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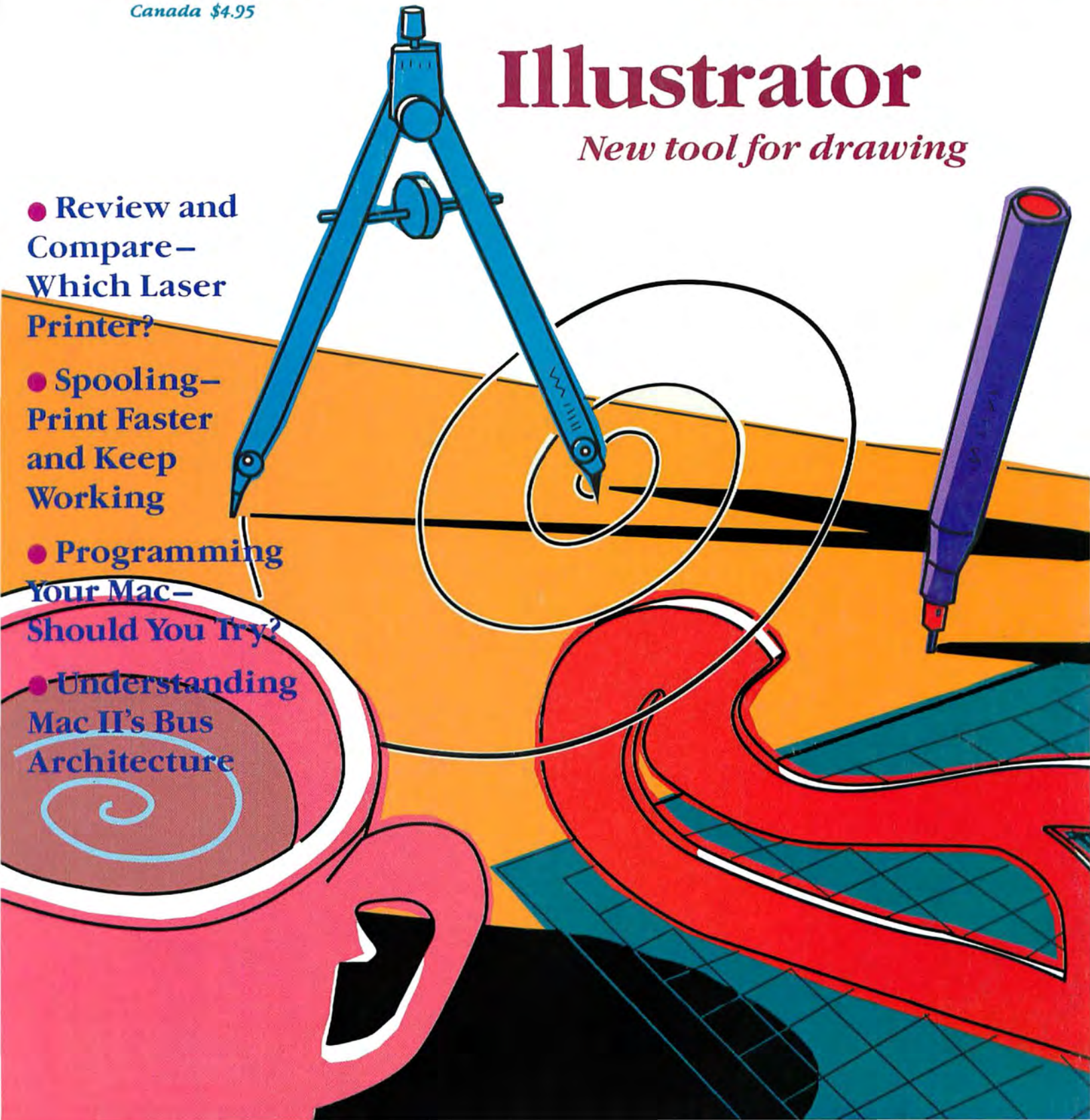


Illustrator

New tool for drawing

- Review and Compare–Which Laser Printer?
- Spooling–Print Faster and Keep Working
- Programming Your Mac–Should You Try?
- Understanding Mac II's Bus Architecture

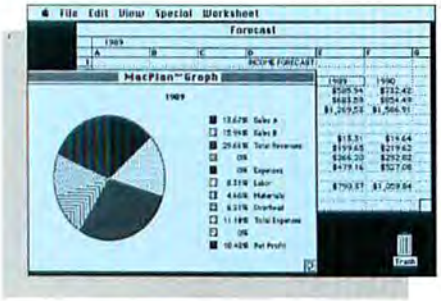
Borland software: technically superior

SideKick®

SideKick: The Desktop Organizer, Release 2.0

Thousands of users already know that SideKick is the most complete and comprehensive collection of desk accessories available.

Well, with Release 2.0, the best just got better. We've just added two powerful high-performance tools to SideKick. We've added Outlook: The Outliner and MacPlan: The Spreadsheet. They work in perfect harmony with each other and while you run other programs!



MacPlan does both spreadsheets and business graphs. Paste them into your Outlook files and generate professional reports.

SideKick: The Desktop Organizer, Release 2.0 now includes

- ☑ Outlook: The Outliner
- ☑ MacPlan: The Spreadsheet
- ☑ Mini word processor
- ☑ Calendar
- ☑ PhoneLog
- ☑ Analog clock
- ☑ Alarm system
- ☑ Calculator
- ☑ Report generator
- ☑ Telecommunications (new version now supports XModem file transfer protocol)

Upgrade Now! *If you are one of the thousands of SideKick users, just send us your original master disk back with a check for $34.95, and we'll rush you a brand new SideKick, Release 2.0, complete with manual.*

**Introductory offer expires July 1, 1987*

New! Includes Outlook and MacPlan!

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Outlook: The Outliner

- *It's the desk accessory with more power than a stand-alone outliner*
- *A great desktop publishing tool, Outlook lets you incorporate both text and graphics into your outlines*
- *Works hand-in-hand with MacPlan*
- *Allows you to work on several outlines at the same time*

MacPlan: The Spreadsheet

- *Integrates spreadsheets and graphs*
- *Does both formulas and straight numbers*
- *Graph types include bar charts, stacked bar charts, pie charts and line graphs*
- *Includes 12 ready-to-use templates free!*
- *Pastes graphics and data right into Outlook creating professional memos and reports, complete with headers and footers, in a snap*

New Version!

System requirements:
Macintosh 512K or Macintosh Plus with one disk drive.

Reflex®: The Database Manager

Why are so many critics praising Reflex?

Because Reflex is the high-performance relational database manager that every Mac user has been waiting for.

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Reflex is the full-featured database manager that everyone who manages mailing lists, customer files, budgets and almost any other set of business numbers needs today.

Whatever business you're in, whatever you manage, you need Reflex: The Database Manager.

Reflex: The Database Manager— MacUser Editor's Choice Award

System requirements:
Macintosh 512K or Macintosh Plus with one disk drive. Second external drive recommended.

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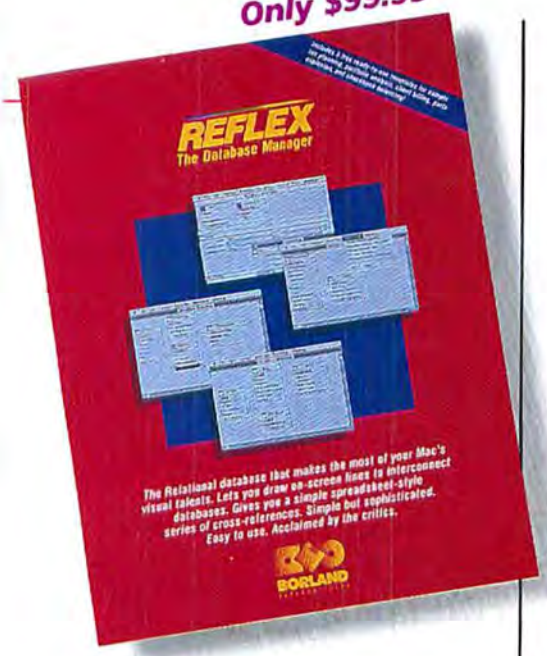

The Critics' Choice

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. . . can be used quickly and easily even by someone who has never heard of a relational database. It is a good buy for its quality, not just its price. **MacUser**

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. . . a combination of power and flexibility that distinguishes it from any other product we've seen. **Esther Dyson, Release 1.0"**

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- ☑ *Multiple editing windows—up to 8 at the same time*
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- ☑ *No need to switch between programs to compile or run a program*
- ☑ *Streamlined development and debugging*
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- ☑ *Compatible with Macintosh Programmer's Workshop Pascal (with minor changes)*
- ☑ *Ability to define default volume and folder names used in compiler directives*
- ☑ *Search and Change features in the editor speed up and simplify alteration of routines*
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- ☑ *"Units" included to call all the routines provided by Macintosh Toolbox*

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The Critics' Choice

"Turbo Pascal is the true winner in the stand-alone Macintosh development environments . . . Turbo Pascal provides ease of use, extremely fast compilations, excellent documentation, great support and a company that is well known in the industry. To end it off, you get all of this for the paltry price of $99! Now isn't that a reason to get moving with Turbo?

Robert Forras, MacTimes

Turbo Pascal is already an industry standard in the IBM-compatible world and we're very excited to see Borland International's new commitment to provide this and other modestly-priced, high-quality software for the Macintosh computer.

John Sculley, Apple Computer, Inc."

System requirements:
Macintosh 512K or Macintosh Plus with one disk drive. (The complete Turbo Pascal package, including compiler and editor, occupies only 50K of memory.)

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MACWORLD

June 1987

The Macintosh™ Magazine

On the Cover
Find out how Adobe's Illustrator *provides technical illustrators and graphic artists with unprecedented control over their drawings (see p. 116). Illustration by Mick Wiggins.*

Departments

13 **Mac Bulletin**
Late-breaking news.

19 **David Bunnell**

35 **Letters**

45 **Commentary/Jerry Borrell**

52 **Contributors Notes**

57 **Steven Levy**

75 **Verbatim**
A talk with Apple R&D chief Larry Tesler.

171 **New Products**
The latest software, hardware, and accessories.

187 How To/**Quick Tips**
Printing from BASIC, shrink-to-fit *Excel* columns, alternate start-up screens, and more.

197 How To/**Getting Started with Database Managers**
What does *relational* mean? This and other filing mysteries revealed.

209 How To/**Insights on ReadySetGo**
Pointers for power pasteup.

221 How To/**Mac Publishing Tools**
Laser printing without tears, at your desk or a copy shop.

232 **Updates**
Keep up with Mac software upgrades.

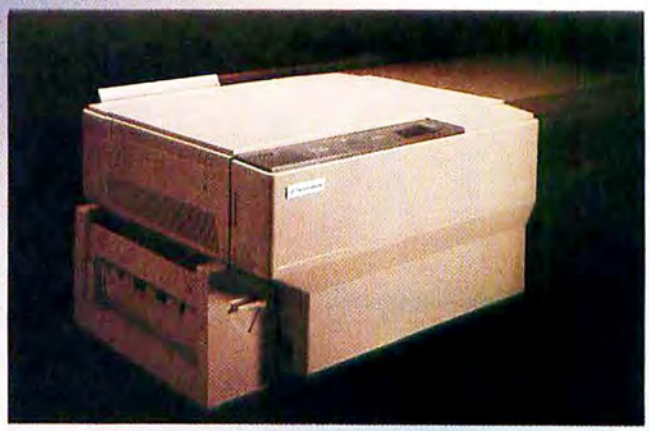
245 **Where to Buy**
Information on products in this issue.

250 **Best-Sellers**

99 Macworld News

- *Thinking in Parallel* A parallel-processing board from Mechanical Intelligence.
- *Under My Node* A Mac-style front end for UNIX.
- *Berklee School of Music* The ultimate music LAN.

Plus, reports on the Arabic Mac, a low-cost film recorder, Gassée's literary excursion, *Programmer's On-Line Companion*, and more.



Features

116 **Illustrator: The Tracer's Edge**
Putting Adobe's professional PostScript paint program through its paces.

122 **Laser Wars**
Alternative laser printers challenge Apple on price and performance.

130 **Approaching the Mac II**
Welcome to the world of expandability—a briefing for Mac II shoppers.

134 **Programming from the Start**
A primer for aspiring application developers.

142 **Speaking of Spoolers**
Don't let outputting put you out—software that lets you work while the LaserWriter does.

Reviews

152 **Presenting PowerPoint**
A new idea in presentation graphics.

154 **Reaction Positive**
MicroChem molecular modeling.

156 **Sleek, Fast Accounting**
Rags to Riches modules.

157 **Bridging Network Boundaries**
InterBridge AppleTalk expander.

158 **Cash-Conscious CAD**
MiniCad 2-D/3-D design.

159 **A Familiar Maze**
MacMan PacMan for the Mac.

160 **Quiet Thunder**
Thunder spelling checker.

161 **The Mouse that Rolled**
quadLynx and *Turbo Mouse* trackballs.

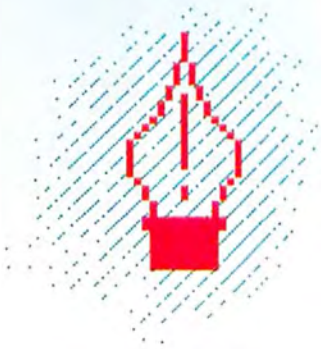
162 **Object Logo Arrives**
Logo, Macintosh-style.

164 **Meticulous Timekeeper**
Office Productivity System time-billing and job-costing.

165 **Stranger in a Strange Town**
Tass Times in Tonetown graphic adventure game.

166 **On the Safe Side**
MacSafe file protection and encryption.

167 **Discovering What's Necessary**
Desk Necessities DAs and utilities.



Some pens are mightier than others. Illustrator's *icon gives a clue to the program's strength: its versatile PostScript pen. For details, see p. 116.*

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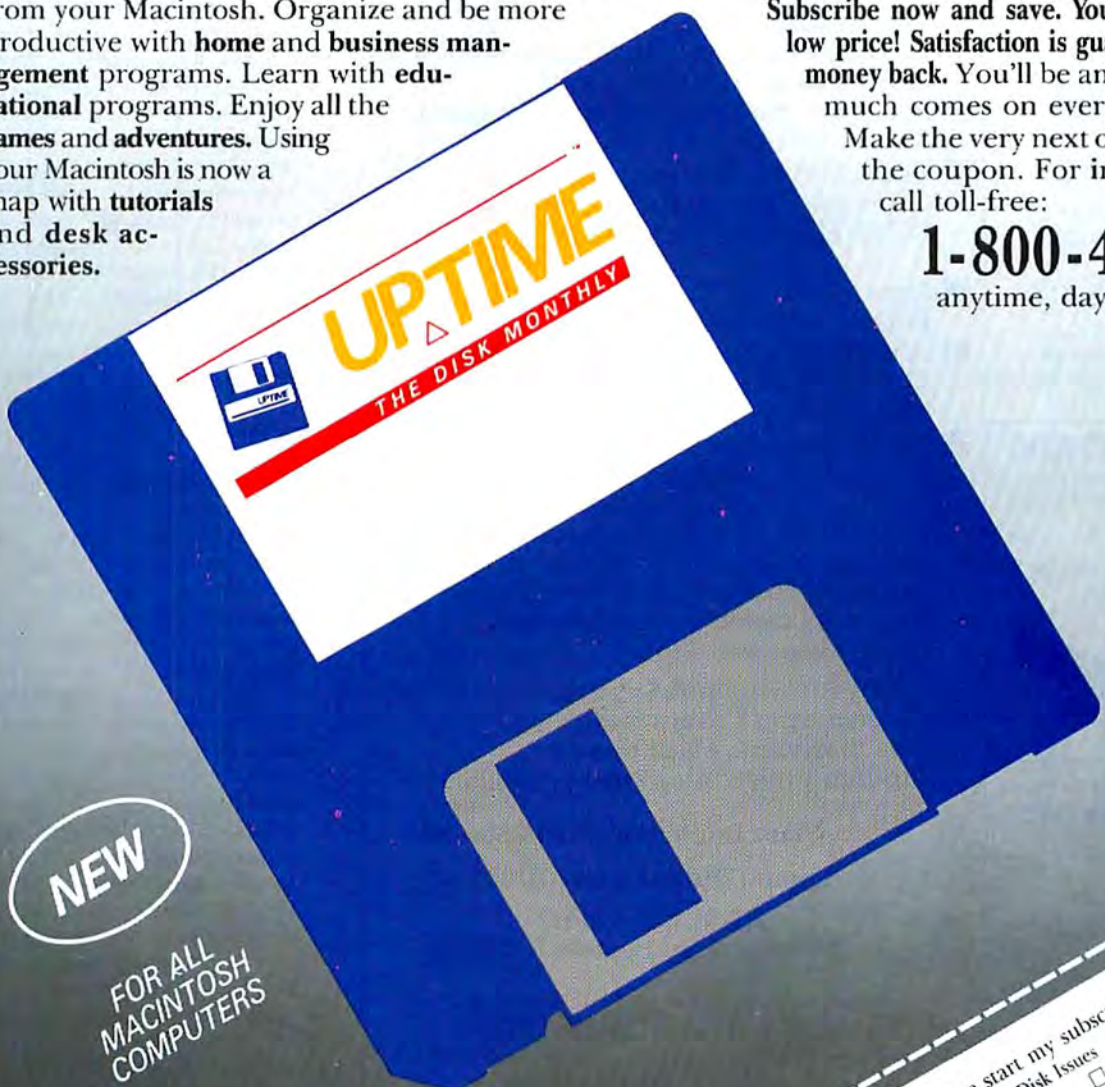

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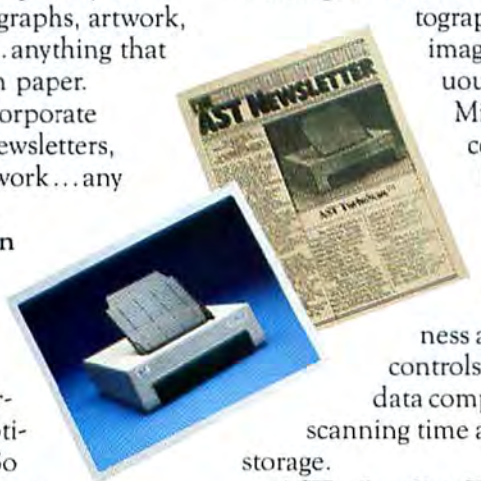

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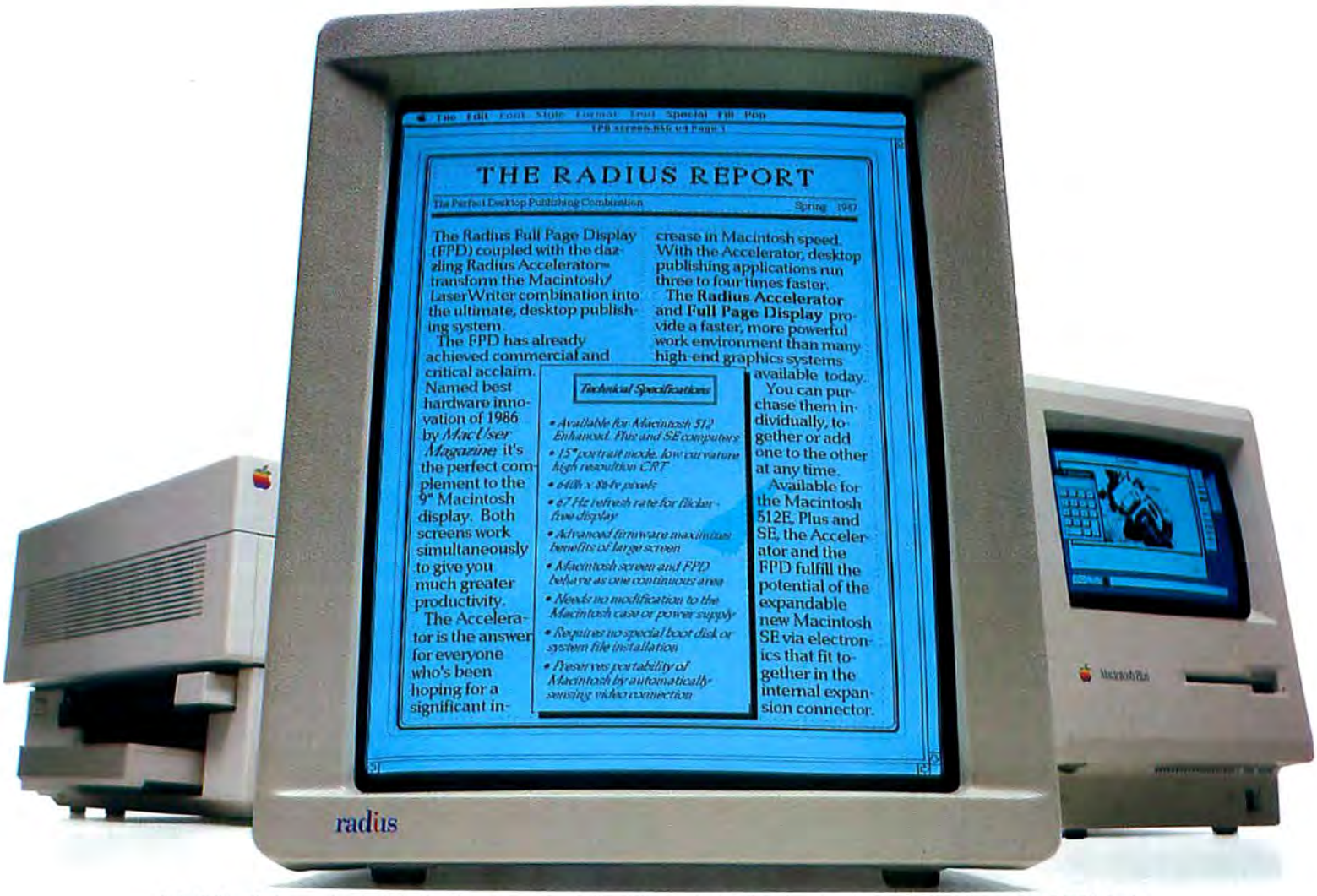

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Mac Bulletin

Mac II Wins Round One

Already people are comparing the Mac II with the IBM PC-compatible Compaq DeskPro 386. In its April feature comparing the two machines, *Business Software* magazine found the Mac II "such a fine machine overall . . . that we predict Mac IIs will become a fairly common sight in the DOS-dominated business office," and called it a "32-bit bargain." The magazine figures each version of the Compaq 386 costs at least $1000 more than the comparable Mac II configuration.

Mac Sounds to CD

A high-end audio equipment manufacturer is preparing software that will make it possible to record sounds on a compact disk and edit them with the Mac. Compusonics of Palo Alto, California, makes the DSP 1000, a digital audio recorder that records sounds (from microphones or other audio sources) onto 5¼-inch optical disks that are played back on a compact disk player. Compusonics is developing Mac software for the recorder that would enable users to edit sounds on the disk or add tracks. Think of it: you record an ancient treasure like Hoagy Carmichael playing "Stardust," bring up a window on the Mac to wipe out the pops and the cracks, and voilà, all's right with the world. The software won't be out for many months, but that will give you time to save up the $6995 for the DSP 1000.

Desktop Publishers Duke It Out

The preeminence of Aldus's *PageMaker,* the Mac's premier page-layout program, now faces aggressive competition from underdog software publishers. Well, maybe underdog doesn't describe all the players: giant Letraset claims to have received a heartwarming number of takers for its recent $99 trade-your-*PageMaker*-for-our-*ReadySetGo* offer. And even before Target Software's *Scoop* was released, that company's two-page ads directly attacking *PageMaker* had become a hot topic. As if that weren't enough competition, at press time Quark's promising *XPress* had not yet begun to fight. Try not to get in the way; the going could get rough.

Faster Font Management

At press time Adobe Systems of Palo Alto, California, was putting the finishing touches on a new version of the PostScript font-downloading software that will enable Linotronic typesetters to take advantage of their internal hard disks to permanently store more fonts. Because swapping fonts is a time-consuming aspect of laser printing, the new font downloader will speed up printing as well as add convenience. Initially the new software will be distributed through Linotype to owners of its L-100 and L-300 PostScript printers, but as other printers emerge with built-in hard disks, the new font-downloading code will become more widely available.

Other news from Adobe: Varityper of East Hanover, New Jersey, has added a 600-dot-per-inch printer to the PostScript roster. The VT-100 is a plain-paper laser printer priced under $20,000 that uses dozens of Varityper fonts. And DEC's 300-dpi, 8-page-per-minute ScriptPrinter joins its 40-page-per-minute PrintServer in the PostScript line of printers.

Enlisting the Mac

The Mac is making inroads on the government-supply front, a critical area because the United States government is the biggest consumer of computers in the country. Falcon Microsystems of Landover, Maryland, has been awarded a $4.7 million contract to supply and service 1000 Macs in various configurations for the Naval Weapons Center in China Lake, California.

Changing Teams

Erstwhile Apple software-development vice president Guy Kawasaki has left Apple to head a United States subsidiary of ACI, the French company that developed *4th Dimension.* That's the powerful database and applications generator that Apple recently jettisoned to mollify third-party Mac developers. Acius plans to release the star-crossed database manager in an American version this summer.

Publisher, Mail-Order House Split Up

The average Mac user probably couldn't have cared less about the joint ownership of MindWork Software, publisher of *MindWrite,* and Icon Review, the Mac-only mail-order house in Carmel Valley, California. But given the natural rivalry between software retailers and mail-order businesses, some distributors did care, and MindWork met resistance trying to get its word processor/outliner program to dealers' shelves. The result? The software publisher and Icon Review have split up. Susan Raab, marketing director of MindWork Software, says the goals of the two businesses conflicted, but that the newly separated companies will try to part amicably; after all, the software developer for MindWork and the head of Icon Review are brothers-in-law who customarily sit around the same table at the holidays. A telling sign of the change, though: the latest Icon Review catalog planned a ⅓-page ad for *MindWrite,* compared to the splashy 2-page spread in the previous edition. The program's price is also changing, to $295, as its publisher tries to distinguish it from the many other Mac text-processing programs by calling it an outliner with built-in word processing instead of just another word processor with extra outlining features.

(continues)

Award-Winning Program

Tom Jennings, creator of the IBM PC public-domain bulletin board and electronic mail system *Fido/FidoNet,* received the first Andrew Fluegelman Award for software excellence at the Software Publishers Association's annual awards ceremony in March. The $5000 cash award was established by PCW Communications in memory of Fluegelman, founding editor of *PC World* and *Macworld,* and creator of *PCTalk,* a powerful communications program for the IBM PC that pioneered the concept of freeware.

Twitcher

Apple is reportedly preparing to release a new version of the Finder that will incorporate parts of Andy Hertzfeld's *Servant,* which combines elements of *Switcher* with the Finder. Code-named Twitcher, the new Finder will enable you to open several applications simultaneously on the desktop and click to move between them.

APDA: Growing Pains

Some *Macworld* readers had reported difficulties with the Apple Programmer's and Developer's Association, such as constantly busy phone lines and back-ordered development programs or documentation. Apple Computer's APDA liaison, Lyn Termeer, reports that the bottlenecks have been cleared with an additional line for the toll-free ordering number and two other lines devoted to customer service. She suggests using MCI mail or AppleLink (address: APDA) to sidestep the phone lines altogether.

Marriage of Convenience

Brøderbund Software has signed an agreement with MacroMind, the Chicago-based publisher of *MusicWorks* and *VideoWorks,* to distribute MacroMind's new products, starting with *VideoWorks II.* Brøderbund will handle sales and distribution of the programs from its San Rafael, California, headquarters; MacroMind will continue to design, publish, and market the software independently.

Says Brøderbund founder Gary Carlston, "This type of arrangement allows smaller, creative publishers to concentrate on their strengths. They don't need to invest their energy, not to mention their limited capital, trying to develop an effective sales organization of their own."

Fatter Floppies

With the advent of Sony's 1.6MB 3½-inch floppy disk, a Mac drive to match can't be far behind. So far only one Mac drive maker, Mirror Technologies of Hugo, Minnesota, would admit it's planning to release drives for the 1.6MB disks—probably not until spring of 1988.

Industry insiders wonder whether the floppy drives' price per megabyte will be low enough by then to make them attractive to buyers who could add an external 20MB hard drive for only a couple hundred more. Giant floppies—such as Kodak's costly and rather slow 10MB 5¼-inch drive—may be the wave of the future for people who need to cart around a lot of data and don't want to risk jostling the bits out of place on a hard drive.

One Million Macs

The one-millionth Macintosh rolled off the assembly line in March, and Apple awarded it to Jef Raskin, a leader of the Mac development team. Raskin has since left Apple to head his own company, Information Appliance in Menlo Park, California, where he continues to pursue innovative design.

The Programmer's Code

The question of software compatibility has cropped up again, as it did last year when the Macintosh Plus and its new System software emerged. Just how compatible are your existing application programs with the new machines? The experts at Apple usually respond to the effect that "well-behaved" applications ought to work fine. In fact, Apple's technical experts regularly publish detailed guidelines to help programmers stay in line.

Specifics on compatibility from *Macintosh Technical Note No. 117* make good reading even if you don't crunch code for a living. Here are ten commandments listed under the heading "Bad Things: The primary reasons why programs break from one version of the System to the next."

- Thou shalt not assume the screen is a fixed size.
- Thou shalt not assume the screen is at a fixed location.
- Thou shalt not assume that rowBytes is equal to the width of the screen.
- Thou shalt not use nil handles or nil pointers.
- Thou shalt not create or use fake handles.
- Thou shalt not write code that modifies itself.
- Thou shalt think twice about code designed strictly as copy protection.
- Thou shalt check errors returned as function results.
- Thou shalt not access hardware directly.
- Thou shalt not use any of the bits that are reserved. (Unused means reserved.)

A New Tempo

A new version of *Tempo,* the Mac's main macro maker, is due out from Boulder-based Affinity this summer. The upgrade—actually, nearly a new program altogether—allows you to open files from the Finder and, most importantly, is not position-dependent. That means you can count on the macro to properly scroll windows, select menu commands, and respond to dialog boxes even if they have moved on the desktop since the macro was recorded. A graphics-based editor is on the way for the new version.

Clip Art by the Bushel

Symmetry, the maker of *PictureBase,* an indexing system for Mac graphics, has come up with a system for cataloging vast quantities of clip art, technical drawings, or other images on CD ROM. Symmetry plans to unveil a prototype of the system this month, but the job of packaging the system for newspaper publishing companies, corporate communications departments, and technical documentation factories will be left to other companies. First to license Symmetry's system: Metro Associated Services, a large supplier of clip art for daily newspapers, recently made larger by the purchase of the graphics wing of Scripps Howard newspapers. □

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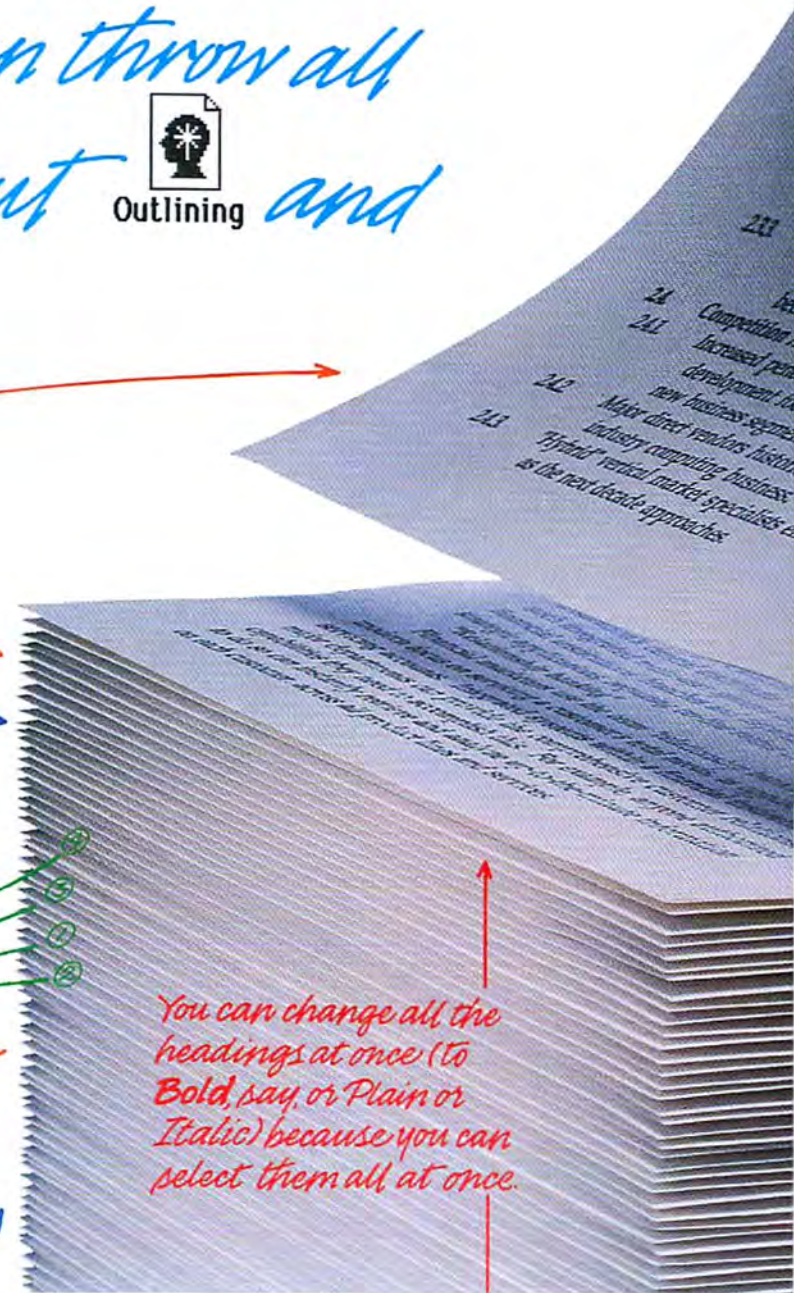

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David Bunnell

Welcome to the Party

The Macintosh is a big winner with IBM's endorsement of a Mac-style user interface for its new line of computers. So what else is new?

In the past several months there's been a great deal of speculation in the personal computer business—a lot of paranoia really—about IBM. Big Blue was going to pull the plug on the clones, it was going to cut the heart out of Compaq, it was going to smash the Macintosh. Now that the announcement of IBM's new line of PCs—sorry, PSs—is out, my assessment is that it's a good thing for the entire industry.

This assessment is apparently shared by Microsoft's Bill Gates, who dropped by my office a few days after the announcement. He says, "I think it's very creative and very brilliant, the way they have used so much IBM technology—the memory chips, disks, network cards, gate arrays, and things like that. And yet in the case of two of the key elements, IBM maintained the partnership with Intel on the microprocessor and Microsoft on the operating system. I think it's a good strategy that will improve their market share more through leadership than by funny closed-type things," he continues. "So I'm really glad they took the approach they did. I think it is the right approach and I think people should applaud IBM for it—but it's pretty rare that people do that for IBM."

I couldn't agree more with Gates's statement. The IBM announcement is even good for the clone makers because IBM's price points are not a threat to them. IBM's new 8086 machine will sell for somewhere between $2000 and $2400 with a monitor. Today, you can readily buy a generic PC clone in the $595 to $795 price range, while AT clones start at about $1000 with a monitor. So clearly IBM is not attacking the "commodity" market.

Big Blue is not the party pooper it was made out to be. In fact, it's become the life of the party because it's managed to push the PC standard without abandoning it.

Who stands to benefit from all this turmoil? The customer, of course. Clone makers will be compelled to create better clones because they'll have to come up with a graphics chip on a motherboard with resolution equivalent to that of IBM's built-in graphics capabilities. I predict that in the next 6 to 12 months we'll begin to see new and improved clones on the market.

IBM's announcement will be good for Apple because IBM has essentially endorsed the Macintosh style of computing. With its new line of machines, IBM has developed hardware that will let MS-DOS machines do precisely the kinds of things that the Mac has been doing for years.

The problem is, the software just isn't there yet. IBM's new OS/2 operating system will probably not be available until some time next year. And the software applications for the new operating system will come even later than that. So along with the luxury of being ahead of its time with hardware, Apple has the added advantage of having software available right now.

Apple has another strategic edge over IBM. IBM's announcement of its OS/2 operating system and its extended OS/2 system, along with the new DOS 3.30, is certain to create confusion in the marketplace. Corporations will have to decide whether they want to go all the way with IBM, stick with their existing PCs—or what.

Many of them may end up buying Macintoshes, perhaps reasoning, Why should we buy an imitation Macintosh from IBM when we can buy the real thing from Apple?

In a way, the new announcements could be bad news for Compaq, because Compaq tried to advance the PC standard on its own. By forging ahead with an 80386-based machine, Compaq went out on a limb, and IBM has chopped the tree down. On the other hand, the IBM 386 machine is priced much higher than Com-

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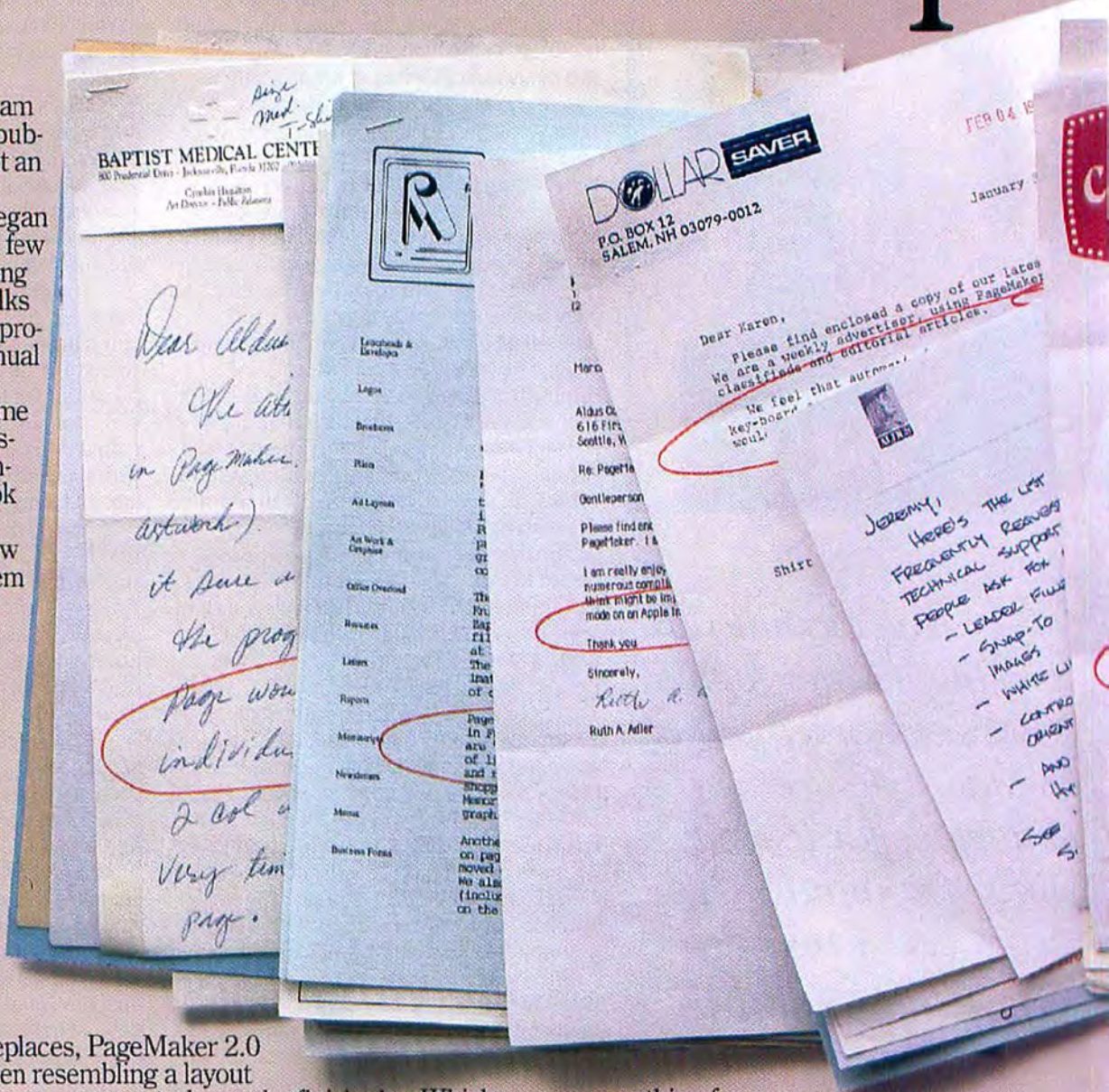

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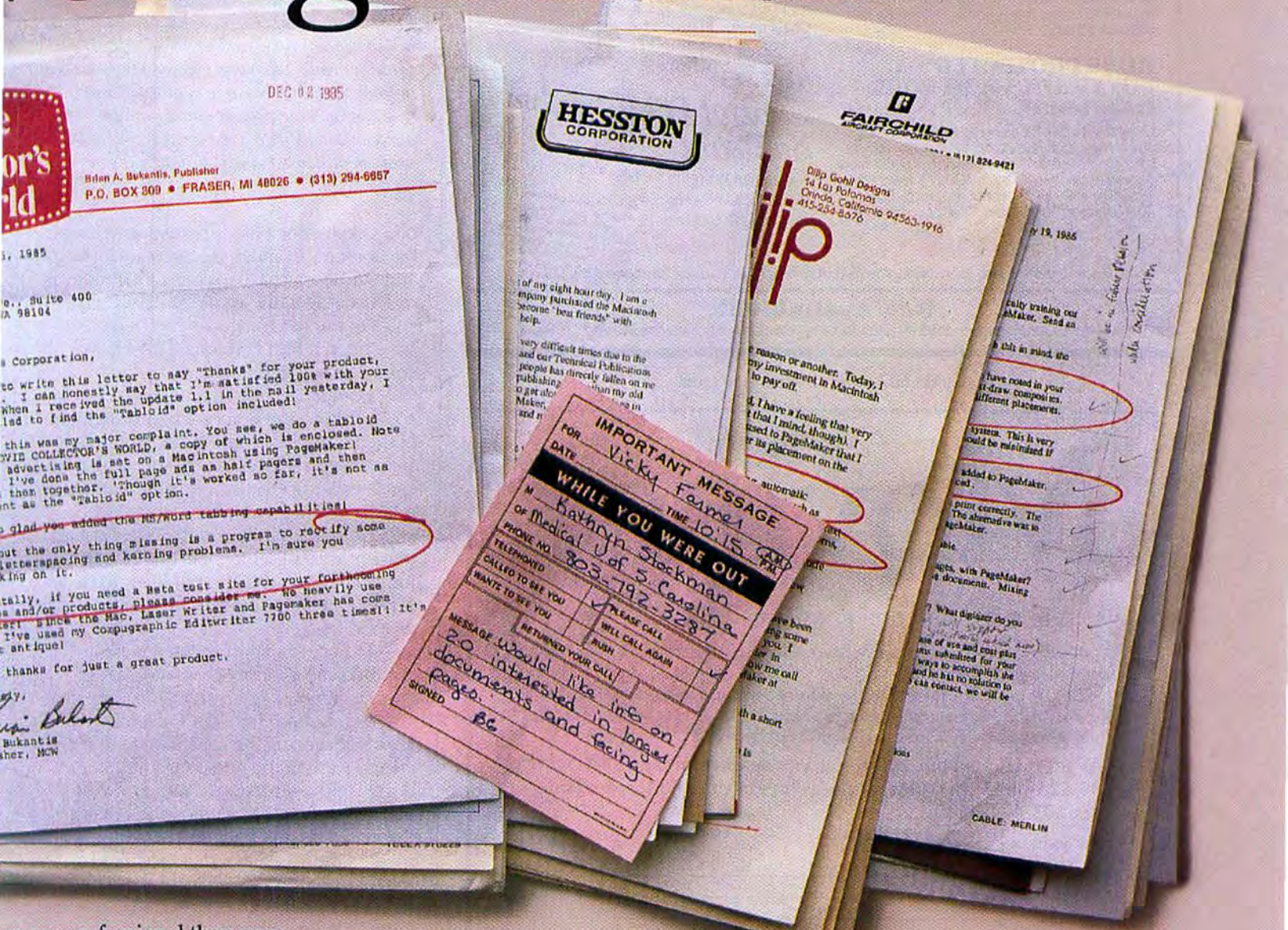

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David Bunnell

ED KASHI

Recently Microsoft chairman Bill Gates stopped by our offices and we talked about IBM's Personal System/2. I told him I thought Big Blue had become the life of the party by pushing the PC standard without abandoning it, and Bill agreed. "I think it's a good strategy that will improve their market share," he said.

paq's, so it's not a life-threatening situation for Compaq. Compaq has great technology and will simply have to adjust its strategy in order to stay in the game. At least Compaq's not under the gun, which it would have been if IBM had priced its 386 machines more aggressively.

Companies like Hercules, which rely so heavily on the graphics board segment of the PC market, could suffer. But here again, it won't be entirely devastating because existing PCs that don't have graphics boards still need graphics capabilities.

Compaq, Tandy, and the other clone makers are still selling lots of PCs, so the impact of IBM's move is not likely to be felt for several months, perhaps even for a year or more.

In fact, I can't think of a company that will become extinct because of IBM's announcement.

The bottom line for PC users is that IBM is advancing the state of the art. It's clearly leading the personal computer industry in the direction of more powerful hardware and more memory by breaking through the 640K barrier. The announcement of the WORM (write-once, read-many) drive with its 200MB capacity is particularly significant because IBM is now acknowledging that optical memory is the wave of the future. The fact that IBM has

(continues)

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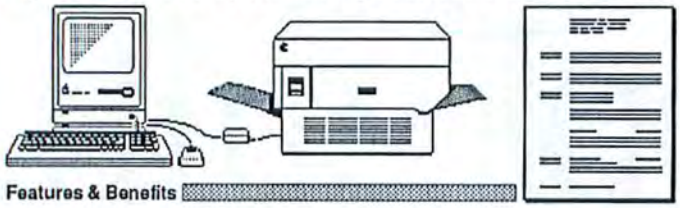

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David Bunnell

dropped the 5¼-inch disk in favor of the high-density 3½-inch disk is also noteworthy. And the 640-by-480 screen resolution is another trendsetting decision that brings PC graphics up to the Macintosh standard.

All these state-of-the-art enhancements, including the connectivity of IBM's machines to mainframes and minis, together with the new extended OS/2 operating system that will feature a window manager and extensions for database and communications capabilities, will make IBM's computers truly formidable contenders in the PC marketplace.

Incidentally, in the long run, Ashton-Tate might conceivably be one of the industry losers. Now that a database will be built into IBM's proprietary OS/2 extended operating system, you really won't need *dBase II* any longer. But this development is still a long way off, and it's not clear how fast it will actually happen. Bill Gates goes even further than this. He says, "IBM—and it must have been many years ago—decided there was no market in which they couldn't compete if they tried hard enough. There is just a dedication to being competitive across the board with this stuff."

IBM's new line may have some shortcomings, but the net result is to raise the stakes for everyone in the personal computer business. From now on we're going to have more powerful PCs—with more memory, multitasking capability, windowing software and optical disk storage, and much-improved connectivity with other PCs, minicomputers, and mainframes.

In my opinion, everyone's a winner with the IBM announcement. IBM wins because it has reestablished its leadership in the industry; the clones are winners because they get to survive; and more established companies like Compaq have been given a new lease on life, provided they play by the rules. Apple is a big winner because IBM has in effect put its stamp of approval on Apple's existing Macintosh line, especially the Mac II and the Mac SE.

It's really great. IBM has invited us all to a party. We all get to play Pin the Tail on the Database and Musical Chairs and other wonderful party games. Most important, we get to have our cake—and eat it too.

Thanks for the invite, Big Blue. It's going to be a real bash. □

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When the Macintosh was first introduced, it was heralded as the computer "for the rest of us."

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Because each was created not simply to tap the Macintosh's resources as a tool for business, but dramatically enlarge them in the process.

HYPERDRIVE LENGTHENS ITS LEAD OVER THE LATECOMERS.

HyperDrive was the first hard disk to be installed inside the Macintosh—and it gave the Mac unprecedented increases in speed and capacity.

Now General Computer extends these increases to the Macintosh SE with a new internal hard disk—HyperDrive FI/40.

Given its heritage, it should come as no surprise that HyperDrive FI/40 is extremely fast. Once installed, an FI/40 will speed power-up time by 57%. Load Microsoft's Excel two times faster. And Aldus' PageMaker three times faster.

These and other reductions in work time are matched by a correspondingly vast increase in the capacity for work. An FI/40 will enable the Macintosh to store the data that would otherwise occupy an astonishing 14,000 pages.

But all this isn't to say that HyperDrive's elevated performance is denied those who prefer an external hard disk.

HyperDrive FX/20 and FX/40 provide the same speed and capacity to any Macintosh with an SCSI port. And like all internal HyperDrives—which is to say unlike any other hard disk—the FX drives come with a complete array of software.

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NETWORKING SOFTWARE THAT OUTWORKS THE OTHERS.

If networks exist to promote the free exchange of information, it follows that the freer the exchange, the better. By that standard, HyperNet 2.0 creates new possibilities for desktop communications.

HyperNet enables up to 32 Macintoshes to read, edit or transfer files from any hard disk in an AppleTalk network. Even if everyone wants to refer to the same information at once.

Unlike other networking software, HyperNet works without need of a dedicated Macintosh to run the network. Or a network administrator to maintain it.

In fact, HyperNet doesn't even require Hyper-

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Macintosh Plus,
HyperDrive FX/20

Macintosh SE,
HyperCharger 020

Drive. It works with any Macintosh and any hard disk made for the Mac. Not to mention all the software compatible with AppleTalk.

Which means you can take full advantage of multi-user programs for electronic mail such as Think Technologies' InBox. Or powerful database managers such as Blyth's Omnis 3.

The resulting network provides a fully compatible complement for people who use AppleShare. And for people who don't, HyperNet provides a fast, easy-to-use network on its own.

INTRODUCING TWO NEW EXPANSIONS OF THE OUTERMOST LIMITS.

If you bought the Macintosh because it delivers "the power to be your best," then more power should make you even better.

That's the mission of the two newest additions to the General Computer family—HyperTape 40 and HyperCharger 020.

HyperTape 40 may not make diskettes obsolete, but it can decrease your dependence on them.

Plugged into any Macintosh with an SCSI port, HyperTape allows you to back up the equivalent of 50 diskettes of data onto one compact 40-megabyte cartridge. HyperTape can be programmed to back up automatically—even when you're away from your Macintosh. And you have the peace of mind that comes with knowing your documents are stored using the most reliable method for protecting data from accidental loss.

Even greater economies of time and effort are available through HyperCharger 020—a powerful enhancement board which, installed inside the Macintosh SE, delivers the processing prowess of the Macintosh II.

A Macintosh SE thus equipped not only runs most software up to an incredible four times faster. HyperCharger's optional floating point coprocessor also allows it to handle financial modeling, statistical analysis, and other tasks which ordinarily would require a much larger, more complex and more expensive computer. And since HyperCharger is internally installed, the SE remains as compact and portable as before.

In sum, no other family of peripherals leaves the Macintosh so thoroughly equipped for superior performance. Or so thoroughly qualified for a career in business.

For a detailed review of those qualifications, stop by an authorized General Computer dealer. And for the name of one near you, call (800) 634-9737. In Illinois, (800) 854-9737.*

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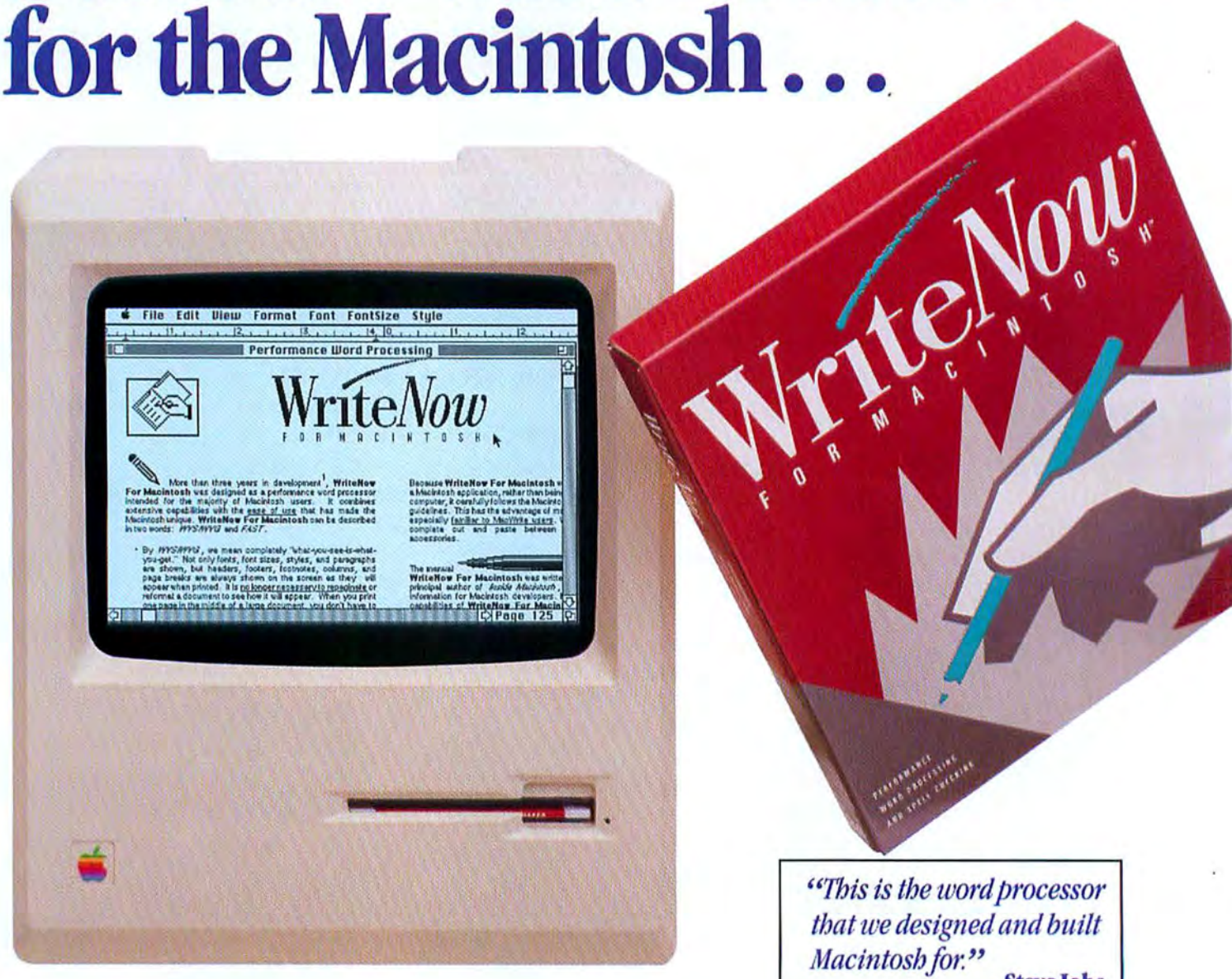

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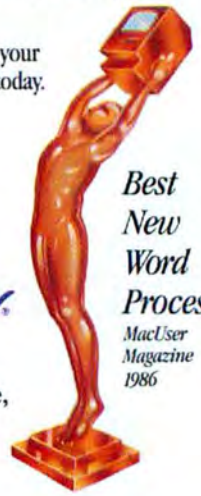

Best New Word Processor
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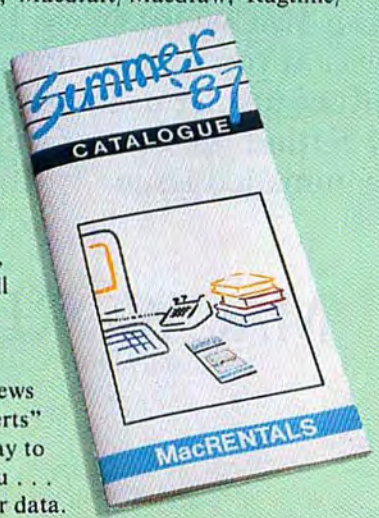

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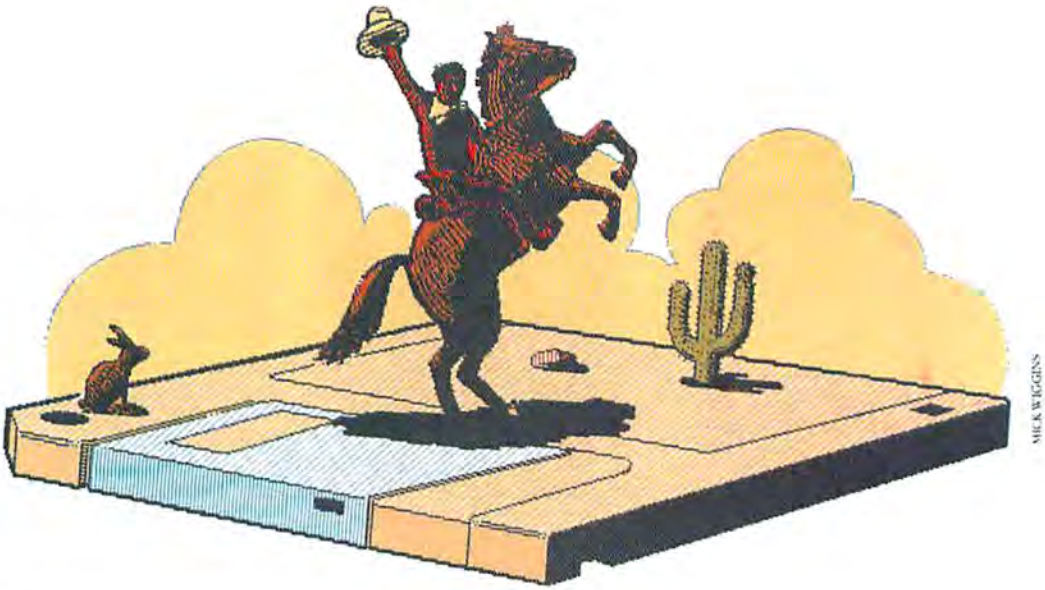
Letters

A forum for Macworld readers



MICK WIGGINS

There's Something A Myth

Despite what Scott Watson said about the source of the name of his *Red Ryder* program [*Mac Bulletin,* February 1987], I'm sure it was taken from the famous comic-strip character of the thirties and forties created by Fred Harmon.

