
MicroTech International	microMAC 45	HDI (SE)	45	\$1089	\$17.74	2 yr.
MicroTech International	Nova 20	HD	22.9	\$789	\$34.45	5 yr.
MicroTech International	Nova 30	HD	30	\$929	\$30.97	5 yr.
MicroTech International	Nova 50	HD	50	\$1349	\$26.98	5 yr.
Mirror Technologies	MagNet 30X	HD	31	\$1295	\$41.77	1 yr.
Mirror Technologies	MagNet 40X	HD	40	\$1795	\$44.88	1 yr.
Mirror Technologies	MagNet 85X	HD	85	\$4595	\$54.06	1 yr.
Mirror Technologies	300 SE	HDI (SE)	30	\$1095	\$36.50	1 yr.
Mirror Technologies	450 SE	HDI (SE)	45	\$1295	\$28.78	1 yr.
Mirror Technologies	50 II	HDI (II)	50	\$1599	\$31.98	1 yr.
Mirror Technologies	80 II	HDI (II)	80	\$2699	\$33.74	1 yr.
Northern Telecom	Memory Bank 261	HD	261	\$11500	\$44.06	2 yr.
Northern Telecom	Memory Bank 485	HD	485	\$15900	\$32.78	2 yr.
NuData	Data Cell 20	HD	20	\$1095	\$54.75	1 yr.
NuData	Data Cell 40	HD	40	\$1695	\$42.38	1 yr.
NuData	Data Cell 90	HD	90	\$2350	\$26.11	1 yr.
NuData	Data Cell 150	HD	150	\$3395	\$22.63	1 yr.
NuData	Data Cell 220	HD	220	\$5295	\$24.07	1 yr.
NuData	Data Cell 10R	HDR (BF)	10	\$1385	\$138.50	1 yr.
NuData	Data Cell 10R X 10R	HDR (Dbl/10BF)	20	\$2685	\$134.25	1 yr.
NuData	Data Cell 40 X 10R	Comb. (40F/10BF)	50	\$2800	\$56.00	1 yr.
NuData	Data Cell 90 X 10R	Comb. (90F/10BF)	100	\$3415	\$34.15	1 yr.
NuData	Giga Cell 290	HD	290	\$8550	\$29.48	1 yr.
NuData	Giga Cell 440	HD	440	\$13,050	\$29.66	1 yr.
NuData	Giga Cell 580	HD	580	\$15,600	\$26.90	1 yr.
Palo Alto MicroSystems	WhisperDrive 32	HD	32	\$750	\$23.44	90 days
Palo Alto MicroSystems	WhisperDrive 1-32 SE	HDI (SE)	32	\$750	\$23.44	90 days
Peak Systems	Plus-20	HD	21	\$895	\$42.62	1 yr.
Peak Systems	Plus-30	HD	31	\$1095	\$35.32	1 yr.
Peak Systems	Plus-50	HD	45	\$1695	\$37.67	1 yr.
Peak Systems	Plus-80	HD	65	\$2195	\$33.77	1 yr.
Peripheral Land	PL 30 Turbo	HD	32	\$1195	\$37.34	1 yr.
Peripheral Land	PL 50 Turbo	HD	50	\$1495	\$29.90	1 yr.
Peripheral Land	PL 100 Turbo	HD	100	\$2495	\$24.95	1 yr.
Peripheral Land	PL 172 Turbo	HD	172	\$4995	\$29.04	1 yr.
Peripheral Land	PL30i	HDI (SE)	30	\$995	\$33.17	1 yr.
Peripheral Land	PL50i	HDI (SE, II)	50	\$1295	\$25.90	1 yr.
Peripheral Land	PL65i	HDI (SE, II)	65	\$1450	\$22.31	1 yr.
Peripheral Land	PL 30	HD	30	\$995	\$33.17	1 yr.
Peripheral Land	Infinity II	HDR (BF)	10	\$1095	\$109.50	1 yr.
Peripheral Land	Infinity	HDR (BF)	10	\$1295	\$129.50	1 yr.
PCPC	MacBottom HD21	HD	21	\$1195	\$56.90	2 yr.
PCPC	MacBottom HD32	HD	32	\$1395	\$43.59	2 yr.
PCPC	MacBottom HD45	HD	45	\$1795	\$39.89	2 yr.
PCPC	MacBottom 20	HD	20	\$1195	\$59.75	2 yr.
PCPC	PCPC I HD144	HDI (II)	144	\$3295	\$22.88	1 yr.
PCPC	PCPC HD20 WSI	Mod	n/a	\$299	n/a	2 yr.
Priam Systems Division	MacDisk 40	HD	38.5	\$1195	\$31.04	1 yr.
Priam Systems Division	MacDisk 65	HD	65	\$1595	\$24.54	1 yr.
Priam Systems Division	MacDisk 100	HD	100	\$1995	\$19.95	1 yr.
Priam Systems Division	MacDisk 230	HD	230	\$3995	\$17.37	1 yr.
Primary Data	Pro 20	HD	20	\$695	\$34.75	1 yr.
Primary Data	Pro 40	HD	40	\$895	\$22.38	1 yr.
Primary Data	Pro 50	HD	50	\$1195	\$23.90	1 yr.
Primary Data	Pro 80	HD	80	\$1395	\$17.44	1 yr.
Primary Data	Pro 160	HD	160	\$2495	\$15.59	1 yr.
Primary Data	Pro 80DC	HD	80	\$1495	\$18.69	1 yr.
ProApp	ProApp 20S	HD	21	\$995	\$47.38	1 yr.
ProApp	ProApp 40S	HD	40	\$1395	\$34.88	1 yr.
ProApp	ProApp 40SEI	HDI (SE)	40	\$1295	\$32.38	1 yr.
ProApp	ProApp 90SI	HDI (II)	89	\$2799	\$31.45	1 yr.

Legend:

AP = automatic park
APL = automatic park and lock
B = Bernoulli cartridge
BF = big floppy

Comb. = combination drive
Dbl = double
F = fixed
HD = external hard disk

HDI = internal hard disk
HDR = removable media
Mod = adapter module
PD = public domain

Average Access Time (milliseconds)	Head Parking	Backup Software	Spooler Software	Utility Software*	Other Goodies
16.5	AP on powerdown	yes	no	e,f,i	
16.5	AP on powerdown	yes	no	e,f,i	
85	AP on shutdown	Apple	no	Apple	
85	AP on shutdown	Apple	no	Apple	
85	AP on shutdown	Apple	no	Apple	
65	AP on powerdown	no	no		
28	AP on powerdown	no	no		
33	AP on powerdown	no	no		
65	AP on powerdown	no	no		
28	AP on powerdown	no	no		
28	AP on powerdown	no	no		
28	AP on powerdown	no	no		
23	APL on powerdown/power loss	yes	no	i	sturdy
18	APL on powerdown/power loss	yes	no	i	sturdy
65	software	yes	yes	d,i,j	LEDs
35	software	yes	yes	d,i,j	LEDs
16.5	APL on powerdown	yes	yes	i,j	LEDs
16.5	APL on powerdown	yes	yes	i,j	LEDs
16.5	APL on powerdown	yes	yes	i,j	LEDs
65	n/a	yes	yes	i,j	LEDs
65	n/a	yes	yes	i,j	LEDs
35(F)/65(BF)	software	yes	yes	d,i,j	LEDs
16.5(F)/65(BF)	APL on powerdown	yes	yes	i,j	LEDs
16.5	APL on powerdown	yes	yes	i,j	includes 12MB cartridge
16.5	APL on powerdown	yes	yes	i,j	includes 12MB cartridge
16.5	APL on powerdown	yes	yes	i,j	includes 12MB cartridge
32	AP on shutdown	yes	no	i (Apple)	5MB PD software
32	AP on shutdown	yes	no	i (Apple)	5MB PD software
65	software	yes	yes	b,c,d,i,j	
65	software	yes	yes	b,c,d,i,j	
26	AP on powerdown	yes	yes	b,c,d,i,j	
26	AP on powerdown	yes	yes	b,c,d,i,j	
35	APL on powerdown	yes	no	d,e,i	
35	APL on powerdown	yes	no	d,e,i	
23	APL on powerdown	yes	no	d,e,i	
18	APL on powerdown	yes	no	d,e,i	
35	AP on powerdown	yes	no	d,e,i	
35	AP on powerdown	yes	no	d,e,i	
35	AP on powerdown	yes	no	d,e,i	
65	AP on powerdown	yes	no	d,e,i	
65	n/a	yes	no	d,e,i	
75	n/a	yes	no	d,e,i	also reads IBM 5 1/4 in. disks
65	AP on shutdown	yes	ImageWriter/LaserWriter	a,c,copy,i,j	internal HC 1200bd modem & spkr. \$200
65	AP on shutdown	yes	ImageWriter/LaserWriter	a,c,copy,i,j	internal HC 1200bd modem & spkr. \$200
65	AP on shutdown	yes	ImageWriter/LaserWriter	a,c,copy,i,j	internal HC 1200bd modem & spkr. \$200
65	AP on shutdown	yes	ImageWriter	a,c,copy,i,j	
28	AP on shutdown	yes	ImageWriter/LaserWriter	a,c,copy,i,j	internal HC 1200bd modem & spkr. \$200
n/a	n/a	yes	ImageWriter/LaserWriter	a,c,copy,i,j	
29	APL on powerdown	no	no		RLL encoding
28	APL on powerdown	no	no		RLL encoding
28	APL on powerdown	no	no		RLL encoding
20	APL on powerdown	no	no		RLL encoding
60	none	yes	no	i	9MB of PD software
60	none	yes	no	i	9MB of PD software
26	APL on powerdown	yes	no	i	9MB of PD software
26	APL on powerdown	yes	no	i	9MB of PD software
16	APL on powerdown	yes	no	i	9MB of PD software
26	APL on powerdown	yes	no	i	9MB of PD software
65	AP on powerdown	yes	no	c,d,h,i	60K disk cache; 9MB of PD software
28	AP on powerdown	yes	no	c,d,h,i	
25	APL on powerdown	yes	no	c,d,h,i	keep both internal floppies
18	AP on powerdown	yes	no	c,d,h,i	

*Utility Software:

a = file search
b = file recovery
c = diagnostics
d = park heads
e = partitioning

f = security
g = mount volume
h = format
i = backup
j = spooling

Hard Disks Compared

Manufacturer	Product	Type	Capacity (megabytes)	List Price	Cost per Megabyte	Warranty
ProApp	ProApp 140SI	HDI (II)	143	\$4299	\$30.06	1 yr.
ProApp	ProApp 320SI	HDI (II)	320	\$6999	\$21.87	1 yr.
Racet Computers	Administrator I	HD	150	\$5995	\$39.97	6 mo.
Racet Computers	Administrator II	HD	300	\$7995	\$36.65	6 mo.
Relax Technology	MacMate 20	HD	21	\$995	\$47.38	4 mo.
Relax Technology	MacMate 40	HD	40	\$1495	\$37.38	4 mo.
Relax Technology	MacMate 80	HD	80	\$1895	\$23.69	4 mo.
Relax Technology	MiniMate 20	HD	20	\$995	\$49.75	4 mo.
Relax Technology	MiniMate 30	HD	30	\$1195	\$39.83	4 mo.
Relax Technology	Relax SI 20	HDI (SE)	20	\$895	\$44.75	4 mo.
Relax Technology	Relax SI 30	HDI (SE)	30	\$1095	\$36.50	4 mo.
Relax Technology	Relax SI 40	HDI (SE)	40	\$1395	\$34.88	4 mo.
Relax Technology	Relax SI 80	HDI (SE, II)	80	\$1795	\$22.44	4 mo.
Relax Technology	Relax SI 91	HDI (SE, II)	91	\$1895	\$20.82	4 mo.
Relax Technology	Relax SI 150	HDI (II)	150	\$3995	\$26.63	4 mo.
Relax Technology	HardPlus 20	HD	21	\$1195	\$56.90	4 mo.
Relax Technology	HardPlus 30	HD	30	\$1395	\$46.50	4 mo.
Relax Technology	HardPlus 40	HD	40	\$1595	\$39.88	4 mo.
Relax Technology	HardPlus 80	HD	80	\$1995	\$24.94	4 mo.
Relax Technology	HardPlus 91	HD	91	\$2095	\$23.02	4 mo.
Relax Technology	HardPlus 150	HD	150	\$4395	\$29.30	4 mo.
Rely	Rely Drive 65	HD	64.1	\$1995	\$31.12	1 yr.
Rely	Rely Drive 110	HD	110	\$2595	\$23.59	1 yr.
Rely	Rely Drive 240	HD	240	\$4495	\$18.73	1 yr.
Rodime	Rodime 20 Plus	HD	20	\$1195	\$59.75	1 yr.
Rodime	Rodime 45 Plus	HD	45	\$1595	\$35.44	1 yr.
Rodime	Rodime 20i Plus	HDI (Plus)	20	\$1195	\$59.75	1 yr.
Rodime	Rodime 45i Plus	HDI (Plus)	45	\$1595	\$35.44	1 yr.
Rodime	Rodime 450RX	HDI (SE, II)	45	\$1595	\$35.44	1 yr.
Rodime	Rodime 1000RX	HDI (II)	100	\$2995	\$29.95	1 yr.
Rodime	Rodime 1400RX	HDI (II)	140	\$3495	\$24.96	1 yr.
Spectra Micro Development	Spectra Drive 20	HD	21	\$662.50	\$31.55	6 mo.
Spectra Micro Development	Spectra Drive 40	HD	40	\$1295	\$32.38	6 mo.
Spectra Micro Development	Spectra Drive 80	HD	80	\$1595	\$19.94	6 mo.
Spectra Micro Development	Spectra Drive Internal 20	HDI	20	\$895	\$44.75	6 mo.
Spectra Micro Development	Spectra Drive Internal 40	HDI	40	\$1295	\$32.38	6 mo.
Spectra Micro Development	Spectra Drive Internal 80	HDI	80	\$1595	\$19.94	6 mo.
Sunol Systems	SunStreak SCSI-30	HD	30	\$895	\$29.83	6 mo.
Sunol Systems	SunStreak SCSI-45	HD	45	\$1495	\$33.22	6 mo.
Sunol Systems	SunStreak SCSI-70	HD	70	\$1995	\$28.50	6 mo.
Sunol Systems	SunStreak SCSI-110	HD	110	\$2295	\$20.86	6 mo.
Sunol Systems	SunStreak SCSI-180	HD	180	\$5795	\$32.19	6 mo.
Sunol Systems	SunStreak SCSI-245	HD	245	\$6995	\$28.55	6 mo.
SuperMac Technology	DataFrame 30	HD	30	\$995	\$33.17	1 yr.
SuperMac Technology	DataFrame XP30	HD	30	\$1195	\$39.83	1 yr.
SuperMac Technology	DataFrame XP60	HD	60	\$1695	\$28.25	1 yr.
SuperMac Technology	DataFrame XP105	HD _r	105	\$2695	\$25.67	1 yr.
SuperMac Technology	DataFrame XP150	HD	150	\$3295	\$21.97	1 yr.
SuperMac Technology	DataFrame XP60 + B	Comb. (60F/20B)	80	\$3495	\$43.69	1 yr.
SuperMac Technology	DataFrame XP 150	HDI (II)	150	\$2995	\$19.97	1 yr.
Supra Corporation	SupraDrive 20	HD	21	\$699	\$33.29	90 days
Supra Corporation	SupraDrive 30	HD	31	\$995	\$32.10	90 days
Supra Corporation	SupraDrive 250	HD	60	\$1995	\$33.25	90 days
Supra Corporation	SupraDrive 60	HD	250	\$3995	\$15.98	90 days
Warp 9	Photon 20	HD	21	\$569	\$27.10	90 days
Warp 9	Photon 30	HD	31	\$789	\$25.45	90 days
Warp 9	Photon 40	HD	40	\$949	\$23.73	90 days
Warp 9	Photon 80	HD	80	\$1379	\$17.24	90 days
Warp 9	P20i	HDI (SE)	20	\$499	\$24.95	90 days
Warp 9	P30i	HDI (SE)	30	\$649	\$21.63	90 days
Warp 9	P45i	HDI (SE)	45	\$899	\$19.98	90 days

Legend:

AP = automatic park
 APL = automatic park and lock
 B = Bernoulli cartridge
 BF = big floppy

Comb. = combination drive
 Dbl. = double
 F = fixed
 HD = external hard disk

HDI = internal hard disk
 HDR = removable media
 Mod. = adapter module
 PD = public domain

Average Access Time (milliseconds)	Head Parking	Backup Software	Spooler Software	Utility Software*	Other Goodies
23	AP on powerdown	yes	no	c,d,h,i	
20	AP on powerdown	yes	no	c,d,h,i	
23	AP on powerdown	yes	no	i,e	built-in RAM cache, tape available
23	AP on powerdown	yes	no	i,e	built-in RAM cache, tape available
65	software	yes	no	d,g,i	extend warranty to 1 yr. for \$50
45	software	yes	no	d,g,i	extend warranty to 1 yr. for \$50
28	software	yes	no	d,g,i	extend warranty to 1 yr. for \$50
65	software	yes	no	d,g,i	extend warranty to 1 yr. for \$50
45	software	yes	no	d,g,i	extend warranty to 1 yr. for \$50
65	software	yes	no	d,g,i	extend warranty to 1 yr. for \$100
45	software	yes	no	d,g,i	extend warranty to 1 yr. for \$100
45	software	yes	no	d,g,i	extend warranty to 1 yr. for \$100
28	AP on powerdown	yes	no	g,i	extend warranty to 1 yr. for \$100
18	AP on powerdown	yes	no	g,i	extend warranty to 1 yr. for \$100
23	AP on powerdown	yes	no	g,i	
65	AP on powerdown	yes	no	g,i	
65	AP on powerdown	yes	no	g,i	
40	AP on powerdown	yes	no	g,i	
28	AP on powerdown	yes	no	g,i	
18	AP on powerdown	yes	no	g,i	
23	AP on powerdown	yes	no	g,i	
26	AP on powerdown	no	no	none	RLL encoding
26	AP on powerdown	no	no	none	RLL encoding
16	AP on powerdown	no	no	none	RLL encoding
85	software	yes	no	c,d,i	
28	AP on powerdown	yes	no	c,i	
85	AP on powerdown	yes	no	c,i	
28	AP on powerdown	yes	no	c,i	
28	AP on powerdown	yes	no	c,i	
28	AP on powerdown	yes	no	c,i	
28	AP on powerdown	yes	no	c,i	
65	software	no	no	d	10MB of PD software
28	AP on powerdown	no	no	none	10MB of PD software
28	AP on powerdown	no	no	none	10MB of PD software
65	software	no	no	none	10MB of PD software
28	AP on powerdown	no	no	none	10MB of PD software
28	AP on powerdown	no	no	none	10MB of PD software
65	AP on powerdown	no	no	none	
55	AP on powerdown	no	no	none	
55	AP on powerdown	no	no	none	
29	AP on powerdown	no	no	none	
27	AP on powerdown	no	no	none	
27	AP on powerdown	no	no	none	
65	AP on Finder shutdown	yes	yes	i,j	RLL encoding
63	AP on Finder shutdown	yes	yes	i,j	RLL encoding
28	AP on Finder shutdown	yes	yes	i,j	RLL encoding
16.5	AP on Finder shutdown	yes	yes	i,j	RLL encoding
16.5	AP on Finder shutdown	yes	yes	i,j	RLL encoding
28	AP on Finder shutdown	yes	yes	i,j	RLL encoding
16.5	AP on Finder shutdown	yes	yes	i,j	RLL encoding
25	software	no	no	c,i	
65	software	no	no	c,i	
28	software	no	no	c,i	
18	software	no	no	c,i	
65	AP on powerdown	no	no	h	
58	AP on powerdown	no	no	h	
46	AP on powerdown	no	no	h	
33	AP on powerdown	no	no	h	
65	AP on powerdown	no	no	h	
65	AP on powerdown	no	no	h	
28	AP on powerdown	no	no	h	

*Utility Software:

a = file search
b = file recovery
c = diagnostics
d = park heads
e = partitioning

f = security
g = mount volume
h = format
i = backup
j = spooling

utility is the single most important piece of software you can have for your hard disk, and is one of the things you should look for in considering different hard disk packages. The absence of good backup software is no reason to reject a disk, as you can buy backup programs from third-party vendors at respectable prices. But the presence of a good backup utility is a definite plus.

Noise Level

It may sound trivial, but sitting for hours each day next to a whining or whooshing hard disk can drive you bonkers. The drive mechanism itself makes little sound; the noise almost invariably comes from a cooling fan. Some hard disks are cooled by convection or a heat sink

rather than a fan. If the one you are considering is fan-cooled, ask your dealer to let you sit with it for a while when it's running, to get a fair sample of its noise level. Better yet, see if you can take it home overnight; showroom noise can mask the actual loudness level of the drive. If you buy the drive by mail, find out if you can return it for a full refund if you can't stand the way it sounds.

Additionally, pay attention to how long the disk's connector cable is and ask whether extension cables are available. Situating the disk a few feet from your work station can sometimes eliminate the aggravation factor.

SCSI Addressing and Termination

If you intend to use two or more hard

disks with the same computer, pay attention to how easy it is to change the SCSI address and the termination resistors. The SCSI protocol allows up to seven devices (including the computer) to be daisy-chained together. Each hard disk must have a different priority number, or SCSI address, and the chain must begin and end with a terminator. Hard disks always come with some preset SCSI address, and usually (though not always) with an attached terminator. If you chain together several disks, you must change their addresses to avoid conflict, and you must remove the terminators from the middle of the chain. The easiest disks to chain have external switches for changing the address and accept external terminators that plug directly into the SCSI connectors.

Spinning Platters

A hard disk consists primarily of a spinning metal platter (or several of them stacked together) on which the data is stored, and a moving read-write head rather like the tonearm of a record player. Disks containing multiple platters utilize one head per disk.

The hard disk platter is laid out like an English dart board. The concentric circles, which form a bullseye pattern, are called tracks. Each track is divided radially into a number of sectors, like slices of a pie. One sector holds 512 bytes of data (that's 1/2 kilobyte).

When the computer requests data, the read-write head moves to the proper track on the disk, waits for the disk to come around to the sector where that data is located, and reads it.

If a file is of any significant size, it's going to be stored in several different sectors on the disk, and those sectors need not be (and usually aren't) contiguous. The drive writes to available space wherever it can find it, and if the adjacent sector is already full, it goes and

finds one someplace else to hold the next 512 bytes of data.

When a drive in combination with a specific Macintosh computer is writing to, or reading from, consecutive sectors on the same pass of the disk, it is said to be using 1:1 interleaving. When it can only read-write to every other sector, the interleaving is 2:1; every third sector makes it 3:1, and so on. Some say that the lower the interleave ratio, the faster the data gets collected or written, but this only gets at half the truth. In fact, the optimum interleave ratio depends on which computer is involved, and a ratio either too high or too low can result in loss of speed. The Mac II, with its rewritten SCSI driver and faster processor, can handle 1:1 interleaving effortlessly. The SE, which is slightly slower, optimizes at 2:1 interleaving. The Mac Plus can manage every third sector, for a 3:1 ratio.

Some manufacturers, such as SuperMac Technologies, achieve 1:1 interleaving with the SE and Plus by modifying the SCSI drivers, but that is not common. Although some hard

disks have a built-in minimum interleave, in most cases the ratio may be set to fit the computer the drive is serving. One company (FWB) claims to have hard disk software intelligent enough to determine which computer it is connected to and then automatically optimize performance for that computer.

Why do mismatched interleaving factors slow down hard disk operation? Well, imagine a disk formatted 1:1 for use on the Mac II. It has data written to consecutive sectors: 1, 2, 3, 4, and so on. If the disk is then connected to a Mac Plus, the computer will read sector 1 and catch its breath, and then sector 2 will have passed by; so the Plus will have to wait a full revolution to read sector 2, then another revolution to read sector 3, and so on. On the other hand, imagine the disk formatted 3:1 for use on a Mac Plus: its data is written to 1, 4, 7, 10...2, 5, 8, and so on. If the hard disk is then moved to a Mac II, the computer will only be able to retrieve data from it at one-third its normal speed.

Portability

If you frequently need to transport your drive from place to place, the dimensions and weight of the unit will be important considerations. Will it fit inside your Mac carrying case? Into your briefcase? Does it weigh 5 pounds or 10 pounds? Additionally, you will want to inquire into its sturdiness. Is it equipped with internal shock mounts? What is its shock resistance rating (measured in g forces)? Can you drop it onto pavement without hurting it? If you intend to plant the disk on your desk and leave it there, these considerations become less important.

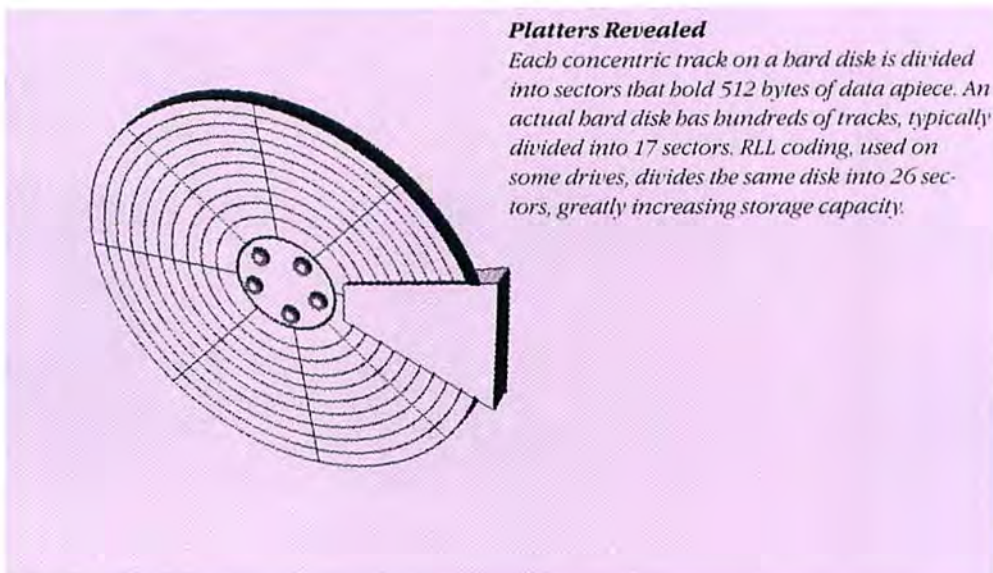
Reliability

Reliability is the most important consideration of all, and one of the hardest to measure. Great price, high capacity, and a truckload of features mean nothing if the disk isn't reliable.

Unfortunately, there is little information that will tell you whether a given hard disk is failure-prone under prolonged usage. You have to find out from someone who has used it a lot—by reading detailed hands-on magazine reviews; by raising pointed questions in a forum such as those on CompuServe, Delphi, or GEnie; or by asking around at your local Mac user group. (You can get the address of your nearest Mac user group by phoning Apple at 800/538-9696, asking for extension 500, and giving them your zip code.)



Jasmine's BackPac 40 offers portability without the inconveniences of an internal drive, by mounting directly on the rear of a Mac Plus.



Platters Revealed

Each concentric track on a hard disk is divided into sectors that hold 512 bytes of data apiece. An actual hard disk has hundreds of tracks, typically divided into 17 sectors. RLL coding, used on some drives, divides the same disk into 26 sectors, greatly increasing storage capacity.

Although hard disk reliability is difficult to assess, there are a couple of objective things you can look for in attempting to predict it. One is the length of the manufacturer's warranty. If an established manufacturer is willing to warrant the product for an extended period, that's about as close as you can come to a guarantee of reliability. The second is a factor some manufacturers list in their specs, MTBF (mean time between failures). The most common MTBF is around 20,000 hours, but a few drives carry a rating twice that high.

Such ratings should not be taken as definitive: 20,000 hours is about 2¼ years of 24-hours-a-day running, and most drives on the market haven't even been in existence that long. The MTBF is arrived at by stress testing and then extrapolating the results, not by actually running the disk normally until it fails. Nevertheless, an MTBF rating considerably higher than the norm is an indication that the disk is probably more failure-resistant than the average.

Dollars per Megabyte

Even though price seems to be the topmost consideration in every buyer's mind, it shouldn't be. Everybody reads the right-hand side of a restaurant menu first, but most of us resist the urge to order Armadillo du Jour merely because it's cheap. You first find out if you're going to be able to digest it. The same principle applies when you're buying a hard disk. You want to be sure of getting one that will genuinely meet your needs; if it doesn't, a low price can turn out to be false economy. Cost may always be important, but cost should always be weighed against performance

needs. At the same time, don't fall for the myth that high quality always equals high price. Many lower-priced units have outstanding track records and thousands of satisfied users.

When comparison shopping, don't simply compare price tags: compare the cost per megabyte of storage. You may find that by upping your dollar outlay a little, you can up your storage capacity a lot. Megabyte costs tend to cluster in the \$25 to \$35 range, with wide deviations in both directions. The best bargain we've seen, by a large margin, is \$8.65 per megabyte for the Magic 300 hard disk from MacProducts. But to take advantage of it, you'll have to spend a couple thousand dollars more than you'd pay for a low-priced 20MB unit.

If a limited budget is the determining factor in what you are going to buy, be encouraged by the fact that there are nearly 20 hard disks available with list prices under \$700, and that discounts from list are very common among dealers and mail-order houses. □



The Game Hall of Fame Annex

*Where our intrepid reviewer
chooses the best Macintosh games
for the second year running*

by Steven Levy

When the Macintosh Game Hall of Fame was completed last year, no one really suspected that it would become a major tourist attraction, luring hundreds of thousands of vacationers off the interstates to crowd around banks of 9-inch screens and try their hands at *Airborne* and *Flight Simulator*. Indeed, that didn't happen. But some people did notice, particularly people associated with games that did not meet the rigorous entrance standards associated with the Hall. Some of those frustrated suitors even tried to hint that the Macintosh Game Hall of Fame was a mild fraud.

We are shocked. The Hall is by now a venerable institution. It is a feature, not a bug, that its elective rules are Draconian. You don't want just anybody in a Hall of Fame. And though the Macintosh still lags behind many of its computer counterparts in number of games available, there are hundreds of contenders for the Hall, and only a very few spots open. In fact, we filled those spots last December, in our first induction. Then more games came out, some of them very good ones, and our attention was diverted to a few wonderful games that we missed the first time around. Therefore we contracted, at some expense to ourselves, to build an annex to the Hall. So don't say we haven't kept up.

Now for those election rules. We have always liked the rigid three-fourths requirement of the Baseball Hall of Fame—a player needs to be mentioned on fully 75 percent of the ballots before his plaque can

stand in the Hallowed Halls. But since there is only one elector in the Macintosh Game Hall of Fame—his byline appears above—the three-fourths standard is, well, moot. You get all or nothing.

Some critics have been so harsh as to suggest that one is not a sufficient number of electors for such a weighty institution. Obviously they have not read the Hall's motto—It's Only a Game. Some games you like a lot, some you like not as much. And some games suck fish. Here in the Hall, we believe in preserving our subjectivity.

Seriously—and we are serious about games, we promise—our Macintosh has been working overtime running the best entertainment software available. The criteria for selection are the same as last year: games that best take advantage of the Mac's strengths, games that assume the user's intelligence and inspire his or her creativity, and games that open up a world unto themselves. Neat-ness counts. Welcome to the Annex.



Arcade Game: *Dark Castle*

Most arcade games use the mouse like some brain-damaged joystick. With *Dark Castle*, you use the mouse to throw stones at vultures, bats, rats, and mutants—and the action seems natural (see Figure 1). Why didn't anyone else think of that? Meanwhile, your non-mouse hand moves your figure through a series of challenging screens, any one of which would make an impressive game in itself. The animation is superb, the puzzles imaginative, the digitized sound effects subversively humorous. It takes a while to get going, but

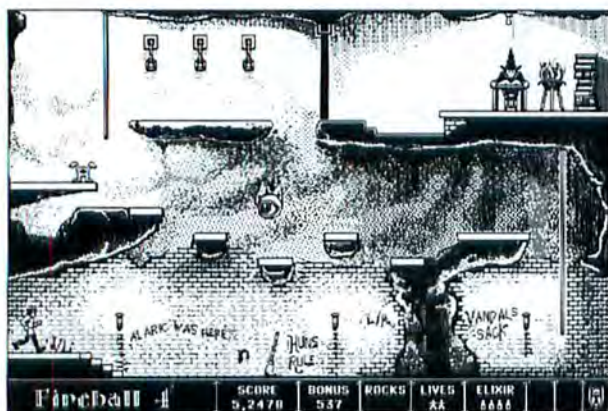


Figure 1

In *Dark Castle* the fireball is one of several weapons you need to win the game. In this scene you earn the right to face the wizard and receive the power of the fireball by dodging the fatal sweeps of the magic broom, immobilizing the burning eye before it bunts you down, and pulling the three chains in the correct sequence to lift the veil.

no matter what level of skill you've attained, you always know just how you blew it. And you immediately want to restart to do it right the next time.

The idea is to find and defeat a Black Knight, who will undoubtedly seem like an apocryphal figure to you for a very long time. It takes a lot of mastery to get to him. But you'll have a swell time trying. The good news is that a sequel is planned, called *Beyond Dark Castle*.

Leaving this one out of the Hall of Fame would be like ignoring Hank Aaron. No runner-ups in this category, as nothing comes close.

Sports Game: *HardBall*

Sports Game is the most competitive division in the Hall of Fame scramble. Last year's winner, *Mac-Golf*, has been improved. There are excellent emulations of skiing and tennis. And there are two good alternatives each in the sports of football and racquetball. One of the Macintosh football games, *NFL Football Challenge*, is an excellent gridiron strategy game, but the conversion from the IBM edition doesn't do enough with the Mac interface to win entry. As for racquetball, the Mac enthusiast can choose between a nifty game selling for under \$20 (*Primavera Racquetball*) and a feature-loaded premium effort (*MacRacquetball*) that allows modem competition. (In other words, with this one you can aim a kill shot from 3000 miles away.)



Still, it was a baseball game, *HardBall*, that slid its way into the Annex. Literally. Because the nicely digitized baseball sounds, including that of a sliding baserunner, are indicative of the attention to detail that makes *HardBall* a winner. By concentrating on the pitcher-batter duel and giving each moundsman up to four different pitches to mix, *HardBall* replicates the mental struggle at baseball's core and requires some hand-eye mastery for hitting and fielding (see Figure 2). One big complaint is that extra-inning games are prone to crash.

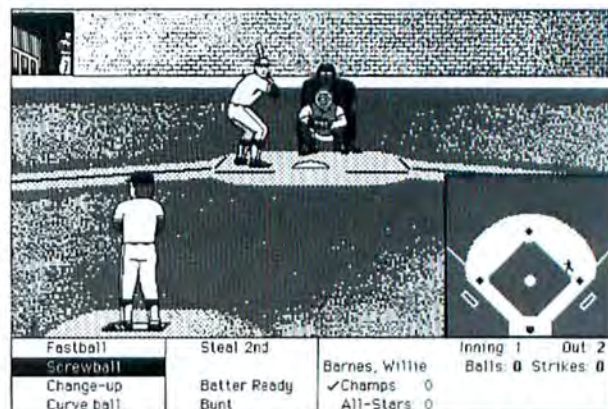


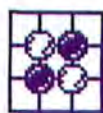
Figure 2

The pitcher-batter duel in *HardBall*: with two outs and a man on first, left-hand-bitting Willie Barnes should watch out for the screwball.

Though the publishers have not licensed the real names of baseball players, the different selection (and varying effectiveness) of pitches gives the unfamiliarly named hurlers personalities of their own. The computer opponent is a fair, if sometimes erratic, manager, but *HardBall* is best played human versus human.

Strategy Game: *Go*

You've probably heard about this complex, 4000-year-old Asian game, rich in nuance and deep in meaning. From a nondescript, grid-covered board and several hundred black and white stones, you can supposedly learn military strategy, human nature, yin, yang...the works (see Figure 3). But you probably have been too intimidated to learn how to play it—it would be like trying to learn Chinese. Go for the Mac; besides providing a fine computer opponent for old hands at the game, *Go* specializes in bringing the novice up to speed. You begin with an excellent participatory tutorial—one of the better uses we've seen for OWL's hypertext *Guide* program. When you're ready to challenge the Master, there are many ways to take it slow—you can limit the board size, get extra pieces, and ex-



The Multiplayer Wing

Finally we are beginning to see Macintosh games that welcome not one or two but literally dozens of players. We're accommodating them in a special wing of the Hall of Fame. (Admission extra.)

Online Game: *Air Warrior*

You think you liked *Flight Simulator*? Imagine using it in conjunction with 20 other people, each of you controlling a classic World War II plane like a Spitfire, a Mustang, or a Zero. The 20 of you are divided into three teams (countries), and as you fly over the territories of those three lands, you encounter one another. You can team up with allies, bomb enemy airfields, and engage in dogfights with foes. And you can stop imagining—that game is here, now, on the GENie online service.

It works like this—you download the Mac version of the game from GENie, practice a little, then log back on (late weekend days seem the busiest times) to scuffle up some dogfighting (see "Air Warfare"). Beware—you are bound to encounter some bona fide aces. Some *Air Warrior* masters have devoured military textbooks like

Fighter Combat Tactics and Maneuvers, with all their devastating applications to this game.

Solution: team up with experienced allies. Look for wounded planes trying to reach home base—and pounce. You can even taunt your doomed foe by sending a "radio" message.

The only drawback is cost. The initial capital outlay is lower than for most games (the \$18 GENie sign-up fee), but at \$5 an hour, addiction can jeopardize your livelihood. On the

other hand, it's cheaper than flying lessons.

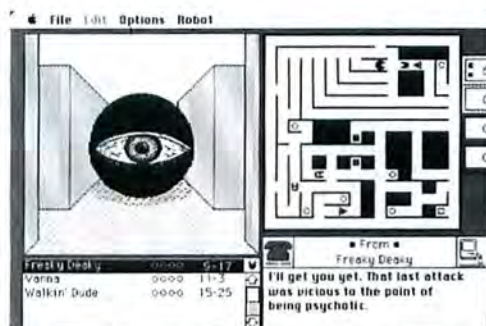
Network Game: *Maze Wars+*

A classic game for networks, optimized for AppleTalk. The premise is simple: you move through a four-level maze, seeing what your game piece sees. When you spot someone else's marker, shoot it. Avoid being shot by someone else. Dull when played against a computer, hysterical fun when five or more people engage. Who said networks were for work?



Air Warfare

A Mustang P51D comes in for a landing in Air Warrior. This is Flight Simulator with a difference: an opponent in Detroit flying a Zero might gun you down.



Don't Eyeball Me, Boy!

Hunting through the labyrinth, Maze Wars+ players confront opponents (like the eyeball) face to face. Invective can be sent over the network using the game's message feature.

tract hints from the Go Master. Best of all is a feature wherein your computer explains each of its moves, and even provides a complete analysis of the game thus far.

With all of the cultural overhead removed, you're free to divine the ages-old lure of this deceptively simple game. And if you want a real opponent and can't find one in the neighborhood, you can use the two-player-by-modem option to challenge a more distant friend.

A close contender in this category is *Chessmaster 2000*, now the premier chess game on the Mac. Every feature you can think of, and at its top levels it makes anyone less than Spassky look spastic.

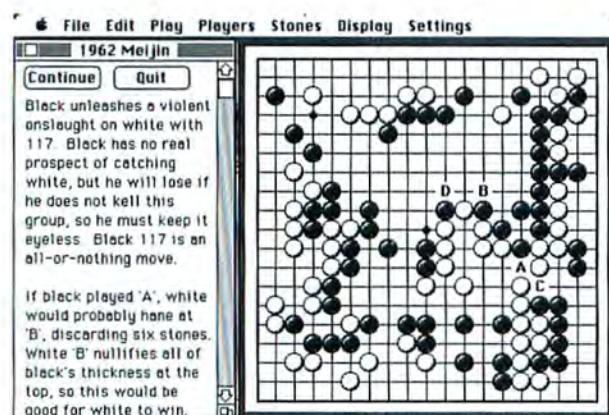


Figure 3

In Go, opponents try to capture territory by positioning stones in strategic locations. Here Go for the Macintosh diagrams the progress of a historic match.



Simulation Game: *Ferrari Grand Prix*

Simulation games depend on constructing a situation that allows the player to totally lose him- or herself in the portrayal of some situation not easily experienced without a computer. Flying a plane and controlling a submarine have been successfully emulated. And now: driving a low-slung Ferrari over tricky European race courses (see Figure 4).

If you think driving on the freeway is tough, try your hand at the Formula One racing circuit. Controlling the car here is a bit tough to master, especially when shifting gears, braking, and negotiating hairpin turns. Going 120 miles an hour here feels like 120 miles an hour. (And you can approach 200 mph.) While you're zipping along at breakneck speed, the concentration required is terrific—so much so that you may feel, yes, this is what Grand Prix Racing is really



Figure 4

The view from a Ferrari's cockpit. Approaching a busy curve at high speed requires concentration.

like. But each time you strap yourself in, you find yourself getting better; if you stick with it, you'll soon be good enough to challenge the computer-controlled opponents. (You can "cripple" them until you dare to take them on at their best.) After a few hours of ultra-high-speed racing, however, you may want to relax with *Golf Cart Simulator*, just to calm your nerves.

Also in the best simulation tradition, you have control over your environment—*Ferrari Grand Prix* lets you design your own racecourses, even down to the scenery.



Adventure Game: *Tass Times in Tonetown*

Not much new in this category. Two more efforts by the makers of last year's choice, *Déjà Vu*, maintain graphic excellence and attention to detail—if not plot originality—with *Uninvited* and *Shadowgate*.

But the Annex welcomes a sleeper—*Tass Times in Tonetown*. To be sure, some of the logic behind this game is rather warped—but that is only in keeping with something that seems a cross between *Raw* magazine, *The Face*, and the "Bizarro World" of DC Comics. Your mission is to find your missing Grandpa, but the weird dimension you must seek him in is an irreverently depicted punkish milieu. The currency is guitar picks, the haircuts are Mad Max-ish, the language is *Clockwork Orange*, and the satire is gentle but insistent. The graphic interface is easy to work with, and if some of the puzzles seem solvable only after some therapeutic headbanging—or a few hours of MTV—so what? Tass times are fun times.

As they did last year, also-ran honors go to Infocom. Its better adventure-game efforts this year include Doug Adams's funny but all-too-real *Bureaucracy*, as well as *Stationfall*, the delightful follow-up to the classic *Planetfall*. But these text games are doomed to runner-up-dom until Infocom addresses the virtues of the Mac interface more creatively.

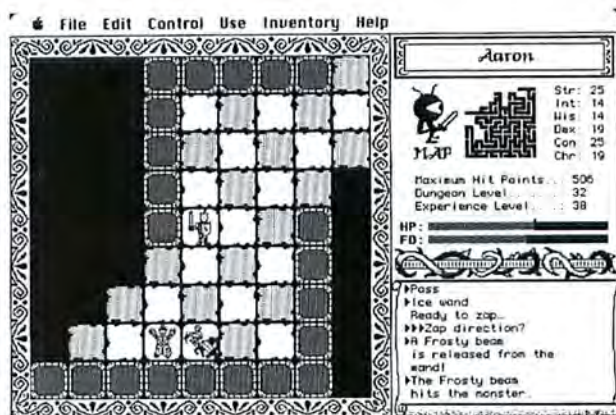


Figure 5

Aaron, a 37th-level Knight, blasts a centaur with an ice beam in *The Dungeon of Doom*. This is the 32nd level of the dungeon, dangerous turf.

Role-Playing Game: *The Dungeon of Doom*

Shareware lives, sort of. Version 4.0 of this standard go-down-into-the-dungeon epic is still, at this writing, available from user groups and online services for perusal and use; if you like it and are honorable about it, you'll send the author a well-deserved \$25. But word has it that the next version of the game will be commercially distributed.