Dennis Appleton
Lynbrook, New York

Ryde 'em Memories

I don't believe what Scott Watson said about the name of his communications program. The secret reveals itself when you click on the *Red Ryder* icon; the icon turns into a picture of a cowboy on a horse. Doesn't anybody else remember the *Red Ryder* picture shows every Saturday back in the 1940s and early 1950s?

Corkey Sandel
College Station, Texas

So, Mr. Watson, what's it to be, a strip-joint singer or a comic-strip cowboy that gave the name to your program?—Ed.

The Think Method

I am a musician in the Boston Symphony. A year ago I was preparing to play a piece written and conducted by French composer Pierre Boulez, whose style of writing sometimes makes his pieces difficult to play. I could tell by a glance at the music that other percussionists had had trouble with one movement, because all their pencil marks combined to make the page look like a road map. Thanks to the Mac and *Professional Composer,* I managed to rewrite the movement so that it could be more easily understood. Just now I received a note from a colleague in the Cleveland Orchestra thanking me for leaving the Mac printout with the music and saving him time in preparing the same piece.

Tom Gauger
Brookline, Massachusetts

Index on a Disk

Our consulting firm for local school districts and businesses finds *Macworld* to be a valuable resource. To assist us in rapidly searching topics of interest, we created your index on *Microsoft Excel;* recently we converted to *Reflex.* For $7 and a self-addressed, stamped envelope, we'll send anyone a copy of the 1984 to 1986 index on a 400K disk.

William J. Trautt
Northwoods Computing
819 Sixth Ave. W
Ashland, Wisconsin 54806

We have tried out this index and find it quite useful. Thanks for your offer to your fellow readers.

We have also learned about MacFind, *a cumulative index of* Macworld *and two other Mac publications, available from MacKay Associates (6439 Boxelder Dr., Lincoln, NE 68506, 402/483-5583) in versions for* Microsoft File, OverVue, Excel, Helix, Double Helix, Interlace/Reflex, Record Holder, *and* FileMaker. MacFind *costs $12 postpaid for an index that cov-*

(continues)

Corrections

Allotype Typographics, publisher of downloadable fonts ("Font Facts," February 1987) is at 1600 Packard Rd. #5, Ann Arbor, MI 48104, 301/424-3942.

In "Art to Go," in the December 1986 issue, our reviewer thought she was evaluating finished art for Compuset's Clip Art, Volume 1; *since then the product has matured, raising its ranking in our reviewer's estimation to three stars.* Mac-Hy-phen, *reviewed in* Macworld, *January 1987, is now known as* LetraHyphen, *available from Letraset, 40 Eisenhower Dr., Paramus, NJ 07653, 201/845-6100.*

MacMemories, *reviewed in the March issue, is available from ImageWorld, Inc., P.O. Box 10415, Eugene, OR 97440, 503/485-0395, 800/457-6633. $30 per disk, 5-disk Blue Ribbon Holiday set $130, 13-disk Medallion set $340, 18-disk Full set $450.*

In our April issue, the still from 2001: A Space Odyssey *in "April Fooleries" should have been accompanied by a line reading "© 1968 Metro-Goldwyn-Mayer Inc."*

Money

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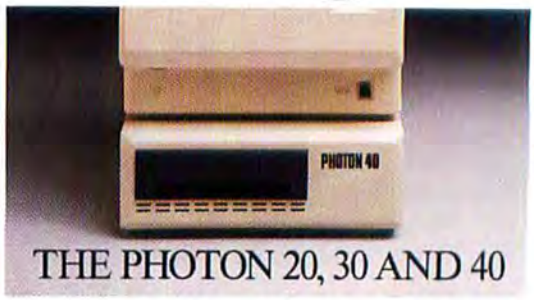

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MACWORLD May 1987

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Letters

ers issues through 1986; a 1987 version at $15 is planned for June and December release.—Ed.

Unexpected Mail-Order Fallout

Since last November I have been running a mail-order business in Massachusetts, making available software developed by Enzan-Hoshigumi Co., Ltd. of Japan and other Japanese products such as washi paper for use on an ImageWriter or LaserWriter. I recently received the bad news from my commercial bank that my application to set up a Visa/Mastercard mercantile account had been declined on the grounds that no new applications from mail-order businesses were being accepted. A second bank gave me the same response.

The sudden turn of events has taken a toll on my business; I have had to return several orders paid for with credit cards. Worse yet, there will be a large potential loss of business from others who would prefer to take advantage of purchasing on credit. Every other mail-order business accepts credit-card orders over the phone.

When Jerry Borrell wrote in his column this February that the reputation of the mail-order business was at stake in the eyes of your readers, he had no idea that it also makes starting up a small new company a thousand times harder.

Doug Braat,
President
Enzan Software
Stow, Massachusetts

What an unexpected turn of events. We wonder if the banks are taking the same attitude with discount airlines.—Ed.

Portable Feedback

The review of the Dynamac in the February *Macworld* ["Macintosh in Flatland"] reminded me of an interview Alan Kay gave, when he was still with Atari, on the 128K Macintosh just after its release. He considered it a nice attempt, but he thought it was a shame it fell so far short of what was possible even at that time. The eternal dilemma of computerdom is that the gifted can always envision more than reality can produce. Fortunately, today's products lay the groundwork for tomorrow's.

The production unit of the Dynamac does include a 640- by 400-pixel display, a quieter fan, and a more readable screen, due to a three-layer polarizing filter. We now have a built-in modem that offers U.S. and European (CCITT) compatibility at 300/1200 bps. With our product, portability is a feature, not the essence. Rather than use a design that would strip a desktop unit's features to achieve portability, we opted to enhance the Mac in every respect: screen size, power supply, cooling, memory/hard disk/modem options, inputs, outputs, switchable voltage, and, we hope, appearance. The Dynamac is not a perfect computer, but we think it is a superior one. At the price we have to charge, it ought to be.

As for the name, it is an accolade to Alan Kay's vision, not a claim to fulfill the Dynabook's promise.

Stephen P. Hull,
President
Dynamac Computer Products
Golden, Colorado

Another Visionary Heard From

In "Glimpsing the Future with Guide," [*Macworld*, February 1987] Robert C. Eckhardt asks "But is *Guide* true hypertext?" I define *hypertext* simply as "nonsequential writing," and *Guide* provides a clean and elegant package for writing, reading, and exploring in this still-new medium.

The author rightly points out that we are as yet some way from the universal hypertext—the immense libraries and publishing pools of the future, which we will be able to explore in all directions virtually without limit.

Creating the software basis for this publishing repository has been the work of Project Xanadu; our prototype hypertext server is finally on line for experimental use. We are working nonexclusively with OWL, the creators of *Guide*, to create a powerful user's console to go with this new form of storage. So *Guide* is one step toward the universal hypertext of the future.

Theodor H. Nelson,
Director
Project Xanadu
San Antonio, Texas

BASIC Winners

What ever happened to the winners of the *Microsoft BASIC* program contest you promised to publish?

Jerry Brightbill
Tonasket, Washington

The winning MSBASIC programs are on CompuServe, in data library 5 of the MAUG.—Ed.

(continues)

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Letters

The Big Spin

As the chief programmer for D2 Software's *MacSpin*, I would like to set the record straight about how our product performs on the large-screen products described in "Up on the Big Screen" in the January 1987 issue of *Macworld*. At its January 1986 release, *MacSpin* version 1.0 functioned properly on all Macintoshes, from the 128K to the XL. The 1.1 release (September 1986) works with all the screens we knew of then. We have since tested it and have found no problems on standard Macs from the 512K up, the Dynamac, the Radius Full Page Display, and E Machine's The Big Picture. In January 1987 I tested *MacSpin* on the latest MegaScreen and did not observe any of the problems attributed in the review to *MacSpin*. Furthermore, we are enhancing *MacSpin* so that it takes better advantage of all this new screen real estate.

Andrew W. Donoho,
Vice President
D2 Software
Austin, Texas

More Font Facts

Congratulations on Erfert Nielson's effort to get her "Font Facts" straight [*Macworld*, February 1987], which clarified the differences between types of fonts available and how to use them. We are disappointed, however, that the article did not mention NeoScribe International's LaserPerfect Fonts, including MacSlab; Hebrew; Norfolk, a display font; Athina, a fully accented modern Greek serif font; and a Hindi font. We are trying to make up for the lack of PostScript fonts available to the international publishing market and to designers concerned with high-caliber typography.

Michael Ross
NeoScribe International
P.O. Box 633
East Haven, CT 06512

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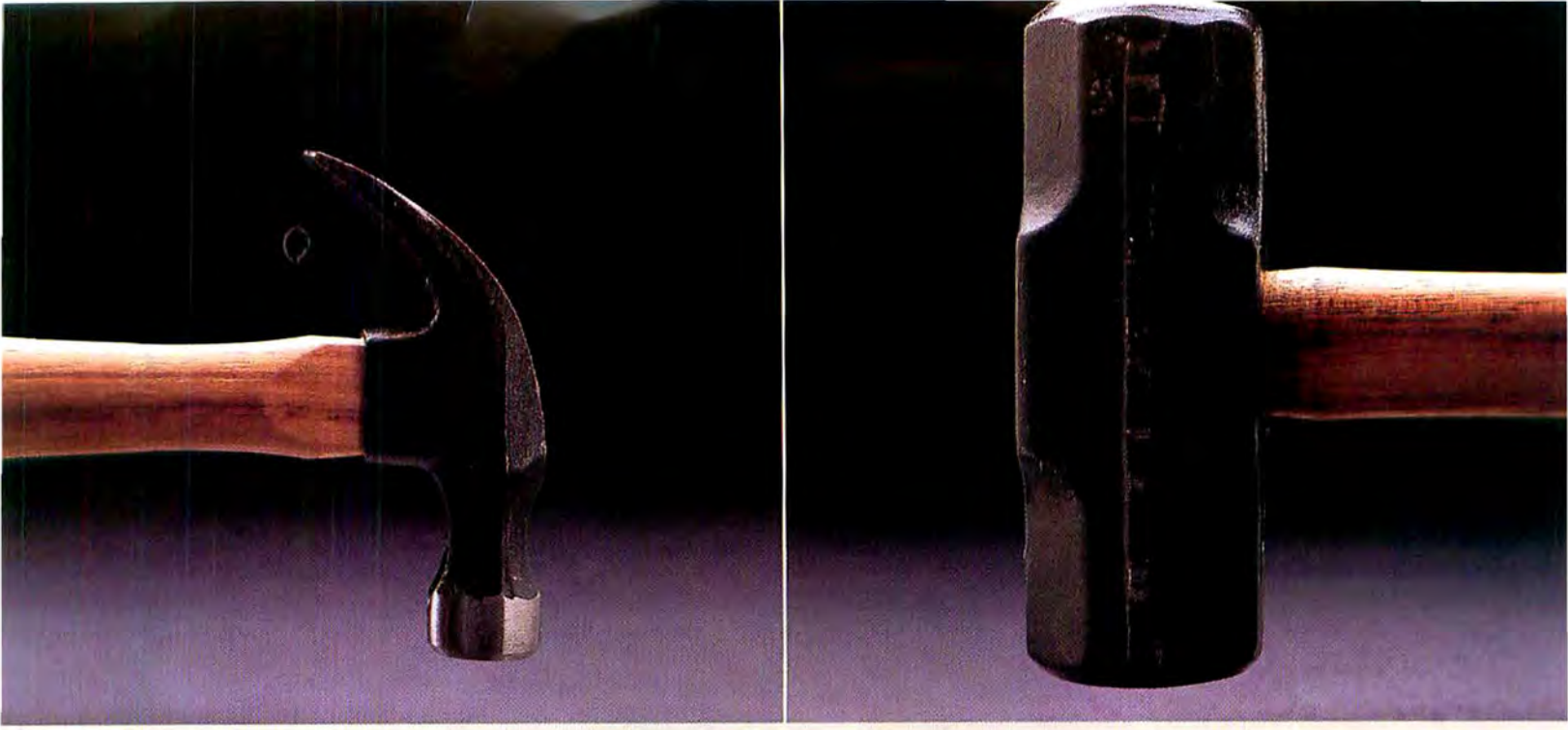

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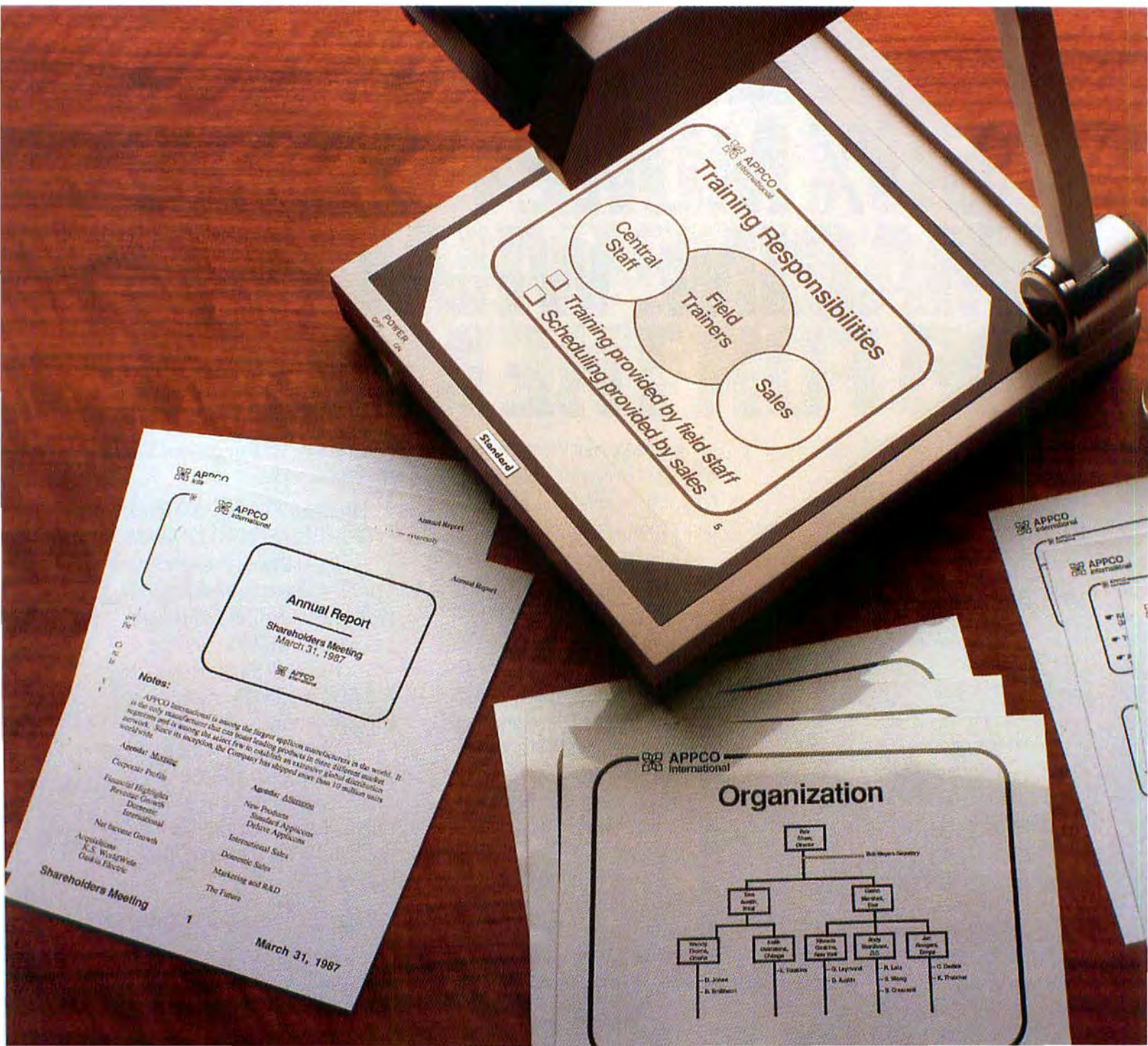

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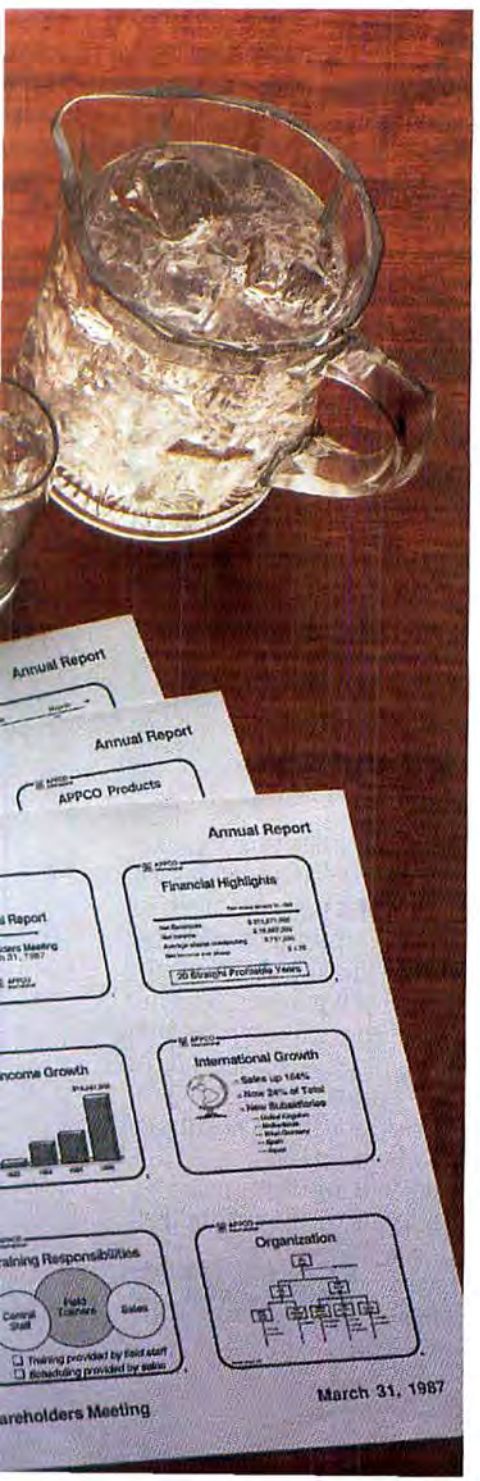

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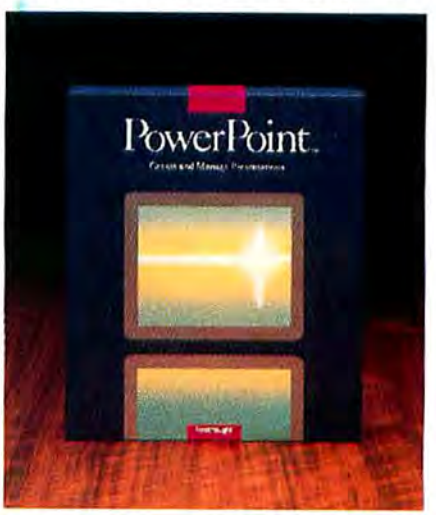

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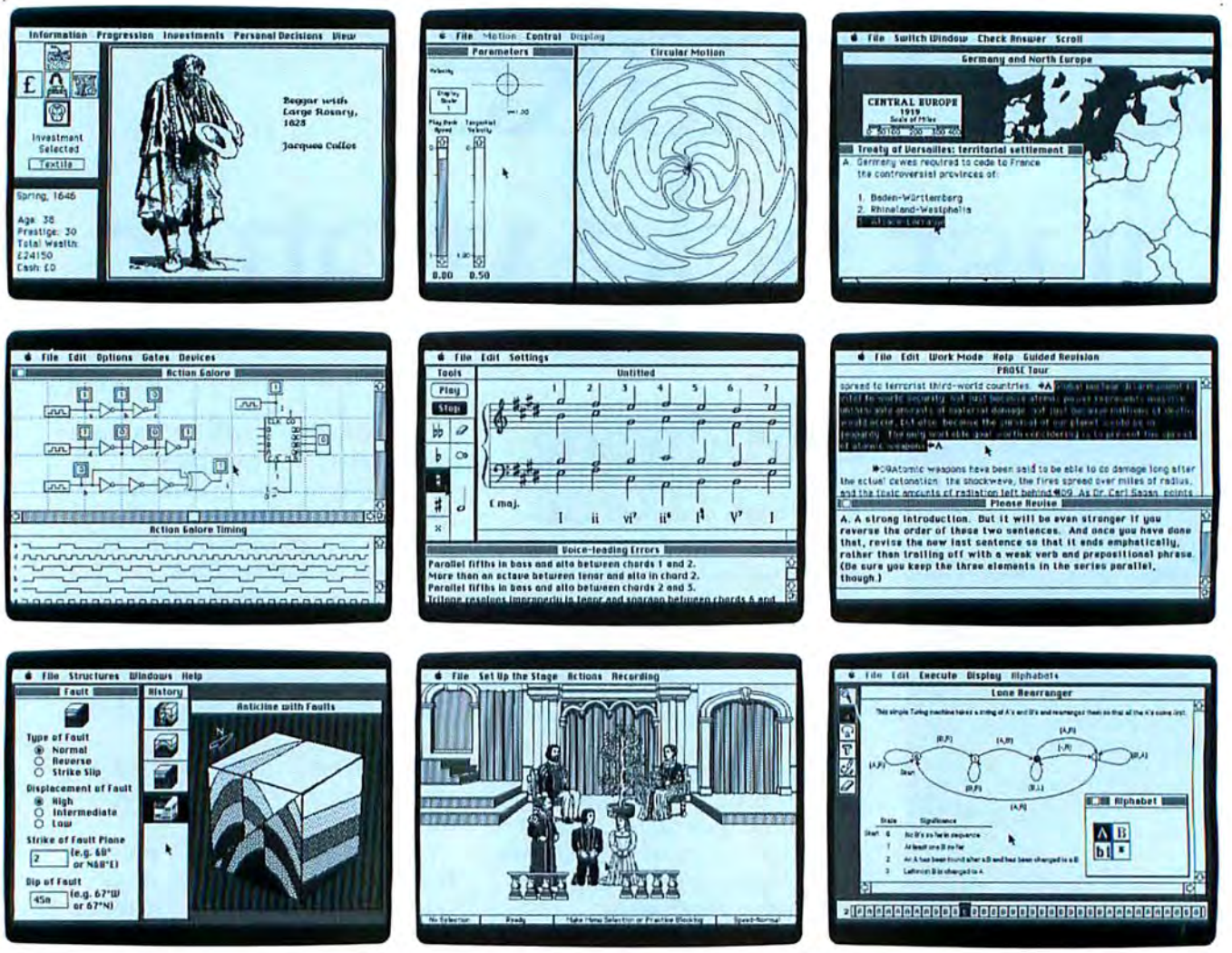

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What's Next

A wish list of Macintosh breakthroughs

Ever notice that computer magazines, especially monthlies, seem out of sync with their surroundings? At least much of the time? Except for our April issue. We offered four features and three departments on the Mac SE, Mac II, and third-party products only days after they were announced. Some fast work, you say? We obviously knew something beforehand. In fact, we knew quite a lot. So did a hundred other publications where you also might have noticed a peculiar lack of speculation about new Apple products. You may surmise in retrospect that *Macworld* halted the speculation at about the time we began laying the groundwork for our April issue.

Such surprising quiescence occurs periodically, when editors swear to secrecy in order to gain access to new product information from developers. From the time we're given access to such information until it appears in print, we are privy to an incredible race by Apple and third-party developers to reach announcement dates with products. This frenzy of activity is an incredible process to behold. Months of seven-day work weeks go into the hurried development of some new products. Battles ensue between marketing and engineering departments as they debate how appropriate a product might be for a little-known market. Some products never come to fruition; others become a compromise of resources, time, and people; still others appear without a glitch.

The trust that Apple and developers bestow upon us is unique in the computer industry—even major developers of products for the IBM PC are left in the dark by Big Blue. So we're caught between our journalistic desire to print all the news that fits and the realization that by playing the game, we can ultimately offer our readers information that's more detailed, more accurate, and timely. We become cynical observers of our own industry as weeklies and dailies rush into print with their own interpretations of what might happen. We know reporters are making call after call to developers or to friends at Apple, gathering bits of information that become an impressionistic version of what is to be.

Rarely do we in the monthly press find ourselves in a position to speculate. Well, we're now in one of those fallow periods between new announcements and our self-imposed silences. We really don't know what's coming, so it's safe to make informed guesses, even impassioned pleas for the next products. So here are my speculations: a wish list for the remainder of 1987.

A personal LaserWriter for under $2000. I would be willing to tie up my Mac's processor with PostScript calculations if that meant I could have a laser printer at home capable of quality as high as the LaserWriter Plus. Since I don't need lots of fonts, $1500 would be even better, but Apple has to pay for those *Wall Street Journal* ads. (A cheap LaserWriter won't need a *WSJ* ad—trust me, guys.)

Update the Finder. The most-often-viewed aspect of the Macintosh could be made much more imaginative and useful. However, tinkering with the proven formula of the desktop could be daunting for Apple—why fix something that's not broken? The answer: because we the buyers would enjoy our computers more.

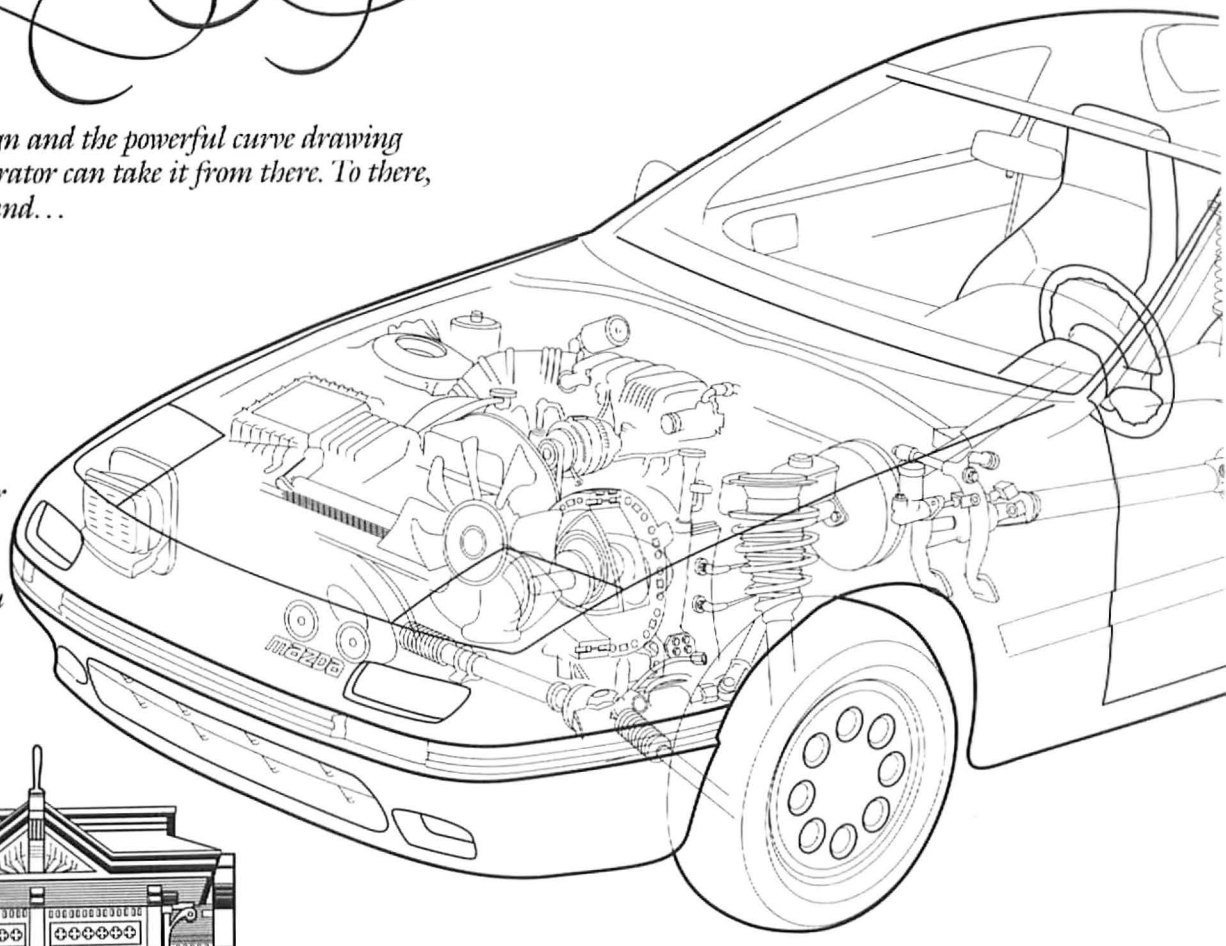
A portable Mac for under $2500. And please don't use one of those miserable LCD displays. Do it right—like Dynamac—and use a gas-plasma or an electroluminescent display. They're brighter, easier on the eyes, and more suited to video than LCDs. Yes, a legible display consumes a lot of power, but I don't mind not being able to use one on an airplane. What I want to do is carry a Mac—not lug it—from the office to my home, where I can prop up my feet and continue to work peacefully. Or take one with me on a trip and work in a hotel room.

(continues)

Artifactory

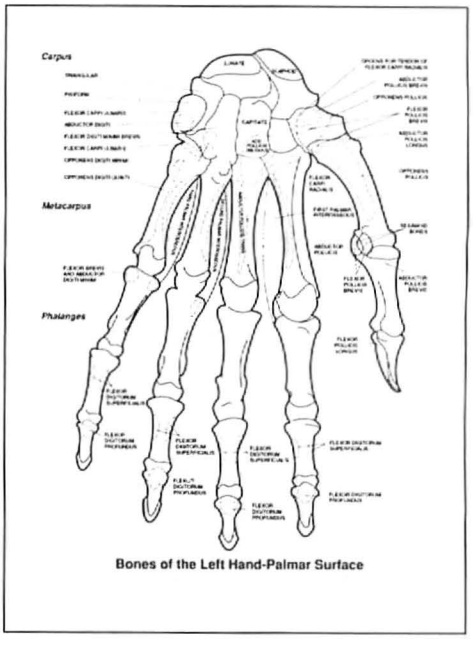
Other draw and paint programs also let you add captions. But none of them can put those captions next to the sharpest, cleanest lines and curves on the map.

Just rough out your basic design and the powerful curve drawing capabilities of the Adobe Illustrator can take it from there. To there, then back over there, then around...



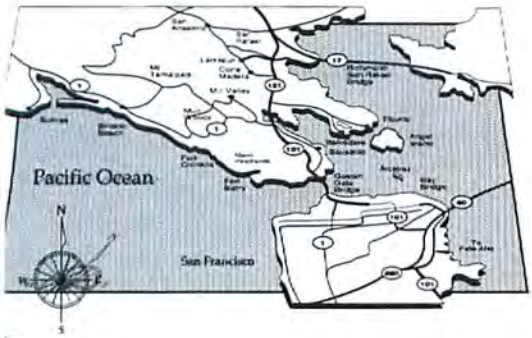
Share your drawing with other users. And if anyone wants to change it—no problem—the Adobe Illustrator can give you another perfect original. Fast.

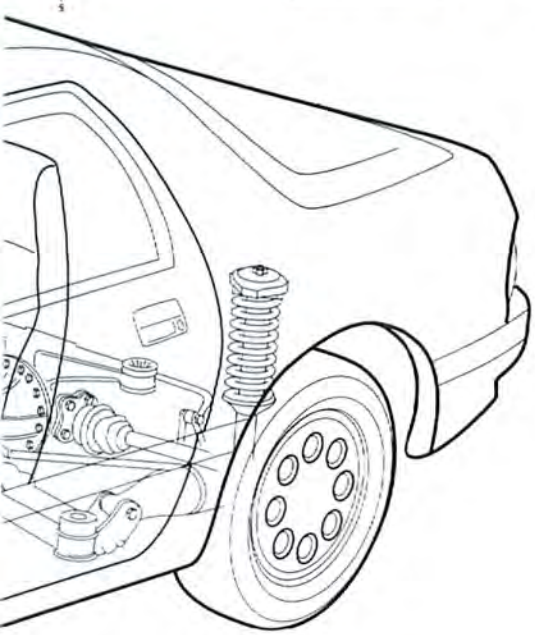
Start with a blueprint or just a dream and the Adobe Illustrator can help you build out the rest. Straight and true.



Bones of the Left Hand-Palmar Surface

For producing the finest details, all kinds of line weights, even typeset captions with precise control, no other program can touch it.





Unlike other draw and paint programs, the Adobe Illustrator uses lines and curves to form an image, instead of dots. So there's really no limit to the ideas you can hatch. Or cross-hatch.

GRAB A BITE TONIGHT

Change is the name of the game in logo design. And the Adobe Illustrator can make changes in a fraction of the time it would take by hand. And not a big fraction, either.

NOW A WORK OF ART DOESN'T HAVE TO BE A LOT OF WORK.

Now it can be the work of the new Adobe Illustrator.™ The most powerful and practical art production tool ever to grace a computer screen.

The Adobe Illustrator is a software program that, for the very first time, combines the control and fine detail of drawing by hand with the speed and mathematical precision of the computer.

The result is, well, you can see the results for yourself.

What you can't see, and can't possibly imagine, is how fast it is. How versatile. And how productive it can make you.

Instead of building an image with dots like other programs, the Adobe Illustrator uses precise *curves and lines.* So nothing looks like it was drawn by a computer. And you have infinite control.

The Adobe Illustrator won't limit your artistic license, either. On the contrary, you'll be able to do things with it you've never done before.

You don't have to build a drawing from scratch, you and your Macintosh™ can start with the scanned image of a photo, logotype, blueprint, a rough sketch, even something from your scrap file. Or use a document from MacPaint™ or compatible software. You can even combine two or more images into a single image and work with that.

Once it's in the computer, you can manipulate it in ways possible only with a computer. Even share your work with other users.

But no matter where you start, or what you do to it, you'll be pleased to know the Adobe Illustrator will drive any POSTSCRIPT®-equipped printer from an Apple® LaserWriter® to a typesetter like the Linotype™ Linotronic™ 300. So you can get final art with resolution so high you'll get dizzy just looking at it.

So go see it. Call us at (800) 29-ADOBE, (800) 85-ADOBE in California, and (415) 852-0271 from Canada for the location of the Adobe dealer nearest you.

But do it soon. The first thing the Adobe Illustrator is going to draw is a crowd.

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Circle 678 on reader service card

Anyone who wants to drag around a 9-pound NiCad battery should stick to IBM PCs. Instead, give me dual floppies, 4 megs of RAM, and an integral modem, please.

Speaking of floppies, I would love to have those new Sony floppies with 2.5MB each. Then I could actually do useful backups from my hard drive to floppies.

Multitasking. I want to open and manipulate more than one window—and more than one application—at once. I want to ask an underutilized Mac on a network to share some of my work: tasks such as running my personal laser printer or exchanging data via modem.

Improvements to Apple's own application software. *MacPaint, MacWrite, MacDraw,* and *MacProject* are all showing signs of age. We've got other paint, project management, and word processing products now, but how about *Draw?* With a new generation of hardware, is it too much to expect similar breakthroughs in Apple software?

New benchmark programs. We've got the new machines, so where are the hot programs equivalent to those that ushered in the Macintosh? We need some far-reaching products that will not only set the pace for what others expect from the Mac but also will challenge developers to produce even better products.

UNIX for the rest of us. I/don't/like/ ##*/**! jargon. I just want access to all of the functionality that exists in hundreds of applications running under System 4.2 and System V UNIX.

AppleLink the world. Cut it loose from the dealers or make part of it available to anyone with a Mac. At one point Apple had a vision for AppleLink. It was going to be the equivalent of ARPANet for the Mac buyer: a network that would allow Mac owners and developers to talk to one another. You buy a Mac, take it out of the case, plug it into the phone, and it dials a service that takes the buyer on a walk-through of the newly bought product. Do that, Apple, and we'll make reviews and other editorial content available for the network, and then our readers can really enter the information age.

Cut the price on the Mac Plus and get some lower-priced units shipped out there before the price of a PC clone with monitor and *MS Windows* sinks below $700. We're all rooting for Apple's success, but the profit margins should move down faster. You don't necessarily sacrifice the future by selling more for less, Commodore notwithstanding. Maybe spend less time catering to analysts—corporate buyers look at the price tag, not just the stock price or advantages in training.

The last item on my list relates less directly to the buyer. It involves leadership and the investment of resources needed to lead. While writing an article on the SE last month, I became aware of problems related to accelerator cards for the SE. All the developers have discussed adding another connector to their card that will allow further extension to the SE—and each has its own specification for doing so. As I worked on the article, I pressed both Apple engineering and developers to talk to one another, hoping they'd arrive at a standard for the secondary connector. Then, not only the buyer would benefit, but also the developers would be saved the trouble of building unique connectors for each accelerator card.

Apple must invest in engineering, development, and its evangelists, if it is to keep avoiding the morass of technology incompatibilities common to the IBM PC market. □

Sit down, boot up and find yourself surrounded by the sights and sounds of the fairway – with MacGolf, the premier simulation golf game for Macintosh™ users.

MacGolf challenges beginners and experts with 3-dimensional animated golfers and graphics, realistic (digitized) sound effects, and two 18 hole golf courses. Up to four people can play.

MacGolf works on a 512K or Macintosh Plus and costs only $59.95. Get MacGolf at your nearest dealer today. Or call Practical Computer Applications at (612) 427-4789.

MacGolf™

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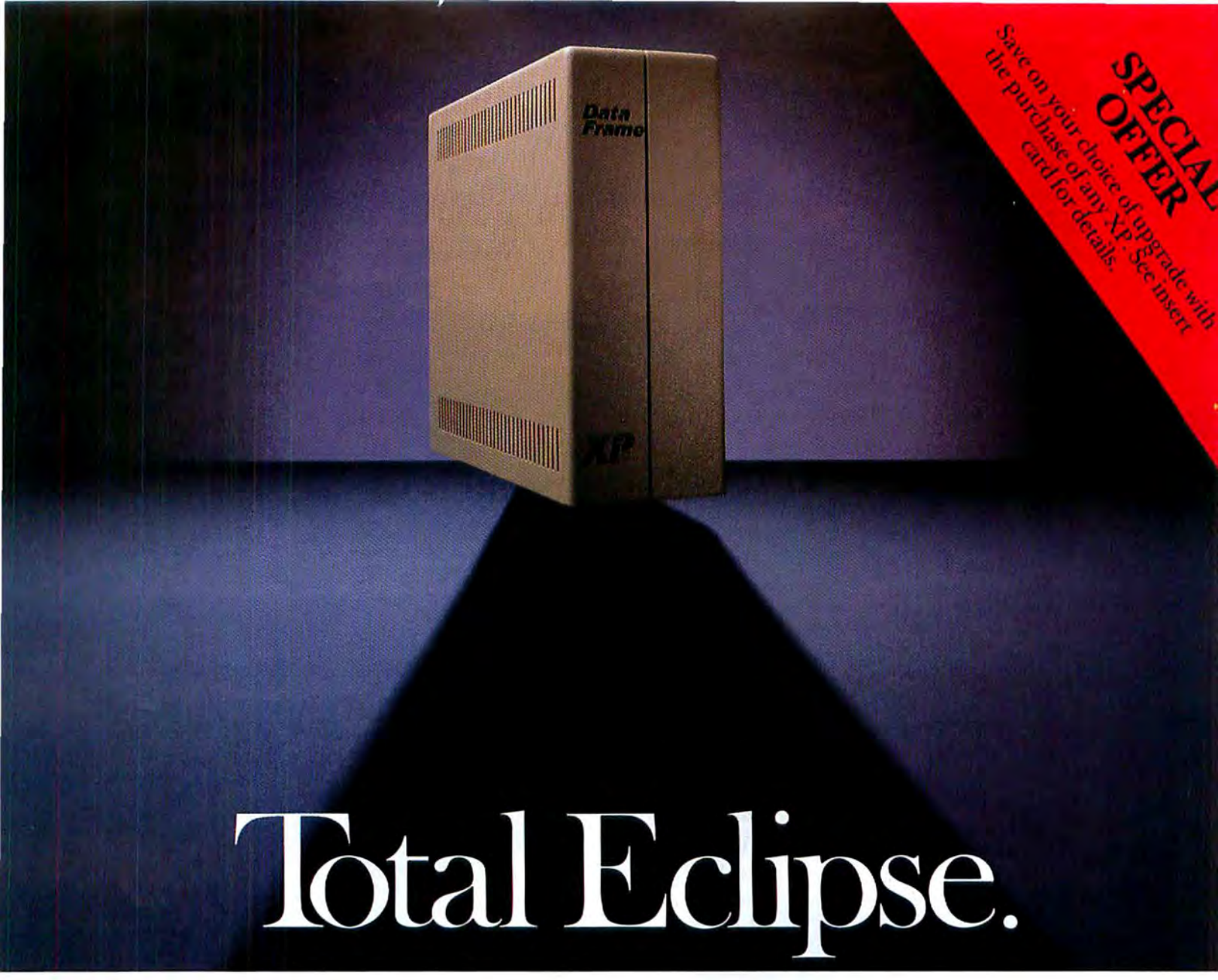
Circle 211 on reader service card



Total Eclipse.

Introducing DataFrame XP,™ the SCSI hard disk that eclipses all others.

DataFrame's superiority has been clear since Apple chose it to introduce the speed and performance of the Macintosh Plus. And now, while other manufacturers are still working to emulate our best selling DataFrame 20, SuperMac Technology™ is proud to introduce *the second generation hard disk that clearly outshines:* DataFrame XP.

The fastest SCSI under the sun.
DataFrame XP's advanced SCSI technology delivers virtually twice the speed of any other full SCSI drive—including Apple's recent release. Every program runs *faster.* And the programs that make frequent use of the disk run *much* faster.

Reliability that overshadows all others.
DataFrame is far and away the critic's choice. *The MACazine* gave DataFrame its highest rating. And *Macworld* says "DataFrame was one of the few completely trouble-free drives tested."

Unbeatable reliability is the reason SuperMac offers the only full one-year warranty in the business.

A design so simple, it's brilliant.
DataFrame XP comes with all the features of the original DataFrame. Preformatted for immediate set up and use, just stand the XP beside your Mac and plug it in. And it comes with free backup, print spooler, and self-test software *plus* free lifetime software upgrades.

DataFrame XP always stays cool because its vertical 'chimney' design efficiently vents heat without use of a fan (that's why it's quiet!). The XP sits beside your Macintosh, not inside or under it, so the drive won't heat your system.

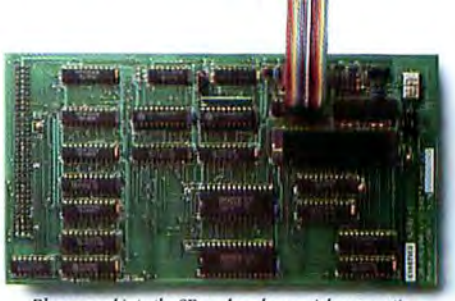
How to make your Mac shine.
Just add a DataFrame XP. Or upgrade your existing DataFrame to XP performance. Both are every bit the DataFrame *The MACazine* called "the best buy for a SCSI hard disk considering price, product quality, performance, warranty and technical support."

Compare the rest of the SCSI drives. Then test the XP. And prepare for something overpowering: A total eclipse.

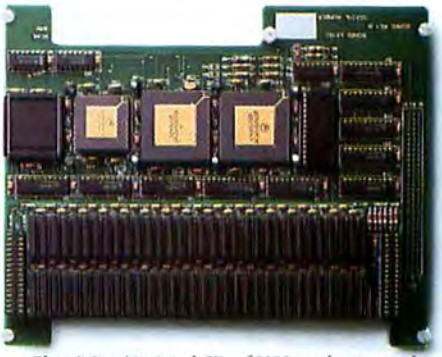
SuperMac Technology
950 N. Rengstorff Ave.
Mountain View, CA 94043
(415) 964-8884

SUPERMAC TECHNOLOGY

Macintosh SE. The perfect place to start building–equipped with a built-in 20MByte hard disk (or a second internal floppy) and one internal expansion slot.



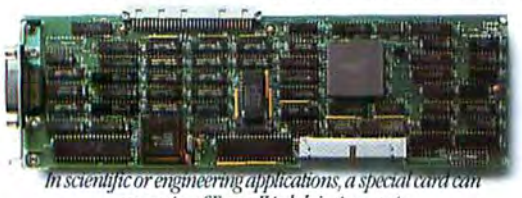
Plug a card into the SE and make a quick connection with mainframes and networks.



Floor it. In a Macintosh SE, a 68020 accelerator card gives you license to exceed the speed limit.

Add a 5.25" disk drive, and (with the right card) you can use information created on IBM or compatible PCs. Or run MS-DOS programs

A new keyboard, re-designed for the new generation of Macintosh computers.



In scientific or engineering applications, a special card can connect an SE or a II to lab instruments.

The new AppleColor® High-Resolution RGB monitor can create brilliant hues and true gray scale on your Macintosh II. In finely-detailed 640 x 480 pixel resolution. Also available: a 12" monochrome monitor.

How to build your

You've heard about them. You've read about them. By now, you've probably even seen them.

Our latest leaps in technology, the new Macintosh™ SE and Macintosh II personal computers, have been getting their share of press.

But to add to what you may already know, we'd like to tell you more about their most powerful feature: expandability.

It's something we made possible by adding expansion slots. So you can easily customize your Macintosh to meet the demands of any business.

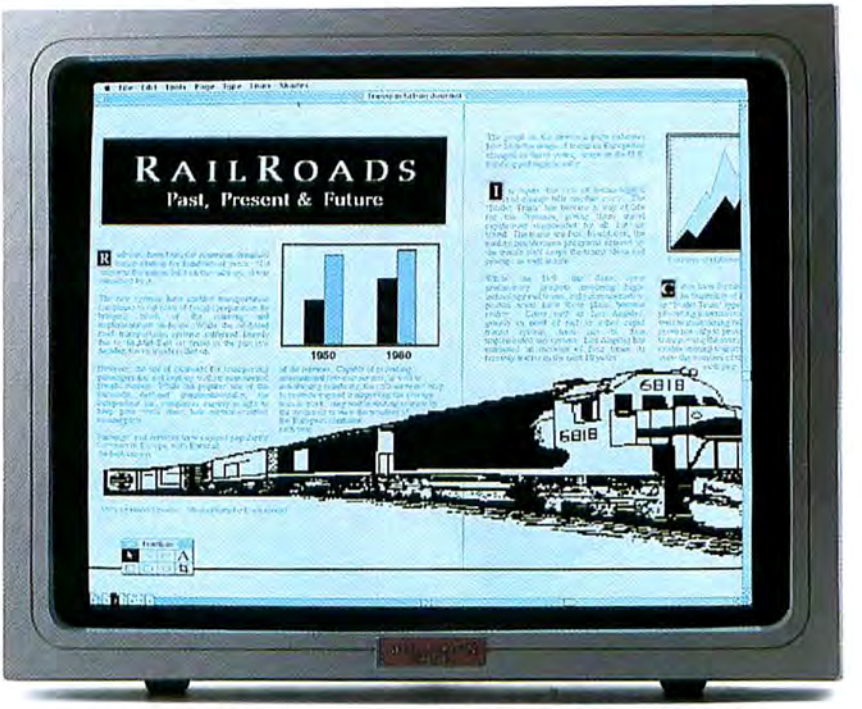
You can, for example, set up a system that's perfect for major-league number crunching. Or add features to give you even greater power for Apple Desktop Publishing, like displays as big as 21 inches.

The SE sports one expansion slot. While the Macintosh II takes the idea of expansion to the extreme–with six 32-bit NuBus slots. Which have the good sense to configure themselves, and require you to do nothing more than plug in the options of your choice.

Such as an 80286 co-processor card that lets you run programs written for MS-DOS computers. And a video card that produces near-photographic images

senting the Apple Extended Keyboard. Complete with 15 programmable function keys, as well as separate cursor and numeric keypads.

Via the expansion slots, you can add an AST co-processor card to either the SE or Macintosh II.

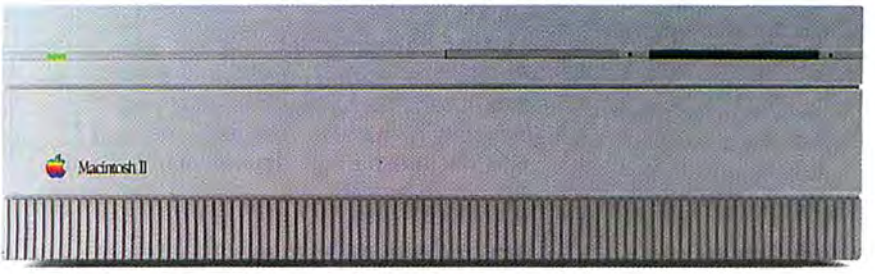


With either the SE or the II, a large-screen monitor (available from other manufacturers) can give you the big picture. And show you up to two pages at once.

ing one of the II's six lots, you can tie into the company nframe or an office etwork like Ethernet.

If you lose it, you can't use it. The Apple Tape Backup 40SC safeguards the work on your hard disk. Pronto.

Build yourself a power station. The Macintosh II has a lightning-fast 32-bit Motorola 68020 processor, a 68881 co-processor and six NuBus expansion slots.



The Macintosh II Video Card can generate colors 256 at a time, at up to eight bits per pixel. Using a palette of over 16 million colors.

own Macintosh.

rom a palette of over 16 million colors.

The new Macintosh computers are uilt to be customized in other ways, too.

You can set up your SE with up o four megabytes of memory, so it has he power to run the most sophisticated rograms. And configure the II with up o eight megabytes of memory on the nain board, or a walloping 1.5 gigabytes sing the expansion slots.

As for storage, there's plenty. With either computer, you get the option of an internal hard disk. Or an external one that can store up to 80 megabytes.

You can also choose between two keyboards. One of which has 15 function keys that come in handy when delving into special applications.

And as you might expect, we've done more than just give you a very good way to build the Macintosh of your dreams.

We've also arranged to make sure you have the perfect workshop: an authorized Apple® dealer.*

Where you can get some expert assistance choosing your options.

So all you have to do is stop in. And get to work.

The power to be your best.™

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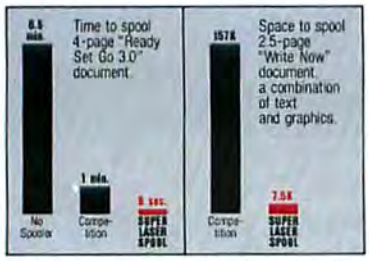
BLINDINGLY FAST. By sending your print files to the background and returning control of your Mac to you, SuperLaserSpool lets you work and print at the same time. And it does this *5 to 40 times faster* than its nearest competitor.

SuperLaserSpool gets you back to work fast. You never wait for the printer, no matter how many documents you have queued up or even if the network is busy. SuperLaserSpool automatically manages the entire printing process while you work.



Look how much faster SuperLaserSpool will give your Mac back compared to its competition.

SuperLaserSpool's files are so small, you don't have to worry about running out of disk space.

WORKS WITH ANY APPLE® PRINTER. SuperLaserSpool can print to the LaserWriter and ImageWriter™ (either direct-connect or AppleTalk™-connected).

INCREDIBLY COMPACT. Other spoolers require so much storage space that a hard disk is essential. Not so with SuperLaserSpool. You can use it with floppy-disk systems because its files are so compact.

DOWNLOADED FONTS. Unlike most of its competitors, SuperLaserSpool can handle files that have multiple downloaded fonts.

EASY TO USE. With SuperLaserSpool, you can view all the jobs in the print queue, change their priorities, delete jobs, receive on-screen help, and check on network activity. Your spool files are always safe, even if the system crashes.

SuperLaserSpool works with almost all Macintosh applications. You can even leave and enter different programs without disrupting the printing of documents.

And it's completely invisible: You can launch it and forget it's even there.

- **SINGLE-USER: $149.95**
- **MULTI-USER: $395.00**

Get SuperLaserSpool at your local SuperMac dealer today, or order direct.

SUPERMAC SOFTWARE

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Contributors Notes

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Jim Heid *("Laser Wars," "Speaking of Spoolers," and "Approaching the Mac II") is a contributing editor of* Macworld *who writes the monthly* Getting Started *column. Formerly a typographer for a large printing firm, he has been writing about the Macintosh since its introduction, and is author of* dBase Mac in Business, *brought out this year by Ashton-Tate Publishing.*

Allen Munro *("Programming from the Start") conducts research on intelligent computer-based simulation training at the University of Southern California. He is author of* Mac Power: Using Macintosh Software, *published by Scott, Foresman.*

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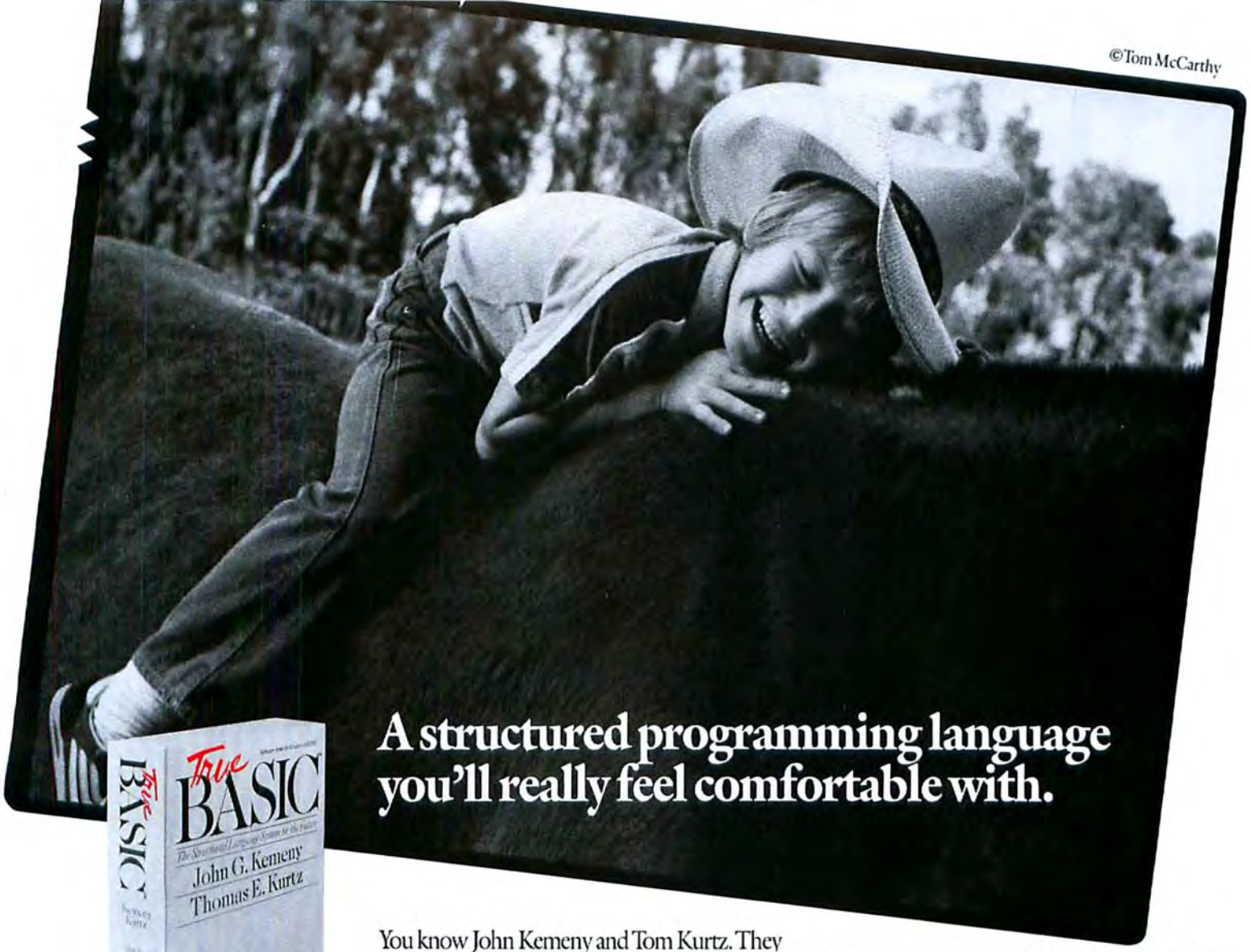
Charles Seiter *("Insights on ReadySetGo") is a chemistry professor turned computer writer who telecommutes from his woodland home in Willits, California. His published works include* The Skeptical Consumer's Guide to Used Computers, *from Ten Speed Press, and books on Pascal and computerized financial planning for Addison-Wesley.* □



A structured programming language you'll really feel comfortable with.

You know John Kemeny and Tom Kurtz. They developed the original BASIC. Now they're back with an even better version: a flexible, easy-to-use structured programming language they call True BASIC.™

True BASIC offers a full selection of control structures. External procedures can be compiled into libraries, making True BASIC faster and more powerful than any other programming language.

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Available for the IBM-PC™ and compatibles, Apple Macintosh,™ and Commodore Amiga.™

To order, talk to your local dealer or call (603) 643-3882 TODAY!

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☐ I'm ready to buy. Call me and tell me how.
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Circle 469 on reader service card

"Our goal was simple capable writing too mind saying, we've

Charles Simonyi, Chief Architect, Applications, Microsoft Corporation.

We weren't looking for incremental improvements. We were shooting for a quantum leap. Not a word processor but a *document* processor. A tool which would exceed every expectation and overwhelm every standard.

From now on, when people define what software should do for the production of documents, they'll point to this: Microsoft® Word Version 3.0 for the Apple® Macintosh.™

On Word, everything you need to structure a document is integrated into the program. Starting up front with the outliner. Followed by style sheets which you can quickly set up to standardize and recall the formats you use repeatedly. Then a built-in spelling checker proofreads for you when you're finished.

Because speed is of the essence, we made Word a rocket. It scrolls faster, saves faster. And you can't out-type it.

Because there's a big, diverse world out there, Word easily shares and automatically converts files created with the IBM® PC version of Word. And supports DCA protocols for exchanging formatted files with minis, mainframes, and dedicated word processors.

Finally, what you see on screen will look superb on paper. Word will set text next to graphics. And exploit the capabilities of laser printers beyond anything that has gone before.

But the most powerful feature of all is its accessibility. Word lets you run its menus in either Short or Full mode. The first, a concise, basic menu which gets new users producing instantly. The second, a comprehensive menu which taps into Word's vast capacities.

That's Word for the Macintosh. Not just the best word processor on any microcomputer, but the most effective tool of persuasion ever devised.

Microsoft Word is available for the IBM PC and compatibles and the Apple Macintosh.

Microsoft® For the name of the nearest Microsoft dealer or to upgrade to Version 3.0, call (800) 426-9400. In Washington State and Alaska, (206) 882-8088. In Canada, call (416) 673-7638.

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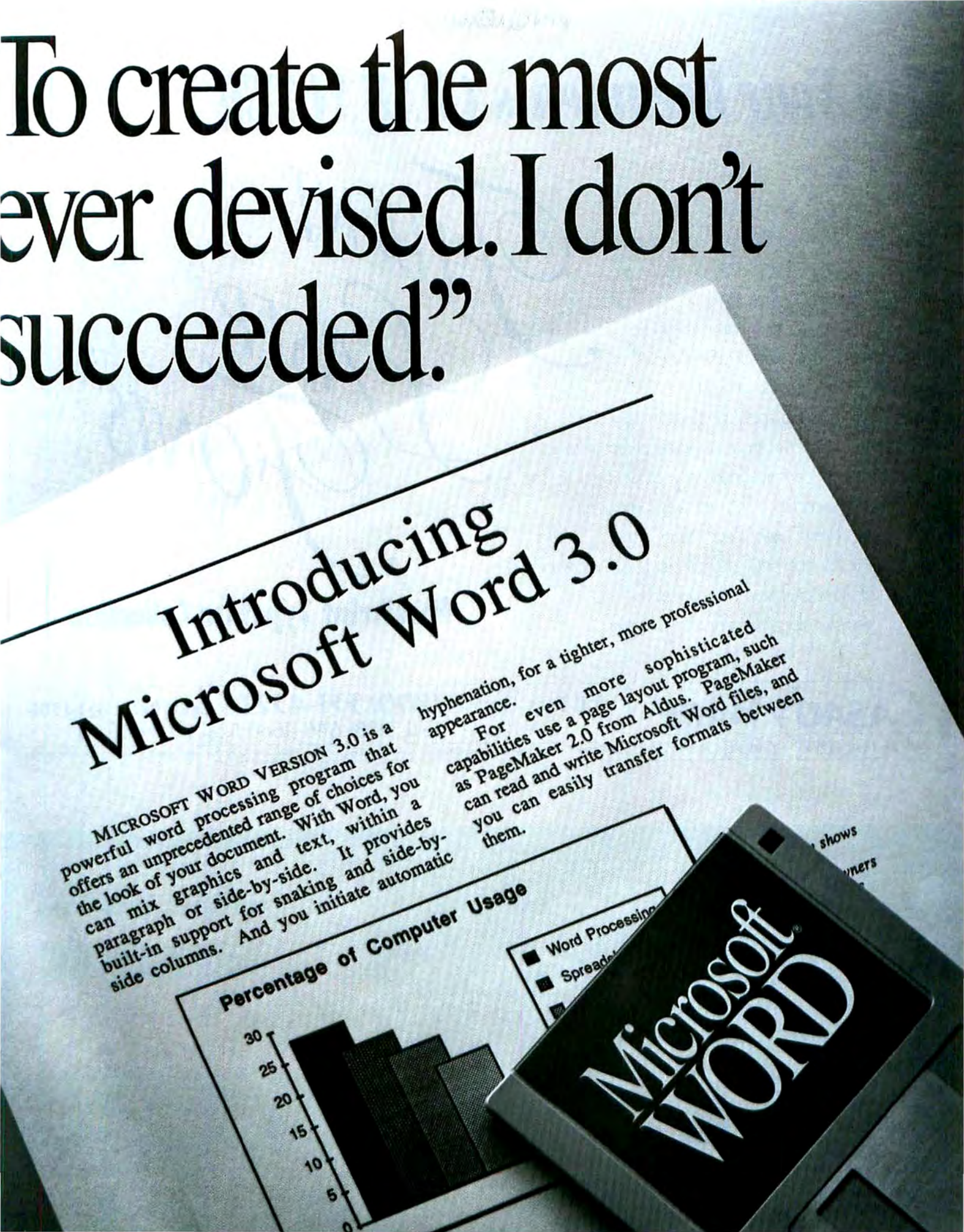
To create the most ever devised. I don't succeeded."

Introducing Microsoft Word 3.0

MICROSOFT WORD VERSION 3.0 is a powerful word processing program that offers an unprecedented range of choices for the look of your document. With Word, you can mix graphics and text, within a paragraph or side-by-side. It provides built-in support for snaking and side-by-side columns. And you initiate automatic hyphenation, for a tighter, more professional appearance.

For even more sophisticated capabilities use a page layout program, such as PageMaker 2.0 from Aldus. PageMaker can read and write Microsoft Word files, and you can easily transfer formats between them.



Give Your Documents CHARACTER

Fluent Laser Fonts provide a variety of typestyles to catch the eye and create an ambience for your message. Being high-quality PostScript® fonts, they can be printed at any size on the Apple® LaserWriter® or any other PostScript printer. There is no copy protection to cause problems or inconvenience, so installation is easy. Once installed, they automatically download to the printer when needed. This ad was prepared using Cricket Draw™ and PageMaker™, then printed on the Allied Linotronic™ 100P at 1270 dots per inch. Fifteen volumes of fonts are available. Call toll-free number for printed samples.

Fluent Laser Fonts™

PostScript Typeface Collection

CasadyWare
P. O. Box 223779 • Carmel, CA 93922

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Questions? Call (408) 646-4660 from 9-5 Pacific Time

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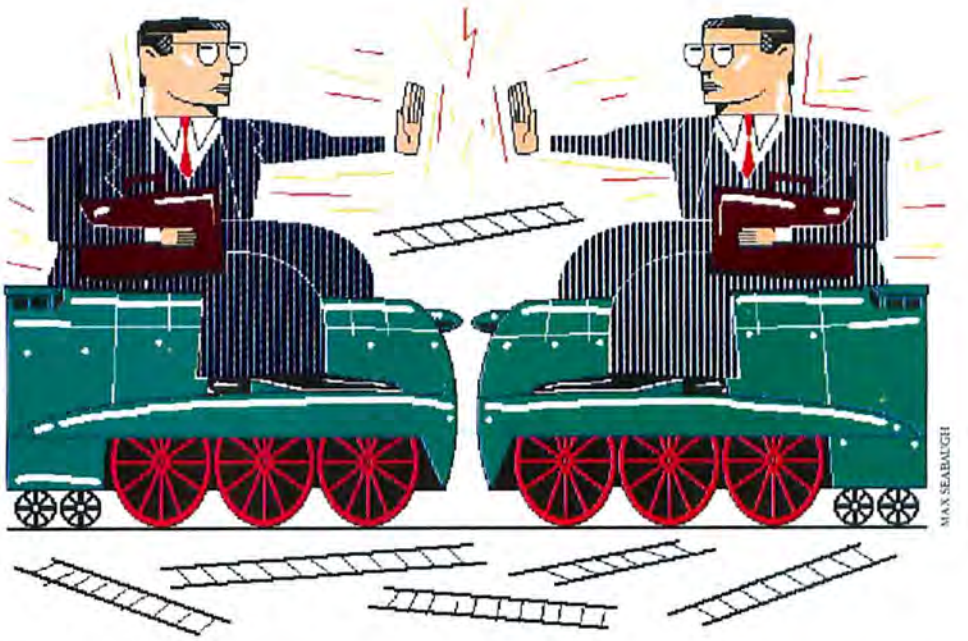
Steven Levy

What's the Deal with "Look and Feel"?

Copyright arguments are good for lawyers, not so good for users



The other day I rang up the chairman of a major Macintosh software developer. I told him I was researching a column on all the litigation (actual and threatened) concerning the degree of ownership a company can claim for what the user sees on his or her computer screen—what is known as the "look and feel" issue.

"Oh, God," he said. "You, too?"

Well, yeah. True, the issue has been chewed over considerably in the early months of 1987. That only reflects its importance, not just to the industry, but to the computer user. And in all the talk about who's suing whom and how copyright arcana might be applied in judicial decisions, the user's point of view has been as cynically treated as the hapless infant dubbed "Baby M" by some legal functionary in New Jersey. Those on both sides of the look and feel question—which is less a question of utility, jurisprudence, or creativity than it is of money, plain and simple—solemnly invoke the user as the ultimate beneficiary of their side's winning the day. If corporations keep control of their computer interfaces, users will be blessed with future innovations, sing those who favor liberal interpretation and strict enforcement of copyright. Opponents fighting for narrow interpretation and lenient enforcement of what constitutes a proprietary interface say quite the opposite: standards will emerge that will benefit the user.

The temptation is to look at both claimants and say, "One of these shysters is lying." But our legal system is based on the advocacy system, which encourages polar viewpoints. The claims of litigants are not so much direct movements toward truth as pas de deux in a careful choreography of terms that must be defined in a legal sense. Which bears only coincidental resemblance to real sense.

So instead of bemoaning the abuse of the user in the fight over who owns look and feel—or in any way trying to untangle the legal questions, a task for which I have no taste or expertise—I will simply discuss the issue from the user's perspective. Specifically, a Macintosh user.

PARC and Shop

First, some background. You might say this mess began in December 1979 when Steve Jobs, then chairman of Apple Computer, and a few of his employees took a tour of the nearby offices of the Xerox Coporation's Palo Alto Research Center (PARC). They took the tour with the permission of Xerox. At the time, Xerox owned about 3 percent of Apple, which was then a private corporation. (Xerox sold off its investment, worth about $1 million, in 1981.) The highlight of the tour was a look at Xerox technology, particularly the operating system of the Xerox Star computer, a machine more successful in reputation than in sales. This technology included a mouse, windows, icons, menus that magically appeared on screen when they were needed, and a bit-mapped display that allowed superb presentation of text on a crisp black-on-white screen. Steve Jobs was sufficiently impressed to take a few of those ideas back to Apple Computer and integrate them into the Lisa Computer, which Apple announced in January 1983. A year later came the Macintosh, which also utilized some of those concepts, in addition to other borrowings and some original ideas.

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Steven Levy

The Macintosh interface was a wonder to behold and use. Not only was it easy to learn, but once you learned it, you could apply your knowledge to virtually all the applications that ran on the Mac. Ideally, they all worked in a similar fashion, not only in the way they presented themselves on screen, but in the keyboard command shortcuts used to cut, paste, save, and quit. Software developers who did not take full advantage of the Macintosh's look and feel found themselves labeled pariahs. Case in point: Living Videotext's David Winer, whose *ThinkTank* program differed from most Macintosh programs and was criticized for its anomalies by Apple and by customers. (Eventually Winer came to see he was wrong, and his current flagship product, *More,* fits the interface like a glove.)

How important is this interface to users? Depends. If you use only one program and have no reason to use other computers, its ease of use will save you a little time and effort and help you master that program more quickly. But the real value comes in being able to transfer your expertise to other programs. While those mired in the relatively chaotic world of MS-DOS–by far the majority of PC users–face a dreary learning curve each time they pop a new shrink-wrap, Macintosh users expect to be up and running on new software in as little time as it takes to launch the program. Recently, perusing a book called *The Macintosh Bible* (Goldstein and Blair, 1987), I read about someone abandoning the powerful *OverVue* database because it uses nonstandard commands: specifically, a ⌘-Z does not mean Undo, but actually *does* something! I had also stopped using *OverVue* because it refuses to accommodate standard Mac procedure.

I am tempted to say that we Macintosh users are spoiled, but I think that term is misleading. We are not spoiled. We are the first group of computer users who are getting what we deserve.

You Can't Go Home Again

We deserve even more: to be able to walk up to any computer, regardless of manufacturer, and access its applications, open and close files, and–above all–understand what the program is doing. The Macintosh interface, or something that works on the same principles, could be the means by which this is accomplished. Indeed, we have seen systems which, at the

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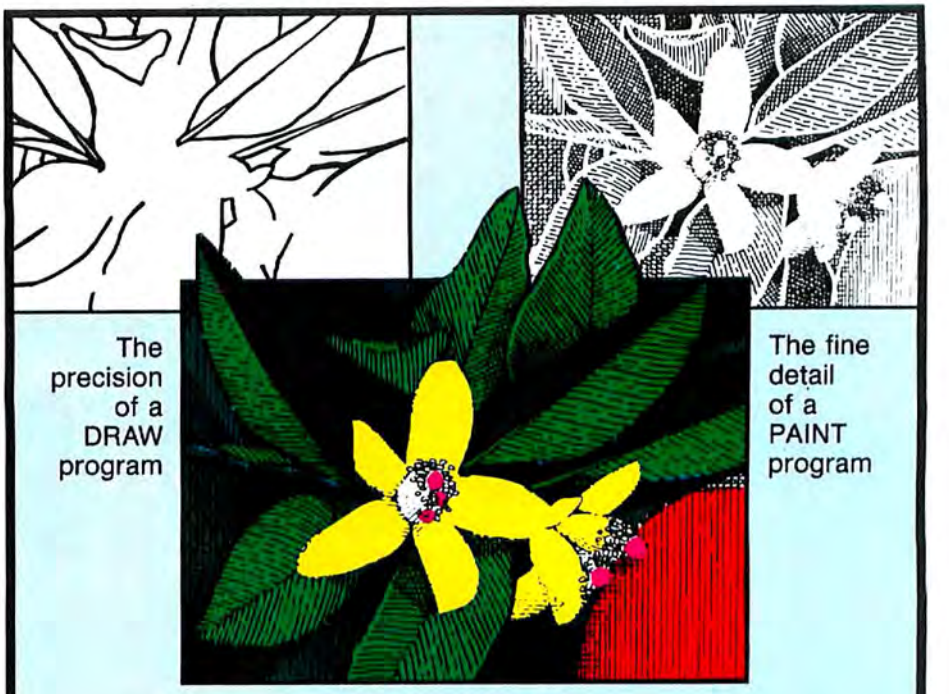

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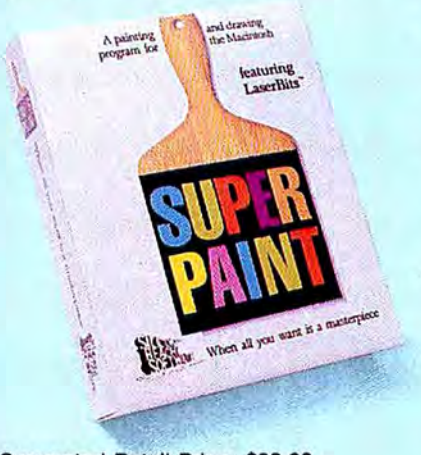

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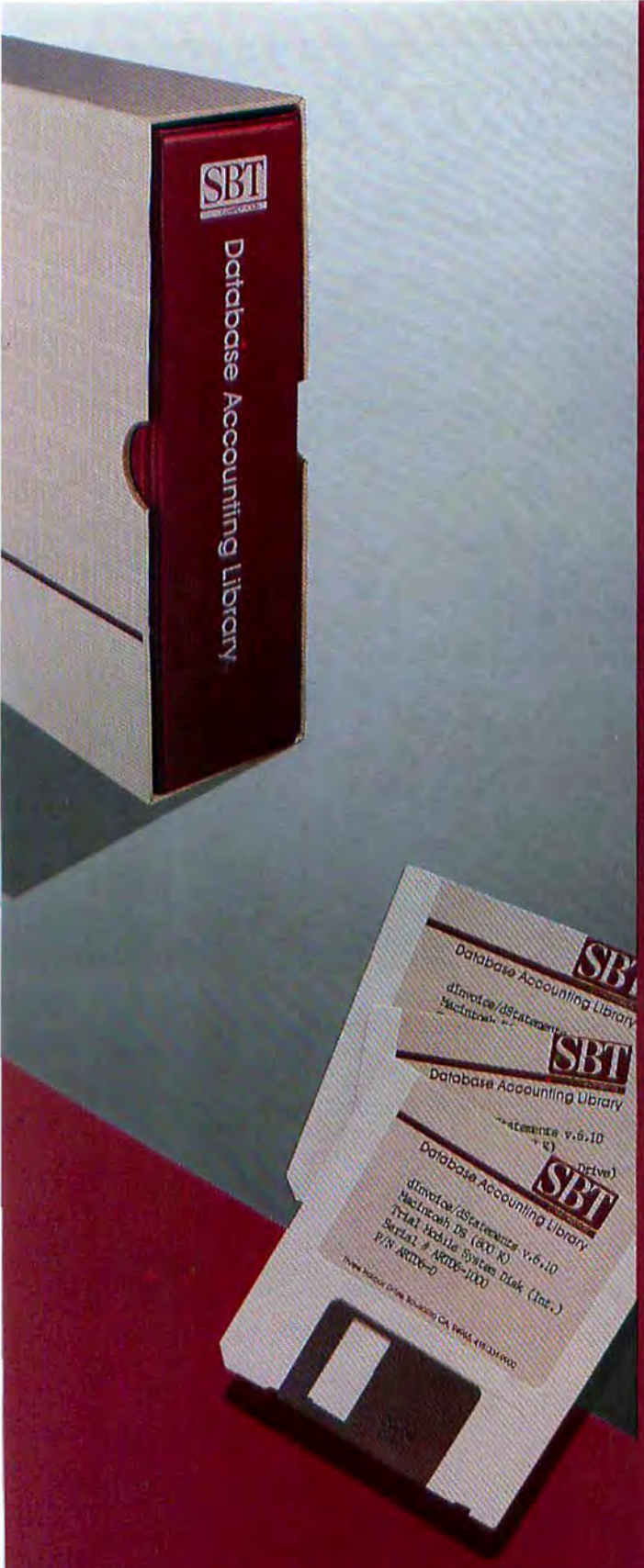

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very least, can make the Macintosh user feel at home while visiting the otherwise hostile world of IBM PCs and clones. I'm speaking of *GEM,* developed by Digital Research, *Microsoft Windows, X-Windows* from MIT, and *News,* developed by Sun Microsystems.

This similarity is fine for the user who wants to feel at home in a different location. But before we move in the furniture, Apple Computer is compelled to inform us that *it's not our house.* The interface is Apple's, and we lease it at their option. I won't bore you with the legal precedents that led to this claim's hard-won validity (if indeed its validity will ultimately be proven in the high courts of the land), but the current wisdom is as follows. No longer does a software copyright protect only the computer code in which the program is written; the copyright also covers what the program looks like on the screen and what it feels like to use. So if *GEM* and *Windows* look and feel like the Macintosh, they must be modified to look and feel like something else, or get Apple's OK, or leave the marketplace.

When Apple complained about *GEM,* its developer modified it until Apple agreed that its copyright was not infringed. (Some people opined that the changes were largely cosmetic, but no matter—Apple made its point.) In the case of *Windows,* Microsoft entered into a licensing agreement with Apple that avoided litigation. The full details of both agreements are confidential, which does little to clarify matters for others.

Saving Interface

Apple is not only within its rights to protect the copyright claim it has registered with the government (which I hear consists of a videotape of the Finder and perhaps an application or two), but as a public corporation and a developer of technology it owes its stockholders a vigorous protection of what the company owns. Those defending Apple go further, saying that if Apple's creativity in inventing the Macintosh interface were not rewarded, other companies would lose incentive to innovate, and we would all be poorer.

The other side says that the components of the Mac interface consist of ideas, not technology—and ideas are not subject to copyright. (Apple justifies its own use of

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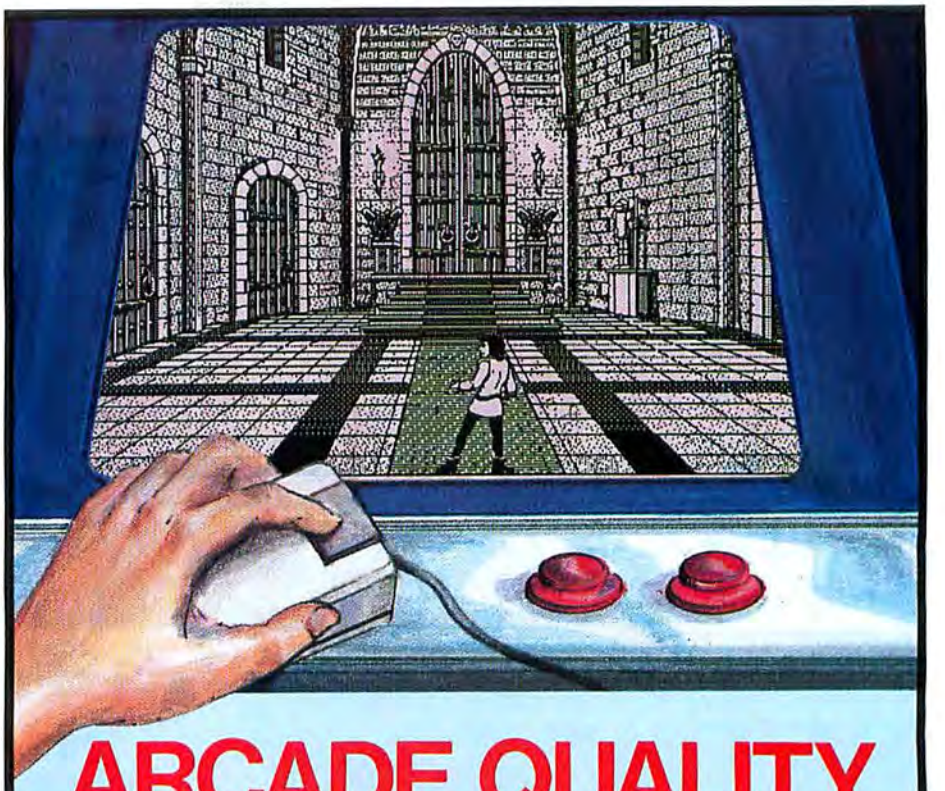

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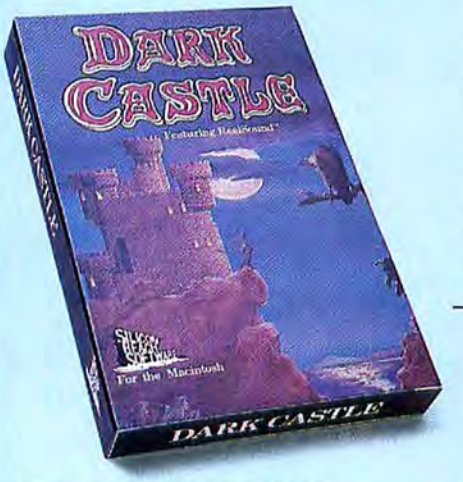

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certain Xerox Star features by calling them ideas and concepts, not proprietary technology.) Furthermore, some note that when Apple was first "evangelizing" companies to develop software using the Macintosh interface, little mention was made that the companies who followed Apple's advice would not own the look and feel of their own software–even in innovations made by the companies themselves.

Confusion is the byword. For instance, take a product like Aldus's *PageMaker*. On the Macintosh, it runs wonderfully. Recently Aldus released *PageMaker* in a *Microsoft Windows* version. To an untrained eye, it seems to have a lot in common with the Macintosh version, but those similarities, according to Aldus chairman Paul Brainerd, are protected from litigation because of Microsoft's license with Apple. An Apple spokesperson told me, however, that applications that look and feel like the Macintosh are not protected simply because they run under *Windows*. Only if the software is developed specifically for *Windows* is it protected.

See what I mean by confusing? And believe me, the more said about when a *Windows* application violates Apple's copyright, the worse it gets.

Similarly, Apple reserves the right to claim any innovation that developers create on software that uses the Macintosh interface. But Brainerd says *PageMaker*'s original features–like its Toolbox, a little grid of icons that call up functions when you click on them–belong to Aldus, and Aldus alone. "We came up with original innovations, and we consider them proprietary," he says. "We have a *PageMaker* user interface. We have filed for our own visual copyright."

Apple's response to this kind of conflict is that some things are ultimately a matter of interpretation, and the company feels confident that its claims would be substantiated in court.

Nobody really thinks that Apple is going to haul Aldus, one of its most valued developers, into court. And some people have guessed that Apple's warnings to applications developers are mostly saber rattling, trying to stop the flow of Macintosh's superior software base into the enemy camp. (In practice, Apple says it will give its developers guidance on how to avoid abusing copyright.) But Paul Brainerd notes

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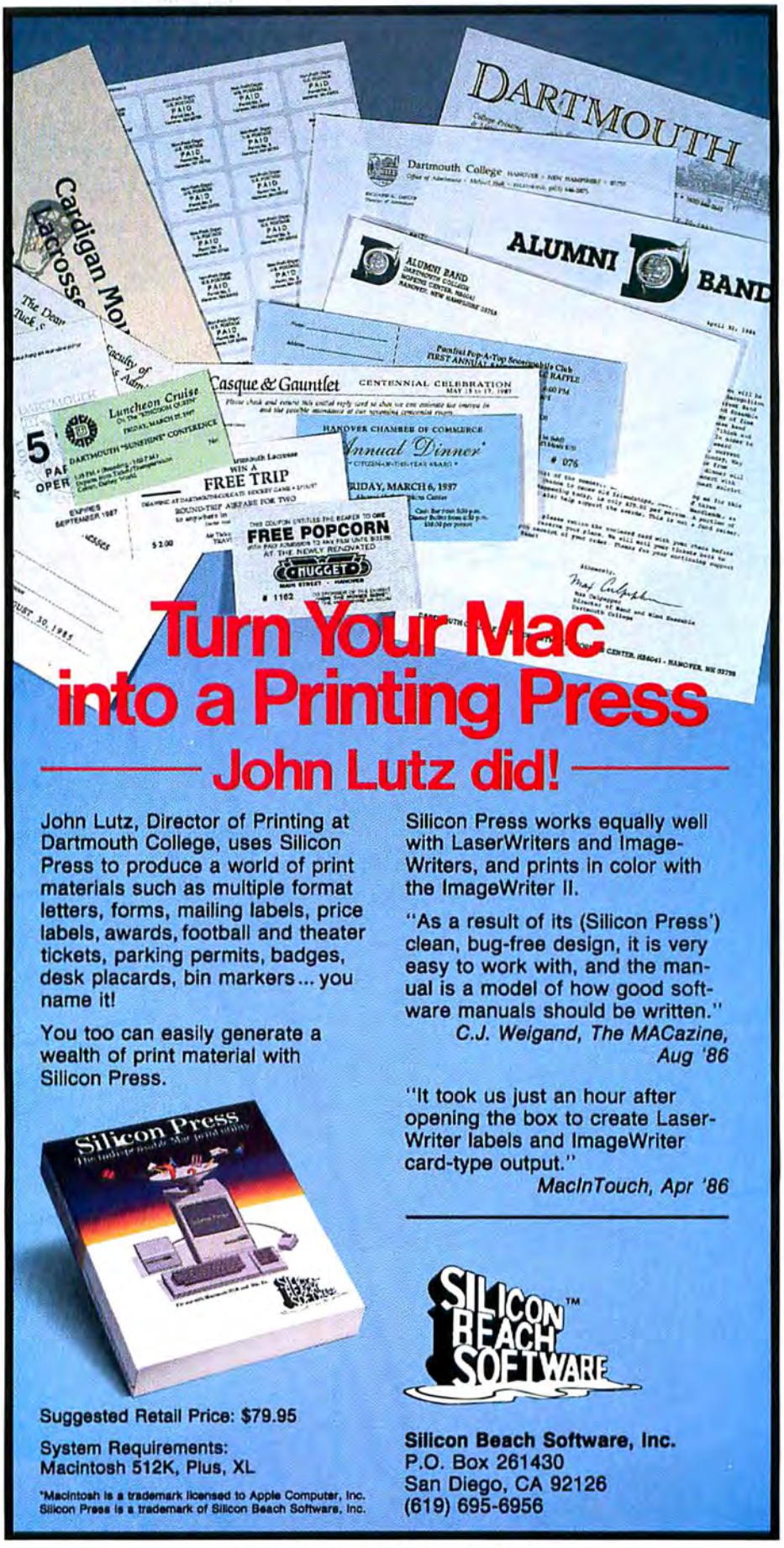

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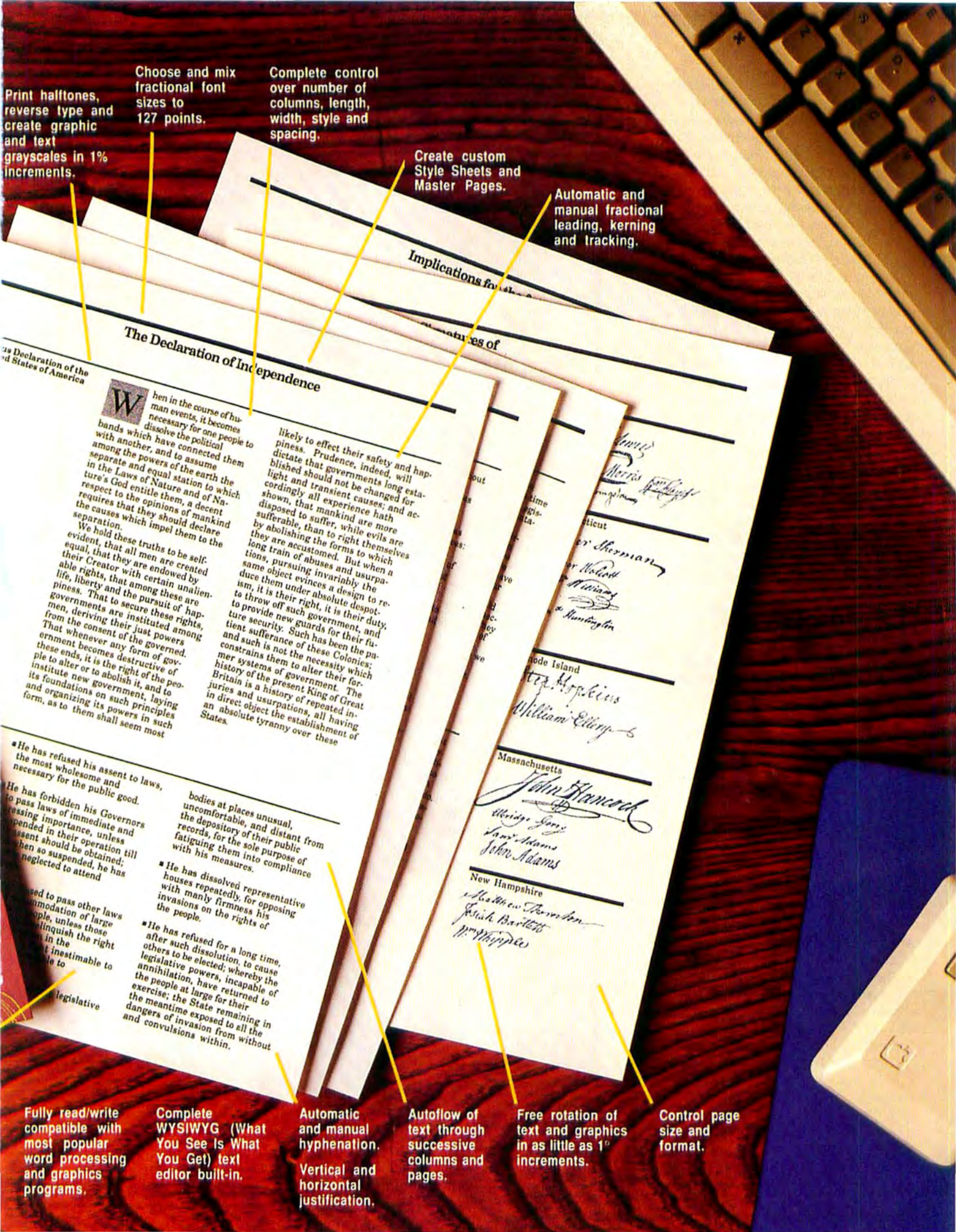
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dryly that, "It would be counter-productive to stop us. [By taking our software into the other market] we're building bridges—exactly what John Sculley suggests is a good idea."

From a user's point of view, building those bridges is essential. Now that we have Macintoshes that accept boards that run IBM and clone software, it's time to make sure we don't have to confront Software From Hell each time we leave the Mac environment. Even those who use only the Macintosh have a stake in this issue. If Apple decides to play hardball with its interface, some developers might decide that working the Mac software market is not worth the trouble; they might opt instead to write software for computers that utilize the powerful Intel 80386 chip. Or if they do write software for the Macintosh, they might intentionally not follow the interface, to be free to port their software to other environments later.

There is a more nightmarish scenario. A Xerox spokesperson says that his company is "watching" the continuing litigation on the look and feel issue. Just watching as an interested party, that's all. No indication that Xerox's observations could lead to legal action. But while the possibility seems remote, it is not inconceivable that at some point Xerox might decide to challenge Apple by claiming that the Mac interface not only borrowed ideas and concepts from the Star (kosher), but the look and feel as well (verboten). If there were even a slight chance of losing that suit, Apple executives would probably wish they had never heard of look and feel.

Is this Any Way to Run a Railroad?

By learning the Macintosh interface, we climb aboard locomotives that run best on a certain gauge of track. The more track laid in that gauge, the more places we can go. If somebody puts limits on how much track can be set and restricts its destinations, our locomotive is worth that much less. Instead of a green light, we may encounter warning signals.

There's something wrong with a railroad when the signalmen wear three-piece suits and carry briefcases full of motions and countermotions. Living Videotext's Dave Winer puts it well when he says, "I don't want to spend my time suing and being sued. I'd rather spend my time being competitive."

We will never know what might have been created if the energy from all this legal wrangling had been channeled instead into making greater products. But we do know that a comprehensible interface allows us to create more and to use more varied and complex software, and encourages us to be our best. The universal interface we all yearn for will come much more slowly—or not at all—if companies dole out their best effort only to those who pay for it; yet the benefits that could come from that ideal interface surely would bring more prosperity to all in the computer industry. And if that interface has the look and feel of the Macintosh, how could that possibly work to the detriment of Apple, which has designed its computers to utilize that environment to the maximum?

I sense a crisis waiting to be dispelled by common sense. Is this too much to expect in an industry that is, after all, founded on logic? □

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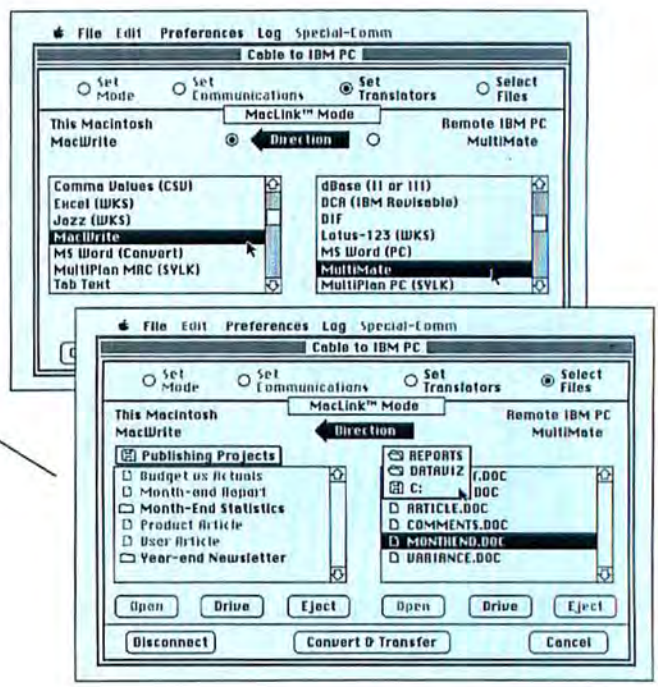

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Circle 281 on reader service card

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Cabinet becomes platform for Laserwriter. Holds disks, manuals, and a full carton of paper.

One table fits all

The new MacTable fits every Mac made, be it 128, 512, Plus, SE, or the Macintosh II.

It has a place for everything. Hard disk, second drive, modem, keyboard, mouse, Imagewriter, and Laserwriter. Plus a carton of paper. Yet even with a full complement of gear, there's room to spread out for serious work.

Every surface interchangable

Each of MacTable's four surfaces can be independently tilted — and interchanged! You can even make it right or left handed. So it accommodates any peripheral you'll ever have at comfortable working and viewing angles.

Stands the test of time

MacTable is meticulously built in Denmark, by craftsmen using pure beechwood and durable laminates. Its new, sturdier design and quality materials support even the heaviest equipment. And MacTable is now a new color: Platinum Gray, same as the new Macintosh line.

...again.

Interchangeable surfaces offer configurations for every size Mac.

Improved roll-away cabinet

The new free-standing cabinet (optional) is big enough to use as a stand for your Laserwriter or CPU. It features easy-glide casters, space for full-size binders, and a special place in the locking drawer that holds over 100 disks upright and secure.

New lower price

The new MacTable also has a new price. Just $269. Add the sturdy, matching cabinet for $129 more (all prices plus shipping and handling). And if you're not satisfied with MacTable for any reason, return it for a prompt refund (less shipping).

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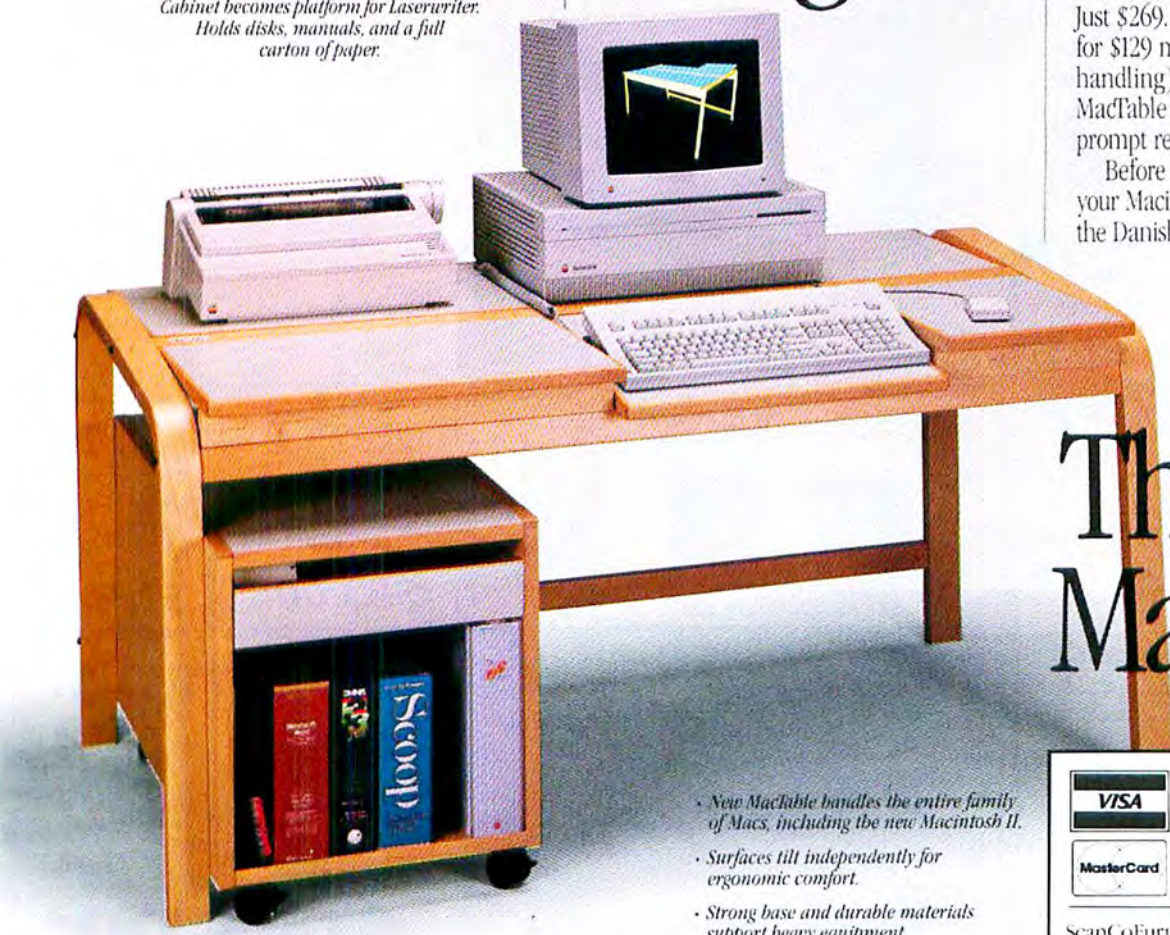

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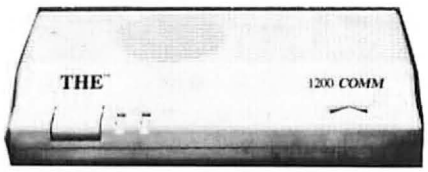

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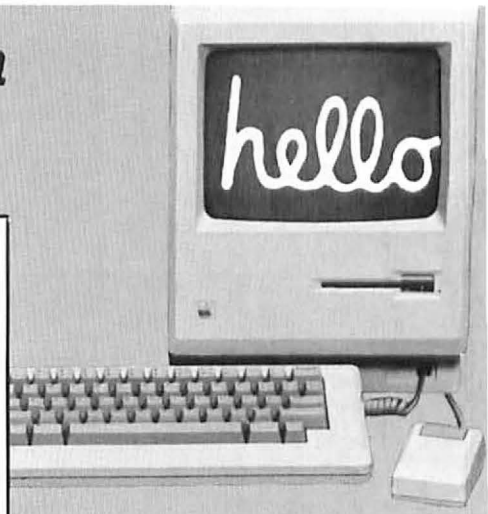

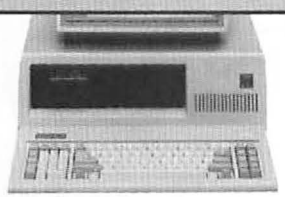

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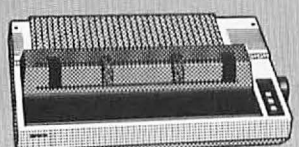

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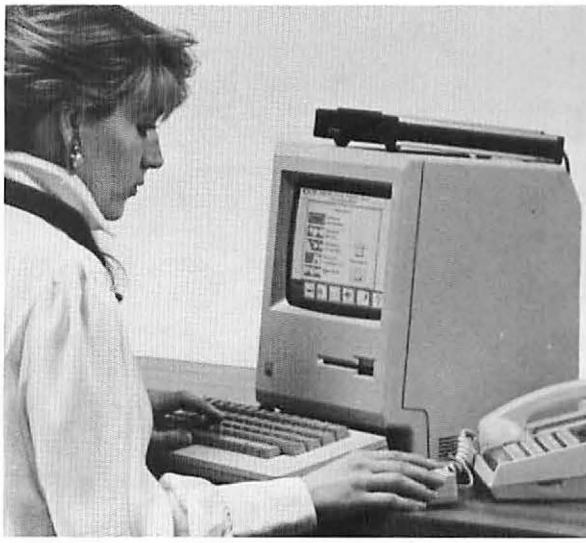

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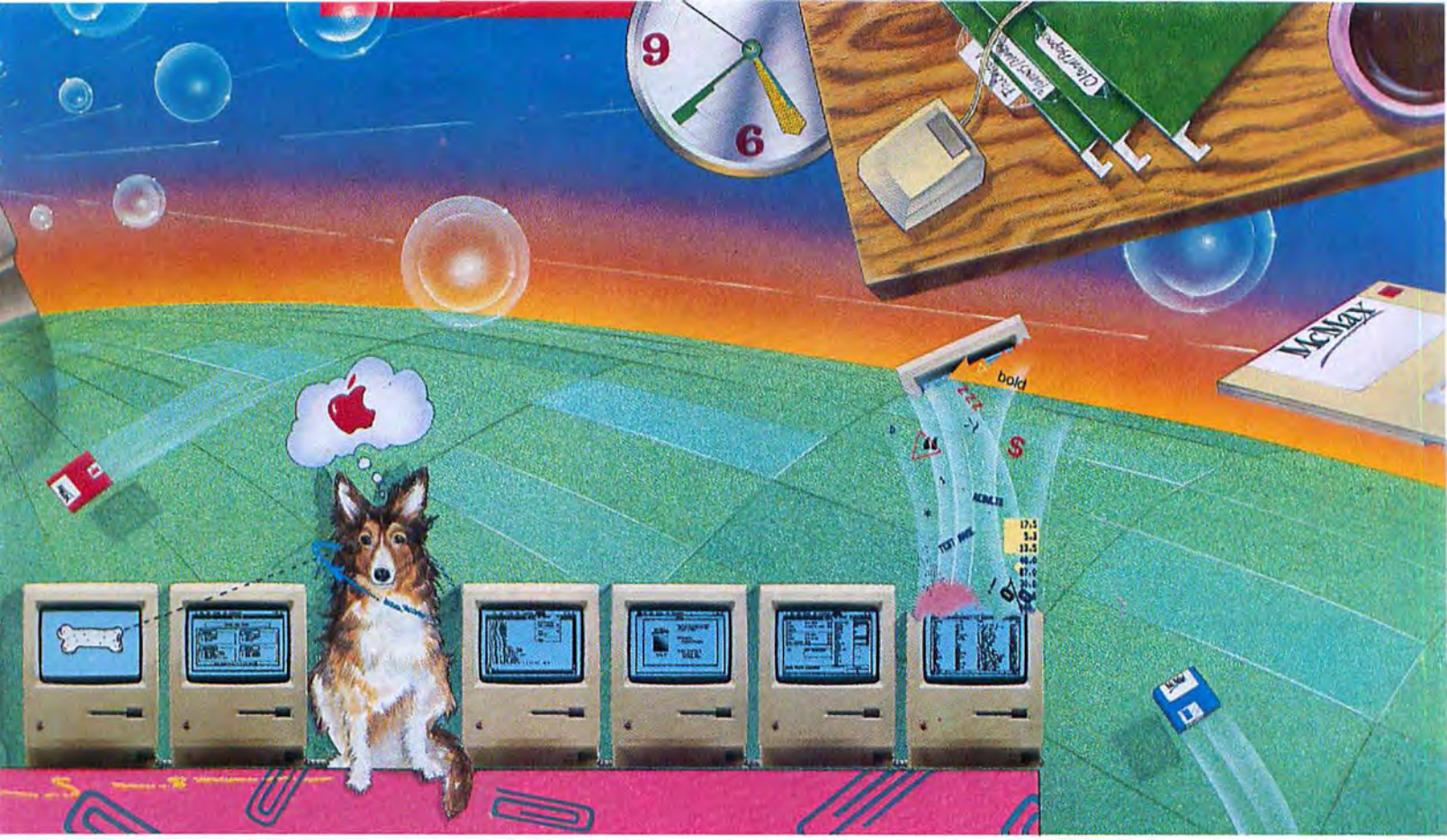

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Verbatim

An interview with Larry Tesler, Apple Computer's vice president for advanced technology

Larry Tesler heads Apple Computer's research and development wing. And he's eminently qualified to do so, having worked for seven years at the Xerox Palo Alto Research Center (PARC), which was a hotbed of personal computer experimentation back before Apple got off the ground. At PARC, working with others who had done computer research at SRI under Douglas Engelbart, Tesler contributed to the creation of pop-up menus—the predecessors of the menus we've grown accustomed to on the Mac. Tesler joined Apple in 1980 and helped design the Lisa computer, the company's first product with the familiar black-on-white display built around the same desktop metaphor used in the Macintosh.

What does the advanced technology group do?

We are the technology investigation group at Apple. Engineering is divided into two parts, advanced technology and product development. Product development ships products and develops new products primarily as an evolution of previous products, whereas advanced technology doesn't ship products. We do technology studies, prototypes of ideas; we're concerned with standards, standards organizations, and the future directions of Apple technologies and architectures. We also conduct a small amount of basic research.

How does the advanced technology group compare with the IBM Watson Research Center or the AT&T Bell Labs?

Our group is not a research lab. We do some work that could be published in refereed journals, but not much. We do little work in basic technology—for example, nothing in semiconductor materials or compiling techniques. We are oriented to the application of advanced technology to products.

At what point will Apple create a research laboratory?

At some point we will be large enough for our own research laboratory. It will arrive gradually over the next few years—when revenues are several times higher than now.

Some high-tech companies measure technical achievement by the number of patents they hold. What is the rate of patent development at Apple?

In the past Apple had few patents, but our rate of applying for patents is increasing rapidly. The feeling is shifting here, from an emphasis on getting products out fast to an emphasis on inventing things along the way. It's a move toward new and unique developments to give our products more differentiation. Part of this is the ability to work over a longer time frame. We were working with six months to a year when I came to Apple. Big projects requiring, say, four years stretched our resources and the patience of people. Now we have several projects three, five, and ten years away from results. The company has grown so that we can afford to do this.

As observers of technology, many of us wonder how Apple can differentiate its products given its ties to standard microprocessors such as the 68020 and 68030.

The answer lies in the Mac II. It has the same CPU as several other computers, yet the Mac II differs from them. First, it costs somewhat less; second, it has a "plug and play" expansion bus; third, it has the unique Apple user interface and the Toolbox. Then we have the exceptionally high quality graphics developed through custom silicon technology and all of our existing software to back this up.

Plus AppleTalk and SCSI. These aren't on a different level from what other companies can do, but most haven't developed these technologies.

Here is our pattern for the future: to use off-the-shelf parts and follow standards in some of the design of a system, but to include important proprietary technology in other places. This strategy doesn't just make it harder for possible competitors but gives our products an advantage over commonly available alternatives. So different is better, not just proprietary.

(continues)

PHOTOGRAPHS BY WILL MOSGROVE

Jasmine has the drive

80 MB Direct Drive
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The Direct Drive 80™

A true performance breakthrough! This sleek drive designed by Quantum blazes away with an amazing 26 millisecond access time. It features error correction and media defect handling to ensure long life and perfect performance. This drive is so intelligent it constantly scans and locates any defective sectors and locks them out... automatically. We're so confident about the superiority of this drive that we offer a full 2-year warranty for only $100 additional. It fits into the same slim case as the others in the Direct Drive series.

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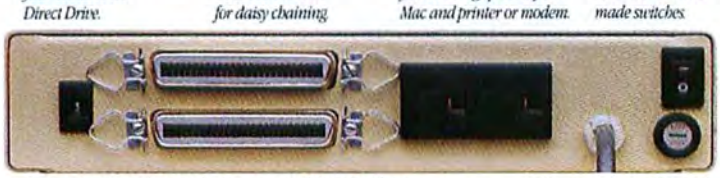

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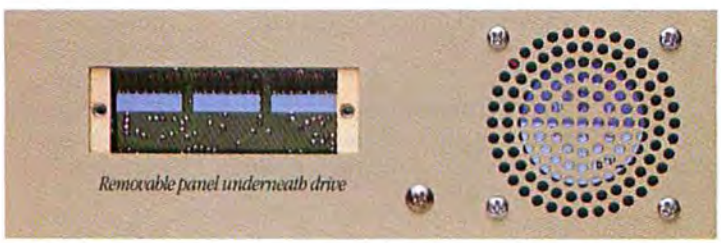

To add three or more SCSI devices, some small plugs called terminating resistors must be removed from the middle units. Jasmine designed this small panel so you never need to play technician and open our box.

Our ultra quiet fan pulls air through the drive and sends it out the bottom.