The current version, though, is well worth seeking out. Game play is brisk; you control one player whose attributes and equipment grow more potent as the game progresses. Movement is with the mouse, and there is a handy automatic mapping feature that helps make *The Dungeon of Doom* a more casual



Brain-Teasing Game: *The Fool's Errand*

This game is like a jigsaw puzzle: a lengthy project to be attacked piece by piece. A certain satisfaction comes upon completion, but the real enjoyment is of a rainy-day variety, as you idly tackle this section or that. *The Fool's Errand* has for its plot a standard fantasy quest, but embedded in the seemingly endless scroll that narrates the story are 42 puzzles to be solved (see

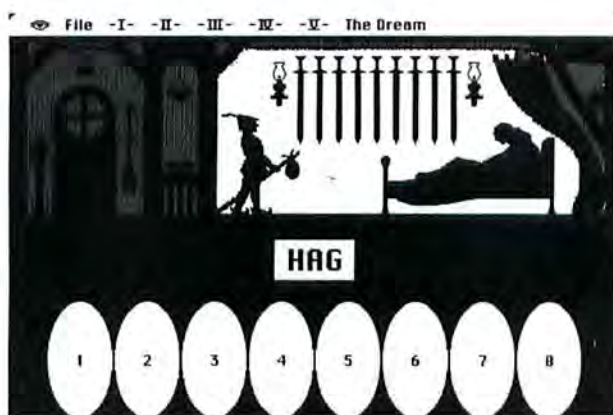


Figure 6

One of the hardest puzzles in *The Fool's Errand* requires you to push a certain combination of eight buttons correctly to build a sentence.

Last Year's Winners

Best Arcade Game: *Airborne*, Silicon Beach Software

Best Role-Playing Game: *Wizardry*, Sir-Tech Software

Best Adventure Game: *Déjà Vu*, Mindscape
Best Sports Game: *MacGolf*, Practical Computer Applications

Best Strategy Game: *The Ancient Art of War*, Brøderbund Software

Best Brain Game: *Life*, public domain

Best Simulation: *Flight Simulator*, Microsoft

Figure 6). Most involve word-play of some sort, others call for some degree of dexterity, and a few involve rearranging pieces like—surprise!—a jigsaw puzzle.

If any puzzle has you stymied, you can go on to the next and come back later. If you really get stuck, you can buy a hint book.

But you don't have to be a genius to get through this—just patient. If there are still families that like to tackle puzzles together, this is the one to try. □

Inside Outliners

A guide to outliners: programs that put a new twist on an old idea

by Robert C. Eckhardt

I remember how much I hated learning to outline, back in junior high. I rated outlining up there with sentence diagramming as a technique designed by teachers to make writing as unpleasant and difficult as humanly possible. I used to copy and recopy outlines to get them right—and then dismiss the whole exercise as futile once I'd written a paper that bore little relation to my hard-fought plan.

But outlines, and my attitude toward them, have changed now that my pencil and piles of cast-off outlines have been replaced by a Macintosh and an outliner program. And the change is partly because the outlines I create now hold the potential to be far more than just skeletons for future writing projects. Outliners can serve, among other things, as simple databases, appointment books, automatic-dialing phone books, and storage bins for pictures or stray text.

So before you dismiss outliners as just updated versions of an old torture technique, consider what this burgeoning area of Macintosh applications can do for you.

I. Configurations

All outliners perform the same basic job: they provide an easy way to create classic outlines (with subordinate topics nested under general topics) and to move, rearrange, temporarily hide, alphabetize, and otherwise organize all the topics. Similar though they may be at heart, however, outliners come in many different forms, from desk accessories or minor segments of major applications to full-scale applications replete with extras. Which kind of outliner is for you depends on how you intend to use it, the amount of RAM in your Macintosh, and several other factors.

You can call up desk accessory outliners like *Acta*, *Voila*, and *Outlook* (included in *SideKick*) at any time from almost any application—whether you're using a 512K Macintosh or running with a full MultiFinder set.

But because they are desk accessories, these programs lack many of the special features that application outliners offer. And although they are small by application standards, desk accessory outliners can still add considerable bulk to your System file—from 40K for *Acta* to 113K for *Outlook*.

Application outliners, such as *ThinkTank* and *MaxThink*, work with other applications under MultiFinder, but only if you have enough memory. Running *ThinkTank*, for example, with only one other program requires at least one megabyte of RAM. If you don't have enough memory, you must quit your current application, open the outliner, save your outliner work, and finally, reopen your application. Since outlining is rarely an end in itself, using an outliner in this way largely defeats its purpose. If you can spare the memory, however, an application outliner such as *ThinkTank* used under MultiFinder is just as convenient as a desk accessory, and more powerful.

As outlining catches on, more application outliners are combining full-powered outlining with other useful functions. The best known of these high-powered models is *More*, which can convert outlines into presentation graphics, create appointment calendars in outline form, and even dial the phone for you. *MindWrite* doubles as a basic *MacWrite*-like word processor. In both *More* and *MindWrite*, the outliner and the other parts of the program work together to make a whole that is greater than the sum of its parts.

The outline view in *Microsoft Word 3.0* is an example of the final type of outliner: a minor outlining facility resident within a major application. Unfortunately, *Word*'s outline view seems more stuck-on than built-in. Although switching between outlining and writing views is quick and easy, the outline facility



Outliners Outlined

	Acta 1.2	Voila 1.0	Outlook	ThinkTank 512
Type of program	DA	DA	DA	application
Program size	52K	83K	111K	158K
Outline size limit	limited by RAM	limited by RAM	limited by RAM	270K
Maximum number outlines open at one time	1	1	limited by RAM	1
Automated window tiling				
Maximum number characters per line	32,767	80	431	77
Separate windows required for graphics or overflow		•	•	•
Allows multiple paragraphs in one topic	•			
Headline attributes can shrink to one line	•	topic is one line	topic is one line	topic is one line
Text wraps	•			
Displays topics to designated level				
Degree of control over fonts and sizes	some	some	some	limited
Degree of control over text style	some	some	some	limited
Reverse sorting	•	•	•	
Search	•	•	•	•
Replace		•	•	•
Mark and gather				
Prints topics to designated level	•	•		•
Choice of outline scheme	•	•	•	
Exports outlines	• ¹	• ²	text only ³	text only
Maintains outline format in exported files	numbering only		•	

¹To *MacWrite*; text

²To *More*, *ThinkTank*; text

³Retains indents and numbering

⁴To *Jazz*, *MacWrite*, *ReadySetGo* (MS-DOS), *ThinkTank 512*, *ThinkTank 2.0* (MS-DOS), *Microsoft Word*; text

is awkward at best, and the interaction between the two views is often confusing and sometimes frustrating. Perhaps by the time you read this, built-in outlining facilities will be more numerous—and more useful—than *Word*'s solitary and sorry example.

II. Features

The operating style and features of outliners on the market vary considerably. Differences range from which key command performs a function to the way outlines are exported to other programs. Some of these discrepancies may seem minor, but they can significantly affect the usefulness of an outliner. For example, if the procedure for moving outline topics seems counterintuitive to you, the program may drive you crazy long before you derive any benefit from it. Or if you need to create elaborately styled outlines, a program that permits only rudimentary use of Style commands won't be much help.

One basic difference between outliners is the amount of text permitted within a single topic. In *Voila* the maximum number of characters allowed in a single topic is 80, while in *More* the maximum is 127. With either program, if you have a lot on your mind (suppose while outlining a paper, you're inspired to type an entire paragraph), you must put the overflow text in a special window appended to the topic. With *Voila*, this means that you can't see the entire outline as a unit, since overflow text windows obscure the underlying outline.

In *Acta*, on the other hand, a topic can contain an unlimited amount of text. *Acta* even allows multiple paragraphs within a single topic. To make the outline easier to navigate and view, you can shrink topics so that only the first line is visible. If you use outlines as precursors for written work, and write by building on your outlines paragraph by paragraph, outliners that force you to put long sections of text in special windows can get in the way. In such a situation, it makes more sense to use an outliner like *Acta*, which allows you to keep all your text in the outline window.

A related issue is whether topics wrap to a new line when they hit the right side of the screen, or sail right into space, requiring you to scroll to see the text that runs off the edge. If you regularly write lengthy topics, scrolling to read an entire topic gets tiresome quickly. In both *SideKick*'s Outlook and *More*, topics

More 1.1	MindWrite 1.0	Microsoft Word 3.01
application	application	module
315K	224K	370K
limited by RAM	none	none
6	limited by RAM	limited by RAM
•	•	
127	no limit	no limit
•	•	•
topic is one line	•	•
•	•	•
•	with difficulty	to first 9 levels
some	good	none
good	good	none
•	•	•
•	•	•
•	•	•
•	•	•
•	•	•
•	•	•
•	text only	
•		n/a

run off the edge of the screen. *Acta*'s topics break to a new line when they come to the edge of the window, no matter how wide or narrow the window may be. And *MindWrite* text breaks either according to the margins set by the ruler or at the edge of the window, depending on which option you choose.

Outliners also vary in their text-editing and formatting capabilities. In *MindWrite*, for example, you can double-click on a word to select it, but you cannot extend the selection to neighboring words by dragging (although you can in most other outliners and word processors). On the other hand, *MindWrite* has an editing feature I believe is unique: if you want to turn a section of your outline into a separate outline, or to reorganize what you have, you can select any combination of noncontiguous topics and cut, copy, or move them.

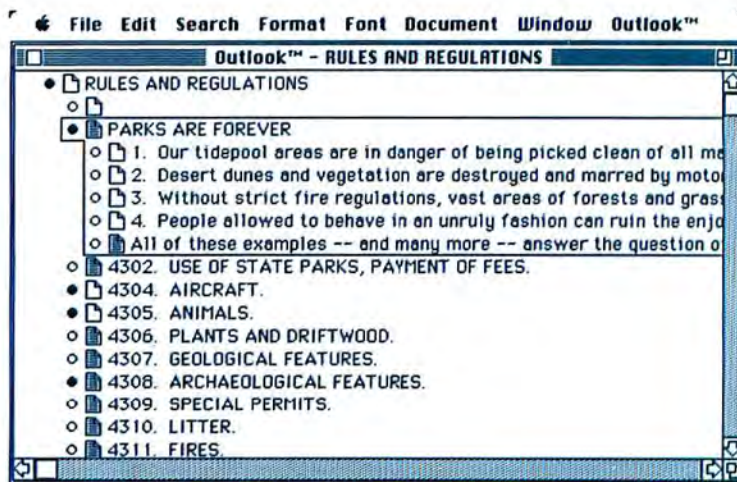
Differing text styles and sizes can do as much to make an outline communicate quickly and effectively as indents, numbers, and letters can. Some programs, such as *ThinkTank*, provide only a limited number of fonts, sizes, and styles to choose from, and require you to treat the entire outline the same way. Others, such as *Voila* and *Acta*, permit you to select the font, size, and style for headlines of a given level, or for a se-

lected topic and its subordinates, or for some other portion of the outline, but not for individual words. *More*, *Word*, and *MindWrite* are the most versatile, permitting unlimited formatting of characters, words, and topics.

Although all outliners use indentation to indicate the topics and subtopics of an outline, every program has its own way of marking individual topics and indicating hidden subtopics and text. Most outliners use symbols of one sort or another—bullets, pluses and minuses, open and closed triangles—as topic markers. *Word*'s outline view is a notable exception; unless you select the Renumber command, the topics in a *Word* outline contain no markers at all. Instead, *Word* uses ellipses and underlining to indicate collapsed subtopics and hidden text. There's little to recommend one symbol system over another; only *Word*'s lack of marker symbols is clearly inferior.

Many outliners allow you to change the topic markers to one of several traditional outline-numbering schemes. Some, such as *Word*, *MindWrite*, and *More*, let you view the numbers on screen. Others, such as Outlook and *Acta*, number the outline only when you print it or save it as a text file. For creating technical reports or documentation that requires traditional outline-numbering schemes, you'll probably want to use an outliner that can number (and renumber) topics on the screen while you work.

Possibly the greatest advantage of outlining on a computer is the ease with which you can move topics and subtopics from place to place and promote or demote them. But here again, outline-editing methods differ from program to program. With most outliners (*Word*'s outline view is a notable exception), you can



Outlook

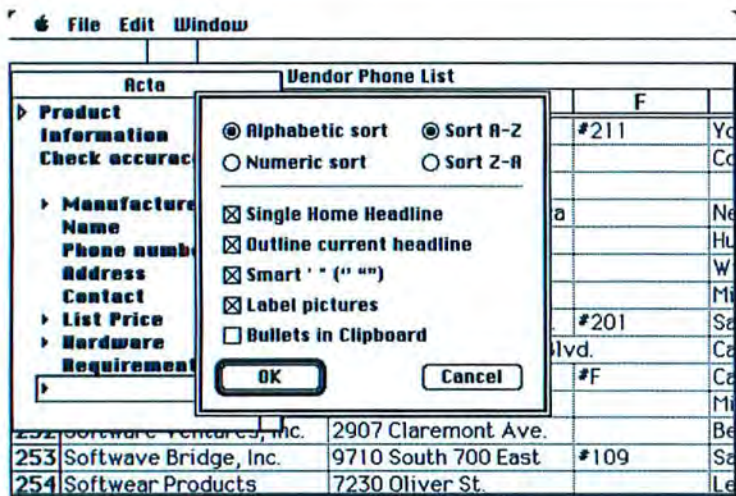
SideKick's Outlook uses black circles to indicate the presence of subtopics. The page-with-text icons indicate document windows. Long topics run off the edge of the screen; to read them, you must use the scroll bar at the bottom of the window.

use the mouse to drag a topic up, down, left, or right. And while all outliners have keyboard commands for left and right movements, only a few (such as *Voila* and *More*) have keyboard commands for moving topics up and down. So if you prefer to work from the keyboard, be sure to get an outliner that has a complete set of outline-reorganization keyboard commands.

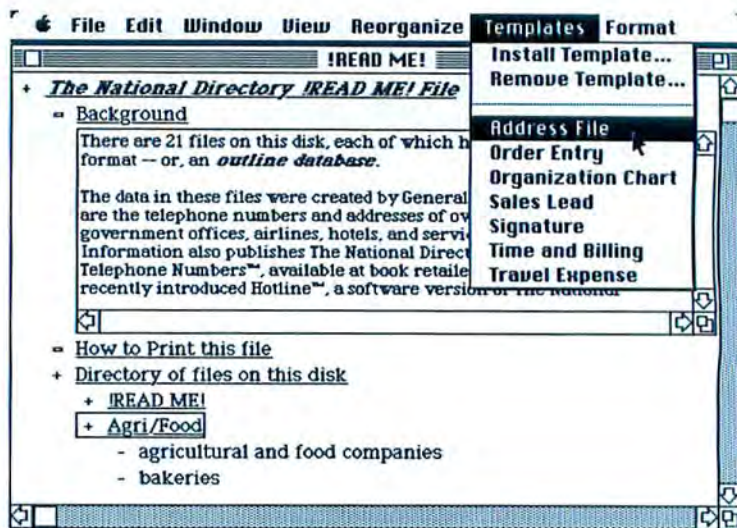
Since you will often want to copy an outline to another application, an outliner's ability to export outlines with formatting intact is an important consideration. Since both *Word*'s and *MindWrite*'s outliners are meant to be used within their own programs, they can export outlines only as plain text with no structure.

Most other programs are more understanding. *Acta*, for example, can create either text or *MacWrite* files that not only preserve their outline structure but also include labels or bullets for every topic (if you prefer, you can create a file with no topic labels at all). *More* does even better: its Export command creates outline files with nearly all the formatting intact in *Word*, *MacWrite*, *Jazz*, and plain text formats. And if you are in *More*'s Tree or Bullet Chart mode, the Export command creates a PICT (*Draw*) file containing the current tree or bullet chart.

A final difference in operating style has to do with how various outliners handle graphics. Some, such as *Acta*, place graphics directly in an outline. In programs such as *Voila*, however, you must place each graphic in a special window, which means that only one graphic can be viewed at a time. If you want to be able to scroll through an outline and quickly view all the graphics it contains, be sure to use an outliner that can handle the task.



This outline has been created with *Acta*, a desk accessory outliner, while working within Excel. Interestingly enough, a specialized version of *Acta* is now included with the latest version of *More* so that you can create outlines within other programs and save them in *More*'s file format. You can later elaborate on the saved outlines with *More*'s powerful features.



More

More 1.1 comes with a *National Directory of Addresses and Telephone Numbers*, a database that demonstrates how outlines can be used to store and retrieve information. The Template menu inserts preformatted topics into any outline and gives an idea of some other things *More* is good at.

III. Beyond Outlining

While not all outliners are equally capable, all of them can do more than just make outlines. Put another way, electronic outliners have transformed the outline format into something more than just a way to organize your thoughts. *More* outlines, for example, can generate bullet charts and other types of presentation graphics. But everybody knows that. What everybody doesn't know is that outliners can be used in many ways and in many situations, some of them obvious, others not so obvious.

For example, in addition to helping you organize thoughts, outliners enable you to organize almost any kind of list, alphabetically or numerically. If you create lists in a word processor and sort them by hand, using an outliner instead will save you time and frustration. All outliners can sort—alphabetically from A to Z and numerically from small to large. Some can also sort backwards, and some sort dates or times. *More*, for example, does all these things.

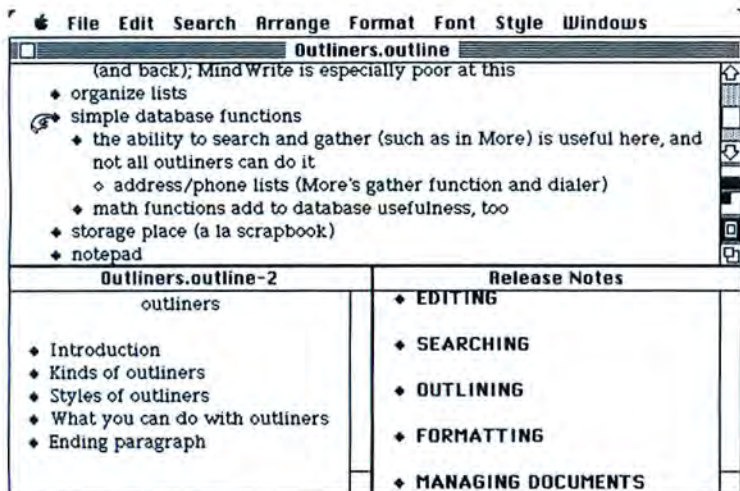
The way outliners sort numerical lists is often less than intuitive, however. In some programs, such as *ThinkTank*, all numbers to be sorted must contain the same number of digits, so you must add one or more zeros before smaller numbers. Other outliners, such as *Acta*, sort only integers and ignore numbers to the right of the decimal point.

Because all outliners have at least a rudimentary Search command, outlines can also serve as simple

databases. You could, for example, put your phone and address list in an outline, keep expense records in an outline, or create a reference outline of area codes that lists their location and time zone. The more sophisticated capabilities of some outliners can greatly increase the utility of such database outlines. *More* clearly provides the best example. It has time and date stamps that make entering time information for such things as expense records much easier. *More*'s search-and-gather and math functions enable you to sort an expense list by type of expenditure and then determine the sum for each type. And once you locate a number on your outline phone list, *More* can actually dial it for you.

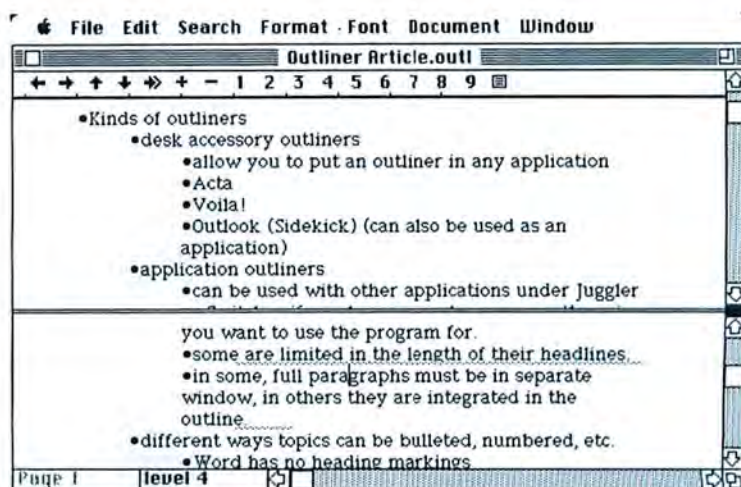
Outlines can also serve as storage bins for stray graphics and text. Desk accessory outliners, for example, work well as replacements for the Scrapbook. And since an outliner, unlike the Scrapbook, can create and open many files instead of just one, you have a lot more flexibility for organizing material. You might store images in one outline and text in another, say, or create separate outlines for different subjects and put images and text together. To find images quickly, you can type one or two descriptive words in the topic to which the graphic relates and then later search for one of the words.

An outliner can also serve as a replacement for the Notepad desk accessory. Again, outliners have the advantage of being able to open more than one notepad/outline file. And even the simplest desk accessory outliner has more sophisticated text-editing and formatting capabilities than the Notepad.



MindWrite

You can use MindWrite's ability to tile as many as four windows on screen to view different outlines or get different views of the same outline.



Microsoft Word

You can manipulate a Microsoft Word outline by using keyboard commands or the icons in the outline icon bar. Gray underlining indicates hidden subordinate topics; the level of the current topic appears in the lower-left corner.

Desk accessory outliners can also be used to create custom help files for other applications. You could create a help file with instructions for features and commands you find a little too complex, or for others who use your computer and need a helping hand. *Acta* makes such a project especially easy with its Acta File feature, which opens a specified file automatically every time you select *Acta*.

On-screen appointment calendars are another function for which electronic outlines are well suited. Although you can create one by hand with any outliner, *More*'s Calendar command automates the process. And a calendar feature can serve other purposes as well. For example, it can transform a whirlwind schedule of parties and dinners into a sobering expense report—like Cinderella's glittering carriage into a dusty pumpkin—as future engagements become fond memories.

It should be apparent by now that outlines have changed since my junior-high days. With all the advantages of on-screen editing, outlines are no longer a chore to create. Even the most basic outlining program serves a wide variety of functions. And with high-powered outliners such as *More*, the number of purposes outlines can serve is greater still. If you've been put off by memories of the outlines of your youth, now's the time to look again and see how much outliners have to offer. □

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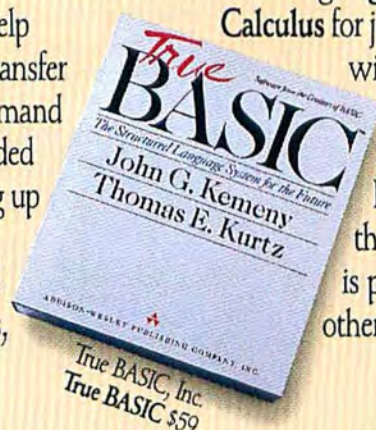


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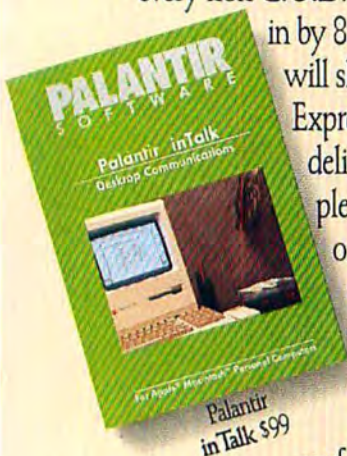
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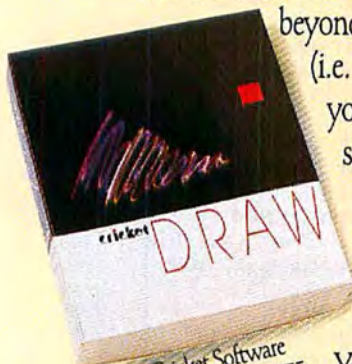
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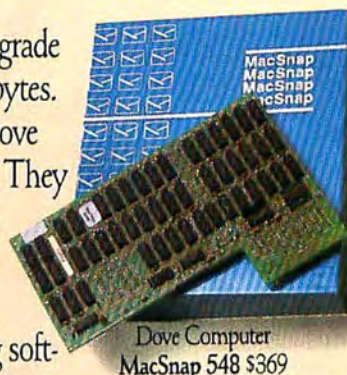
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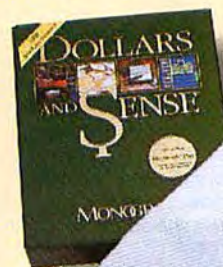


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Don't be a wimp! Round the bases at top speed and slide safely into home with this dual-response device. Combines cursor response of a mouse with the fun of a joystick. Great with games, goes extra innings at work.

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Cricket Software ... NCP

Statworks (statistical package)	75.
Cricket Graph (multiple windows)	124.
Cricket Draw (advanced draw capabilities)	175.

Data Tailor ... NCP

Trapeze (spreadsheet, reqs. 512k)	159.
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DataViz ... NCP

MacLink Plus (transfer Mac/IBM data)	149.
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Digital, etc. ... NCP

Turbo Macaccountant (GL, APAR, Payroll)	255.
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Dove Computer ... NCP

RAMSnap (RAM Disk/Disk Cache)	22.
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Dubl-Click Software ... NCP

Calculator Construction Set	37.
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World-Class Fonts! (both volumes)	47.
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WebPaint Clip Art (both volumes)	47.
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Electronic Arts ... CP

Deluxe Music Construction Set 2.0	62.
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Enabling Technologies ... NCP

Easy3D (create solid 3D objects)	79.
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Pro 3D (3D shaded modeling)	199.
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Enzan-Hoshigumi USA ... NCP

Japanese Clip Art Scroll 1 "Heaven"	59.
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Japanese Clip Art Scroll 2 "Earth"	59.
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MacCalligraphy (create unique designs)	115.
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Fifth Generation Systems ... NCP

FastBack Mac (powerful backup utility)	59.
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Forethought ... NCP

Factfinder 1.1 (information organizer)	39.
----------------------------------------	-----

FileMaker 1.0 (custom design reports)	49.
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FileMaker Plus 2.0 (database)	139.
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PowerPoint 1.0 (presentations)	189.
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Foundation Publishing ... NCP

Comic People (create your own characters)	26.
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Comic Strip Factory (create cartoons)	59.
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FWB Software ... NCP

Hard Disk Backup or Hard Disk Partition	37.
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Hard Disk Util (program backup)	\$55.
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Great Wave Software ... NCP

KidsTime (educational, ages 3-8)	27.
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TimeMasters (learn about time, ages 4+)	27.
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ConcertWare+ (music composition)	39.
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ConcertWare+ MIDI	79.
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Greene, Inc. ... NCP

QuickDEX (address book)	24.
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Hayden Software ... CP

MusicWorks (songs for your Mac)	29.
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Score Improvement for the SAT	58.
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Ideaform ... NCP

MacLabeler or DiskQuick	28.
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Imagine ... NCP

Smart Alarms (DA reminder system)	38.
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Multi-user Smart Alarms	99.
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Infosphere ... CP

LaserServe (network software)	64.
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ComServe (NCP, modem sharer)	124.
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MacServe (network software)	164.
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Innovative Data Design ... NCP

MacDraft 1.2A (requires 512k)	157.
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LaserWare ... CP

LaserWorks (requires 512k, LaserWriter)	195.
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LaserPaint (requires Mac Plus)	315.
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Layered ... CP

Notes for...Excel, Microsoft Works,	
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PageMaker, or Word	each 41.
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Legisoft/Nolo Press ... NCP

WillWriter 2.0 (prepare your own will)	30.
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Letraset ... NCP

Ready,Set,Go! 4.0 (page layout)	289.
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Linguist's Software ... NCP

Tech (1000 different symbols)	59.
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Foreign Language Fonts	call
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Living Videotext ... NCP

More (outlines, windows, & tree charts)	149.
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Lundeen & Associates ... NCP

WorksPlus Spell 1.1	49.
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MacroMind ... NCP

VideoWorks II (animation tool)	119.
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MacroPac International ... NCP

101 Macros for Excel	45.
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Magnum ... CP

The Slide Show Magician 1.3	35.
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Micro Analyst ... NCP

Mac Zap (recover crashed hard disks)	36.
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Microsoft ... NCP

Flight Simulator (the Mac takes flight, CP)	32.
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Basic Interpreter 3.0	62.
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Chart 1.02 (42 chart styles, CP)	72.
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Multiplan 1.1 or File 1.05	110.
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Basic Compiler 1.0	119.
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Fortran 2.2 (compiler)	169.
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Works 1.1 (integrated tool)	185.
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Excel 1.04 (power spreadsheet)	224.
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Word 3.01 (word processor)	239.
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Miles Computing ... NCP

Mac the Ripper Vol. 3 (req. Paint program)	27.
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Orchestra of Fonts Vol. 4 (30 different fonts)	27.
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Peoples, Places & Things Vol. 5	27.
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Mindscape ... NCP

The Perfect Score: SAT (CP)	47.
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ComicWorks (create your own comics)	47.
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GraphicWorks 1.1 (newsletters)	87.
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Monogram ... NCP

Dollars & Sense (home, small business)	81.
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Odesta ... NCP

Double Helix II (relational, custom menus)	349.
--------------------------------------------	------

Multi-User Helix (requires 512k)	429.
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ust three dollars.*

PBI Software ... CP

Strategic Conquest (multi-user) \$35.

Primer Software ... CP

Smash Hit Racquetball (top-rated!) 15.

Psion ... CP

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

Sierra On-Line ... CP

Leisure Suit Larry 24.

King's Quest I, II or III 30.

Space Quest 30.

Silicon Beach Software

Airborne! (CP, the classic!) 20.

Enchanted Scepters (CP, over 200 scenes) 21.

Dark Castle (NCP, arcade action) 27.

World Builder (NCP, program creator) 41.

Simon & Schuster ... CP

Star Trek—The Kobayashi Adventure 24.

Sir-Tech ... CP

Mac Wizardry (high-rated fantasy) 35.

SPHERE, Inc. ... NCP

Tellstar II (No. & So. hemispheres, req. 512k) 15.

GATO or Orbiter 26.

XOR ... NCP

NFL Challenge (be the coach!) 65.

HARDWARE

Manufacturer's minimum limited warranty period is listed after each company name. Some products in their line may have longer warranty periods.

NOTE: Some hardware items are available in either platinum or beige color. Please specify.

20 Megabyte SCSI Hard Drive 529.

Apricorn ... 1 year

ApriCord Mac (for Mac 512k or Mac Plus) 75.

AST Research ... 6 months

AST TurboScan (300 dpi scanner) 1389.

Curtis Manufacturing ... lifetime

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.

Dove Computer ... 90 days

MacSnap 524 (512k to 1 Meg) 139.

MacSnap 548 (512k to 2 Meg) 369.

MacSnap 2S (1 Meg to 2.5 Meg) 489.

MacSnap 4S (1 Meg to 4 Meg) 969.

Ergotron ... 1 year

Mouse Cleaner 360° 15.

MacTilt or MacTilt SE 69.

MacTilt (for large monitor) 89.

MacBuffer 512k 329.

MacBuffer 1024k 429.

Farallon Computing ... 1 year

PhoneNET PLUS (DB-9 or DIN-8) 45.

Hayes ... 2 years

Smartcom II (communications software) 88.

Smartmodem 1200 299.

Smartmodem 2400 449.

Kensington ... 1 year

Applertalk Cable Clips or Connectors each 1.

Mouseway (mouse tracking pad) 8.

Mouse Pocket (for your idle mouse) 8.

Mac Plus/Mac SE System Saver Cover 9.

Imagewriter II Dust Cover 9.

Printer Stand 17.

Mouse Cleaning Kit w/Mouse Pocket 17.

Disk Case (holds 36 Mac disks) 19.

MacConnection Hardware Special

through December 31, 1987

I/O DESIGN MACLUGGAGE

Macinware SE

Transport your Mac in style with I/O Design's Macinware SE carrying case. Sturdy, well-padded design for your entire system. Includes internal compartments for your keyboard, hard drive, modem, mouse, manual and cords. Available in navy blue.

Imageware II

Same rugged construction as the Macinware SE case—high density foam and 1000 denure nylon Cordura. Includes a pocket for a small supply of computer paper. Available in navy blue.

Macinware SE-Imageware II Special
Buy both and save only \$105.

Disk Drive Cleaning Kit 20.

Tilt/Swivel 22.

Universal Copy Stand 23.

Polarizing Filter (Mac Plus or Mac SE) 33.

Surge Suppressor 34.

Apple Security Kit 34.

Printer Muffler (80 column) 38.

Printer Muffler (132 column) 51.

Printer Muffler Stand (80 or 132 column) 25.

Control Center 63.

A-B Box (for the Mac Plus) 63.

System Saver Mac 64.

Turbo Mouse (for the MacPlus & SE) 83.

Koala Technologies ... 90 days

MacVision (digitizer, includes MoreVision) 175.

Kraft ... 1 year

3 Button QuickStick special

Migent ... 1 year

Pocket Modem (ext. 300/1200 baud) 169.

Mirror Technologies ... 1 year

Magnum 800 External Drive 209.

Magnum Tape 20 Backup 899.

Magnum Tape 40 Backup 1079.

MagNet 30x (w/cable & print spoolers) 799.

MagNet 40x (w/cable & print spoolers) 1079.

MagNet 40/40 (40 Meg, 40 Meg tape) 2139.

Nutmeg Systems ... 1 year

Nutmeg FPD 15" Monitor 1395.

Nutmeg 19" Monitor 1549.

Nuvotech ... 1 year

EasyNet (AppleTalk network connector) 28.

Personal Computer Peripherals ... 2 years

Optional built-in 1200 bps modems available.

MacBottom HD 21 Meg (SCSI) 769.

MacBottom HD 32 Meg (SCSI) 899.

MacBottom HD 45 Meg (SCSI) 1159.

SoftStyle ... 90 days

MacEnhancer (for plotters to printers) 175.

Summagraphics ... 90 days

MacTablet 12" x 12" 379.

Systems Control ... 2 years

MacGard (surge protection) 55.

Thunderware ... 90 days

ThunderScan 4.0 with PowerPort 199.

DISKS

Sony 3 1/2" DS/DD Disks (box of 10) \$18.

Fuji 3 1/2" DS/DD Disks (box of 10) 19.

MAXELL 3 1/2" DS/DD Disks (box of 10) 20.

Verbatim 3 1/2" DS/DD Disks (box of 10) 20.

3M 3 1/2" DS/DD Disks (box of 10) 20.

INFORMATION SERVICES

CompuServe Information Service 24.

Dow Jones News/Retrieval Membership Kit 24.

ACCESSORIES

Clean Image Ribbon Co.

Clean Image Ribbon Kit 12.

Computer Coverup

Imagewriter II Cover 8.

Mac Plus & Keyboard (two covers) 10.

I/O Design

Imageware II (Imagewriter II carry case) 45.

Macinware Plus (Mac Plus carry case) 65.

Macinware SE (Mac SE carry case) 75.

Macinware SE-Imageware II special

Kalmar Designs

Teakwood Roll-top Case (holds 45 disks) 14.

Teakwood Roll-top Case (holds 90 disks) 20.

Teakwood Roll-top Case (holds 135 disks) 28.

Magnum

Mouse Mover (let your mouse ride!) 14.

Moustrak

Moustrak Pad (standard 7" x 9") 8.

Moustrak Pad (large 9" x 11") 9.

Sensible Software

Quality "MacAttire" nylon dust covers 7-17.

High Trek Imagewriter II carry case 49.

High Trek Mac Plus or SE carry case call

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overnight delivery for j

Olduvai Software ... NCP

DA-Switcher (unlimited desk accessories) \$26.
Post ART (clip art, 3 disk set) 36.
Icon-It! (create custom icon bars) 41.

OWL International ... NCP

Guide (hypertext, free-form info) 77.
Guide Envelope System 99.

Palantir ... CP

MathFlash or WordPlay 26.
MacType (typing instruction) 32.
inTalk (communication to emulation, NCP) 99.

PBI Software ... NCP

HFS Locator (DA organizer for HFS) 26.
HD Backup (supports MFS, HFS) 28.

Personal Computer Peripherals ... NCP

HFS Backup 29.

ProVUE Development ... NCP

OverVUE 2.0 (power-packed database) 149.

Rubicon Publishing ... CP

Dinner At Eight-Silver Palate Bundle 51.

Satori ... NCP

BulkMailer 3.0 (mailing lists) 82.
BulkMailer Plus (up to 90,000 names) 199.
Legal Billing (attorneys to accountants) 379.
Legal Billing II (full trust accounting) 569.
Project Billing (architects to engineers) 442.

Silicon Beach Software ... NCP

Silicon Press (printer utility, 512k) 41.
SuperPaint (advanced graphics program) 79.

Simon & Schuster ... NCP

Mac Art Department (req. Paint program) 24.
Typing Tutor IV (new & improved) 35.

SoftStyle ... NCP

Epstart (Epson printer driver) 27.
Printworks (print faster & in color) 46.
Laserstart (Hewlett-Packard Laserjet) 58.

Softview ... NCP

Macinuse (time-use manager) 42.

Software Discoveries

Record Holder Plus (data manager) 45.

Software Supply ... NCP

Suitcase (font and DA utility) 38.
PowerStation (alternative to Finder) 38.

Software Ventures ... NCP

Microphone 1.1 (includes Glue™) 119.

Solutions, Inc. ... NCP

SmartScrap & The Clipper 40.
Glue (creates "print to disk" capability) 40.
SuperGlue (total graphic integration) 57.

Springboard ... CP

Art a la Mac Vol. 1 or 2 (NCP) 23.
Early Games or Easy as ABC 28.
Certificate Maker (requires 512k) 35.
Certificate Library Vol. 1 19.

SuperMac Software ... NCP

SuperSpool 3.4 45.

Diskfit (backup & restore utility) \$45.

Network Diskfit (automatic backup) 205.

Sentinel (encryption) 85.

SuperLaserSpool 85.

Multi-User SuperLaserSpool 205.

Survivor Software ... NCP

MacMoney (financial planner) 41.

Symmetry ... NCP

Acta 2.0 (outline/writing desk accessory) 37.
PictureBase 1.2 (clip art manager, 512k) 59.

Think Educational ... CP

MacEdge II or Mind Over Mac 28.

THINK Technologies ... NCP

HFS Navigator (search for buried files) 35.
Laserspeed (LaserWriter utility) 55.

Lightspeed Pascal 65.

Lightspeed C (top-rated C Compiler) 95.

InBox Starter Kit (CP) 215.

InBox Personal Connection (Mac & PC) call

T/Maker ... NCP

ClickArt Personal Graphics, Effects,
Publications, Letters Vol. 1 or 2, Holidays,

Business Image each 28.

Bombay, Plymouth, or Seville Laser font 45.

Write Now (word processor) 99.

TML Systems ... NCP

TML Source Code Library 55.

TML Pascal (compiler, req. 512k) 59.

TrueBasic ... NCP

True BASIC (fast, flexible, & portable) 59.

Algebra I or II, Pre-calculus, Trigonometry,

3D Graphics, Discrete Math, Probability,

Calculus, Arithmetic, & MacFunction. each 35.

TrueSTAT (statistics) 58.

Runtime (create stand-alone applications) 59.

Unicorn ... CP

Animal Kingdom (ages 6-12) 27.

Decimal Dungeon (math, ages 9 and up) 27.

Fraction Action (arcade style math game) 27.

Mac Robots (pre-school program) 27.

Math Wizard (math games, ages 5-10) 27.

Read-A-Rama (reading, ages 5-8) 32.

William & Macias ... NCP

myDiskLabeler (design & print labels) 24.

myDiskLabeler w/Color (req. Imagewriter II) 32.

myDiskLabeler w/LaserWriter option 35.

Working Software ... NCP

Lookup (90,000 word dictionary) 29.

Findswell (locate documents fast) 32.

Spellswell (spelling checker) 42.

Spellswell Legal or Medical Dictionary 57.

GAMES

Accolade ... CP

Hardball (baseball simulation) special

Activision ... CP

Tass Times in Tonetown \$21.

Championship Star League Baseball 22.

Shanghai (Mah Jongg strategy) 24.

Portal (sci-fi novel) 30.

Addison-Wesley ... CP

Puppy Love (your dog will love it!) 19.

Avalon Hill ... CP

MacPro Football (req. 512k) 29.

MacPro Football 85 Team or Season 16.

Blue Chip ... CP

Millionaire, Tycoon, Baron or Squire 35.

Broderbund Software ... CP

Lode Runner (over 150 levels) 24.

Ultima III (fantasy adventure) 24.

Ancient Art of War (military strategy) 27.

Toy Shop (create working models) 31.

Bullseye ... CP

Ferrari Grand Prix (Formula One racing) 33.

Fokker TriPlane Flight Simulator 33.

Electronic Arts ... CP

Ogre (tank simulation) 20.

Archon, Skyfox, Seven Cities of Gold,

Dr J vs Larry Bird, Patton-vs-Rommel,

Pinball Construction Set each 27.

Chessmaster 2000 29.

Epyx ... CP

Rogue (strategy dungeon classic) 15.

Sub Battle Simulator (NCP) 24.

Winter Games (Olympic events) 24.

Hayden Software ... CP

Sargon III (9 levels of chess) 29.

Infinity Software ... CP

Go (4000-year-old strategy game) 22.

Grand Slam (tennis, req. 512k) 27.

Infocom ... CP

Hitchhiker's Guide to the Galaxy 18.

Leather Goddesses, Trinity, Moonmist,

Ballyhoo, Bureaucracy, Stationfall, Nord & Bert,

Lurking Horror, Plundered Hearts,

Hollywood Hyjinx (standard) each 24.

Zork Trilogy 44.

Invisiclues Hint Booklets (please specify) 6.

MacroMind ... CP

Maze Wars+ (play via modem or network) 31.

Miles Computing ... CP

Harrier Strike Mission or Quintette 27.

Down Hill Racer (3D ski simulation) 27.

Fool's Errand (solve the puzzles) 27.

Mindscape ... NCP

Balance of Power (world politics) 30.

King of Chicago (req. minimum 512E) 30.

Shadowgate (castle adventure) 30.

Uninvited or Deja Vu 30.

Olduvai Software ... NCP

Maze Survival (action game) 21.

1-800/Mac&Lisa 770C

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Reviews

Hello, PhoneNet Calling

PhoneNet System

Network-wiring system and diagnostic software. **Pros:** Inexpensive; straightforward installation; unique troubleshooting features. **Cons:** StarController requires manager Mac in close proximity; TrafficWatch requires dedicated Mac as monitor. **List price:** StarController \$1695 (Wiring Kit \$95 extra); Passive Star Wiring Kit \$95; PhoneNet Plus Connectors \$59.95 each; TrafficWatch \$195; Testing Utilities \$29. **Requires:** 512K. **Copy protection:** None.

Three or four Macs and a LaserWriter are only the beginning of AppleTalk networking. Business users need to expand and link together their networks in a logical fashion for greater efficiency. Farallon Computing's PhoneNet goes beyond the simple bus structure of Apple's connector system, offering network components that make expansion easier. And PhoneNet's use of existing phone wiring not only simplifies AppleTalk installation—it saves you money.

Two PhoneNet devices, the Passive Star Wiring Kit and the StarController, can create large star-topology networks ranging in size from 4000 feet to 36,000 feet of cable that may extend over many offices, floors, or buildings.

Seeing Stars

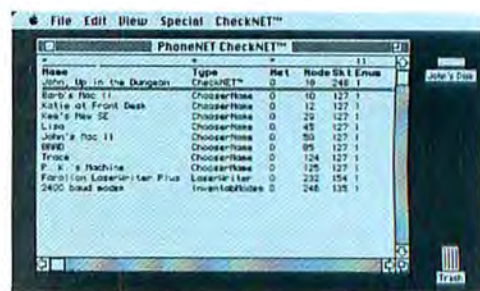
The StarController consists of 12 isolated ports, one for each leg of an active star and one separate port for network management. The StarController can handle 3000 feet of cable per leg, for a total of 36,000 feet; each leg can consist of multiple devices or another active star. Assigning one StarController to each floor of a building and then chaining these stars or connecting them via another master StarController simplifies configuring an entire building for an AppleTalk network.

The StarController management bus operates independently of AppleTalk, enabling the manager to isolate problems in each leg of the star, even if the management Mac is disconnected from the network. The StarCommand software allows the manager to isolate one or more legs from the StarController, and attach names and comments to each port. This eliminates the need to physically inspect every machine to locate problems or monitor the network. The manager's Mac must be located within 200 feet of a StarController, but Farallon plans to remedy this inconvenience by offering a modular attachment for remote access via a modem or for local testing with a portable computer.

Smaller offices may not need the capabilities of the StarController, and so instead may choose a more limited star topology with the Passive Star Wiring Kit. This kit includes a standard telephone-type punch-down block for making network connections in a utility closet and supports up to six separate legs that are not isolated from each other. The kit can support a total network length of about 4000 feet and is more flexible for wiring offices than a simple daisy-chain network of 3000 feet.

Making the Connection

The PhoneNet Plus Connectors are designed to replace Apple's own AppleTalk connectors, but they can also connect to telephone cabling rather than to Apple's shielded cabling. The connector design allows internode distances of 3000 feet, whereas Apple's cabling supports lengths of only 1000 feet. Connecting to telephone cables means PhoneNet Plus Connectors can use existing building wiring to create an AppleTalk network, without compromising the normal telephone service on the same cables.



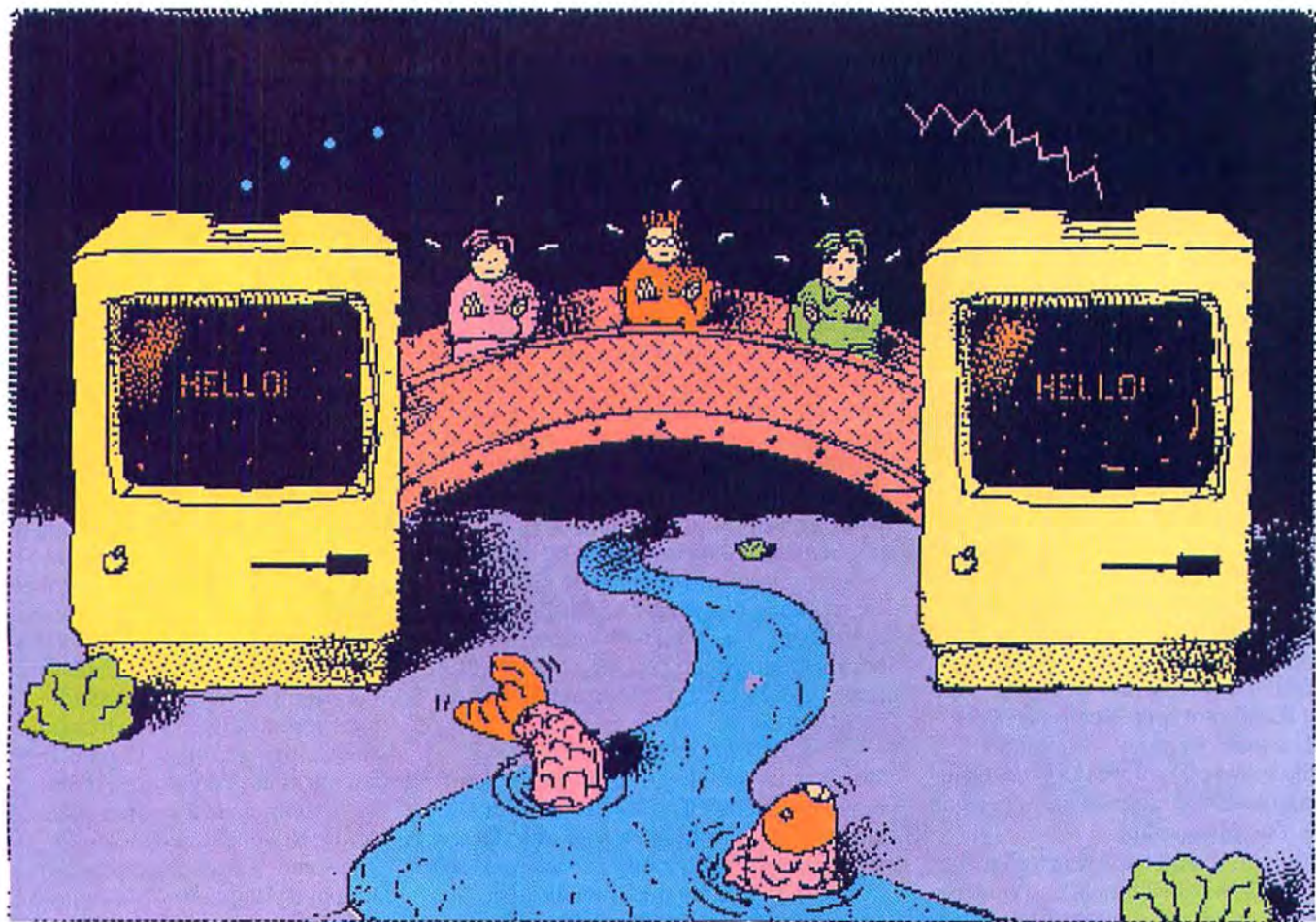
CheckNet

CheckNet lists all users, including node names and numbers.



Watching Traffic

Here, TrafficWatch displays network traffic in "bar graph" form.



Who's Out There?

Farallon's *TrafficWatch* and *Testing Utilities* are designed to assist network managers in diagnosing network problems.

When networks become sluggish or nodes cannot communicate, *TrafficWatch* is a handy tool for isolating the problem. *TrafficWatch* provides the network manager with information on network traffic between nodes, as well as the number and type of errors occurring on the net (see "Watching Traffic"). Network traffic can be displayed dynamically as a series of bar graphs or presented in spreadsheet form.

TrafficWatch can store traffic data at arbitrary intervals for further analysis within *Excel*. Farallon includes two *Excel* macros designed to simplify the task of collating the network traffic data. These macros can reformat the original *TrafficWatch* data, produce graphs of traffic for each user and the entire network, and provide a breakdown of network errors.

TrafficWatch deactivates AppleTalk. So while *TrafficWatch* is in use, the monitoring Mac is not a recognizable node on the AppleTalk network and cannot use *AppleShare*, *TOPS*, or *MacServe*. This package is also incompatible with a debugger. These limitations seem a small price to pay, though, for the valuable information provided by *TrafficWatch*.

The *Testing Utilities* disk includes CheckNet, a simple desk accessory that provides information on other active network users and printers. Since AppleTalk

does not automatically register a name with a node, the utilities disk also includes an Init resource called RegisterName, which allows users to choose a name for their Mac that will register on the network every time they boot their Mac. CheckNet lists these names to show all current users on the net; this information can then be used to determine if the proper connections have been established (see "CheckNet").

Working within the phone system, PhoneNet gives corporate AppleTalk users effective tools for organizing networks as work groups, as well as for linking these work groups together into either departmentwide or corporatewide networks.
—Dave Kosiur

See *Where to Buy* for product details.

A (Re)Touch of Gray

ImageStudio 0.6 (prerelease)

Gray-scale editor for retouching scanned images. **Pros:** Versatile set of tools and effects for enhancing images. **Cons:** Files require a good deal of memory. **List price:** Version 1.0, \$495. **Requires:** Mac Plus (Mac II recommended for viewing gray-scale information). **Copy protection:** None.



Desktop publishing is changing faster than you can say Johannes Gensfleisch Gutenberg. With the advent of high-resolution input devices from companies like Abaton and Microtek, Mac publishers can produce digitized versions of photos, which can be placed into a variety of page-layout programs and printed on the LaserWriter or a PostScript-compatible phototypesetter. Images recorded by many of today's scanners include the gray-scale information necessary to approximate the range of grays in a continuous-tone photograph.

Although scanner software offers some control over brightness and contrast, as well as some rudimentary image-editing tools, it's inadequate for extensive touch-up work. But salvation is here: Letraset's

ImageStudio (formerly code-named The Realist) gives publishers an extensive array of tools for retouching scanned images before placing them in page-layout programs. In addition to touch-up tools, the program provides a number of halftone printing effects in the form of adjustable dot and line screens.

Digital Darkroom

ImageStudio's collection of tools and special effects does everything from smooth the jaggies to improve the contrast in selected areas. The program can be used for simple tasks like cleaning up unsightly glitches in a scanned picture, or for more elaborate alterations, such as removing a deposed leader from the company newsletter's group portrait. And although it's not intended to be a stand-alone drawing program, *ImageStudio* can be used to create freehand drawings as well. I spent hours experimenting with numerous pens, brushes, and effects, printing out several paper trays' worth of experiments on the LaserWriter.

ImageStudio's layout is clean and straightforward. The program offers four movable palettes. The Tool Palette contains two selection tools (a lasso and a rectangle), six drawing tools, a zoom tool, and a "grabber" to slide the drawing area around the page. The Pen Palette offers a selection of eight pen tips (drawing tool shapes) and a space for custom tips you de-

sign. The Graymap Editor palette displays one slider for brightness and another for contrast, as well as the *graymap box*, which sets the distribution of shades in an image. Finally, the Shade Palette shows a continuum of 17 grays; double-click a shade to access *ImageStudio*'s full range of 65 shades.

The basic procedure for editing an image is this: first, you load a digitized photo into *ImageStudio*, which maps the gray-scale information for each dot into one of *ImageStudio*'s 65 grays. The program accepts *MacPaint*, *ThunderScan*, *FOTO*, and *TIFF* files, although *TIFF* (Tagged-Image File Format) may differ from one scanner to another. (According to a Letraset representative, *ImageStudio* reads images from most 300-dpi scanners, including those from Abaton, Thunderware, and Microtek.) Once the picture is in *ImageStudio*'s drawing window, you can crop it, rotate it, change the brightness and contrast of all or part of the image, touch up flaws, or otherwise edit the image. *ImageStudio* lets you open several views of an image at once, in scales ranging from 25 percent to 1600 percent of its original size. In most cases, you'll zoom in on a section and retouch the picture in a magnified view.

Some of the drawing tools may look familiar to Mac artists, but *ImageStudio*'s tools operate somewhat differently from those of Macintosh paint programs. The brush, for example, blurs the edges of each



House Painting

If you carefully compare these two images, you'll note some changes produced with *ImageStudio*. In the right-hand image, two trees were removed

to provide a better view of the row of houses. The portions of the houses behind the departed trees were drawn with several pens, and the edges

were smoothed with the water drop. In addition, a sky and cloud were added and the image was darkened slightly and cropped.



stroke, as if ink or paint were spreading out. The pencil draws a hard-edged, opaque line in the selected shade, the charcoal lays down a progressively darker line as you rub an area, and the rubber stamp draws multishade lines with custom shapes and patterns. Two unique tools, the water drop and the finger, blend or smear rough edges, smoothing the transition from one shade to the next and eliminating jagged lines (*anti-aliasing* in computer-graphics terminology).

Custom Tools

All of *ImageStudio*'s tools can be customized. Double-clicking on a tool brings up a Preferences dialog box that offers options such as Pressure (how many strokes are required to darken an area), drawing from dark to light (this option causes a brush stroke to "fade out"), and repeat pattern (this option allows you to create effects such as a broken line rather than a continuous one). The Preference dialog boxes enable retouchers to create a set of custom tools to suit individual needs. For example, the charcoal can be made into a piece of chalk that draws in white instead of black; the brush can be made to paint only on the background, leaving foreground objects untouched; or the paint bucket can be instructed to spill a smooth gradation from one shade to another rather than a solid shade.

ImageStudio not only lets you customize the existing tools, but allows you to create original tools as well. Surround a pattern with the selection rectangle, choose a command, and the tool is inserted in the Custom menu, ready to be retrieved.

Only a few of *ImageStudio*'s many features are mentioned here. The more I used the program, the more I was impressed with the programmers' attention to detail. For example, *ImageStudio* lets you click on a pattern in the drawing and "pick it up," making it instantly available for shading adjacent areas. Another example: a lassoed selection can be edited; if you slip when surrounding a complex shape, you can alter the blinking lasso line rather than start over.

Once you've retouched an image, you can paste it into a page-layout program that accepts TIFF, *MacPaint*, or EPS (Encapsulated PostScript) files. Unfortunately, files saved in TIFF or EPS take up quite a bit of



memory; this is not a function of *ImageStudio*, but results from the routines TIFF and EPS use to store files. For example, a file that occupied 94.5K in *ImageStudio* format took up 405.5K in TIFF and a whopping 834K in EPS. A file of this size could be refused by the LaserWriter as well as by page-layout software. (A Letraset spokesperson suggests scanning large pictures at less than the full 300-dpi resolution; 150 dpi should be sufficient for most printing applications.) I encountered no problems pasting an image in both TIFF and EPS format into *ReadySetGo* 4.0 and printing the file. (This is not surprising, since Letraset distributes both programs and had a chance to work on compatibility.) I was able to paste EPS and TIFF files into *PageMaker* 2.0, but ran into problems when I tried to print the files on the LaserWriter. If you plan to use *ImageStudio* with *PageMaker*, I'd suggest checking with Letraset before making your purchase—I can't make a definitive statement on printing problems based on a prerelease version of *ImageStudio*.

Other than oversized files, the only notable problem I ran into was sluggish behavior on the part of some of the drawing tools. This could prove annoying when drawing freehand, but shouldn't be a bother during the generally slow and meticulous work of touching up a photo. Finally, although *ImageStudio* works on a Mac Plus, I'd suggest running on a Mac II for best results. A Plus can display only simulated gray scale—pixels are either black or white, and must be arranged in patterns to represent shades of gray. On a Mac II equipped with a graphics card, however,

each pixel can have a shade of gray, producing a much better representation of the final printed output. Retouchers who use *ImageStudio* on a Mac Plus will have to resort to printing numerous proofs on the LaserWriter to see the results of their work accurately.

Any Mac publisher who uses scanned photos should take a look at *ImageStudio*. While retouching digitized photos may not be as noble a pursuit as creating original artwork, it's nonetheless an important aspect of producing professional-looking publications. *ImageStudio*, by enabling artists to enhance scanned images, adds another layer of sophistication to the art of desktop publishing. —Erfert Nielson, *Dithering Idiot*

See *Where to Buy* for product details.

Desktop Publishing the Hard Way

MacPublisher III 3.0

Desktop publishing program. **Pros:** Flexible and precise page-layout tools; capable graphics features; color printing. **Cons:** Unwieldy text formatting and editing; lacks style sheets and batch pagination. **List price:** Version 3.1 \$295. **Requires:** 512K. **Copy protection:** None.



Given *MacPublisher III*'s wealth of sophisticated features, Letraset's sudden decision last summer to drop the program in favor of *ReadySetGo* might, on first glance, be puzzling. But despite goodies like text and graphics rotation, gray scales, and support for full-color printing and PostScript files, *MacPublisher III*'s design suffers from major inconsistencies and limitations. While you can lay out complex pages with precision, and many of the program's advanced features are easy to use, the *MacPublisher III* turns some basic chores into exercises in exasperation, especially when it comes to text formatting.

Layout Strengths

As with most other programs of its ilk, you build a page in *MacPublisher III* by defining component blocks for text and graphics. You place and resize blocks with the mouse, or by typing coordinates into an associated spec sheet. The layout tools are flexible, and snap-to positioning and an automatic sizing feature (a text block can be set to adjust its bottom border as you add or remove text) make accurate work relatively painless. In another nod to efficiency, *MacPublisher III* lets you designate text or graphics as repeating elements such as headers or midpage banners that appear throughout a document, and lets you automatically lay them out on mirror-image left and right pages.

A *MacPublisher III* main document, called an *issue*, contains only the layout of the various empty blocks you've placed. The text and graphics themselves are stored in separate disk files linked to the issue, making it easy to use the same layout as a template for future documents (see "Layout Screen").

Problems, Problems

MacPublisher III is replete with sophisticated typesetting controls, but because the program mangles some basic text-editing functions, you may find it hard to appreciate the advanced features.

One of *MacPublisher III*'s most surprising defects is its inability to handle more than one font or font size in a line of text, or even within one text block. You can work around this limitation by creating a block for each font change, but what would ordinarily have taken a few quick swipes of the mouse may now require many minutes of planning and screen manipulation. And this setup will return to haunt you if make any changes later.

MacPublisher III has separate style-editing and text-editing modes for changing text; switching between the two modes requires a keyboard-mouse command that isn't listed on the menus. In the style-editing mode, you see text styles (italics, boldface, and so on), discretionary hyphens, and the position of tabbed text, but all of these are invisible in the text-edit mode. However, it's difficult to accurately position the cursor for cut-copy-paste operations and for text insertion from the keyboard while in the style-editing mode. Despite these differences, you can change styles or edit the text itself in either mode.

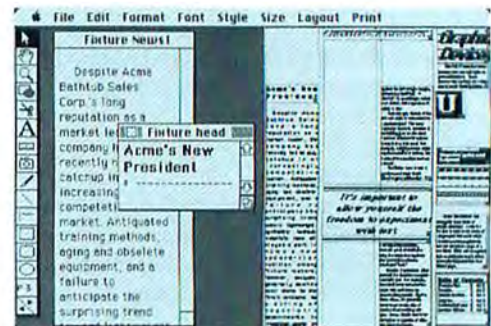
In both modes, *MacPublisher III* inserts invisible-but-editable style characters at the beginning and end of each style change. While you can't see these characters, you can erase them. When making any changes near a style character, it's all too easy to inadvertently remove italics from an emphasized word or add underlining to an entire passage.

While *MacPublisher III* provides good character formatting control, sophisticated kerning and leading features, it's gravely inadequate for paragraph formatting. Not only are reusable style sheets or paragraph format tags missing, you don't even get rulers for defining tabs and indents.

Speaking of tabs, *MacPublisher III*'s implementation of tab stops, which are permanently set at every four spaces, severely limits their usefulness. For all practical purposes you can use only one tab per line—otherwise, text piles up in an unintelligible heap at the end of the line. To further complicate the matter, these preset tabs do not appear in a ruler line. Thus even in the style-edit mode, where you see the results of your tabbing, the difficulty of positioning the cursor makes it hard to line up material. With all of these constraints, it's almost impossible to coax, say, a name and address list into a simple, temporary columnar format within a single text block.

If you think you might get around these formidable formatting limitations by

preparing the text with another program, think again. Although *MacPublisher III* retains text styles when it imports *Word* and *MacWrite* files, it strips out their tabs and font changes, including point size. Text files, by the way, are limited to 32K.

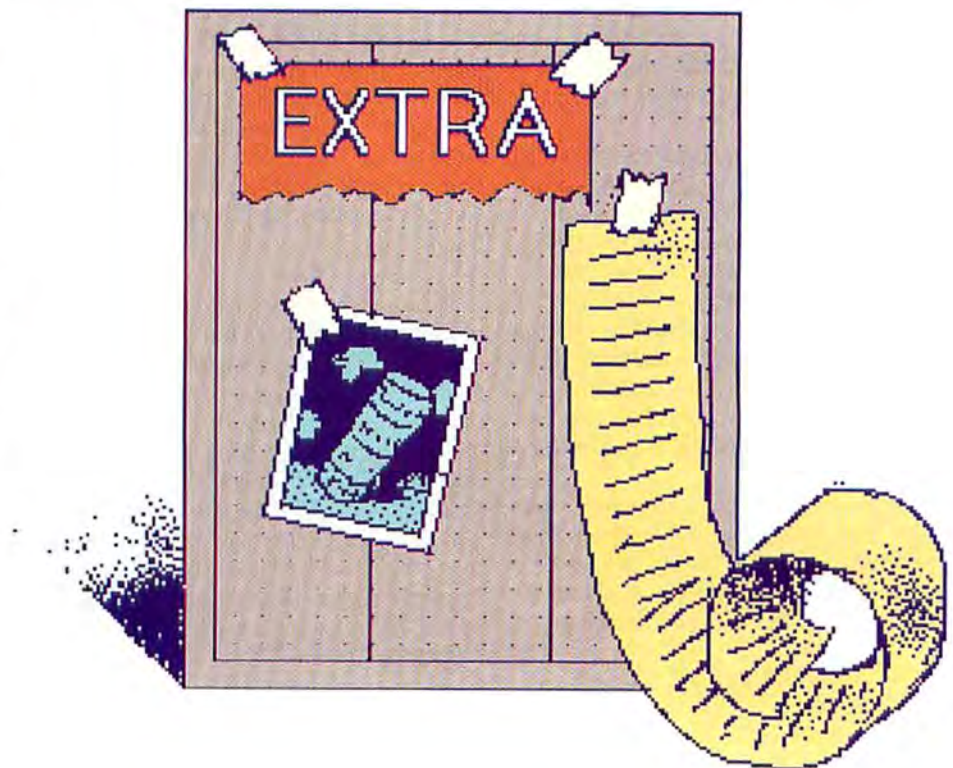


Layout Screen

In this *MacPublisher III* layout screen the two individual short text files on the left have already been placed in the page layout (leftmost column).

The Bright(er) Side

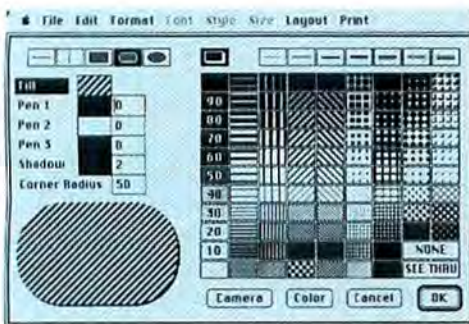
Though *MacPublisher III* lacks a batch pagination feature, you can flow text automatically from one block to carryover blocks. You can only establish links between these carryovers within the original text file. Unlike *XPress* or *Ragtime*, *MacPublisher III* can't link or disconnect any two blocks whenever you like. Instead, to



make text flow into a different location in your document, you must move the carry-over block.

Currently, *MacPublisher III* is unique in its ability to rotate text, an easy-to-use touch that newsletter publishers and ad designers will appreciate. Still, all you see of the rotation on the screen is a rectangular outline, and you can't be sure of how the text will look on the printed page.

If *MacPublisher III* is cumbersome at manipulating text, its graphics capabilities are powerful and simple to use. You can draw lines, boxes, and circles, and you get an extensive palette of fill patterns (see "Graphics Palette"). You can place, crop, scale, or rotate picture files from other applications in bit-mapped, object-oriented, and Encapsulated PostScript formats. The program even supports color on the Mac II, prints in color on the ImageWriter II, and makes color separations on the LaserWriter.



Graphics Palette

MacPublisher III boasts an extensive palette of fill patterns, gray scale choices, and colors. The palette also gives you independent control of three separate borders around boxes and circles.

MacPublisher III can theoretically handle just about any page-layout task, but if your project calls for frequent text-format changes, the eventual results may not be worth the strain. The program is probably best suited for short newsletters with lots of graphics.

MacPublisher III follows real-life page layout too closely. If your needs for desktop publishing software cover a broader range, and you don't require *MacPublisher III*'s unique color or rotating features immediately, you should probably look elsewhere or wait for the inevitable upgrade.
—Steve Cummings

See *Where to Buy* for product details.

Vocab Rehab

Smart Words

Vocabulary-training program. **Pros:** Innovative; accommodates diverse learning styles; makes vocabulary drills interesting. **Cons:** Limited to 600 words; no option for adding new word lists. **List price:** College Prep Vocabulary \$49.95; Essential Business Vocabulary \$49.95; additional data disk \$19.95. **Requires:** 512K. **Copy protection:** None.



An extensive vocabulary is an all-around useful tool. But acquiring one can be as tedious as learning Latin grammar. *Smart Words*, an interactive vocabulary-drill system from Addison-Wesley, incorporates a variety of teaching techniques designed to parry the boredom of word learning and to accommodate diverse learning needs.

Words on the Menu

Smart Words comes in two versions, each with its own vocabulary. The College Prep version is geared toward students who must brave the Scholastic Aptitude Test (SAT) to apply for college admission. The Essential Business version targets the college graduate who is entering the professional job market for the first time. Aside from the different vocabulary sets, the two versions are programmed identically.

The heart of the *Smart Words* program is the Learning Words menu that accesses the basic vocabulary training exercises. Learning Words presents a group of ten words on Flash Cards. Each word has six drill options that allow you to select a Definition, suggested Pronunciation, Background (origin), Context (sample sentence), Synonym, or Antonym.

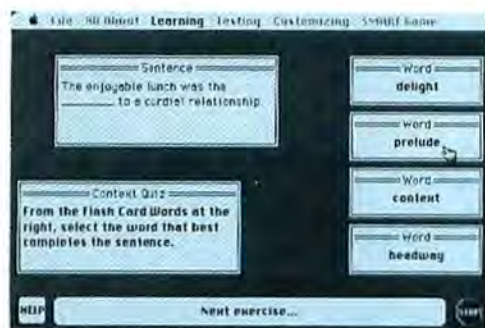
When you've examined all ten words to your satisfaction, *Smart Words* quizzes you with a series of carefully designed multiple-choice questions in a variety of formats. Rather than penalize you for wrong answers, *Smart Words* offers a review hint if you choose two incorrect answers to any question (see "Pop Quiz"). Because some people learn better under pressure, the program also includes a less-forgiving Word Testing menu option that times re-

sponses, forbids retakes, and ruthlessly tallies each mistake.

When you start by accessing the Learning Words or the Word Testing menu, a group of ten words is randomly chosen; you can't specify which group of words you want to work on. With each program version, you can gain more control over your personal curriculum by using the Customized Learning menu. You simply browse through the 300-word list and select the ones you want to study in detail.

Smart Words also features an innovative Imagine option. It is often easier to remember the meaning of a word if you can associate it with an image. The Imagine option suggests a visual image for the word you're trying to learn (see "Visual Mapping"); but if you prefer, you can create your own image, thereby attaching personal associations to a word and incorporating it more naturally into your vocabulary.

The final menu accesses Smart Game, a maze game in which you use word "keys"



Pop Quiz

A series of multiple-choice questions provides you with immediate review at the end of each learning session.

to unlock "doors" to different levels of a complex maze. While this simple game is no *Dark Castle*, it does provide an entertaining facade for serious vocabulary work.

Peccadillos

Smart Words' biggest peccadillo (flaw according to the program) is its limited word list. When compared to the 3000 words covered by Barron's SAT prep book, the *Smart Words* College Prep Vocabulary of 300 words seems inadequate. The publisher, however, is currently considering a revision or additional supplementary data disks for release in early 1988.



Visual Mapping

The *Imagine* option suggests a way to visualize a word's meaning.

Barron's also scores higher than *Smart Words* at providing etymological information to help students learn meanings of words by breaking them down into roots, prefixes, and suffixes.

But *Smart Words* scores bonus points when it comes to motivation; it's a lot more interesting and fun to learn new words with this imaginative interactive program. —George and Susan Beekman

See *Where to Buy* for product details.

How Not to Meet Women

Leisure Suit Larry in the Land of the Lounge Lizards 1.0

Animated adventure game. **Pros:** Humorously animated; tongue-in-cheek "adult" content parodies painful aspects of real life. **Cons:** Meandering, nonviolent script does not provide the edge other action/adventure games do; game contributes nothing to enlightened male attitudes toward women. **List price:** \$39.95.

Requires: 512K. **Copy protection:** Key disk.



Leisure Suit Larry in the Land of the Lounge Lizards, from Sierra On-Line, is an animated adventure game for those tired of zapping and blasting their way through wimpy fantasy kingdoms. The action is set in the American gambling city of Lost Wages; the challenges are divorce, gambling, and middle-age mating. Treacherous, eh? The game has a parental guidance warning and is biased

toward adult males with the courage (and/or practical experience) to identify with a divorced, amusingly ill-equipped soldier in the war between the sexes. As the game packaging loudly proclaims, "Yeah, Larry's a jerk." What's worse, no matter how well you play the game, he remains a jerk.

Modern Urban Singlehood

The evening starts with the animated figure of Larry standing outside a down-scale bar. From the taxi stand outside the bar, Larry is free to visit any of the game's locations in any order. At its best, *Leisure Suit Larry* surprises you with clever animations that make you laugh out loud. At its most boring, the game requires too much time gambling for small change. And at its worst, the game is offensive—not in the way some may feel a film like *Animal House* offends, but in the offensive manner of a man who still calls women "chicks."

The challenge of *Leisure Suit Larry in the Land of the Lounge Lizards* is to discover the specific (and convoluted) sequence of locations and events necessary to reach the final goal. There are fewer puzzle elements than in more-intense adventure games, and more cartoon-like performances—which, however neatly done, render you more of a viewer than a player. The animation runs slowly on a 512K Mac; on a Mac SE, the game is improved by relatively quick, fluid movement.

Adult Adventure?

Larry's idea of an ideal mate is shallow even for a parody. On the reference card supplied with *Leisure Suit Larry*, under Talking to Women it says: "Women can be loads of fun.... Women are also fickle. Do not take 'no' for an answer." The card might just as easily have said, "Women can be flexible. Try asking again."

There are many examples of a fifties mentality that are meant to be satirical but just seem lame. That and the overall looseness of the script deny this game the sharp edge found in successful adventure games. And while there are numerous (usually sophomoric) traditional-male laughs, *Leisure Suit Larry in the Land of the Lounge Lizards* could have been funnier and

somewhat more contemporary if Larry encountered (humorously rendered) women of the eighties. If the fun here suffers in comparison with the raunchy and humorous *Leather Goddesses of Phobos* or *Space Quest* games, it is mostly because of the retrograde subject matter. —Keith McCandless

See *Where to Buy* for product details.

Pace Yourself

Personal Training Systems

Audiocassette and disk-based tutorials for Excel, PageMaker 2.0, Word 3.0, and Works.

Pros: Well-organized and comprehensive. **Cons:** Instruction sometimes too slowly paced; purchasing more than one module may be necessary to make full use of program. **List price:** *Excelerate 1.04* \$39.95; *LearnWord 3.01*, *MasterWorks 1.1*, *PageTutor 2.0* \$49.95 each. **Requires:** 1MB for *PageTutor*, 512K for all others. **Copy protection:** None.



For those who've wanted to attend a seminar to learn some of the more complicated software packages for the Mac but have neither the time nor the cash, Personal Training Systems now offers the next best thing. *Excelerate*, *MasterWorks*, *LearnWord*, and *PageTutor* training series provide comprehensive basic-to-advanced training on *Microsoft Excel*, *Works*, *Word 3.0* and *PageMaker 2.0*. The *Excelerate* series has nine modules, and the others each have three modules. Each module is purchased separately and consists of an audio cassette, a disk, and a command summary card.

Because *Excel*, *Works*, *Word*, and *PageMaker* are so powerful, most people prefer to first master some basics, then use the programs while they gradually learn the more sophisticated features. Any product that enhances this process is a welcome alternative to the cumbersome documentation that often confuses more than it helps. These well-organized training series provide a hands-on, incremental method of acquiring essential skills.

You begin by inserting the training disk in the internal drive and the appropriate program disk in the external drive and starting the audiotape. Every module con-

tains ten lessons, each previewing what will be learned before guiding you through a working session. Next, general principles are developed from the hands-on experience. Finally, by reading a command summary card, you further commit the command sequences to memory.

The Teaching Modules

Each module takes between one and two hours to complete. But since the training disk contains a separate file for each lesson, it is simple to stop a session in the middle of the module and resume later.

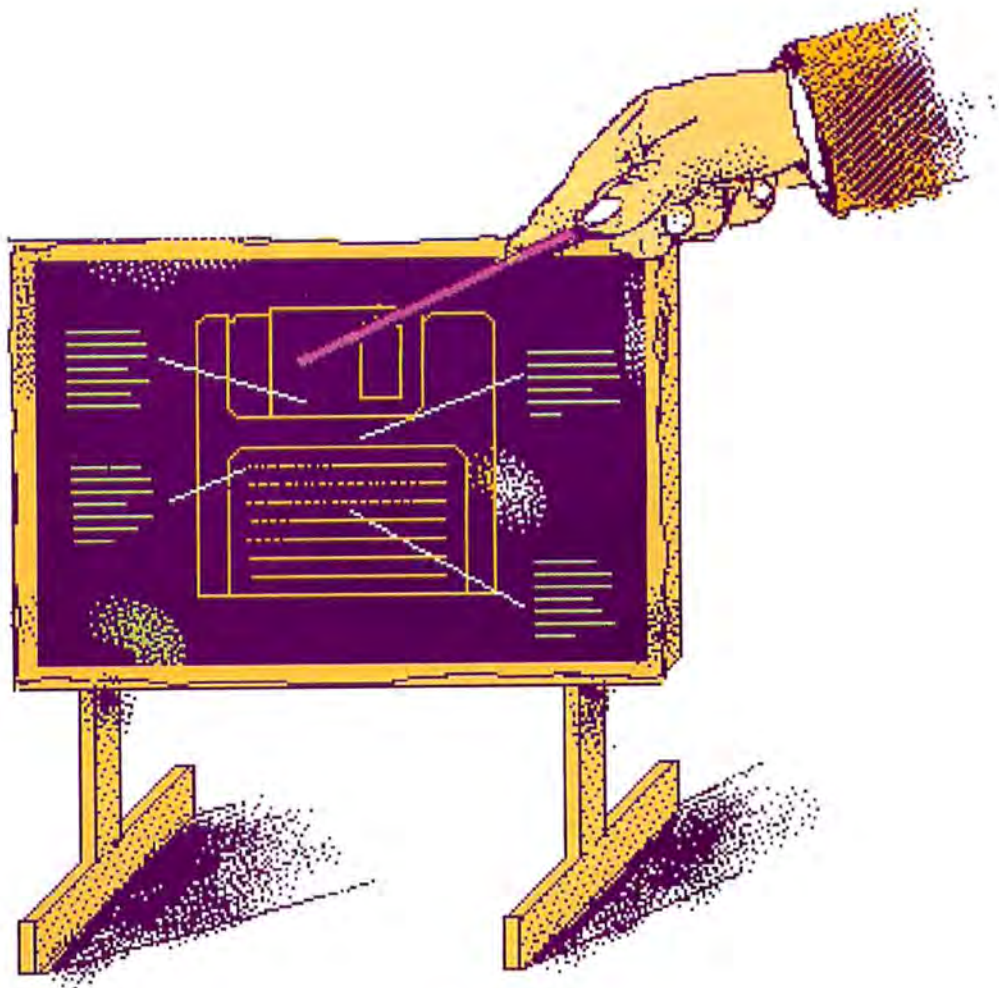
Theoretically, if you expect to use only the basic features of the program, you need only buy the first module of the training series. In some cases this works well; in other cases, it doesn't. For example, Module 1 of *LearnWord 3.0* teaches you to enter, delete, and move text; print; justify; change font style and size; use tabs; create headers and footers; and check spelling. So by the time you finish this module, you will have the tools to create most documents.

On the other hand, Module 1 of *PageTutor* leaves you slightly less prepared for using the program: you learn neither graphics-cropping techniques nor how to delete and insert pages until you get to Module 2.

Excellerate Module 1 is the least self-contained, since it leaves you without the ability to use CLEAR to delete cells, display commas in numbers, delete or insert a row, and copy or move cells. In fact, you'll probably find it hard to create a usable spreadsheet without first going through at least three of the four spreadsheet modules in this series.

A Closer Look at Excellerate

The *Excellerate* series offers two versions of Module 1. Module 1A is called *Fundamental Excel for the First-Time Spreadsheet User* and 1B is called *Fundamental Excel for the Experienced Spreadsheet User*. Each volume teaches the same *Excel* functions. The only difference is that 1A adds auxiliary clauses that explain spreadsheet terms such as cell, row, and column. The modules are so similar that unless you're absolutely certain that an inexperienced spreadsheet user will never use the module, you might as well purchase 1A.

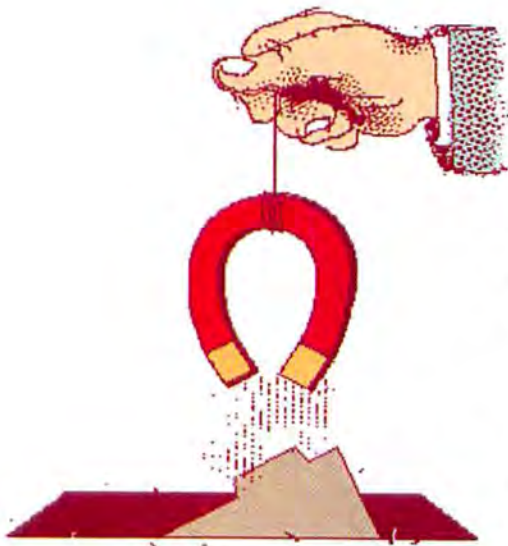


In addition to its spreadsheet application, *Excel* has database management and graphics capabilities; it also provides a macro function for automatically recording a series of actions, which can later be executed with a couple of keystrokes. Therefore, five of the *Excellerate* modules cover those functions. They include Module 2, *Creating Business Graphics*; Module 4, *Building and Using Databases*; Module 5, *Building and Using Macros*; and Module 6, *Advanced Macro Techniques*. Each module is self-contained and complete—and they're perfect for experienced *Excel* spreadsheet users who want to expand their knowledge in particular areas.

One problem with classroom instruction is that it often caters to the slowest student. In fact, that was my only complaint about the tone of this series—it does sometimes seem intended for a particularly inattentive student with a rather poor memory. As a result, some of the narrative has an unfortunate Mr. Rogers-like simplicity and repetitiveness that may send you scrambling for the fast-forward button.

But that's a quibble. In general, these lessons provide a means of learning four very complex programs in well-organized bite-size portions. And whatever problems you may have with the individual modules, if you go through an entire series (which takes about two days for *Excellerate* and one day for each of the others), you'll acquire an excellent working knowledge of the program.—*Lawrence Stevens*

See *Where to Buy* for product details.



The Finder in a Desk Accessory

DiskTools II 1.0

Desk accessory Finder alternative.

Pros: Performs some functions the Finder can't; elegant interface; improves Standard File; flexible Quick Launch feature; compatible with AppleShare. **Cons:** Very large (over 90K). **List price:** \$49.95 (included in DiskTools Plus). **Requires:** 512K. **Copy protection:** None.



Managing an ever-growing assortment of files on your hard disk can become quite a chore when you have to return to the desktop every time you want to copy a file or perform mundane file-organizing tasks. *DiskTools II* from Batteries Included, a division of Electronic Arts, bypasses the trip to the desktop by providing most of the functions of the Finder in a desk accessory; it even performs some functions the Finder can't.

Icon Do It

With 14 icons, *DiskTools II* imitates Finder functions (see "A DA Imitates the Finder"). You merely select a file or group of files (you can operate on multiple files), and then click on the appropriate icon. You can erase, eject, unmount, or change the name of your disk. (Remounting your hard disk is simple, using a menu selection.) Files and folders can be renamed, copied,

moved, found, or trashed. You can create empty HFS folders with a single click. Clicking on any icon will bring up a dialog box related to the operation you've chosen. To delete three files, just select the files, then click on the Trash Can icon. A dialog box tells you how many items you've selected and asks you to confirm deletion. If you hold down the Shift key when you select the icon, the files will be deleted without a warning.

Info at a Glance

To ascertain the combined size of a group of files or folders, select those you want, then click on the Size icon to show the total in a dialog box. This is a function the Finder doesn't provide. When you get file information, you can check the file creation and modification dates, change the type and creator, or set any of the file bits. You can also see how much free memory you have left by clicking on the Question Mark icon. This window also shows your Mac's technical specifications. You can also

Features from other file-finding programs (Apple's *Find File*, PBI's *Locator*, and PCPC's *Eureka*) have been combined to create *DiskTool II*'s Find function. You can search for any file that contains, begins with, or matches the string you type; any file modified on, before, or after a specific date; or any file of the same type or with the same creator as you indicate. *DiskTools II* searches for the files, then lists them in a window. When you select the file, its path appears in another window (see "Finding Files"). If it's only one file you're looking for, just double-click on it after it's been found, and *DiskTools II* will jump to that file, already highlighted in its folder. To locate several files simultaneously, *DiskTools II* lets you copy each path to the Clipboard and later paste the paths into a text-editor DA like *miniWriter*.

DiskTools II can launch applications or documents by double-clicking on a file name. If documents have the same creator, you can launch multiple documents by simply selecting the files and pressing Return.



A DA Imitates the Finder

The *DiskTools II* file management window shows ten icons across the top and four along the right side. You can select multiple files from the file directory list, then click on the appropriate icon to perform the function that the icon represents.

use *DiskTools II* to see how much space you have left on your disks or to look at the files you have on your hard disk.

With its rewritten Standard File, *DiskTools II* remembers how deep you've gone in your folders (even when you are tabbing back and forth between volumes), and it remembers the scroll position of the directory windows. This makes file management easy. Once you locate a file in a folder you can copy it to another folder in another volume without ascending and descending directory paths. You can type a letter on the keyboard to select a file from the *DiskTools II* list; every function has a command-key equivalent.

This is an efficient way to unpack multiple *PackIt* or *PIT* files.

A Quick Launch feature lets you easily launch applications and documents without having to dig through a hierarchy of folders. You can add as many files as you want to the Quick Launch window and rearrange their order by using the Cut and Paste buttons. You can even insert labels (such as "communications" or "utilities") between files to make the list easier to read.



Finding Files

DiskTools II found seven MacPaint documents. The program lists the paths in a scrollable list at the right. You can paste these paths—via the Clipboard—to a text editor for later reference.

DiskTools II is one of seven desk accessories included with *DiskTools Plus*. For \$49.95 you also get a wonderful calendar DA, a free-form phone pad DA, two calculators, a DA that activates windows on the screen, a text-printing DA that allows you to print in the background (but you can't quit the application you're in), and a program to print your calendar files. The whole package is one of the best values on the Mac market today. And *DiskTools II* is the one desk-accessory I can absolutely not live without. It'll help you manage your files efficiently and elegantly. —Rob Hahn

See *Where to Buy* for product details.

Expanding Your Network

MultiTalk MT-100 Port Server

Serial port server for AppleTalk. Pros:

Allows connection of up to three standard asynchronous serial devices to network; automatic configuration for operation at 75 to 9600 baud. Cons: Specific device drivers must be obtained separately. List price: \$695.

Requires: 512K.

NetModem V1200

Network modem for AppleTalk. Pros:

Network users can share a modem; convenient remote operation; answers incoming calls and routes to appropriate network user. Cons: 300- or 1200-baud operation only. List price: \$599.

Requires: 512K.



AppleTalk networks that can connect as many as 32 devices are cost-effective and convenient—and they are proliferating. Two new devices that allow networks to serve more people with fewer devices and greater flexibility are Abaton's MultiTalk, a serial port server that opens networks up to asynchronous serial devices not specifically designed for Apple-

Talk, and Shiva's NetModem, the first modem designed specifically for AppleTalk.

MultiTalk

Ordinarily, only peripherals that understand the AppleTalk communication protocol can be connected to an AppleTalk network. Abaton's MultiTalk port server removes this constraint. MultiTalk consists of a small box with four 8-pin connectors: one for an AppleTalk network connector and three for standard serial connectors. You can connect up to 3 asynchronous serial devices (such as printers, plotters, scanners, modems) to MultiTalk using standard serial cables. By changing the MultiTalk DIP (Dual In-line Package) switch settings you can use up to four MultiTalk boxes in a network and get simultaneous access to 12 serial devices. The serial devices do not have to be compatible with AppleTalk. Operating at 75 to 9600 baud, MultiTalk automatically adjusts to the configuration specifications for a device.

MultiTalk installation is very straightforward, but you must follow a certain sequence, a fact not really explained in the manual. You install MultiTalk by connecting it to the Mac's printer port with an AppleTalk Connector Kit. You connect peripherals with standard serial cables and then plug in MultiTalk. (If it is plugged in before the cables are connected, it will not initialize properly.) The MultiTalk Installer program must be run on the start-up disk for each Macintosh in the network in order to name the available ports (see "Installation"). Once you click OK, the program modifies the System file on the current start-up disk, adding about 4.5K. You can restrict access to sensitive resources, such as a mainframe link, by omitting the port's name during installation. Later you can easily update port assignments using the Installer.

After installation, operation is simple. When an application tries to access the Mac's modem port, a dialog box pops up identifying the serial devices; names of devices that are unavailable are grayed. Although all serial devices connected to MultiTalk are controlled through MultiTalk software, you continue to select other network devices (such as a LaserWriter) from the Chooser.



FRED STIMSON

MultiTalk has several limitations. Unlike Softstyle's *MacEnhancer*, MultiTalk's software does not include drivers for serial devices manufactured by other companies. Mac-compatible device drivers must be obtained from your dealer or the product manufacturer. While MultiTalk is compatible with most communications programs and network software, it is not compatible with *MacLink Plus*, *Telescape Pro*, and *Switcher*.

NetModem

NetModem, a 1200-baud modem and AppleTalk server bundled into a single package, is designed specifically for AppleTalk networks and the Mac. Several features make NetModem's operation as simple and familiar as operating a direct-connect modem. Instead of front-panel status LEDs, which cannot be seen by someone a dozen feet away, the modem's status indicators are displayed in the upper right corner of your screen (see "The Status"). During connection, tones usually made audible by a speaker inside the modem are sent to your Mac's speaker, so that no matter how far away the modem is, you can still hear the progress of the call. Two software-based modem servers, Infosphere's *ComServe* and Mirror's *ModemShare*, lack these convenient features. NetModem also differs from software-based communication servers in its ability to answer incoming calls and notify the appropriate network user that a call has been received.



Installation

MultiTalk's installation program must be run on the start-up disk for each Mac in the network. Here, a dialog box allows you to name each port. Since you can have up to four MultiTalk units in your network, as many as 12 ports can be named, as well as a local modem port.

Further, NetModem is an independent network device; software servers require a dedicated host Mac.