Exclusively Jasmine

- adds shock absorbers that protect your drive.
- adds two switched AC outlets at no extra charge.
- includes full 3-way electronic surge protection.
- features the original SCSI select switch that allows you to add another drive or tape backup with the push of a button.
- never requires you to open the box to daisy chain multiple drives.
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No SCSI Port? Try JasPort™ Jasmine's $129 solution

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Training costs little on our product, which lowers the barrier for entry to new categories of users.

How do you distinguish between Apple's windowing and the growth of other industry standards for workstation windowing software: *X-Windows, Microsoft Windows,* and *News?*

There are many windowing concepts out there based on work at Xerox PARC, but the details and expressions differ considerably. We think our particular expression of that concept is unique and attractive to many of our customers.

There are two aspects, power and "look and feel." No question, other machines have similar power; the difference is in the look and feel. If *Macworld* has articles as good as other publications, but doesn't have aesthetics to match, then it won't sell as well as other magazines. On the other side, having been in the market longer and having all the third parties working with us gives us a lead.

Could you define what differentiates the Mac's window system?

Apple doesn't merely have a window system; it has a user interface that's consistent across all Mac applications, supported by the user interface Toolbox, and built into ROM. That includes a window manager and aspects of the interface such as the menu manager, graphics, resources manager, and dialog manager. And a style of programming that gives the user a feeling of directly manipulating objects, seen on large expanses of flat space that can be scrolled through windows and printed on paper as they appear on the screen.

If I were in a company evaluating what kind of workstation to acquire, how could I choose between an IBM RT, a Mac II, an Apollo, and a Sun 140?

I would say consider the Mac II if you're selecting a first machine, or if you're not satisfied with the software available on the others, or if you want the power of a full 32-bit workstation for a new category of workers. For example, if you've had people designing printed circuit boards on workstations before, and you want to add people analyzing telemetry data who have been sharing a supermini.

Training costs little on our product, which lowers the barrier for entry to new categories of users. The Mac II takes advantage of a large number of applications, and it has monochrome or color displays as

(continues)

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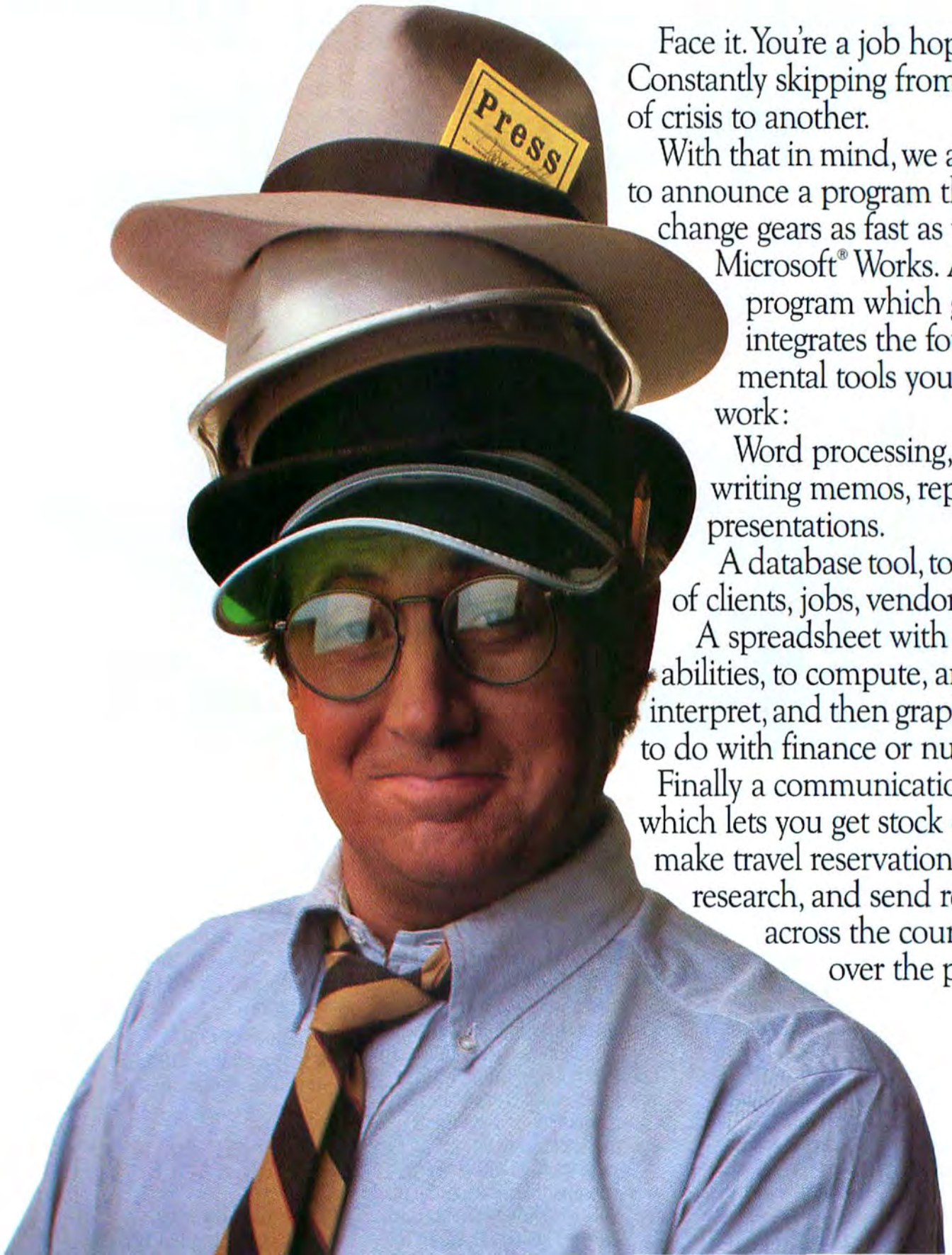

Face it. You're a job hopper. Constantly skipping from one kind of crisis to another.

With that in mind, we are pleased to announce a program that can change gears as fast as you do: Microsoft® Works. A one disk program which gracefully integrates the four fundamental tools you need at work:

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A database tool, to keep track of clients, jobs, vendors.

A spreadsheet with charting abilities, to compute, analyze, interpret, and then graph anything to do with finance or numbers.

Finally a communications tool which lets you get stock quotes, make travel reservations, do research, and send reports across the country, right over the phone lines.

for you to change jobs.

Microsoft Works lets you juggle all these jobs, move swiftly and easily between them, while transferring and combining their information as you please. Because you do all these jobs with one, easy to learn, totally integrated program.

Quick study. Quick change.

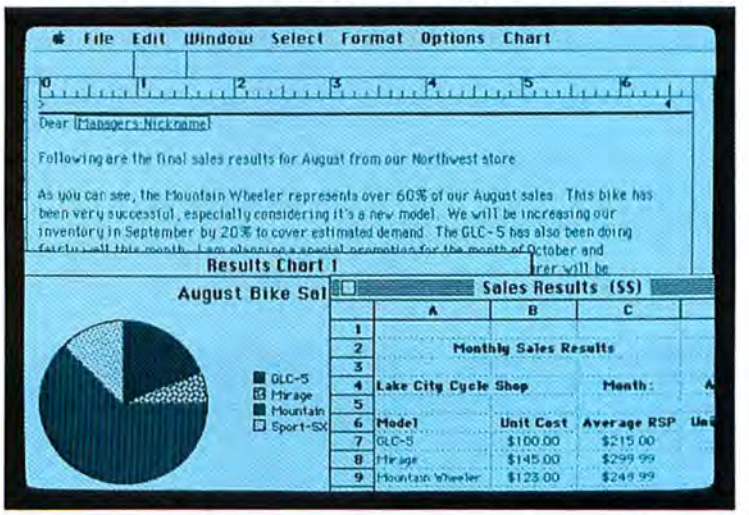
The first job is the easiest. Learning to use Microsoft Works.

It's a snap. The overall program and each tool within runs Macintosh™ style. Which, as you probably know, is a natural, common sense, point-at-what-you-want system.

And Microsoft Works is seamlessly melded together. You can have all four tools on screen at once. Jump instantly from one to another. And later combine work done in each part of the program on a single printed page.

This easy exchange of data makes jobs go faster and easier. One practical example being mass mailings of form letters where you need to combine names from the database with text written in the word processor.

All in all, Microsoft Works is a superb solution for day to day, get-it-done problems. An inspiring display of convenience, efficiency, and utility.



And, of course, it's a product of Microsoft, the preeminent developer of programs for the Macintosh. Which is not a claim, it's a fact.

If you're in a business that won't let you stick to one thing, check out Microsoft Works. The program that can change jobs as fast as you do.

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Performance increases by a factor of three or four every two years.

well as easy-to-use communications packages for accessing other CPUs. These features make the machine very attractive. Other workstations offer higher performance, but our line of peripherals is broader and less expensive. And you can expand a Mac II network to more bandwidth as your needs grow—to fiber optics or Ethernet.

There are products such as the MI-4 from Mechanical Intelligence that provide 7 to 10 million instructions per second (mips) of computing on a Mac today—that's more power than a VAX 11/7800. What's next?

I haven't seen the MI-4 card yet. Performance increases by a factor of three or four every two years. The Prodigy from Levco has been running at about 2.5 mips for over a year, and you say that there is currently a Mac that can run at 10 mips. I think that over the next two years Macs will run even faster.

How fast can we make the Mac II? Could it become a "Cray on a desktop" in the near future?

There are three things to consider in such a question: the compute speed, the RAM size, and the I/O throughput. Speed is the easiest to define, comparing it with processing speed on other microcomputers and on minicomputers. Memory is tough only if the machine is a small box. Throughput is the toughest issue.

Okay, with how much RAM can you configure the Mac II?

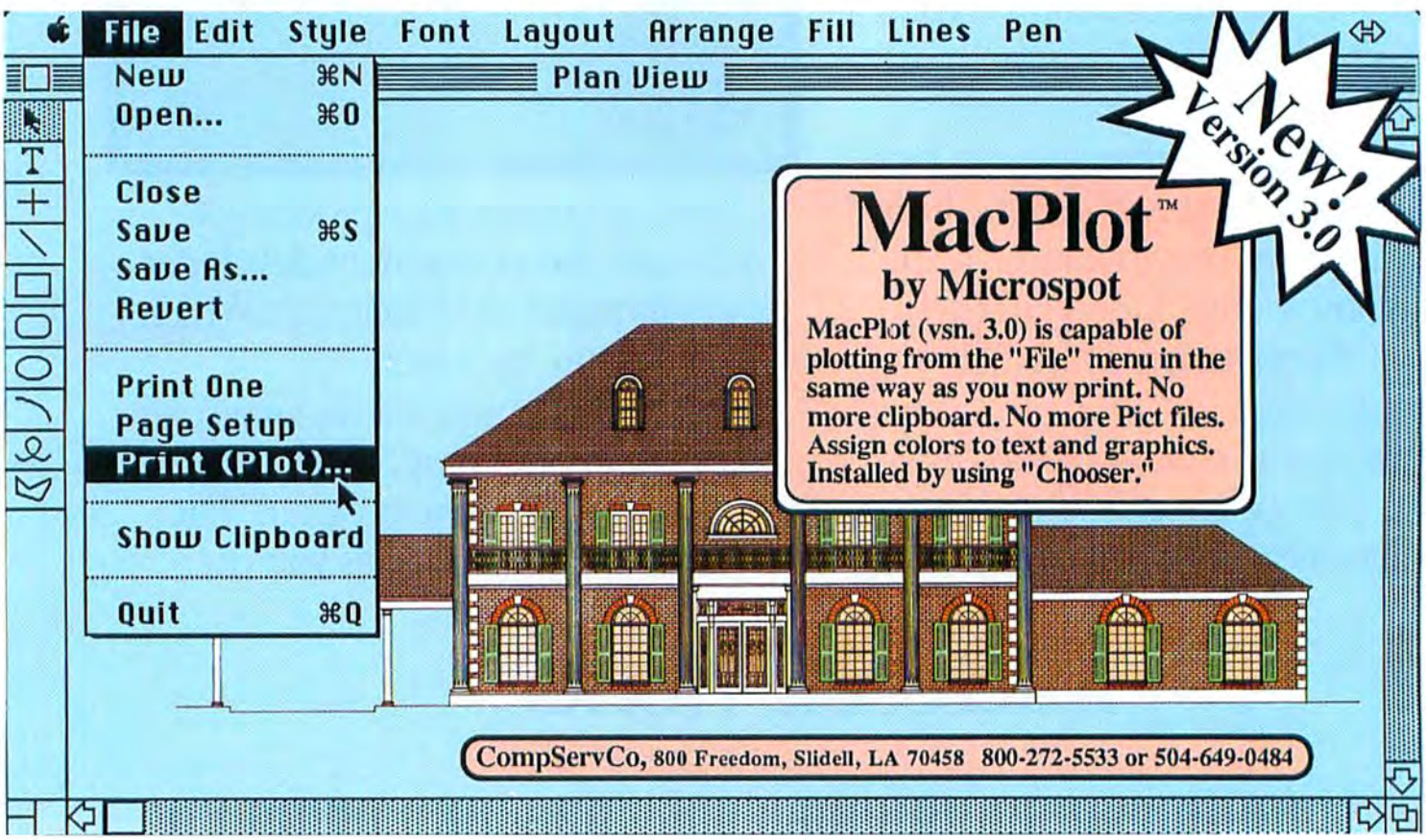
That depends on the size of the RAM chip. With 1-megabit chips you can go to 8 megabytes on the main board, and with 4-megabit chips, up to 32 megabytes. Using NuBus cards, you could go as far as 4 gigabytes some day.

Why would the NuBus be a bottleneck at Cray speeds?

There is a 10-MHz bandwidth limitation across the 32-bit channel, so there is a physical limit of 40 megabytes per second throughput. But the effective rate, given activities such as bus arbitration, is less.

The hyperchannel on the Cray, with cables as thick as your arms, has a throughput of 100MB per second. And the Cray can accept that amount of data. The

(continues)



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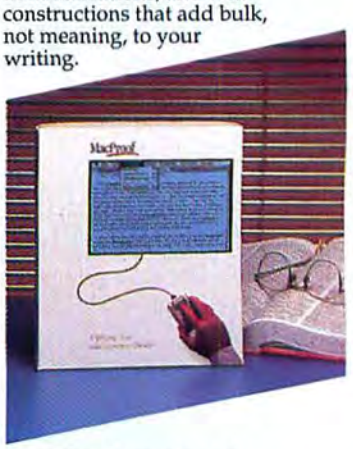

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Works w/512K, 512E, Mac Plus,SE & II; requires HFS Hard Drive

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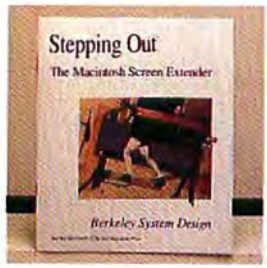
Requires SCSI port



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From Berkeley System Design

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This unique software gives you the advantages of a full-screen display on a regular Mac screen — at a fraction of the cost. Select your screen size, then magnify or reduce the image with simple keystrokes. To access your "large screen," just move your mouse to the edge of the screen and watch the image "slide" to reveal the hidden areas of your document. Especially good for creating enlarged screen shots or working with page-layout and graphics programs.

Works w/512K, 512E, Mac Plus & SE

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Works w/512K or Mac Plus; requires 5-meg cartridge; cable included

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Requires Mac Plus-to-Modem Cable

Neos Mouse

From Neos

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This mouse represents a natural evolution in mouse technology. It's designed with a reverse-tapered shape that fits your hand without tiring your wrist. Teflon pads combine with a slightly higher cursor ratio for a free-moving, smooth feel that lets you get around the screen faster. Buttons actuate true micro-switches (not stamped-metal springs) to give you the tactile feedback of a distinct "click."

You'll work faster, more surely with the Neos Mouse.

Not compatible with Mac SE & II

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From FactFinder Software

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Works w/128K, 512K, 512E, Mac Plus & SE

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From Network Specialties

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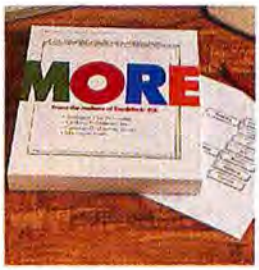

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Well-written UNIX applications will be easy to convert to the Mac.

Mac II is a different kind of computer; the Cray has huge disks, different I/O organization. The two are not analogous.

What are the first developments for the Mac II that will lead to these higher capacities?

We'll see the same type of add-ons as with the IBM PC: coprocessors, high-speed digitizers, graphics processors, array processors, specialized accelerators for jobs such as fast Fourier transforms (for image processing).

UNIX was shown in March at the AppleWorld show in Los Angeles. When will it be ready?

About midyear 1987.

What's UNIX all about?

I expect that current users of UNIX applications will be attracted to Apple's hardware platform by the features of the UNIX we are developing and by our version's ability to use existing applications. But there will be more applications on the Mac operating system and Toolbox than on the new UNIX part of the system.

Will Mac applications be hard to convert to UNIX?

No. Well-written applications will be easy to convert.

Some confusion exists about the two versions of the Motorola memory management chip—PMMU (paged memory management unit) and HMMU (H memory management unit)—in the Mac II. Can you distinguish between the two?

The HMMU allows the Mac operating system and Mac applications to run on the Mac II, but not UNIX, which requires the PMMU. The HMMU supports a single address space up to 16MB when running old Mac applications, or up to 4 gigabytes when running new applications; UNIX requires multiple-address spaces of variable size—one space per process. The PMMU will be available when Apple ships UNIX. UNIX will be shipped on tape (requiring Apple's tape drive) and will require the PMMU.

How much memory will be required on the digital board of the Mac II to run UNIX?

Two megabytes minimum, four recommended. UNIX will run on the 40MB hard disk, but software developers will want 80MB.

When will we have multitasking on the Mac?

As soon as UNIX ships on the Mac II. Also, the new Finder for the Mac II has unprotected multitasking—that is, in computer jargon, it allows "multiprogramming." Many programs will run on the same machine, and you will be able to switch between them with a mouse click. You will be able to run some programs in the background. But it's not so easy to program for that, so only certain things will run in the background, for example printing, lengthy calculations, telecommunications. Few existing applications can run in the background because they require user interaction. Think of *MacPaint;* if you don't interact with the program, it does nothing.

The unprotected aspect also causes some concern. If the programs are not hardware protected, then one program could write into the memory of another. If you run six applications at once, for example, you could crash the memory dedicated to one of them, as sometimes happens with *Switcher,* but that isn't common. I don't want to confuse that with hard disk crashes—they're not likely. This kind of crash would only affect the RAM space dedicated to a program.

(continues)

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512K - 1024K	159.00	512K - 1024K	159.00
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68020	495.00	4MB Hyper.	1199.00

180 Day Warranty on all Upgrades.
Over 3200 Upgrades Completed.

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Sony SS Bulk	.99	Fuji SS Boxed	1.06
Sony DS Bulk	1.34	Fuji DS Boxed	1.45

Ordering Information
Call 1-800-MAC-DISK, or 1-800-2MAC-TEX for Texas residents. Our hours are 8am-6pm CST. $40 minimum on all orders. Visa, MasterCard C.O.D., PO's, Checks. Texas residents please add 7 1/4% sales tax. Prices are subject to change. Items are subject to availability. Returns may be subject to a restocking fee.

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Circle 456 on reader service card

If we say no to ideas due to time constraints, or risk, or work load, that turns people off; they stop generating ideas.

The future of multitasking in the Mac operating system depends on the PMMU chip. When it's available at a lower cost we can protect programs from one another. There is no announced schedule for that.

What are your goals for new Macs in broad terms?

Better graphics, more speed, easier software development, bridges to video and other technologies.

When will optical disks be practical for Macs?

Magnetic disks are horizontal media: if you have a computer, you need one. Optical media are vertical; it depends upon your application whether or not you need it. For example, in a library, CD ROM is important. For training, videodisk is important—you need massive amounts of text in combination with still images and video.

Questions continue to arise about Apple's hardware reliability, especially in relation to the analog boards that contain the video and power supply cards. Will this improve?

Macs have a very high reliability and a high mean time between failures, but there are weak links, as in every system. The power supply is one, partially because of the various ways it's loaded down with upgrades. This has been a major concern in designing the Mac II and the SE, and changes in this area have improved the Mac Plus. We expect problems with power supplies to continue to diminish.

Statistically the number of power-supply failures is very low, especially compared to personal computers in general. We run into trouble when people have added memory upgrades or large screens, more so when the machine in question was originally a 512K Mac.

You spent several years at Xerox PARC?

I worked there from 1973 till 1980, on user interface design and testing, text editing, page layout, development tools, and a transportable multiprocessor computer.

Why did you leave?

A lot of people began to leave in 1979-80, and by 1981-82 it had become a mass exodus. I was getting tired and wanted to do something else, and I saw opportunities elsewhere. A lot of people did the same and founded many companies in the Valley: Convergent Technologies, Grid, 3Com, and many others. They left to make something of PARC technology. Others went to universities. Many left out of general frustration with Xerox's inability to turn the dreams that they let us create into products. When we had opportunities to go to other places to make them happen, we did.

Is PARC still the same?

I have a sense that it is being reborn. It is still a center for computer science research. The question remains whether Xerox can make PARC relate to its business.

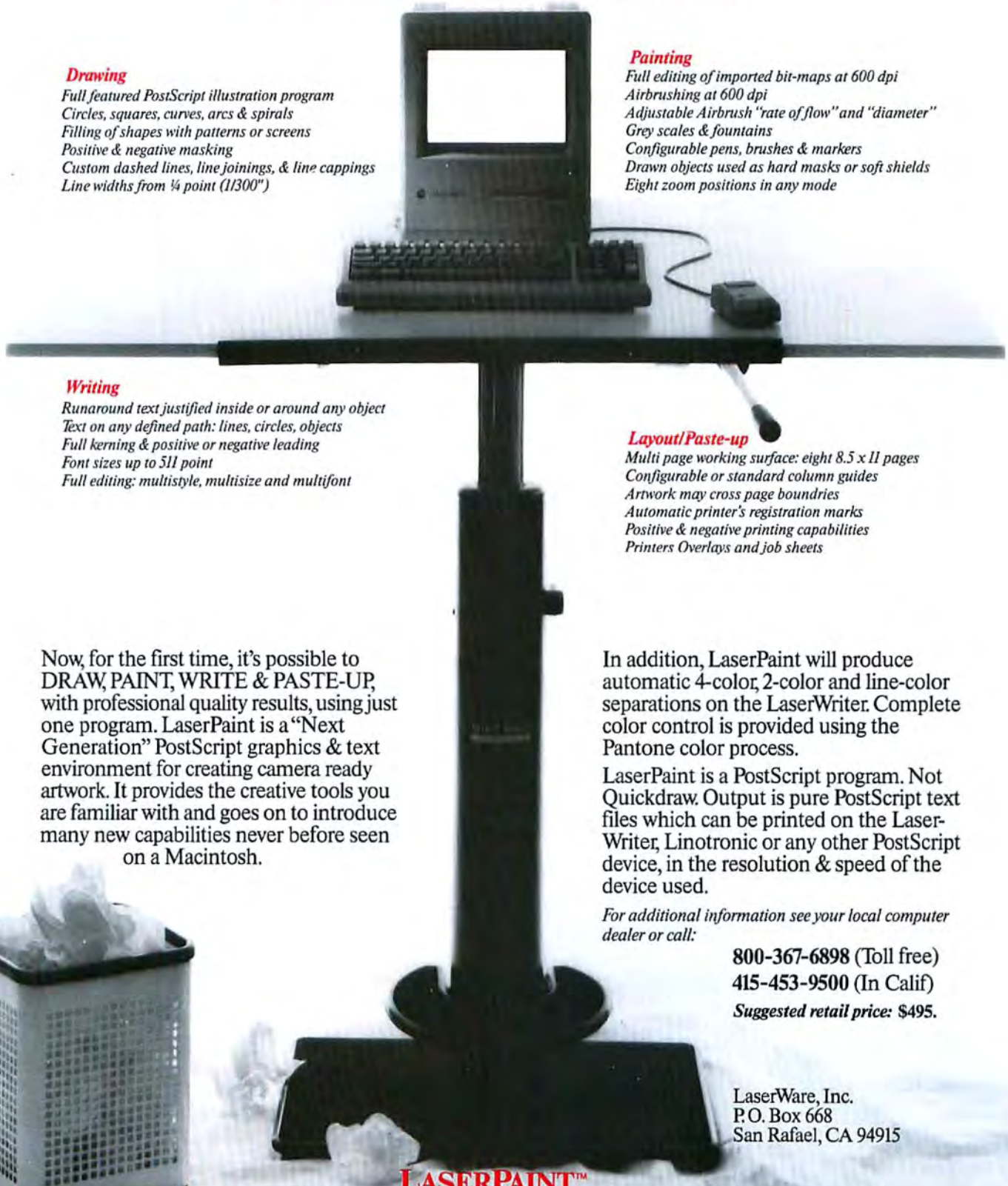
PARC is attributed as the source of many developments: the window interface, pop-up menus, and icons. How did they develop?

PARC attracted people from different places, who contributed different parts of the dream of what computers could be. Some were thinking about personal computers, mainframes in small packages, bit-mapped graphics. A large number of people came from SRI, having worked under Doug Engelbart, so they knew about

(continues)

The Next Generation of Macintosh Graphics Software Has Arrived.

LaserPaint, The Integrated Graphics Workshop



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Eight zoom positions in any mode

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Runaround text justified inside or around any object
Text on any defined path: lines, circles, objects
Full kerning & positive or negative leading
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Full editing: multistyle, multisize and multifont

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Multi page working surface: eight 8.5 x 11 pages
Configurable or standard column guides
Artwork may cross page boundries
Automatic printer's registration marks
Positive & negative printing capabilities
Printers Overlays and job sheets

Now, for the first time, it's possible to DRAW, PAINT, WRITE & PASTE-UP, with professional quality results, using just one program. LaserPaint is a "Next Generation" PostScript graphics & text environment for creating camera ready artwork. It provides the creative tools you are familiar with and goes on to introduce many new capabilities never before seen on a Macintosh.

In addition, LaserPaint will produce automatic 4-color, 2-color and line-color separations on the LaserWriter. Complete color control is provided using the Pantone color process.

LaserPaint is a PostScript program. Not Quickdraw. Output is pure PostScript text files which can be printed on the LaserWriter, Linotronic or any other PostScript device, in the resolution & speed of the device used.

For additional information see your local computer dealer or call:

800-367-6898 (Toll free)
415-453-9500 (In Calif)

Suggested retail price: **$495.**

LaserWare, Inc.
P.O. Box 668
San Rafael, CA 94915

LASERPAINT™
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Cricket Software Statworks	79.00
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Dove Computer Corporation	
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MacBottom HD-40 *(40Mb SCSI Hard Disk)*	1289.00
MacBottom 20 *(20+Mb Serial Hard Disk for Mac 512k & MacPlus)*	869.00
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Western Automation Labs	
Dasch External RAMdisk *(1024KB)*	349.00
Dasch External RAMdisk *(2048KB)*	429.00

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Smartmodem 1200	379.00
Smartmodem 1200 Mac w/Smartcom II & Cable	429.00
Smartmodem 2400	579.00
Transet 1000-128K	269.00
Transet 1000-512K	359.00
Transet 1000 Mac Accessory Kit	31.00
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I foresee a personal computer that is so portable you will take it everywhere.

the mouse and the concept of a user interface. There were also ARPANet people who understood networking. All of them came together with a vision of powerful interactive computers on every desk.

Jeff Rulifson came from SRI, where he had created the user interface for Engelbart's system because he needed a test procedure; he implemented some basic functions—move, delete, and so on—and this formed the basis of a user interface. A mystique grew up around it; people wrote long essays about it, justifying it as the best way for people to interact with the computer, even though it was never designed for people to use.

In 1973 Jeff Rulifson and I wrote a white paper on office-automation systems and included a couple of paragraphs on iconic user interfaces. We came up with chairs, a desk, files, folders, and other icons that would represent the users' activities. But we didn't experiment with prototypes for a few years.

Tim Mott and I developed a modeless editor, with characteristics of today's Macintosh word processors.

So conceptually you had built the Mac interface in 1975?

No, a *MacWrite*-like application. There was no menu bar, no scroll bars, and windows did not overlap. It didn't look like the Mac.

There is a famous story about you and Steve Jobs at PARC. Is it true?

In 1976 I started to get into micros. I went to the Homebrew Computer Club micro meetings and to demos of the Altair. I even bought one, a vapor machine that never arrived. The party line at Xerox was that micros wouldn't be useful until they had the power of a mainframe on a desk. The Commodore Pet I bought in 1977 showed me that micros could be used—I even wrote some educational software. I became the in-house advocate for micros at PARC.

Several friends of mine had gone to Apple. I stayed at PARC because I believed that Xerox would produce the great personal computer. We tried to get Xerox interested in building a six-slot personal computer based on the 8086 microprocessor from Intel, but there was no action, just interest. I got frustrated with this attitude.

At the same time Xerox had invested in Apple Computer. A courtesy tour of

(continues)

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Verbatim

PARC was being given to Apple people, who had asked to see our personal computer technology. Someone had to demo the machines, and I was the obvious choice. Most of the other PARC staff felt that Apple was a hobbyist's company, and that its engineers were hackers. So in 1979 I gave a Smalltalk demo, and Steve Jobs got all excited and wanted to know why Xerox was not using the technology.

(We couldn't tell him about the Star; that personal computer was still a secret.) He said that if Xerox didn't want to do anything with Smalltalk, then he would. I decided then that I was at the wrong company. Seven months later I went to Apple.

How do you keep entrepreneurship in engineering?

That seems to be no problem. The people we hire have that innovative spirit and the initiative to get or bring new ideas on board. They put much energy into making things happen. A manager would have to deliberately squelch the natural tendencies of this kind of person for that spirit to be lost.

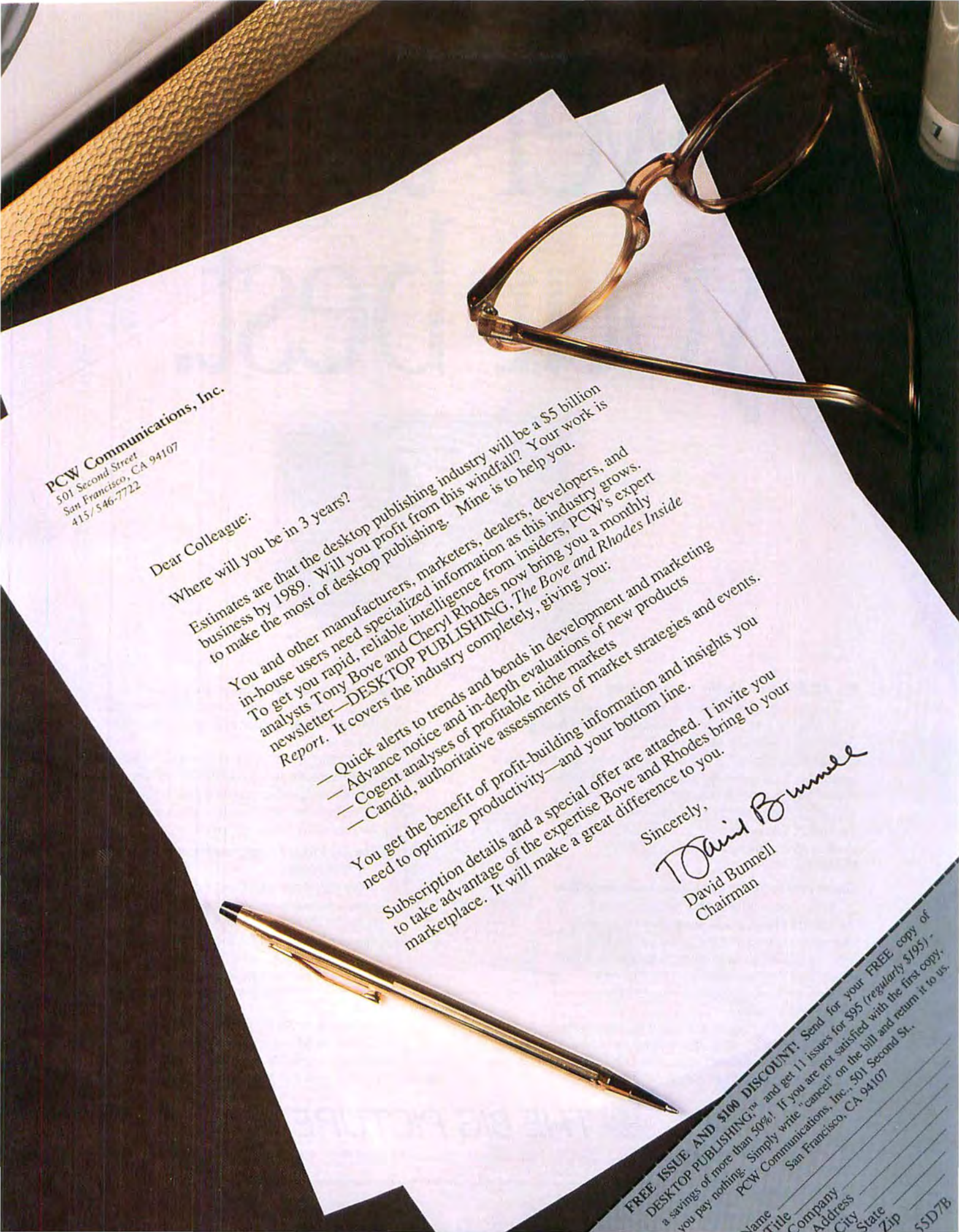
Are there specific ways to encourage people?

If the organization's response to new ideas is encouraging, appreciative, and supportive, that keeps people innovative better than any material rewards would. If we say no to ideas due to time constraints, or risk, or work load, that turns people off; they stop generating ideas, no matter what we pay them.

Give us your outlook on major events in new computer technology over the next several years.

I see a personal computer that is so portable you will take it everywhere. High-quality, 3-D, interactive, computer-generated graphics on the desktop. Integrated Systems Data Network (ISDN) will be adopted as a communications standard, enabling easy use of a worldwide network. Finally, pervasive use of computing. People's communications habits will be based on the assumption that everyone has a computer, much as today we all assume that everyone has a phone. □

Interviewed by Jerry Borrell



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Macworld News

by Daniel Farber

MARK JOHANN

Laurent Ribardière and Marylène Delbourg Delphis expect* Silver Surfer, *a.k.a.* 4th Dimension, *to make waves among databases.

Silver Surfer

Twenty-year-old Parisian programmer Laurent Ribardière and his French publisher, Marylène Delbourg Delphis, had a dream: to have their Macintosh database program *4th Dimension* published in the United States by a major software publisher. The program had been enthusiastically received in France. Both a powerful relational database manager and a complete application developer, *4th Dimension* is supposed to dramatically reduce the time required to create vertical applications. The range of applications includes accounting, document-retrieval systems linked to videodisk players, interactive pictorial medical education, and even graphic adventure and action games.

In November 1985, Apple software evangelists invited Ribardière and Delphis to the United States and helped them shop for a publisher, but they failed to find a suitable match. Rather than lose what Apple insiders considered an important, strategic product at a time when the Mac was having trouble gaining acceptance in big business, Apple decided to publish *4th Dimension* itself. For Ribardière, this was a dream come true. But it was to remain only a dream. Third-party developers, including Ashton-Tate and Microsoft, were putting pressure on Apple not to publish *4th Dimension,* or *Silver Surfer* as it came to be known within Apple (named after Ribardière's favorite Marvel comic book character). Apparently, the third-party developers viewed *4th Dimension* as a serious competitor in the high-end database market, and feared the added marketing edge an Apple label would give it. They may also have wanted to score *4th Dimension* for their own product lines. Apple finally decided that publishing the program would impair relationships with Macintosh developers and ultimately hamper their own efforts. So a few days before the March announcement of the new Macintoshes, and after more than a year inside Apple and substantial development costs, Ribardière and Delphis were given back their baby.

For Ribardière and Delphis, the experience was instructive and the result not as bad as you might think. *4th Dimension*'s arrival in the United States was delayed, but the user interface was improved and Ribardière learned English. Within just a few days of being turned away by Apple, Delphis began setting up a new company, Acius, to publish *4th Dimension* in the United States. And they expect to ship the program early this summer.

Hieroglyphics Revived

Although the Egyptians haven't written hieroglyphics for over 15 centuries, you can now do so with the fonts and paint files found on two disks from DublClick Software. One disk, *MacTut,* is aimed at Egyptology novices. Created by computer science professor J. D. Robertson and Barbara Paugh, *MacTut*'s eight paint files contain gods (male and female in large and small sizes), classic Egyptian borders and symbols, and a map of ancient Egypt. Each paint file contains a custom set

(continues)

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of patterns that can be moved into any other paint pattern palette with the Pattern Mover desk accessory included on the disk.

MacTut also contains six fonts based primarily on the Henry George Fischer book, *Ancient Egyptian Calligraphy.*

Programs like* MacTut *and* ProGlyph *offer ancient hieroglyphic scripts on disk.

Each font comes in two sizes, 24 point and 48 point, and is named for the geographic area (such as Thebes, Memphis, Hermopolis) within which its glyphs are commonly found. The glyphs are almost all in outline form and range from falcons, ibis, and fish to papyrus, people, and (ancient) everyday objects. Although they appear a little rough-hewn on the screen, the glyphs look quite handsome when printed in high-quality mode on the ImageWriter or with smoothing on the LaserWriter. Most of the hundreds of glyphs in the six fonts represent whole words or ideas, and a brief manual shows you how to create phonetic transliterations of English words using 23 of the glyphs.

ProGlyph, written by Egyptologist Michael A. Berger, contains four fonts, an on-disk manual in *MacWrite,* a KeyCaps-style desk accessory, and keyboard maps for each font. The fonts come in three sizes each, 12, 18, and 24 point, and the glyphs tend to be less detailed than those in *MacTut.* All are based on Alan Gardiner's book, *Egyptian Grammar;* the keyboard layouts, in fact, contain a reference to Gardiner's sign-list for each glyph. *ProGlyph* was created for serious writers and readers of hieroglyphics, and the disk comes with a special Geneva Diacritics font for writing hieroglyphic transliterations with standard Geneva. But the fact that creator Berger actually uses it at work doesn't mean you can't have fun with *ProGlyph* as well. Just keep in mind that the 12-point characters can be rather difficult to read on the screen; you may want to compose your inscriptions in a larger size and then convert to 12 point prior to printing.

MacTut and *ProGlyph* are available for $16 each, or $26 for both, from Dubl-Click Software in Northridge, California (818/349-2758).—*Robert C. Eckhardt*

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Nutmeg Systems in conjunction with Xerox is offering a 15-inch portrait screen, which displays an entire 8½- by 11-inch page. The Xerox screen has full brightness and contrast controls, and 720- by 900-pixel, 90-dot-per-inch resolution (compared to 640- by 864-pixel, 77-dpi resolution in the Radius 15-inch Full Page Display). The Nutmeg video interface card clips onto the 68000, and the connector installs flush into the security port on the back of the Mac. A low-glare filter and swivel-and-tilt stand are also built into the unit. The $1995 display is compatible with all versions of the Macintosh. For more information contact Nutmeg Systems at 203/966-3226.

Under My Node

Most people associate UNIX with large networks navigable only by those initiated into the complex command structure of the system. Lutzky-Baird Associates has pioneered an implementation of UNIX—*Ultra-Office*—that links Macintoshes and PCs to a UNIX host while maintaining a rudimentary Mac-like user interface for the UNIX file structure. *Ultra-Office* installations include corporate giants like Eastman Kodak, Hughes Aircraft, Bell South, and EDS. At Della Femina, Travisano & Partners, an advertising agency, the account services department and secretarial staff were networked on 22 Macs last year via *Ultra-Office.* The test program was so successful that the company plans to install a Convergent Technology UNIX server, which can handle 40 to 50 users, and use a Zilog system for backup.

The agency's applications include word processing, budget analysis, media flow charts, and statistical information plotting. The creative departments should be on line by midyear.

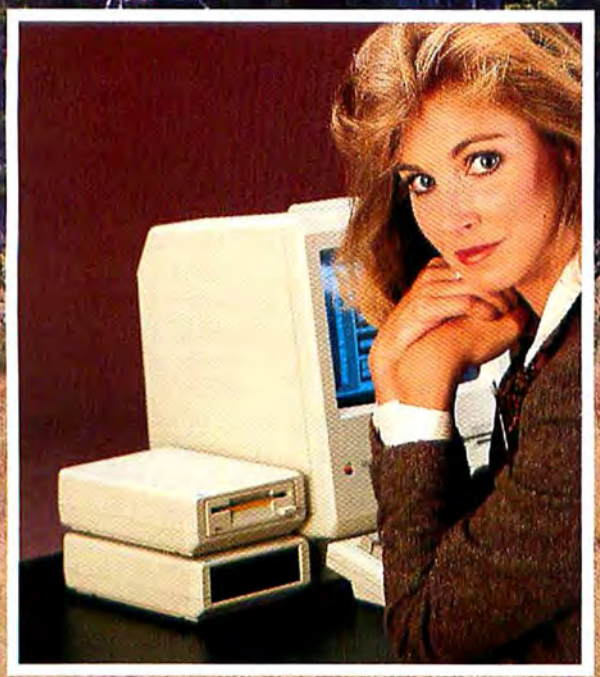
Users of the *Ultra-Office* network aren't forced to speak UNIX unless they want to—the system has a Macintosh-like front end with icons and pull-down menus. Information is stored in and retrieved from the *Ultra-Office* library on a checkout basis. Each user has personal library space on the hard disk of the UNIX system. In addition, public library space is accessible to anyone on the network. Users can store files publicly or privately. If you want to edit a file, you must check it out—only one user can open a file at a time, but unlimited users may open read-only copies of a file. *Ultra-Office* also provides electronic mail, but it lacks the sophistication of programs like *InBox* and *Internet.* You can append documents to messages, but AppleTalk users cannot send mail to users logged directly on

MAX AGUILERA-HELLWEG

Making UNIX user-friendly was a challenge for Jon Simonds and Charles Baird. Their company was the first to link Macs to a UNIX host with a Mac-like user interface for the UNIX.

(continues)

Power and Elegance



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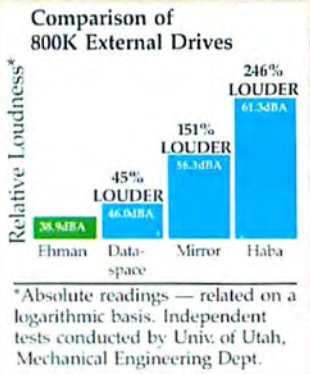

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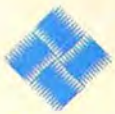

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Circle 602 on reader service card

to UNIX. The system also provides print spooling to the LaserWriter.

For large offices that use several types of machines, multiple AppleTalk networks and UNIX computers can be connected with an Ethernet backbone. In addition, Lutzky-Baird plans to offer a voice-annotation system. Users will be able to send Macintosh documents, along with spoken comments, across the network.

Lutzky-Baird's server software is running on a variety of host computers, including Convergent Technology, IBM AT, Alto, Sun, Pyramid, and Zilog. The company plans to develop an implementation on Apple's Mac II UNIX. For more information contact Lutzky-Baird at 213/649-3570.

ERIC POGGENPOHL

Thomas Piwower has proof that desktop publishing works for small newspapers.

Roll Call

Roll Call, a Washington, D.C., weekly tabloid with a very influential circulation of about 7000, provides news about the goings-on up on Capitol Hill. *Roll Call* recently converted to a Macintosh-based desktop publishing system for all its prepress activities. The paper's offices now sport seven Mac Pluses connected to two 20-megabyte hard disks and a LaserWriter Plus. On the software side, *Microsoft Word* and *PageMaker* handle word processing and page layout.

Bonny Wolf, associate editor of *Roll Call,* paid the highest compliment to Mac desktop publishing when she pointed out that the first issue produced under the new system looked "just like last week's issue." Furthermore, the Mac setup will save *Roll Call* an estimated 75 percent in production costs. In addition to improving editorial control and shrinking production time, the system allows the publication to set type for its advertisements. And all this was achieved within a five-day changeover process.

Roll Call is typical of the trend among small newspapers to convert prepress operations to desktop publishing workstations. Publications as diverse as the University of Utah's daily newspaper and *Publish!* Magazine are already using the Macintosh as a page-composition workstation and the LaserWriter as a proofing device.
—Elinor Craig

Top Gun

Sphere/Spectrum HoloByte's *Falcon,* an F-16 fighter simulation for the Mac complete with digitized sounds, captures the feel of being at the controls of an F-16 combat aircraft à la *Top Gun,* the top-grossing film of 1986. And that evaluation comes from actual fighter pilots, not video-game or Cessna pilots.

One option allows you to engage another player in a dogfight via modem or direct connection, and the program includes four alternating heads-up displays (HUDs) and authentic dogfight panels—or close to authentic, since most of the plane's technical specifications are classified information. *Falcon* simulates many of the F-16's advanced electronic features, such as radar detection and avoidance, possible pilot blackouts during high *G* (gravitation force) turns, variable-range power, air brakes, electronic countermeasures, chaff, and flares. The $49.95 simulation should be available in early summer—we hope along with a joystick that will let you feel like you're at the controls of an F-16 rather than at the keyboard of a Mac.

ERIK SIMONSEN

Dogfight it out for top gun with* Falcon, *an F-16 simulation.

Sphere also plans to publish a PT boat simulation—*PT 109*—under the Spectrum HoloByte label. The game will be similar to *Gato,* the company's WWII submarine simulation. Eventually, Sphere hopes to develop a network technology that would allow you to pit different games against each other, for example, *Falcon* versus a ground attack simulation, or *Gato* versus a convoy simulation. Dare we hope that the widespread availability of personal computers and war simulation software will satisfy the human appetite for armed conflict? Countries could fight it out on screen rather than on the battlefield.

Thinking in Parallel

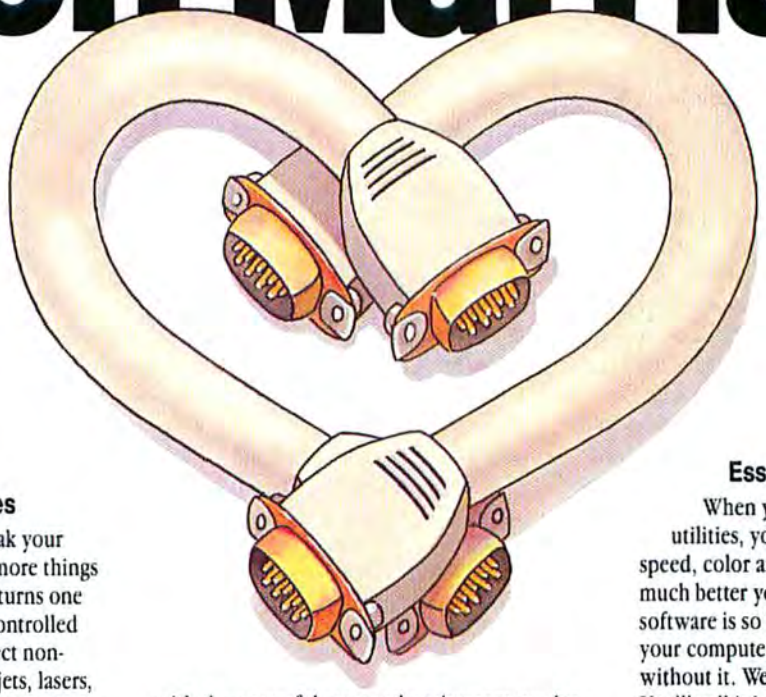
The human brain, unlike the traditional computer's central processing unit (CPU), can easily process many thoughts simultaneously. The Macintosh, like all other personal computers and, in fact, the majority of minicomputers and mainframes, contains only one central processor and thus can execute only one instruction or one program at a time. On the other hand, machines with multiple CPUs, each having its own memory, can execute many subprograms—one per CPU—in parallel. Many contemporary computer architects view these parallel processors, multiple CPUs with memory connected via high-speed communication links, as the way to achieve ultra-high performance. A few feel that parallel processing is the only way in which a thinking machine can ever hope to approach the functionality of the human brain.

The MI-4 parallel-processing system can perform five times faster than a Mac II.

While the Macintosh SE, Plus, and 512K were not designed to rival the capabilities of today's parallel processors, Mechanical Intelligence of Cardiff, California, has announced a parallel-processing development system for the Mac based on the Inmos Transputer chip. The $1295 MI-4 board contains a 32-bit reduced instruction set (RISC) Transputer, 1MB of RAM,

(continues)

Open Marriage



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and four high-speed serial communication lines. Each MI-4 is capable of processing up to ten million instructions per second, and multiple MI-4 boards can be assembled like building blocks into different processing "shapes," such as a pipeline, a square, or a cube. For calculation-intensive procedures, like some graphics, scientific, or math applications, you can add the MI-4 T800 floating-point processing unit to the processing structure. The $1495 T800 performs about five times faster than the Mac II's 68020/68881 duo.

The $195 Link adapter lets you download programs from the Mac's hard disk to the individual MI-4 processor boards. Currently you must add a power supply to either a Mac or a Mac Plus to install the MI-4 and Link adapter boards. Because there is so little free space inside the Mac 512K or Mac Plus's cabinet, only two MI-4 boards will fit. To avoid space conflicts, Mechanical Intelligence offers a $350 expansion box with a power supply and cables for four or more MI-4 boards.

You can program the MI-4 in assembler and C, although to take maximum advantage of the parallel processors, you need software capable of breaking a problem into units, called *processes,* each of which runs on a separate processor and communicates with other processes. Alternatively, multiple processes can share a single processor. Inmos, the developer of the chips on which the MI-4 is based, has developed software, called *Occam,* that divides a problem into processes. Currently Mechanical Intelligence is working with Inmos to translate the IBM PC version of the *Occam* compiler for the Mac. For more information contact Mechanical Intelligence, at 619/426-1455.
–David Ushijima

New Dimensions

Visual Information's *Design Dimensions* and *Solid Dimensions* are among the first programs to show the color graphics capabilities of the Mac II. A 3-D color CAD modeling design package, *Dimensions* currently has a rendering capability of 65,000 facets on a 2MB machine with very fine shading, without ray tracing. On a Mac II, ray tracing is 20 times faster than on a Mac Plus; the company expects to make it 40 times faster by converting some code to assembler and writing to the 68881 math coprocessor. In addition to smoother and faster rendering, the Mac II allows *Dimensions* to rotate objects in color. Visual Information president Nick Pavlovic believes that the Mac II has the power to compare favorably with the higher-priced Sun and Apollo color-graphics workstations.

Dimensions is compatible with SuperMac Technology's high-resolution color monitor. And the program transfers data back and forth with Micro CAD/CAM's *MGM Station, MacDraft,* and *MacDraw.* With *Dimensions* you can create color 3-D objects out of black-and-white 2-D *MGMStation* objects, and then do solid modeling in color. In addition, *Dimensions* interfaces with MacNeal-Schwendler's stress-and-vibration-analysis program *MSC/pal.* For more information contact the company at 818/918-8834.

JOHN GREENLEIGH

The on-line companion himself, Steve Capps.

Programmer's On-Line Companion

Steve Capps, former Apple programmer and codeveloper of the Finder, has developed a utility program that lets you access all Macintosh calls, record structures, and other data quickly in the course of programming. The *Programmer's On-Line Companion* is based on volumes 1-4 of *Inside Macintosh* and the *Apple Numerics* manual. Capps wrote the program so that he wouldn't have to open *Inside Macintosh* each time he forgot a procedure.

A single keystroke brings up a window wherever you click the mouse button. In this window, you type in a call, or part of a call, or search for a particular call. The program then displays the procedure and allows you to insert it into your code. Once you get a window up, it stays up, so you can refer to it easily. However, the *Programmer's On-Line Companion* doesn't work in any of the Mac program debuggers. Capps is working on an upgrade to the program that includes the fifth volume of *Inside Macintosh.* The $34.95 utility is available from Addison-Wesley; for more information call 617/944-3700.

FRANK SCHAEFFER

Visual Information's* Dimensions *is the first program to show off the Mac II's prodigious 3-D modeling and design capabilities. Ray tracing is up to 40 times faster than on a Mac Plus.

AppleShare Trends

With the introduction of the *AppleShare* file server, many companies are making subtle but noticeable changes to their products and to the ways they sell them. For instance, the introduction of *AppleShare* has helped speed the decline in the number of companies selling copy-protected programs. Copy protection has been dropped from version 3.24 of *Omnis 3 Plus,* which is designed to run on an *AppleShare* network. According to Blyth Software, the move was both a response to customer requests and a way to avoid problems that might arise from running copy-protected software in a network environment like *AppleShare.*

There have been no radical changes in licensing agree-

(continues)

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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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ments yet, but that may change. With version 3.0 of *Microsoft Word,* which can be run as a multiuser application on *AppleShare,* Microsoft dropped copy protection. The company also made a subtle change in the licensing agreement, which now says that a company must buy one copy of the program for each *concurrent* user. Although you need to put only one shared copy of the program on the *AppleShare* file server, you must buy five copies, for instance, if as many as five people might use the program simultaneously. Most other vendors contacted have similar policies of one copy per user or concurrent user.

Little progress has been made toward defining site licensing requirements. Most vendors have unpublished vol-

ume discount schedules based on the one-copy-per-user philosophy. Some products, like *Omnis 3 Plus,* have different versions for different numbers of users. Very few companies, however, offer unlimited use at a specific site, or within a specific company, for a fixed price. If *AppleShare* becomes as popular as AppleTalk, that may all change.—*Steve Mann*

ImageMaker

Presentation Technologies has introduced ImageMaker, a peripheral that allows you to create low-cost, high-quality slides with the Macintosh. ImageMaker generates 8000-line

MEL LINDSTROM

ImageMaker promises to make slide making painless and inexpensive on the Mac.

35mm slides consisting of both text and graphics for about 50 cents each, or about one tenth the cost of systems with equivalent resolution. The program is capable of creating color slides from black-and-white displays by allowing users to specify different patterns to represent colors from a palette of background and foreground colors. ImageMaker is compatible with all the popular presentation graphics applications, including *MacDraw, MacWrite, Excel, Cricket Graph, Jazz,* and *PowerPoint.* ImageMaker is priced at $4495 and the software at $149. For more information contact Presentation Technologies at 743 N. Pastoria Ave., Sunnyvale, CA 94086, 408/749-1959.

The Third Apple

"When I watch fifty-year-olds crowing over their Macintoshes, I know that they are feeling the sensation I know so well and of which I never tire: the feeling of suddenly having access to domains from which one felt excluded forever. An incomparable sense of freedom . . . a limitless space in which they can explore unknown lands containing immense resources."

These words come from *The Third Apple* (Harcourt Brace Jovanovich, 1987) by Jean-Louis Gassée, philosopher, poet, mathematician, and also vice president for product development at Apple. Known for his eloquent and often metaphysical ramblings, this provocative evangelist has taken up the mantle at Apple following Steve Jobs's departure.

The Third Apple, translated from the 1985 French edition, contains Gassée's reflections on computers, French culture, Silicon Valley, clothes, economics, programmers as artists, Apple, and other topics. Several sections are devoted to exploring the human/computer relationship and artificial intelligence. According to Gassée, the computer is a tool designed to amplify human intelligence, not replace it. "It's not a rival, but a servant. When you have truly understood and experimented with this hierarchy, you have the intoxicating feeling of controlling a huge amount of power."

In Gassée's view, mainframes suggest the "death-dealing power of industrial wealth," whereas microcomputers "evoke the world of Dionysus." Gassée's unbridled enthusiasm for personal computers transforms them into "instruments that allow the mind to take flight," that offer a "whiff of the infinite." A Cray supercomputer in Gassée's eyes is a high-tech muse rather than a multimillion-dollar refrigerated number cruncher.

Overall, *The Third Apple* conveys Gassée's optimism and enthusiasm for computer technology. He is a dreamer, a twentieth-century romantic for whom computers are both objects to discover and vehicles for self-discovery, and whose daily task, ironically, is to shape dreams into practical realities in the form of new Apple products. With people like Gassée holding forth at Apple, it's fairly certain that the company will continue to deliver innovative products.