NetModem installation is simple. You attach it to the network using the AppleTalk Connector Kit. Run the NetModem installation program (it places two new files in the System Folder; the System file is not altered). After that, restart the Macintosh (if you don't, it's possible a system crash will occur because NetModem may require more system-heap RAM than has been allocated). Set your communication program to access the modem through the printer port and you're ready to go online. NetModem is compatible with all popular communication programs for the Mac.

Like most modems, NetModem uses the Hayes AT command set. Its speed is limited to 1200 baud, but a 2400-baud version is planned. NetModem lacks a phone connector for the handset of the phone. If you want to use the phone line for voice communication, you have to swap the line connection from the modem to the phone.

Even though all computers in the network can access NetModem, only one computer at a time can communicate online. If the modem is busy when you request access, it can notify you when it becomes available.

MultiTalk and NetModem solve different problems, but both make AppleTalk networks more flexible and cost-effective by allowing network access to resources without tying up a Mac as a server. Both devices are easy to install and are compatible with most existing software. They require

little if any training for users to make the most of the expanded network capabilities. —Nanci Hamilton

See *Where to Buy* for product details.

Working Software Opens Up

Findswell 1.0

File finder. **Pros:** Finds files quickly; great shortcuts through the HFS; easy to install and use. **Cons:** Several applications on the market offer similar features, some for free; does not edit, delete, or move files. **List price:** \$49.95.

Requires: 512K. **Copy protection:** None.

LookUp

Desk accessory dictionary. **Pros:** Quickly checks spelling; guess feature accepts wild-card characters; works with almost all Mac software. **Cons:** Guess feature is weak; full-featured DA spelling checkers are available for similar prices. **List price:** \$74.95. **Requires:** 512K. **Copy protection:** None.

Spellswell 2.0c

Spelling checker. **Pros:** Update adds guess feature and improved proofreading; looks at the number of spaces between words; identifies unpaired parentheses and quotation marks; works with Word 3.01. **Cons:** Weak guess feature; too many unnecessary words flagged by proofreader; accented words cannot be entered in dictionary. **List price:** \$74.95. **Requires:** 512K. **Copy protection:** None.



The Status

NetModem indicates its status with a menu bar front-panel display that resembles the front-panel LEDs of direct-connect modems. The status indicators also serve as the title for a pull-down menu that allows access to several special NetModem functions: Hide LEDs; Release, which allows the modem to be used by others in the network; Attention; and Help. The Call Handler dialog box (displayed using the Control Panel desk accessory) allows you to configure your Mac to listen for incoming calls.



Spellswell, arguably the best spelling checker on the Mac market, used to be Working Software's only product. Then earlier this year it released *Findswell*, a file finder, *LookUp*, a desk accessory dictionary, and *QuickLetter*, a desk accessory letter writer, as well as a new version of *Spellswell*.

Findswell

Findswell, written by David Dunham (author of *Acta* and *MiniWriter*), is an easy-to-use yet sophisticated file finder. Not only does it find the file quickly, it allows you to open the document immediately by double-clicking the mouse. For documents

you frequently use, the program lets you click in front of the file name to leave a check mark. Every time you open *FindsWell*, the names of all the check-marked files are visible and ready to be opened, no matter how deeply the files are nested in the Hierarchical File System (HFS). Above the file names, the program displays the file's path as well as data you'd expect to see in Get Info (see "Dodging HFS").

FindsWell is easier to install and handier than a desk accessory—just drag the icon into the System Folder. You access *FindsWell* by clicking on a button located at the bottom of the Standard File dialog box. ⌘-O then ⌘-F will get you there even faster.

Launcher, another icon on the *FindsWell* disk, opens applications. I find it only marginally useful, as it does not have *FindsWell*'s search functions, and it will not simultaneously launch a document with an application.

LookUp

LookUp is a dictionary DA that appears as an item in the menu bar of most applications and lets you quickly check the spelling of a word. To tell whether a word is spelled correctly, you simply select the word and a ⌘-key combination. If you've spelled it correctly you'll hear a beep; if the sound is turned off, a dialog box will appear confirming your spelling. If the word is spelled incorrectly, a full window opens. Like *Spellswell*, *LookUp* offers three choices for finding the correct spelling:



you can scroll through the dictionary (when you click on a suspect word in the text, the program locates the closest alphabetical match to the word you select); you can type in a word and the program automatically searches for the closest alphabetical match; or you can select the Guess button, which guesses the correct spelling phonetically. If you only know part of a word, you can use wild-card characters. *LookUp* uses *Spellswell*'s dictionary—in fact if you have *Spellswell* on the same disk they can share the dictionary. Double-clicking on the correct spelling enters it in the text of almost all Macintosh applications, including other DAs. Notable exceptions are *OverVue* and *Microsoft Excel*.

Spellswell

Spellswell, Working Software's spelling checker, is now out in version 2.0c (For a review of the previous version, see *Reviews*, *Macworld*, August 1987). Those who already have it will definitely want the \$15 upgrade. The most important improvement is the addition of a Guess feature. Clicking on the Guess button, then double-clicking on the correct spelling, is the

fastest way to correct errors—even typographical errors—in any spelling checker. *Spellswell*'s new guessing ability is good, but not as thorough as Electronic Arts' *Thunder*.

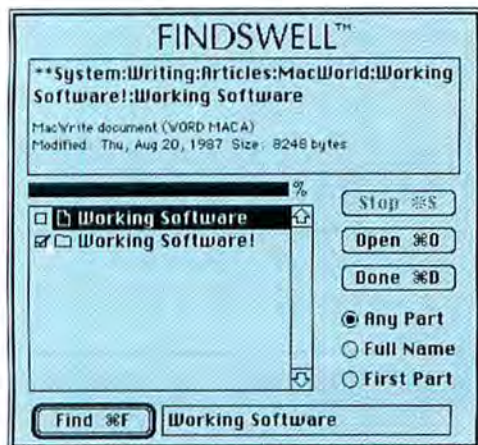
Spellswell's proofreading capabilities have also been improved. The program checks incorrect spacing between words and punctuation marks, and unpaired quotation marks and parentheses. Unfortunately, this causes the program to suspect such words as *Mr.* and *Dr.* because they often don't have two spaces after the period.

Spellswell is the first independent spelling checker to work correctly with *Word* 3.0 (and 3.01). A Transfer menu item has also been added to speed up switching between *Spellswell* and a word processor. Supplemental legal and medical dictionaries are available for \$99.95 each.

QuickLetter

I looked at a prerelease version of Working Software's most unusual new product, a word processor DA designed for writing letters. Its unique features so speed up and simplify the chore of letter writing that I expect *QuickLetter* will become very popular.

To create a letter with *QuickLetter*, you choose a form letter from those includ-



Dodging HFS

FindsWell is fast and easy to use. Here it shows the path to the selected document, as well as the Get Info data. Putting a check in front of the document ensures that its name will be in the window the next time you open *FindsWell*. Double-click on a document's name to open it.

ed on the disk, or a custom stationery page (or style sheet) you've previously designed. You then open the Address Book and find or enter the name of the person you're writing to. There are additional lines in the Address Book for notes and the preferred salutation for each individual. An Auto-Paste button puts the name and address at the top of the letter and on the envelope template, and enters the salutation. A date stamp adds the day's date. A page-preview function lets you grab and drag the text on the page to center it. There are even envelope templates that include your return address. *QuickLetter* also shows you how to align each type of envelope in each printer.

Priced at \$129.95, *QuickLetter* includes roughly the same word-processing features as *MacWrite*. Notable exceptions: you can have only one ruler per document, tab functions are elementary, and graphics cannot be on the same line with text. *QuickLetter* can read its own format, *MacWrite*, or ASCII text. It can export data as ASCII text.

Working Software's *Spellswell* and related dictionary products are the best spelling checker options on the Mac market today (see "The Final Spelling Test," *Macworld*, October 1987, for an in-depth comparison). *Findswell* is small, fast, and easy to use—a likely candidate for the most popular of the recent file finders. Working Software is gaining more attention for its fairly priced, well-crafted products and excellent customer support. —*Scott Beamer*

See *Where to Buy* for product details.

The Musical Tutor

Listen 2.0

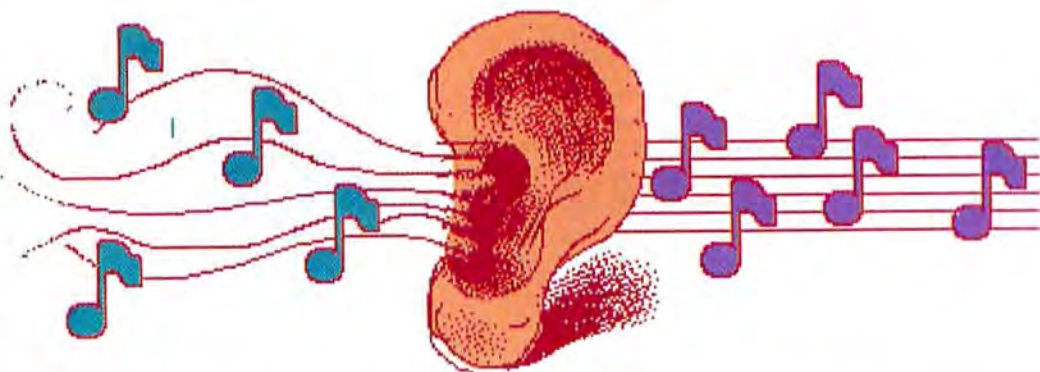
Ear-training drills. **Pros:** Provides easy-to-use drills for amateur and professional musicians; level of difficulty easily adjustable by user; works with MIDI instruments. **Cons:** Does not include drills for rhythmic notation/accuracy.

List price: Version 2.1 \$99. **Requires:** 128K.

Copy protection: Key disk.



Unfortunately, exercises vital to a music student's understanding of melodic and harmonic structures are also repetitive, time consuming, and often terribly boring. This is especially true of ear training, which teaches an aspiring



musician to recognize chords, note intervals, and melodic lines through a series of drills that can severely try the patience of even the most devoted student and professor. Music educators found a solution in Apple II programs, which provided a variety of learning levels simultaneously, repeated exercises indefinitely, were more accessible than human tutors, and were infinitely more patient. Imaja's *Listen 2.0*, an ear-training program for the Mac, adheres to this approach. (Version 2.1, the current shipping version, is available from Resonate.)

Listen includes 15 different exercises that are grouped into three main areas: melodic exercises to improve melodic memory, sequence, and range; interval exercises to stress pitch relationships; and chordal exercises to improve recognition of chord types and inversions.

Like those used in college ear-training or music theory courses, *Listen*'s drills are logically laid out, practical, and extremely flexible. The user can easily adjust the difficulty, length, mode, timbre, and range of the melody and interval drills. Chord drills can be preset to include everything from simple triads to half-diminished 13th chords. Other user options set the first note displayed in the chord (if any), the types of inversions used, and the first note played in the chord. This flexibility not only increases the program's usefulness for both beginning and advanced students, but also enlivens what would normally be a tedious set of exercises.

Answers with MIDI

Listen displays information in three main windows: Piano, Guitar, and Progress. Answers input with the mouse or the MIDI

(Musical Instrument Digital Interface) keyboard appear on the keys of the Piano window or on the frets of the Guitar window. The sound is played through the Mac's internal speaker and through the MIDI keyboard if it's hooked up.

Listen's MIDI implementation is quite well thought out. The program lets you vary clock speed, serial port, and MIDI channel. While whole chords cannot be played into the program at once, *Listen* will accept arpeggiated notes relatively quickly.

Listen's piano-keyboard input option reinforces the relationship of the note sounds with their locations on the piano keyboard. Since nearly all college music programs require piano literacy, this is an important feature.

The Progress window displays instructions for the current drill, time elapsed since the exercise began, number of correct and incorrect answers, and hints suggesting which answers were wrong and why (see "Progress Window"). The program displays two other sets of information: the Timer window, which shows how much time remains before an answer is



Progress Window

The Progress window tallies the correct and incorrect responses in a sequence of notes. A check mark indicates a correct answer, while an X above or below a line indicates an incorrect answer that is too high or too low.

required (determined by user); and the Notation window, which shows the drill's questions and answers in standard musical notation. Unfortunately, if you use the Notation window, the answers remain in view during the drill.

Listen sets some new standards for music education software in ease of use and flexibility. Several colleges have already incorporated *Listen* into their regular ear-training/music theory curricula. Although a set of exercises to strengthen rhythmic accuracy and notation would make it more useful, *Listen* is still one of the best pieces of music education software currently available for the Mac.

—Erik Holsinger

See *Where to Buy* for product details.

Courseware Construction Set

Course Builder 2.0

Courseware authoring language. **Pros:** Simple, icon-based programming; creates stand-alone applications; built-in drawing and animation tools. **Cons:** Inability to mix fonts and styles in text windows; lack of support for gray scale or color. **List price:** \$395. **Requires:** 512K. **Copy protection:** None.



Although specialized systems for courseware development have been used on mainframes for many years, the Macintosh has been limited to traditional computer languages like Pascal that aren't well-suited to developing instructional programs. TeleRobotics International has changed all that with *Course Builder*, a new authoring language that combines the Mac's ease of use with the powerful tools needed to write courseware incorporating text, graphics, animation, and sound.

Building Blocks

Course Builder programs are constructed from blocks that are represented by icons in the Tool Palette (see "Blocking It Out"). Blocks can be cut, pasted, or

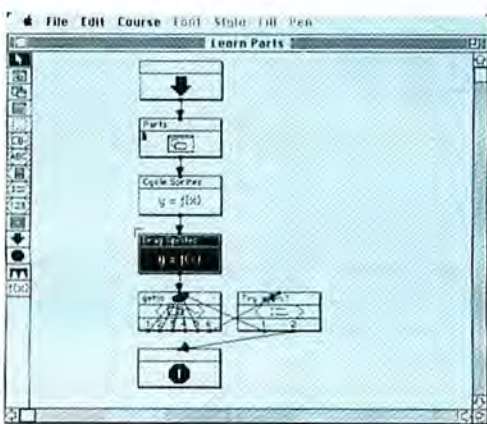
moved, singly or in groups. An invisible grid automatically aligns the blocks in neat rows and columns. However, unlike *MacDraw*'s grid, *Course Builder*'s grid can't be turned off.

Course flow within a program is designated by arrows you draw by dragging the cursor from one block to the entry point of another. Since there aren't any restrictions on the number of arrows or their direction, complex course windows tend to look like rush-hour traffic. Flow along any path can be dependent on the values of up to five different variables, such as the time taken or the number of attempts made to respond to a question correctly. *Course Builder*'s conditional branching capabilities allow for the implementation of elaborate teaching strategies.

Blocks that comprise a subsection of a given course can be conveniently grouped within larger, specialized blocks called *nests*. Although flow within nests can be controlled entirely by arrows, *Course Builder* also allows random and linear branching for writing drill-and-practice applications. Another type of block, the *list access nest*, gives the student direct access to any block via a scrollable list of all the blocks within a nest.

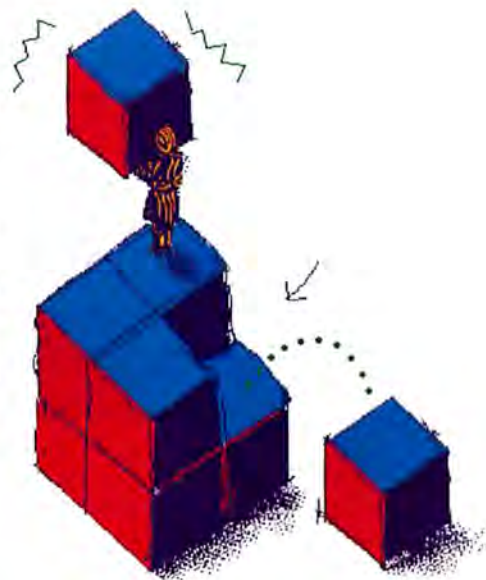
Ins and Outs

Course Builder provides for a rich variety of input methods, including typing, menu selection, and clicking on regions or radio buttons. Text input can be scanned for the presence of particular combinations of character strings, and up to ten different reply-dependent exit paths can be specified. The author can choose to ignore



Blocking It Out

Courseware is constructed from basic building blocks selected from the Tool Palette on the left, with flow between blocks indicated by arrows. As blocks are added, a flow chart of the course builds up.



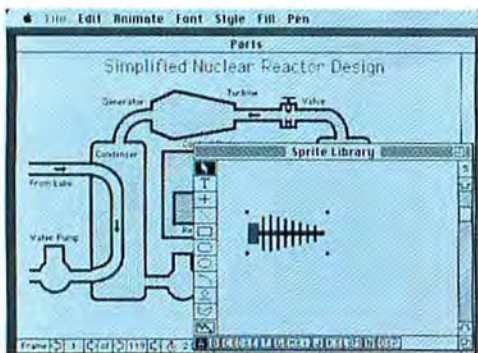
case, punctuation, or extra spaces in an answer, and a time limit can be set for each response. The only missing feature is the capability to search for phonetic equivalents of specified words or phrases.

Text output is done in text windows, which unfortunately limit you to only one font, size, and style for all the text in a window.

If Apple's *Macintosh* driver is in the System Folder, the text can be presented in synthesized speech. (*Macintosh* is included with *Course Builder*, but the current version is incompatible with the Macintosh II). *MusicWorks* and digitized sound files can also be set to play as text is displayed.

Course Builder really shines in its animation sequences, which are programmed using design blocks and consist of a succession of static background frames with superimposed moving elements called *sprites* (see "The Sprite Stuff"). The design window in which the backgrounds are laid out provides many of the object-oriented drawing tools familiar to *MacDraw* users, as well as several bit-mapped graphics tools. Pictures can be imported through the Clipboard, but color and gray scale aren't supported.

Sprites are also designed using object-oriented drawing tools and are overlaid on the background frames. Specifying sprite movements is very easy: you set the starting and ending positions of the sprite, and *Course Builder* fills in the intermediate positions for you. Complex simulations are possible using the animation sequences in conjunction with calculation blocks, which let you manipulate variables to de-



The Sprite Stuff

Sprites are animated graphic elements in front of static backgrounds. Each animation window can have up to 32 of them, and each sprite can have up to 16 different "poses," such as the successive positions of a person walking.

termine the position and other attributes of the sprites.

What's the Score?

No course authoring system would be complete without facilities for recording student responses, scoring, and course registration. *Course Builder* can generate several types of report files, ranging from simple statistics to complete records showing every type of input and every branch taken. There are also sets of internally maintained variables on which a student's path through a lesson can be based, via conditional arrows. *Course Builder's* registration function is limited to specifying names and passwords for up to 200 students per course.

A major bonus is the program's ability to save courses as documents or as stand-alone applications that can run on any Macintosh without the need for a run-time module.

Individually, *Course Builder's* building blocks are easy to use, but developing courseware remains a time-consuming and intricate task. *Course Builder* can no more help you create effective course material than a word processor can improve your writing. The documentation, although complete, would benefit from additional examples, as well as a more comprehensive index. Also, *Course Builder* sometimes seems to overuse the Macintosh interface, forcing you to click on items to fill in formulas rather than allowing you to type them out.

Although at first glance it might seem that Apple's *HyperCard* can duplicate many of *Course Builder's* functions, *HyperCard* lacks the sophisticated animation features, it is less flexible in its manipulation of windows, and it is not as well suited to writing interactive simulations. *Course Builder's* ability to create stand-alone applications is another big plus not found in *HyperCard*.

All in all, *Course Builder* is an excellent choice for writing instructional software on the Mac.—*Franklin Tessler, M.D.*

See *Where to Buy* for product details.

More on Hand

PowerStation 1.0

Finder alternative. **Pros:** Excellent, intelligent Finder replacement; versatile application- and document-launching configurations; good documentation. **Cons:** Buttons can't be resized. **List price:** Version 1.1 \$59.95, includes Pyro screen saver. **Requires:** 512K. **Copy protection:** None.

Suitcase 1.0

Desk accessory organizer. **Pros:** Circumvents problem of limited fonts and desk accessories in System file; smart handling of desk accessory/font conflicts. **Cons:** None. **List price:** \$59.95, includes Pyro screen saver. **Requires:** 512K. **Copy protection:** None.



The Finder is more than adequate for general file maintenance, but it's beginning to show its age. It can be a downright nuisance to dig through layers of folders to find misplaced documents; worse are those spectacular crashes produced by System files overloaded with desk accessories and fonts. Two new products from Software Supply, *PowerStation* and *Suitcase*, improve the System's file- and DA-management capabilities. Even though they're sold as separate products—and are not inexpensive—you'll probably want them both.

Feel the Power, Luke

Although there are several public domain and shareware Finder replacements (such as *Oasis* and *WayStation*), *PowerStation* is the most powerful and elegant offering yet. It lets you group applications

and documents without using folders (although it isn't meant to replace the folder metaphor), and it's fast.

PowerStation pops up whenever you start up your Mac or quit a program (much like the Finder does, although *PowerStation* loads more quickly). The main *PowerStation* window consists of a menu bar and lots of buttons. You can create up to 16 screens or "pages" of buttons. Each button can launch an application, open one or more documents, or open a desk accessory. If your Mac has a large external monitor, or if you use a Mac II, the number of buttons per screen varies: more screen space, more buttons. Each page of buttons is instantly accessible by clicking the mouse or entering a keyboard command. You assign each page of buttons a name (like "graphics") and then install the corresponding applications, documents, or desk accessories into the buttons on the page (see "Graphics Page"). You can label the buttons as well as cut, copy, and paste them (on the same page, or between pages), but you cannot change the button size.



Graphics Page

The buttons on this page open graphics applications and documents. The arrow buttons located at the bottom of the screen represent other pages of buttons.

PowerStation offers a variety of ways to automatically rearrange the buttons on a page. If an application can create its own documents, then *PowerStation* puts a small document icon next to the program button. When clicked, the document icon opens into a larger window in which you can install documents from any number of different folders. You may choose to have a document preselected in this window—a useful feature if you always start your word processor or page-layout program with a



custom dummy document. One of *PowerStation*'s most useful features is its ability to install in the document launching window, in one alphabetized, scrollable list, all of the files created by an application.

PowerStation features full keyboard support. You can activate ⌘-key combinations, select a button by typing the beginning of its name, and launch the application for a selected button by pressing the Return key. The Mac Plus cursor keys allow you to move between pages of buttons and between individual buttons. Software Supply offers full online help and a summary of all the ⌘-key combinations and shortcuts in the program. *PowerStation* lets you automatically print single or multiple documents (like the Finder's Print command does). The program's documentation is extremely well written and complete.

May I Take Your Suitcase?

Many technically oriented Mac owners delight in cramming more than 15 desk accessories into the System, regardless of how unstable most System files become when subjected to this sort of hacking. Software Supply's *Suitcase* DA manages your desk accessories and fonts by giving you access to them through *Suitcase* rather than through your System file. The program also manages F-keys, although you still need Carlos Weber's *FKey Manager* to create your F-key file.

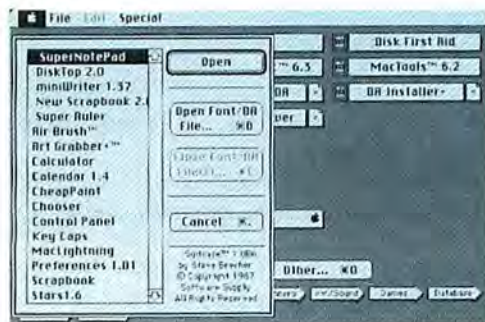
When it's placed in the System Folder, *Suitcase* appears as a desk accessory when you boot up your Mac (it's an Init that installs itself in the Apple menu—no Font/DA Mover required). You create a new folder inside your System Folder to hold desk ac-

cessories and fonts. Any desk accessory or font file you put inside this folder will appear in your menu the next time you boot up (see "One DA"). While testing *Suitcase*, I installed about ninety desk accessories in my System; *Suitcase* did a superb job of managing them, along with my bit-map and LaserWriter fonts.

Software Supply designed *Suitcase* to be operated with keyboard commands as well as mouse clicks. You can open *Suitcase* with a ⌘-key combination, scroll through a list of all installed desk accessories with cursor keys, or select a DA by typing the first few characters of the file name.

Pyromania

Included with both *PowerStation* and *Suitcase* is a screen-saver Init called *Pyro*, which wins a prize for displaying the prettiest show of any Mac screen-saving utility. Fireworks erupt on the screen, and if you are using a Mac II, they're in color. Those



One DA

By installing *Suitcase* in your System file you have access to an almost unlimited number of desk accessories and fonts. When desk accessories are not installed directly into the System file, backing up your hard disk becomes a simpler task.

using System version 4.1 or later can set *Pyro* preferences in the Control Panel to determine whether background tasks like spooling should continue when *Pyro* is on. (Those using older System versions can set these parameters with a separate application.) Since *Pyro* does interrupt printing and downloading, it will not load if those functions are in use.

Software Supply has provided the Mac community with high-quality, indispensable software. Once you've used *PowerStation* for more than an hour, you'll wonder how you lived without it. When it's used in conjunction with a good file-management DA (such as *DiskTop*, *DiskTools II*, or *HFS Locator Plus*), the Finder can be completely bypassed, adding considerable overall speed to your system. If you have a hard disk, get *PowerStation*. You won't regret it. And for access to virtually unlimited numbers of fonts and desk accessories, there is simply no better utility than *Suitcase*. Even though some may consider these products to be priced slightly high, the old saying "you get what you pay for" was never more appropriate.

—David Biedny

See *Where to Buy* for product details.

Mail-Merging Power for MacWrite

MergeWrite 1.0.

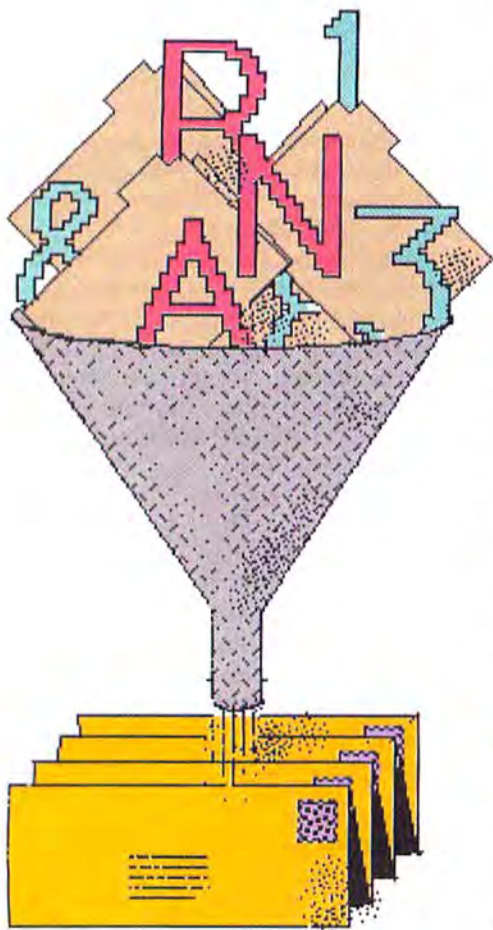
Mail merge for MacWrite. **Pros:** Allows MacWrite users to do mail merges; provides for conditional inclusions, range selection, and data verification of each record. **Cons:** Can't edit text in program; no keyboard equivalents.

List price: \$49.95. **Requires:** 512K.

Copy protection: None.



To prepare form letters with *MacWrite* you've always had to change the address and salutation before printing each copy. The original version of *Microsoft Word* offered a mail-merge feature, but it had some peculiarities. For instance, you couldn't interrupt a print merge in process, and the program would flash messages like "Data Record Too



Long" without suggesting a way to fix the problem. Also, you couldn't see on screen exactly what would be printed. Software Discoveries' *MergeWrite* eliminates these problems, and does so inexpensively.

Merger Mania

To set up a merge file, first create the form document in *MacWrite*. As you enter the text, type in field names where you want the program to insert appropriate data. *MergeWrite* offers a choice of field markers: square brackets ([]), curly brackets ({}), or the familiar international quote marks used with *Word* (« »). The program lets you insert conditional instructions to further customize a document.

As with most other merge programs, you need to set up a separate data document that contains the information to be merged with each field name. This data document can be a *Record Holder* file, an

ASCII file from another database program, or a text-only file created by *MacWrite*. (*MergeWrite* will not accept text-only files from other word processors unless they can be saved to *MacWrite*.)

Users may select field and record delimiters; the default settings are for tabs between fields and returns between records. This control makes it easy to select a delimiter that doesn't appear in the document—a big improvement over *Word*.

To print a merge document, simply quit *MacWrite*, open *MergeWrite*, and select the documents to be merged. The program lets you control the printing process: you can sort records by any field, merge any range or the entire list, and check the accuracy of each record before printing. It's a fairly easy process. The clear documentation helps when preparing complicated conditional instructions.

Unfortunately, you can't edit anything in *MergeWrite*. If you see an incorrect entry you must either skip the flawed entry and complete the merge print or abort the whole process, go back into *MacWrite*, fix the entry, and then return to *MergeWrite*. Now you can select a range starting where you left off. This means you don't have to reprint the entries you've already printed correctly.

Unlike *Word*, *MacWrite* doesn't allow new lines without new paragraphs; if data records have different numbers of lines, you must embed an extra return in the data field and surround the field with quotes.



Setting Delimits

MergeWrite lets you choose your own delimiters for both the form and the data document.

I tested the program with both *MacWrite* 2.2 and 4.5, using conditionals and complicated formats. The program worked beautifully; the only problem was that the one keyboard command it supports (⌘-Q to quit the program) didn't function.

For the price, this program is hard to beat. I would recommend *MergeWrite* to any *MacWrite* user who'd like to do mail merges, although if you're already using a word processor with built-in merge, you're probably better off staying with it. You can use *MergeWrite* with the View module in Cortland Computer's *Top Desk*—a desk accessory that lets you cut and paste multiple documents—and the cursor key support offered by *MacWrite* 4.6. This combination makes *MacWrite* the word processor it should have been all along.

—Shel Horowitz

See *Where to Buy* for product details.

A Choice Environment

TML Modula-2 for MPW 1.0

Modula-2 compiler, MPW tool. **Pros:** Low price; good code quality; examples; works with other MPW compilers. **Cons:** Lack of type-transfer functions (type coercion). **List price:** \$99.95. **Requires:** 512K. **Copy protection:** None.



TML Systems developed *TML Pascal*, the first native Pascal compiler for the Macintosh. Now TML has released a Modula-2 compiler for MPW (the *Macintosh Programmer's Workshop*), offering a high-quality product at a very reasonable price (*MPW Pascal* and *MPW C*, for example, cost \$125 each for version 1.0 and \$175 each for 2.0 beta versions). Another MPW Modula-2 compiler, from SemperSoft, will be released in a few months.

What's the reason for this surge of interest in Modula? Simply this: Modula is the language in which Niklaus Wirth claims to have "fixed" the shortcomings and omissions in his original design of Pascal. It has numerous attractive features, including based variables (you may optionally specify that a given variable "resides" at a spe-

cific address), procedure variables and parameters, and encapsulation of local modules. The syntax is similar to Pascal (though not identical), while the approach is closer to that of C (you can bend the rules considerably as long as you notify the compiler of your transgressions).

Compiler

TML Modula-2 works equally well with both *MPW 1.02* and *MPW 2.0B1*, and it conforms to the conventions established by the Apple compilers. The shell variables the compiler uses in searches are *MInter*-*faces* (for compiled Definition Modules) and *MLibraries* (for Object Modules). This corresponds to the *PInter*-*faces*—which the more familiar Pascal compiler uses—and the *PLibraries* that contain Object Modules. The C analogs are *CInter*-*faces* for .h files and *CLibraries* for object files. Even the compiler options match Pascal conventions when there is an equivalent capability.

The documentation is well organized and includes a useful index. The manual is as complete as the generally satisfactory *TML Pascal* manual, and it's well written (despite occasional spelling errors). *TML* provides informative examples, and the original sources are fully accredited.

One annoying deficiency of the compiler is the lack of type-transfer functions. With type-transfer (called coercion in Pascal and casting in C), it's possible to signal the compiler to relax type checking in certain instances. Often this permits more compact programming by allowing otherwise "illegal" operations. While *VAL* can provide an equivalent function, its use makes the code larger and slower. It introduces an extra function call in the program and requires temporary variables to hold the results of calls to *VAL*, thereby increasing code size.

The compiler allows for the creation of "textbook" applications in a manner totally transparent to the user. Running these applications, you see a single window and operate as if you were using a less capable machine (a PC, maybe?). Full support for *Inside Macintosh* volumes 1-5 is provided. The provided *SYSTEM* module also supports *INLINE* and *CODE* procedures, greatly enhancing low-level access to the machine. The current release does not have 68020 or direct 68881 support.

I have a few minor suggestions for improving *TML Modula-2*, other than inclusion of type-transfer functions. Support for sets larger than 16 elements (*BITSET*)—at

How Much, How Soon, How Fast

Application Size (in bytes)

Development Environment	MiniEdit	CatchMe	FileDemo
TDL Modula-2 1.00A	11,861	4928	8520
TML Modula-2 1.0	12,982	4606	7986
TML Pascal 2.02	10,611	3894	6809
MPW C 2.0B1	12,112	4228	7143

Three programs were used to gauge how large an application each development system generates: *MiniEdit*, by Stephen Chernicoff; *CatchMe*, by Bob Perez; and *FileDemo*, by Chris Morgan.

Development Environment

Development Environment	Compilation Time (in seconds)
TDL Modula-2 1.00A	212
TML Modula-2 1.0	176
TML Pascal 2.02	89
MPW Pascal 2.0B1	181

This table shows how long each system took to compile and link *MiniEdit* to create a stand-alone application.

Development Environment

Development Environment	Solution Time (in seconds)
TDL Modula-2 1.00A	0.4
TML Modula-2 1.0	0.8
TML Pascal 2.02	0.8
MPW Pascal 2.0B1	0.8

TDL Modula-2 was able to solve Towers of Hanoi with 9 disks in half the time it took the other systems.

least to handle *SET OF CHAR*—would help. A more integrated interface (like that of *TML Pascal*) would free the programmer from having to remember which chapter of *Inside Macintosh* defines which routines, types, and variables. This would make *TML Modula-2* read a larger symbol file at compile time (although it no longer needs to open and close as many files), but would eliminate much file referencing by the programmer.

Like *MPW* itself, the compiler will run on a 512K Macintosh with at least 800K of

disk space. But it's inconvenient to use with anything smaller than a Mac Plus with a hard disk. The large capacity is not required by the compiler, but by the sheer scope and size of *MPW*.

TML has delivered a fine product at a reasonable price. Its support and upgrade policies are among the best in the business, which implies that the product will get even better and not cost a lot when it does. If you have *MPW* and are interested in *Modula-2*, you will like this product.

—Dennis Cohen

See *Where to Buy* for product details.

Change Procedure for the Invoice Entry Form Views:

```

CASE (Status) OF
  WHEN 1 DO
    (AmountInvoiced) = (AmountInvoiced) + (
      Invoice)
  WHEN 2 DO
    SETNEXTFIELD("New Customer Form")
  WHEN 3 DO
    (Date "LastInvoiced") = (AmountInvoiced)
  OTHERWISE

```

Path: To:

Relations:

Fields:

Context Menu Options: BREAK, CASE, EXIT, FOR, IF, LOOP, NEXTBROWSE, PREVIOUS, PRINT, PRIORBROWSE, PROJECT, REPORT, SETBROWSE, SETNEXTFIELD, SETNEXTFIELD, USE, UNTILE

Buttons: Clear, Verify, OK, Cancel

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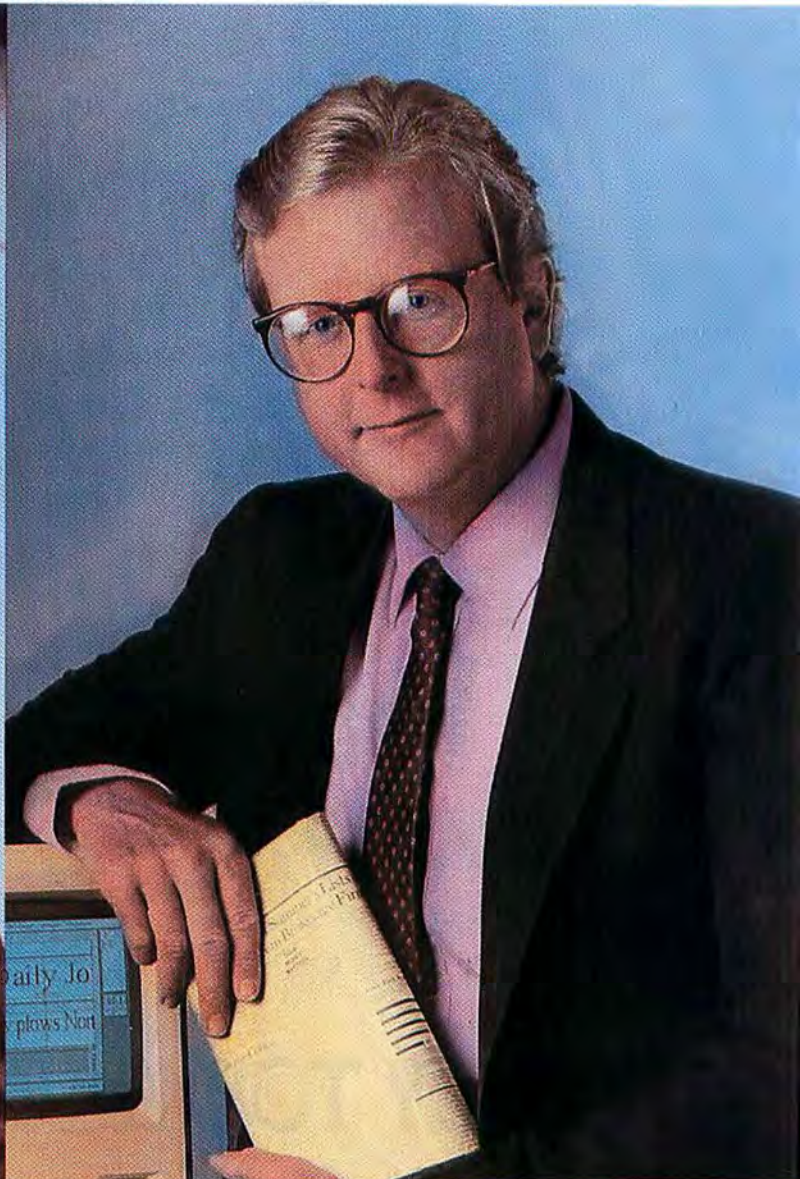
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New Products

*Information on the Mac's latest software,
hardware, and accessories*

Edited by Eileen Drapiza

This section covers Macintosh products formally announced but not yet evaluated by *Macworld*. All prices are suggested retail. Please call vendors for information on availability.

SOFTWARE

ADS-Architecture, ADS-Electronics Symbol libraries for *MGMStation* CAD. Architectural symbols in ANSI standards and electronic and electrical design symbols. 512K min. memory. *ADS-Architecture* \$125, *ADS-Electronics* \$195. Compu-Arch, 213/281-5933.

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ArtDisk 1 & 2 Bit-mapped graphics. Vol. 1 includes files of buildings and landscapes; Vol. 2 includes files of people, animals, and birds. \$19.95 each. D.V. Franks, 919/848-9935 or 919/890-1256.

BAKERForms Four accounting packages for *Microsoft Works*. Accounts Payable package automatically balances check-books and prints checks; Payroll package generates payroll reports; Purchasing package prints purchase orders; Accounts Receivable package prints invoices and monthly statements. 512K min. memory. \$169.95 (\$49.95 each). Baker Graphics, 617/996-6739.

Business Class Customizable desktop travel planning tool that allows easy access to thousands of travel facts. Built-in phone interface. 512K min. memory; requires *HyperCard*. \$69.95. Activision, 415/960-0410.

Capps' Editor-construction kits for *Light-speedC* and *Light-speed Pascal*. \$75.

Think Technologies, 617/275-4800 or 800/648-4465.

CoCoPro Estimates resources needed to complete software development projects. 512K min. memory. \$495. Iconix Software Engineering, 213/458-0092.

ERVision CASE tool for database design. Creates and edits entity-relationship diagrams. 512K min. memory. \$150. Andyne Computing, 613/548-4355.

Fastback Hard disk backup/restore utility. Backs up 10MB hard disk in less than 10 minutes; recovers data from damaged backup disks. 512K min. memory. \$99.95. Fifth Generation Systems, 714/553-0111 or 800/225-2775.

Focal Point Customizable time- and information-management system. 512K min. memory; requires *HyperCard*. \$99.95. Activision, 415/960-0410.

Graham Speller Spelling checker DA. Checks words as you type, with 75,000-word dictionary and 25,000-word thesaurus. 512KE min. memory. \$33.95. Graham Software, 303/422-0757.

Mac II Tools Disk for MacForth Extension set for *MacForth Plus*. Includes 68020 assembler and floating-point coprocessor. Supports color. 1MB min. memory. \$79. Creative Solutions, 301/984-0262 or 800/367-8465.

MacAtlas Professional Version Clip-art collection with more than 60 PICT-format U.S. maps showing country, state, and county borders. \$199. MicroMaps, 609/397-1611.

MacCOGO Determines geometric/structural shape properties. 512K min. memory. \$95. Erez Anzel Software, 416/738-4601.

MacOilie Geo-utility program performs math computations commonly used in petroleum industry. 128K min. memory. \$39. No phone number listed. Old Aulachogen Software, P.O. Box 23264, Oklahoma City, OK 73123.

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MathView Professional Performs wide range of math functions. Includes multi-dimensional function evaluation, plotting surfaces in 3-D, matrix operations, and operations on ordinary differential equations. 512KE min. memory. \$249.95. BrainPower, 818/884-6911.

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Scrabble Virgin Games' electronic version
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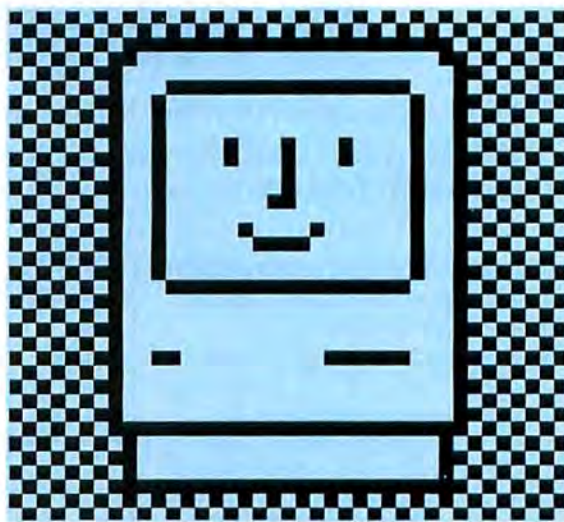
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EMAC 20D, 40D, 60T, FS100 20D and 40D are 20MB and 40MB external hard disks; 60T is 60MB tape drive; FS100 is file server with 260MB hard disk and built-in 60MB tape backup system. \$995, \$1295, \$1395, and \$13,995, respectively. Everex, 415/498-1111.

ExpanSE, ExpanSE II Expansion chassis systems for Mac SE. ExpanSE increases SE to four slots. ExpanSE II also allows SE to use Mac II cards. \$995 and \$1195, respectively. Second Wave, Inc., 512/335-9283.

EyeSaver 14-in. paper-white screen monitor with twice the viewing area of Mac Plus or SE. Resolution equal to that of Mac. \$395. ProApp, 714/855-9088.

Galaxy LS Large-screen monitor adapter board that plugs directly into the Orion Accelerator board. \$495. MacPeak Systems, 512/327-3211.

GPB-PRL 8-bit micro-based IEEE-488 bus to parallel (Centronics) bus converter. Includes integrated DMA controller and 64K memory buffer (expandable to 256K). \$495, \$695 for 256K version. National Instruments, 800/531-4742, 512/250-9119, 800/433-3488 in Texas.

Grappler C/MAC/GS Universal parallel printer interface. Provides serial-to-parallel conversion with built-in emulation code and disk-based print utilities. \$99. Orange Micro, 714/779-2772.

JDL-850 GL+ Plotter/printer for producing color plots up to 18 by 24 in. Compatible with H-P Graphics Language. \$3845. JDL, 805/495-3374.

Machroma C2 14-in. color monitor with 640- by 480-pixel resolution (926 by 580 with future video cards). Includes built-in audio speaker, line jack, volume control, headphone jack. \$895. 4SITE, 408/425-8700.

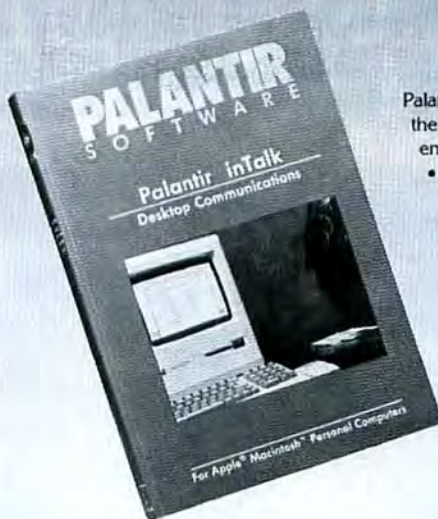
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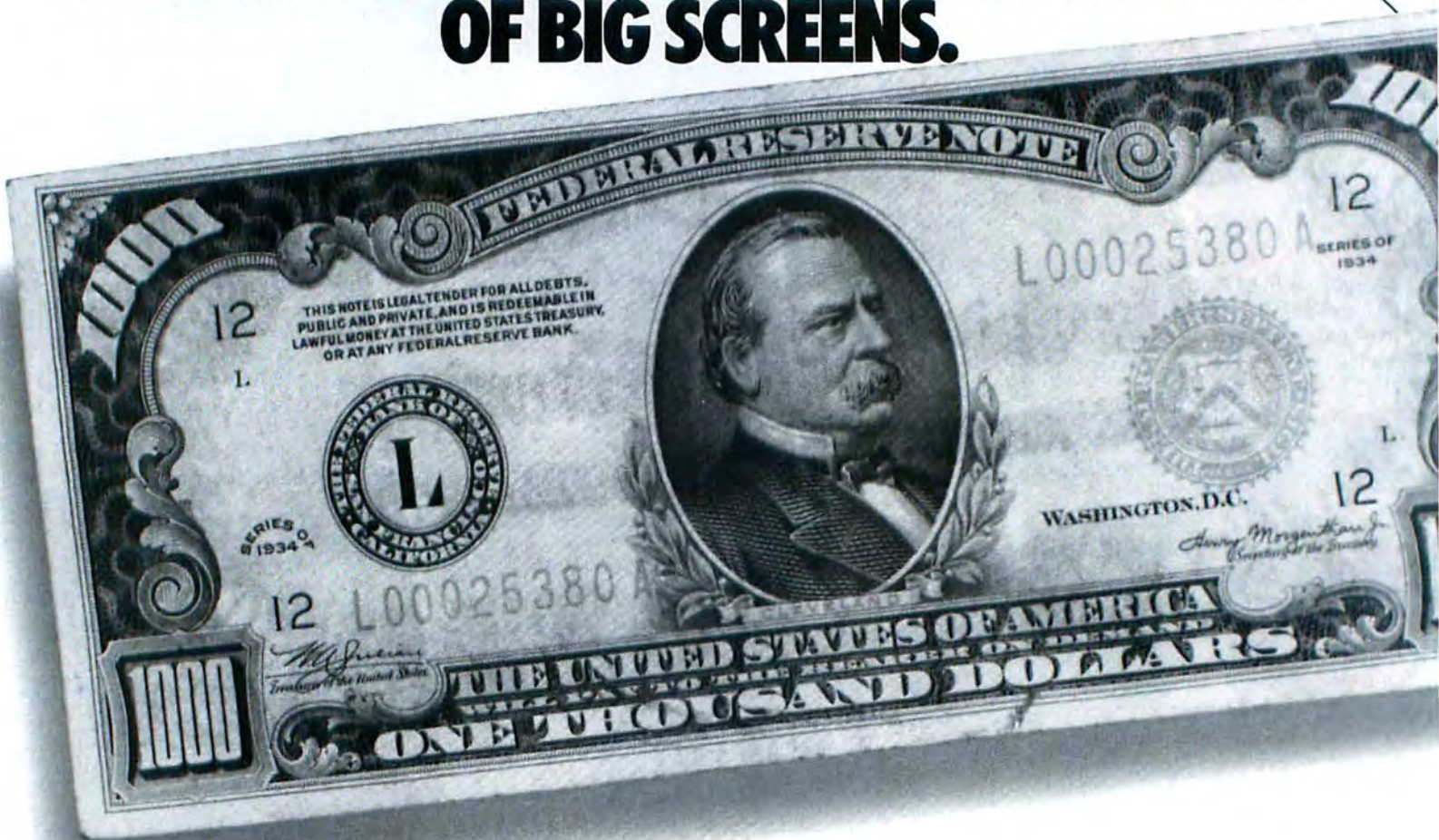
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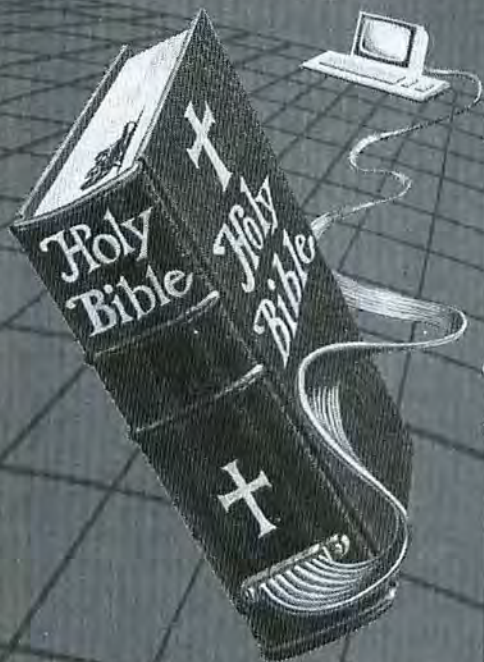
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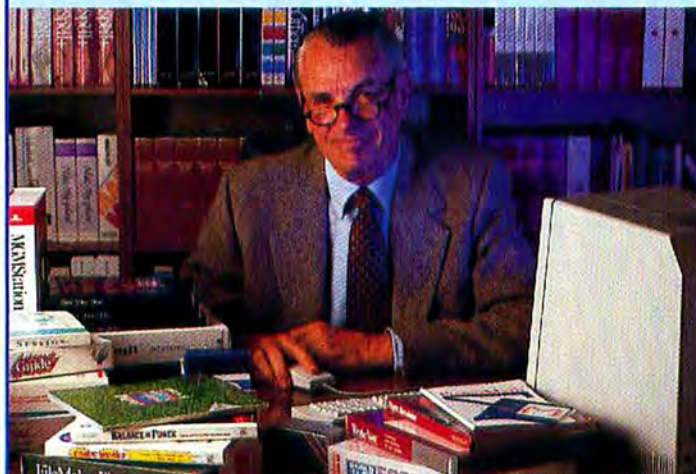
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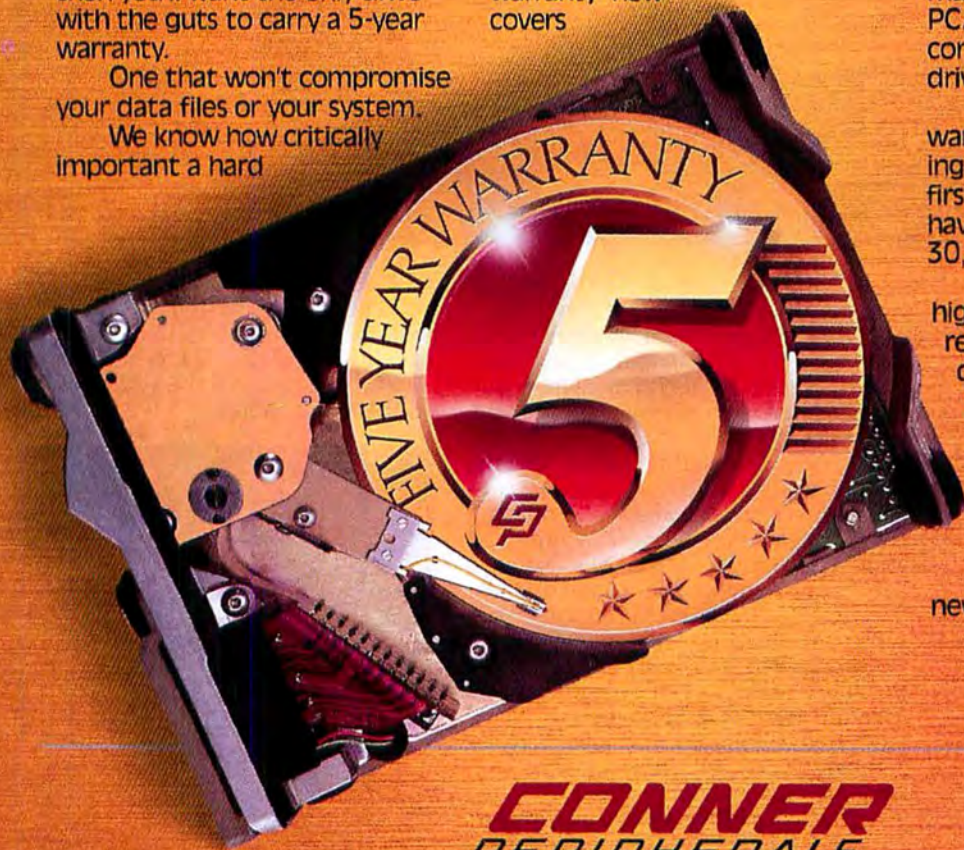
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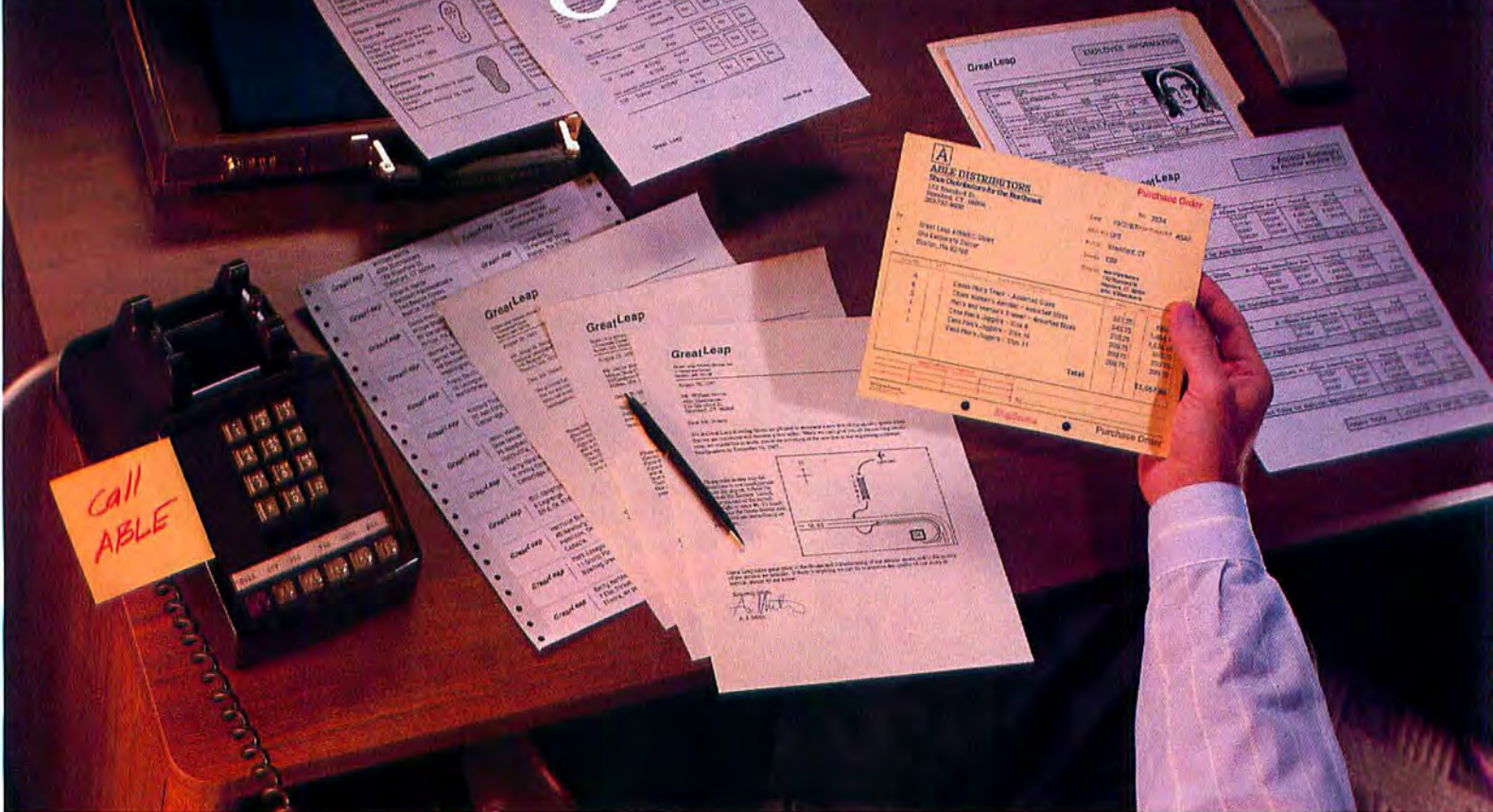
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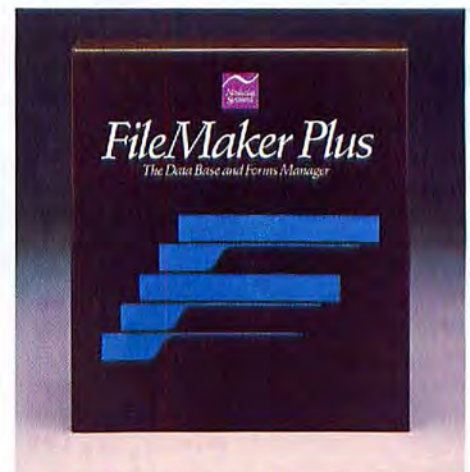
And FileMaker Plus is on friendly terms with the entire Macintosh family, including the Macintosh 512K, Macintosh Plus, Macintosh SE as well as the Macintosh II, the ImageWriter II and LaserWriter Plus, and the latest system software, such as MultiFinder and AppleShare.

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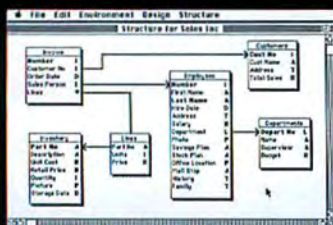
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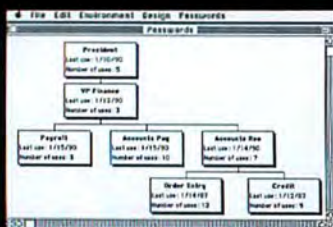
Structure containing files, fields and links



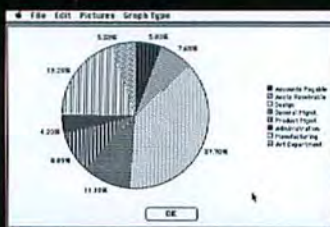
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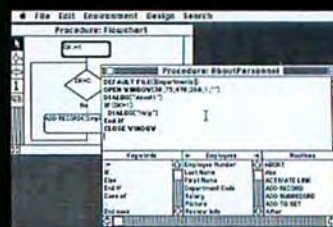
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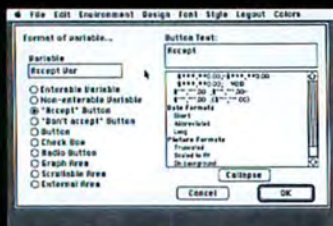
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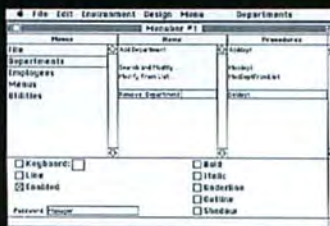
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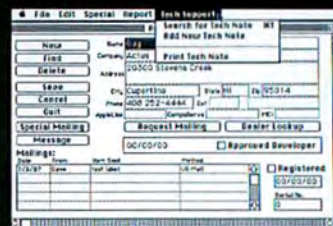
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Getting Started with PostScript

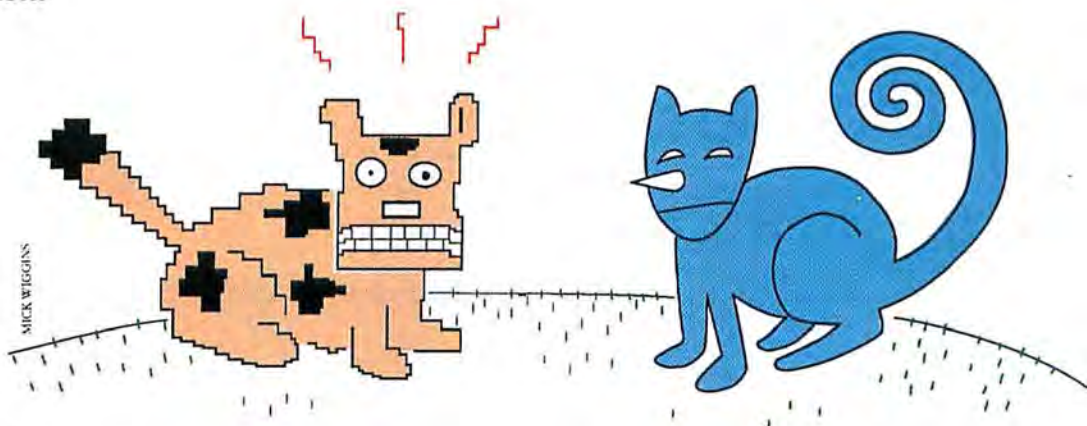
Understanding page-description languages, how the Mac uses PostScript, and how to speak the LaserWriter's mother tongue

by Jim Heid

Your boss is no smarter than you are, yet you're treated like a peripheral in the office. You sit in a corner, biding your time, waiting for the boss to bark. When the orders finally arrive, you go into action—assimilating data, making decisions, crunching numbers, and turning out a finished product that makes the boss look stellar. What's in it for you? All the paper you can eat and a new toner cartridge now and then.

It's a good thing LaserWriters haven't unionized, or they might demand the attention they deserve. Sure, it was the Mac's graphics and friendly personality that sparked the desktop publishing revolution. But it's the LaserWriter and other laser printers, driven by Adobe Systems' PostScript, that have fueled the fire.

What is PostScript? To most LaserWriter users, it's air: unseen and unheard, but indispensable. Technically, PostScript is a programming language—a vocabulary of English-like keywords that combine with math symbols and other operators to make up programs that perform a given task. With an all-purpose programming language like BASIC or Pascal, the task might be a game, an accounting program, or a word processor. With PostScript, the result is a document produced by an *output device*—a laser printer or a phototypesetter. PostScript is a *page-description language*, a specialized dialect whose vocabulary is tightly focused on the task of describing the appearance and position of text and graphics in a document.



PostScript's Place

Page-description languages are a recent development, inspired by the burgeoning capabilities of computer printers and the increasing demands of their users. PostScript was born in 1982 at Adobe Systems, under the guidance of founders Charles Geschke and John Warnock. Before founding Adobe they developed a page-description language similar to PostScript, called InterPress, at Xerox's Palo Alto Research Center—the research and development lab where many of the Mac's mouse, window, and menu concepts were first tested.

PostScript lives in the part of a laser printer called the *controller*. The controller accepts instructions and data from the Mac, interprets them, and then controls the printer's *engine*, which produces the hard copy. This controlling process involves directing the pulsing of the printer's laser as it scribes a series of fine parallel lines across a photosensitive drum. The lines—300 per inch on LaserWriter-class printers—

are similar to the scan lines visible upon close examination of the screen of a computer or television. Indeed, the images on a video screen and a page of laser printer output are actually close cousins, both made of scan lines produced by a *raster* controller. Acronym buffs often call laser printer controllers *RIPs*, short for raster image processors.

All laser printers have controllers, but not all controllers use page-description languages. Many laser printers, including the best-selling Hewlett-Packard LaserJet series, accept orders in the form of less flexible *control codes*. A control code is a special character sequence sent by the computer that tells a printer, "Don't print this; treat it as a command instead." Some control codes tell the printer to switch to bold or underlined type, or to a different

(continues)



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How To/Getting Started

font. Others may feed a sheet of paper, position text at a certain location, or draw a line on a page.

Control codes, also called *escape codes*, have been guiding print mechanisms for decades. They're fine for formatting the "letter quality" characters of a daisy wheel printer or electronic typewriter, and they're adequate for instructing a printer to switch from one font to another. But as a printer's capabilities increase, so do the number of control codes required to access them. If you're a controller designer, one solution is to add new control codes to accommodate new features—at the risk of creating a dizzyingly high number of control codes that could be obsolete when tomorrow's print engines arrive. A better solution is to start from scratch and design a printing-oriented language whose keywords can be combined in different ways to produce different results. That's the PostScript approach. (This introduction can't go into the technical details. For more on programming in PostScript, see Adobe's texts *PostScript Language Reference Manual* and *PostScript Language Tutorial and Cookbook*, both published in 1985 by Addison-Wesley.)

The Object Is the Game

PostScript is built on a foundation that gives it complete dominion over a printer's capabilities. One cornerstone of that foundation is a powerful set of *graphics operators*—programming routines that allow PostScript to rotate, enlarge, reduce, shade, chop, slice, and dice graphic images. Another is the basic premise that everything on a page, including text, is a graphic. That means anything PostScript can do to a picture, it can do to text. And the mortar holding it all together is an *object-oriented* approach that lets PostScript create images on everything from video screens to laser printers to phototypesetters.

Let's address that last point first. A few months ago, we looked at the differences between bit-mapped and object-oriented graphics (see "Getting Started with Macintosh Graphics," *Macworld*, August 1987). We saw then that a bit-mapped graphic such as a *MacPaint* picture is a series (a map) of bits in the Mac's memory, each corresponding to a dot on the screen. An object-oriented graphic like a *MacDraw* drawing, however, is stored as a series of

(continues)

PostScript Programs

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Graphics, Type Design			
Adobe Illustrator	\$495	Adobe Systems, Inc.	415/961-4400
Cricket Draw	\$295	Cricket Software, Inc.	215/251-9890
Fontographer	\$395	Altsys Corporation	214/424-4888
LaserFX	\$195	Postcraft International	818/718-1598
			416/641-0678 (Canada)
LaserPaint	\$495	LaserWare, Inc.	800/367-6898
			415/453-9500
Fonts			
Adobe Type Library	\$185 per package (four typefaces)	Adobe Systems, Inc.	415/961-4400
Allotype Fonts Library	\$40-\$160	Allotype Typographics	313/663-1989
ClickArt LaserLetters	\$79.95 per package	T/Maker Company	415/962-0195
Fluent Laser Fonts	\$69.95 per volume	CasadyWare, Inc.	800/331-4321
			800/851-1986 (CA)
Laser fonts	\$34.95-\$44.95	Century Software, Inc.	415/549-1901
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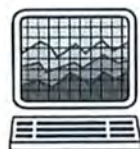
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How To/Getting Started

commands for QuickDraw, the Mac's built-in library of graphics routines. These commands describe each object's appearance, including its location, size, line thickness, and pattern. Because object-oriented drawings are stored as QuickDraw commands rather than as a fixed number of dots, they are *resolution independent*—they can take advantage of all the sharpness your printer has to offer. They aren't tied to the relatively coarse 72 dots-per-inch (dpi) resolution of the Mac's screen.

PostScript takes a similar route to resolution independence by acting as a middleman between the Mac and the printer's engine. A PostScript controller receives commands from the Mac that describe each object's location and appearance, interprets the commands, and then creates a bit-mapped image for the entire page in the printer's memory. Thus the Mac can remain blissfully ignorant of the printer's resolution; an image becomes tied to a fixed number of dots per inch only moments before it's printed, when its bit map is created in the printer's memory. (The one time this rule doesn't apply is when you're printing a *MacPaint*-type picture, whose resolution is already carved in the Mac's memory. That's why object-oriented programs like *MacDraw* give better results with laser printers.)

The biggest benefit of PostScript's resolution independence is that it frees the Mac from having to know how much resolution a given printer provides. That means you can use the same programs to print the same documents on a 300-dpi LaserWriter, a 600-dpi Varityper VT-600, a 1270-dpi Linotronic 100, or a 2540-dpi Linotronic 300. The only difference in output of each will be increasingly sharper images.

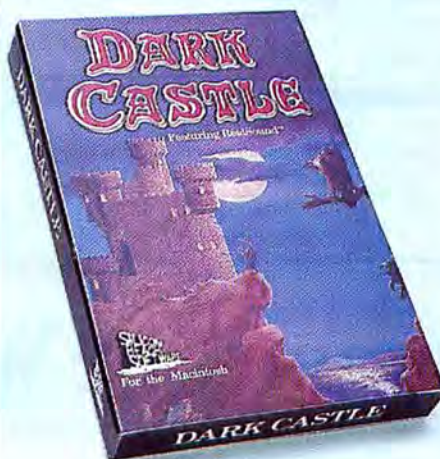
Well, almost. There can be some trials on the trail from LaserWriter to Linotronic. The most obvious is the appearance of gray shades, called *screens* in the printing trade. A screen comprises a group of dots; the more dots within a screen's area, the darker the shade of gray. On a LaserWriter, each dot is $\frac{1}{300}$ inch in diameter—the smallest dot that the printer's engine can produce. But a Linotronic 300 can create a dot $\frac{1}{2540}$ inch in diameter. This size difference means that light screens print far lighter on a Linotronic than on a LaserWriter. Both devices are printing the same number of dots, but the size of those dots differs. Hairline

(continues)



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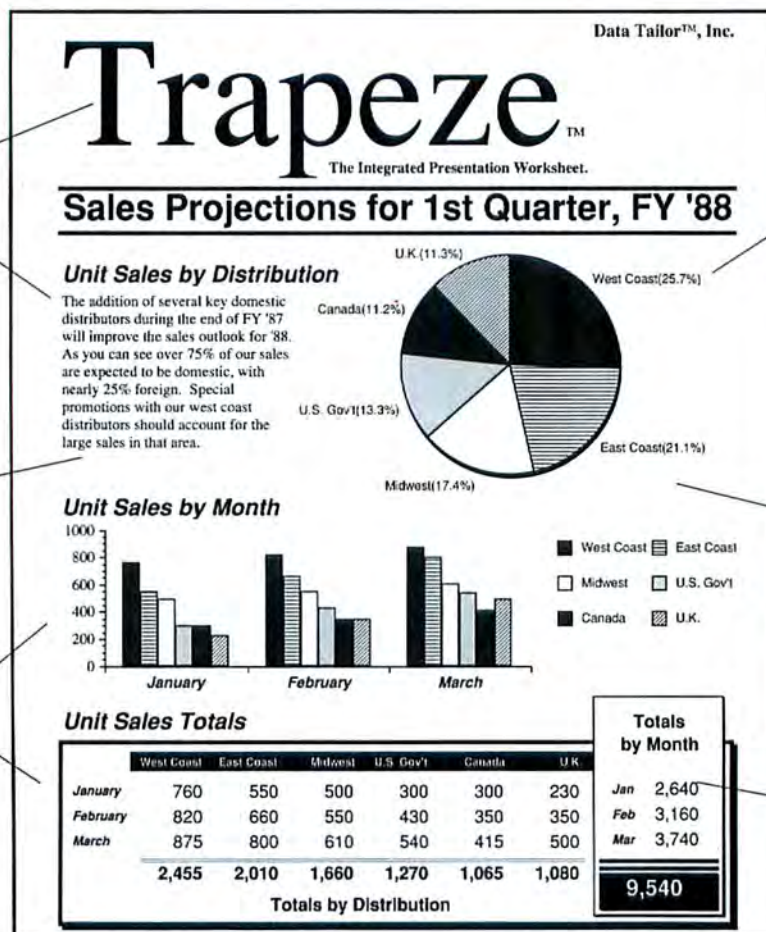
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How To/Getting Started

rules, which are one dot wide, are finer on a Linotronic for the same reason.

Also, some Linotronic users report problems with extremely complex pages' taxing the Linotronic's memory, even though the same pages may print on a LaserWriter without incident. That presents another potential compatibility wrinkle: even though PostScript is designed for device independence, situations can occur where a document that prints on one printer chokes another. One printer may lack fonts another one has, or may have less free memory than another. Linotronic veterans recommend printing test documents to verify font and memory compatibility. It's a lot harder to iron out compatibility wrinkles with a deadline staring you in the face.

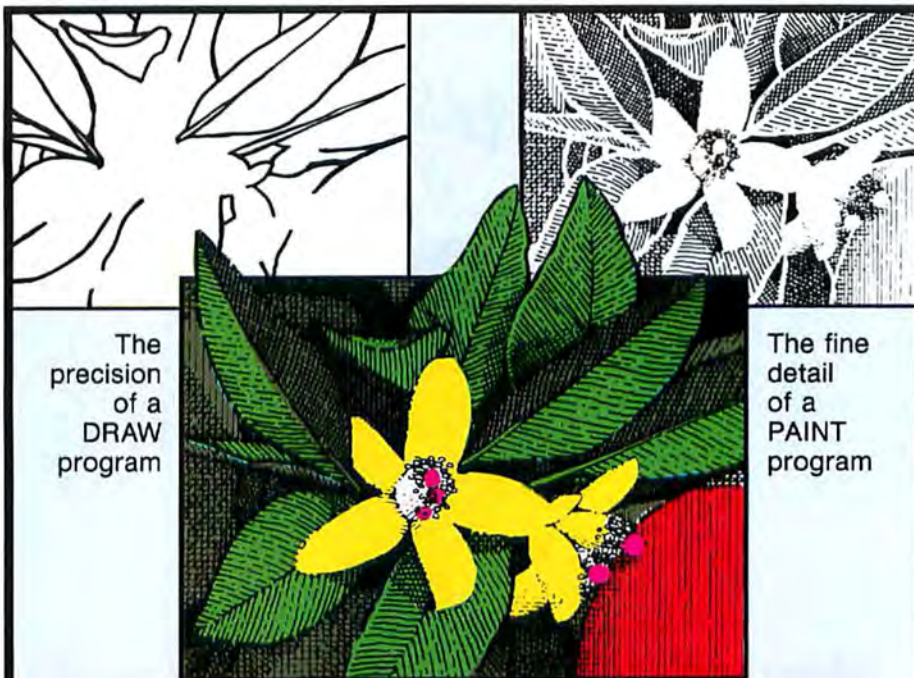
Language of a Thousand Faces

A variation on the object-oriented theme gives PostScript enough font finesse to make a type hound howl. In PostScript printers, fonts are stored as mathematical equations called *outlines*, which the controller can use to create characters of virtually any size. As an oversimplified example, instead of describing an uppercase *T* as an object ten dots high with a crossbar eight dots wide, PostScript describes it as an object whose crossbar is 20 percent shorter than its vertical stem. It's like a recipe that lists ingredients in proportions instead of measurements: the cook (the controller) can then use math to *scale* the final product to any size.

By describing fonts as outlines, PostScript can use the same font description to create character bit maps in any size, from a barely visible one-point character up to, according to Adobe, a character the size of Rhode Island. (Naturally, you'd need a Texas-size printer for a cipher that size.) By contrast, the Mac's screen and Apple's ImageWriter printers use bit-mapped font descriptions and require a separate, disk-consuming description for each size. Many non-PostScript laser printers, including Hewlett-Packard's LaserJets, require bit-mapped font descriptions, too.

Just as a cook can change the outcome of a dish by changing the proportions of its ingredients, a PostScript printer can change the look of a font by altering its proportions. As "Changing Proportions"

(continues)



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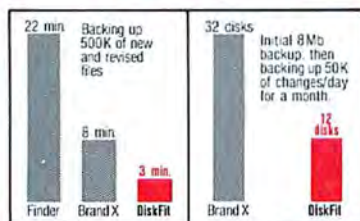
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How To/Getting Started

PostScript can create new typefaces by expanding and condensing existing ones. This is 14-point New Century Schoolbook in its original form.

PostScript can create new typefaces by expanding and condensing existing ones. This is 14-point New Century Schoolbook, expanded 30 percent.

PostScript can create new typefaces by expanding and condensing existing ones. This is 14-point New Century Schoolbook, condensed 30 percent.

Changing Proportions

Since PostScript fonts are described mathematically, a PostScript printer can expand or condense a font by making calculations, giving the font a new personality. Many desktop publishing programs, including XPress, ReadySetGo, and Scoop, can exploit this capability.

shows, fonts can assume different personalities when *expanded* (widened) or *condensed* (narrowed). And because PostScript can apply its graphics-manipulation skills to text, PostScript printers can shade text, rotate it, print it in circles or along a wavy line, and even print text within text as in "A C of PostScript." (This illustration is based on one in Adobe's exemplary free newsletter, *Colophon*, available by writing Adobe Systems, 1870 Embarcadero Rd., Palo Alto, CA 94303.)

Adobe knows that all the type-transformation talent in the world is worthless if your fonts are ugly to begin with. Its library includes nearly 150 of today's most beautiful typefaces, licensed from such titans of type as Mergenthaler and the International Typeface Corporation (ITC). Most PostScript printers come with between 13 and 35 typefaces built into permanent memory chips (read-only memory, or ROM) and organized into *families*. For example, the

(continues)

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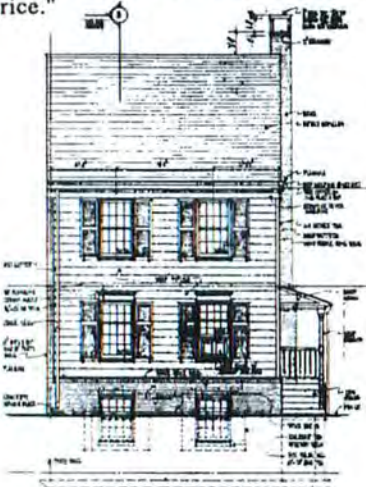
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How To/Getting Started

LaserWriter's Times family comprises four typefaces: Times Roman, Times Italic, Times Bold, and Times Bold Italic.

You can supplement a printer's ROM-based fonts with *downloadable fonts*, whose outlines are stored on a floppy or hard disk and downloaded into the printer's memory as needed (see "Font Facts," *Macworld*, February 1987). A LaserWriter contains enough memory to hold three or four downloadable typefaces; higher-performance LaserWriter alternatives like QMS's PS-800 Plus and Texas Instruments' OmniLaser 2108 have more memory and can hold roughly twice as many. (See "Laser Wars," *Macworld*, June 1987, for reviews of several LaserWriter alternatives and for details on PostScript shopping considerations. The Texas Instruments 2108 printer is reviewed in September's *Reviews* section; watch for the upcoming review of the Varityper VT-600.)

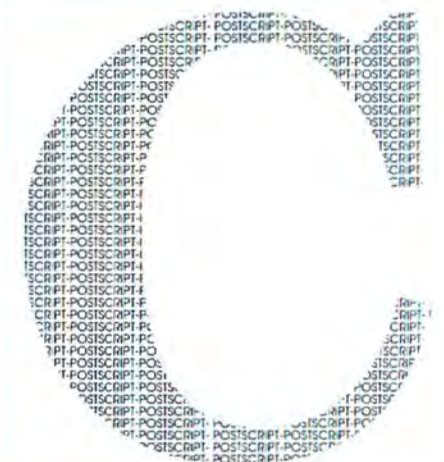
The Price of Power

The calculations involved in translating font outlines and interpreting graphics commands could keep a Mac busy for some time. A printer equipped for PostScript, however, contains impressive computing hardware that liberates the Mac from much of that math. In a LaserWriter Plus, a 68000 microprocessor presides over 1.5 megabytes of memory, two-thirds of which is required to hold a full-page, 300-dpi bit map. Another megabyte of ROM holds the PostScript interpreter and built-in fonts, while a cast of supporting chips manages communications between Mac and controller, and between controller and engine. Prior to the Mac II's introduction, people joked that the LaserWriter Plus was Apple's most powerful computer. They weren't entirely wrong.

These smarts free the Mac from grappling with the myriad calculations necessary to describe a complex image. They're also the reason why PostScript printers cost so much. (For example, QMS's non-PostScript KISS printer is a bare-bones laser printer designed to be a fast, quiet alternative to a letter quality office printer. It uses the same identical Canon-built print engine as the LaserWriter Plus, but costs less than \$2000.)

To make their purchase less painful, PostScript printers contain *print server* software that lets up to 32 Macs on an AppleTalk network share one printer. Serv-

(continues)



```
%  
200 400 translate  
/Roman /AvantGarde-Book  
findfont 6 scalefont def  
/Bold /NewCenturySchlbk-Bold  
findfont 300 scalefont def
```

```
/strg  
(POSTSCRIPT-POSTSCRIPT-POSTSCRIPT-  
POSTSCRIPT-POSTSCRIPT-POSTSCRIPT-  
POSTSCRIPT) def
```

```
/crlf  
{ currentpoint 6 sub  
exch pop 0 exch moveto } def
```

```
/pristring {strg show crlf } def
```

```
/Background  
{ 150 { pristring } repeat } def
```

```
gsave  
newpath 0 0 moveto  
8 setflat  
Bold setfont (C) true charpath clip
```

```
0 350 moveto  
Roman setfont Background
```

```
grestore
```

```
showpage
```

A C of PostScript

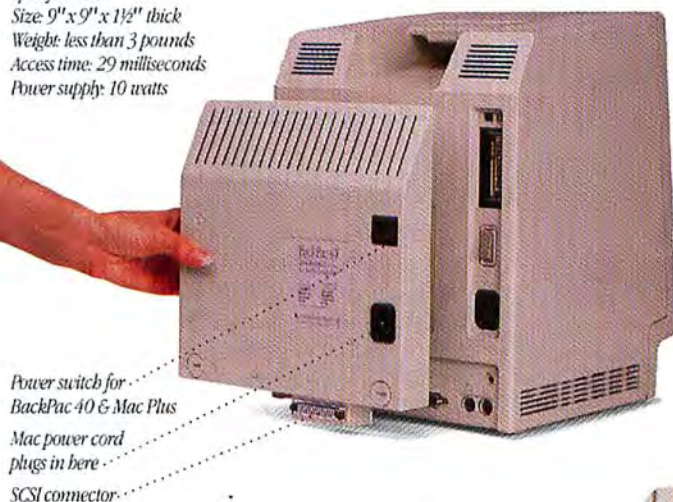
PostScript can "clip" text to fit within an arbitrary shape. This custom patterned C is the result of the PostScript program shown.

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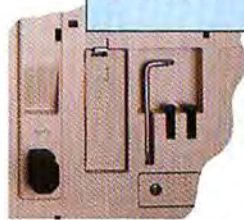


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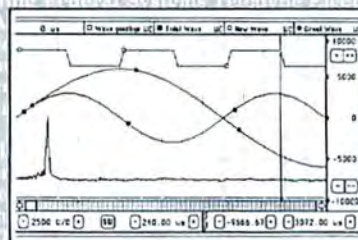
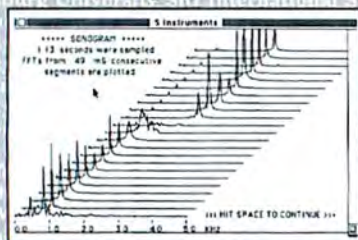
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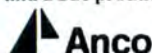
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How To/Getting Started

er software lets a printer listen for print requests from any machine on a network and take care of them on a first-come, first-served basis. Non-PostScript printers generally lack server software; multiple machines can share them only if you buy splitter boxes and server software.

Despite having its own microprocessor and a good head for figures, a PostScript printer can seem slow at times. Documents containing large or complex graphics can bog down the controller. Documents using numerous fonts can fill the printer's *font cache*, an area of memory that holds the bit maps for characters that have already been printed on a page. In such cases, the controller must purge the character bit maps it has laboriously created, then create the new ones it needs. If the purged characters are needed again, the controller must start over again with the font's outlines.

PostScript and Macs

To access a PostScript printer, the Mac needs two system files, LaserPrep and LaserWriter. The LaserWriter file is a *printer driver* that tells the Mac how to access a PostScript printer. The LaserPrep file is a *PostScript dictionary* that the Mac transmits to the printer at the beginning of the first job you print after starting the printer—it's what's being sent when the Mac displays the "Status: initializing printer" message.

LaserPrep actually adds new commands to the PostScript language that allow it to work with the LaserWriter driver, which sends not standard PostScript commands but a special, pseudo-PostScript "shorthand" that takes less time to transmit and is more compatible with QuickDraw. In essence, LaserPrep takes the printer aside and whispers, "Listen. We Macs use PostScript a bit differently. Here's what we do..." These *extensions* to the PostScript language remain in the printer's memory until it's shut off, which is why you only see the "initializing printer" message during the first print job of the day.

The LaserPrep and LaserWriter files may be all the Mac needs to access a PostScript printer, but it takes a special breed of program to plumb the depths of PostScript's power. Cricket Software's *Cricket Draw*, for example, is an object-oriented drawing program that exploits PostScript's ability to print text along a wavy path and

(continues)



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create stunning shading effects (see "Rounding the Bezier Curve," *Macworld*, May 1987, and "Mac Graphics Tools," *Macworld*, August 1987). Altsys Corporation's *Fontographer* lets you modify existing PostScript fonts (to add, for example, special characters, or to create symbols) or design entirely new ones. Postcraft International's *LaserFX* lets you apply any of 30 different effects to text. Then there's *Illustrator*; Adobe's own hotline to PostScript's power (see "Illustrator: The Tracer's Edge," *Macworld*, June 1987).

With *Illustrator*, you create line-oriented illustrations by drawing sequences of straight and curved line segments called *paths*. You can trace pasted-in or scanned bit-mapped images, draw from scratch, or create special typographic effects based on PostScript fonts. *Illustrator* translates your efforts into a PostScript program that you can send to a printer or save in a variety of formats for inclusion in other documents.

Many desktop publishing and word processing programs let you incorporate PostScript effects created with the programs listed above. Several methods exist for including PostScript effects in other

documents, but the most useful are Encapsulated PostScript (EPS) files and the special PICT files that *Cricket Draw* creates. These two types of files have technical differences, but both provide the same advantage: they store the PostScript programming statements the printer needs to create an effect, *as well as* QuickDraw commands that let the Mac approximate the effect on screen. In an EPS file, one part of the file contains PostScript statements and another part contains the QuickDraw commands. *Cricket Draw*'s PICT format stores the PostScript statements needed to create an effect along with the QuickDraw commands that all PICT-format files contain. (See the August 1987 *Getting Started* for information on PICT and other graphics file formats.) With *Cricket Draw*'s approach, you can include effects in programs that don't support EPS files, such as *Microsoft Word*.

The common denominator between these programs is that they're "PostScript aware." Their output contains instructions that go straight to the heart of a PostScript controller, instead of being simple bit-mapped images or QuickDraw commands. Apple is discouraging the development of such PostScript-dependent products, partly

because they can be incompatible with non-PostScript printers such as General Computer's QuickDraw-based Personal LaserPrinter (PLP), and also because they strengthen the bond between the Mac and PostScript. That's a bond Apple doesn't want to become too strong, since Apple, too, has a QuickDraw-based laser printer in the wings.

Considering QuickDraw

If you're laser printer shopping, you'll need to decide between a printer built around PostScript or one that uses QuickDraw. "PostScript versus Non-PostScript" lists ten points of comparison that may help. For more insights on QuickDraw printing, see "The QuickDraw Solution," *Macworld*, September 1987.