DAN ESCOBAR

Author and Apple exec Jean-Louis Gassée says the "third" apple, Apple Computer, follows in the tradition of other historic apples—the one from Eden and Newton's.

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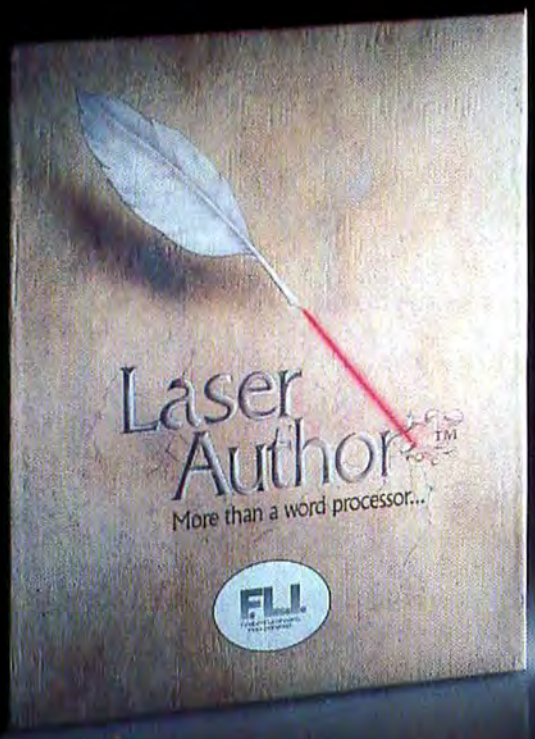

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SO NOW YOU KNOW WHY YOU BOUGHT A MAC.

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Arabic Mac

Since last October, when the Arabic version of the Macintosh was rolled out in Middle Eastern cities like Cairo and the Dubai sheikhdom in the United Arab Emirates, the Arabic Mac has established a loyal following.

The Arabic Macintosh doesn't merely provide Arabic scripts and right-to-left word processing. The software was designed to conform completely to the idiosyncrasies of the Arabic written language. The Arabic system-software desk accessory lets you control ligatures, numeric formats, and other features. An extended Arabic facility adds ten letters to the standard alphabet to accommodate Urdu, Farsi, and Malay language users. In addition, the system and the keyboard are fully bilingual, allowing you to combine English and Arabic in the same sentence.

The Arabic Mac provides three calendars: Gregorian, Islamic lunar, and astronomical lunar. For lunar calendars the Mac has to compute the relative positions of the earth, moon, and sun; it then calculates the date, depending on your location, which you specify by clicking on a map or inputting exact coordinates. The Mac also computes the difference from Greenwich time.

The product is shipped with three Arabic fonts, two of which provide output on a LaserWriter Plus. Arabic versions of *MacPaint, MacDraw,* and a word processor (*Arabscript* from PATI) have been released. But given that the Japanese Mac didn't take off until *Excel* was released, the ultimate success of the Arabic Mac will depend on the localization of mainstream applications like *Excel,* as well as desktop publishing software such as *ReadySetGo* and database software. Along with the Hebrew version of the Mac, and the other flavors, the Mac may well become lingua franca in the diplomatic and international business world.

JERRY SPAGNOLI

Software designer Mark Davis and Hesham Abu Al-Ata celebrate the Arabic Mac's success.

Berklee School of Music

At the 1986 International Computer Music Conference in the Hague, microcomputers finally outnumbered mainframes—and the micro of choice was the Macintosh. The overall impression one got from the conference was that truly powerful music LANs (local area networks) are still a ways off, but students at Berklee College of Music might disagree.

David Mash, Chairman of the Music Synthesis Program at Berklee has set up a music LAN that goes beyond many of those speculated on at the conference. The current 3Com EtherMac network includes 14 digital music workstations, an Apple LaserWriter, 2 ImageWriters, and a 3Server3 70MB hard drive (which automatically backs itself up to tape every night at 2 a.m.). Each digital music workstation includes a Mac Plus, a Kurzweil MIDI board and fully loaded Kurzweil Expander, a Yamaha TX-816 rack, an Oberheim Expander, a Yamaha RX-11 Drum Machine, an Opcode Studio Plus MIDI adapter, a Kamlet Matrix MIDI switch box, a Yamaha SPX-90 Digital Effects Processor, a Yamaha D-1500 Digital Delay, a Hill Multi-mix 16-channel mixer, and a TEAC 4-track cassette deck. An analog lab contains 14 additional workstations, but only 3 are linked to the Macintosh network. The whole system will be expanded to 36 workstations by next September.

SETH RESNICK

David Mash of the Berklee College of Music has set up a 3Com EtherMac network for state-of-the-art digital music workstations.

To use a workstation, the student inserts a boot-up disk into the workstation's Macintosh, which automatically logs the workstation on to the network and provides the user with two volumes: a 3MB applications volume and a larger public volume. The applications volumes each contain a copy of Mark of the Unicorn's *Professional Composer* and *Performer,* various patch editors and librarians from Opcode Systems, and all the Macintosh/Kurzweil programs. Digidesign's *Sound Designer* and *Softsynth* are being added as well. Because each workstation has its own associated 3MB applications volume, Berklee purchased separate copies of each package. Students who submit assignments on line use a different boot-up disk to access their teacher's volume, which is reserved for collecting homework.

In addition to being a bulletin board, the public volume lets teachers store files for students to emulate, allows faculty to post study guides for exams and quizzes, and includes a Scrapbook file containing *MacDraw* images for making synthesizer setup diagrams.

Besides being linked to the 3Com network, all the workstations' MIDI devices are networked together, so one workstation can control several others if necessary. Even though the workstations are mainly headphone-based, teachers or lab monitors can route audio output from any number of workstations to loudspeakers. Each teacher's workstation has a large-screen Limelight monitor wired into the Mac's newly added NTSC ports. Finally, one of Berklee's 24-track recording studios also contains a digital music workstation; students create music sequence files and patches in the networked labo-

(continues)

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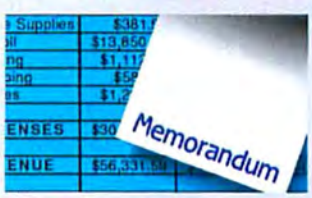

The note-worthy new program from Target Software.

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ratory and then bring these files on Macintosh 800K disks to the recording studio to make professional-quality multitrack analog tapes (the workstation's TEAC 4-track cassette recorders are mainly used for testing work in progress). Perhaps the most important detail here is that at all stages, the students work with state-of-the-art hardware and software, identical to that used in the real world, and the department makes every effort to keep the entire system upgraded and updated.
—*Christopher Yavelow*

Christian Science Monitor on a Mac

The *Christian Science Monitor,* one of the nation's oldest and most respected daily newspapers, is using the Macintosh to create what is expected to be a ten-page, 8½- by 11-inch, electronic, executive summary edition.

The *Monitor* plans to transmit the World News Dispatch Service by modem to a satellite uplink that will beam the service to FM radio stations around the country for sideband transmission to subscribing customers. Created the night before, this abstracted corporate edition will print out early in the morning on customers' computer printers equipped with FM receiver units.

Monitor stories and specially created graphics—including locator maps, logos, flags, line drawings, and scanned images—will be combined via *PageMaker* to produce the miniaturized edition. Each day, six to eight national and international stories will cover political, corporate, and financial topics.

New Music

Every year at the National Association of Music Merchants (NAMM) convention, manufacturers and vendors put on a big show to introduce new musical product lines to their dealers. This year NAMM even had some floor space dedicated to music software. For the last two years the Mac has been the market-share leader in high-end music software. This year, with so many new products for PCs, it was harder to tell who's ahead.

The most exciting new Macintosh software products for musicians were the updates to the *Opcode* sequencer and the *Sound Designer Softsynth* version 2.0. With the *Opcode* version 2.5 software you can record multiple parts (similar to multitrack tape) and then manipulate them with sophisticated editing techniques, such as step entry, autocorrection, and transposition. The biggest new breakthrough with version 2.5 is that you can transcribe or

print out music notation on a standard ImageWriter or laser printer by linking with *DMCS (Deluxe Music Construction Set).* For the serious Mac musician, *Sound Designer* by Digidesign revolutionized sound manipulation for sampling keyboards. Now *Softsynth,* an additive synthesis program, has added the power of FM synthesis to version 2.0, enabling you to generate 32 operator sounds and then port the finished product to your sampler.

The new catch phrase at the show was "the no-moving-parts studio." With a Mac as the main processing unit, a MIDI interface, a sequencer, library software, and a few MIDI keyboards, voilà—you have a studio. If you really want to go for it, get a VCR, a time-code reader, and a synchronizer and do video and film scoring at home. Making its debut at this show was a new film-music system called *Cue,* from Opcode Publishing. Also included in the new music software products are some inexpensive and extremely fun programs, such as *M, Jam Box/4,* and *Music Mouse.*

Thanks to the popularity of MIDI and improved manufacturing techniques, musical power previously available only to serious professionals is now affordably priced. My choice for winners in the instrument category were: Casio's FZ1, a 16-bit sampling keyboard (soon to have sound-designer support); new versions of Yamaha's popular DX7 IID and IIFD FM synthesizers; and the Roland D50, which introduces linear arithmetic (LA) synthesis, a process capable of mixing digitally generated partials and pulse code modulation (PCM). The Roland D50 also includes digital parametric reverb and delay processing; its Emu rack mount, EMAX, constitutes an important addition to any serious MIDI setup.

This year's NAMM convention was a delight to attend and clearly indicated that the Mac is a widely respected musical tool.—*Bryan Bell*

ED KASHI

The Corporate Macintosh Showcase, a 30-foot mobile home, brings the Macintosh office to the doorstep of corporate clients.

Motoring with a Mac

The ultimate traveling computer-demonstration unit—dubbed the Corporate Macintosh Showcase—has been outfitted in a 30-foot motor home by the Computer Center of Hayward, California. Equipped with Macs, a LaserWriter, large display screens from both Radius and E-Machines, an Abaton flatbed scanner with OCR software, a Hewlett-Packard drafting plotter, and an IBM XT (to demonstrate connectivity) the mobile home will exhibit Mac desktop publishing and CAD applications. The $100,000 facility will travel to corporate management information officials for demonstrations of Macintosh capabilities.

An added benefit will be to supplement the store's Business Training Center. When new units are delivered to a corporate client, five Macs can be set up in the vehicle for an on-location orientation class. □

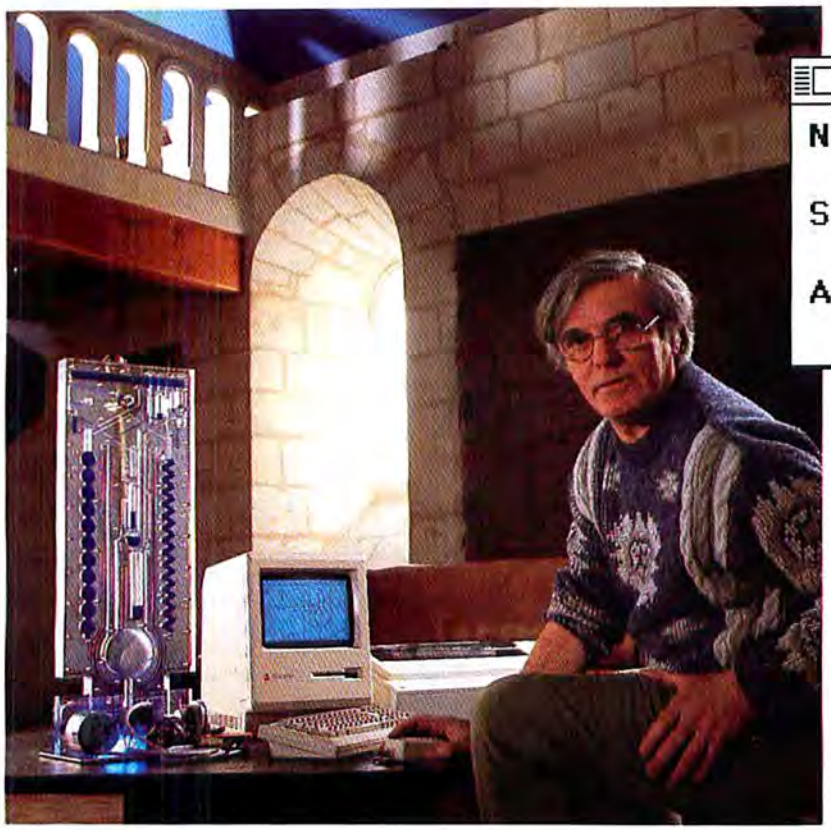
When you want

SOFTWARE

NCP denotes not copy-protected.
CP denotes copy-protected.

Affinity Microsystems ... NCP
Tempo *(power user's macro utility)* ..... $55.
ALSoft ... NCP
DiskExpress *(maximize disk performance)* 27.
Altsys ... NCP
FONTastic *(create your own fonts)* ..... 27.
FONTastic Plus *(advanced font editor)* .... 49.
Fontographer *(Laserwriter font editor)* ... 245.
Ann Arbor ... NCP
FullPaint *(open four documents at once)* .. 53.
Batteries Included ... NCP
The Mac BatteryPak *(9 desk accessories)* 27.
Thunder! *(50,000 word spelling checker)* .. 29.
Isgur Portfolio *(investment manager)* .... 105.
Berkeley System Designs ... NCP
Stepping Out *(requires 512k)* ..... 64.
Blyth ... CP
Omnis 3 Plus ..... call
Borland International ... NCP
Sidekick 2.0 ..... 59.
Reflex *(information management analysis)* 59.
Turbo Pascal *(HFS compatible)* ..... 59.
BPI Systems ... NCP
General Accounting *(full-featured)* ..... 129.
BrainPower ... NCP
StatView *(statistics package)* ..... 35.
Graphidex *(DA graphics organizer)* ..... 75.
Designscope *(electronic circuit design)* .. 129.
StatView 512+ *(req. external drive, 512k)* ... 179.
Bravo Technologies ... NCP
MacCalc *(easy to use spreadsheet)* ..... 85.
Broderbund ... CP
Print Shop *(create cards and memos)* ..... 39.
Geometry *(over 350 problems!)* ..... 64.
CAMDE ... NCP
Nutricalc *(diet & nutrition analysis)* ..... 49.
Nutricalc Plus *(dietician's delight)* ..... 175.
CasadyWare ... NCP
Fluent Fonts *(two-disk set)* ..... 29.
Fluent Laser Fonts *(Vols. 1-15)* ..... *each* 48.
Central Point Software ... NCP
Copy II Mac *(includes MacTools)* ..... 20.
Challenger Software ... NCP
Mac3D *(3D graphics, CAD features)* ..... 119.
Chang Labs ... CP
Rags to Riches Ledger or Payables ..... 125.
Rags to Riches Receivables *(req. 512k)* ... 125.
Rags to Riches Three Pak ..... 299.
Inventory Control ..... 243.
Professional Billing ..... 243.
Cortland ... CP
TopDesk *(7 new desk accessories)* ..... 34.
Creighton Development ... NCP
MacSpell+ *(spell checker, req. 512k)* ..... 52.
Cricket Software ... NCP
Statworks *(statistical package)* ..... 77.
Cricket Graph *(multiple windows)* ..... 127.
Cricket Draw *(advanced draw capabilities)* 177.
Data Tailor ... NCP
Trapeze *(spreadsheet, reqs. 512k)* ..... 173.
DataViz ... NCP
MacLink Plus *(transfer Mac/IBM data)* .... 159.
Desktop Graphics ... NCP
DrawArt *(MacDraw artwork, req. 512k)* .... 28.
DrawArt Vol. 2 *(MacDraw clipart, req. 512k)* 42.
DrawForms *(requires MacDraw)* ..... $30.
Digital, etc. ... NCP
Turbo Maccountant *(GL,AP,AR,Payroll)* ... 262.
Dove Computer ... NCP
RAMSnap *(RAM Disk/Disk Cache)* ..... 36.
Dow Jones ... CP
Market Manager PLUS 1.5 ..... 159.
Dreams of the Phoenix ... NCP
Day Keeper Calendar ..... 35.
Quick & Dirty Utilities ..... *each* 35.
Twelve-C Financial Desk Accessory ..... 35.
Dubl-Click Software ... NCP
World-Class Fonts! Vol. One or Vol. Two .... 28.
World-Class Fonts! *(both Volumes)* ..... 49.
WetPaint Vol. One or Vol. Two ..... 29.
WetPaint Clip Art *(both volumes)* ..... 49.
Calculator Construction Set ..... 39.
Electronic Arts ... CP
Deluxe Music Construction Set 2.0 ..... 63.
Enabling Technologies ... NCP
Easy3D *(create solid 3D objects)* ..... 69.
1st Byte ... CP
Speller Bee or First Shapes ..... 27.
KidTalk or Mathtalk ..... 27.
Smoothtalker *(speech synthesis)* ..... 27.
Forethought ... NCP
Factfinder *(free-form info organizer)* ..... 49.
FileMaker *(custom forms & reports)* ..... 79.
FileMaker Plus *(feature-packed database)* 159.
FWB Software ... NCP
Hard Disk Backup *(protect hard disk info)* .. 38.
Hard Disk Partition *(speeds up hard disk)* .. 38.
Hard Disk Util *(program backup)* ..... 56.
Great Wave Software ... NCP
KidsTime *(educational, ages 3-8)* ..... 28.
TimeMasters *(learn about time, ages 4 & up)* 28.
ConcertWare+ *(music composition)* ..... 29.
ConcertWare+ MIDI ..... 75.
Hayden Software ... CP
Hayden:Speller *(for Word & MacWrite)* ..... 27.
MusicWorks *(songs for your Mac)* ..... 29.
Home Design *(NCP)* ..... 49.
Score Improvement for the SAT ..... 59.
Score Improvement: Achievement Test .... 59.
VideoWorks *(animation)* ..... 59.
Ideaform ... NCP
MacLabeler *(print disk labels)* ..... 29.
DiskQuick *(catalog floppies & hard drives)* .. 29.
Imagine ... NCP
Smart Alarms *(DA reminder system)* ..... 38.
Impulse ... NCP
Comic Strip Factory *(create cartoons)* ..... 65.
Industrial Computations ... NCP
Powermath *(equation solving tool)* ..... 59.
Infosphere ... CP
LaserServe *(network software)* ..... 65.
MacServe *(network software)* ..... 175.
Innovative Data Design ... NCP
Paste-Ease *(requires Paint program)* ..... 35.
MacDraft *(new updated version, 512k)* .... 159.
Kensington ... NCP
Type Fonts for Text *(16 new fonts)* ..... 29.
Type Fonts for Headlines *(req. 512k)* ..... 41.
Laserware ... CP
Laserworks *(requires 512k, Laserwriter)* ... 229.
Layered ... CP
Notes for...Excel, Microsoft Works,
or PageMaker ..... *each* 42.
Legisoft/Nolo Press ... NCP
WillWriter 2.0 *(prepare your own will)* ..... 31.
Linguist's Software ... NCP
Tech *(1000 different symbols)* ..... $59.
FOREIGN LANGUAGE FONTS
MacCyrillic ..... 39.
SuperFrench/German/Spanish ..... 39.
MacHieroglyphics, MacKana/Basic Kanji,
MacSemitic/Coptic/Devanagari, MacKorean,
MacGreek, MacHebrew ..... *each* 59.
SuperGreek New or Old Testament ..... 79.
MacGreek/Hebrew/Phonetics ..... 89.
LaserGreek ..... 79.
LaserFrench/German/Spanish ..... 79.
LaserCyrillic ..... 115.
Living Videotext ... NCP
ThinkTank 512k *(outline processor)* ..... 99.
More *(outlines, windows, & tree charts)* .. 158.
Lundeen & Associates ... NCP
WorksPlus Spell ..... 39.
MacMemory ... NCP
MaxRam & MaxPrint *(Ramdisk, spooler)* .. 33.
Magnum ... NCP
Natural Sound Effects ..... 27.
Natural Sound Cable & Editor Disk ..... 89.
McPic - Volume 1 or Volume 2 ..... 29.
The Slide Show Magician 1.3 *(CP)* ..... 35.
Microsoft
Flight Simulator *(the Mac takes flight, CP)* 32.
Learning Multiplan and Chart *(2 disks, CP)* 39.
Basic Interpreter 3.0 *(NCP)* ..... 64.
Chart 1.02 *(42 chart styles, CP)* ..... 72.
Multiplan 1.1 *(63 col. by 255 rows, CP)* ... 105.
Word 1.05 *(word processor, CP)* ..... 110.
File 1.05 *(flexible data manager, NCP)* ... 111.
Basic Compiler 1.0 *(NCP)* ..... 119.
Fortran 2.2 *(compiler, NCP)* ..... 169.
Works 1.0 *(integrated tool, NCP)* ..... 189.
Excel 1.03 *(power spreadsheet, NCP)* ... 224.
Word 3.0 *(word processor, NCP)* ..... 239.
Miles Computing ... NCP
Mac the Ripper *(req. Paint program)* ..... 27.
Orchestra of Fonts Vol. 4 *(30 different fonts)* 27.
Mindscape ... CP
The Luscher Profile *(personality profile)* ... 24.
The Perfect Score: SAT ..... 47.
ComicWorks *(create your own comics)* .... 48.
GraphicWorks *(newsletters, ads, posters)* 48.
Monogram ... NCP
Forecast *(tax planning)* ..... 40.
Dollars & Sense *(home, small business)* ... 81.
New Canaan MicroCode ... NCP
MDCFinder *(requires 512k)* ..... 20.
Mac Disk Catalog II *(requires 512k)* ..... 31.
Odesta ... NCP
Double Helix *(relational, custom menus)* 275.
OWL International ... NCP
Guide *(hypertext, free-form info)* ..... 79.
Palantir ... CP
MathFlash, WordPlay or MacType ..... 26.
General Ledger or Accounts Receivable .. 49.
inTalk *(communication to emulation, NCP)* 99.
PBI Software ... NCP
Icon Switcher *(customized icons)* ..... 14.
HFS Locater *(DA organizer for HFS)* ..... 26.
HD Backup *(supports MFS, HFS)* ..... 29.
Personal Computer Peripherals ... NCP
HFS Backup ..... 34.
ProVUE Development ... NCP
OverVUE 2.0 *(power-packed database)* .. 149.
Mail Manager Template ..... 29.
Personal Finance Template ..... 29.

Real Time.



Contest Winner #7

Name: Bernard Gitton,
Les Rosiers, France

System: Mac Plus
(and an Apple II)

Applications:
Designs liquid clocks.

Go with the flow.

Bernard Gitton's workshop occupies an 850 year old chapel on the banks of the Loire in France. (That alone makes him a winner in our opinion). There he designs clocks on his Mac. They don't have hands, LED displays, quartz crystals, gears, or springs. Because, in these elaborate timepieces, water marks the flow of time with the same patient persistence as the ancient river outside.

Monsieur Gitton's clocks can be found all over the world: in Berlin, Sao Paulo, Paris, Tokyo, and soon (we hope) in Marlow, NH. They range from about 6 ft. to about 40 ft. high.

In each one, a simple hydraulic pump brings fluorescent colored water to a glass ball at the top. From there, the fluid flows into a shallow bowl which, when full, tips a pendulum device, thereby determining the rate at which the water will continue on through an elaborate series of siphoning tubes and spheres. Filling, so to speak, the hours and minutes of every day.

It's actually more complicated than that, but do you really want to know?

Micro seconds.

Bernard Gitton uses *MacDraw* to outline the plan, and *MacDraft* to detail the complex electronics, mechanics, hydraulics, and even the shapes of the glassware itself. *MacPaint* and *Ready-Set-Go* help produce detailed drawings of each clock.

But, much as he loves the Mac, Bernard has decided to go into head-to-head competition with Apple. He recently created a hydraulic "calculator" that can perform binary additions. He claims that it is the "the slowest computer in the world; it adds two numbers of 4 bits in 22 seconds!" But, we imagine, it does so more beautifully than any micro on earth. Voila! N'est-ce pas?

Et toi (if we may be so familiar)? How do you use your Mac to pass the time? Your story could be worth $500 in free add-ons and software.

"Mon Connection."

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MacConnection.

Infocom ... CP
Leather Goddesses of Phobos
Hitchhiker's Guide, Trinity, Moonmist,
Ballyhoo, *(standard)* . . . . . *each* $24.
MacroMind ... NCP
Maze Wars+ *(play via modem or network)* 32.
Miles Computing ... CP
Harrier Strike Mission *(3D flight simulation)* 27.
MacWars *(3D space simulation)* . . . . . 27.
Mindscape ... CP
Racter *(converse with your Mac!)* . . . . . 27.
Balance of Power *(world politics)* . . . . . 30.
King of Chicago *(req. minimum 512E)* . . . . 30.
Brataccus *(great graphics, req. 512k)* . . . . 30.
Uninvited *(mystery adventure)* . . . . . 30.
Deja Vu *(murder mystery)* . . . . . 32.
PBI Software ... CP
Strategic Conquest *(multi-user)* . . . . . 35.
Psion ... CP
Psion Chess *(3D and multi-lingual)* . . . . . 31.
QWare ... CP
Orb Quest *(graphic fantasy adventure)* . . . 29.
Sierra On-Line ... CP
Championship Boxing *(knock 'em out!)* . . . 25.
Silicon Beach Software
Airborne! *(CP, the classic!)* . . . . . 20.
Enchanted Scepters *(CP, over 200 scenes)* 21.
Dark Castle *(NCP, arcade action)* . . . . . 28.
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
(Formerly Spectrum Holobyte)
GATO *(submarine simulation)* . . . . . 26.
Orbiter *(space shuttle simulation)* . . . . . 27.
Tellstar II *(No. & So. hemispheres, req. 512k)* 32.
XOR ... NCP
NFL Challenge *(be the coach!)* . . . . . 79.

HARDWARE

Manufacturer's minimum limited warranty period is listed after each company name. Some products in their line may have longer warranty periods.

Apricorn ... 1 year
ApriCord Mac *(Mac Plus parallel interface)*. 75.
AST Research ... 2 years
AST 2000 *(20 MB, 20 MB tape)* . . . . . 1779.
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 Memory Upgrades
Mac Snap 524 *(512k to 1 Meg)* . . . . . 139.
Mac Snap Plus 2 *(Mac Plus to 2 Meg)* . . . 249.
Mac Snap 548 *(512k to 2 Meg)* . . . . . 369.
Mac Snap 548S *(incl. SCSI interface)* . . . . 499.
Ergotron ... 1 year
Mouse Cleaner 360° . . . . . 15.
MacTilt *(includes external drive bracket)* . . . 74.
MacBuffer 512k . . . . . 329.
MacBuffer 1024k . . . . . 429.
Hayes ... 2 years
Smartcom II *(communications software)* . . 88.
Smartmodem 1200 . . . . . $369.
Smartmodem 1200 Package . . . . . 425.
Smartmodem 2400 . . . . . 569.
InterBridge *(connect Appletalk networks)* 599.
IOMEGA ... 90 days
Bernoulli Box *(dual 10 MB w/SCSI)* . . . . . 1579.
Bernoulli Box *(dual 20 MB w/SCSI)* . . . . 1879.
Bernoulli Box *(dual 10 MB, Appletalk)* . . 1995.
Kensington ... 1 year
Appletalk Cable Clips or Connectors . . *each* 1.
Mouseway *(mouse tracking pad)* . . . . . 8.
Mouse Pocket *(for your idle mouse)* . . . . . 8.
Mac Plus System Saver Cover . . . . . 9.
Imagewriter (II) Dust Cover . . . . . 9.
Mouse Cleaning Kit w/Mouse Pocket . . . . . 17.
Disk Case *(holds 36 Mac disks)* . . . . . 19.
Disk Drive Cleaning Kit . . . . . 20.
Tilt/Swivel . . . . . 22.
Universal Copy Stand . . . . . 24.
Polarizing Filter . . . . . 34.
Surge Suppressor . . . . . 34.
Control Center . . . . . 64.
System Saver Mac *(platinum or beige)* . . . . 64.
A-B Box *(for the Mac Plus)* . . . . . 64.
Turbo Mouse . . . . . 85.
Koala Technologies ... 90 days
MacVision *(digitizer)* . . . . . 175.
Kraft ... 1 year
3 Button QuickStick . . . . . 49.
Mirror Technologies ... 1 year
Magnum 800 External Drive . . . . . special
MagNet 20x *(w/cable)* . . . . . 779.
Magnum 20 Tape Backup . . . . . 899.
MagNet 30x *(w/cable)* . . . . . 949.
MagNet 40/40 *(40MB, 40MB tape)* . . . . 2395.
MagNet 85x *(w/40MB tape)* . . . . . 3995.
Personal Computer Peripherals ... 1 year
MacBottom Hard Drive 20MB *(serial)* . . . . 865.
MacBottom Hard Drive 20MB *(SCSI)* . . . . 865.
MacBottom Hard Drive 40MB *(SCSI)* . . . 1295.
Summagraphics ... 90 days
MacTablet 6" x 9" *(stylus driven)* . . . . . 289.
MacTablet 12" x 12" *(sketching)* . . . . . 379.
Systems Control ... 2 years
MacGard *(surge protection)* . . . . . 55.
Thunderware ... 90 days
Thunderscan *(high-resolution digitizer)* . . 175.
Western Automation ... 1 year
DASCH RAMdisk 2000k . . . . . 459.

DISKS

Single-sided Diskettes

Sony 3½" Disks *(box of 10)* . . . . . 14.
MAXELL 3½" Disks *(box of 10)* . . . . . 14.
Fuji 3½" Disks *(box of 10)* . . . . . 14.
Verbatim 3½" Disks *(box of 10)* . . . . . 15.
3M 3½" Disks *(box of 10)* . . . . . 16.

Double-sided Diskettes

Sony 3½" Disks *(box of 10)* . . . . . 21.
MAXELL 3½" Disks *(box of 10)* . . . . . 21.
Fuji 3½" Disks *(box of 10)* . . . . . 21.
Verbatim 3½" Disks *(box of 10)* . . . . . 23.
3M 3½" Disks *(box of 10)* . . . . . 24.

INFORMATION SERVICES

Compuserve
Compuserve Information Service . . . . . 24.
Dow Jones
Dow Jones News/Retrieval Membership Kit $24.
Source Telecomputing
The Source *(subscription & manual)* . . . . . 30.

ACCESSORIES

Clean Image Ribbon Co.
Clean Image Ribbon Kit . . . . . 12.
Computer Coverup
Imagewriter (II) Cover . . . . . 8.
Mac (Plus) & Keyboard *(two covers)* . . . . . 10.
Diversions
Underware Ribbon *(iron-on black transfer)* . . 9.
Multi-color Transfer Ribbon . . . . . 19.
I/O Design
Imageware II *(Imagewriter II carry case)* . . . 49.
Macinware Plus *(Mac Plus carry case)* . . . . 69.
Macinware SE *(Mac SE carry case)* . . . . . 89.
Innovative Concepts
Flip & File Micro *(holds 25 disks)* . . . . . 9.
Flip & File *(holds 40 disks)* . . . . . 18.
Innovative Technologies
The Pocket Pak *(holds 6 disks)* . . . . . 9.
The Easel *(holds 20 disks)* . . . . . 13.
The Disk Directory *(holds 32 disks)* . . . . . 18.
The Library *(carousel, holds 80 disks)* . . . . 29.
Kalmar Designs
Teakwood Roll-top Case *(holds 45 disks)* . . 14.
Teakwood Roll-top Case *(holds 90 disks)* . . 21.
Magnum
Mouse Mover *(let your mouse ride!)* . . . . . 14.
Moustrak
Moustrak Pad *(standard 7" x 9")* . . . . . 8.
Moustrak Pad *(large 9" x 11")* . . . . . 9.
Ribbons Unlimited
Imagewriter Black or Color Ribbons. . . . . 5.
Imagewriter Ribbons Six Pack . . . . . 25.
Smith & Bellows
Mahogany Disk Case *(holds 90 disks)* . . . . 28.

OUR POLICY

- We accept VISA and MASTERCARD.
- No surcharge added for credit card orders.
- Your card is not charged until we ship.
- If we must ship a partial order, we never charge freight on the shipment(s) that complete the order.
- No sales tax.
- All U.S. shipments insured; no additional charge.
- APO/FPO orders usually shipped 1st Class Mail.
- Allow 1 week for personal and company checks to clear.
- UPS Next-Day-Air available.
- COD max. $1000. Cash or certified check.
- 120 day limited warranty on all products.*
- To order, call us anytime Monday thru Friday 9:00 to 9:00, or Saturday 9:00 to 5:30. You can call our business offices at 603/446-7711 Monday through Friday 9:00 to 5:30.

SHIPPING

Note: Accounts on net terms pay actual shipping. **Continental US:** For printers and drives add 2% for UPS ground shipping (call for UPS Blue or UPS Next-Day-Air). For all other items, add $2 per order to cover UPS shipping. We will automatically use UPS 2nd-Day-Air at no extra charge if you are more than 2 days from us by UPS ground. **Hawaii:** For printers and drives, actual UPS Blue charge will be added. For all other items, add $2 per order. **Alaska and Outside Continental US:** Call 603/446-7711 for information.

fast flowing service call

Rubicon Publishing ... CP
Silver Palate Collection *(NY's finest!)* . . . . . $28.
Dinner At Eight *(recipes to wines)* . . . . . 32.
Dinner At Eight-Silver Palate Bundle . . . . . 54.
Satori ... NCP
BulkMailer *(mailing lists)* . . . . . 74.
BulkMailer Plus *(up to 90,000 names)* . . . 225.
Legal Billing *(attorneys to accountants)* . . 385.
Legal Billing II *(full trust accounting)* . . . . . 575.
Project Billing *(architects to engineers)* . . . 445.
Silicon Beach Software ... NCP
Accessory Pak 1 *(useful utilities)* . . . . . 21.
Silicon Press *(printer utility, 512k)* . . . . . 41.
SuperPaint *(advanced graphics program)* 54.
Simon & Schuster ... NCP
Mac Art Department *(req. Paint program)* 24.
Paper Airplane Construction Kit . . . . . 24.
Typing Tutor III *(learn to type!)* . . . . . 35.
SoftStyle ... NCP
Colormate Art *(Colormate images)* . . . . . 27.
Colormate *(color printing utility)* . . . . . 48.
Laserstart *(Hewlett-Packard Laserjet)* . . . . . 58.
Decision Map *(make better decisions, CP)* 75.
Software Discoveries ... NCP
Record Holder *(data manager)* . . . . . 41.
Software Ventures ... NCP
Microphone *(communications)* . . . . . 58.
Solutions, Inc. ... NCP
SmartScrap & The Clipper . . . . . 41.
Glue *(creates "print to disk" capability)* . . . 41.
Springboard ... CP
Art a la Mac Vol. 1-People & Places *(NCP)* 23.
Art a la Mac Vol. 2-Variety Pack *(NCP)* . . . . 23.
Easy as ABC *(ages 3-6, letters, CP)* . . . . . 28.
Early Games *(ages 2-6, counting, CP)* . . . . 28.
Certificate Maker *(CP)* . . . . . 35.
State of the Art ... CP
Electric Checkbook *(print checks)* . . . . . 28.
SuperMac Technology ... NCP
SuperSpool . . . . . 39.
Diskfit *(backup & restore utility)* . . . . . 49.
SuperLaserSpool . . . . . 99.
Multi-User SuperLaserSpool . . . . . 259.
Survivor Software ... NCP
MacMoney *(financial planner)* . . . . . 42.
Symmetry ... NCP
Acta 1.2 *(outline/writing desk accessory)* . . 38.
PictureBase *(clip art manager, 512k)* . . . . . 44.
T/Maker ... NCP
ClickArt Personal Graphics . . . . . 28.
ClickArt Effects . . . . . 28.
ClickArt Publications . . . . . 28.
ClickArt Letters Vol. 1 or Vol. 2 . . . . . 28.
ClickArt Holidays *(Easter)* . . . . . 28.
ClickArt Business Image . . . . . 28.
Bombay, Plymouth, or Seville Laser font . . . 46.

MacConnection Special of the Month
through June 30, 1987

MIRROR TECHNOLOGIES
Mirror Magnum 800

The Mirror Magnum 800 is a superior quality 3.5" double-sided disk drive specially designed to work with all Macintoshes—from the 512k to the new Mac SE. It will recognize all disk commands, and connects directly to the Mac's drive port. Quiet and reliable, the Magnum 800 features either automatic or manual eject.

- Read/write LED indicator
- Available in platinum or beige
- Full one year warranty

Mirror Magnum 800 Disk Drive . . . . . $209.

Write Now *(word processor)* . . . . . 104.
Target Software ... NCP
Merriam Webster's Thesaurus . . . . . call
MacLightning *(interactive spell checker)* . . call
Medical or Legal Dictionary . . . . . call
Voila! *(desk accessory outliner)* . . . . . call
Telos Software ... NCP
Business Filevision *(512k, external drive)* 199.
Think Educational ... CP
MacEdge II or Mind Over Mac . . . . . 28.
Think Technologies ... NCP
Laserspeed *(Laserwriter utility)* . . . . . 67.
Lightspeed Pascal *(includes debugger)* . . . 87.
Lightspeed C *(top-rated C Compiler)* . . . . 127.
TML Systems ... NCP
TML Source Code Library . . . . . 58.
TML Database Toolkit . . . . . 64.
TML Pascal *(compiler, req. 512k)* . . . . . 68.
TrueBasic ... NCP
True BASIC *(fast, flexible & portable)* . . . . . 88.
Algebra II, Pre-calculus, Calculus, Trigonometry, 3D Graphics, Discrete Math, Probability & Chippendale utilities . . . *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)* 33.
myDiskLabeler w/Laserwriter option . . . . . 35.
Working Software ... CP
(Formerly Greene, Johnson)
Spellswell *(spelling checker)* . . . . . 45.

GAMES

Accolade ... CP
Hardball *(baseball simulation)* . . . . . 24.
Activision ... CP
Championship Star League Baseball . . . . . 22.
Borrowed Time *(murder mystery)* . . . . . 27.
Shanghai *(Mah Jongg strategy)* . . . . . 27.
Tass Times in Tonetown . . . . . 27.
Hacker *(you're on your own!)* . . . . . 27.
Hacker II *(breach Russian computer)* . . . . . 30.
Addison-Wesley ... CP
Puppy Love *(your dog will love it!)* . . . . . 15.
Ann Arbor Softworks ... CP
Grid Wars *(3D graphic arcade)* . . . . . 22.
Artworx ... CP
Bridge 4.0 *(sharpen your skills)* . . . . . 20.
Avalon Hill ... CP
MacPro Football *(req. 512k)* . . . . . 30.
Blue Chip ... CP
Millionaire *(stock market)* . . . . . 35.
Tycoon *(commodities)* . . . . . 35.
Baron *(real estate)* . . . . . 35.
Squire *(personal finance, req. 512k)* . . . . . 35.
Broderbund Software ... CP
Lode Runner *(over 150 levels)* . . . . . 24.
Ancient Art of War *(military strategy)* . . . . . 27.
Toy Shop *(create working models)* . . . . . 39.
Bullseye ... CP
Ferrari Grand Prix *(Formula One racing)* . . . 34.
Fokker TriPlane Flight Simulator . . . . . 34.
Electronic Arts ... CP
Archon *(arcade strategy, req. 512k)* . . . . . 27.
Skyfox *(3D graphics)* . . . . . 27.
Seven Cities of Gold . . . . . 27.
One on One/Dr J vs Larry Bird *(req. 512k)* . . 27.
Patton-vs-Rommel *(req. 512k)* . . . . . 27.
Pinball Construction Set . . . . . 27.
Chessmaster 2000 . . . . . 30.
Epyx ... CP
Rogue *(strategy dungeon classic!)* . . . . . 24.
Winter Games *(Olympic events)* . . . . . 24.
Firebird ... CP
Pawn *(fantasy adventure)* . . . . . 27.
Hayden Software ... CP
Perplexx *(scrabble-type game)* . . . . . 24.
Sargon III *(9 levels of chess)* . . . . . 29.
Infinity Software ... CP
Grand Slam *(tennis, req. 512k)* . . . . . 27.

1-800/Mac&Lisa 710C

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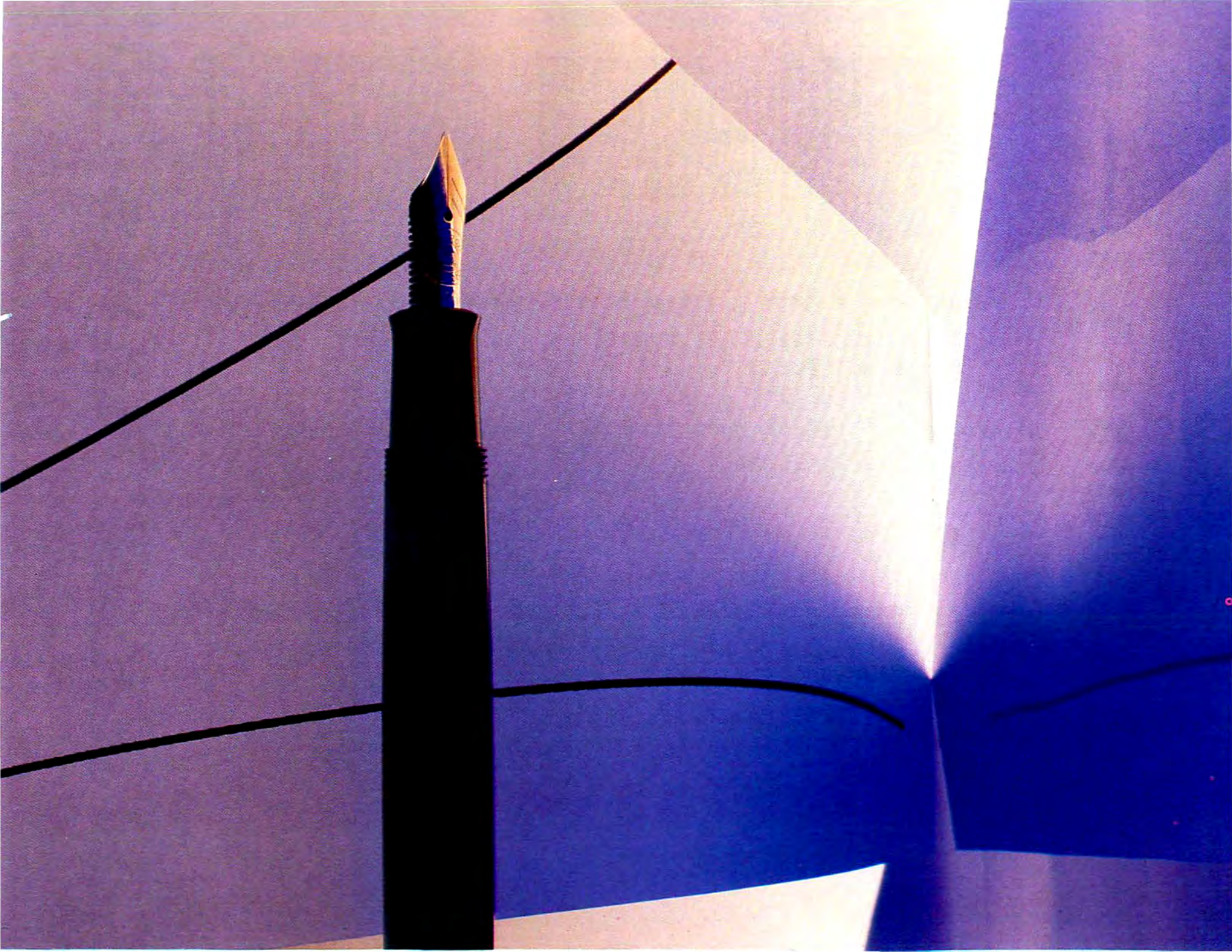


Illustrator: The Tracer's Edge

Professional-quality PostScript graphics from Adobe

by Robert C. Eckhardt

Now that Macintosh applications have settled into a number of well-established categories and styles, the emergence of a startlingly different program is a rare event. Although many touted the recent rash of new graphics applications–*FullPaint, SuperPaint, GraphicWorks,* and *Cricket Draw*–as great leaps forward in Macintosh graphics, none of these programs were dramatically new: they all built directly on the concepts, tools, and procedures of their predecessors. With *Illustrator,*

however, Adobe has rebuilt the graphics program concept from the ground up.

Before *Illustrator,* Mac graphics programs were based on either of two strategies, each with its own strengths and weaknesses. Freehand drawing programs like *MacPaint* let you draw complicated shapes and shade them however you choose. But because these programs work with bit maps, they offer you very limited ability to change what you've drawn, and their print quality is restricted to the Mac screen's 72 dots per inch (dpi). By contrast, object-oriented programs like *MacDraw* use mathematical expressions to define lines and shapes. These programs can print at very high resolution, and they enable you to change the size, placement, line weight, pattern, and shape of objects in a drawing at any time. But object-oriented programs buy editing flexibility at the expense of drawing freedom; instead of using a freehand tool, you must compose pictures using only straight lines, limited arcs, circles, squares, and other simple shapes.

Illustrator's achievement is the marriage of *MacDraw*'s editability and high resolution with *MacPaint*'s facility with eccentric shapes. Designed by the creators of PostScript, *Illustrator* is really a PostScript interface that enables artists to harness that language's graphics power without learning a word of code.

The program's heart is its unique pen tool, which can define curves of virtually any shape. As you draw, the program automatically generates a PostScript file that can be output on anything from an ImageWriter to a 2500-dpi Linotronic typesetting machine. In addition, *Illustrator* offers precise control over line width, the ability to specify up to 100 shades of gray (or magenta, cyan, and yellow, for output to color printers), and a variety of tools for scaling, rotating, shearing, and otherwise manipulating PostScript objects.

Something Completely Different

Illustrator is a powerful program designed for graphics professionals who produce publication-quality art. Power, however, has its price. One of the many characteristics that set *Illustrator* apart from previous Macintosh graphics programs is that it is not primarily a drawing program. Like using an airbrush, working with *Illustrator* takes too much planning and is too cumbersome for freehand work; the program's focus is on art production rather than design.

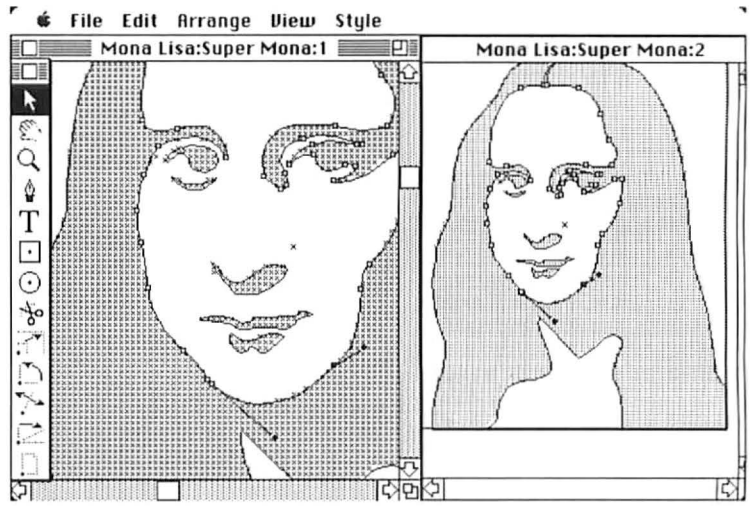
Traditional illustrators commonly work out the dimensions and details of a drawing in pencil, and then trace that sketch in pen and ink. Similarly, with *Illustrator* you can use scanned images or freehand *MacPaint* sketches as "templates" for producing high-quality art. An example can best demonstrate this unique approach to computer graphics.

Consider the project of converting the Mona Lisa clip-art image from T/Maker's *ClickArt* series into *Illustrator* art (see "Tracing a Template"). When you open *MacPaint* (or *MacDraw*) files from *Illustrator,* the program displays them in gray so that your *Illustrator* artwork, which you will draw over the template, stands out. The template opens at "actual" *Paint* size, in which each dot in the image is equivalent to one pixel on the screen. By clicking the magnifying glass tool, you can enlarge the template for a more comfortable working size or reduce it for a better overall view. Nine magnification levels are available, each twice the size of the previous one.

Our strategy for reproducing this image will be to trace the outline to create a solid black silhouette, trace the highlights within the silhouette and fill them with white, and finally, add the frame.

To trace a shape, you use the pen tool to draw a sequence of line segments—a *path* in *Illustrator* terms. Shapes composed only of straight lines are created simply by clicking the pen tool at each successive corner, a process identical to that of *MacDraw*'s polygon tool. Thus, to draw the bottom part of the silhouette, you would click on the right edge of the figure, the lower-right and then left corners, and the point at which the hair leaves the frame. If you hold down the Shift key when you click, your lines will be constrained to the horizontal or vertical, and all your corners will be square.

Because the outline of the hair is a curve, you'll need a new technique to continue tracing. In *Illustrator* you don't drag a curve out as you might drag an arc in *MacDraw* or *Cricket Draw.* Instead, you use the pen tool to specify a beginning point for the curve.



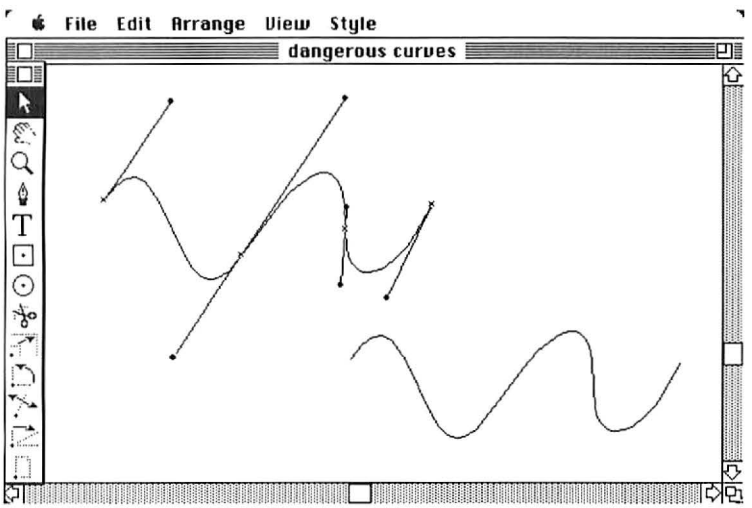
Tracing a Template

Illustrator *lets you view one document in several different ways. The right window shows a reduced view of the Mona Lisa template. When drawing the path, you would probably work in an enlarged view, such as the one on the left. The curve of the chin has been selected, so its direction points are visible.*

You then drag a handle out from your beginning point in the general direction you want the curve to go; a deep curve requires a long handle; a shallow curve, a short handle (see "Curve Control"). To complete the curve, you lay down an end point and pull out another handle; the program automatically sends an arc to bridge the two points. Once the curve has been drawn, you can adjust the handles to control its shape with an unprecedented degree of precision. The process of drawing curves in *Illustrator* seems counterintuitive at first, but with practice it becomes second nature.

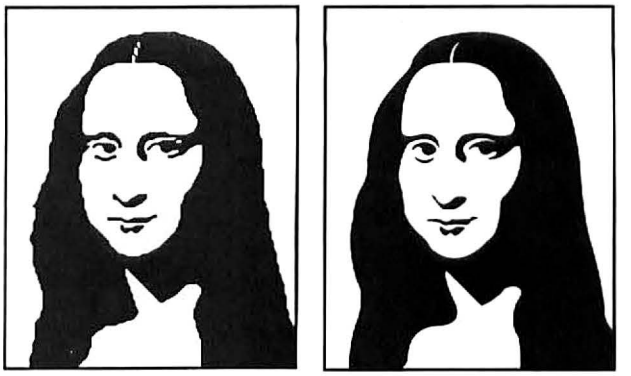
To continue drawing the silhouette, you first use the Option key to get the pen tool to switch from drawing straight lines to curves. You then keep going around the top of the head, laying down points—known as *anchor points*—wherever the line changes from a curve to a straight line or from a convex to a concave curve. Less complex curves require fewer points. Wherever two curves or a curve and a straight line meet to form a sharp corner, you use the Option key to create an angled joint rather than a smooth transition. Finally, after working all the way around the silhouette, you create a closed loop by placing the last point on top of the first one.

Part of *Illustrator*'s power comes from the unparalleled flexibility of its pen tool. You can use keyboard commands to invoke virtually any of the other drawing tools without having to go back to the palette. For example, by pressing the space bar, you can temporarily convert the pen to the hand tool. If you hold down the ⌘ key, the pen becomes the pointer, which you use for curve editing. Pressing the space bar together with the ⌘ key changes the pen tool into the magnifier, while the Option key determines whether you zoom in or out.



Curve Control

These two curved lines are identical except that the one at left has been selected to show its direction points (the black dots at the ends of the tangential lines). You can reshape a curve at any time by dragging on the direction points, moving the anchor points, or adding new anchor points.



Mac Make-Over

The easiest way to create Illustrator *art is to trace bit-mapped images such as the clip-art silhouette on the left. The high-quality PostScript image on the right shows the improvement possible with* Illustrator.

Fill and Stroke

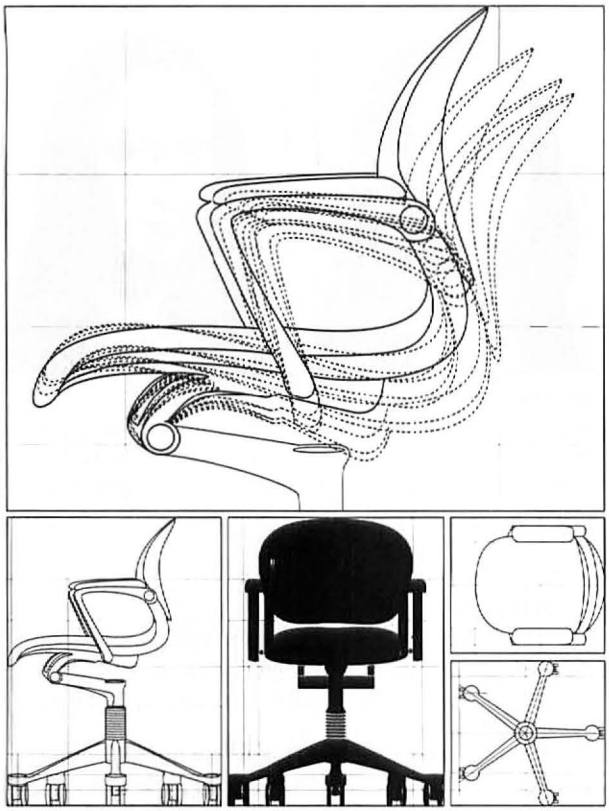
Although outlines created with the pen tool look real enough, they can't be printed until they're given either a *stroke* or a *fill*. You use the Paint dialog box to stroke or fill a path.

The Fill section of the dialog box lets you determine what the interior of the selected path will look like. Selecting none leaves the interior transparent. You can also select white, any percentage of black, or any percentage of cyan, magenta, or yellow. To fill the Mona Lisa, you would click on the % Black button; the program automatically fills in 100 as the default percentage.

Stroke attributes refers to the characteristics of a line drawn on top of the path. You have the same options as those available for fill—in this case, you'd choose none. If you select a stroke attribute other than none, a series of options lets you specify the stroke's thickness to a fraction of a point; the characteristics of the stroke's ends, or caps (rounded, butted, or projecting); and the shape of corners where lines meet (mitered, rounded, or beveled). You can also create patterns for dashed lines.

Clicking on the OK button fixes the fill and stroke attributes and returns you to the drawing window. But because a path is a simplified stand-in for what the program will eventually print, the screen looks just as it did before. A major benefit of this symbolic nature of the drawing window is the much greater speed with which the program can redraw the screen (especially important as Macintosh screens get larger).

To see how your handiwork will actually look when printed, you must select Preview from the View menu. Preview removes the template from view and displays a reasonable rendition of the the final image. I say "reasonable," because the screen resolution inevitably limits the fidelity of the image, and type is still shown in blocky, bit-map form.



Easy Chair

A sample technical illustration: artist Michael Renner used the rotate tool to indicate the reclining action of this office chair.