The dawn of QuickDraw laser printing doesn't mean dusk for PostScript. PostScript has gained unstoppable momentum in the past few years. Over a dozen printer manufacturers are selling or developing PostScript devices. Over 300 programs for Macs, IBM PCs, and mainframe computers support it. And as PostScript printers proliferate

(continues)

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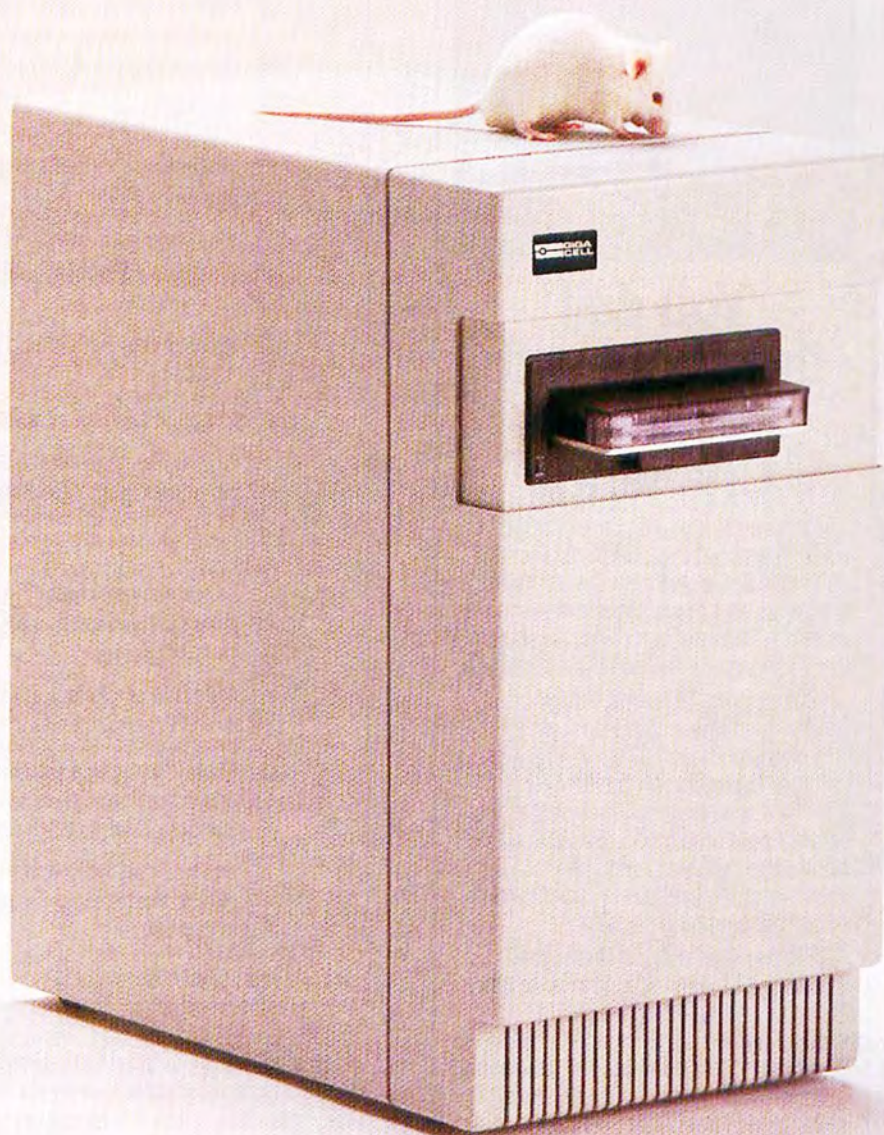
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PostScript versus Non-PostScript

Here's a quick look at the differences between PostScript laser printers and General Computer Company's Personal Laser Printer; the only QuickDraw laser printer so far released that includes outline fonts.

PostScript

Processing occurs in printer, requiring complex controller but freeing Mac for other tasks

Many font outlines stored in printer's ROM

Spoolers can be used to regain control of the Mac sooner

Printer can be shared by up to 32 Macs

Large selection of fonts

Controller can shadow text and print along an irregular path

LaserWriters make nearly ideal proofing printers for Linotronic output

Can use applications that generate PostScript effects

Most PostScript printers can also emulate other printers, such as Diablo 630 daisy wheel

Printer can be used with other PostScript-supporting computers

Non-PostScript

Processing occurs in Macintosh, allowing simpler, less expensive controller, but requiring extensive memory and disk space

All font outlines stored on required Macintosh hard disk

Spoolers are ineffective since data isn't sent to printer until page is described in the Mac

No built-in sharing capabilities

Font selection currently limited

Shadowed text, the ability to print text along an irregular path, and some other effects currently not available

Spacing of some fonts may not match PostScript counterparts, making proofs less accurate

PostScript-specific applications may not work

No emulation features are provided

Printer must be used with Macintosh

erate and the price of their memory chips drops, the cost-chasm between "personal" laser printers and a PostScript printer could shrink to a hairline crack. AST Research has recently announced the TurboLaser/PS, a LaserWriter Plus-compatible printer that, at \$3995, will be the cheapest PostScript printer yet.

You may also see PostScript in the video circuitry of tomorrow's computers, whose programs could use its device-independent qualities to create images on

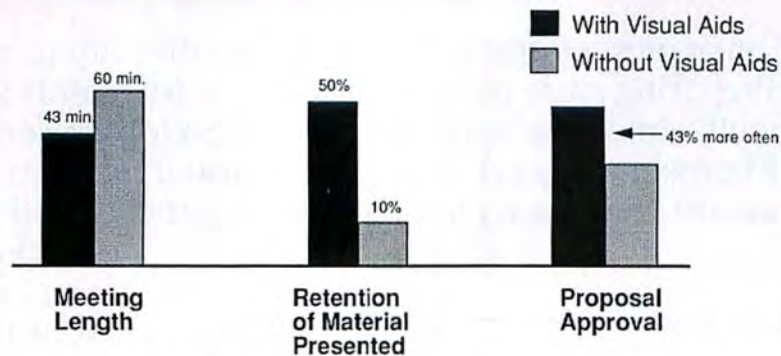
screens of varying resolutions. Also around the corner are color printers, as well as sophisticated facsimile machines that will use PostScript to describe an original document's appearance and all but clone it at the other end of the line. PostScript will evolve to meet the needs of the devices that speak it. That's what a language is supposed to do. □

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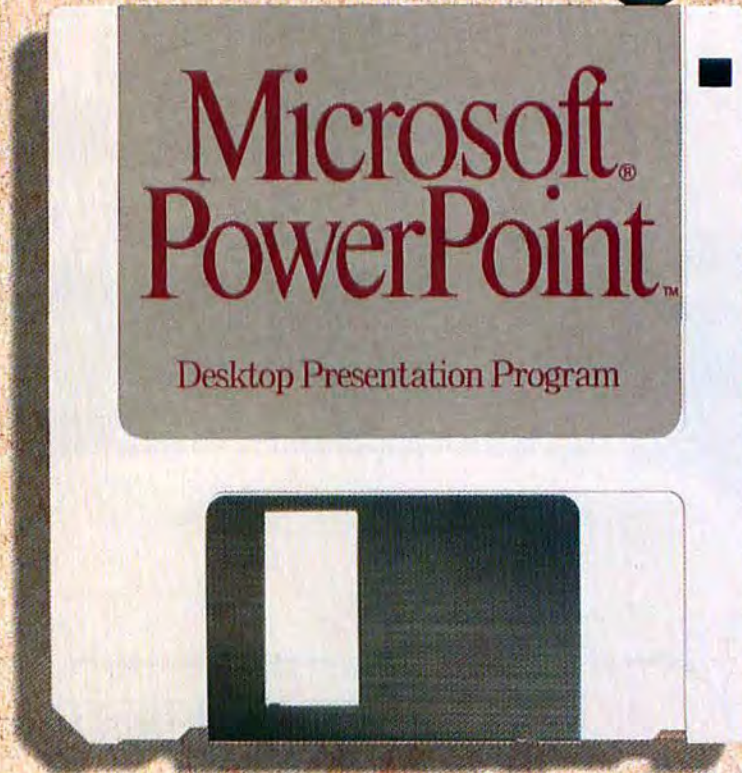
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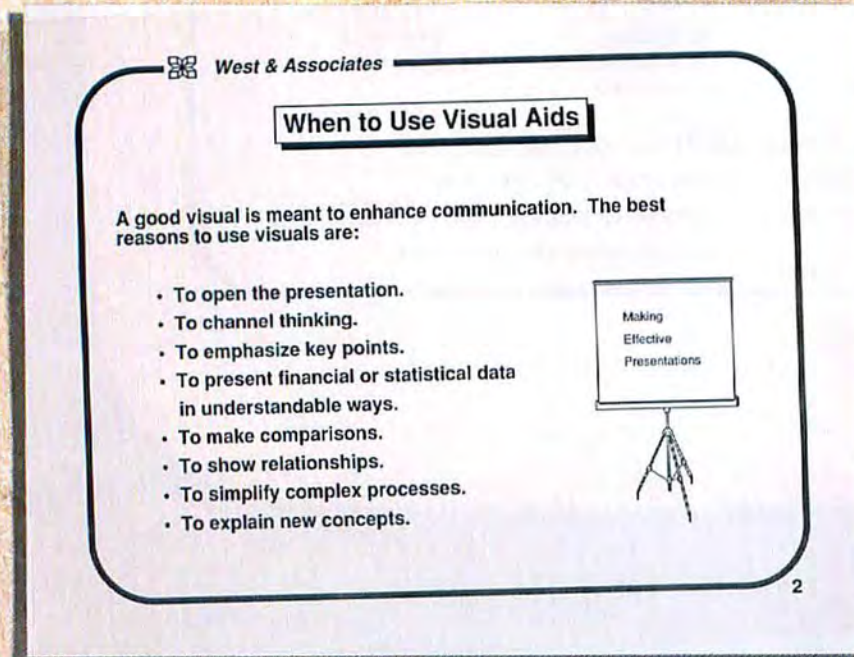
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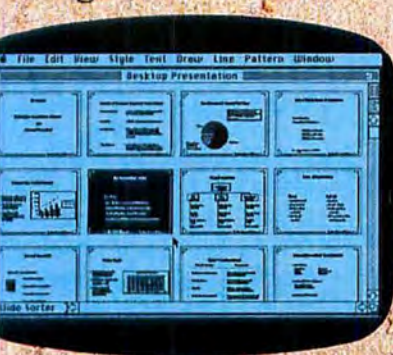
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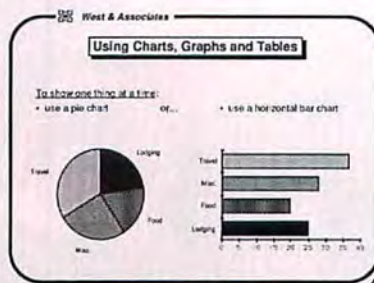
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Pie Charts

- show items as a fraction of the whole.
- emphasize key items by "exploding" a pie slice.

Bar Charts

- show items relative to each other.
- emphasize key items with shading.

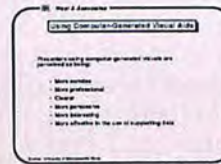
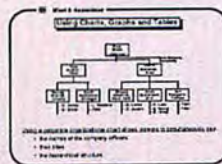
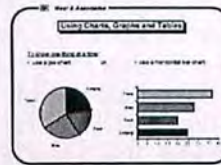
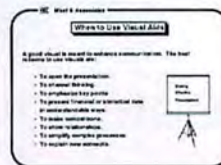
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Business Clinic

Putting HyperCard to work managing your To Do list

by Danny Goodman

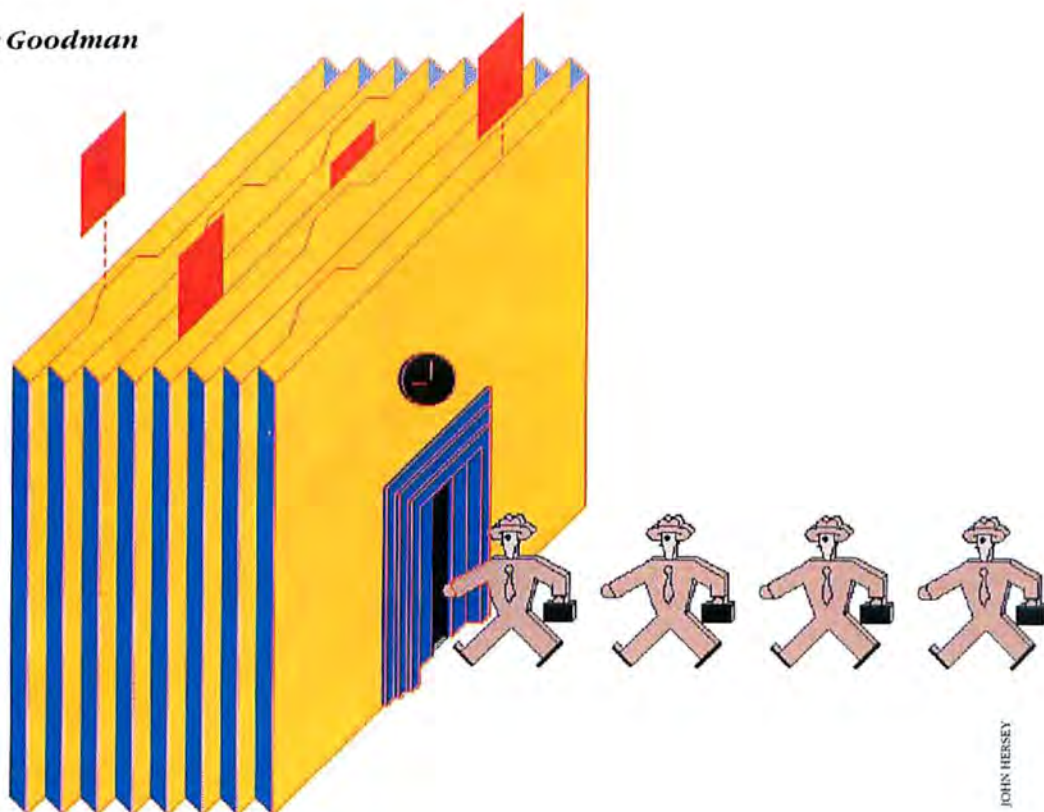
With this issue Danny Goodman begins a new problem-solving column designed to help you work more efficiently with the Mac. This month he demonstrates a practical application for HyperCard. Next month he'll show how to transfer information from a database into HyperCard.

Over the years, I've observed how organized executives follow up on tasks that require action at a future date. Usually, these busy people—or their assistants—keep track of commitments with a simple prompting system. Some call it a follow-up file; others call it a tickler file. Whatever the name, the system usually consists of a series of file folders or one of those expandable, partitioned portfolios. The folders, organized by date, hold reminders for tasks that must be performed. The executive or assistant checks the day's folder first thing every morning. Typically, information from the various reminders goes into a To Do list for the day.

The system works, but a computerized version can be quicker and more intelligent—quicker by generating the To Do list automatically, more intelligent by flagging unfinished items from previous days. My version, called the Tickler, shows how to put the much-talked-about *HyperCard* to work saving steps for you. You'll need to know how to get around in *HyperCard*, but that's easy to learn from its online Help stack or from its documentation. I've used only art and icon buttons that come with *HyperCard* so that you can reproduce the look of this example.

Basic Structure

The Tickler is a single *HyperCard* stack consisting of two similar but distinct backgrounds (see "A HyperCard Glossary").



JOHN HERSEY

Only one card has the first background: this To Do card presents a list of all items for the current day and any unfinished items from previous days (see "To Do List"). The other background is for the Reminder cards, which hold details about tasks to be completed in the future (see "Reminders"). Create the To Do card first so that it becomes the first card in the stack—and thus the one that appears whenever the stack opens. This card contains 4 background fields and 17 background buttons. With this many buttons, you do no typing on the To Do card in the finished application, only button pressing.

A guided tour of the To Do card demonstrates how it works. Only three of the background fields show up on the To Do card. The Date field shows the day and date, and the 12 blank lines in the Actions

field take up most of the rest of the card. To the right of Actions are a dozen small blanks that make up the field called Done; a script connected to the locked field automatically fills in a check mark when you click.

A fourth (hidden) field, called Links, makes the connections between the To Do items and their Reminder cards. To create the hidden field, start by making a new background field. Its size and location are not critical. Name it Links, and then type **hide field "Links"** into the Message Box. That's all there is to it.

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A HyperCard Glossary

Background The design of a *HyperCard* card that is shared by other cards in the stack, comparable to the blue and red lines printed on a stack of traditional index cards. The background may include graphics, buttons, and fields.

Button A place on a card where you click to effect some action. Buttons may look like arrows, icons, dialog box text buttons, radio buttons, or check boxes. Or they may be transparent (invisible), positioned atop graphics that wouldn't otherwise respond to a click.

Field A rectangular area on a card where you type text.

Fields come in several types, including scrolling fields, and may be one or more lines long.

Handler A self-contained HyperTalk script that tells *HyperCard* what to do under well-defined conditions (for example, "on mouseUp" is the handler for when the mouse button is released).

Repeat Loop A section of a HyperTalk script that performs operations repeatedly on a succession of similar objects, such as flipping through a series of cards to accumulate a list of information.

Notice the three buttons on top of the card, next to the To Do title. The button that looks like a stack of ruled cards takes you to the last of your Reminder cards so that you can add a new one when you need to. The other two buttons link to *HyperCard*'s Address and Phone stacks. Scripts attached to these buttons first look to see if any text in the current card is selected. If so, clicking on the button not only takes you to the appropriate stack, but also performs a *HyperCard* Find command for the selected text.

When you start up the Tickler, it automatically fetches items from the Reminder cards that pertain to the current date, as indicated by your Mac's internal clock. You look ahead by clicking the Tomorrow button and return to the present by clicking on Today.

The remaining 12 buttons on the To Do card are the transparent ones atop button art copied from the Art Ideas stack that comes with *HyperCard*. Clicking on a button next to an Action item instantly takes you to the Reminder card for that item.

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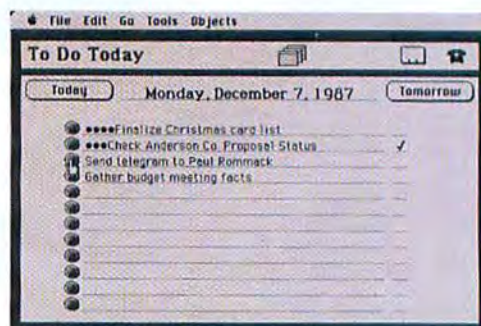
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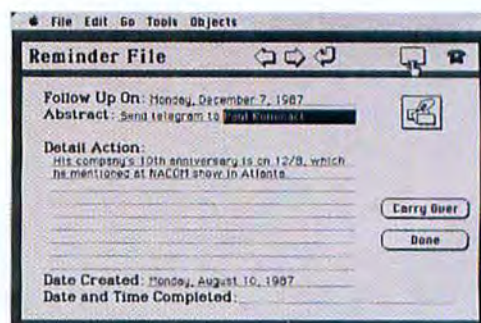
To Do List

The To Do card automatically lists the items that need attention today. Unfinished items get a bullet for each day they're late. To see an item's Reminder card, click on the button next to it.

The Reminder background contains five visible and plainly identified fields (see "Reminders"). The three arrow buttons at the top of the card should be familiar to all HyperCard users, but here they have an interesting twist. Clicking on the Previous and Next buttons lets you cycle through just the Reminder cards, without ever accidentally hitting the To Do card. To return to the To Do card, you click the angled arrow button.

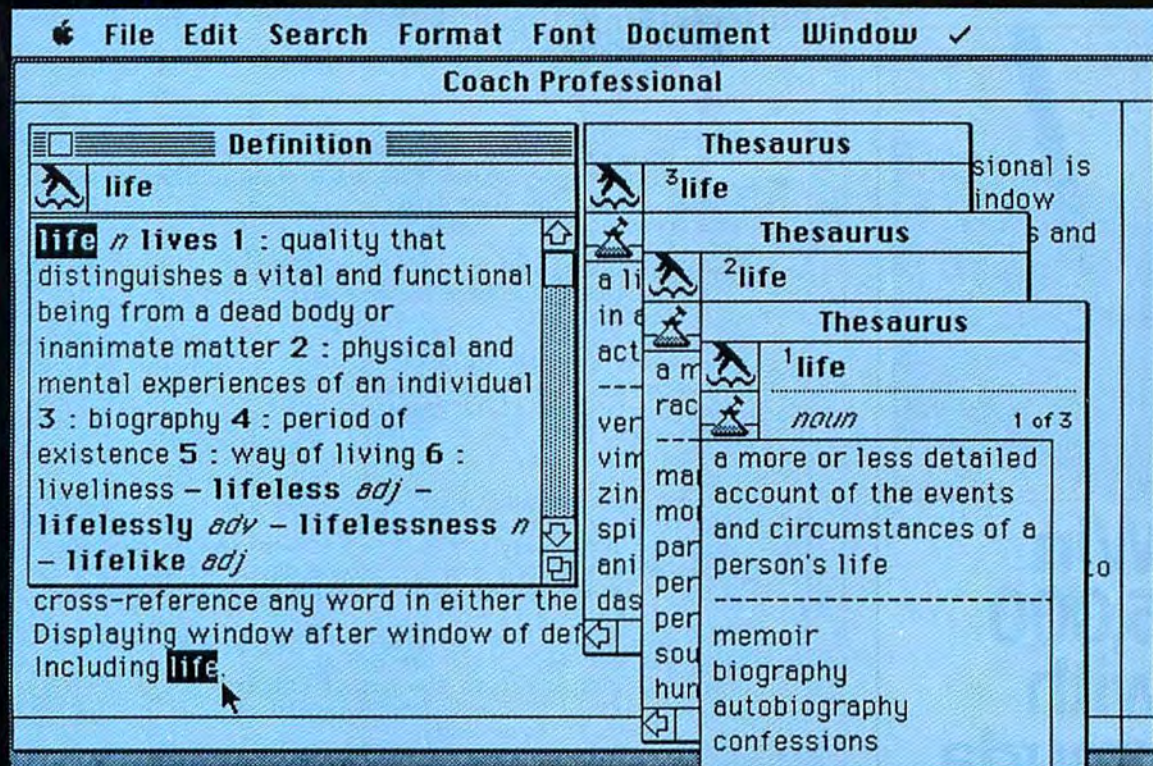
Below the Address and Phone buttons is a Sort button, which sorts the Reminder cards by their Follow Up On dates. Below that is a Carry Over button, which lets you replace the date in the Follow Up On field with the next day's date. Clicking on the Done button places the current date and time in the Completed field at the bottom of the card. Incidentally, if you click on the To Do card to check off an item, the Tickler automatically fills in this Completed field in the Reminder card for that item.

(continues)



Reminders

You fill out a Reminder card for each task you plan. The cards link to the Address and Phone stacks. Selecting a name and clicking on the Address stack button finds that person's card.



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```

on openStack
  -- no need to update more than once per day
  if field "date" is the long date then exit openStack
  else update the long date
end openStack

on update theDate
  -- the watch cursor while you wait
  set cursor to 4

  -- clear out the old stuff
  put empty into field "Actions"
  put empty into field "Done"
  put empty into field "Links"

  get theDate
  put it into field "Date"
  convert it to seconds
  put it into today          -- today's date in seconds
  put 60*60*24 into oneDay  -- one day's seconds
  put 1 into lineNumber     -- starting point for later

  -- fetch data from cards in Reminder background...
  -- without going to those cards
  repeat with x = 2 to the number of cards
    get (field "FollowUpDate" of card x)
    convert it to seconds
    if it is empty then next repeat
    if it <= today and (field "Completed" of card x) is empty then
      put (field "Abstract" of card x) →
        into line lineNumber of field "Actions"

      -- insert one bullet for each day late
      repeat (today - it) div oneDay times
        put "•" before line lineNumber of field "Actions"
      end repeat

      -- field "Links" holds a list of card IDs of linked cards
      put (the name of card x) into line lineNumber of field "Links"
      add 1 to lineNumber
    end if
  end repeat
end update

-- address of linked card is derived from the target button's name
on mouseUp
  if the name of the target contains "Go" then
    get second word of the short name of the target
    go to line it of field "Links" -- the id of the linked card
  end if
end mouseUp
  
```

Listing 1

The To Do card's background contains three HyperTalk handlers: one executes when you open the stack, one updates your To Do list each day, and one handles the 12 Go buttons.

Using the Stack

Making the Tickler work for you is as simple as creating a new Reminder card. You do this by selecting New Card from the *HyperCard* menu (or by typing ⌘-N) and filling in three fields: Follow Up On (the date you want the task to appear on the To Do list); Abstract (a summary of the task, which will be listed in the To Do card); and Detail Action (a specific description of the task).

When you open the stack, the To Do card shows the agenda for the current day. *HyperCard* takes a few seconds to assem-

ble the list, but it only needs to do so once each day.

The Update Handler

Looking at the scripts under the surface of the cards shows how everything fits together. By far the most complex script in the Tickler stack is the one that builds the To Do list when you open the stack (see Listing 1). This script consists of two message handlers, *openStack* and *update*,

(continues)

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which are attached to the To Do card background. (With the card on the screen, choose Bkgnd Info from the Objects menu and click on the Script button to type in the script.)

Each time the stack opens, *HyperCard* sends an openStack message, which the openStack handler intercepts. This handler first determines whether the To Do card's Date field holds the current day's date. If it does, there's no need to update the card. If an update is needed, the Tickler initiates one by calling the update handler into action, based on the current date (that is, the value returned by the *long date* function).

At the top of the update handler, the date is plugged into a variable called *theDate*, which will be used in a moment.

After clearing the card's multiple-line fields, the handler puts the current date into the To Do card's Date field and sets the values of three variables used in the next section, which begins "repeat with x = 2."

At the heart of the update handler is this repeat loop, which checks each Reminder card to see if its Follow Up Date field equals or precedes the current date (this process takes just a few seconds). If a card's Follow Up Date indicates that it is a candidate for the To Do list, the program ascertains whether the Date and Time Completed field has not been filled in. When the program finds a card meeting those criteria, it copies the Abstract field into a line of the To Do card's Actions field, starting with line number 1.

Next, the repeat loop adds one bullet before the Action name for each day an item is overdue. Carried-over items marked with bullets really stand out in the To Do card list—something an organized person likes to see.

The next line of the repeat loop links the task on the To Do card with its Reminder card. The script puts the name of the Reminder card (in the form of "card id 3592") into the hidden Links field corresponding to the line of the Action list. (In a moment, we'll see how these card IDs work to link the To Do items to the appropriate Reminder cards.)

The final act of the repeat loop advances the line-number counting variable (*lineNumber*) by one. Thus, the next item to be posted on your To Do list goes into line 2 of the Actions field, and the name of the Reminder card for that item goes into line 2 of the Links field.

The Linked Buttons

Remember the 12 buttons that link the Action items to their Reminder cards? You could write Reminder button scripts to make the links, and chances are that each button would then have its own *mouseUp* message handler inside of it. There's nothing wrong with that, but the Tickler demonstrates a more efficient method of handling the buttons.

The technique involves naming the buttons systematically and using the names to reach the linked card. In the Tickler, the 12 buttons are named Go 1, Go 2, and so on, through Go 12. These buttons have no scripts attached to them; in fact, you must go into each button's script editor and delete the default *empty on mouseUp/end mouseUp* handler in the script. The To Do card's background script has a *mouseUp* handler that takes care of these Go button messages (the last handler in Listing 1).

The handler uses the name of the button as an index to the line number in the Links field. The handler reads the line of text in the hidden field as the destination for the Go command. For example, if the first line of the Links field contains *card id 1920*, then *go line 1 of field "Links"* is the same as *go card id 1920*. Thus, 1 handler takes the place of 12.

Checking Off

The comparatively complex handler that places the check mark next to a completed To Do item is also worth dissecting. Recall that it enters a completion time and date in the associated Reminder card. Moreover, if you realize that a checked item has not been completed, you may remove the check mark (and simultaneously remove its corollary on the Reminder card).

Listing 2 shows the *mouseUp* handler attached to the locked Done field on the To Do card. If a text field is locked, the browse tool does not change to the text-insertion pointer when atop the field. You can then treat the field as a button and add click-related handlers.

The first line of the handler establishes the line number where you clicked with a bit of simple arithmetic: after you've grabbed the vertical coordinate of the mouse-click location, subtract from it the number of screen pixels above the top of

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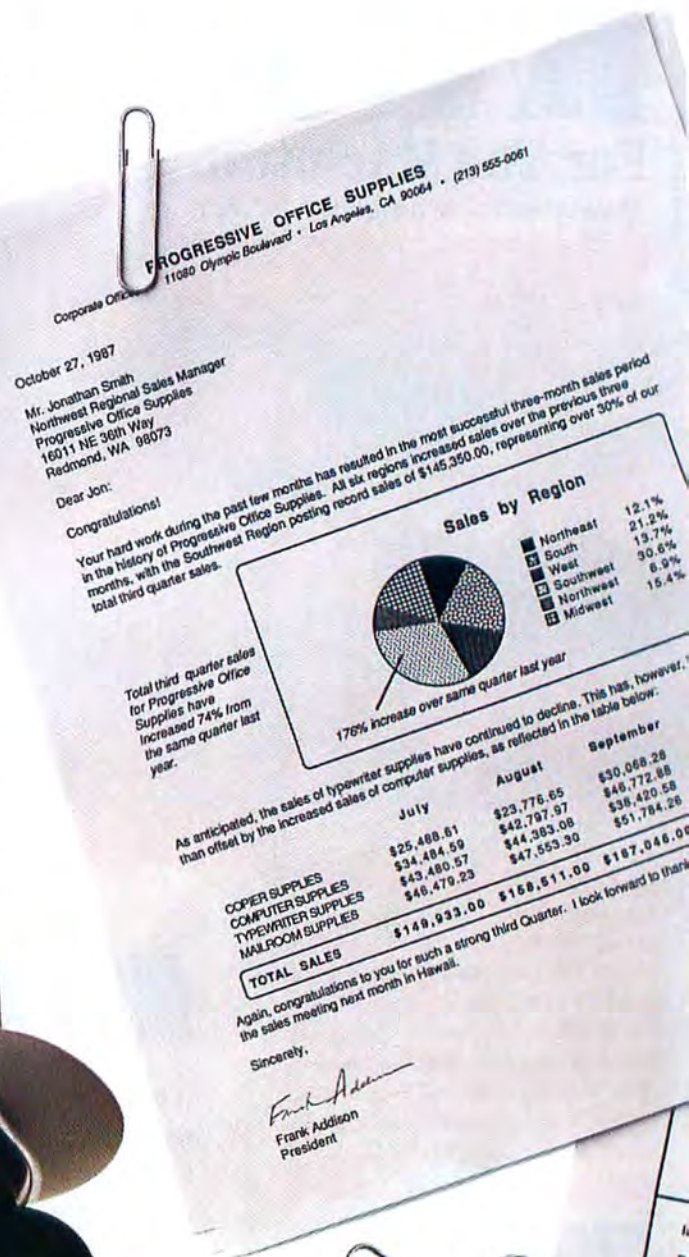
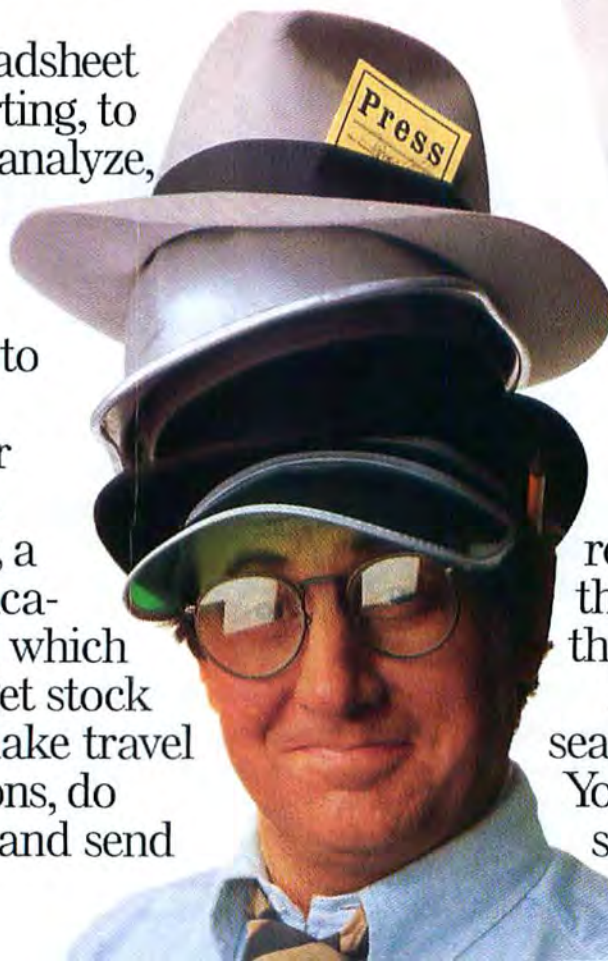
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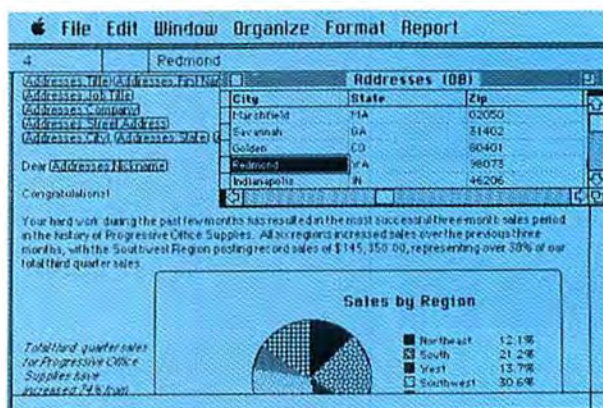
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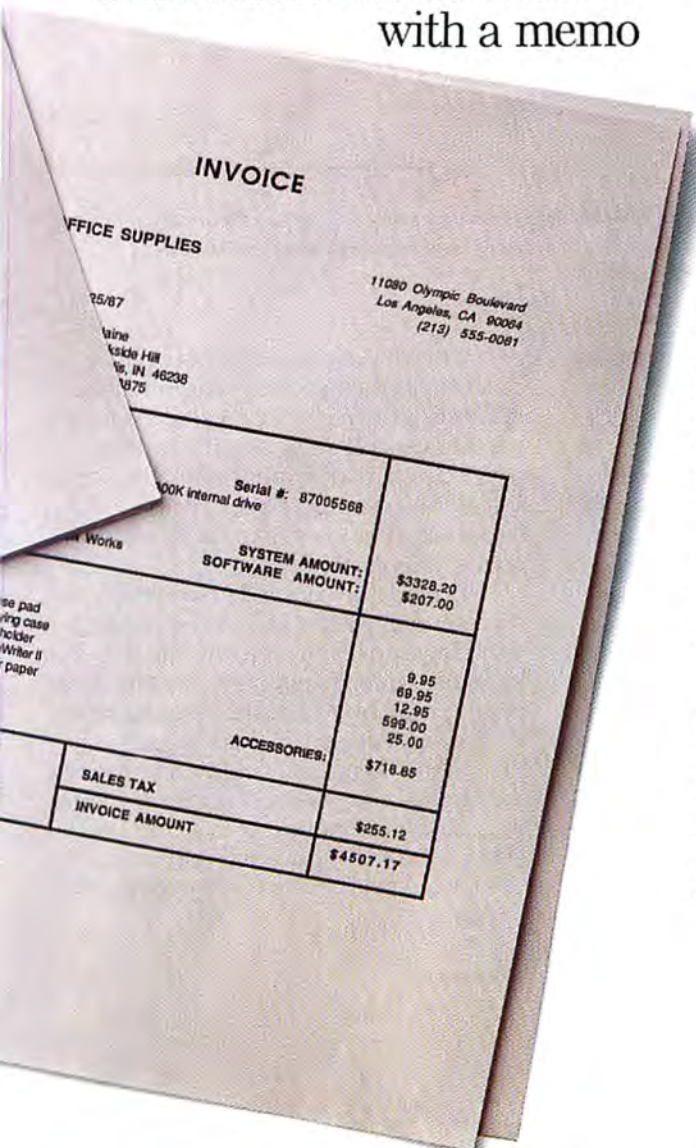
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on mouseUp

```
-- determine which line number the click was in
put (item 2 of the clickLoc - 98) div 17 into lineNumber

-- if there's no action item, then don't check it off
if line lineNumber of field "Actions" is empty then exit mouseUp

-- check it off if there is no check mark in the line of the click
if line lineNumber of field "Done" is empty then
  put "√" into line lineNumber of field "Done"

-- also update the Reminder card without showing it
set lockScreen to true
push card
go to line lineNumber of field "Links"
put the abbr date & " at " & the time into field "Completed"
pop card
set lockScreen to false
exit mouseUp
else

-- uncheck a previously checked-off item
put empty into line lineNumber of field "Done"

-- and erase the date and time it was originally completed
set lockScreen to true
push card
go to line lineNumber of field "Links"
put empty into field "Completed"
pop card
set lockScreen to false
end if
end mouseUp
```

Listing 2

This handler belongs to the long, skinny field in the To Do card where you check off completed items. When you check off an item, the corresponding Reminder card is automatically marked as completed.

the field and divide that amount by the text height of the field's font.

To re-create this feature in your Ticker, here's how to establish the number of pixels above the top of the field. Place the browse tool with the tip of its pointing finger on the top edge of the field (you may want to make the field a rectangle so that you can see its top edge). Then type **the mouseV** into the Message Box. In my stack, that process returned 115 as the vertical coordinate of the top of the field. If I had used that measure in my math, the first line would have been numbered 0, when I really wanted 1. So I subtracted the height of one line (the amount listed in the Font dialog box next to the font size) to arrive at 98. The **div** arithmetic operator determines how many times (in whole numbers) the coordinate result can be divided by the line height. That tells me the line number.

Next, the handler checks the Actions field item for that line to make sure that something is there. If it's blank, the handler stops.

When there is an action that can be checked off, the handler makes sure it has not already been checked. Using the line-number variable set above, the handler puts a check-mark symbol (actually, it's the square-root symbol you get in most fonts by pressing Option-v) into the Done field on the appropriate line.

To place the date and time in the corresponding Reminder card without changing cards on screen, the handler locks the screen temporarily, uses the line-number variable to find the linked card's ID, goes to that card, places the date and time in the Completed field, and returns to the original card. Unchecking the field simply places an empty string into the Done field on the To Do card, and also into the Completed field on the corresponding Reminder card.

(continues)

"How the world's only high-quality PostScript® output device dramatically changed our business."

Charles Solazzo

MicroComputer Publishing in New York City is one of the largest desktop publishing/output centers on the East Coast. Founded by Harold Levine, James Scrittorale and Charles Solazzo, the company has grown from one Macintosh™ and an Apple LaserWriter® into a diversified output service center. Charles Solazzo, Vice President of Sales and Marketing, tells how the company evolved.

"We organized an electronic publishing center."

"We planned to offer in-house full production service, IBM™ and Macintosh rentals, and educational service to clients who wanted to electronically publish documents.

"Our goals emphasized service because service is the foundation of our business."

"We wanted to offer 'one-stop' service and savings."

"We now offer use and/or purchase of software programs; 300 dots-per-inch image scanning with Optical Character Reader (OCR); 3-D video digitizing and scanning; output from ImageWriters, laser printers or the Linotype Linotronic® 300 laser imagesetter; duplicating and on-line book binding.

"Our customers need only dial one telephone number, saving time and money in their search for top-quality output."

"Our sales have quadrupled."

"When we were looking at equipment, Linotype was the only typesetting company that offered high-resolution PostScript compatibility, and still is. So we purchased Linotype's Linotronic 300 laser imagesetter, a PostScript 300 Raster Image Processor (RIP), and an ML 314 Processor.

"And in less than six months, our sales increased over 400 percent. We're almost ready for a second Linotronic laser imagesetter, probably the Linotronic 500 with its 108-pica (18-inch) wide output.

"We will enhance our graphics with scanners, plotters, cameras, color reproduction and a CORA system front-end.

"So when the phone rings, Levine answers, 'Yes, we provide laser-printed output, but if you need higher resolution, we do have a Linotronic 300 laser imagesetter.'"

If you'd like to know more about the Linotronic laser imagesetters, or if you'd like to know more about the service bureaus specializing in Linotronic output in your area, contact: Linotype Company, 425 Oser Avenue, Hauppauge, NY 11788. Or call (516) 434-2016. In Canada, (416) 890-1809. And let our quality speak for itself.

This ad was composed on a Macintosh and output on a Linotronic 300 laser imagesetter.

Linotype

Script of background button "Tomorrow"

```
on mouseUp
  get field "Date"
  convert it to seconds
  -- add one day
  add 24*60*60 to it
  convert it to long date
  update it
end mouseUp
```

Script of background button "To Phone"

```
on mouseUp
  get the selection
  push card
  go to stack "Phone"
  dial it
  pop card
end mouseUp
```

Script of background button "To Address"

```
on mouseUp
  get the selection
  push card
  go to stack "Address"
  find it
end mouseUp
```

Script of background button "To Reminder"

```
on mouseUp
  go to last card of bkgn "Reminder"
end mouseUp
```

Script of background button "Today"

```
on mouseUp
  update the long date
end mouseUp
```

Script of background "Reminder"

```
on newCard
  -- date stamp
  put the long date →
  into field "Created"
end newCard
```

Script of background button "Sort"

```
on mouseUp
  sort dateTime →
  by field "FollowUpDate"
end mouseUp
```

Script of background button "To Phone"

```
on mouseUp
  get the selection
  push card
  go to stack "Phone"
  dial it
  pop card
end mouseUp
```

Script of background button "Done"

```
on mouseUp
  if field "Completed" →
    is not empty then
      -- can't overwrite end time
      beep
      exit mouseUp
    else put the abbr date →
      & " at " & the time →
      into field "Completed"
    end mouseUp
```

Script of background button "Carry Over"

```
on mouseUp
  -- adds one day to date field
  convert the date to seconds
  add (24*60*60) to it
  convert it to long date
  put it into field "FollowUpDate"
end mouseUp
```

Script of background button "To To Do"

```
on mouseUp
  go to first card
end mouseUp
```

Script of background button "Next"

```
on mouseUp
  -- confines cycling
  -- to this background only
  go to next card of this bkgn
end mouseUp
```

Script of background button "Prev"

```
on mouseUp
  -- confines cycling
  -- to this background only
  go to prev card of this bkgn
end mouseUp
```

Script of background button "To Address"

```
on mouseUp
  get the selection
  push card
  go to stack "Address"
  find it
end mouseUp
```

Script of background field "FollowUpDate"

```
on closeField
  convert field "FollowUpDate" →
  to long date
end closeField
```

All other message handlers in buttons and fields for the two backgrounds are quite short and are shown in Listing 3 for your convenience. The only one that needs some explanation is the *closeField* handler for the Follow Up Date field. The Convert command here lets you type in a date in the short date format (for example, 4/5/88 or 4-5-88) and automatically stretches it to the long date format (Tuesday, April 5, 1988) when you tab to the next field or press the Enter key.

Printing

This version of the Tickler does not employ any advanced printing scripts; those might be useful if you need copies of cards to take with you. You can, of course, print the To Do card simply by choosing Print Card from the File menu (or typing ⌘-P).

If you'd like a printout of the day's Reminder cards, you could write a short script built on the current application. The handler would execute an Open Printing command from the To Do card, click only on the Go buttons corresponding to filled out Action-item lines, and print each card it stopped on. By opening printing with the Print Stack dialog box (Open Printing with Dialog), you could print 8 or (with a LaserWriter) 32 cards per page and take the details of your agenda with you on one or two sheets of paper.

When the stack grows bulky with old Reminder cards you no longer need, go to the first card of the Reminder background and start pressing ⌘-Backspace to delete each card. You can't undo this operation, so think before you delete.

I'm sure you'll have some additional ideas for enhancing the Tickler stack for your own work, but this skeleton should quickly get you going in the right direction. Let me know how you're doing with this or any other *HyperCard* applications you have devised. □

Tell us what your sticky wickets are—problems using the Mac at work, or business problems you'd like to tackle with the Mac. Each month we'll select a workplace scenario suggested by a reader and propose a detailed, specific solution. Write Business Clinic, Macworld, 501 Second St., San Francisco, CA 94107. Address us electronically at CompuServe 70370,702, The Source BCW440, or MCI Mail "Macworld."

Listing 3

These 15 short scripts are attached to the buttons and fields on the To Do and Reminder cards of the Tickler stack. Each script goes into action when its button or field is clicked.

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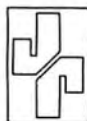
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Circle 621 on reader service card



Quick Tips

Answers to your questions

by **Lon Poole**

You may have noticed that *Macworld* articles often refer to articles that have appeared in earlier issues. If you're a new subscriber or just don't save old magazines, you may wish to order back issues. The cost is \$6 per issue in the United States and Canada, \$12 per issue elsewhere. Send your name and address, the month and year of each back issue you want, and a check (U.S. funds) to *Macworld* Back Issues, 144 Townsend St., San Francisco, CA 94107.

Q Back Issue Storage Device
In about July 1986 I saw an advertisement in *Macworld* from a company called Jesse Jones Box Company. They offered for \$6.95 a sharp-looking blue box in which to store a year's worth of *Macworld* magazines. Unfortunately, I no longer have the original advertisement, nor do I have the address of the box company. I have looked through numerous past issues of *Macworld* and cannot seem to find a repeat of this advertisement.

*Anthony R. Vanchieri
Costa Mesa, California*

A The address is Jesse Jones Industries, Dept. Mac-w, 499 E. Erie Ave., Philadelphia, PA 19134, 800/972-5858. The current price is \$7.95 for one slipcase, \$21.95 for three, and \$39.95 for six; add \$1 per slipcase for postage and handling.

Q Alter MacWrite Defaults
I use *MacWrite* often and am wondering how I can change the default settings of the ruler, font, font size, and paper size. When printing, I always want high quality, so I don't need the dialog box that

asks for print options. Also, is there a possibility that I can trick the program so it will accept manual hyphenation of words? This would be of great advantage for writing in German because the words tend to be long.

*Hans-Ulrich Thomas
Zurich, Switzerland*

A You can make a *MacWrite* template document that sets up all the conditions you want. Then, instead of using the New command each time you want to create a new document, you open the template document and immediately use the Save As command to give the document its own name.

To create a template, choose New from the File menu. Then set up formatting rulers, headers, footers, paper size, orientation, and other paragraph and document formatting. Choose the font, size, and style you wish to start the document with. Enter any text and paste any pictures that will appear in every document. Choose Print, select the options you will normally use, and print a copy of the template by clicking OK. Finally, save the document under a generic name, such as Letter or Envelope.

As for hyphenation, you can certainly break lines manually by strategically inserting hyphens. Just before printing, go through your document looking for short lines. Put a hyphen in the first word following a short line. This solution is less than ideal because the hyphenated word may end up in the middle of the line if you make changes in the paragraph. Ideally, you would like your hyphens to be invisible unless they occur at the end of a line. Other word processors have these optional hyphens, but not *MacWrite* 4.5.

Q Sleeveless Disks

When I buy disks, they arrive wearing plastic sleeves. Should I continue to use the sleeves on a daily basis? This has

been an area of much controversy among my fellow Macintosh owners. Some claim that the sleeves keep dust from accumulating and control static electricity. Others say that the sleeves actually cause static electricity.

*Aaron Alpher
Tucson, Arizona*

A If disk manufacturers had intended disk sleeves to be reused, I think they would have made them of more rugged material, such as the Tyvek they use for 5¼-inch disk sleeves. Also, I've yet to see a software publisher that ships application disks with sleeves. The flimsy plastic sleeves that 3½-inch disks come in probably don't do any harm, but they probably don't do any good, either. If you want to protect your disks, I'd suggest a disk storage box or a fabric disk wallet.

Away All Windows

Tip: After using *Excel* for quite a while now, I find it bothersome to save all open documents individually. The Close All command helps, but it prompts with dialog box after dialog box, asking me if I wish to save each document. I devised an *Excel* macro that saves every open *Excel* document except the macro itself, without any prompting (see "Close&SaveAll"). To work, the macro document must be named Close&SaveAll.

*Scott Silverman
East Brunswick, New Jersey*

Install It All

Tip: The Installer can install more than one printer driver or more than one other installation script at a time, although it may not seem like it. To do this, select one script and wait while the *Installer* fig-

(continues)



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How To/Quick Tips

	A	B
1	Close&SaveAll	by Scott Silverman
2	=MESSAGE(TRUE,"Saving and closing all Excel documents")	Display advisory below menu bar
3	=ECHO(FALSE)	
4	=IF(NOT(WINDOWS())="",GOTO(A5),GOTO(A11))	If no windows left, then end macro
5	=IF(INDEX(WINDOWS(),1)="Close&SaveAll",GOTO(A6),GOTO(A8))	If top window is this macro,
6	=ACTIVATE.NEXT()	activate the next window
7	=IF(INDEX(WINDOWS(),1)="Close&SaveAll",GOTO(A11),GOTO(A8))	If top window is this macro, skip it
8	=SAVE()	Otherwise, save it
9	=CLOSE()	and close it
10	=GOTO(A4)	Go check the next window
11	=ECHO(TRUE)	
12	=MESSAGE(FALSE)	Erase advisory message
13	=RETURN()	End of macro

Close&SaveAll

This Excel macro closes and saves all open Excel

documents except the macro itself, without asking you if you want to save each one.

ures sizes. Then Shift-click to select another script and wait again while the *Installer* figures sizes. Repeat. Finally, after selecting all the scripts you want installed, click the Install button.

Jim McSpirt

Sayreville, New Jersey

All Torn Up

Tip: When I first started using continuous-feed paper, the tedium of tearing off the edges almost did me in. I've developed a system that about cuts the time in half. First, you fold the printed paper into a stack the way it came from the box. Then you loosely fold it in half lengthwise so the tear-off strips are together. Now you can tear off all the edges together, and lickety-split you're off doing something better with your time.

Stephen Bradshaw

Indianapolis, Indiana

If you have a thick pile of printed pages, separate it into smaller stacks before applying this method.

Exporting Repeat Fields

Tip: *FileMaker Plus* has a Repeat command that lets you store multiple values in a single field. This is handy for such purposes as recording several orders on a single invoice or several locations or contacts for one company.

But exporting repeat fields to a text output file (using the Output To command) lumps all the values in the repeat field into a single text string preceded and followed by regular tab characters. In the text file, the multiple values are separated by a character with ASCII code 29 (hexadecimal 1D). This character appears as a box (□) in most word processors.

Few other database applications, if any, recognize the repeat-field separator

and put multiple values into separate fields. *Double Helix*, for example, doesn't accept the separator or the string that contains it.

You can work around the multiple-value separator problem by using a word processor that can search and replace by ASCII code, such as *Microsoft Word 3.01*. Open the exported text file and replace every occurrence of the multiple-value separator with a regular tab character. In *Word's* Change dialog, for example, type ^29 in the Find What box and ^t in the Change To box. Then click the Change All button.

It's also possible to change the multiple-value separator in *FileMaker Plus* itself. You can use *ResEdit* to make the change. Start by making a copy of *FileMaker Plus* and renaming the copy to distinguish it from the unmodified original. Next, open *ResEdit*. In *ResEdit*, find and open the copy of *FileMaker Plus*. Then find and open the resource WPIO = 0. This resource contains the hexadecimal numbers 0D09 0B1D (see "Separation Anxiety"). These are the ASCII codes, respectively, of the record separator, field separator, return character, translation character, and multiple-value separator. Change the 1D to the ASCII code (in hexadecimal) of the character you want to use as a multiple-value separator. Then close the windows, clicking Yes to save changes to the copy of *FileMaker Plus*, and quit *ResEdit*. The modified copy of *FileMaker Plus* will then include the new separator between multiple values when you output a text file.

I used *ResEdit* to change the multiple-value separator to an asterisk (ASCII code 2A) before exporting to a text output file.

(continues)

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Separation Anxiety

You can change the character FileMaker Plus puts between multiple-value fields in an exported text file. Use ResEdit to change the ID in FileMaker's WP10 = 0 resource to the ASCII code (in hexadecimal) of the separator character you want.

When I imported that file into *Double Helix*, I used a series of abacuses with Locate and Extract tiles to pull out the multiple values and store them in new fields. This

way, the process of transferring my data into the multiuser version of *Double Helix* does not suppress the multiple values in repeat fields.

Gordie Sands
Avon, Massachusetts

Mouse Rest

Tip: In *MacDraw* you don't have to move the mouse all the way from the drawing window to the tools window and back again. If you are using a drawing tool, you can press the Enter key to change the tool pointer to an arrow pointer. Conversely, you can change the arrow pointer to the last-used tool: press **⌘** while you click.

Mohsen Hamed
Zagazig, Egypt

Word 3.01 Page Setup

Tip: Microsoft Word 3.01 imposes its own Page Setup and Print dialog boxes. They don't include some of the special options in LaserWriter resources version 4.0 (and later), such as Precision Bitmap Alignment and Flip Horizontal. You can access the standard dialog boxes by pressing the

Shift key as you choose Page Setup or Print from the File menu (be sure to press and hold Shift before pulling down the menu).

David E. Condit
Warrenton, Virginia

Esoterica

Tip: Have you ever wondered who did the programming on the Chooser and the Control Panel? To find out, click the version number of each of these desk accessories.

David E. Condit
Warrenton, Virginia

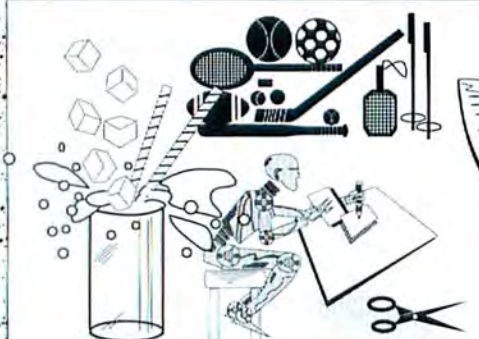
SE Keyboard

Tip: With the Control key on the Mac SE keyboard you can now type characters that you could not type before. In the Chicago font, for example, press Control-Q to type the cloverleaf symbol on the **⌘** key, Control-R to type a check mark, and Control-T to type an Apple logo (see "Controlled Characters"). Most of the current

(continues)

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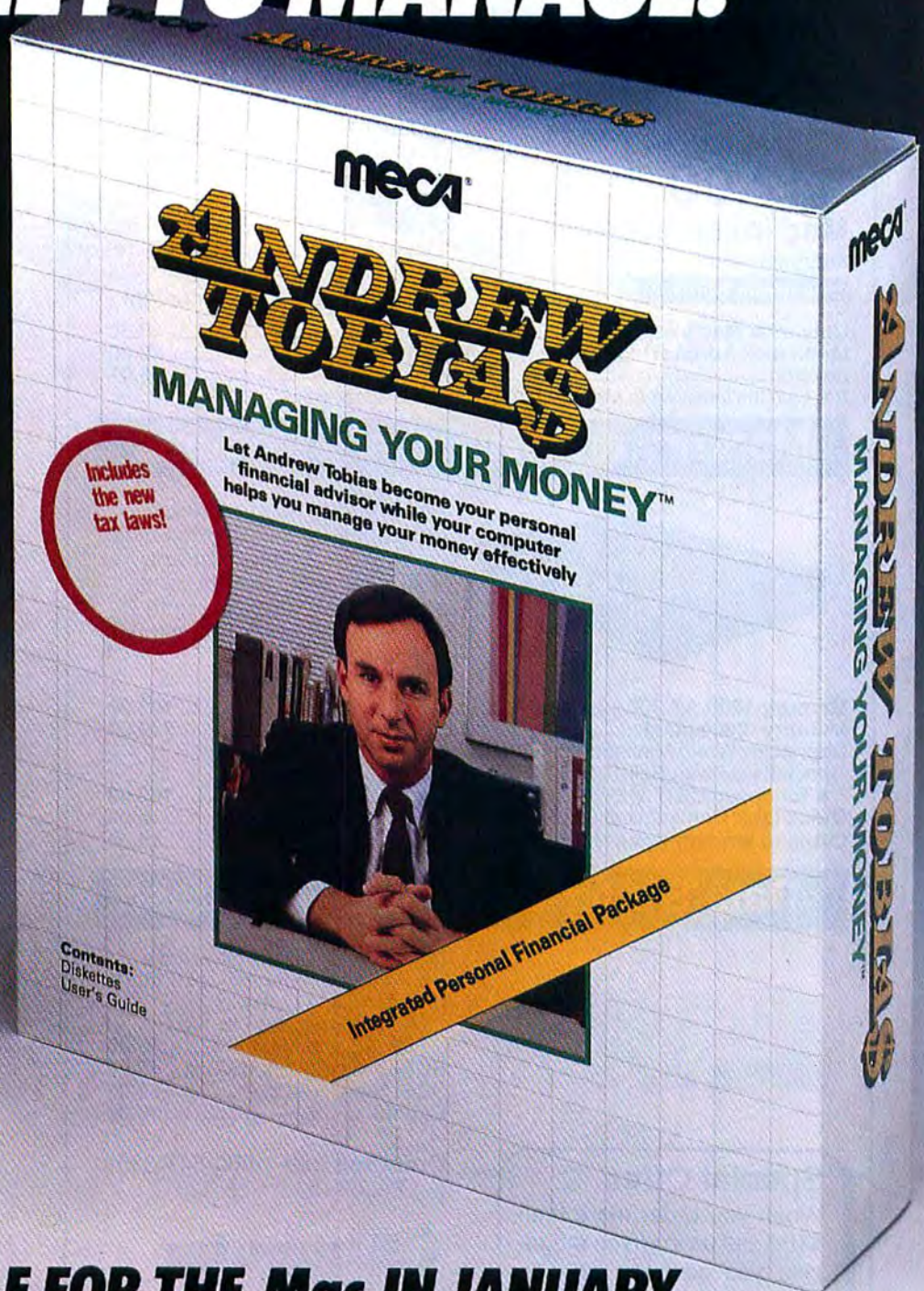


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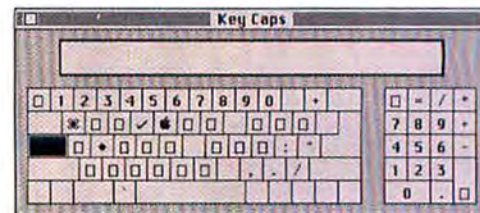
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How To/Quick Tips



Controlled Characters

Pressing the Control key on the Mac SE and Mac II keyboards lets you type previously inaccessible characters.

Apple fonts have no visible characters in these spaces, but many other fonts do.

David E. Condit
Warrenton, Virginia

Improve MacDraft Print Quality

Tip: To improve the quality of a printed MacDraft 1.2a document, save the original document and then double the scale, using the Layout Menu. For example, if the original scale was 1" = 100', change to 1" = 50'. Before printing, choose Page Setup from the File menu and select a 50 percent reduction. When you print, the reduced text looks normal rather than "computer generated."

By the way, when opening documents created with an older version of MacDraft, you must select the Tall Adjusted option in the Page Setup dialog if you're using an ImageWriter. Otherwise, the screen view of a single page appears about one inch too wide. What's more, the printed copy has its horizontal scale compressed and that extra inch of drawing area does not print.

Jerry Jenkins
Birmingham, Alabama

Heavyweight Paper Champ

Tip: I hated my ImageWriter II when I first got it. Tractor-feed paper became crooked after several pages and tore, no matter what. I went to several dealers, and none of their service departments could help me. They said the unit was fine, and couldn't even duplicate the problem. Finally one technician suggested I use heavier paper. I switched to 20-pound bond, and now everything is fine.

Mike Conley
San Diego, California

(continues)

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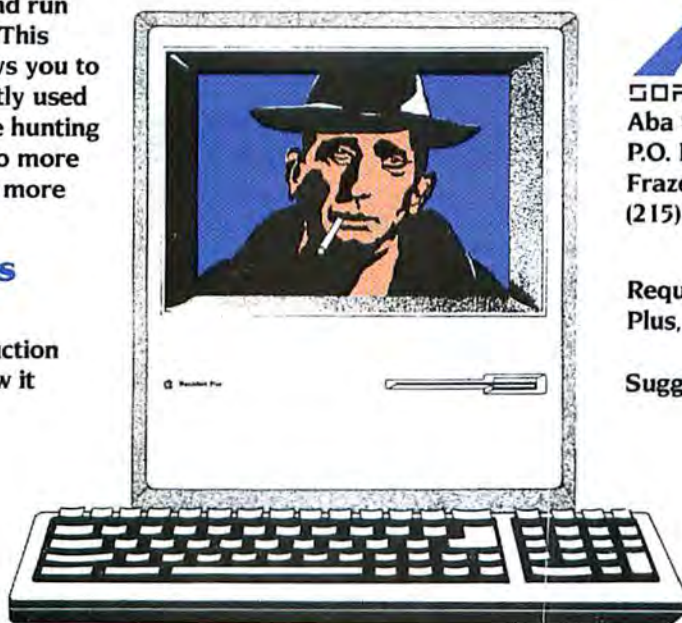
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How To/Quick Tips

Text Wraps Text

Tip: Normally, *ReadySetGo* doesn't allow wrapping text around other text. You could use *MacDraw* to create the text to be surrounded and then import the text into *ReadySetGo* as a graphic (text can be wrapped around a graphic).

There's an easier way to convert text to a graphic. First, create the text using a standard Text Block. Make all the adjustments you need to the text, such as adding style options or changing the point size. Then, when the text looks exactly the way you want it, select the text block (not the text itself) and copy it into the Scrapbook. This converts the text block into a graphic block. With the Scrapbook still open, copy again. Finally, close the Scrapbook, prepare a graphic block, and paste.

*Bill Jastram
Tualatin, Oregon*

LaserWriter Test Ban

Tip: I've got a very simple way to stop the test page that the LaserWriter prints whenever you turn it on—without resorting to PostScript commands. Just pull the paper cassette tray out far enough to disengage the feed mechanism, approximately one inch. Then turn on the LaserWriter. Wait until the green light stops flashing and remains constant, indicating that warm-up is complete, then shove the tray back in. This trick sure has saved me a lot of paper, as well as a lot of aggravation from feeling powerless to prevent the test sheet.

*Chuck Wegner
Neillsville, Wisconsin*

If you'd rather "fix" the LaserWriter permanently with PostScript commands, the June 1987 Quick Tips describes how you can use MacTerminal to do so.

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Purpose	<p>The Andrew Fluegelman Award is given annually to encourage personal computer software excellence and to recognize a software programmer or team of programmers. We are looking for people who have made a substantial, innovative contribution to the personal computer community in commercial, shareware, or public-domain software.</p> <p>The award was established in 1986 by PCW Communications, Inc., to commemorate Fluegelman's contributions to the software field. Fluegelman developed <i>PC-Talk</i>, the first easy-to-use and powerful communications program for the IBM PC. His concept of freeware remains one of the most innovative means of sharing and marketing software. Fluegelman died in July 1985, and a fund was established in his name. The annual award, sponsored by PCW Communications and the Software Publishers Association, is made possible through the Andrew Fluegelman Fund.</p>
Eligibility	<p>Any commercial, shareware, or public-domain personal computer software developed by an individual or a team—including utilities, applications, and languages—is eligible. The program must have been released between January 1, 1984, and December 31, 1987. Nominations can be submitted by anyone who did not participate in the software's development. Companies are encouraged to submit nominations for software that they market; but only individuals, not companies, are to be nominated.</p>
Prize	<p>The award winner will receive \$5000 and a commemorative plaque. The award will be presented at the Software Publishers Association annual awards dinner in California in March 1988.</p>
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Insights on SuperPaint

Twenty tips for souping up SuperPaint

by *Erfert Nielson*

SuperPaint combines two schools of Macintosh graphics—the *MacPaint* method and the *MacDraw* method. The program combines bit-mapped and object-oriented graphics, smoothly integrated in two overlapping layers. While *SuperPaint* improves upon *MacPaint* by offering such features as a larger drawing area, scrolling tools, and multiple windows, it doesn't provide all of *MacDraw*'s capabilities. *SuperPaint* owners who have used *MacDraw* or other Mac drafting programs may pine for features such as arrowheads, dotted lines, hairlines, and rotated text. Enterprising users have come up with innovative solutions (*kludges* in computer parlance) for these deficiencies and others. An enhanced version of *SuperPaint* that will address many of the current version's shortcomings is reportedly in the works, but in the meantime, the following tips will help you squeeze more performance out of both layers of *SuperPaint*. Thanks are due to *SuperPaint* users Joe McKenzie, Richard Moore, and Robert Eckhardt, and to Ken Jones of Silicon Beach Software's technical support staff.

The Layered Look

SuperPaint's two-layer approach can be confusing at first. When should you use the paint layer? When is the draw layer more appropriate? Many users stick to the draw layer almost exclusively. For one thing, the draw layer offers superior printing results, taking advantage of the LaserWriter's 300-dots-per-inch (dpi) resolution, gray scales, and PostScript fonts. The paint layer, on the other hand, prints a literal pixel-by-pixel representation of what's on the screen, at a resolution of 72 dots per inch. The draw layer also gives users the ability to freely modify objects—a shape can be stretched, shrunk, or filled with a different pattern at any time. In the paint layer, once an object is drawn it's simply a pattern of dots.



JEFFERY NEWBURY

But the paint layer offers some advantages, notably pixel-by-pixel precision. Tools like the pencil and the spray can offer artists the ability to create freehand effects impossible in the draw layer. What makes *SuperPaint* special is its ability to include both methods in a single drawing, letting users work in the style they prefer.

I'd Rather Be Scaling

SuperPaint lets you copy drawings from one layer to the other. One way to combine the assets of both layers is to scale a paint illustration in the draw layer.

(continues)

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How To/Insights

While you can scale a drawing in the paint layer, the result is sometimes a muddy jumble of pixels, especially if a drawing is scaled to less than 50 percent of original size. Since the draw layer is capable of printing at a resolution of 300 dpi on the LaserWriter (four times that of the paint layer), images created in the paint layer can be scaled to 25 percent of their original size in the draw layer without losing any pixels.

To accomplish this, select a paint image and choose Copy To Drawing from the Edit menu. Delete the original in the paint layer so it doesn't obscure the draw-layer image. In the draw layer, select the object and choose Scale Selection from the Edit menu. Click on 25%, or type in a percentage if you prefer—but don't enter a percentage lower than 25 if you want to keep all the pixels in the reduced version.

Paint Remover

You may occasionally wish to scale a drawing in the paint layer. The following technique will improve the appearance of images reduced in this layer.

To prevent the unsightly glob of compressed pixels that can occur when an image is reduced in the paint layer, create a screen that wipes out half the pixels, resulting in a crisper image when the drawing shrinks. First, select Paint On Black from the Paint menu. This option covers only black pixels with the selected pattern, leaving white areas intact. Select the image to be scaled, click on the middle gray in the gray-scale pattern palette (eighth from the left, bottom row), and choose Fill from the Paint menu. Half of the black pixels turn white. Now, with the image still selected, choose Scale Selection from the Edit menu and click 50% in the resulting dialog box. The reduced image, although not as crisp as if it were scaled in the draw layer, looks much better than if you'd simply scaled the original image. For a comparison of scaling techniques, see "Three Scaling Options."

A Storage Drawer

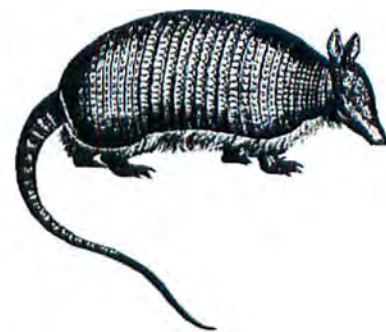
If you're working on a complicated illustration in the paint layer and need space to work on a detail or two, you can temporarily copy part of the painting to the draw layer, giving you a clean space to work in. Select the section you wish to move, press ⌘-E to copy it to the draw layer, and erase the original in the paint layer. Then choose Hide Back Layer to obscure the image in the draw layer. When you're ready to



Scaled 50% in paint layer



Scaled in paint layer with gray fill pattern



Transferred to draw layer and scaled 50%

Three Scaling Options

Scaling a picture in SuperPaint's paint layer compresses the pixels, darkening and blurring the image. Applying a gray screen to the image helps, but for best results, transfer the picture to the draw layer and scale it there.

retrieve the stored section, go to the draw layer, select it, and transfer it back to the paint layer with ⌘-E. This method is quicker than using the Scrapbook as a holding area.

(continues)

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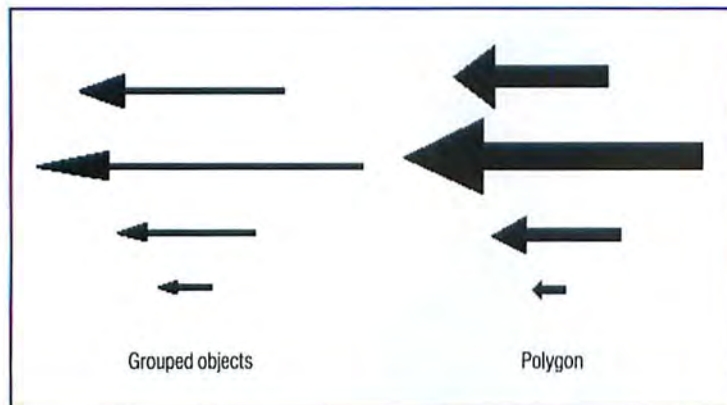
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Flexible Arrows

You can create arrows in SuperPaint's draw layer by grouping a line and a triangle, but arrows look better when resized if they're made with the polygon tool.

**Animation Aid**

Another unusual use of SuperPaint's two-layer approach applies to animation. If you create animations with Beck-Tech's MacMovies, which strings together a series of MacPaint pictures to produce frame-by-frame animation, you can use SuperPaint to produce smooth transitions from one frame to the next. To produce a smoothly animated sequence, first create an object in SuperPaint's paint layer and press **⌘-Shift-3** to take a screen shot—a MacPaint

document that records what's on the screen. This screen shot will be frame 1 of your animation.

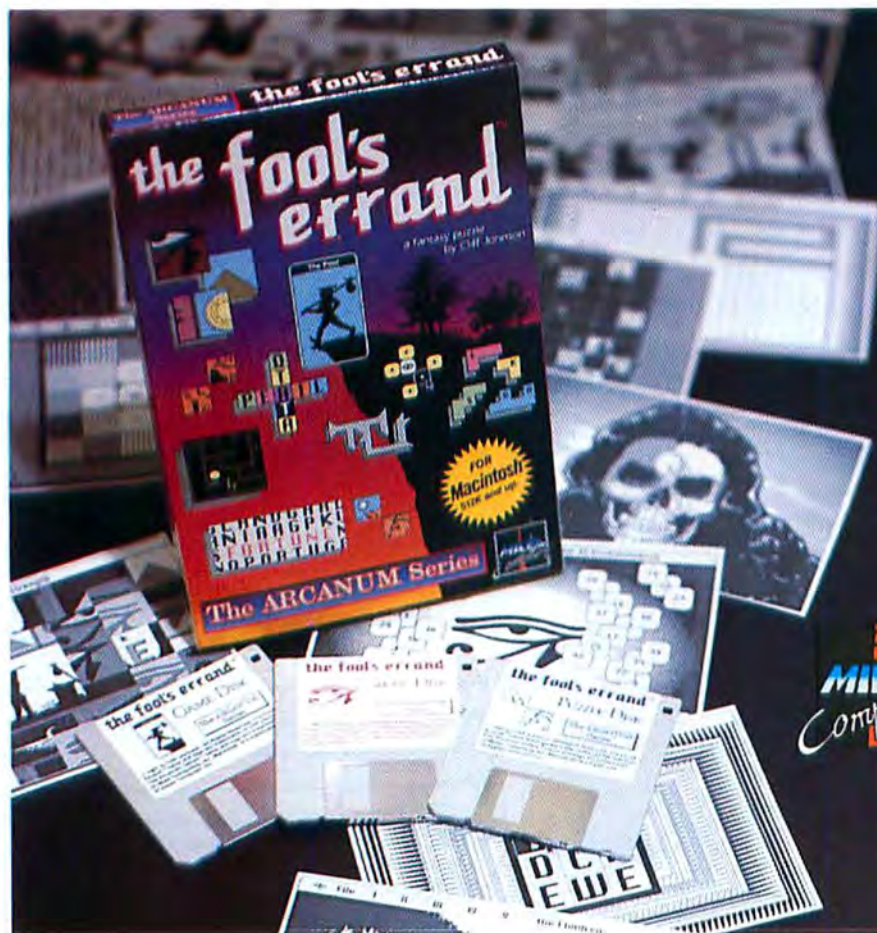
Next, copy the object to the draw layer and, remaining in the paint layer, use SuperPaint's Nudge commands to move the object in one-pixel increments. In this case, the paint layer acts like a piece of tracing paper, showing the object's original position in the draw layer and its new position in the paint layer. When the object is in position for frame 2, choose Hide Back Layer to hide the draw layer, and take another screen shot. Continue this procedure until you've shot an entire movie.

A Few Pointers

Many people use SuperPaint's draw layer to create flow charts, organizational charts, or technical drawings. But unfortunately, SuperPaint doesn't include a built-in supply of arrows for those drawings. It's easy enough to create your own arrows by grouping a straight line with a triangle for the arrowhead. You can store a collection of homemade arrows in the Scrapbook for easy retrieval, pasting the appropriate arrow into a document and duplicating it, rotating it, and so on. But problems arise when you try to resize such an arrow; the line width stays fixed, but the head undergoes unattractive contortions. There's a better way to build an arrow. Turn on the grid to help keep sections aligned, and draw an arrow as a single object with the draw layer's polygon tool. You can then stretch and shrink it with little distortion ("Flexible Arrows" shows the results of resizing the two arrow types).

Dots and Dashes

Another feature found in many drawing programs but not in SuperPaint's draw



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layer: dotted and dashed lines. Fortunately, it's easy to make your own. Simply select a line pattern, click the Line indicator (the leftmost box on the pattern palette), and draw a line with the straight-line tool. If the existing patterns don't provide the right spacing between dots or dashes, create your own patterns and apply this technique.

Hairlines

The thinnest line you can select in *SuperPaint* is one pixel wide. Some designers want the precision of hairlines—lines of less than a pixel. Unbeknownst to many users, *SuperPaint* offers two ways to create hairlines. The first method requires a bit of experimentation but does work once you get the hang of it. From the bottom row of the line-pattern palette, select the fourth pattern from the left for a vertical line or the fifth for a horizontal line, click the Line indicator, and draw a single-pixel line. Then use a Nudge command to move the line up or down (if it's a horizontal line) or sideways (if it's a vertical line). Nudge the line until it disappears on the screen, then nudge it one more pixel and print the results. If you're not satisfied, try nudging it

two pixels after it disappears. A simpler technique for drawing hairlines is to enter LaserBits and draw a single-pixel line, which will be reduced when printed. Although this method is easier, you can create only short line segments because of LaserBits' 2- by 2½-inch size restriction.

Pseudo-Footers

If you want to add page numbers or other footers to a *SuperPaint* document, you can trick a line of text into printing below the normal bottom page margin. In the draw layer, type a line of text at the bottom of a document. Then place the cursor at the beginning of the line and hit Return. This forces the text just below the drawing area, giving you a little extra space for the document. (Warning: Versions of the LaserWriter earlier than 4.0 may cause a system error.)

Big Changes

People who switch from *MacPaint* to *SuperPaint* may be unaware that the latter's Flip and Rotate commands can operate on an area larger than the screen. Unlike *MacPaint*'s selection rectangle, or *marquee*, *SuperPaint*'s paint-layer marquee scrolls the screen when it hits an

edge, allowing you to select up to an entire page at once. While you can flip a page-sized image horizontally (mirror image) or vertically (upside down), the program won't allow you to rotate a large image left or right if the image won't fit on the page when tipped on its side. You may also be surprised to learn that Paint menu commands such as Free Rotate, Stretch, Distort, and Slant work with large selections as well. Unlike the Edit menu's Rotate Left and Rotate Right, Free Rotate may rotate a large object right off the edge of the page. Don't worry, though—the Undo command will come to the rescue if you inadvertently rotate part of a drawing into oblivion.

Rotated Text

One of *SuperPaint*'s most innovative features is LaserBits, an option that lets you work pixel-by-pixel at a resolution of 300 dpi rather than at the screen's normal 72 dpi. Each pixel in the screen image is replaced by a 4- by 4-pixel square, allowing you to make minute changes that show up when the image is printed at the LaserWriter's 300-dpi resolution. LaserBits

(continues)

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How To/Insights

doesn't restrict you to the tedious process of changing one dot at a time, however. As the manual briefly states, all of *SuperPaint*'s painting and drawing tools work in LaserBits. What the manual doesn't mention is that you can use LaserBits to rotate text to any angle with the Paint menu's Free Rotate command. Because LaserBits operates at a higher resolution than the paint layer, text rotated in LaserBits looks far better than text rotated in the paint layer.

Here's how. Type a short phrase in the paint layer (remember that LaserBits can't operate on a section larger than 2 inches wide by 2½ inches high). Select the phrase with the marquee and choose New LaserBits from the File menu. In LaserBits, again surround the text with the marquee, choose Free Rotate, and rotate the text. You may need to touch up the text a bit in LaserBits, but one look at the same text rotated in the paint layer should sell you on the LaserBits method (see "A Few Words").

Scaling in LaserBits

LaserBits objects can be scaled up or down like other objects. To scale in LaserBits, select and open a LaserBits object from the draw layer (LaserBits objects are distinguished from other objects in the draw layer by hollow "handles") or open a new LaserBits file if none exists. Then simply select the object in the LaserBits window and choose Scale Selection from the Edit menu.

Multiple Pattern Palettes

SuperPaint offers four pattern palettes: miscellaneous patterns and textures, line patterns, gray scales for PostScript printing, and a blank palette to fill with custom patterns. Each palette contains 32 patterns, plus black, white, and no pattern. If 32 custom patterns isn't enough for you, you can alter existing patterns in the other palettes. If that still isn't enough, you can add palettes to the program with *ResEdit*. From the Desktop, launch *ResEdit* and double-click on System Folder; then *SuperPaint* Prefs, then PAT#. Finally, click on the empty palette to select it. Next, pull down the Edit menu and choose Duplicate (or press ⌘-D) once for each blank palette you want. When you return to *SuperPaint*, you'll see that all the palettes you duplicated are available as blank palettes.

Inverted Patterns

Here's a short tip, just for variety. To invert a pattern (change black pixels to white and vice versa), double-click on the pattern in the pattern palette to bring up the Edit

Big Tire Sale—
Prices Slashed!

Big Tire Sale—
Prices Slashed!

Big Tire Sale—
Prices Slashed!

A Few Words

As you can see, rotating text in the paint layer provides unsatisfactory results. Rotating the same text in LaserBits greatly improves its readability. Cleaning it up in LaserBits makes it sharper still.

Patterns box, hold down the ⌘ key, and click the left-hand square in the Edit Patterns box.

Easy Pattern Pickup

You can shop for interesting patterns by running the pointer over a drawing until you find a pattern you like. Double-click on a square in the empty palette provided for custom patterns (or on an existing pattern you wish to change). When the Edit Patterns box appears, hold down the mouse button and move the pointer across the screen until a good-looking pattern appears in the box. Click the Save button and the pattern is added to your collection. This procedure works fine, except that the pointer moves in jerky, eight-pixel jumps. For added precision when cruising for patterns, hold down the Option key when you move the mouse to move in increments of one pixel rather than eight.

Oversized Patterns

SuperPaint's patterns are normally made up of 8-by-8-pixel squares—when you use a tool like the paintbrush or the paint bucket, the 8-by-8 squares mesh together to fill an area with a solid pattern. To create a larger-pattern square, perform the following steps. First, set the grid to 24 screen dots in the Grid & Rulers dialog

(continues)

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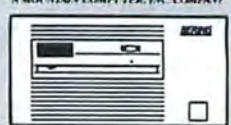
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Start-up Lineup

To avoid chopping off the top 1/4-inch of a start-up screen, you must drag the image so its upper-left corner aligns with the upper-left corner of the full-screen view.



box. Turn on Grid Snap and click OK. In the paint layer, create a pattern with any of the tools. Select one grid square of the new pattern with the marquee, hold down the Option and \mathbb{H} keys, and drag the selection around the screen. The pattern is repeated in 24-pixel-square chunks across the screen. You can use the large pattern as a background or turn off the grid and carve it into smaller sections to place in a drawing.

Starting Up Is Hard to Do