To complete the Mona Lisa, you would trace each white area within the silhouette and paint it white (with no stroke). Since the most recently drawn path covers anything drawn previously, the new white-filled shapes will conceal the black silhouette beneath. To prevent accidental movement and misalignment, you would group paths together as you worked. Finally, you would use the rectangle tool to complete the frame. To allow the rest of the artwork to show through the frame, you would select none for the rectangle's fill.

The result—a detailed image composed entirely of seamless curves and smooth lines—is nothing like the template from which it was derived (see "Mac Makeover"). In contrast to the original *MacPaint* image, the higher the resolution of the printer, the better the *Illustrator* version will look. Also unlike the *MacPaint* image, enlargements or manipulated versions of the *Illustrator* art will not have the "pixelated" look characteristic of bit-mapped images. Equally important, with just one or two commands you can refill the image in any shade of gray (or color, with the proper printer) or convert it to outline form with precisely specified stroke widths.

Transformers

At any time during a drawing session, you can rework previously drawn paths, often in ways that would be impossible in other graphics programs. For example, with the scissors tool you can add new points to the middle of a line segment—to add detail to or refine the shape of complex curves—or you can cut single paths in two. With the pointer you can move points or handles to fine-tune a curve.

With the rotate tool you can reposition paths or text either by dragging or by specifying degrees of rotation. This tool can be used, for example, to automate the drawing of radially symmetrical objects.

The reflect tool creates a mirror image of the selected object (path or text) along any axis you choose. This tool is useful for such tasks as reversing images and type, creating reflections, and producing bilaterally symmetrical objects in half the usual time.

The shear tool slants selections horizontally, vertically, or both, and provides an easy way to make shadows or slanted type. The scaling tool can enlarge or reduce an object along a single axis or along two axes, with either uniform or differential scaling on the two axes. You can specify that the existing line weights be scaled or remain unaltered. This ability to scale without changing line weights is a feature even the best stat camera can't match.

Reflection, shearing, moving, and scaling can all be done by eye or by precise measurements via the appropriate transformation dialog box. You can use the Transform Again command to repeat any of the operations performed with the transformation tools. And of course, all transformed images are resolution-independent, just as smooth and free of the jaggies as the originals from which they were made.

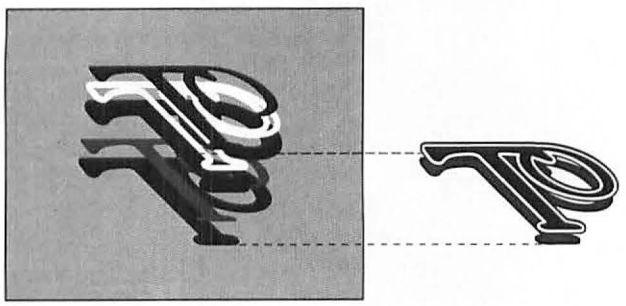
A Program for All Types

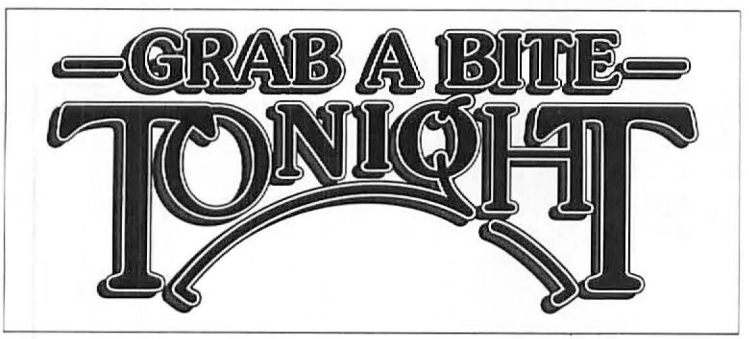
Illustrator's text-entry pointer is the familiar I-beam, but when you click to place your caption, title, label, or other text on screen, you get a dialog box instead of the expected text-entry bar. In the dialog box, you set the font, style, size, leading, kerning, and alignment of the text you want to enter. You type the text itself in a large entry box, which means that every text block must have a single set of attributes. Lines of different sizes, words of different styles, even specially kerned letters must be created as separate text blocks.

You can employ any of the transformation tools to stretch, shrink, rotate, reflect, or shear any text block to create high-quality special-effects type. You can also use the Paint commands to specify both fill and stroke (to create outline type, for example). Anyone who has ever sent out for special-effects type will appreciate the savings in both money and grief.

No program is perfect, especially in its first incarnation, and *Illustrator* is no exception. My list of objections, however, is surprisingly short: the program should provide a simpler way of moving a path or text block over or under another one, rather than forcing you to cut the object and then use a special Paste command. Despite the program's ability to display multiple windows, including several views of the same document, it has no Window menu to help you uncover hidden windows. There should be a way to kern pairs of letters within a text block and a way to fit text onto a curved line. Also helpful would be the option to use units of measurement other than picas and points; some technical artists, for example, might prefer centimeters or inches.

Illustrator's insistence on measuring everything in picas and points provides one clue to this program's target audience. So does the $500 price. *Illustrator* is like a sleek, well-engineered car that can cruise at 150 mph. If you lack the skill or opportunity to fully use it, then you might as well stick to a more practical model. Similarly, for those who regularly work with low-resolution output (such as that of an ImageWriter), *Illustrator* offers only marginal improvement over programs that are considerably less expensive.





Tinkering with Type

Adobe artist Russell Brown created this logo as an experiment in type modification. He began by combining various sizes of Souvenir Light (for the top line) and Demi with drawn elements (as for the tail of the g*). He then copied and stacked five layers of the basic design on top of one another, as shown in the inset. By stacking thinner, unstroked letters on top of more heavily stroked letters, Brown produced the outline effects. The bottom two layers were then selected and dragged to throw the shadow.*

A Rose May Be a Rose . . .

But an Illustrator *drawing isn't just a drawing. Once you've defined your basic paths,* Illustrator*'s fill, stroke, and other options enable you to realize your art in limitless ways. (*Illustrator *does not automatically produce fill patterns; the gradient and striped backgrounds here were created manually.)*

In addition, as of this writing only a few programs (such as *Microsoft Word* 3.0 and *ReadySetGo* 3.0) accept and print PostScript files. These programs, however, are unable to display PostScript images on screen. *Illustrator* can also save files in the Encapsulated PostScript (EPS) format, which was designed to address PostScript's screen-display difficulties. At this time, EPS works only with *PageMaker* 2.0. While the number of programs that work with EPS or regular PostScript files is certain to grow, so far only a handful of developers have announced their intention to include PostScript compatibility in their programs. So, for the time being, you won't find *Illustrator* too useful if you want to incorporate its output primarily in programs that aren't PostScript compatible.

The cost of converting to *Illustrator* is steep. Even if you already have a Mac Plus and access to a LaserWriter (an ImageWriter would be an inadequate preview tool for applications requiring *Illustrator*'s talents), you must consider not only the price of the program but also the cost of a paint program and a digitizer.

Like an airbrush, *Illustrator* is not a tool for everyone. But for those who need a sophisticated, resolution-independent artist's tool, there's nothing better. *Illustrator* was envisioned from the start as a professional graphics system, and every aspect of the program, from the specific tools and capabilities it incorporates to its overall working strategy, reflects that intention.

Up to now, Macintosh graphics have been limited, so much so that most Macintosh-generated art was easily recognizable. Now *Illustrator* has restored a traditional approach to graphics that early Macintosh programs took away, offering instead what the best Macintosh programs have always offered: familiar concepts and tools translated into electronic form, bound only by the imagination of the person holding the mouse. □

Laser Wars

by Jim Heid

If you've decided to take the plunge and replace your whining ImageWriter with a laser printer, the printers you probably think of first are Apple's LaserWriter and LaserWriter Plus. But despite their prominent role as conspirators in the desktop publishing revolution, Apple's printers aren't your only alternatives. Adobe Systems has licensed PostScript, the page-description language that gives LaserWriters their text- and graphics-printing prowess, to more than 15 other manufacturers. A growing number of LaserWriter alternatives are becoming available, many with price or performance advantages over Apple's printers.

Reviewed here are four representative LaserWriter alternatives, ranging in price from $2995 to $17,900: QMS's PS-800 and PS-800 Plus; The Laser Connection's PS Jet, a kit that turns a Hewlett-Packard LaserJet into a PostScript printer; and Dataproducts' LZR-2665. PostScript makes them compatible, but price and performance make them different.

Setting up one of these LaserWriter stand-ins with a Mac is a matter of plugging in an AppleTalk connector and using the Chooser desk accessory. These printers' PostScript interpreters make them compatible with LaserWriters and allow them to use Apple's (and Aldus's) LaserWriter printer drivers as well as downloadable fonts from Adobe and others (see "Font Facts," *Macworld*, February 1987).

In one way, the proliferation of PostScript printers places Adobe and software developers between a rock and a hard place. Anxious to add value to their wares, some printer manufacturers are offering unique options like bin sorters for collating documents and dual paper trays for holding different sizes or types of

PHOTOGRAPHS BY DAVID BISHOP

A hard look at four new challengers to the LaserWriter's hegemony over Mac laser printers

paper. The problem: how to take advantage of these unique features while preserving PostScript's device independence and compatibility advantages. Adobe is working on one possible answer: a printer-description file that will allow applications to determine and exploit a printer's features.

Laser Shopping List

PostScript solves the compatibility problem, but laser printer shoppers must consider several technical issues as well as choose from an array of options.

■ *Memory* The amount of memory in a PostScript printer—and the way the printer uses it—has a direct bearing on the printer's performance. When it comes to printing documents containing numerous fonts and sizes, the key to printer performance is the *font cache,* an area of the printer's memory set aside for holding bit-mapped descriptions of fonts. The font cache's inner workings are technically complex (see "PostScript's Type Drawer"), but the rule to remember *isn't* the bigger the font cache, the faster the printer will be at printing documents with many fonts and sizes.

■ *Print resolution* The number of dots per inch that a printer produces is important for desktop publishing applications. All of the printers reviewed here match the LaserWriter series' 300-dot-per-inch (dpi) resolution; laser printers with finer resolutions are available, but are quite expensive. Agfa's P400PS offers 400-dpi resolution as well as a high-performance controller equipped with its own hard disk, but its $28,000 price dwarfs even that of the LZR-2665.

■ *Page size* The size of the paper-feed and toner-distribution mechanisms limits Apple's printers to 8½-inch-wide paper, which is inadequate for drafting or computer-aided design applications and for desktop publishing jobs like 11- by 17-inch posters or tabloids. *B-size printers* such as Dataproducts' LZR-2665 automatically feed paper up to 11 by 17 inches. Because every dot on a page requires a corresponding bit in memory, these printers contain more memory than LaserWriters and other 8½-width, or *A-size,* units (see "Lasers at a Glance").

■ *Print engine* You should consider the printer's mechanism for advancing paper and distributing and melting toner on a page for three reasons: speed, print quality, and duty cycle. With graphics printers in general, and PostScript printers in particular, the paper-feed mechanism is a minor player in determining performance.

Still, when printing simple documents containing one or two fonts, the printer with the fastest paper-moving mechanism is generally fastest. Also, some engines expose an image differently, producing blacker blacks—less-apparent scan lines—that are especially noticeable in documents containing reverse type (white on black) or large graphics. Finally, some engines are designed for heavier use and are rated for a longer life than the Canon LBP-CX engines in LaserWriters—an important factor for large networks or other printing situations that exceed the Canon engine's recommended-use capacity of 3000 pages per month.

■ *Built-in fonts* Typeface requirements may also influence your choice of a printer. Built-in fonts—as opposed to downloadable fonts—save money, time, and disk space. At this writing, QMS's PS-800 Plus and Apple's LaserWriter Plus lead the font derby with 11 built-in font families each. Most PostScript printers duplicate the LaserWriter's type drawer: Courier, Times Roman, and Helvetica. Any PostScript printer can use downloadable fonts, however, and most LaserWriter Plus fonts are available in downloadable form.

Still, each set of Adobe downloadable fonts costs between $140 and $185; buying the fonts built into the LaserWriter Plus costs close to $1500. Downloadable fonts impose performance and storage tariffs, as well. It takes 30 to 40 seconds for the Mac to download a font over AppleTalk, but the typefaces in a PS-800 Plus or LaserWriter Plus are always on tap. Moreover, the font files themselves take up disk space (between 25K and 40K per font, depending on the typeface), and only three to six fonts, depending on the printer, will fit in a printer's memory.

■ *Connection ports* Some PostScript printers have parallel connectors as well as serial and AppleTalk ports, allowing you to use these printers with parallel port-equipped computers like the IBM PC. A parallel port is of little value if AppleTalk is all you use, but it could be useful in conjunction with a printer's emulation modes.

■ *Emulation modes* LaserWriters and other PostScript printers provide an emulation mode that lets the printer mimic the Diablo 630, a venerable letter-quality printer supported by most MS-DOS software. Some printers provide additional emulation modes for imitating Hewlett-Packard LaserJets, plotters, or Texas Instruments printers.

Because no other widely available page-description language provides PostScript's capabilities, any emulation mode will turn a PostScript printer into an inferior printer that can't handle text and graphics as well. But for offices that use MS-DOS computers with software that doesn't support PostScript printers, emulation modes at least allow exploitation of a PostScript printer's speed and print quality.

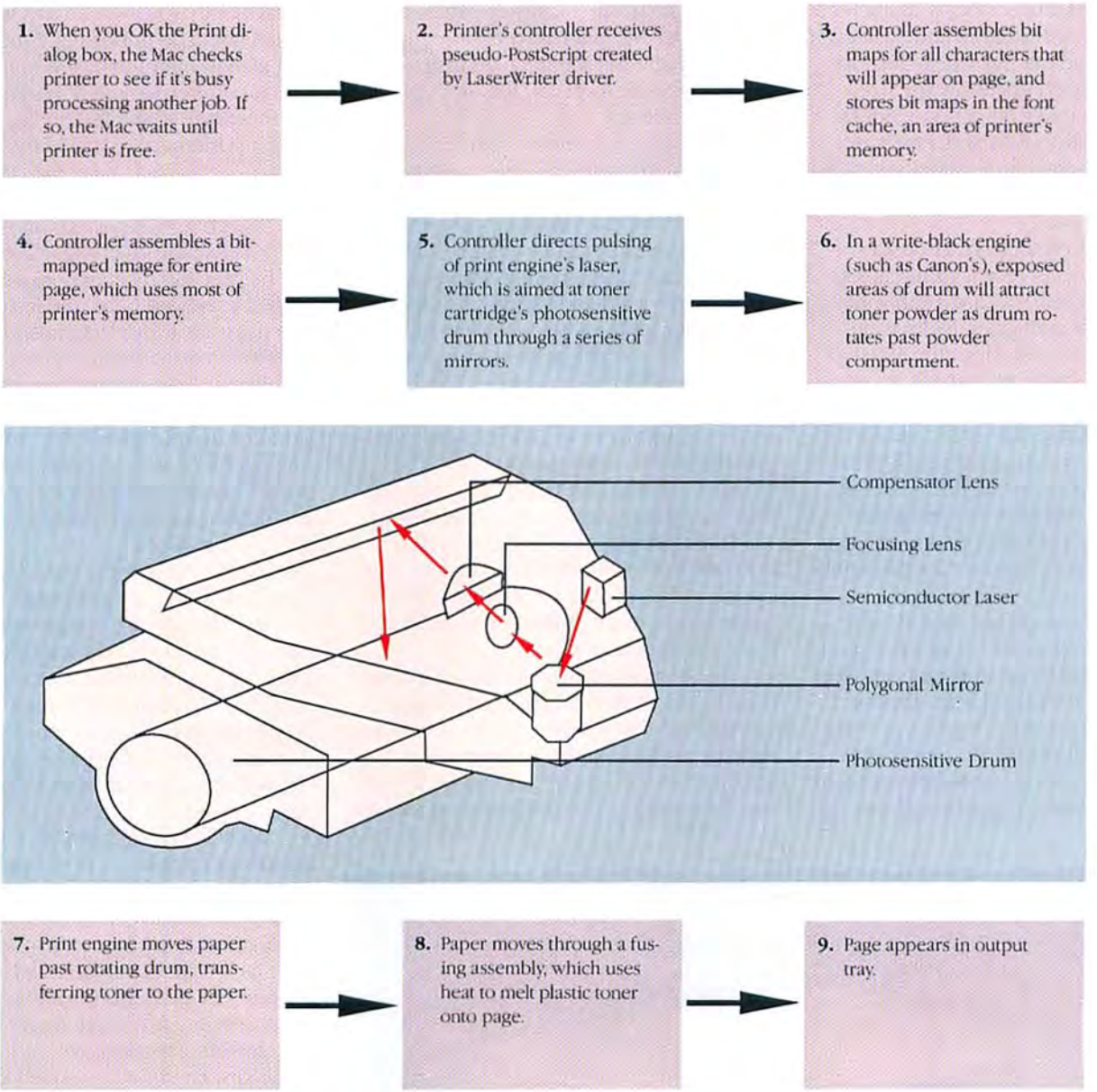
■ *Accessories* Some PostScript printers accept accessories, such as large-capacity paper trays and bin sorters. If you use a laser printer as a typesetter—to produce pages for a commercial printer—such accessories have limited value. They could, however, be useful if you want to run a laser printer more like a printing press, producing dozens or hundreds of copies of a document.

QMS PS-800 and PS-800 Plus

The QMS's PS-800 series printers are built around the same Canon mechanism that's in the LaserWriter. The PS-800 contains the same three font families as the LaserWriter, and the PS-800 Plus matches the LaserWriter Plus's font mix. On the test track, however, the similarities end. A larger memory and a larger font cache enable the PS-800 to outprint a LaserWriter or LaserWriter Plus.

Setting up a PS-800 is straightforward. After you (and someone else) heft it from the box, you remove several shipping spacers, insert a small cleaning pad, and slide a toner cartridge into place. The toner cartridges are identical to those used in LaserWriters: one cartridge lasts for roughly 3000 copies and contains the photosensitive drum that transfers the image to paper. When you replace the toner, you also replace the drum, thereby performing most of the preventive maintenance the machine requires.

The PS-800's real strength is its superior performance, due in part to its larger memory and to some sophisticated proprietary hardware tricks. The PS-800 contains 2 megabytes of memory, versus the LaserWriter series' 1.5MB. The extra half megabyte allowed QMS to create a 279K-font cache, versus the 150K in the Apple printers. The difference is obvious. A PS-800 is a superior alternative to a LaserWriter. In one test, which involved printing a ten-page document containing numerous pictures



and six fonts, the PS-800 was three times faster than the LaserWriter Plus.

The PS-800 beats the LaserWriter by a length, but the PS-800 Plus beats the LaserWriter Plus by a mile. The fastest printer of the four tested, the PS-800 Plus is the only printer running PostScript version 44, which is faster than earlier versions and far more memory efficient. For example, the PS-800 Plus contains the same amount of memory as a PS-800, but upon start-up, a whopping 410K of memory is available, versus the PS-800's 213K—enough to make even the most rabid downloadable-font hound stop barking. And the PS-800 Plus was four times faster than the LaserWriter Plus when printing a complex document with downloadable fonts and bit-mapped images. Unless you have a service contract with (or stock in) Apple, there's no reason to consider a LaserWriter Plus over a PS-800 Plus. QMS is contemplating offering an upgrade from the PS-800 to the Plus, but price and availability information had not been disclosed as of this writing.

Laser Connection's PS Jet

Hewlett-Packard's LaserJet was the first mass-market laser printer built around the Canon engine. LaserJets outnumber LaserWriters six to one and are the best-supported laser printers in the MS-DOS world. Nevertheless, LaserJets are better suited to replacing letter-quality daisy wheel printers than performing demanding desktop publishing and graphics applications. Hewlett-Packard's Printer Control Language lacks PostScript's powerful graphics-manipulation skills and can't touch PostScript's typographic capabilities. Like Macintosh screen fonts, LaserJet fonts are stored as bit maps. This approach requires a separate, memory-consuming description for each size, severely limiting the number of fonts and sizes the printer can

provide. PostScript describes a character's appearance mathematically, and PostScript can use that same mathematical description to create the character in any size—from an unreadable 1 point up to, Adobe says, the size of Rhode Island. PostScript can also alter character descriptions to produce slanted, expanded, compressed, and shaded text.

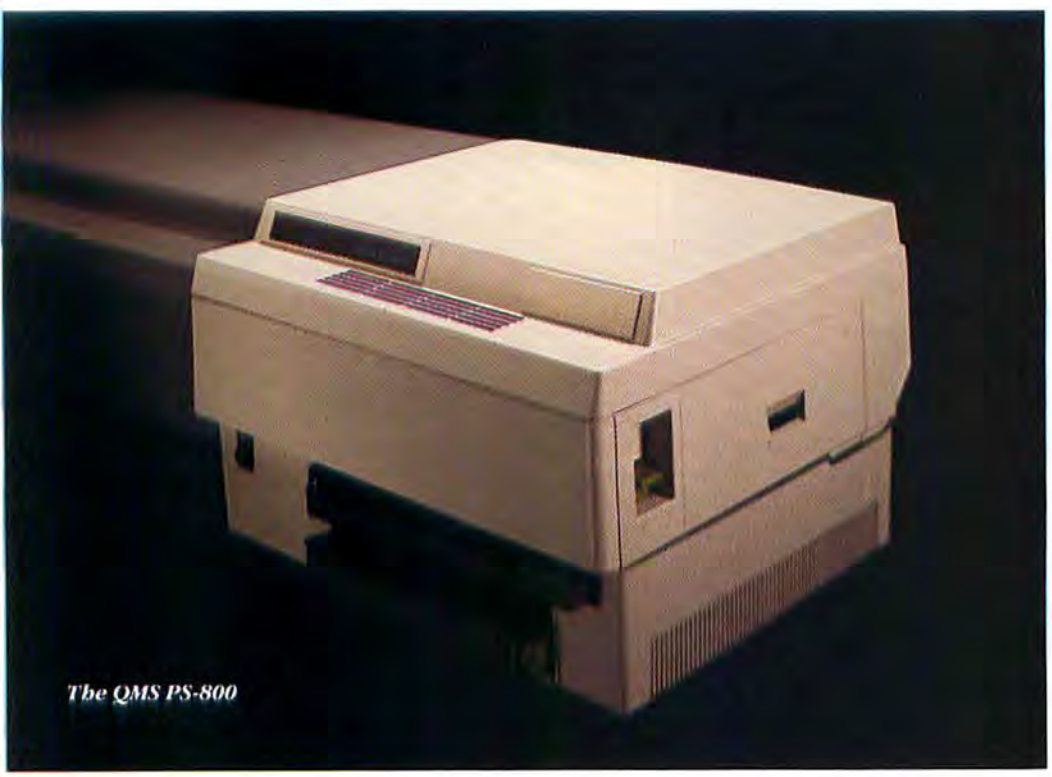
The Laser Connection, a division of QMS, has developed PS Jet, a kit that lets you replace Hewlett-Packard's controller with a PostScript controller. PS Jet is designed for owners of the roughly 350,000 LaserJets sold to date, but other Canon-based printers, including units from Canon and QMS, are transplant candidates too. PS Jet may appeal most to owners of QMS's KISS, an under-$2000 machine designed as a fast replacement for a letter-quality printer. PS Jet works well, but you could almost buy a PostScript printer for the $2995 that it costs.

A PS Jet kit comprises several cables and a new controller—the upper portion of the printer, where the status lights and the LaserJet's font cartridge slot are located. Dexterous hands and a screwdriver are all you need to perform the transplant; the manual's clear step-by-step instructions are accompanied by photographs and descriptions that help you locate key cables and connectors. The photos were missing from my draft copy, but the detailed instructions still allowed me to install the new controller in 40 minutes.

While the conversion requires no soldering and the manual's hand holding is helpful, installing PS Jet isn't for everyone. If working with fat, unwieldy cables in a space cramped by static-sensitive circuit boards and delicate machinery makes you nervous, have a dealer install the upgrade. The transplant does void Hewlett-Packard's warranty, so you may want to postpone the operation until the expiration date.

A PS Jet-equipped LaserJet printer performs identically to a QMS PS-800. Unless you reinstall its original controller, the printer's life as a LaserJet is over, and that may be a significant loss for offices using MS-DOS software that doesn't support PostScript printers. The Laser Connection could have added a LaserJet emulation mode to the PS Jet, but doing so would have boosted its price.

PS Jet works like a charm and is faster than Apple's LaserWriters, but LaserJet owners must weigh the update's strengths against the loss of their LaserJets. For $2000 more than the PS Jet costs, you can buy a PS-800 and have two printers. For the extra money you also get a new engine, which could be important if the LaserJet you plan to upgrade has seen extensive use. A better value might be The Laser Connection's $3495 PS Jet Plus, whose controller is identical to that of the PS-800 Plus.



The QMS PS-800

Dataproducts' LZR-2665

Weighing 176 pounds and costing $17,900, Dataproducts' LZR-2665 is by far the biggest and most expensive PostScript printer reviewed here, and it is the only one not built around a Canon engine. The LZR-2665's print engine comes from Toshiba and uses loose toner rather than Canon's convenient throwaway drums. The printer's unique advantages make it appealing for heavy-duty printing environments, but the performance of *Macworld*'s evaluation unit didn't come close to the engine's capabilities.

Girth and cost put the LZR-2665 in a class apart from A-size printers. You can't buy an LZR-2665 at a computer store and take it home in a hatchback. The printer arrives on a truck and must be installed by a qualified technician, who removes shipping retainers, installs the polished drum that transfers toner to paper, and adjusts the printer's laser and toner-distribution mechanism.

Most PostScript printers have three lights that inform you of the printer's status and indicate a paper jam or manual-feed operation. Lights convey little information, however—a point proven by the fact that the Mac's Print dialog box for LaserWriters contains a help button that explains how to use the printer's manual-feed mode. The LZR-2665 boasts a classy-looking graphic status display showing a side view of the printer. When paper is feeding, a moving line indicates the paper's progress through the printer. When paper jams, a crumpled-sheet icon flashes in the vicinity of the jam. When you're printing in manual-feed mode, an arrow pointing to the manual-feed slot flashes when it's time to insert a blank sheet of paper.

The LZR-2665 boasts two slots for paper trays, letting you mix and match paper sizes or types. You can, for example, put letter-size paper in one tray and tabloid-size in the other, or letterhead in one and blank sheets in the other. You switch between trays with the front panel buttons. Applications that check for the printer's

two trays can also select between them. *PageMaker,* for example, automatically selects the 11- by 17-inch tray when printing tabloid-size pages.

You add powdered toner to the LZR-2665's conveniently located hopper after every 6000 copies or so. Adding toner from a bottle is less convenient than sliding a new cartridge into place, but it's no more difficult than spooning ground coffee into a filter. And you'll feel a sense of satisfaction, knowing that you're not contributing to the scores of spent Canon printer and copier cartridges filling the world's garbage dumps.

The LZR-2665's engine is a *write white* engine—instead of exposing the areas of the photosensitive drum that will appear black in the final copy, the laser exposes the areas that will appear white. The result is black areas that appear darker, without the subtle scanning lines visible upon close examination of a Canon-printed page.

The Laser Connection PS Jet

Lasers at a Glance

	LaserWriter Plus	QMS PS-800	QMS PS-800 Plus[1]	Laser Connection PS Jet	Dataproducts LZR-2665
Specifications					
Amount of RAM (megabytes)	1.5	2	2	2	2.5
Amount of ROM (megabytes)	1	0.5	1	0.5	0.5
PostScript version in unit tested	38	38	44	38	43
Built-in fonts	35	13	35	13	13
Free memory available at start-up (bytes)	174,040	213,436	410,754	213,700	181,120
Size of font cache (kilobytes)	160	279	279	279	200
Number of paper cassettes	1	1	1	1	2
Maximum paper size (inches)	8½ by 14	8½ by 14	8½ by 14	8½ by 14	11 by 17
Capacity of paper cassette (sheets)	100	100	100	100	250[2]
Print engine manufacturer	Canon	Canon	Canon	n/a	Toshiba
Engine duty cycle (pages per month)	3000	3000	3000	3000	80,000
Writes white or black	black	black	black	black	white
Interfaces[3]	A, R	A, R	A, R	A, R	A, R, P
Emulation modes	Diablo 630	Diablo 630	Diablo 630	Diablo 630	Diablo 630
List price	$5799	$4995	$5494	$2995	$17,900
Performance[4]					
Initialize and print simple document	04:04	03:48	03:47	03:48	02:58
Print simple document after initialization	03:01	02:43	02:04	02:43	01:50
Initialize and print complex document	22:36	09:17	06:33	09:17	9:00[5]
Print complex document after initialization	21:09	07:40	05:27	07:40	7:20[6]

[1] Specifications and performance results also applicable to Laser Connection's PS Jet Plus.
[2] 500- and 1500-sheet paper feeders are also available.
[3] *A* stands for AppleTalk; *R,* RS-232C; and *P,* Centronics Parallel.
[4] The "simple" document was a single-spaced, ten-page *Microsoft Word* document formatted in 12-point Courier with Bold and Italic; no graphics. The "complex" document was a single-spaced, ten-page *Word* document containing 24-point Times Roman Bold, 12-point Times Roman with Bold and Italic, 12-point Helvetica with Italic (one line), 12-point Garamond with Italic (downloadable fonts), and seven small, bit-mapped images. All times are in minutes and seconds.
[5] 18 minutes when using long-leading tray. In both cases, the LZR-2665 failed to print the last page of the document.
[6] 14 minutes when using long-leading tray. In both cases, the LZR-2665 failed to print the last page of the document.

PostScript's Type Drawer

The font cache is a reserved portion of a PostScript printer's memory, separate from what is referred to as *virtual memory* (VM). A printer's performance when printing text directly relates to the size of the font cache, which holds bit-mapped representations of one or more fonts and sizes. If the beginning of a document appears in 11-point Helvetica, for example, the printer's controller retrieves the outline description for Helvetica from ROM, and builds a bit map for each character printed in 11-point type. These bit maps stay in the font cache until space is needed for other characters, at which time the controller purges them on a "least recently used" basis.

If the text later requires characters whose bit maps were purged, the controller must reassemble them from the ROM descriptions—like a hot-metal typographer who has run out of the characters in a font and must have them recast from the original mold. According to Adobe's *PostScript Language Reference Manual* (Addison-Wesley, 1986), printing a character that isn't in the font cache typically takes a thousand times longer than printing one that is.

As PostScript has evolved, the font cache algorithm has been improved in several ways that boost performance significantly. In PostScript version 23, the version in the LaserWriter, the font cache was cleared each time the fairly common PostScript memory management operator "restore" was encountered. This negative side effect doesn't occur in PostScript versions higher than 23. Thus, newer versions of PostScript need to rebuild bit maps less often.

Version 38, contained in most of the printers reviewed here as well as the LaserWriter Plus, fixed the purging problem and also made the cache larger and more efficient. In versions 38 and above, the font cache represents data in two ways. The bit maps for small point sizes are stored as they are; bit maps for large point sizes, however, are stored in a compressed format. Printing a character stored in packed format is slightly slower because of the time required to unpack it, but the compact format enables the cache to hold more, thereby lessening the need for purging bit maps. The amount of memory allocated to the font cache is fixed, although it varies among printers—which explains the dramatically differing results in my performance tests.

PostScript programmers can use the "cachestatus" operator to obtain information about the font cache, including the total number of cached characters. The "setcachelimit" operator sets the maximum number of bytes that a single character's bit map may occupy. The printer does not cache characters larger than that value; it rebuilds from their descriptions each time it encounters them.

Performance Problems

The LZR-2665's Toshiba engine is rated at a swift 26 pages per minute, but I never saw that kind of performance. Unlike Canon-based printers, the LZR-2665 feeds letter-size paper with its long edge leading; the 11-inch-wide edge of a sheet enters the printer first. The Toshiba engine, however, draws images from left to right as you look at a sheet of paper in portrait orientation. To accommodate the long-leading paper feed, the LZR-2665's controller must rotate the data it receives 90 degrees. This slows down processing, especially for graphics. In one test, the LZR-2665 slowed to half the speed of the PS-800 and PS Jet.

A Dataproducts representative told me how to eliminate the need for rotation and boost performance by configuring one of the printer's paper trays to feed letter-size paper on its short edge. Doing so doubled the printer's performance in most tests. It also makes the standard letter-size tray useless, however, and forces you to buy a $95 adjustable tray. And even that performance gain makes the printer only slightly faster than the QMS units. The LZR-2665's heavy-duty engine is rated at 80,000 pages per month. Given its controller's performance problems, however, there aren't enough hours in a day to reach that figure.

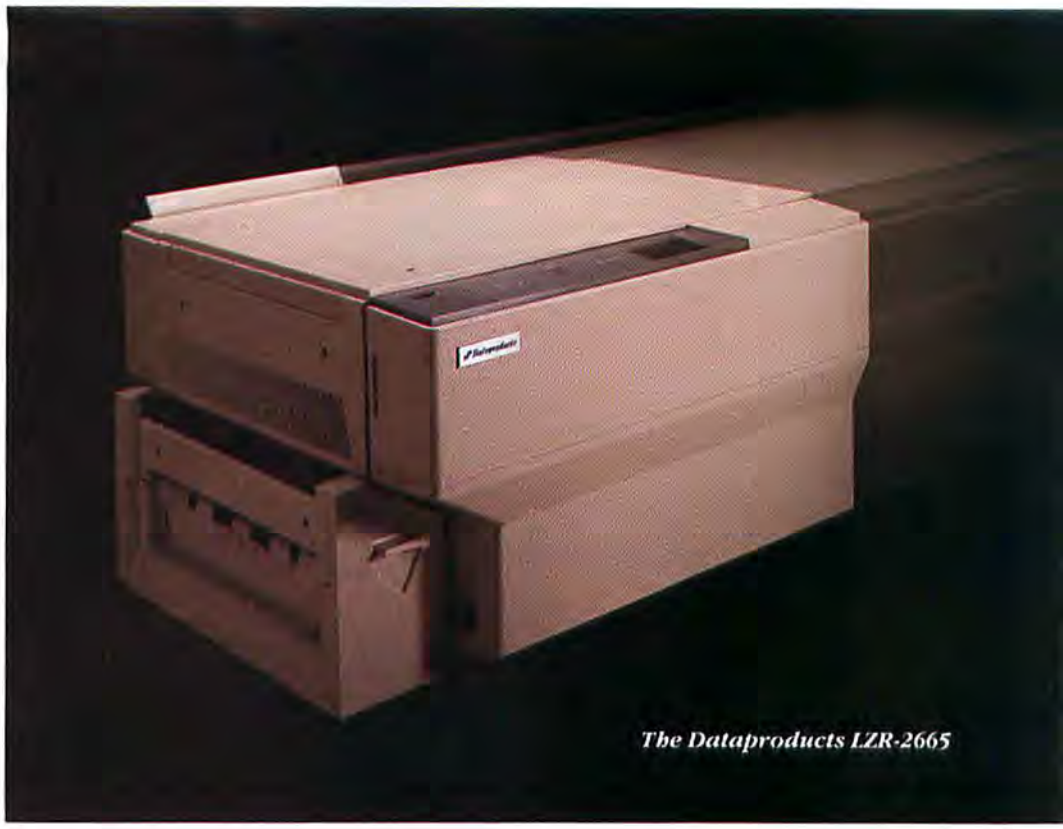
The printer's use of memory also hampers its performance. The LZR-2665 contains a half megabyte more memory than the PS-800 and PS Jet; yet on start-up, the LZR-2665 has 30,000 fewer bytes available. Adobe's *Font Downloader* reports only 181K free, versus more than 213K in the other printers. The reason: 2MB are set aside to hold the data required to describe an 11- by 17-inch page. If you're printing a smaller page, the printer uses the extra memory for *double buffering*—printing one page while simultaneously describing the next.

The result, however, is that the LZR-2665 holds fewer downloadable fonts than other printers. I was barely able to shoehorn the Garamond family into the printer's memory; with the exception of the LaserWriter Plus, the other units I tested had room for Garamond and two weights of Benguiat. Dataproducts claims that double buffering improves perfor-

mance, but the LZR-2665s might perform better if the unused memory were made available for fonts and for a larger font cache.

The LZR-2665 also stumbled when I attempted to print a ten-page *Word* document containing numerous small bit-mapped images as well as a half-dozen fonts, two of which were downloaded. The printer refused to print the last page, and during the printing of the first nine, the Mac frequently displayed a message saying that I was taxing the printer's memory.

The LZR-2665 could be a useful proofing device for publishing firms that produce tabloid-sized documents, and its parallel interface could find favor in IBM PC-equipped offices. But this printer's controller needs some performance tuning before it can live up to its engine's capabilities.



The Dataproducts LZR-2665

A Postscript

Of the printers reviewed here, QMS's PS-800 Plus wins hands-down. It's faster and less expensive than a LaserWriter Plus, yet its Canon engine uses the same toner cartridges and accessories. The PS-800 is a winner as well, outperforming a LaserWriter while costing less. The PS Jet and PS Jet Plus offer the same speed as their QMS cousins, but you should consider one—preferably the PS Jet Plus—only if you have a Canon-based printer whose engine is in good condition. Dataproducts' LZR-2665 produces first-rate tabloid-size copy; but this printer's performance needs boosting, and its price must drop.

The PostScript printer industry is in the midst of a baby boom. At last November's Comdex trade show, ITT Qume (San Jose, California) announced its $5695 ScripTen printer; and Kodak subsidiary Diconix (Dayton, Ohio) announced Dijit 1/PS, which accepts plug-in cartridge fonts and can automatically print on both sides of a sheet of paper. Texas Instruments (Austin, Texas) also offers two PostScript printers built around the write-white Ricoh engine: the $5995 OmniLaser 2108 offers 2MB of memory, two font cartridge slots, and a 10,000-copy-per-month duty rating; the $7995 OmniLaser 2115 boasts 3MB of memory, two 250-sheet paper cassettes, and a 15,000-copy-per-month duty rating. Both printers also emulate the Diablo 630, Hewlett-Packard's LaserJet, and Hewlett-Packard Graphics Language-based plotters. AST Research (Irvine, California) announced a PostScript enhancement for its Ricoh-based TurboLaser printer, and Quadram announced the Ricoh-based $5495 QuadLaser WS8. QMS is also developing a 15-page-per-minute printer based on a Ricoh engine.

The PS-800 is a winner as well, outperforming a LaserWriter while costing less.

PostScript's detractors claim the language is slow, and they aren't completely wrong. As yet, no PostScript controller can generate pages as quickly as its engine can print them. But Adobe is working to improve performance. More PostScript printer manufacturers are switching to the faster, more memory-efficient version built into the PS-800 Plus. This year will also see a new generation of high-performance controllers that replace the 68000 microprocessor with a 68020—the same chip that presides over the Macintosh II. Combined, these two improvements will greatly enlarge a printer's downloadable font capacity and will at least begin to silence the performance critics.

If you need a laser printer now, however, don't hesitate. You can eliminate the wait inherent in PostScript printing by using one of the new breed of PostScript spoolers or buffers (see "Speaking of Spoolers" in this issue). Remember also that some improvements—for example, a leap in resolution that would make the output of under-$10,000 laser printers look typeset—aren't even on the horizon. Tomorrow's LaserWriter-class PostScript printers may give faster output, but it won't look much sharper. And, of course, the responsibility for attractive copy will never reside in a printer. □

See *Where to Buy* for product details.

Approaching the Mac II

by Jim Heid

If you've ever gone stereo shopping, you know there are two routes to take. You can buy an all-in-one stereo, with the turntable, receiver, and a cassette deck all in one unit. Or you can mix and match components from different manufacturers and assemble a system yourself. The first approach is fast and easy, but it limits your choices. With the second, you can build a system that matches your budget and audio tastes, but you need to know something about the components and how to connect them when you get home.

Tailoring a system to suit your own needs is what the Macintosh II is all about. Apple's high-performance Mac lets you do what previous Mac owners couldn't: open it up to add accessories such as high-resolution color screens, high-speed network interface cards, internal or external hard disks.

Although using the machine is still as easy as ever, there's a lot more to consider when you're shopping for Mac II boards. Before you assemble a Mac II system, it will help if you understand the basic capabilities of the machine.

Slots: The Keys to the Bus

The keys to the Mac II's expandability are its six *expansion slots*. You can plug cards (also known as boards) into each of the 96-pin connector sockets. The slots themselves tap into the Mac II's *NuBus*, the channel over which information travels between the expansion cards and the Mac II's main memory. NuBus cards can communicate over the bus with most of the Mac II's internal components. In addition to *address lines* and *data lines*, which let the NuBus cards direct data to and from specific areas in the Mac much like we send mail to a particular street address, the NuBus contains *interrupt request lines*. These let the cards temporarily suspend the CPU's operation in order to send or receive data or take charge of the Mac II's circuitry.

Typically the Mac's 68020 microprocessor controls a card's functions by sending instructions and data over the NuBus. However, a NuBus card need not simply follow the 68020's dictates. A NuBus card can contain its own processor, called a *coprocessor*, that independently executes its own programs. AST's Mac286 MS-DOS coprocessor card, for example, executes MS-DOS applications.

The coprocessor on a NuBus card typically communicates with the Mac's CPU by passing information directly to an area in memory, a technique known as *direct memory access* (DMA). Whereas the Mac's CPU normally must stop what it's doing to transfer all information from an external device to memory, a NuBus card can do this while the 68020 is executing another program. The end result is much higher performance for NuBus-connected devices like display screens or even local area networks.

Plug and Play

With most computers that allow hardware mixing and matching, it's difficult to write software that works with all combinations. Compatibility concerns are common with slot-equipped computers like the Apple II and the IBM PC. To prevent two or more expansion boards from vying for the same memory space, you must set address or configuration switches when you install the boards. Most programs come with a long list of requirements: "... requires serial communications card, color/graphics adapter, 384K of memory," and so on. Many also come with a disk of device drivers—software that tailors an application for specific types of hardware—and an installation or setup program to tell the program what hardware you have.

The Mac II offers the expansion flexibility of slots without installation hassles or compatibility complications. Each NuBus board contains its own *configuration ROM*—a read-only memory chip to provide information to the Mac II's operating system, specifically to its Start Manager and Slot Manager. At start-up time, these two players will load the software drivers needed to use the card and then set up the system so that cards don't conflict with each other. When you start the Mac II, each card's configuration ROM does in a flash what may take an IBM PC user hours. If a configuration ROM turns out to have a bug in it, the manufacturer can supply a disk

Interested in Apple's high-performance workstation? Here are some basics to consider before you buy.

APPLE CREATIVE SERVICES/CARL B. STONE

containing a program that installs the updated software in your System file, replacing the board's ROM driver.

Expansion Options Galore

The Mac II allows you to build a system that's yours alone and to update it as technology and your needs change. This tailoring begins at the most visible level: the screen. Like the IBM PC, the Mac II's motherboard contains no screen-display circuitry. Instead, you buy a video card and a monitor. Apple's video card supports color and black-and-white displays, with screen resolution of 640 horizontal dots, or *pixels,* and 480 vertical pixels (versus the original Mac's 512- by 342-pixel resolution). Other firms are also offering video cards and monitors; SuperMac Technology's Spectrum boasts a whopping 1024-by-768 resolution and can display color, gray-scale, or black-and-white images on a 15-inch or 19-inch analog RGB monitor. Sigma Designs' LaserView displays even more dots (1664 by 2000 pixels) on 15- or 19-inch monochrome displays.

And just as it eliminates card configuration hassles, the Mac II's system software avoids the compatibility problems that arise with other computers that offer a variety of video cards. On the Mac II, you choose the type of display you have, color or monochrome, and the number of bit planes—1, 4, or 8—from the Control Panel desk accessory (see Figure 1). The number of bit planes determines how many colors or shades of gray you can display. You can even configure multiple monitors to act as one large screen (see Figure 2). The applications themselves don't need to know the type of display you are using. The Mac's Color Manager does the dirty work of translating each program's display instructions into instructions that match the video card's capabilities. The result is that you can change the video card and monitor at the drop of a hat and still run the same software you always run, while taking full advantage of the resolution and color of the new screen.

Another likely addition to your system is a hard disk. Previous Macs had to be coerced into accepting an internal hard disk. Because the Mac's bus was inaccessible, internal hard disks like General Computer's HyperDrive had to horn in on it via a clip attached directly to the Mac's 68000. The Mac SE has eliminated the need for a clip by providing an internal Small Computer Systems Interface (SCSI) connector as well as a separate internal expansion connector that contains signals from the 68000. The Mac II's motherboard, like that of the SE, also has an internal SCSI connector into which you can plug an internal hard disk or tape backup. An external SCSI connector like that of the Mac Plus also enables you to use external SCSI devices (see "Shopping

Expanding Terminology

Apple Sound Chip (ASC) The integrated circuit in the Mac II that enables it to produce sound. The ASC is controlled by an operating system component called the Sound Manager.

Bit plane A portion of memory dedicated to holding the color information or shade of gray for each picture element (pixel) on the screen. The more bit planes a computer's graphics circuitry offers, the more colors or shades of gray it can produce. With Apple's video board for the Mac II you can choose between 1, 4, and (with the memory upgrade installed) 8 bit planes, to display black and white, 16, or 256 colors or shades of gray, respectively. The Mac Plus and SE, which have only 1 bit plane apiece, can display only black and white.

Coprocessor A microprocessor that works along with the computer's central processing unit (CPU), usually to lighten its workload, but occasionally to allow the computer to mimic other machines.

Dithering A graphic-display technique that produces shades of gray or colors by combining black-and-white or colored screen dots into patterns. A dithered image appears to contain more colors or shades of gray than can actually be displayed on the screen at one time (see "The Graphic Mac," *Macworld,* November 1986).

Driver Software that tailors a computer's input or output for a particular device like a screen, printer, or hard disk. In essence, a driver "teaches" the computer's operating system how to access the device (see "Getting Started with the Mac System," *Macworld,* November 1986).

Ethernet A network developed by Intel, Xerox, 3Com, and others, that is especially popular on IBM PCs, minicomputers like Digital Equipment Corporation's VAX, and workstations like the Sun 3. The availability of Ethernet expansion boards for the Mac II and SE will allow those computers to join Ethernet networks (see "Filling the Slots," *Macworld,* April 1987).

Expansion board A printed circuit board that plugs into an expansion slot and gives capabilities to a computer that it previously lacked. Typical expansion boards: video display boards, memory expansion boards, modems, and network boards.

H Memory Management Unit (HMMU) A memory-management chip in the Mac II that performs the memory juggling required to let the Mac II run existing Macintosh software, which expects to find the computer's memory organized for the original Mac's 68000 microprocessor. The Mac II comes standard with the HMMU installed. (See *Memory management, Paged Memory Management Unit, UNIX.*)

Memory management A term for the overall process of organizing a computer's memory. Memory management involves reserving portions of memory for certain operating system functions, determining where a program resides in memory, and translating memory locations from one addressing scheme into another.

MS-DOS The disk operating system developed by Microsoft and used in IBM PCs and compatible computers. IBM's version is called PC-DOS. AST's Mac286 MS-DOS coprocessor board is available for the Mac II, enabling it to run programs written for the IBM PC.

NuBus A standard that specifies the mechanical and electronic rules by which the Mac II's expansion bus operates (see "Macintosh II: Opening to the Future" [Looking at the NuBus], *Macworld,* April 1987).

Paged Memory Management Unit (PMMU) A memory management chip that lets the Mac II run the UNIX operating system (see *Memory management, UNIX*).

RGB Short for *red-green-blue,* RGB is used to refer to the type of signal a color display screen requires. An RGB monitor requires three video signals, one each for the monitor's red, green, and blue electron guns. The other type of color monitor is the *composite* monitor, for which the three color signals are blended into one. Composite monitors are less expensive than RGB monitors but lack their sharpness and color clarity.

Start-up device The expansion board or disk drive from which the Mac II starts when you turn it on or reset it. You choose the start-up device using the Control Panel.

UNIX An operating system developed at Bell Laboratories, usually found on minicomputers and used most by research labs and universities. UNIX is best known for its multitasking capability—the ability to run two or more programs simultaneously. When equipped with the PMMU, the Mac II can run UNIX—specifically, an Apple version of UNIX called A/UX.

for SCSI Storage," *Macworld,* January 1987). In addition, you can now add high-performance, high-capacity hard disks from companies like Mirror Technologies, AST, Peripheral Land, LoDown, CMS, and Northern Telecom. Optical storage devices, write-once read-many (WORM) drives, and compact disk read-only memory (CD ROM) drives are also available from LoDown.

Telecommunicators can gain some desk space by adding an internal modem to the Mac II. A communications program that takes advantage of the NuBus's ability to control the Mac II's power could open up new possibilities. Many communications users like to create autopilot scripts that sign on to an information service late at night, when phone and access rates are low and a service's response time is faster. Doing this, however, requires leaving the computer on all night. An intelligent modem and communications program, such as one to come from SuperMac, could turn the Mac II on at a predetermined time and download all your on-line mail from MCI—or the latest discussions on CompuServe, Delphi, GEnie, or the Well—and then turn the machine off after conducting the communications session.

Adding coprocessor cards (available soon) that take over certain computation-oriented tasks will greatly speed up tasks such as 3-D graphics, image processing, numerical analysis, and network processing.

Busing the Desktop

Both the SE and the Mac II provide another bus called the Apple Desktop Bus, or ADB. ADB is a serial bus. (In serial communications, the eight bits making up a byte travel in single file, as opposed to parallel communications, in which they travel side by side in their own lines. For more on communications, see "Getting Started with Communications Gear," *Macworld,* May 1987.) The ADB can't provide the high-speed communications necessary for coprocessor or memory boards. However, it can respond effortlessly to signals from a keyboard, mouse, or other input device. On the Mac II and the SE, the mouse and keyboard are connected to the Mac via the ADB, and its presence makes it easier to add another input device, such as a trackball, a graphics tablet, or a light pen.

MEL LINDSTROM

The 3-Headed Mac
Attaching multiple displays to the Mac II is a snap. Each monitor requires its own NuBus graphics card. You configure the screens using the control panel's monitor option, after which you can drag windows to different displays.

Brighter Castles
Silicon Beach Software's Super3D *offers designers a tool for creating color 3-D drawings. With* Super-3D, *designers can create objects using wire-frame or hidden-surface models. The drawing or model can be viewed from any angle and displayed in perspective or orthogonally (see "The 3-Headed Mac").*

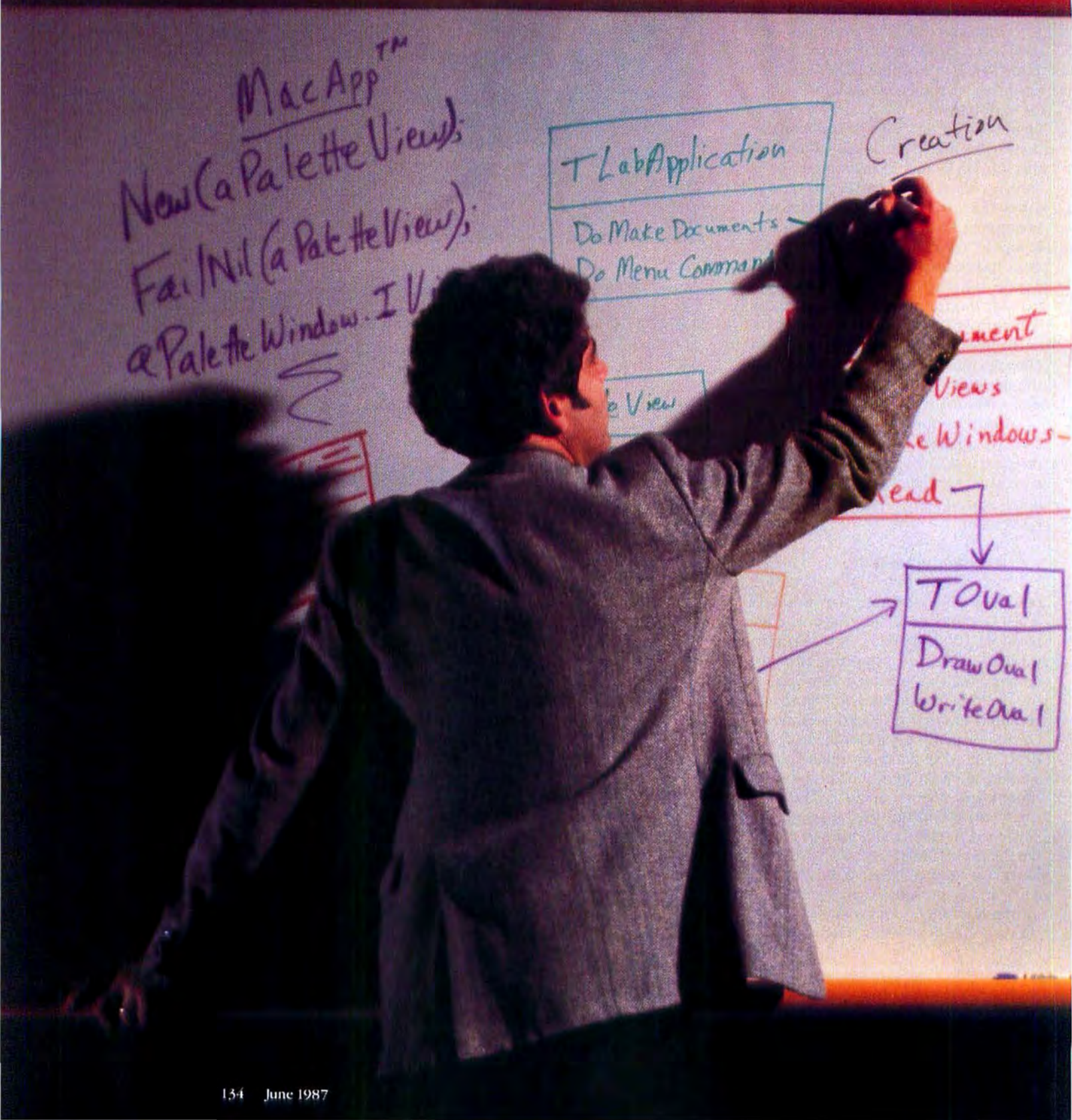
The Expanding Universe

While learning about the Mac II and shopping for a system, you'll encounter a profusion of new technical terms and concepts. The ones you're most likely to hear appear in "Expanding Terminology." For more detailed information on the new machines, see the April 1987 issue of *Macworld.*

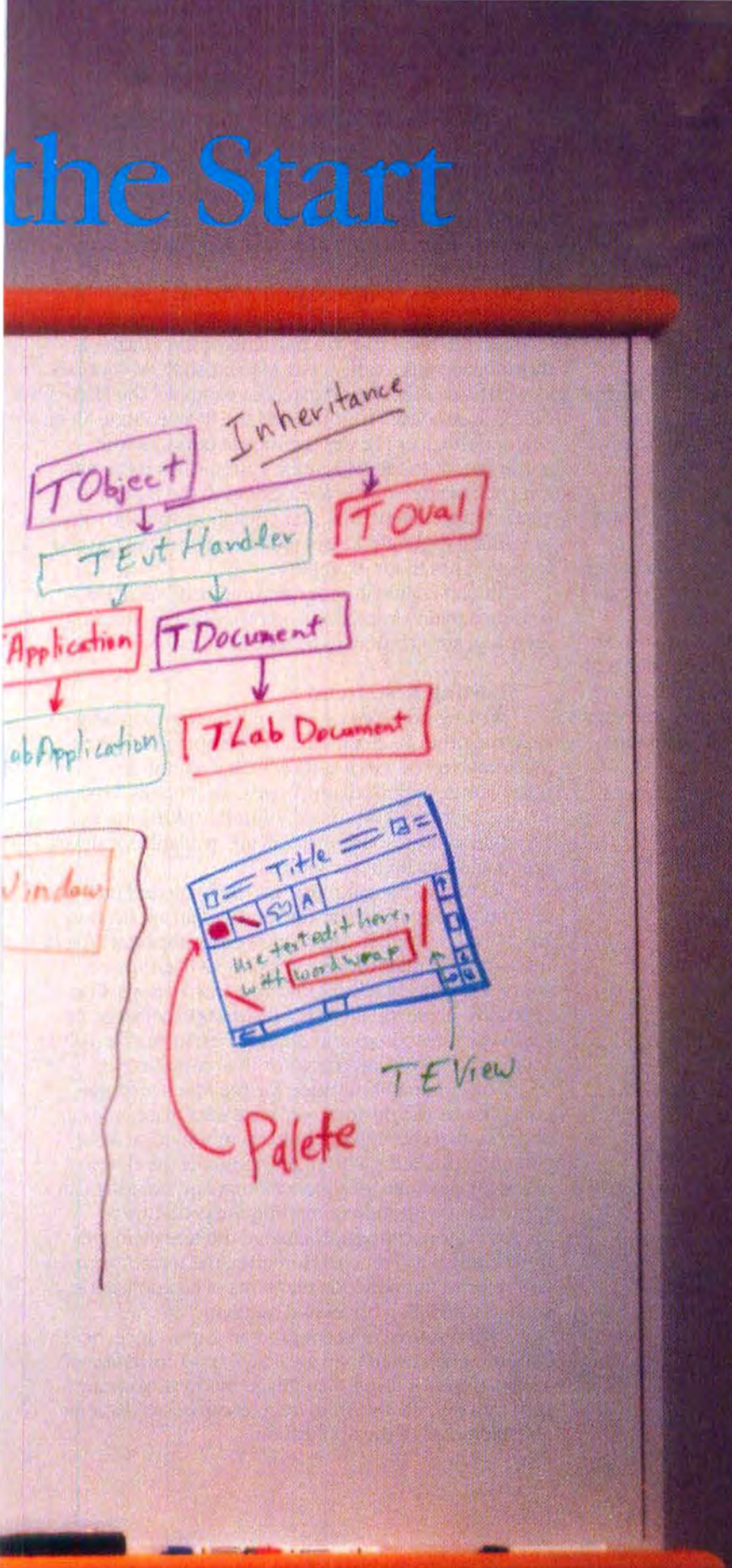
If you own a Mac, should you unload it fast and buy an SE or a II? Not necessarily. If you don't own a Mac, should you automatically consider a II? No. The first-generation Macs are by no means obsolete. Their wide acceptance proves that those closed boxes still provide an ideal mix of features for many applications. And because not all existing software runs on the Mac II, you should definitely try out the applications you intend to use before buying the machine.

However, if you're running an application that can benefit from the Mac II's speed, color, larger screen, gobs of memory, number-crunching coprocessor, or modem that can put your machine on autopilot, the Mac II is for you. And assembling a system isn't that difficult; many people will actually enjoy it. What's nice is that now you have several choices with a common denominator: the Mac's easy, consistent style. □

Programming from



the Start



A beginner's guide to developing an application program

by Allen Munro

The Macintosh is both the easiest personal computer to use and the most difficult to program. Not surprisingly, these two characteristics are related. The standard Macintosh interface, though a boon for the user, requires much more than a cursory knowledge of programming; the first-time developer must digest over 1500 pages of *Inside Macintosh,* Apple's compilation of technical documentation published by Addison-Wesley.

Novices who are serious about developing applications can attend Apple's Macintosh Programming Seminar, a series of four training courses designed to give new developers a running start on their applications (see "Getting Your Programming Diploma"). For those aspiring programmers unable to attend the Apple seminars, here are a few of the concepts presented in the courses to give you at least a foothold on your Mac education.

The ROM's Central Role

The Macintosh ROM contains the fundamental routines that make up much of the Mac's operating system, plus the routines that create the user interface, which all Macintosh applications have in common. In addition ROM-resident routines control such things as the font and type styles and screen-drawing operations.

Programming on the Macintosh is nearly language-independent. No matter which language you use, you create most of the user interface features by calling the ROM routines. Once you learn how to converse with the ROM in one language, you can easily apply the same vocabulary to another language.

PHOTOGRAPHS BY DAN ESCOBAR

Most of the ROM routines are designed to be called from compiled Pascal programs, and the first development tools for the Macintosh were centered around *Lisa Pascal*. That's why most of the instructional materials developed for Macintosh programmers are written in Pascal. Even though Pascal is a readable, well-structured language, programmers using other languages will still have to translate these materials.

The Structure of an Application

All well-structured Macintosh applications have a similar overall structure, one that is quite different from most programs written for other personal computers. Macintosh programs have a curiously passive quality. Rather than saying "first I'll get the user's name, then I'll present three choices, then I'll ask the user to . . . ," Macintosh programs spend most of the time waiting for the user to act. At a very abstract level, all Macintosh applications have the same structure as that shown in Listing 1.

When you write a Macintosh application, you define a procedure, for example, InitializeStuff. Such a procedure consists of ROM calls that set up the data structures required by certain ROM routines, together with any required application-specific initialization.

Listing 1
This is the structure of a simple application written in Pascal. Once InitializeStuff creates the data structures required by the ROM routines, MainEventStuff responds to the user's actions.

```
PROGRAM NormalApplication;
CONST {all the global constant declarations}
VAR   {global variable declarations}
...     {declarations of the procedures InitializeStuff
         and MainEventStuff and their subordinates}
BEGIN
  InitializeStuff;  {One-time startup actions}
  REPEAT
    MainEventStuff;   {What should I do next?}
  UNTIL UserQuits;
END.
```

Listing 2
The procedure MainEventStuff, written in Pascal, responds to events generated by the user. If an event is pending, GetNextEvent returns an event record containing What, Where, and Message fields describing the event; the location of the mouse; and other keyboard, window, or disk information.

```
PROCEDURE MainEventStuff;
   BEGIN
     Cursor_adjust;  {change cursors if needed}
     SystemTask;     {update clock, etc. for Desk Acc}
     IF GetNextEvent(everyEvent,myEvent) THEN {get all events}
        BEGIN
          CASE myEvent.what OF
            mouseDown: Handle_mouse_down(myEvent.where);
            keyDown, autoKey:  Handle_keys;
            activateEvt: Handle_activate(POINTER(myEvent.message));
            updateEvt:  Handle_update(POINTER(myEvent.message));
          END; {CASE myEvent.what}
     END;  {IF}
   END;  {MainEventStuff}
```

For instance, the initialization routine in Listing 1 calls InitFonts for the Font Manager, InitDialogs for the Dialog Manager, and so on. The real content of this application is the structure of the routine called MainEventStuff, which checks for user events and responds to them. Listing 2 shows a simple version of MainEventStuff.

In the procedure declaration the names with underbars (_) refer to the procedures you create to determine the response to a particular event. Each of those procedures calls other Macintosh ROM routines as well as routines you create. For example, the Handle_mouse_down routine calls the ROM routine MenuSelect if the user presses the mouse button in the menu bar, or the ROM routine SystemClick if the button click occurs in a desk accessory. If the button is clicked in a content area, an application-specific routine might highlight a selected object or move the text insertion point, for example.

Much Macintosh programming consists of elaborating a main-event loop and progressively refining the program's responses to user actions.

Editing Resources

Writing programs is only half the development task; the other half consists of developing resources. Macintosh resources are objects that a program uses—icons, menus, dialog boxes, alert boxes, text strings, pictures, and so on. A number of resource compilers and resource editors are available for developing and modifying resources.

Technically speaking, even the compiled program-code segments are resources of an application. A Pascal or C compiler can be viewed as a special type of resource compiler that creates only CODE-type resources, that is, blocks of machine instructions. Conceptually, however, there is a distinction between program-code resources and other types, most of which seem more like data structures than routines.

The original motivation for the Mac's resource concept was the desire to separate data from program code, so that the former could be modified without changing the latter. This makes possible the development, for example, of a French-language version of an application without recompiling the program; resource editors can simply change the text elements from English to French. (Hereafter, the term *resources* will refer to the noncode elements of an application, such as the dialog boxes and menus.)

The resource concept grew in importance, becoming much more than an aid to easy translation of applications for foreign-language markets. You can program the Macintosh to treat resources as dispensable elements of the application.

Getting Your Programming Diploma

Any Macintosh developer, whether an Apple Certified Developer or not, can take Apple's Macintosh Programming Seminars. The seminars are offered as four courses, presented in two separate sequences of two courses each.

Apple's first two courses deal with the fundamentals of Macintosh programming. A one-day course, "Introduction to Macintosh Programming," precedes a three-day course, "Developing a Macintosh Program" (see "Educating the Developer"). In these four days, participants receive an overview of the ROM, exposure to most of the major development tools, and hands-on development experience using some of those tools. In addition to providing well-organized technical content, the course encourages a realistic but confident attitude toward the application-development process.

Unlike almost every book on Macintosh programming, these seminars don't shy away from the development of resources. Instead, students are given early and frequent exposure to the resource creation and editing process, and they're shown productive ways of integrating the development of other resource types with the development of program code.

The second set of two courses begins with "Using MPW: Macintosh Programmer's Workshop," a one-day course that teaches the tricks of Apple's powerful MPW program-development environment. This course describes the capabilities of MPW and provides hands-on experience in the use of the shell and the MPW tools. It also gives tips on mastering powerful but difficult features such as regular expressions. "Using MPW" is followed by "MacApp and Object-Oriented Programming," which lasts for four days. Participants in this seminar learn how to use *Object Pascal* and *MacApp* to rapidly produce complete applications that support the full Macintosh user interface.

Most of the course time is spent in a flexible lecture format and the rest in lab exercises, using commerical development systems to modify applications designed for the seminar. Students leave with source code and resource files for the exercises, along with thick binders of course notes and reference materials.

The Macintosh Programming Seminars are not cheap. Should you take them? The answer to that question depends on the answer to another: Can you put a dollar value on your programming time? If you are paid for your Macintosh development work, or if you expect to be paid for the results of that work, then you can expect to save significant amounts of time—thereby cutting costs—by taking advantage of the head start the seminars offer. For serious developers new to Macintosh programming, the courses are a bargain.

See *Where to Buy* for course details.

Educating the Developer

Beginning with the one-day "Introduction to Macintosh Programming," Apple's seminars offer several options, depending on whether you want to program in a traditional language like C or Pascal or in an object-oriented language like MacApp.

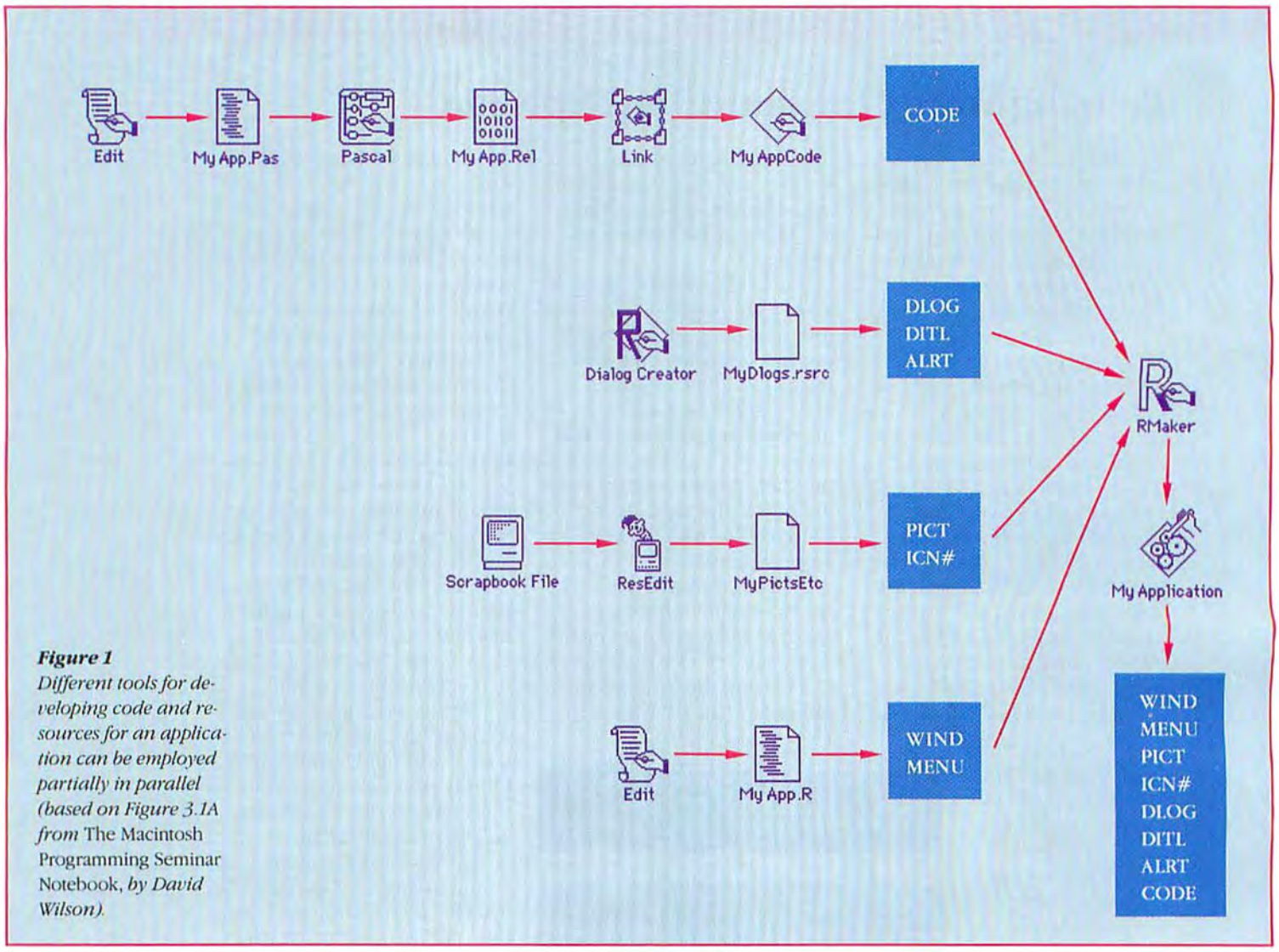
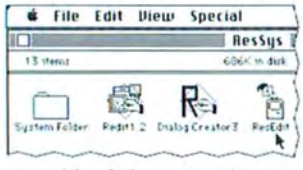


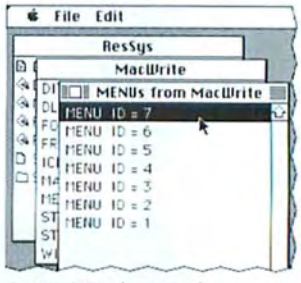
Figure 1
Different tools for developing code and resources for an application can be employed partially in parallel (based on Figure 3.1A from The Macintosh Programming Seminar Notebook, *by David Wilson).*



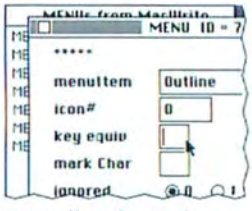
1. Double-click on *ResEdit*.

2. Next double-click on *MacWrite* to open its resource fork for editing.

3. A window appears showing all the *MacWrite* resources. Double-click on the MENU resource.



4. *MacWrite*'s seventh menu is the Style menu. Before the *S* and *O* keys can be assigned to the File menu's Save and Open commands, these keys must be removed from the Style menu.



5. Scroll to the Outline item in Menu 7 and delete its key equivalent (*O*), then go to the Shadow item and delete its key equivalent (*S*).

The resource mechanism enables developers to write applications that use much more memory than is physically available (in a small *Switcher* partition, for example). This is because resources are located on disk and are brought into RAM only as needed. For instance, when you first choose "About..." from the Apple menu, the Mac loads a dialog resource from disk into RAM and then presents a dialog box on screen. If the application later requires the memory occupied by the dialog data, the application purges or erases the data from memory. When the dialog box is needed again (when the "About..." choice is made once more), the previously purged dialog resource will be loaded from disk, and some other resource may be purged to make room for it. Thanks to resources, the Macintosh acts like an object-oriented virtual memory machine.

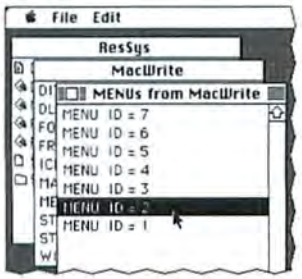
Developing an Application in Parallel

Because you write code and create an application's resources with different tools, you can develop various parts of an application in parallel. In fact, you can build separate resources with different tools. In Figure 1, although the *TML Pascal* compiler creates CODE resources, *Dialog Creator* creates a file with ALRT, DLOG, and DITL resources, which determine the appearance of alert boxes, dialogs, and dialog items, respectively. *ResEdit* builds a file with ICN (a list of icons for the application), PICT (QuickDraw pictures), and WIND (window) resources. In the same example, *RMaker* constructs the BNDL, MENU, and STR# resources used by the application and combines them with the other resource files to build the finished application. The Bundle (BNDL) resource groups together the application's resources; STR# is a list of strings. This is not the only way to build an application; the method you use depends on the development system you choose.

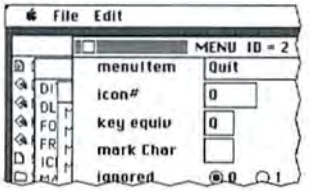
Macintosh 1A
Apple's Programming Seminars, developed by David Wilson, focus on the practical aspects of Mac programming and encourage interaction between attendees.

Most Macintosh programming books don't give much information on resource design and editing, but these topics are every bit as important as programming. When you begin your programming education, plan on doing a lot of experimenting with the resource tools to learn what they can do. One tip: never edit resource files on a hard disk using *ResEdit*. Edit resources on floppies and transfer the resulting files to the hard disk later. *ResEdit* has been known to destroy disk directories, and you don't want to spend precious development time rebuilding a hard disk.

The first exercise in resource editing should be to modify copies of some standard applications, such as *MacPaint* and *MacWrite*. *MacWrite*'s File menu has no ⌘-key equivalents for the commonly used Open, Save, and Quit menu commands. Figure 2 shows how to use *ResEdit* to modify a copy of *MacWrite* so that it provides these features. Once you've built up a little



6. Open *MacWrite*'s File menu.



7. Assign the *S* key to the Save menu item, the *O* key to Open, and the *Q* key to Quit.

8. Your modified copy of *MacWrite* will now have more productive ⌘-key equivalents.

Figure 2
You can add ⌘-key equivalents to applications like MacWrite *and* MacPaint *by using* ResEdit *to modify the appropriate menu resources.*

Books for Macintosh Developers

Every Macintosh programmer needs lots of books and lots of space to spread them out while working. The books in this list are designed to fill some of the needs of developers using native-code development systems. Many more books are available for the users of interpreted programming systems like *Microsoft BASIC* and *Macintosh Pascal*. Those simpler books often provide fine introductions to the basics of QuickDraw. The special concerns of the stand-alone application developers are better met by the following books.

■ *Inside Macintosh,* by Apple Computer (Addison-Wesley Publishing Company, Reading, Massachusetts. Volumes I-III, 1985; Volume IV, 1986). This is the one reference work absolutely required by all Macintosh application programmers.

■ *Human Interface Guidelines,* by Apple Computer (Apple Programmer's and Developer's Association, Renton, Washington, 1987). This document provides a detailed description of Apple's recommendations for the user interface in your programs. Many other useful technical publications are also available from APDA, including guides for topics such as writing SCSI device drivers, AppleTalk programming, and driving the LaserWriter. These specialized documents are not required for programming most applications.

■ *Macintosh Revealed,* Volume I, "Unlocking the Toolbox"; *Macintosh Revealed,* Volume II, "Programming with the Toolbox," by Stephen Chernicoff (Hayden Books, Hasbrouck Heights, New Jersey, 1985). Opinions on the value of *Macintosh Revealed* vary. Some programmers claim it is merely *Inside Macintosh* watered down and reworded. Others claim that it is much more comprehensible and therefore much more useful. Volume II provides a complete example of a text-editing application.

■ *Hidden Powers of the Macintosh,* by Christopher L. Morgan (The Waite Group, New York, 1985). *Hidden Powers* provides an excellent step-by-step introduction to Macintosh application programming using Pascal. Unlike *Macintosh Revealed,* this book gives the reader a graduated set of programs to write, rather than drawing every programming example from a single large application. The new user of a native-code Pascal development system such as *TML, Lightspeed, Turbo,* or *MPW* can learn a great deal by working through this book. It is one of the few books on the market that provides any discussion of resource compilers, but its discussion revolves around *Lisa RMaker,* which uses a slightly different syntax from that of *Macintosh RMaker.*

■ *How to Write Macintosh Software,* by Scott Knaster (Hayden Books, Hasbrouck Heights, New Jersey, 1986). This book could just as well have been called *The Book of Macintosh Debugging and Memory Management,* but then it probably wouldn't have sold so well. Distressing as it may seem to the new Macintosh developer, object-code debugging is probably going to be necessary quite early in the development cycle, and some abstruse memory-management issues must be faced early on.

■ *Motorola 68000 Programmers Handbook,* by Motorola (Prentice-Hall, Englewood Cliffs, New Jersey, 1985, 1984). Unless you are only writing small applications in *Lightspeed Pascal,* you will probably have to do some object-code debugging. That calls for at least a read-only knowledge of 68000 assembly language, for which this is the definitive reference work.

■ *Object-Oriented Programming for the Macintosh,* by Kurt Schmucker (Hayden Books, Hasbrouck Heights, New Jersey, 1986). This book provides experienced Pascal programmers with an excellent introduction to *Object Pascal* and *MacApp* and surveys other object-oriented programming languages for the Macintosh. Although it suffers a bit from hasty editing and an academic orientation, it is a good way to get started with *MacApp.*

■ *MacTutor: The Macintosh Programming Journal,* edited by David E. Smith (MacTutor, Inc., Placentia, California, monthly since 1984). Early articles sometimes emphasized trickiness over clarity, but *MacTutor* has evolved into a useful resource for programming in many different languages. Some articles are tutorials on aspects of the Toolbox or new development tools, and others show how to go beyond the basics taught in most books.

confidence, try modifying a standard "About MacWrite" dialog box. When you are comfortable with resource editing, you can begin to write simple programs made up of resources that you create with resource compilers such as *RMaker* and resource editors such as *Dialog Creator* and *ResEdit*.

Successive Elaboration

Complex applications never spring full-formed from a single session. Applications should be carefully designed in advance of coding, but they aren't actually programmed by designing the entire program at one time. Instead, a very simple version of the program is created first and then modified through many iterations, with subsequent design features added gradually. In practice, the incremental approach to implementing features usually uncovers design flaws, and the design must be revised.

Even experienced developers find that they learn new things from one another.

The Macintosh resource editors greatly aid the process of incremental development. Since resource editing is usually easier than programming, you can begin to implement an application by prototyping it with resources. Write a simple program shell that brings up a static resource—such as a dialog box or a window with a picture—for each feature that can be selected by a menu command. Each picture (PICT resource) in the prototype represents a feature that will be provided by the corresponding menu selection in the full application. You can draw and type these pictures in *MacDraw*. Copy each picture to the Scrapbook, and then use *ResEdit* to copy them from the Scrapbook to a resource file. With *RMaker* (or *Rez*, if you're using *Macintosh Programmer's Workshop*) you can add other necessary resources, such as BNDL and MENU, and combine the compiled code with the resource file built with *ResEdit*.

Getting Help

A simple prototype application created with this technique can gradually be modified to provide each of the features represented by the picture resources. Naturally, you can't expect to progress from simple prototype to full-blown application with nary a hitch nor a question. Even professional developers need technical support during the application-development process. Here are some of the most useful sources of support:

- Other developers
- Books and technical magazines, including all four volumes of *Inside Macintosh* and the technical journal *MacTutor*
- MCI Mail technical support (for Certified Developers)
- AppleLink and telephone support (for Registered Developers)
- The Apple Programmer's and Developer's Association, for access to development tools, including preliminary releases from Apple

By far the most important of these is access to other developers. The best situation would be to work right next to other Macintosh programmers, so that you can answer each other's questions as they arise. Macintosh programming is a complex endeavor; even experienced developers find that they learn new things from one another. If your situation doesn't provide programming colleagues, find or found a local Macintosh programmers' group.

For other tips on getting started in the development process, see "So You Want to Be a Software Developer" by Robert Buderi in the August 1986 issue of *Macworld*.

Do you have a dynamite application germinating inside you? It will never see the light of day if you don't get started. Take Apple's Macintosh Programming Seminars, if you can. Choose a development environment, use the resource editors to flesh out your design, and begin the incremental development process. □

See *Where to Buy* for product details.

Lab Time
Seminar attendees get plenty of hands-on programming in the lab; each student receives a workbook containing exercises on disk.

Speaking of Spoolers

LaserWriter spoolers and buffers cut the wait for laser-printed copy

by Jim Heid

No one likes to wait. Nobody revels in threading through a line at a bank, or enjoys aging in a grocery checkout line while a clerk-in-training hunts and pecks through someone's supplies for the month. Nor is there a LaserWriter user alive who likes reading the "status: processing job" message when there's work to be done. And when you're sharing a LaserWriter on a network, you can almost hear the printer saying, "Take a number, please" while it prints other jobs before getting to yours.

LaserWriters and other printers using the PostScript page-description language may produce four-star text and graphics, but users have traditionally paid for high-quality hard copy with their time. Despite having impressive computer hardware of its own—a 68000 microprocessor and 1.5 megabytes of memory—a LaserWriter seems to dawdle when printing documents containing complex graphics and many typefaces. Even high-performance laser printers like QMS's PS-800 Plus (see "Laser Wars" in this issue) process just one job at a time.

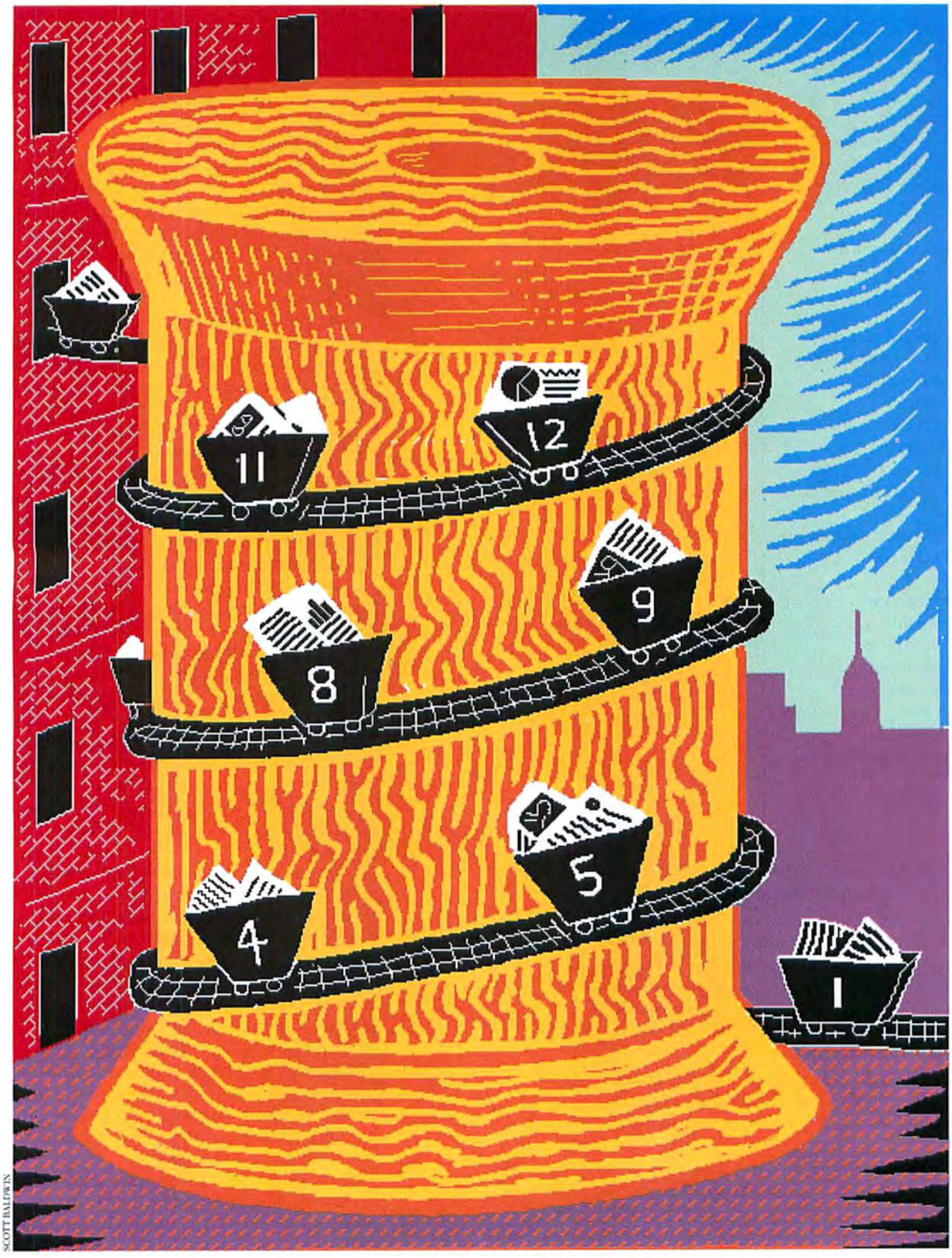
Knowing that people will pay to eliminate a wait, several firms have introduced LaserWriter spooler software for the Mac. Reviewed here are four spoolers —Think Technologies' *LaserSpeed,* Infosphere's *LaserServe,* MacAmerica's *LaserSpool,* and SuperMac Software's *SuperLaserSpool,* which I examined in prerelease form. These products all reduce the wait time inherent in PostScript printing, but the amount of time you save depends on which product you use, what you print, and whether you have a hard disk. "Spoolers Face Off" contains the results of my performance tests.

Spooler Basics

A spooler doesn't speed up the printer, it just lets you get back to work faster. After you choose an application's Print command and OK its dialog box, a spooler intercepts data destined for the printer and stores it on disk in a *spool file.* Because a disk—especially a hard disk—accepts data faster than a printer, which must process the data as it's received, you regain control of the computer sooner with a spooler. After your document has been *spooled,* another portion of the spooler goes to work behind the scenes to *despool* it, sending it to the printer in bursts, while you perform other tasks on the Mac.

Spooling for PostScript printers is far more complex than for printers like the ImageWriter because a PostScript printer requires a direct line of communication to the Mac. A PostScript printer may need to tell the Mac to send a downloadable font, or that it's printing someone else's job. If the printer has just been turned on, it tells the Mac that it needs to be initialized by the Laser Prep file, which prepares the printer to receive PostScript commands from the LaserWriter driver.

The AppleTalk network further complicates the spooling process. When the Mac displays the "Looking for LaserWriter" message, it's surveying the network for the printer you last selected with the Chooser. A spooler must fool the Mac into thinking that it has found a printer, and that the usual two-way communi-



SCOTT BALDWIN

Spoolers Compared

	Think Technologies LaserSpeed 1.0	Infosphere LaserServe 1.1	MacAmerica LaserSpool 3CD	SuperMac Software SuperLaserSpool[1]
Type of spooler	PostScript	PostScript	PostScript	Quick Draw
Spooler installs in System file	●	●		
Memory used (bytes)	28K	50K	n/a	64-180K[2]
Suspends spooler and regains memory		●	n/a	●
Automatic or manual start-up	automatic	either	n/a[3]	either
Automatic printer initialization		●		●
Automatic font downloading		●		●
Works with manually downloaded fonts	●	[4]		●
Works with PageMaker 1.2	●			●
Spools for AppleTalk ImageWriters		●		●
Spools for non-AppleTalk ImageWriters				●
Queue-management desk accessory	●	●	●	●
Optional notification at start of printing	●			
Optional notification at print completion	●	●		●
Manual feed notification		●		●
Reports printer errors	●	●		●
Deletes spooled jobs	●	●	●	●
Changes print order of spooled jobs	●	●	●	●
Previews spooled jobs				●
Remote despooling using different disk				●
Sets network priority		●		●
Shows printer status	●	●	●	●

[1] Specifications and performance results are based on prerelease software; the final software may differ from that described here.

[2] The amount of memory *SuperLaserSpool* uses depends on the size of its spooling buffer, an area of memory that holds data before it's saved on disk. For many laser printing applications, a 64K buffer is adequate. For ImageWriter spooling or laser printing of numerous bit-mapped graphics, SuperMac recommends a 128K buffer. For printing very large, complex bit-mapped images, a 180K buffer is recommended.

[3] Start-up method doesn't apply to *LaserSpool,* since it is a replacement for the LaserWriter driver. Once you've selected *LaserSpool* with the Chooser, it remains active until you select a different driver.

[4] Manually downloading a font offers no advantage; *LaserServe* still saves the font's data in the spool file and downloads it.

Table 1
A comparison of four spoolers for LaserWriters and other PostScript printers.

cation is taking place. Put differently, the spooler has to mimic the printer in order to get the data from the Mac. During despooling, the spooler should respond to requests for downloadable fonts or the Laser Prep file. (For more spooler basics, see "Getting Started with Spooling," *Macworld,* March 1987.)

Ten Points of Comparison

All PostScript spoolers perform some printer mimicry, and each has *laser* in its name, but the similarities end there. Some imitate a printer more thoroughly than others, and most provide convenience features that let you manage the spooling and despooling process (see Table 1). You should consider the following issues when searching for a spooler.

■ *Compatibility* Some programs, including *PageMaker* version 1.2 and Knowledge Engineering's *Just Text,* don't use the Mac's standard printing routines and, therefore, don't work with all spoolers. *PageMaker,* for example, uses its own prep file—Aldus Prep—and handles certain aspects of printing differently (see "How PageMaker Prints"). Unless a spooler does somersaults to work with *PageMaker* (some do, because of *PageMaker*'s popularity and slow printing speed), *PageMaker* users lose the benefits of spooling. Other compatibility problems could surface as new applications arrive that don't use Apple's routines.

■ *Downloadable fonts* Disk-based fonts that you load into the printer's memory before use present sticky problems for spoolers. Usually the Mac's LaserWriter driver transmits downloadable fonts automatically just before a document is printed. Because a spooler determines when printing occurs, it must download fonts itself. Because of the technicalities involved in doing so, some spoolers forgo the convenience of automatic downloading, making you download fonts manually using a font downloader utility before spooling a document. (For more on downloadable fonts, see "Font Facts," *Macworld,* February 1987.)

■ *Queue management* When you and other members of a network are spooling away, a large line, or *queue,* of documents builds. Some users may need their documents faster than others; some may decide not to print a spooled document after all. Most spoolers include a desk accessory for controlling the queue, by deleting spool files or moving some ahead of others. The desk accessories usually also let you turn off despooling, to build up a large queue that you may send to the printer at the end of the day; and bypass spooling, which you might do when using a program that doesn't work with the spooler. The best desk accessories also provide on-line help and let you monitor the printer's progress.

■ *Speed* Using any spooler is faster than using none at all, but there can be dramatic speed differences among them. The biggest factor influencing performance is the point at which the spooler intercepts the Mac's normal printing routine (see Figure 1). One

spooler stores on disk the QuickDraw graphics commands the Mac creates to describe a document's appearance, other spoolers store the PostScript code the LaserWriter driver creates by translating those QuickDraw commands. PostScript code is much larger and takes longer to save on disk than QuickDraw commands, so a QuickDraw spooler spools faster than a PostScript spooler, especially with documents containing bit-mapped graphics such as *MacPaint* pictures.

■ *Disk consumption* Because spoolers store queued documents on disk, they have a ravenous appetite for disk space. One of my tests involved spooling a 10-page *Microsoft Word* 1.0 document containing numerous pictures and two downloadable fonts. Infosphere's *LaserServe* created a PostScript spool file that occupied a whopping 416K of disk space—more than the capacity of a single-sided floppy disk. With SuperMac's *SuperLaserSpool*, the only QuickDraw spooler currently available, the same document produced a 62K spool file. Clearly, a QuickDraw spooler is more practical for Macs without a hard disk, for networks structured around a single hard disk server, or for any system where disk space is at a premium.

■ *Memory consumption* A spooler's software takes a bite out of memory—between 28K and 180K, depending on the product and its settings. A 512K Mac can easily run out of memory if you use other *memory resident* software—a network server like *TOPS* or *MacServe*, a utility like *Tempo*, or a spelling checker like *MacLightning*. One solution to the crunch is a spooler that can be easily disabled, freeing memory for those times when everything just won't fit.

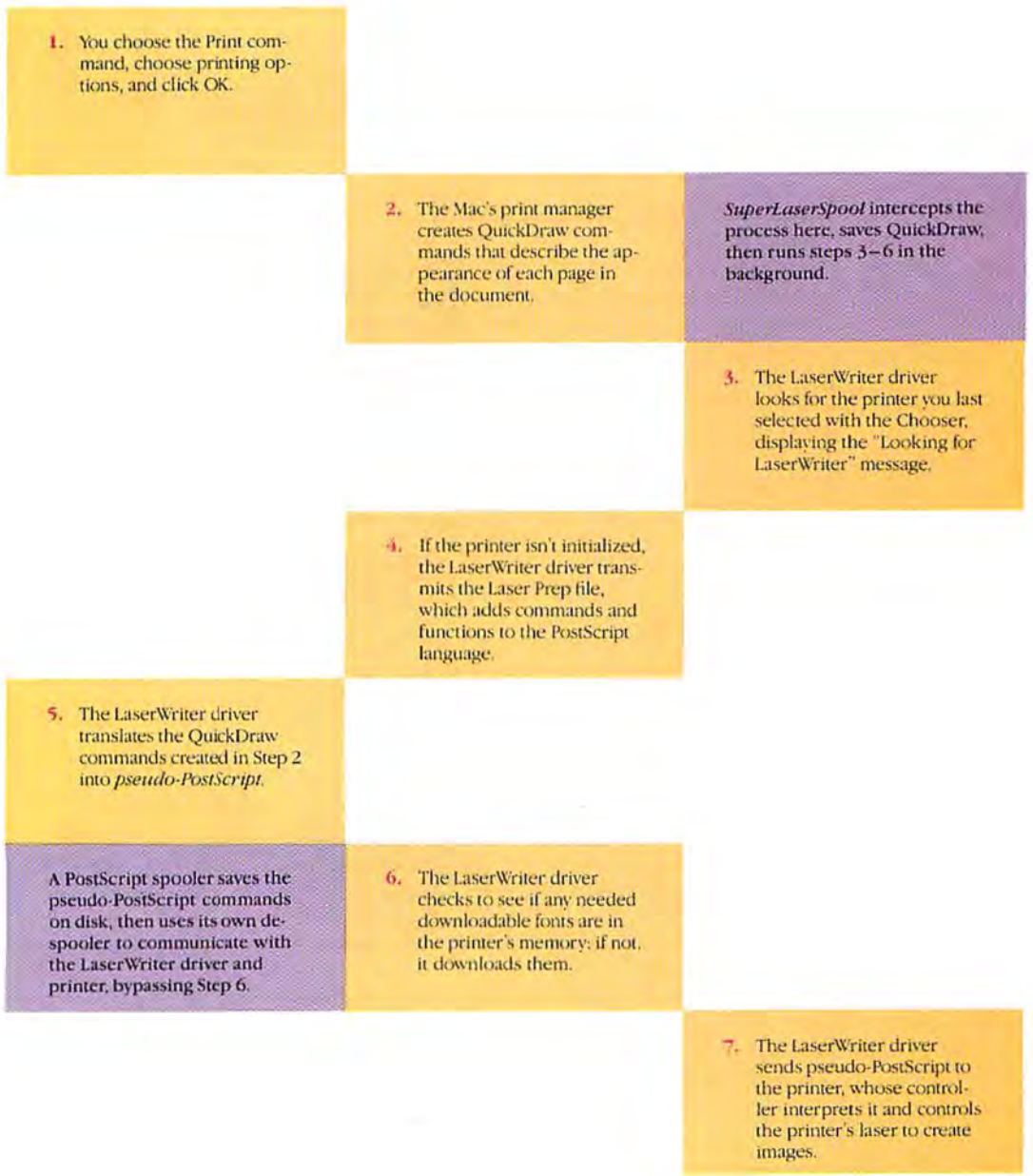


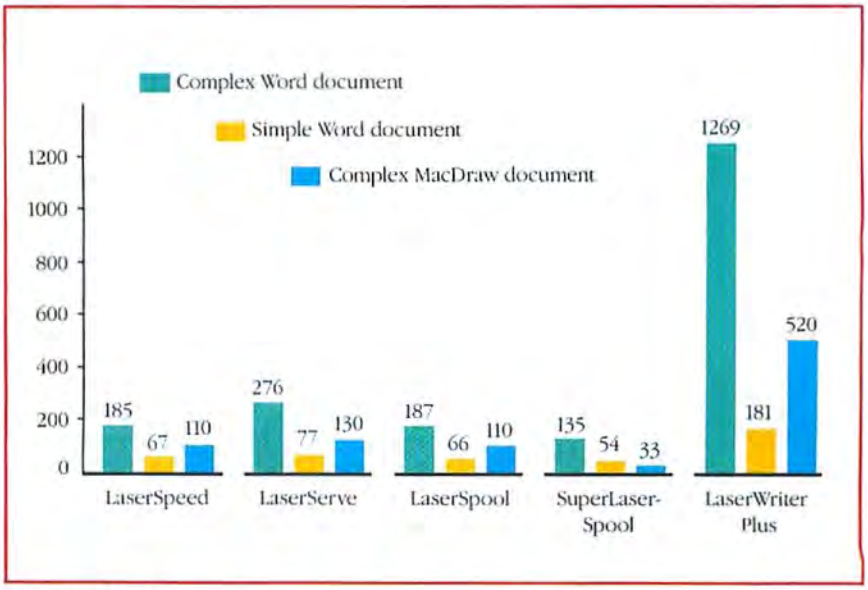
Figure 1
Spoolers work by altering the Mac's normal printing routine and saving either QuickDraw commands or PostScript commands on disk, then communicating with the printer in the background while you use the Mac for other tasks. Pseudo-PostScript is a combination of PostScript and the special commands added by the Laser Prep file (step 4).

Spoolers Face Off

To test the LaserWriter spoolers' performance, I measured the amount of time required to spool three test documents (see "Timing Chart"). The first test, a simple *Microsoft Word* document, was ten single-spaced pages containing 12-point Courier with Bold and Italic and no graphics. The second test, a complex *Word* document, was a single-spaced, ten-page document containing 24-point Times Roman Bold, 12-point Times Roman with Bold and Italic, 12-point Helvetica with one line of Italic, 12-point Garamond with Italic (Adobe downloadable fonts), and seven small bit-mapped images. The third test, a complex *MacDraw* document, contained 2922 objects. All tests were performed on a 512K Enhanced Mac with a 20-megabyte MicahDrive internal SCSI hard disk.

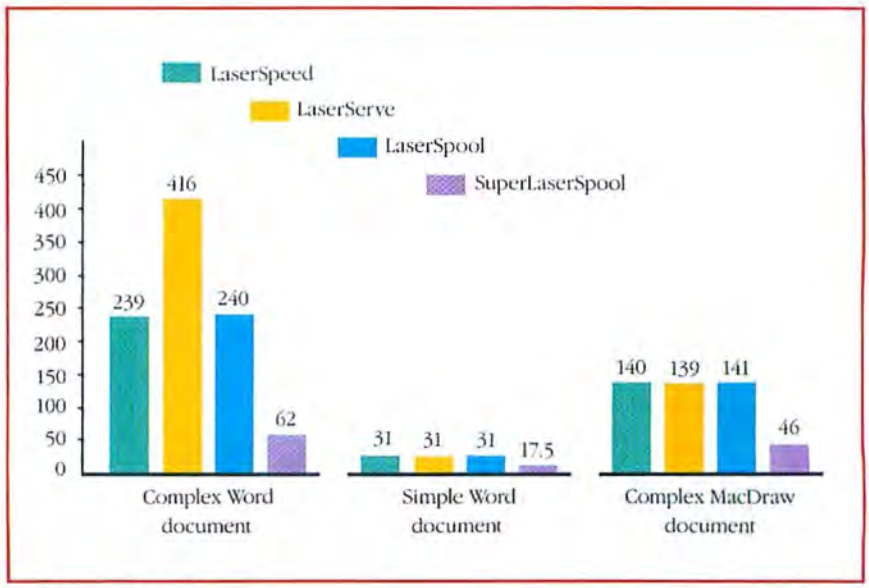
As the chart shows, any spooler accepts a document faster than a LaserWriter Plus does. (To see how some other PostScript printers fared with the same documents, see "Laser Wars" in this issue.) *SuperLaserSpool* flies through documents containing graphics, since QuickDraw commands are much more compact than the PostScript commands created by Apple's LaserWriter driver.

Another measure of a spooler's performance is the amount of disk space its spool files use (see "Disk Space Chart"). Here *SuperLaserSpool* wins again. *LaserServe* shows its lust for tracks and sectors with the downloadable fonts in the complex *Word* document; otherwise, the PostScript spoolers consumed similar amounts of disk space.



Timing Chart

Performance results for four laser printer spoolers, as timed on a 512K Enhanced Mac with a MicahDrive internal hard disk. All times are in seconds. Performance on a floppy disk system would be proportionally slower.



Disk Space Chart

Disk space used by each test document's spool file. All values are in kilobytes. The 185-second result for LaserSpeed *does not include the time required to manually download the two fonts in the complex* Word *document.*

■ *Manual-feed operation* People who frequently use a printer's manual-feed tray need a spooler that allows manual-feed operation. You should be able to select the manual paper-feed button as usual, and the spooler should notify you when it's time to insert paper.

■ *Job notification* With some spoolers dialog boxes optionally notify you when a particular job has started or finished printing. Such features save you the time taken by periodically checking the printer's tray for the hard copy. This is especially useful if the printer is in a different room.

■ *Reliability and error handling* A spooler won't save any time if it crashes the Mac or the printer, or if it fails to report printer errors, such as jams or an empty paper tray. Ideally, the spooler should present you with a dialog box that asks you if you want to continue or cancel the document being processed.

■ *Transparency* Spooling may change what goes on inside the Mac, but it shouldn't change what goes on outside. You shouldn't have to learn a new set of commands and techniques for printing.

Think Technologies' LaserSpeed

LaserSpeed isn't the fastest or the most sophisticated spooler available—it can't automatically download fonts and it violates the transparency concept. Nevertheless, it is reliable, it works with *PageMaker,* and it uses very little memory.

LaserSpeed comes with an installation program that adds two desk accessories to your System file: the queue manager and an invisible desk accessory (technically speaking, a *driver*) containing the program code that despools documents. *LaserSpeed* uses an invisible desk accessory for despooling because the Mac's system software periodically allocates time to desk accessories that are open (which is how the Alarm Clock's numbers advance while another application is running).

This technique for controlling the spooler saves programming time, but it has disadvantages. The Mac doesn't give time to desk accessories when the mouse button is pressed, when loading a program, or when a program is performing a complex task such as search-and-replace or spreadsheet recalculation. With the Alarm Clock, that means numbers don't advance until the mouse button is released or the lengthy operation ends. Using a desk-accessory driver causes despooling to grind to a halt. If the delay lasts more than 30 seconds, a LaserWriter will *time-out,* canceling the current print job and producing an error message.

Whether this is a problem for you depends on your work. Most people don't press a mouse button for 30 seconds at a time, but they may conduct lengthy search-and-replace operations or recalculate large spreadsheets. If you fall into that group, *LaserSpeed* is probably not for you.

Priming the Printer's Pump

After *LaserSpeed* is installed, it loads automatically on start-up. After you've used an application's Print command as you normally would, *LaserSpeed* replaces the usual LaserWriter print messages with a message telling you that it's saving the output on disk. A small LaserWriter icon flashes over the Apple menu every five seconds to remind you that you've spooled a document. If your memory isn't so bad that you need a constant reminder, tough luck—you can't disable the annoying flash.

One way Think Technologies made *LaserSpeed* small and simple was to eliminate automatic printer initialization. If you've just switched on the printer, an attempt to despool a document is met with a message saying you must initialize the printer by choosing Prep Laser (or Prep Aldus for *PageMaker* documents) from *LaserSpeed*'s menu, which appears when its desk accessory is active. After you prime the pump, despooling occurs automatically, unless you disable it to build up a large queue.

Besides making you do what the Mac does automatically, this manual-prepping approach will prevent *LaserSpeed* from working with any forthcoming application that uses its own prep files. A Think Technologies representative said that new versions of *LaserSpeed* will be released as needed to support such applications.

Pros and Cons

LaserSpeed's desk accessory is adequate for managing your print queue and controlling the spooler (see Figure 2). It does, however, lack some of the niceties provided by its competitors. You can't, for example, push the next job you spool ahead of other jobs on the network, as you can with "priority service" on Infosphere's *LaserServe.* The desk accessory does let you disable spooling, although doing so doesn't free up the 28K that *LaserSpeed* uses. As long as *LaserSpeed* is installed in your System file, it loads automatically at start-up, whether or not you've disabled spooling.

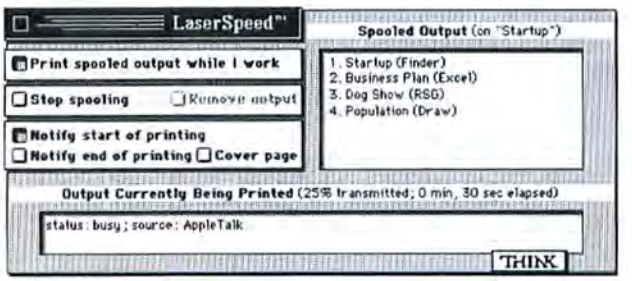


Figure 2

The queue manager for Think Technologies' LaserSpeed *shows spooled jobs and the applications that created them. You can move a job to a different position in the queue by dragging it. The print status messages that the Mac usually displays at the top of the screen appear in the desk accessory's window.*

The Buffer Alternative

You don't have to sacrifice disk and memory space to eliminate the laser wait. DataSpace Corporation's LaserServer and Ergotron Corporation's MacBuffer LW are PostScript *buffers*—hardware add-ons containing their own memory and microprocessors. A buffer's memory replaces a disk for storing jobs en route to the printer, while the buffer's microprocessor and built-in ROM programming replace the spooling and despooling software, communicating with the printer and with the Macs on the network. The LaserServer is built around a 68000 microprocessor (the same chip at the heart of all Macs except the Mac II); MacBuffer LW has a 64180 microprocessor, a memory-management microprocessor that Ergotron says is well suited to accepting data from multiple users simultaneously.

At this writing, neither unit was available in final form, so complete performance and reliability tests will have to wait for a formal review. I did, however, run some tests on a prototype of the MacBuffer LW. The simple *Word* document I used in my spooler performance tests was buffered in 66 seconds—about as fast as the PostScript spoolers when used on a hard disk, but slower than SuperMac's *SuperLaserSpool*. The buffer took the complex *MacDraw* document in 106 seconds, again about the same as the PostScript spoolers, but behind SuperMac's *SuperLaserSpool*.

What advantages does a buffer offer? It doesn't devour disk space and memory as do spoolers; it doesn't modify the Mac's printing routine, so compatibility problems are rare; and it gives each Mac on a network the same fast spooling performance, whether or not it has a hard disk. Most significantly, a buffer doesn't tax the Mac's already hard-working microprocessor and thus eliminates the slowdown in overall performance that spoolers can cause.

There's a price to pay for these pluses. Ergotron's MacBuffer LW costs $2295 with one megabyte of memory (which the firm says is adequate for most networks), and $2695 for a 2MB model. DataSpace's LaserServer starts at $2295 for a 2MB model. The unit contains five expansion slots that can house up to 12MB of additional memory. DataSpace also plans to offer an internal hard disk for holding downloadable PostScript fonts or spooled documents.

But cost is relative. For large networks, it may cost less to buy one buffer than to equip each Mac with spooling software. Downloadable font users could find the LaserServer's internal hard disk a boon to managing a font library. And the low cost of a spooler isn't much consolation if it crashes your Mac, fills your disk, or won't work with the programs you use. In short, buffers aren't cheap, but they may be the most effective route to wait loss.

Although *LaserSpeed* can't download fonts automatically, it can use manually downloaded fonts. If you despool a document containing a downloadable font that isn't in the printer's memory, *LaserSpeed* simply substitutes the Courier font. An error message stating that the required font is missing would save time and paper.

LaserSpeed does display error messages for most other printing problems, but they aren t v"y informative. You're simply told what the error is; *LaserSpeed* doesn't tell you what document it was despooling when the error occurred. And while *LaserSpeed* supports manual-feed operation, it doesn't tell you when to insert paper. Unless you keep an eye on the printer's manual-feed light—which is unlikely if you spooled the job some time before it reached the printer—the next message you see is one saying that a manual-feed timeout occurred and that the job is being "flushed"; that means you must open the original document and spool it again.

Being a PostScript spooler, *LaserSpeed* consumes disk space with a vengeance. And like all the spoolers I tested except SuperMac's *SuperLaserSpool, LaserSpeed* spool files are invisible: they don't appear on the Finder's desktop or in any file scroll boxes. The philosophy behind using invisible files states that you shouldn't have to look at spool files on the desktop, since you can't open or use them and since an unknowing user could think they're unnecessary and throw them away before they're printed.

That makes sense, but it doesn't take into account the occasional system crash. All the spoolers I tested (except MacAmerica's *LaserSpool*) try to recover the queue after a crash, but sometimes they fail. When they do, the invisible files remain as a monument to the crash, taking up disk space that can be recovered only by a program that lets you see and delete invisible files. (PBI Software's *Locator* disk-management desk

accessory and Software Master's *Fedit* disk utility meet this requirement.)

LaserSpeed has some good points—*PageMaker* compatibility, an adequate queue desk accessory, and frugal use of memory—but it also has some rough edges. The invisible desk-accessory despooler causes printer time-outs under some conditions, its error messages are vague, and it handles manual-feed operation poorly. And you should be able to turn off that flashing LaserWriter icon.

Infosphere's LaserServe

LaserServe is the most reliable spooler I tested, and it's less obtrusive than *LaserSpeed.* However, its approach to downloadable fonts virtually demands that you use it on a hard disk.

LaserServe lacks its own installation program, but installing it isn't difficult: with Apple's Font/DA Mover, copy *LaserServe*'s desk accessory into a System file, then copy the *LaserServe* application to a system disk. An option in the menu of the desk accessory lets you specify that *LaserServe* load automatically at start-up. To override automatic installation (and thereby free the memory that *LaserServe* uses) press the X and S keys during start-up.

Most *LaserServe* functions are controlled with icons (see Figure 3). You can also rearrange jobs within the queue by selecting them and using the Edit menu's Cut and Paste commands. If you're in an application that lacks an Edit menu, you can still cut and paste with the ⌘-X and ⌘-V keyboard commands. The desk accessory's menu lets you determine the printer's status; suspend and resume the spooler; and specify priority service, which places your next print job at the head of the queue. Unlike *LaserSpeed* and *LaserSpool, LaserServe* also works with AppleTalk ImageWriters. A menu command lets you specify a number of copies for an AppleTalk ImageWriter print job.

Disk Hog

Once installed, *LaserServe* works unobtrusively, initializing the printer automatically and downloading fonts as required. It jumps the downloadable font hurdle by saving all font data in the spool file of each document that uses that font. For example, if you spool two documents containing Adobe's Souvenir, *LaserServe* copies the Souvenir data from the font file into both documents' spool files.

If you use downloadable fonts extensively, *LaserServe* eats up staggering quantities of disk space. In one test, a one-page letter containing Adobe's Garamond and Garamond Italic downloadable fonts produced a 162K spool file. An office of downloadable-font users networked to a single hard-disk server could all but fill the server with spool files. Downloading the fonts manually beforehand is no help; *LaserServe* doesn't check the printer for them but spools them for every job. And because it takes time to spool the font data, *LaserServe* is the slowest of the products I reviewed at spooling documents containing downloadable fonts.

As with *LaserSpeed, LaserServe*'s spool files are invisible. The unaware user could see a great deal of disk space seemingly vanish if *LaserServe* lost track of a queue of spool files containing downloadable fonts.