You may have noticed an option called StartupScreen in the Save As dialog box. SuperPaint includes a handy utility that lets you make a custom start-up screen—the image that appears for a few seconds when the Mac is turned on—from any SuperPaint picture. The procedure is pretty straightforward. You open the document you want to substitute for your start-up screen, choose Preferences from the Options menu, and check the "Hide menus

when hiding palettes" option. This option allows you to see an entire screenful of a drawing, unobstructed even by the menu bar at the top. To preview your start-up screen, press \mathbb{H} -F to select the full screen and \mathbb{H} -H to hide the palettes. Then press \mathbb{H} -F again to toggle out of the full-screen view, and save the document as a start-up screen. So far, so good? No—so far, so-so. When you start up your Mac and look at the new start-up screen, you might notice that the top quarter-inch of the picture has disappeared; the image fills the entire screen, but it's as if the original drawing were pushed upward a bit, obscuring the very top of the drawing. An extra step can alleviate this glitch. After you press \mathbb{H} -F the second time, use the marquee to select a large chunk of the image, starting at the upper left-hand corner. Use the scroll bars to return the still-selected picture to its original position, then press \mathbb{H} -F again to return to full-screen view. Grab the selection and align the upper-left corner with the corner where the menu bar and the tool palette intersect (see "Start-up Lineup"). Now, when you save the document as

(continues)

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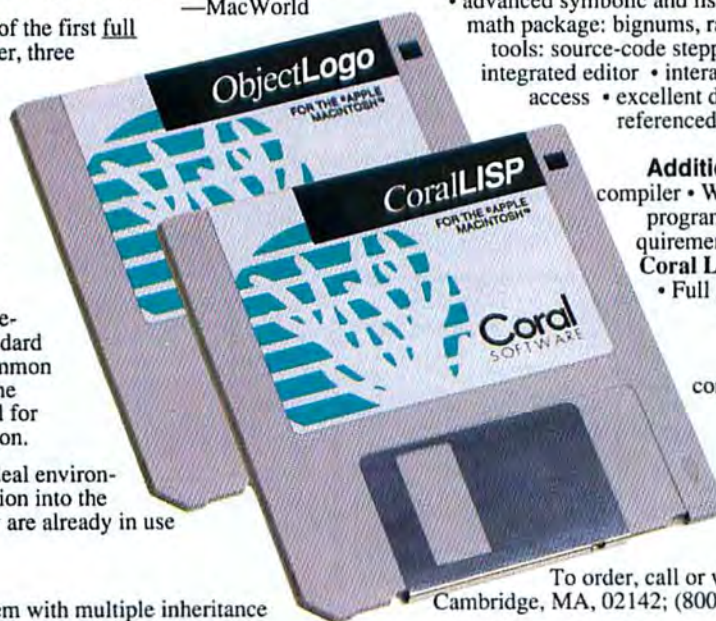
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Coral Software: Where Limitations Are Left Behind

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R.D. Warshawer, Planning and Scheduling Manager, GTE/Government Systems, Strategic Systems Division — from his MICRO PLANNER review. "My evaluation of the software is that it is a superior package, very user oriented, with good documentation . . . The structure makes the maximum use of the Macintosh™ interface, allowing the user to become adept rather rapidly. Users who are familiar with the networking techniques will find this product falls between MacProject (a low-end planning tool) and Artemis (a super powerful mini/mainframe tool). In fact, this product appears to have similar functionality to the Artemis system . . . **For those who find MacProject inadequate** . . . and Artemis too much for their needs, MICRO PLANNER PLUS should be an excellent tool . . . One of the most important features . . . is the ability to save the 'plan' and assess progress against the plan as the actual work progresses. The lack of this capability is what makes MacProject's use extremely limited."

From 'Project Management' by Barry Keating, *Macazine*, June 1986
—"**Carl Sanchez, Chief of Planning for the Launch**

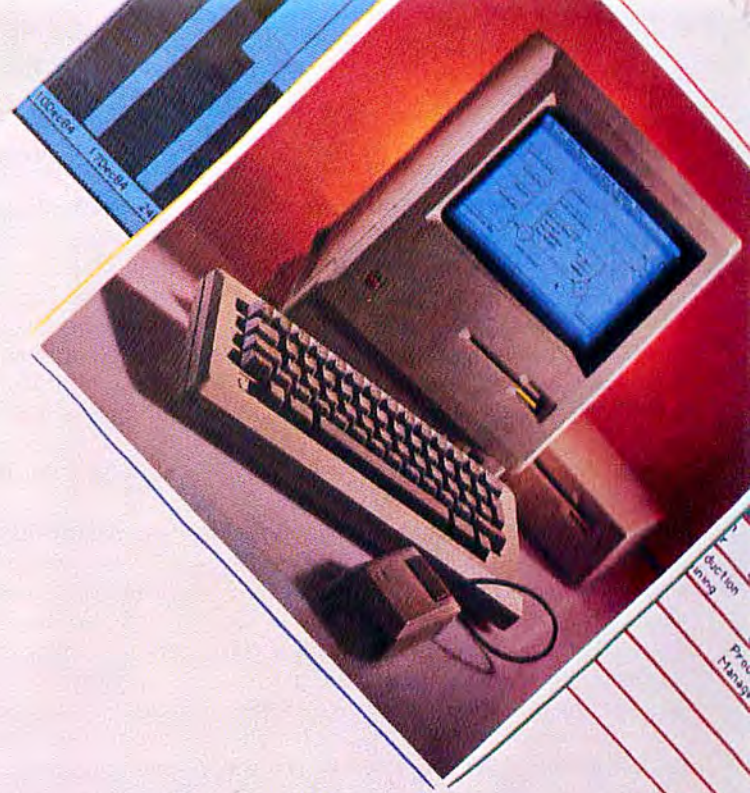
Control Systems Divisions of Martin Marietta . . . As an individual who must both plan and control projects, he has used both MacProject and MICRO PLANNER PLUS (as well as mainframe versions of project management software such as Artemis). While he 'cut his teeth' on MacProject . . . Sanchez believes MICRO PLANNER PLUS to be a much more powerful tool for practitioners than MacProject. Many people at Martin Marietta use MICRO PLANNER PLUS not only for its power but because its learning curve is quite short . . . (less than a day for some people) . . . MICRO PLANNER PLUS has the best training curve of the project management software."

Another user who has switched from MacProject to MICRO PLANNER PLUS is Mike Krueger of Natural Intelligence . . . Krueger, like Carl Sanchez, started out using MacProject but soon found that his job required the sophistication found in MICRO PLANNER PLUS. MICRO PLANNER PLUS is . . . being used to develop the schedule for producing Natural Intelligence's first product . . . (software with an expert systems or artificial intelligence capability).

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a start-up screen, the top portion will remain visible.

The Four Percent Solution

SuperPaint's two layers have caused Silicon Beach programmers untold headaches in the realm of printing. When *SuperPaint* was initially released, the LaserWriter printed bit-mapped drawings at 96 percent of screen size and object-oriented artwork at 100 percent. Silicon Beach compensated for this discrepancy, so both layers printed at 96 percent. But then Apple fixed the LaserWriter driver (version 4.0), which made the paint portion of *SuperPaint* print at 100 percent instead of 96 percent. If you have an old version of *SuperPaint* (1.0) and an old version of the LaserWriter driver (prior to 4.0), you should be OK. If you have the old *SuperPaint* and a new printer driver, the paint layer won't line up correctly with the draw layer when printed. Don't worry; the solution is not as complicated as the problem. The latest version of *SuperPaint*—1.0p—fixes the paint/draw printing discrepancy. To update your disk, you can download a patcher utility from a number of user groups and online services includ-

ing AppleLink, ARPANet, BIX, CompuServe, and MacUnderground.

A Bleak Landscape

Many *SuperPaint* users have found themselves unable to print in Landscape (horizontal) mode. Why? The answer is simple: because it's not possible. Unfortunately, the option isn't grayed—it looks as if you should be able to print. The only solution is to wait for the upcoming *SuperPaint* upgrade; a Silicon Beach representative says this problem will be fixed.

A Smooth Answer

Is it taking what seems like forever to print a document? Try turning off Smoothing in the Page Setup dialog box. An unsmoothed drawing often prints substantially faster than the same drawing with Smoothing turned on. (Note: draw layer objects are by nature smoother than paint objects because of the draw layer's 300-dpi printing capability; create illustration elements in the draw layer whenever possible.)

Page Setup Options

For those who patched their copy of *SuperPaint* to work with LaserWriter

printer driver version 4.0, printing LaserBits at the highest resolution can be tricky. Here's how. In the Page Setup dialog box, turn off Smoothing and Faster Bitmap Printing. Then press the Options button and turn on Precision Bitmap Alignment. Selecting Larger Print Area is also necessary if your document has images touching the right or bottom edges. Also make sure you don't have too many downloadable fonts.

Mac II Fix

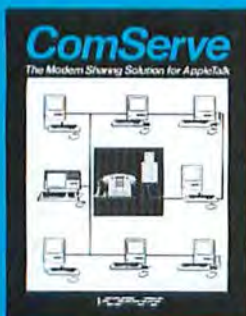
Are you having trouble displaying *SuperPaint* correctly on your Mac II monitor? If so, open the Control Panel and set the monitor to two-color mode.

Your Two Cents

If you have a *SuperPaint* shortcut or tip that we haven't uncovered, send it to us. We pay \$25 to \$100 for tips published in the *Quick Tips* column. Send your contributions to *Quick Tips*, *Macworld*, 501 Second St., San Francisco, CA 94107. □

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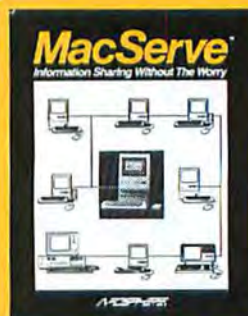
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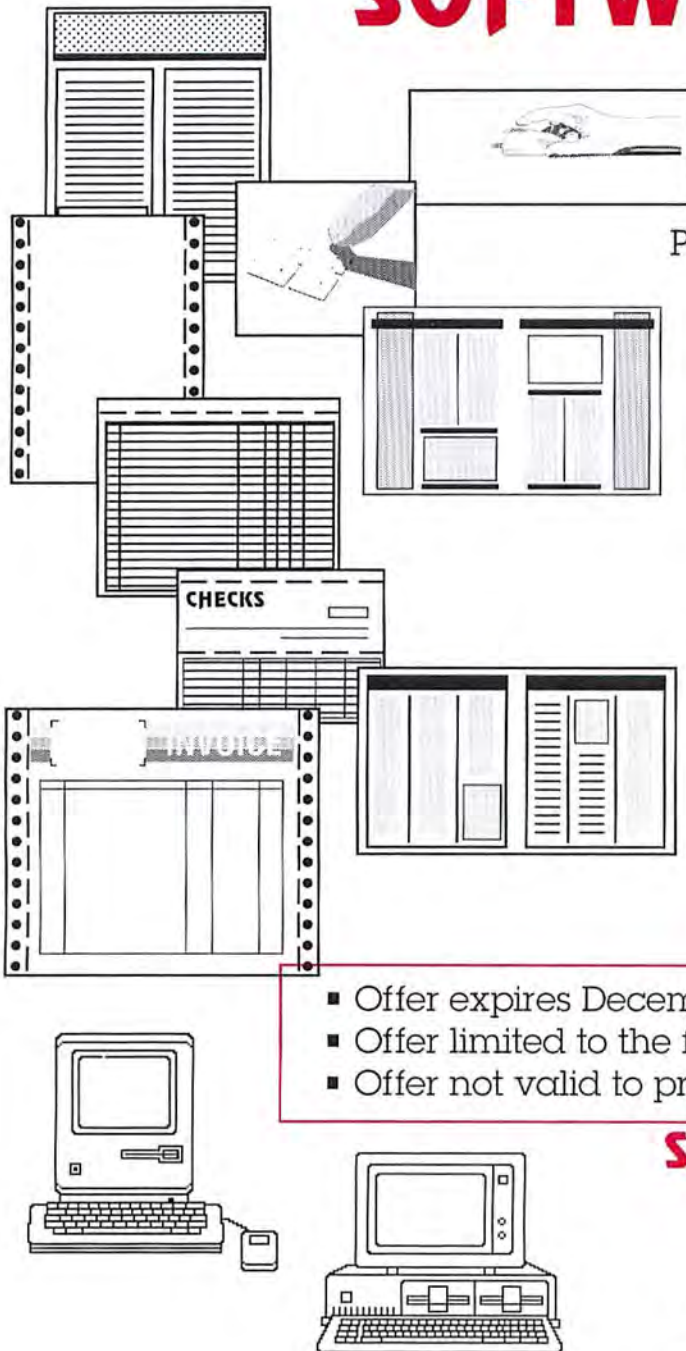
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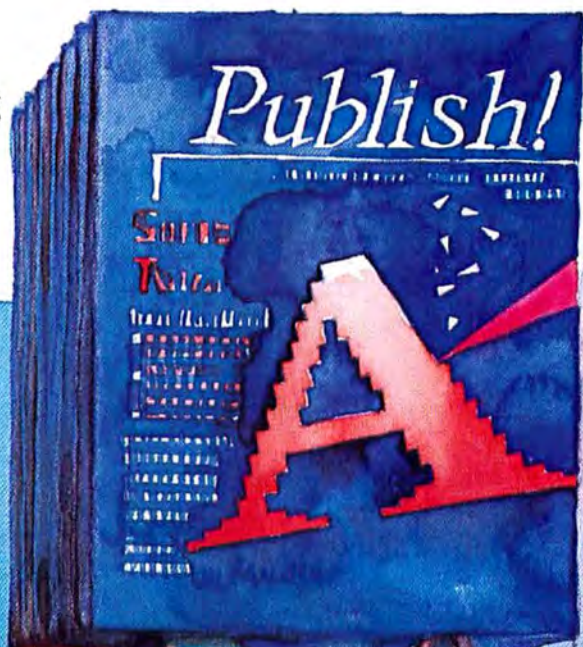
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Mac System Tools

A do-it-yourself guide to installing Mac II memory

by Franklin Tessler

The first time I got a peek inside a Macintosh was when I had my 512K upgraded to a Plus. I felt like a kid peering over the shoulder of a TV repairman, gazing into forbidden territory. The manual made it clear that opening a Mac was one of life's riskier undertakings: *Do not remove the Macintosh cover. No user-serviceable parts inside.* As if to drive the point home, Apple made sure that special tools were needed to open the case.

But the Macintosh II is different. Open. Friendly. The lid's held on by just one small screw and it's probably there just to satisfy some government regulation. When I was recently offered a memory upgrade for the Mac II in my office, I decided to avoid a trip to the dealer and install it myself.

Why Add Memory?

Why bother with more RAM? After all, the one megabyte that is now standard in all Macs is a whopping eight times the memory the computer had when it was first introduced in January 1984. Back then, all applications had to make do with less than 128K or they simply wouldn't run. Even after the debut of the 512K "Fat Mac" later that year, programmers continued to make sure their software would work on the more common smaller machines. Nowadays, programs that run on a 128K Mac are rare; most programs require at least 512K of memory, and applications that demand at least one megabyte aren't unusual. Apple's own *HyperCard* won't run on a 512K, for example. On the Macintosh II, displaying gray-scale and color images places an even greater premium on RAM, with full-screen images consuming more than 300K apiece.

If just one application puts a strain on memory, consider what happens when you try to run two or more of them under MultiFinder. MultiFinder is such a natural extension of the Finder that it's liable to gain a much wider acceptance than *Switcher* ever has, especially when programs that can perform tasks in the background become commonplace. Although you can use MultiFinder with only one megabyte on board, it needs at least twice that much to be really useful.

Another way to increase efficiency with additional RAM is through the Mac's built-in memory cache, which you adjust with the Control Panel desk accessory. The cache sets aside an area of memory in which applications can store frequently used data; this reduces the number of disk accesses and boosts speed of operation. The manual recommends that the cache

be set to no more than one-quarter of installed memory, or 256K on a standard Macintosh II. Even with a small cache, though, the increase in performance can be dramatic.

Extra memory can also be configured as a RAM disk, which fools the computer into using a portion of memory as a very fast phantom drive. Unlike the cache, which stores chunks of data, RAM disks are typically used to store entire files. With either method, however, you run some risk of losing data if the system crashes or power is interrupted. Still, in many applications the increase in speed is well worth it.

Because the RAM chips in the 128K and 512K Macs were permanently soldered in place, adding memory usually meant altering or completely exchanging the sys-

(continues)



Mixing Memory

The table shows four ways of configuring memory in a Mac II. When higher-density chips become available, you'll be able to have as much as 128MB on the main board.

Mixing Memory

First Four Slots	Second Four Slots	Total Memory
four 256K SIMMs	empty	1MB (standard)
four 256K SIMMs	four 256K SIMMs	2MB
four 1MB SIMMs	four 256K SIMMs	5MB
four 1MB SIMMs	four 1MB SIMMs	8MB

tem board. Since the introduction of the Macintosh Plus, memory now comes on separate plug-in circuit boards called SIMMs, short for Single In-line Memory Modules. Each one has a capacity of either 256K or 1MB, depending on the type of chips used. Both the Mac Plus and the SE come with 256K SIMMs in each of their four memory slots (a total of 1MB). If you replace these SIMMs with 1MB modules, you expand your total memory to 4MB. The Mac II has slots for eight SIMMs—in the standard 1MB configuration, four of them are occupied by 256K modules. You can expand on the basic setup by placing four

more SIMMs in the empty sockets, by swapping the 256K modules for 1MB boards, or by combining both (see "Mixing Memory"). Another way to add memory to the Mac II is through NuBus cards in the expansion slots—at present, though, the Macintosh OS (operating system) can't address more than 1MB per card.

SIMMs are available from Apple, as well as from several third-party manufacturers: Dove, Levco, Mass Micro, Mac Memory, Microtech International, and Hard and Soft. Since RAM chips are ranked by speed as well as by storage capacity, you should be sure to specify your Macintosh mode when ordering. For example, the 150-ns (nanosecond) chips that work fine on the Mac Plus will cause system crashes on a

Macintosh II, which requires chips rated at 120 ns or better. The higher-capacity 1MB SIMMs are also more expensive than four 256K chips. For example, a 1MB upgrade from Apple now costs 40 percent more when higher capacity chips are installed. As costs continue to fall and competition heats up, 1MB SIMMs may become more affordable, especially when higher-density chips become available.

Installing SIMMs

Now, what about installation? In my case, I was given an Apple 1MB upgrade consisting of four 256K SIMMs. Apple's kits don't include any instructions, just the warning that you void your warranty if you don't opt for dealer installation. Still, I was able to work my way through the procedure without too much difficulty. If circuit boards make you squeamish, I suggest you have the work done by a qualified service technician, especially if the Mac is still under warranty. But if you want to try it yourself, here are a few tips based on my experience.

(continues)

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Step 5: Touch the power supply to discharge static electricity.

1. Make sure you have a large, well-lighted workspace—the inside of a computer tends to be dark, even with its cover off.
2. Unplug everything (including the telephone) before starting.
3. Using a Phillips-head screwdriver, remove the screw at the back of the case

and lift off the lid by pressing on the tabs at the rear. As the front latches release, you'll hear a terrible sound that's as comforting as a fender grating against a concrete post. Ignore it. Put the screw and the cover aside where they won't be rolled over or stepped on.

4. Stare at the computer for at least five minutes and remind yourself that there's still time to stop and visit a service center. As the sign in the china shop says, "You break it, you pay for it."

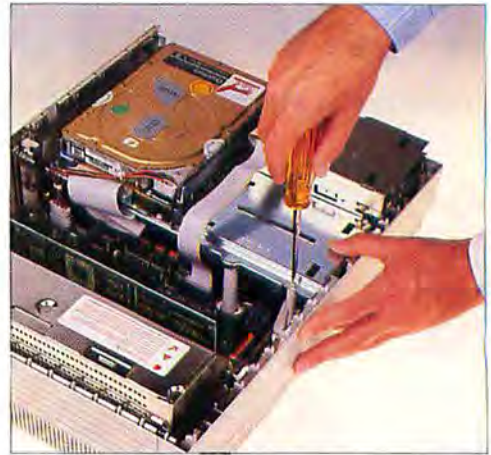
5. Touch the power supply case (at the left) to discharge any static electricity—and kinetic anxiety. If the Macintosh was on before you began, you'll be happy you waited five minutes.

6. The SIMM sockets are situated at the top right of the main board, under the cut-out metal sheet that holds the disk drives. If you have an internal drive, the sockets will be hidden by it. If not, you can install the modules without disturbing anything (though working through the holes in the bracket is awkward).

7. To remove the drive, take out the four screws holding the drive assembly in place, taking care not to let them disappear into the black hole found in every piece of electronic equipment.

8. Unplug the floppy and hard disk cables, noting how they're attached (see step 10 below). The internal SCSI cable is held down by tabs at each side of its connector

(continues)



Step 7: Carefully remove the screws from the disk drive assembly.

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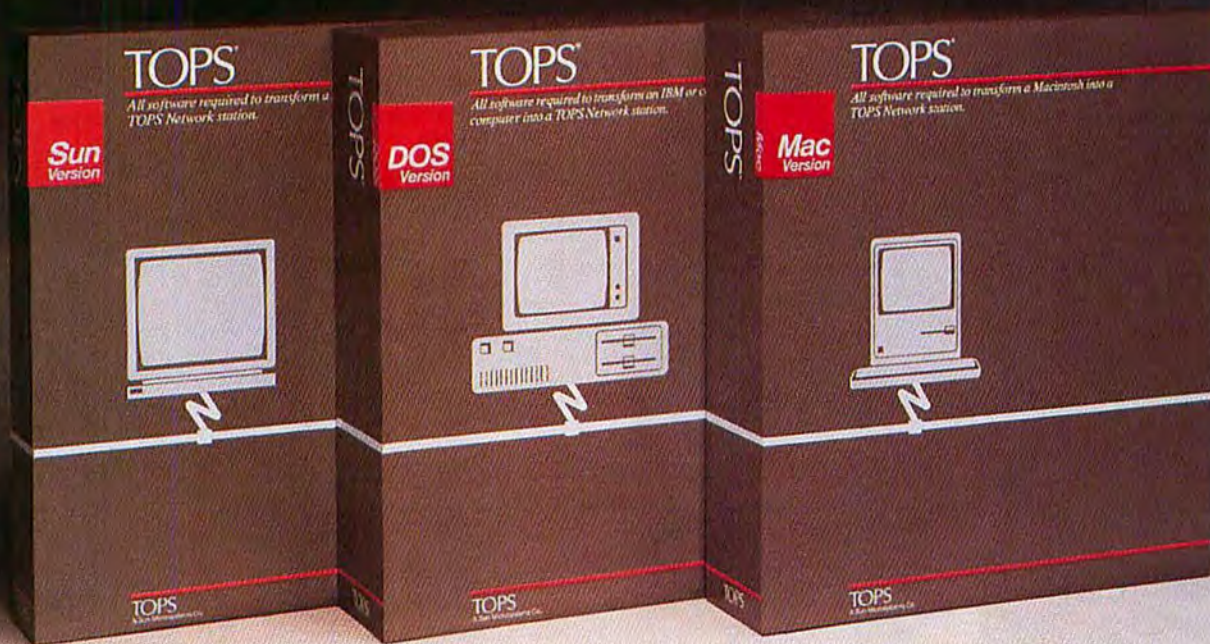
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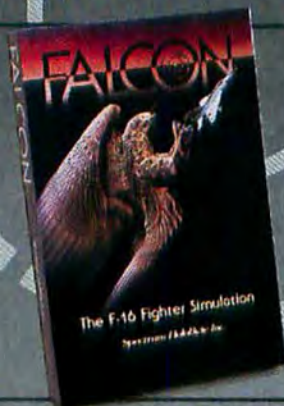
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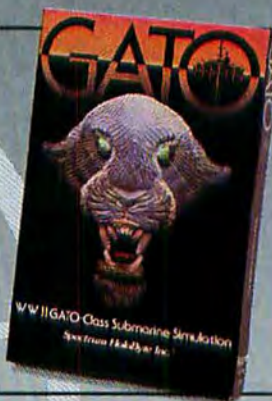
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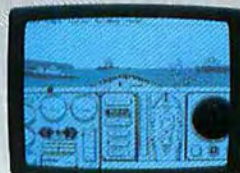
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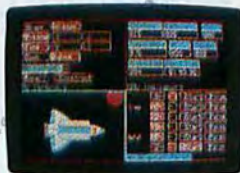
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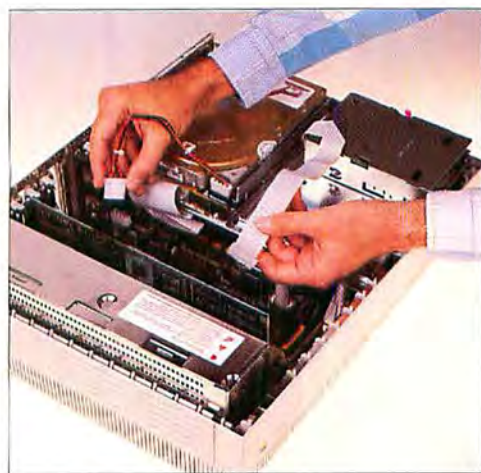
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that have to be pushed sideways before it will disconnect. Slowly lift out the entire assembly.

You can leave the drives connected if you balance the drive bracket on its side,



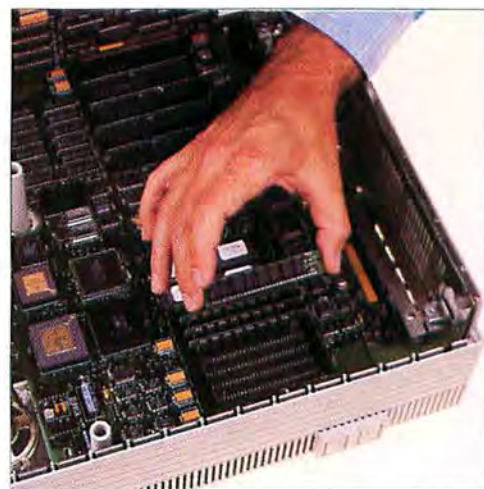
Step 8: Note the position of the two cables and then disconnect the disk drives before you lift out the assembly.

but based on personal experience, I don't recommend it. It's also a good idea to back up the hard disk before you begin, just in case.

9. Install the SIMMs by *gently* pushing them into the sockets with the chips all facing toward the right. (If you're lucky enough to have the larger 1MB SIMMs, you'll have to remove the 256K ones first. It's easier to insert modules than to take them out, so be careful.) The modules are held firmly by plastic tabs on their sides, and they click into place with a sound that's almost as reassuring as the one the lid makes. Make sure all the SIMMs are properly seated by touching them gingerly.

10. The final challenge is to put everything back the way it was. This is when noticing how all the cables were attached pays off. Make sure all the connections are tight before screwing in the drive assembly. (If you've been unfortunate enough to break something along the way, now is a good time to start thinking of excuses.)

That's all there is to it. To see if you've been successful, start up the Mac and look for the number in corner of the About the Finder dialog box. If all's well, you should



Step 9: Position the SIMMs so the chips all face the side of the Mac. Gently push them into place and then check that they're in securely.

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Updates

This list brings you the highlights of software updates recently received but not yet tested. The first price is the upgrade cost for registered owners; the second is the current list price.

Anatool version 2.0 prints multiple-page diagrams and lets you indicate more processes on each one. The new version includes export capabilities. Advanced Logical Software, 9903 Santa Monica Blvd. #108, Beverly Hills, CA 90212, 213/659-5157. \$95; \$925 new.

Bridge version 5.0 bids in Standard American five-card major. Includes autobid and autoplay features, and saves hands for replay. Version 5.0 is faster and offers improved graphics. It can set up all hands and has three levels of point count for the opening hand. Installable on hard disks. Artworx Software, 1844 Penfield Rd., Penfield, NY 14526, 716/385-6120, 800/828-6573. \$12 with original disk, \$5 for backup; \$34.95 new.

Caliope Plus fixes bugs and adds a menu command for unlinking single ideas. Includes new manual. Innovision, P.O. Box 1317, Los Altos, CA 94023-1317, 415/964-2885. Free; \$99 new.

Design version 2.0 can create up to 9999-page diagrams. Features curved multisegment connectors, includes Undo and Hide/Show Status toggle commands, and can specify detail as unselectable. You can select between tiled, scaled-to-fit output, and PICT format.

New documentation included. Meta Software Corp., 55 Wheeler St., Cambridge, MA 02138, 617/576-6920. \$35; \$249 new.

DiskQuick version 2.10 is approximately 15 percent faster and has the ability to export data to databases and word processors. Ideaform Inc., P.O. Box 1540, Fairfield, IA 52556, 515/472-7256. \$15 plus \$1 shipping; \$49.95 new.

DiskTop version 3.0 includes a Find command and ⌘-key equivalents. Allows you to run all files by double-clicking, and lets you set Get Info comments that aren't lost when rebuilding the desktop. LaserStatus and Widgets have also been improved. CE Software, 801 73rd St., Des Moines, IA 50312, 515/224-1995. \$10 plus \$2 shipping; \$49.95 new.

MacDraw version 1.9.5 loads faster and is *AppleShare*-compatible, with single-launch, multiuser capability. Includes zoom box, Cancel button in the printing dialog box, and more command keys. Compatible with the Mac II. Claris Corp., 20525 Mariani Ave. M/S 23-AL, Cupertino, CA 95014, 415/960-1500. Free; \$125 new.

MacNosy version 2 for the Mac II adds new system structures, symbols, and trap calls to handle new additions to the ROM, including color

(continues)



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Updates

QuickDraw. Has the ability to disassemble the Mac II ROM, name more than 600 internal procedures in the ROM, and display text files up to 64K. The Debugger runs on the Mac II in single- or multiple-screen mode, and displays floating-point registers. Jasik Designs, 343 Trenton Way, Menlo Park, CA 94025, 415/322-1386. \$200; \$350 new.

MacProject version 1.2 is *Apple-Share*-compatible, with single-launch, multiuser capability. Compatible with the Mac II; supports color. Claris Corp., 20525 Mariani Ave. M/S 23-AL, Cupertino, CA 95014, 415/960-1500. Free; \$195 new.

MacSafe version 1.08 has more stringent security options that won't allow safes to be opened over a network or moved to another folder, disk, or the Trash Can. Allows you to transfer directly to other applications without returning to the Finder. Kent Marsh Ltd., 1200 Post Oak Blvd. #210, Houston, TX 77056-3104, 800/325-3587. \$5; \$149.95 new.

MacScan version 1.12 includes ten save formats, the ability to crop at a reduced view, use of two new tools, the ability to rotate, flip, or invert the image, and user-definable print options. Contains online help. New Image Technology, Inc., 10300 Greenbelt Rd., Seabrook, MD 20706, 301/464-3100. \$9.95, or free with return of original disk; \$99 new.

MacTerminal version 2.2 is *Apple-Share*-compatible, with single-user launch and capability. Compatible with the Mac II and extended keyboard. Updates the

operation of the Enter key in 3278 mode. See your Apple dealer. Free; \$125 new.

MindWrite version 1.1 includes a new Search and Replace feature that supports *MacLightning*. Has additional keyboard commands, an automatic file backup option, and a click-drag feature for selecting by word. MindWork Software, 9570 Carmel Valley Rd., Carmel, CA 93923, 800/367-4334. Free; \$295 new.

Quark XPress version 1.04 supports the Apple Extended Keyboard and imports *Microsoft Word* 3.0 documents. Maximum line leading has been increased, and Kern and Track menu entries allow precise specification. Manual kerning can override automatic kerning. ⌘-key equivalents have been added. Non-copy-protected versions available. Quark Inc., 300 S. Jackson #100, Denver, CO 80209, 303/934-2211. Free within 90 days of original purchase; \$99 includes extended support and all upgrades; \$695 new. □

To have products listed in this section, send upgraded software, an outline of major changes since the previous release, upgrade price, suggested retail price, company name, mailing address, and phone number to Updates, Macworld, 501 Second St., San Francisco, CA 94107.

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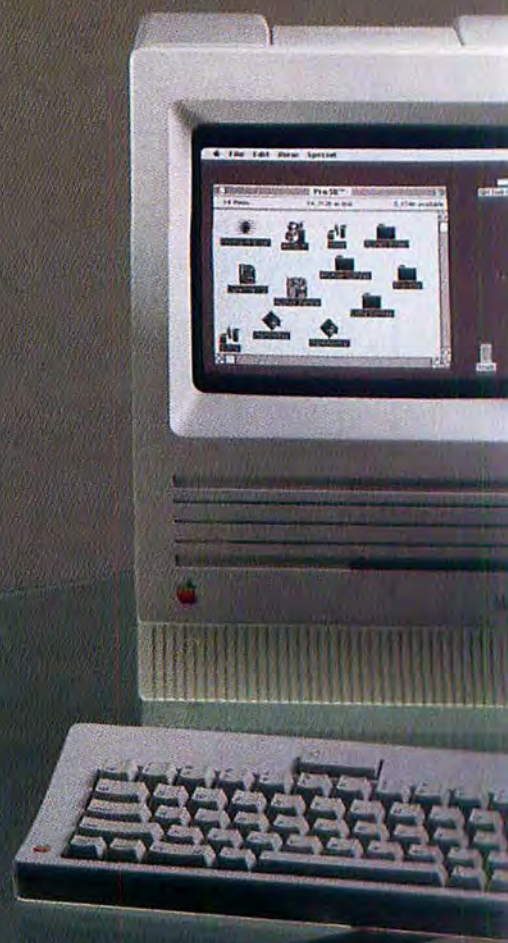
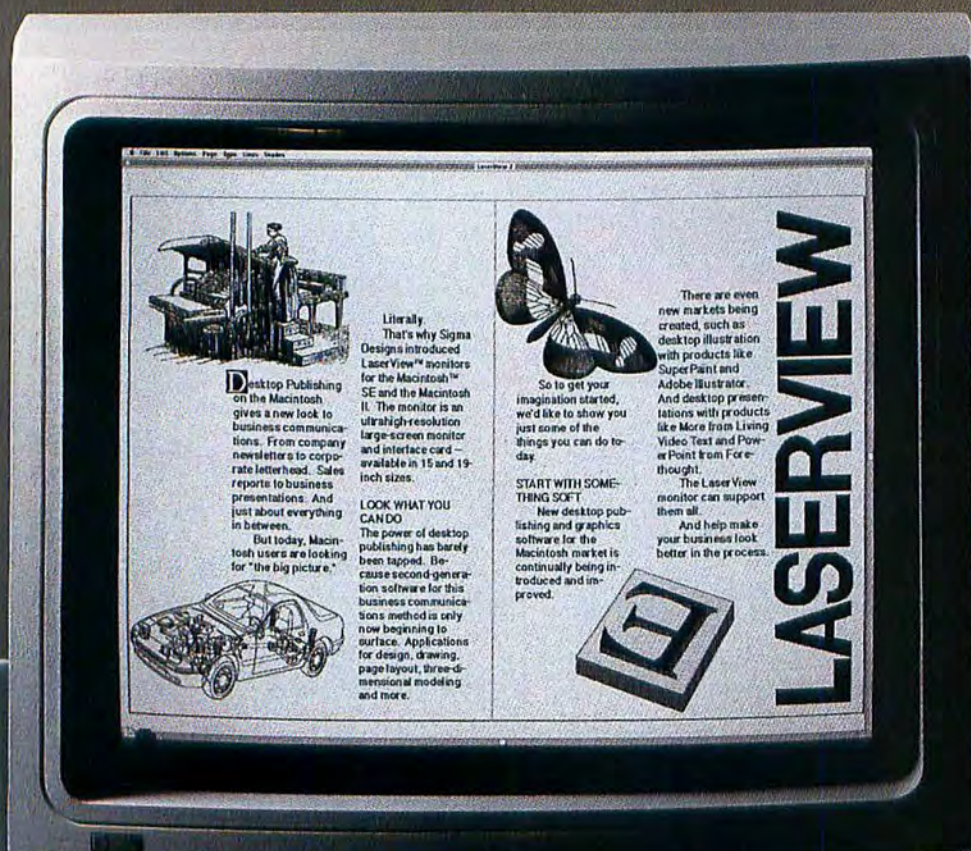
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Public domain software and shareware are available through online information services; user groups (call 800/538-9696 ext. 500 for information on a local user group); or mail-order clearinghouses such as Educomp, 742 Genevieve, Ste. D, Solana Beach, CA 92075, 619/259-0255, 800/843-9497, 800/654-5181 in California, or The Public Domain Exchange, 2074C Walsh Ave., Dept. 609, Santa Clara, CA 95050, 408/496-0624, 800/331-8125.

Pages 90 to 95 *Looking through the Mac II Kaleidoscope*

Apple High-Resolution Monochrome Monitor

Apple Computer, Inc., 20525 Mariani Ave., Cupertino, CA 95014, 408/996-1010. Requires Mac II and video card. \$399.

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Apple Computer, Inc., 20525 Mariani Ave., Cupertino, CA 95014, 408/996-1010. Requires Mac II and video card. \$999.

Macintosh II Video Card

Apple Computer, Inc., 20525 Mariani Ave., Cupertino, CA 95014, 408/996-1010. Requires Mac II and monitor. \$499.

Macintosh Video Card Expansion Kit

Apple Computer, Inc., 20525 Mariani Ave., Cupertino, CA 95014, 408/996-1010. Requires Macintosh II Video Card. \$149.

Multi-Scan Frequency 770

Taxan USA Corp., 18005 Courtney Ct., City of Industry, CA 91748, 818/810-1291, 800/772-7491. Requires Mac II, video card, and adapter cable. \$895, cable \$45.

PCPC II

Personal Computer Peripherals Corp., 6204 Benjamin Rd., Tampa, FL 33634, 813/884-3092, 800/622-2888. Requires Mac II. \$4995.

Sony CPD-1302

Sony Corporation of America, Sony Dr., Park Ridge, NJ 07656, 800/222-0878. Requires Mac II, video card, and adapter cable. \$945.

Spectrum 1000/8

SuperMac Technology, 295 N. Bernardo Ave., Mountain View, CA 94043, 415/964-8884. Requires Mac II and monitor. \$1495.

SuperMac 19" Color Trinitron Monitor

SuperMac Technology, 295 N. Bernardo Ave., Mountain View, CA 94043, 415/964-8884. Requires video adapter card and Mac II. \$3695.

Thomson UltraScan

Thomson Consumer Products Corp., 5731 W. Slauson Ave. #111, Culver City, CA 90230, 800/325-0464, 800/237-9483 in California. Requires Mac II, video card, and cable. \$895.

Pages 96 to 103 *Macintosh-Aided Design*

CADMover

Version 1.1. Kandu Software Corp., P.O. Box 10102, Arlington, VA 22210-1102, 703/532-0213. 512K minimum memory; external drive recommended. \$499.

ColorMaster

CalComp, 2411 W. LaPalma Ave., Anaheim, CA 92801, 714/821-2000. Specifications to be announced. \$4495.

Dimensions

Version 1.18. Visual Information, Inc., 16390 Double Grove, La Puente, CA 91744, 818/918-8834. 1MB minimum memory; requires external drive. For Mac Plus and SE, *Design Dimensions* \$750, *Solid Dimensions* \$395. For Mac II, *Design Dimensions* \$1395, *Solid Dimensions* \$1295.

Frame Mac

Version 1.11. Erez Anzel Software, 113 McCabe Crescent, Thornhill, Ontario, Canada L4J 2S6, 416/738-4601. 512K minimum memory; 800K drive storage recommended. \$595.

JDL-850 GL+

Japan Digital Laboratory, Inc., 2801 Townsgate Rd. #104, Westlake Village, CA 91361, 805/495-3451. 512K minimum memory. \$3845.

MacDesigner

Version 2.0D. Case, Inc., The Market Place, Manlius, NY 13104, 315/682-4000. Key-disk copy protection; installs on hard disk. 1MB minimum memory; requires hard disk. \$2000.

MacDraft

Version 1.2a. Innovative Data Design, Inc., 2280 Bates Ave., Ste. A, Concord, CA 94520, 415/680-6818. 512K minimum memory; external drive recommended. \$269.

MacPlot

Version 3.0. CompServCo., 800 Freedom Ln., Slidell, LA 70458, 504/649-0484, 800/272-5533. 512K minimum memory; requires plotter; 800K drive storage for 512K recommended. Standard Version \$199, Professional Version \$399.

MGMStation CAD

Version 2.09. Micro CAD/CAM, 3230 Overland Ave. #105, Los Angeles, CA 90034, 818/376-6860. Key-disk copy protection; installs on hard disk. 512K minimum memory; requires 800K drive storage. \$795.

MGMStation CAD/CAM

Version 1.5. Micro CAD/CAM, 3230 Overland Ave. #105, Los Angeles, CA 90034, 818/376-6860. Key-disk copy protection; installs on hard disk. 512K minimum memory; requires 800K drive storage. \$7000.

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MiniCad

Version 3.06. Diehl Graphsoft, Inc., 8370 Court Ave. #202, Ellicott City, MD 21043. 301/461-9488. Key-disk copy protection. 512K minimum memory; requires 800K drive storage; Mac Plus and hard disk recommended. \$495.

MSC/pal

Version 1.95. The MacNeal-Schwendler Corp., 815 Colorado Blvd., Los Angeles, CA 90041. 213/259-3888, 800/336-4858. 1MB minimum memory; requires external drive; hard disk recommended. \$1495.

ncCAD/ncCAM

ncCAD 1.13, ncCAM 2.05. Gibbs and Associates, 9311 Eton, Chatsworth, CA 91311. 818/700-8854, 800/654-9399. 512KE minimum memory; requires external drive; Mac Plus and hard disk recommended. ncCAD \$1575, ncCAM \$2075, \$3650 for both.

PowerDraw

Version 1.0. Computer Shoppe, P.O. Box 18344, Greensboro, NC 27419,

919/299-4843. Key-disk copy protection. 1MB minimum memory; requires external drive; hard disk recommended. \$595.

ReadySetGo

Version 4.0. Letraset USA, 40 Eisenhower Dr., Paramus, NJ 07653, 201/845-6100, 800/526-9073. 512K minimum memory; requires external drive for 512K; Mac Plus with external drive recommended. \$495.

Snap

Version 2.0. Data Basics, Inc., P.O. Box 32, Sunset, NC 29685, 803/878-7484. 512K minimum memory; external drive recommended. \$695.

Tempo

Version 1.2. Affinity Microsystems, Ltd., 1050 Walnut St. #425, Boulder, CO 80302, 303/442-4840, 800/367-6771. 512K minimum memory. \$99.

The CAD/CAM Journal

Koncepts Graphic Images Inc., 16 Beaver St., New York, NY 10004, 212/425-4441. Single-copy price \$5. Subscription \$20 per year (6 issues).

The Shinko Color Printer

Computer Friends, Inc., 14250 N.W. Science Park Dr., Portland, OR 97229, 503/626-2291. 512K minimum memory; requires SuperChroma system for Mac 512K, Mac Plus, or Mac SE; requires parallel interface card for Mac II. CHC335 \$4500, CHC65 \$8990.

VAXDraw

Version 1.4. Telos Corp., 3420 Ocean Park Blvd., Santa Monica, CA 90405, 213/450-2424. 512K minimum memory; Mac Plus and hard disk recommended. \$195.

VersaCAD/Macintosh Edition

Version 1.0. Versacard Corp., 7372 Prince Dr., Huntington Beach, CA 92647, 714/847-9960. 1MB minimum memory; math coprocessor, hard disk, and plotter recommended. \$1995.

Versatec Model 7224 Plotter

Versatec, 2710 Walsh Ave., Santa Clara, CA 95051, 408/988-2800. 512KE minimum memory. Price to be announced.

Pages 104 to 117

The Disk Shopper's Guide to Storage

Amcodyne, Inc., 1301 S. Sunset St., Longmont, CO 80501, 303/665-7200.

Apple Computer, Inc., 20525 Mariani Ave., Cupertino, CA 95014, 408/996-1010.

AST Research, Inc., 2121 Alton Ave., Irvine, CA 92714-4992, 714/553-0340.

Bering Industries, 240 Hacienda, Campbell, CA 95008, 408/379-6900.

CMS Enhancements, Inc., 1372 Valencia Ave., Tustin, CA 92680, 714/259-9555.

Cutting Edge, 115 Apache Dr., Evanston, WY 82930, 800/443-5199.

Eham Engineering, 115 Apache Dr., Evanston, WY 82930, 307/789-3830, 800/257-1666.

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FWB Software, 2040 Polk St. #215, San Francisco, CA 94109, 415/474-8055.

General Computer Corp., 215 First St., Cambridge, MA 02142, 617/492-5500.

Hard & Soft, Inc., 2005 W. Cypress Creek Rd. #1A, Fort Lauderdale, FL 33309, 305/772-0430.

International Business Network Computers, 1919 E. Romney #317, Anaheim, CA 92805, 714/635-7825.

Iomega Corp., 1821 W. 4000 South, Roy, UT 84067, 801/778-1000.

Jasmine Technologies, Inc., 555 De Haro St., San Francisco, CA 94107, 415/621-4339.

LaCie, Ltd., 16285 S.W. 85th St. #306, Tigard, OR 97224, 503/684-0143.

Levco, 6160 Lusk Blvd. #C-203, San Diego, CA 92121, 619/457-2011.

LoDown, 10 Victor Sq. #600, Scotts Valley, CA 95066, 408/438-7400.

MacPeak Systems, 1201 Spyglass, Austin, TX 78746, 512/328-0747, 800/225-7509.

MacProducts USA, 9709 Brown Ln., Ste. E, Austin, TX 78754, 512/832-0335, 800/622-3475.

Mass Micro Systems, 3250 Jay St., Santa Clara, CA 95054, 408/988-1200, 800/253-8900.

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1. Macworld magazine, Pub. No. 07418647
 2. Date of filing: October 10, 1987
 3. Published monthly
 3A. No. of issues published annually: 12
 3B. Annual subscription price: \$30.00
 4. Known office of publication: 501 Second St., San Francisco, CA 94107
 5. Complete mailing address of the headquarters of general business offices of the publisher: PCW COMMUNICATIONS, INC., 501 Second St., San Francisco, CA 94107
 6. The names and address of the publisher, editor and managing editor are Publisher: James E. Martin, PCW COMMUNICATIONS, INC., 501 Second St., San Francisco, CA 94107; Editor: Jerry Borrell, PCW COMMUNICATIONS, INC., 501 Second St., San Francisco, CA 94107; Managing Editor: Charles Barrett, PCW COMMUNICATIONS, INC., 501 Second St., San Francisco, CA 94107
 7. The owner is: CW COMMUNICATIONS, INC., Patrick McGovern, 5 Speen St., Framingham, MA 01701. The names and addresses of stockholders owning or holding 1% or more of the total amount of stock are listed below. None
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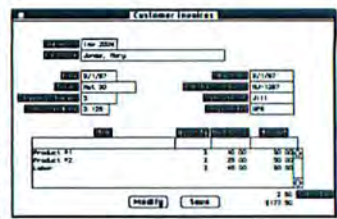
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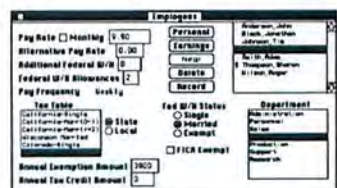
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Working Software Opens Up

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Version 1.0b. Working Software, Inc., 321 Alvarado, Ste. H, Monterey, CA 93940, 408/375-2828, 800/331-4321, 800/851-1986 in California. 512K minimum memory. \$49.95.*

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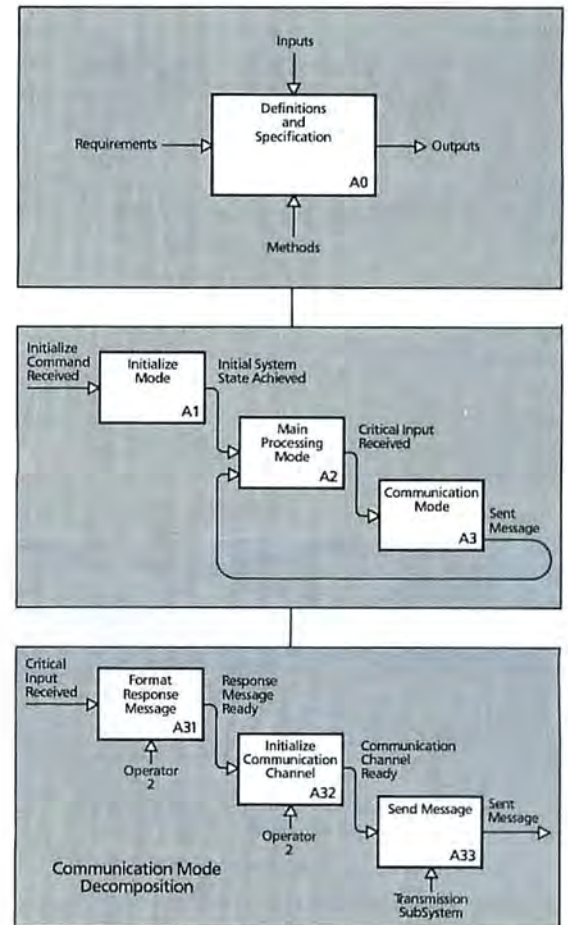
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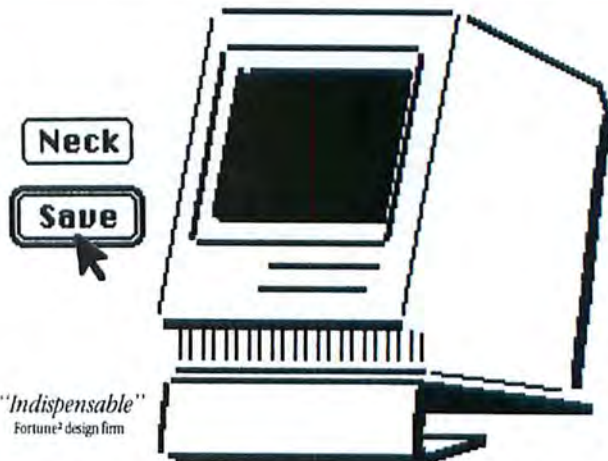
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Macworld Best-Sellers

Months on chart	Last month	This month	
Business Software			
30	1	1	Microsoft Word <i>Microsoft</i>
22	3	2	Microsoft Excel <i>Microsoft</i>
18	5	3	PageMaker <i>Aldus</i>
10	2	4	Microsoft Works <i>Microsoft</i>
26	—	5	MacDraw <i>Apple Computer</i>
8	4	6	SuperPaint <i>Silicon Beach Software</i>
3	6	7	WriteNow for Macintosh <i>T/Maker</i>
2	9	8	Reflex for the Mac <i>Borland International</i>
3	8	9	MacMoney Survivor <i>Software</i>
1	—	10	ReadySetGo <i>Letraset</i>

Education Software			
14	2	1	KidsTime <i>Great Wave Software</i>
14	1	2	Math Blaster <i>Davidson and Associates</i>
12	5	3	Typing Tutor III <i>Simon & Schuster Software</i>
3	—	4	Typing Made Easy <i>QED Information Sciences</i>
1	—	5	Speed Reader II <i>Davidson & Associates</i>

Entertainment Software			
10	1	1	Dark Castle <i>Silicon Beach Software</i>
14	3	2	MacGolf <i>Practical Computer Applications</i>
14	2	3	Flight Simulator <i>Microsoft</i>
1	—	4	HardBall <i>Accolade</i>
3	4	5	Ferrari Grand Prix <i>Bullseye Software</i>

Networking/Data Communications			
14	2	1	AppleTalk <i>Apple Computer</i>
10	1	2	TOPS <i>TOPS</i>
6	3	3	AppleShare <i>Apple Computer</i>
13	4	4	MacServe <i>Infosphere</i>
1	—	5	MicroPhone <i>Software Ventures</i>

Months on chart	Last month	This month	
Hard Disks*			
10	1	1	Apple Hard Disk 20/20SC <i>Apple Computer</i>
3	3	2	Macintosh Internal 20SC Hard Disk <i>Apple Computer</i>
4	5	3	Rodime 20 Plus <i>Rodime Peripheral Systems Division</i>
14	2	4	DataFrame 20 <i>SuperMac Technology</i>
2	—	5	MacBottom 20 <i>Personal Computer Peripherals Corporation</i>

Add-in Boards			
1	—	1	MacSnap <i>Dove Computer Corporation</i>
1	—	2	Apple 1MB Memory Expansion Kit <i>Apple Computer</i>
1	—	3	Radius Accelerator <i>Radius</i>
1	—	4	Apple 2MB Memory Expansion Kit <i>Apple Computer</i>
1	—	5	MaxPlus 2X4-S <i>MacMemory</i>

Product Watch

Editors' choice:
Other recent products of particular interest.

Jam Session *Brøderbund Software*
music/entertainment

Modern Artist *Computer Friends*
Mac II color paint program

Color printer *QMS PostScript*
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Source: Exclusive InfoCorp survey of more than one hundred twenty-five Macintosh retailers and selected mail-order suppliers. Covers sales during August 1987.

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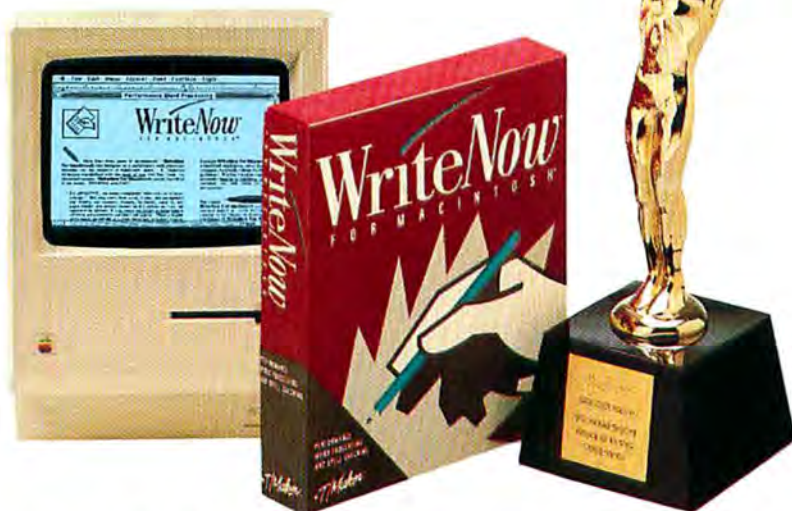
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