LaserServe also uses more memory than *LaserSpeed*—a point proven by the occasional system crashes I witnessed while testing it on a 512K Mac equipped with a HyperDrive (a setup often considered a worst-case scenario where free system memory is concerned). On my other test bed—a 512K Enhanced Mac with a MicahDrive, a configuration with more free memory than a 512K with a HyperDrive—*LaserServe* behaved far more reliably.

A Good Communicator

LaserServe outdoes *LaserSpeed* at keeping you informed. Error messages contain the name of the document that was being despooled when the error occurred and include buttons that let you cancel the job; restart it from the beginning; or continue from where the error occurred, saving time after errors such as paper jams or empty paper trays.

LaserServe comes with a list of applications with which it does and doesn't work. At this writing, only *PageMaker* 1.2, Knowledge Engineering's *Just Text,* or FTL Systems' *MacTEX*—three programs that don't use the Mac's standard printing routines—are listed as incompatible. You don't need to disable *LaserServe* before printing from one of these programs. The programs simply bypass *LaserServe* and print normally.

LaserServe has the same commendable crash-recovery capability as Infosphere's *MacServe* disk server software (see "A Network Divided," *Macworld,* October 1986) and its automatic printer initialization lets it stay behind the scenes better than *LaserSpeed.* It works nicely with downloadable fonts, but you must

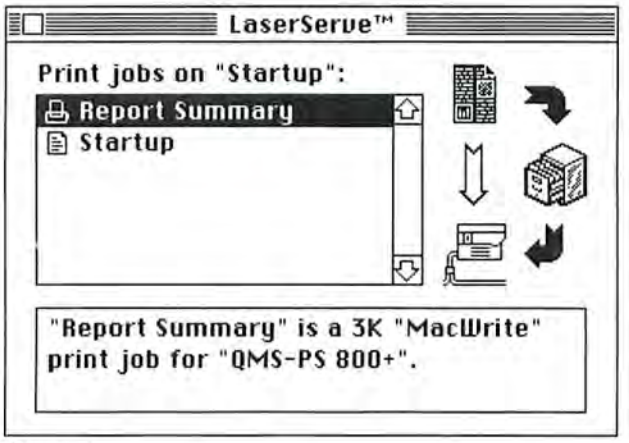


Figure 3
Infosphere's LaserServe *queue-manager desk accessory. You click on arrows to activate spooling and despooling or to bypass the spooler. The icons next to the job names indicate whether the job is printing or waiting. You can reorganize jobs in the queue using Cut and Paste commands.*

How PageMaker Prints

Aldus's *PageMaker* causes compatibility migraines for spooler manufacturers because it radically alters the printing process. Instead of letting Apple's LaserWriter driver translate QuickDraw into PostScript and deal with the printer, *PageMaker* says, "I'd rather do it myself." The program contains, byte-for-byte, portions of Apple's LaserWriter driver (specifically, the PDEF 10 resource, which implements the AppleTalk printer-access protocol, or PAP).

Its independent nature gives *PageMaker* some unique capabilities and some unique printing performance problems. *PageMaker* treats each text block in an article as a separate document; if a text block contains a downloadable font, *PageMaker* downloads it, then purges it from the printer after that block has been processed. If the same font is required in the next text block, *PageMaker* must download it again. The advantage: *PageMaker* documents can contain more downloadable fonts on a page than documents created with other programs, since downloadable fonts are purged more frequently. The drawback: printing a page with numerous downloadable fonts—or the same font in several text blocks—is painfully slow.

Aldus's forthcoming *PageMaker* version 2.0 will let you choose between printing through Aldus's print routines or Apple's; picking the Apple route will eliminate spooler compatibility problems, but you will lose *PageMaker*'s unique printing capabilities.

have a hard disk to use them to any extent. In that regard, *LaserServe* is like a grand piano: nice if you have room for it.

MacAmerica's LaserSpool

LaserSpool was the first PostScript spooler available for the Mac. A bare-bones spooler, its queue-management features aren't as flexible as the other products I tested, it lacks error messages, and it doesn't work with downloadable fonts. When it was the only spooler available, those shortcomings were easy to overlook. But the more sophisticated spoolers now available put *LaserSpool* out of the running.

LaserSpool has a custom LaserWriter driver (based on Apple's version 3.1), which may cause problems when used on a network in which other users have upgraded to a newer version of Apple's driver. It also includes a desk accessory for controlling the queue and determining the printer's status. The spooler does not work with Macs containing the original 64K ROM; it requires a 512K Enhanced or a Mac Plus.

To use *LaserSpool,* you select its custom driver with the Chooser. When you OK a Print dialog box, the driver creates a PostScript file identical to the file Apple's driver creates when you use the ⌘-F key sequence immediately after confirming a Print dialog box. After the PostScript file is created, the driver runs in the background, despooling the file to the printer.

If *LaserSpeed*'s operation is semitransparent, *LaserSpool*'s is downright opaque. Like *LaserSpeed, LaserSpool* makes you initialize the printer yourself. But *LaserSpool* doesn't provide a menu command that transmits the Laser Prep file. Instead, you must print a document while bypassing the spooler, which you do by pressing ⌘-F after confirming the Print dialog box. If you don't press ⌘-F at the right time, *LaserSpool* spools the document and then makes a futile attempt to despool it.

LaserSpool's queue manager desk accessory lets you reorganize spool files waiting to be printed, but not with the click-and-drag or cut-and-paste ease of its competitors. Double-clicking on a spool file's name moves it down one position in the queue. Reorganizing a queue containing a half-dozen jobs can be like trying to solve Rubik's Cube.

LaserSpool is devoid of error messages. The only way to determine the printer's status is to open *LaserSpool*'s desk accessory. *LaserSpool* can't recover the queue after a system crash, but fortunately the spool files are visible on the desktop, so you can at least reclaim disk space easily. You can also send files to the printer, eliminating the need to respool them, using a program called *SendScript,* which comes with *LaserSpool.*

LaserSpool doesn't work with *PageMaker* version 1.2. It cannot automatically download fonts, nor will it work with fonts you've downloaded yourself. It does let you use the manual-feed option, but as with *LaserSpeed,* you have to watch for the printer's manual-feed light. Given its price and limited capabilities, there's no reason to consider *LaserSpool* over the competition.

SuperMac Software's SuperLaserSpool

SuperMac's *SuperLaserSpool* is the most feature-packed product in its class. *SuperLaserSpool* spools for ImageWriters (whether on AppleTalk or not) as

well as for PostScript printers. I used a prerelease copy that was functionally complete but not fully tested, so I can't comment fairly on its reliability. If the final version works reliably, *SuperLaserSpool* will easily take first place among print spoolers.

SuperLaserSpool comes with a queue-manager desk accessory and an application for loading the spooler into memory. To have the spooler load automatically, use the Finder's Set Startup command to make the program the start-up application. If you already use a different program as a start-up application, you can specify a *chain* program that's run after the spooler loads.

SuperLaserSpool works with *PageMaker* 1.2 and other nonstandard applications, and it automatically initializes the printer and downloads fonts as needed. SuperMac Software performs these compatibility and transparency feats by operating Apple's standard LaserWriter driver in the background–while other programs are running–for despooling. All other spoolers work with special despooling software that sends spooled documents to the printer. It's this special software that causes compatibility problems.

As the only QuickDraw spooler in the bunch, *SuperLaserSpool* is also the fastest laser spooler available. Because QuickDraw is more compact than PostScript, spool files take up less disk space. And the QuickDraw spool files allow another nicety: a preview button in the queue-manager desk accessory that lets you see a full page or zoom in on a specific area of a file before it's spooled (see Figure 4). The preview feature doesn't work, however, with spool files created by *PageMaker* or Adobe's *Illustrator,* since those programs create their own PostScript code rather than allowing *SuperLaserSpool* to create QuickDraw spool files.

SuperLaserSpool's strengths don't end with its speed and preview feature. Spool files, which are always visible, stay in a folder called "SLS Spool Files." This not only keeps them from cluttering your desktop, but also lets you delete them when you want to. Best of all, you can take the spool files to a different Mac that's running *SuperLaserSpool,* copy them to its SLS Spool Files folder, and despool them. This feature could be a godsend for laser-printer rental shops or typesetting services. Instead of opening the application in which the document was created, then choosing its print command, you simply copy the needed spool files to the appropriate folder and let *SuperLaserSpool* go to work. You can despool on a different Mac with *LaserSpeed* or *LaserServe,* but to do so you must use the same disk you originally spooled to, since it contains invisible files that you can't easily copy or transmit over a modem.

SuperLaserSpool is the most complete and well-designed spooler available for the Mac. It uses more memory than most other spoolers, however, so it may not work well on 512K Macs with HyperDrives and other memory-tight machines. I couldn't test its error-handling features, but if they're as complete as the rest of *SuperLaserSpool,* it will be the Mac's best spooler.

Figure 4
The queue manager for SuperMac Software's SuperLaserSpool *shows jobs in the queue and lets you alter the order in which they're despooled by dragging them. You can also preview a spooled document by selecting it and clicking the Preview button.*

Closing the Queue

The right spooler for you may not necessarily be the one that includes the kitchen sink. The right spooler is one that works on your system, with the programs and printers you use. If you want to spool from *PageMaker,* choose between *SuperLaserSpool* and *LaserSpeed. SuperLaserSpool* is the obvious choice if disk space is limited, if you also want to spool to ImageWriters, or if you frequently use an outside laser-printer or typesetting service. If you're short on memory but long on storage, consider *LaserSpeed* or *LaserServe,* but beware of *LaserServe*'s appetite for disk space when it comes to downloadable fonts. Finally, General Computer includes a version of *LaserSpool* with its HyperDrive hard disks. I wouldn't recommend buying *LaserSpool,* but it would be worth trying if it came with your hard disk.

Your time-saving choices don't end with the four products reviewed here. Last January, Apple announced *LaserShare,* a laser spooler designed to run on a dedicated 512K Enhanced Mac, or on a Mac Plus running Apple's *AppleShare* file server software (see "AppleShare–Multifaceted Networking," *Macworld,* March 1987). Unlike any other spooler currently available, *LaserShare* can create a log that lists which users printed which jobs, a useful feature for universities that charge students a per-page rate for laser printer access. Gestetner Corporation has announced *LaserExpress,* a spooler that will also have a job-logging feature and won't require a dedicated Mac.

Then there's the cost factor. To give the benefits of spooling to every member of a network, you must buy a separate copy of the spooler for each one. Networks with more than ten or so stations may find it less expensive to buy a hardware buffer from Dataspace or Ergotron (see "The Buffer Alternative").

Laser printer spoolers were slow in coming for the Mac because of the complexities involved in printing to a PostScript printer over AppleTalk. But they're here now, and for the most part, they work well. You might even say they're worth the wait. □

See *Where to Buy* for product details.

Reviews

Presenting PowerPoint

PowerPoint, *prerelease*

Presentation graphics. ***Pros:*** *Provides most capabilities for composing and managing presentations on overhead transparencies, flip charts, and slides.* ***Cons:*** *Limited graphics composition features.* ***List price:*** *Version 1.0 $395.* ***Requires:*** *512K.* ***Copy protection:*** *None.*

PowerPoint, recently released by Forethought, is a management and composition tool that gives you direct, personal control over the production of presentation graphics materials.

PowerPoint accomplishes more preparation tasks than any other presentation software, including viewing and rearranging slide sequences, developing a visually unified presentation, and producing bulleted outlines, speaker's notes, and audience handouts.

Shaping the Presentation

The best feature of *PowerPoint* is its ability to handle a presentation as a unit, eliminating the need to manage an unwieldy assortment of individual drawings and documents in separate files. With *MacDraw,* after you transfer documents to a single file, you must copy and paste the presentation format onto each page. In *PowerPoint,* elements that repeat on every page (borders, logos, sequence numbers, dates) need only be created once. Changes made to the master are reflected on all slides in the series, eliminating repetitive editing. If you need a slide without the master format, such as the closing slide, you can omit the master format. *PowerPoint* also lets you add text blocks and labels to your artwork and arrange and rearrange the order of your slides. The program's management capabilities let you develop slide libraries and reuse slides. This is particularly convenient when you simply want to revise a presentation.

Page Setup determines presentation format. In *MacDraw* you have no way of envisioning how the final slide will look, since the aspect ratio of a slide or transparency is different from a *MacDraw* page. With *PowerPoint,* after you select a desired format, the program shades the area of your document that will not appear on the slide or transparency. Although text and graphics are not automatically resized to fit within the correct aspect ratio, you are given boundaries within which to adjust the content. Predefined formats include overhead transparencies with either vertical (portrait) or horizontal (landscape) orientation and 35mm slides. Other dimensions can be user defined, enabling you to use a large-screen Mac monitor for your presentation.

PowerPoint gives you better text-handling capabilities than *MacDraw,* particularly for labeling slides and creating blocks of text. A label can appear anywhere on a slide, even on top of a pasted-in illustration. To add a block of text, you simply define an area for the text to fill. The defined block is handled as a single object and can be resized. You can also frame text with an automatically sized box. Ruler-defined tabs and indents make production of multilevel bullet charts easy. You create multiple columns by defining side-by-side text areas. You'll find some minor problems aligning text in columns, but this difficulty may have been overcome in the released version.

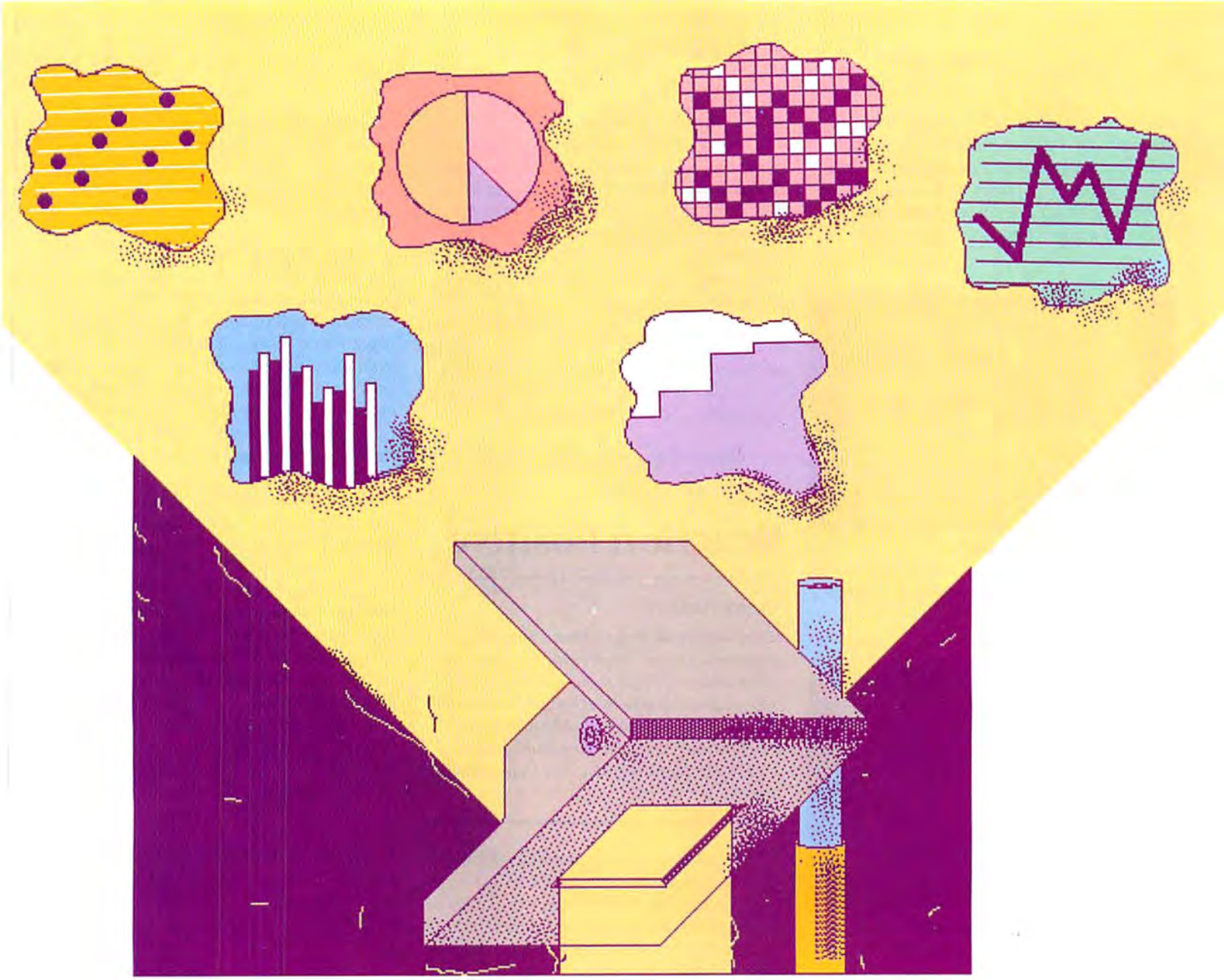
Each presentation has its own set of fonts, which can be easily customized using a simple menu similar to Font/DA Mover. The selection of fonts is saved along with the presentation and does not carry over to other presentation windows that are opened simultaneously.

Limited Graphics

A series of words on slides is seldom visually exciting, however. Graphics composition is *PowerPoint*'s most apparent limitation. Unlike *MacDraw,* PowerPoint is not object oriented, has no grouping function, and can't create complex figures such as polygons. The program's graphics toolbox has just four tools: line, circle, rounded-corner box, and square box. In addition to these drawing limitations, you'll find that fill patterns for objects other than predefined shapes and lines are not allowed. For example, it is impossible to produce a simple pie chart with patterned slices using *PowerPoint* alone.

Unless your graphics requirements are extremely simple, *MacDraw* or another

ILLUSTRATIONS BY MARK ULRICH



draw or paint program is an essential companion to this program. *PowerPoint* accepts pictures in PICT format (*MacDraw, Excel, MacDraft, Cricket Graph,* and most other Mac drawing programs) or *MacPaint* files. The manual says the program will also accept outlines, pictures, bullet charts, and tree charts directly from *More,* though I was unable to make this feature work using prerelease software. From within *PowerPoint,* you can crop a figure by moving a window around it, leaving visible just the portion you want to see (since none of the original image is lost, you can change your mind). You can move figures, resize them, and add labels. But you cannot edit images once you have pasted them into *PowerPoint.* Any changes to graphics must be made from within the image's original application, such as *MacDraw* or *MacPaint.*

Now Where Were We . . .

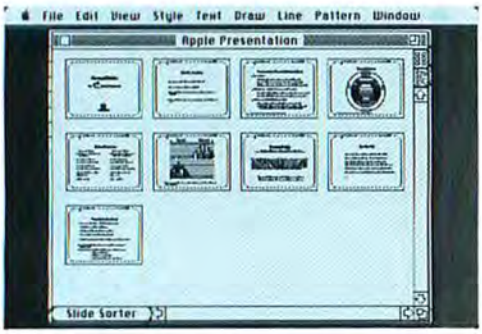
PowerPoint's Slide Sorter turns the Mac's screen into a light table for visually sorting slides (see "Arrange and Rearrange"). Several slides can be moved at once, and when they're automatically numbered, the sequence numbers are updated to reflect their new positions. The program also lets you sort slides by title.

The Slide Show feature allows you to preview the slides, advancing to the next slide either automatically or manually. Slide views can be scaled by selecting a percentage of the full printed size: full size or 75, 66, 50, or 33 percent. You can change the size when designing, sorting, or previewing slides, but the printed size will remain unaffected. The smaller sizes allow you to see the entire slide on screen at once.

PowerPoint gives each slide a note page that provides the speaker with an outline, cues the projectionist with instructions, or maintains reference information

(continues)

about each slide (see "Handling Text with PowerPoint"). Just as with the slides themselves, you can determine the format and layout of the note pages with a master template. The predefined note page contains a reduced image of its associated slide.



Arrange and Rearrange
Slides can be sorted visually with the Slide Sorter option. Here, the slides are reduced to half size (50 percent reduction).

Handling Text with PowerPoint
PowerPoint*'s word processing and editing capabilities are invoked by clicking on the word processing tool and defining a selection box. Alignment, rulers, and line spacing choices can be saved as defaults for other new text boxes. Text can be moved as an object or resized by dragging one of its selection box handles.*

PowerPoint also allows you to create reproductions of the slides in a presentation—two, three, or six images per page—to use as handouts (this feature was not fully implemented in the prerelease version). You can also use *ImageMaker*, a computer peripheral developed by Presentation Technologies, to produce 35mm color slides from presentations created in *PowerPoint* and other software such as *MacDraw, Cricket Draw, Microsoft Excel,* and *Jazz*.

A Sleight of Hand

PowerPoint's function in presentation composition is similar to *PageMaker*'s in desktop publishing. It allows you to flexibly combine the output of a variety of programs and documents into one cohesive presentation. *PowerPoint* is not a standalone presentation preparation program: its graphic design features are limited. But it is easy to use and will streamline the task of creating presentations, briefings, or lecture materials. It can also help you improve the quality of your presentations quickly and easily.—*Nanci Hamilton*

See *Where to Buy* for product details.

Reaction Positive

MicroChem 1.0

Molecular modeling system. ***Pros:*** *Easy to use; interfaces conveniently with mainframe systems.* ***Cons:*** *Some mainframe users may miss color graphics.* ***List price:*** *Organic Model Building Unit $995; Inorganic Model Building Unit $995; Polymer Model Building Unit (projected price) $995.* ***Requires:*** *Mac Plus.* ***Copy protection:*** *None.*

Chemicals and pharmaceuticals are among the few American industries holding their own in world markets. But even in such a booming business, competitive and economic pressures can be fierce. Of the thousands of compounds submitted to the FDA in 1986, exactly 20 new drugs were approved for sale.

The difficulty and expense of making and testing compounds has created a demand for software that will help chemists refine their research efforts by simulating chemical properties on screen. For years an assortment of modeling programs known collectively as *ChemLab* has been the mainframe research standard. Now Intersoft has completely rewritten the *ChemLab* code in TML Pascal to create the professional Macintosh modeling program *MicroChem*.

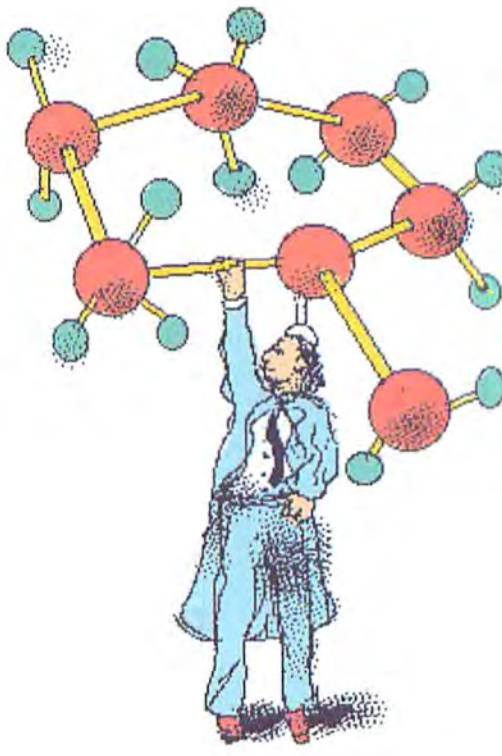
This program encapsulates nearly 20 years of research in molecular graphics and applied artificial intelligence. Its appearance on the Mac (and only on the Mac) means that, for the first time, a personal computer can perform research-grade chemical computation.

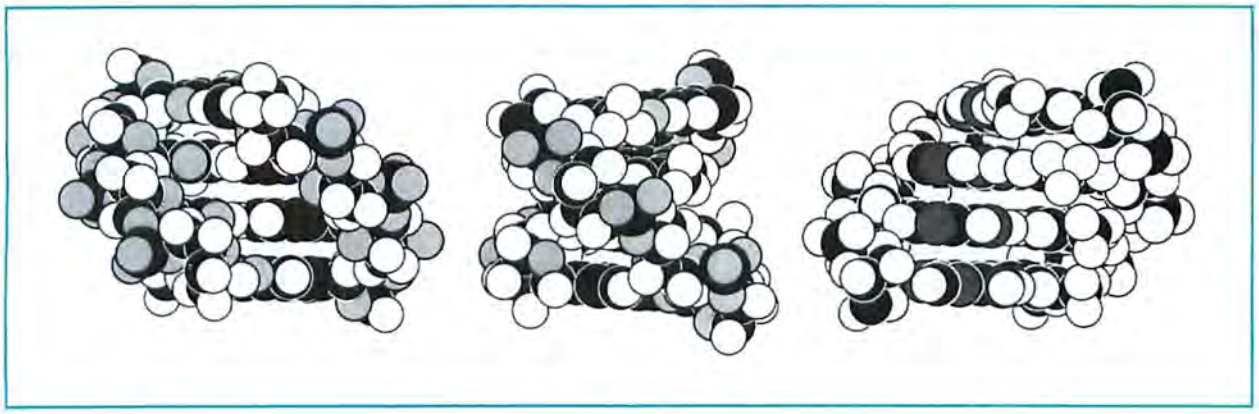
Mac Molecules

The full *MicroChem* package comprises three separate units for organic, inorganic, and polymer chemistry. The organic and inorganic units have been available since early this year; the polymer unit wasn't ready at press time, but may be available by the time you read this review. Each module includes a basic set of input, drawing, and display routines and can be used independently.

ChemLab users will have no difficulty adjusting to *MicroChem;* the Mac routines roughly correspond to their mainframe predecessors, except that they're easier to use. You input molecules to *MicroChem* either by sketching them using InputMol or by downloading them from a mainframe using FormatMol. FormatMol's ability to understand common structural conventions and to turn sloppy freehand sketches into publication-quality renderings reveals some of *MicroChem*'s AI abilities. You can also use FormatMol to translate files in the other direction—from *MicroChem* to a mainframe. FormatMol reads and writes all standard molecular file formats.

Once you've input a molecule, BuildMol (in the organic unit) turns it into a 3-D model. By mainframe standards,





Molecules in Motion
Frames from a MicroChem *"movie" of a DNA molecule rotating in space. Chemists use this view to look for "pockets" and "bulges" in the structure.*

BuildMol's modeling and basic energy calculations are stunningly easy to run; for the first time a full-featured molecular mechanics program handles like *MacDraw*. You can produce larger structures by linking BuildMol fragments together using AssembleMol.

DisplayMol enables you to view your molecule in a variety of ways. In addition to the usual Rotate Molecule and Stereo-viewing visualization commands, *MicroChem* adds a Make Movie function that depicts the molecule tumbling in free space (see "Molecules in Motion").

Most large molecules have considerable flexibility, so finding the most stable conformation is important in predicting chemical properties. *MicroChem*'s Organic Model Building Unit adds a facility called TwistMol for exploring conformations. Sophisticated AI code in this routine calculates steric interactions, bond lengths, and angles and displays contour plots identifying preferred conformations. New proprietary routines give TwistMol near-VAX speed, and the size of the "twisting" molecule is limited only by available memory. With a 1-megabyte Mac Plus, you can analyze molecules of 60 to 100 atoms.

The *MicroChem* Inorganic Model Building Unit provides the specialized programs ZeoMaker, SurfaceMaker, and Complex/cageMaker. These routines automatically construct zeolitic structures (see "Stereo View"), crystal lattice surfaces, and organometallic complexes and molecular cages. Just as organic chemists model drug structures, inorganic chemists want to design and model catalysts. Inorganic catalysts, from the zeolites that make additives for unleaded gas to the platinum antismog converters in cars, are a hot research topic. *MicroChem*'s inorganic facilities handle a greater variety of structures and are more functional than their mainframe equivalents. Intersoft is counting on intense commercial interest in catalysis to drive the *MicroChem*-Mac package into laboratories.

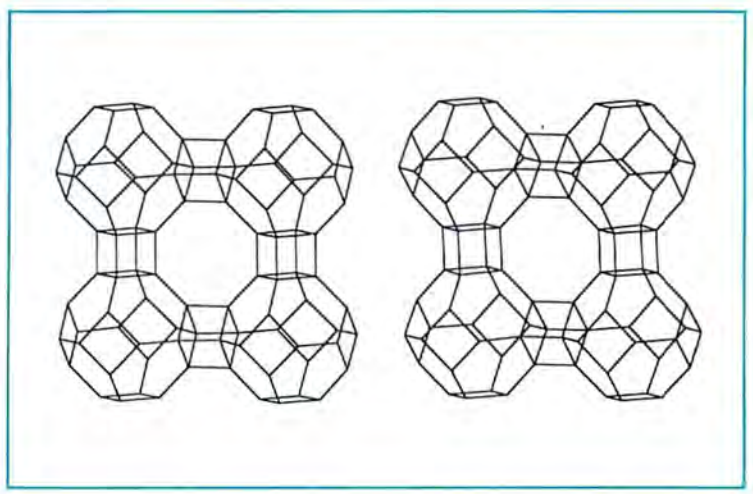
Think Plastics

Since polymers by definition are large, the polymer unit in development for *MicroChem* will be most useful on Macs that have more than 1MB of memory. A conformational study, for example, of eight styrene molecules linked together to make a short strand of polystyrene would probably require 4MB for convenient operation. Such applications will test the number-crunching limits of the Mac II and upgraded SEs and Pluses. Intersoft has benchmarked *MicroChem* on a wide variety of machines and claims that a 68020 Mac with a floating-point math coprocessor and 4MB of RAM outperforms most existing scientific minicomputers on polymer applications.

For serious chemical modeling on a personal computer, *MicroChem* is the only game in town. (Problems with RAM expansion and graphics interface have kept IBM PC/AT-based competitors at the "educational" level.) The consistent, easy-to-learn Mac interface makes it possible for chemists who haven't much computing background to do useful work in the first few sessions. In contrast, most mainframe modeling packages require extensive training (from three days to a week) for the simplest applications.

For years large chemical companies have waited for a system that could make the "one chemist, one computer" lab a reality, but awkward and expensive hardware made this vision unattainable. By choosing the Mac as the delivery system for its chemical software, Intersoft has started a revolution as important in its way as the LaserWriter-*PageMaker* combination in publishing. –*Charles Seiter*

See *Where to Buy* for product details.



Stereo View
You can see the zeolite in "mock 3-D" by placing a large file card between the drawings, sighting down the card, and defocusing slightly. MicroChem *offers stick figures (like this one), ball-and-stick figures, and space-filling representation (as in "Molecules in Motion").*

Sleek, Fast Accounting

***Rags to Riches** 3.1*

Accounting modules. ***Pros:*** *Simple; fast; reasonably priced.* ***Cons:*** *Inflexible GL data entry; weak error handling.* ***List price:*** *$199 per module; $499 for Ledger, Payables, and Receivables combined.* ***Requires:*** *512K.* ***Copy protection:*** *None.*

A few years back Chang Labs' *Rags to Riches* was really the only choice for those using their Macs for accounting. Although there are now over a dozen competing packages, this newest version holds its own against them.

The entire package includes five accounting modules—General Ledger, Accounts Payable, Accounts Receivable, Inventory Control, and Professional Billing. This review covers the new versions of the General Ledger, Accounts Payable, and Accounts Receivable modules.

Each module is a separate program that can be integrated by merging accounting transactions from the various modules into the General Ledger. The modules are structured in a way that allows *Rags to Riches* to function in a multiuser environment, if restricted to one user per module or per set of customer or vendor accounts.

One outstanding aspect of each module is a simple, intuitive approach to accounting. The data is organized in a logical hierarchical fashion, and the transaction types for each module are clearly delineated. For instance, on starting the Accounts Receivable module, you're automatically presented with a list of all customers and their balances for a particular aging period. If you double-click on any customer name, you see the details for that invoice. All the modules have a similar hierarchical organization, so that once you've spent about half an hour learning one module, you automatically know what to expect from the others. Coupled with excellent use of the Macintosh interface, the program's organizational design makes accounting as easy as it's likely to get.

Over the Years

Chang has made this version of the program faster and more flexible than the previous one. Since all data is kept in memory as you're working, program operations take a split second. And with all amounts in the various windows continously updated, you need never be in doubt about the status of your financial affairs.

In addition, a variety of mechanisms speed data entry (see "Data Entry Window"). The program quickly looks up information, such as account numbers for inclusion in a transaction, using a method called *clairvoyance*. As you enter characters that uniquely identify the account, the program matches them against a list of possible choices and then completes the entry. When appropriate, the program supplies default values, although you can override them.

Rags to Riches' reporting capabilities, especially those for the General Ledger, are reasonably flexible. You can assign different font styles and sizes to report components such as titles, headers, and subtotals. You can create a company logo on each report with *ResEdit*. The program lets you group GL accounts for automatic subtotaling. You can also subdivide large entities into smaller ones so that you can track financial information by department, product line, or individual business. All reports can be printed with current-period, quarter-to-date, or year-to-date amounts. Some information can be exported in tab-delimited format to the Clipboard to graph your results in a spreadsheet application such as *Microsoft Excel*.

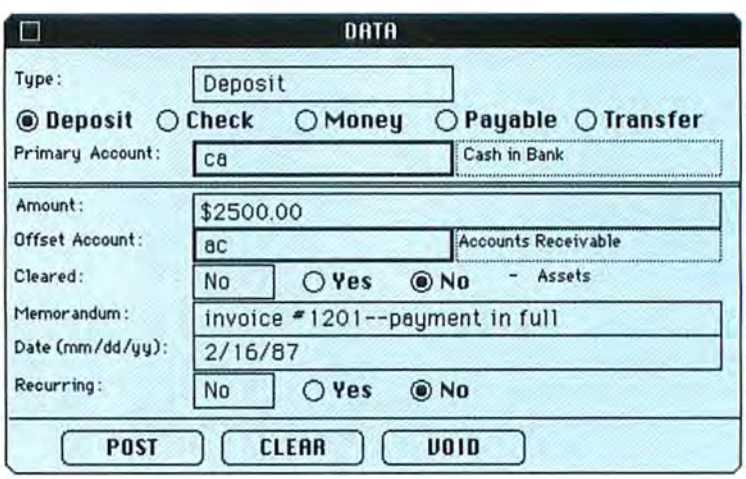
The documentation has also been improved; it now contains practically everything you'll ever need—including a tutorial, a section on setting up your company, a reference section, brief accounting fundamentals, and sample transactions for common business situations—although certain program features are not explained in enough detail. The index is the weakest link: much important information is difficult to find or not even listed, and nothing is cross-referenced.

Still Room for Improvement

Although *Rags to Riches* is a very good product, it still has room for improvement. At times the error handling is not too robust. Its most glaring defect is that it lets you alter a GL account balance in the middle of an accounting period, without even giving you a warning message that such an action will invalidate your financial statements. It also limits each GL transaction to two lines (each side of an accounting double entry). That makes it tough to enter something like a loan payment with an interest component without doing some manual calculations beforehand. You'll find other minor annoyances with the user interface—such as mismatched menu and window names and redundant commands—but they don't affect the product's quality.

Rags to Riches has an intuitive, hierarchical design. An easy-to-use program, it's also fast, flexible, and reasonably priced. Support costs are $75 per year (after 90 days) for all modules. Chang Labs has been selling a good product for a few years now. It's encouraging to see it's keeping up with the competition. —*Steve Mann*

See *Where to Buy* for product details.



Data Entry Window *Most* Rags to Riches *data entry windows have one or more clairvoyant fields (those outlined with a boldface rectangle) that automatically match the smallest unique set of characters you specify when looking up an account, customer, or vendor.*

FRED STIMSON

Bridging Network Boundaries

***InterBridge** 1.05*

AppleTalk network expander. ***Pros:*** *Reduces network traffic; increases network performance; allows remote connection to AppleTalk network.* ***Cons:*** *Occasionally crashes unexpectedly, bringing the network down.* ***List price:*** *$799.* ***Requires:*** *512K.* ***Copy protection:*** *None.*

While many AppleTalk networks simply connect a few Macs and a laser printer, AppleTalk was designed with much greater diversity in mind. InterBridge from Hayes Microcomputer Products lets you easily configure large, complex networks that are as simple to use as one composed of a single Mac and a LaserWriter.

In network terminology the link between two AppleTalk networks is called a *bridge*. When two networks are connected via InterBridge, users can share printers, file servers, and mail resources as though they were connected to one large network.

InterBridge works with any mix of Macintosh 512K, Plus, or XL computers connected to the AppleTalk network. IBM PCs and compatibles that are connected to AppleTalk with Apple, Centram Systems West, or Tangent Technologies AppleTalk PC cards also work with InterBridge.

Making the Connections

Although installation instructions are difficult to locate in the manual, connecting InterBridge to the AppleTalk network is straightforward—you simply connect the two networks to the two AppleTalk ports. Next, you run the Manager application and assign a network number and zone name to the two network ports.

Once installed, InterBridge is fairly transparent to users and applications. If you assign the same zone name to two or more networks, they act as one. With the Chooser desk accessory you can select any device in the same zone. Devices that reside within networks outside of that zone don't appear in the Chooser unless you type in the appropriate zone name. InterBridge requires Chooser 2.3 (supplied with System 3.3 and Finder 5.4). If you have earlier versions, you can install the Zone Chooser from the InterBridge Manager disk. To restrict access to particular devices, you can create a zone protected by a password.

Crossing the Bridge

InterBridge can improve performance in high-volume networks or those accommodating many users. Those who need to connect more than 32 users, for example, can use InterBridge to span 2 AppleTalk networks. If necessary, as many as 15 networks can be linked using one bridge for each pair of adjoining networks. Actually a network can link more than 32 users or devices—each user or device is called a *node*—but standard AppleTalk cabling limits you to 32 nodes per network. Other cabling systems—such as the Farallon Phone-Net—that also work properly with InterBridge allow more than 32 users per network. In fact the actual number of nodes you can connect to a network is limited more by network traffic than by the type of cabling you use; the maximum number of users per network ranges from 7 to 20, depending on how heavily the network is used.

One of the most important uses of zones is to reduce network traffic and thereby improve performance. By judiciously breaking one network into several zones, you can restrict high-volume traffic to separate zones. To help identify heavy traffic spots, InterBridge generates a diagnostic report (see "Traffic Report").

If your network links users to several shared resources, like file servers, you can group users who regularly access one file server on one network and create another network for users who access the other. Then you connect the two networks with InterBridge. This effectively reduces the overall traffic on each network and improves performance.

Going beyond Walls

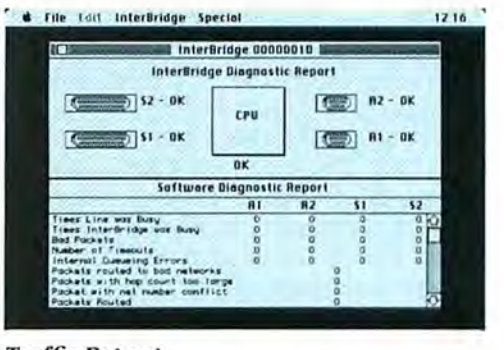
Occasionally you may want to access a resource, such as a print shop's high-speed laser printer, on a distant AppleTalk network. If InterBridge is connected to a modem on each network, users on one network can access the other over the phone, albeit at greatly reduced speeds. Be forewarned that modems slower than 2400 baud will result in timeout errors.

While it would seem that you could simply connect two 9600-baud or faster modems to obtain better remote performance, some high-speed modems use special error-correction schemes that actually retard the modem's performance when used with AppleTalk. So check first to be sure the modem is AppleTalk compatible.

Bridge over Networked Waters

InterBridge users should connect *Interbridge* and check its performance over time. I checked networks with more than four bridges connected directly as well as remotely with two Hayes 2400-baud modems. I did not check InterBridge with 9600-baud or higher modems. Be advised that Hayes does not guarantee InterBridge's remote operation at speeds greater than 2400 baud.

While InterBridge performs excellently for the most part, it is not without problems. I had difficulty connecting InterBridge to the network with version 1.03 of the ROM, but after Hayes distributed the free ROM update (version 1.05), most of the problems disappeared. However, even



Traffic Report

InterBridge's built-in diagnostics test a network's operation, identify certain traffic problems, and verify a network's reliability.

with the 1.05 ROM, InterBridge occasionally stops working, bringing the entire network down. During such a failure I could not access any network device either on the local network or across InterBridge. A Hayes representative was aware of the problem and stated that Hayes would distribute a free ROM update as soon as the problem was corrected.

InterBridge is an essential component in any large network that uses standard AppleTalk cabling. The larger the network you build, the greater the need for InterBridge. Even with its problems, which Hayes promises to correct, InterBridge is an invaluable part of any network designer's vocabulary.–*Prasad Kaipa*

See *Where to Buy* for product details.

Cash-Conscious CAD

***MiniCad** 3.0*

2-D/3-D CAD graphics program. ***Pros:*** *Easy exchange of bit-map and PICT files with other Mac programs; makes true 3-D projections; excellent value for the price.* ***Cons:*** *Confusing display in 3-D mode; documentation and tutorial need improvement.* ***List price:*** *$495.* ***Requires:*** *512K and external drive.* ***Copy protection:*** *Master disk.*

Don't let the name fool you–there's nothing "mini" about *MiniCad,* except its price. Not only does *MiniCad* equal the power of Macintosh CAD heavyweights *MGM Station* and *EZ-Draft* for most practical purposes, it's also less expensive by $300 and $2000, respectively.

Diehl Graphsoft's *MiniCad* actually comprises two separate design and drafting programs: a regular 2-D drafting package plus a separate 3-D graphics module. Although the average architect, engineer, or designer may never put the latter to use, it makes a nice adjunct to an already impressive piece of software.

2-D or Not 2-D

Even if it didn't have anything but its two-dimensional capabilites, *MiniCad* would be worth its price. The program has most of the features that distinguish serious computer-aided design programs, including layering, zoom, text rotation, fillet, and symbols storage (see "2-D Drawings").

In addition, *MiniCad* has a number of features–such as trim, parallel lines, a choice of 66 fill patterns, and autodimensioning–that some more expensive programs lack. *MiniCad*'s Smooth Polygon function enables you to smooth and even reshape polygons using the familiar vertex handles. And the B-spline capabilities should make the program attractive to naval architects and civil engineers as well as urban planners and commercial artists.

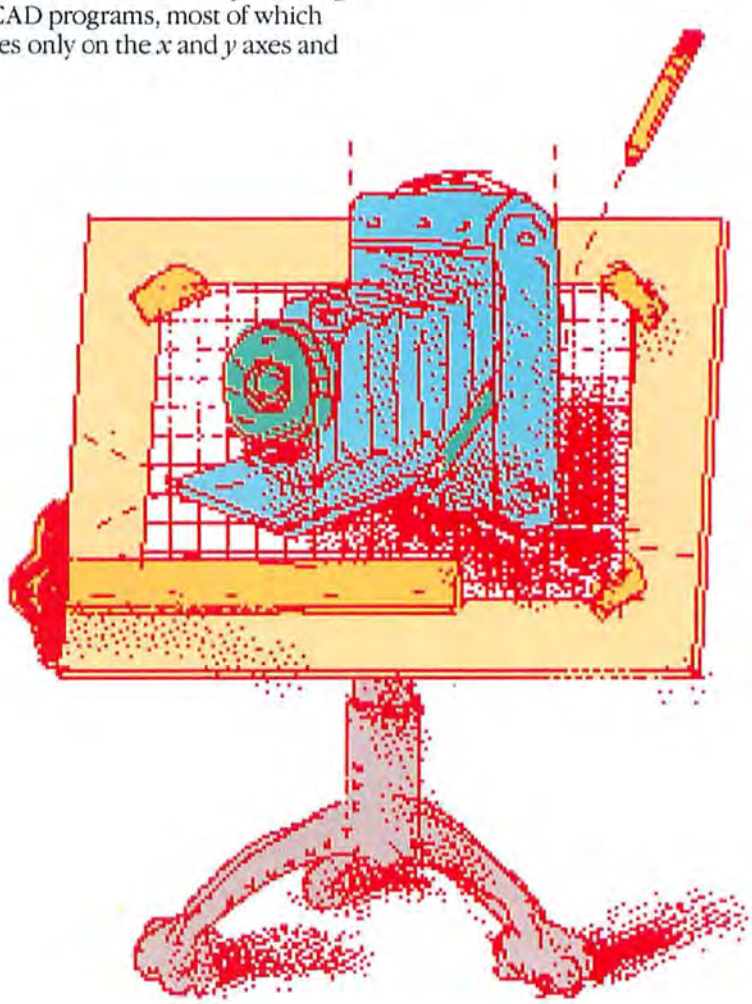
Unlike *MiniCad*'s 3-D segment, which is somewhat awkward, the 2-D segment is well designed and easy to use for such a powerful program. It's obvious that the people at Diehl have worked with CAD users and understand both how they operate and what features they need. Whereas *MGM Station* and *EZ-Draft* were originally created with computer aided manufacturing–as well as design–in mind and include many specialized functions that most CAD operators will never use, *MiniCad* achieves an ideal balance of simplicity and capability.

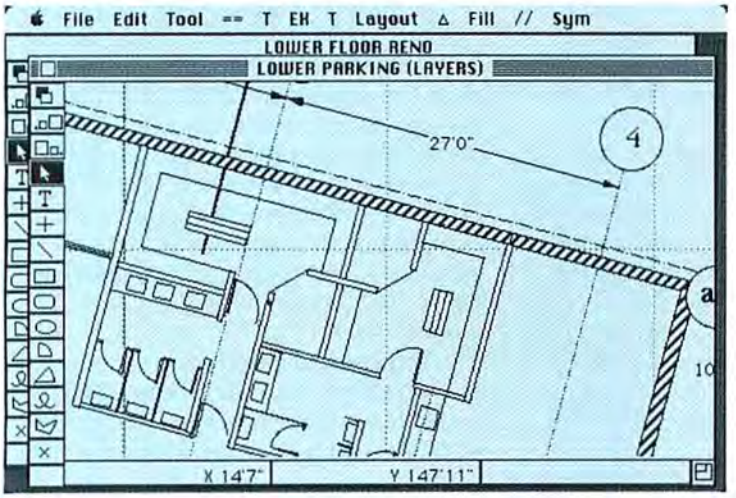
3-D Bonus

MiniCad's 3-D mode is unique among Macintosh CAD programs, most of which accept entries only on the *x* and *y* axes and use isometric or axonometric projections to simulate 3-D representations. Not so with *MiniCad:* you can enter coordinates on all three axes–*x, y,* and *z*–either from the keyboard or the mouse, and the program produces a true 3-D rendering.

While *MiniCad*'s 3-D drawings are impressive, the process of creating them is not simple. You begin the drawing in a special 2-D segment of the 3-D mode. Once the 2-D drawing is completed, you switch to the 3-D toolbox and go through several more steps. After a considerable waiting period while the Mac makes calculations, a wire-frame 3-D rendering appears on the screen.

Once the wire-frame image has been generated, you can call up any of four views–front, side, top, and isometric–separately or simultaneously (see "Four-Way Faucet"). You can shade the 3-D drawing using a pattern or a dithering technique (for an explanation of dithering see "The Graphic Mac," *Macworld,* November 1986). And you can adjust the light source as desired.





2-D Drawings
In MiniCad's *two-dimensional drawing window, you work with up to 40 layers. The program offers trim, parallel-line, and autodimensioning features. These plans were created by Canadian architect Owen Moore.*

A real time-saving feature in *MiniCad*'s 3-D mode is the Prebuilt Shapes function. You can select any of 36 predefined spheres, domes, pyramids, boxes, or other shapes from a menu, and use them as they are or scale and edit them. There's also a set of Cutaway commands that allow you to view the insides of 3-D objects.

MiniCad's 3-D portion includes a Create Bitmap File command, which lets you create *MacPaint*-compatible bit-map files of the screen view. The program also offers a limited bit-map editor, which provides simple paint tools for minor touch-up jobs.

Drawing Conclusions

MiniCad makes excellent use of the Macintosh interface. You can transfer *MiniCad* objects to *MacPaint, MacDraw,* or *MacDraft,* and you can bring objects (except bit maps) from other applications into *MiniCad,* either through the Clipboard or as PICT files. The program includes commands that enable you to open, create, edit, or cut and paste among PICT and bit-map files.

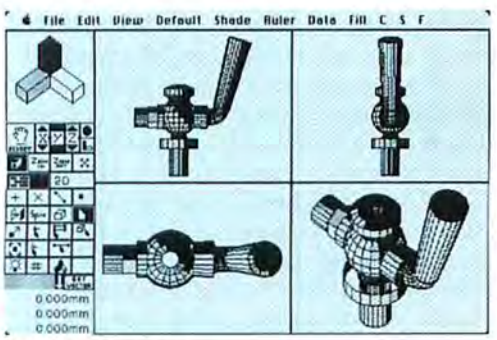
MiniCad, either with its built-in drivers or in conjunction with *MacPlots II* plotter drivers, can print out on an ImageWriter, a LaserWriter, and A- to E-size plotters. Its Layering function allows you to use multipen, multicolor plotters, with a choice of line types and colors for each layer.

MiniCad is not *MacPaint;* it's a complex tool that requires some practice to master. After about ten hours of hands-on experience, however, the average Mac-literate drafting professional should be able to start turning out two-dimensional plans and designs. Since the average CAD user is probably not familiar with 3-D software, learning all the intricacies of *MiniCad*'s 3-D mode may be more difficult.

Those difficulties are exacerbated by the program's documentation. Although the package includes an interactive tutorial that leads you step-by-step through the execution of a typical 3-D drawing, the manual is not logically organized and doesn't offer enough examples. Another problem is that it assumes more knowledge of CAD software than many users may possess.

Improvements to *MiniCad* should include a true rectangular and circular array function and a simpler mirror command. The addition of a database and an IGES exchange command would leave *MiniCad* with little to be desired.

MiniCad is a powerful professional CAD program that may well have all the design power most users will ever need—especially if they're working with a tight budget.—*Chuck Carroll*



Four-Way Faucet
MiniCad's *somewhat confusing toolbox and four views of a shaded, 3-D drawing. This object, a* kraan *in Dutch, was created by engineer Roland Mulders of Amsterdam.*

See *Where to Buy* for product details.

A Familiar Maze

Arcade Adapter/Mac Man *1.1*

Joystick adapter and arcade game. ***Pros:*** *Opens a new market for joystick-compatible software; easy to use; good graphics and speed.* ***Cons:*** *Game lacks originality and variety.* ***List price:*** *$29.* ***Requires:*** *Arcade Adapter, 128K; Mac Man, 512K; joystick.* ***Copy protection:*** *None.*

When it comes to speed and graphics, Nuvo Labs' *Mac Man* leaves most *Pac Man* replicas in the dust. It doesn't measure up to arcade standards for color and flashing lights, but it does take full advantage of the Macintosh's ability to produce slick animation and imagery.

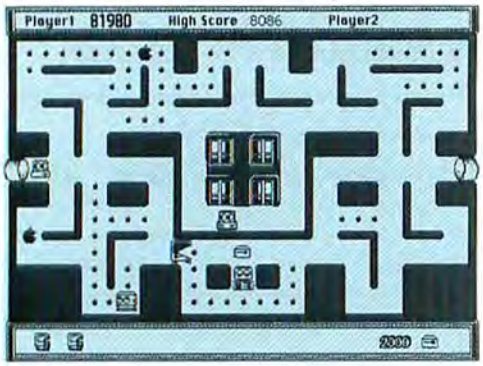
Grab Your Joystick

This package includes a joystick adapter that you plug into the Mac's mouse port. You can attach any Atari-type joystick to Arcade Adapter; I tried both the Wico Command Control and Atari Standard joysticks. Many games benefit from replacing the mouse with a joystick, and a few, because of special design features, undergo a quantum leap in quality. For *Mac Man,* the stick is essential; the game won't run with the mouse, and using the keyboard is hopelessly awkward.

Arcade Adapter gives the Mac easy access to joystick-compatible software (documentation refers you to the Adapter Init File for possible use with other programs). Nuvo Labs and other companies plan to develop more programs that will work with the adapter.

Gulp!

Mac Man's mission is to eat his way through a maze of tiny apples while avoiding marauding PC creatures. You control the mad gulper's movements through the maze by maneuvering your joystick in four directions. You score points for each apple you devour and earn extra points for digesting various prizes that appear randomly. If you're caught by an evil PC, it gobbles you up; however, if you swallow a large energy-apple, you can temporarily turn the tables on your attackers and gain more points.



Rascals in a Maze
In Mac Man, *you travel through a maze, eating apples and avoiding bad-guy PCs. The Arcade Adapter bundled with the game lets you control the action with a joystick.*

You can choose to play with up to five Mac Men for each game. The first few mazes are quite easy to negotiate. When you successfully complete a maze, the program produces a more advanced one, up to a limit of 16.

Mac Man's features include comic-relief interludes between mazes, automatic score keeping, speed and acceleration settings, volume control, four difficulty levels, and a choice of one or two players. Sharp, seamlessly animated graphics depict a bird's-eye view of the *Mac Man* universe with artful charm (see "Rascals in a Maze").

The total effect breathes new life into a prototype that remains legendary among video games. *Pac Man* is alive and well on the Mac.—*John DiPrete*

See *Where to Buy* for product details.

Quiet Thunder

***Thunder** 1.0*

Spelling checker. ***Pros:*** *Allows both interactive checking as you type and checking of already existing documents; adequate main and two supplementary dictionaries.* ***Cons:*** *Runs slowly when checking long documents.* ***List price:*** *$49.95.* ***Requires:*** *512K.* ***Copy protection:*** *None.*

If you compare *Thunder*'s features with those of other spelling checkers, you'll find this 150K desk accessory has a midrange dictionary size of 50,000 words but a list price that's among the lowest. Like most spelling checkers, it offers supplementary dictionaries, but unlike many programs, Batteries Included's *Thunder* lets you check interactively as you type, as well as check a completed document.

Check It Now or Later

Interactive checking mode monitors your spelling as you type, which is especially useful for short documents, like letters or resumes, in which you can't afford to have any spelling mistakes or typos. The program warns you of a mistake either by flashing the menu bar or beeping. Because the program remembers only the most recent mistake, you have to correct errors as they occur.

With a long document, it's more convenient to go back through and correct your mistakes after you've finished. You can select the entire document or any part of it for checking. (*Thunder* saves formatting when used with *MacWrite* and some other word processors, but not *Microsoft Word.*) Once you open Check Selection, the screen gives you a dialog box that contains a portion of the text you selected with the first mistake highlighted, along with options for correcting each mistake and suggestions for proper spelling (see "Check Selections"). If you find the correct spelling among the suggestions, you click on the word (or, more easily, type its number from the list), and the highlighted mistake is corrected in the text. If no suggestions appear or not the one you want, you can click New, type the right word and click OK, then return to the suggestions list where your new word is now listed as #1, and click on its number to enter it.

When the program singles out a proper name or a word not in its dictionary, the Ignore or Next button lets you continue to the next error. Unfortunately, this happens often, especially if you have many proper names in your document; correcting thus becomes a lengthy process. This is a common drawback of many spelling checkers.

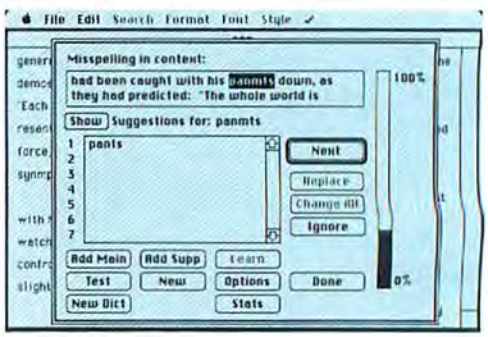
Supplements

Thunder's user-defined dictionaries help avoid unnecessary word checks. If you add a frequently used term or name to the supplementary dictionary, the program will not highlight it unless you've typed it incorrectly.

The Learned Words dictionary serves two important purposes: you can correct in advance a chronic mistake (such as *recieve*) by entering it and its correction, or you can enter an abbreviation that is automatically replaced by the whole word when you enter it in the text—one of *Thunder*'s most attractive features. All changes from Learned Words are made automatically, without being highlighted during normal correction.

Delays and Glitches

Unless you take the time to add words to the dictionaries, you'll grow impatient with *Thunder* as it chugs along, searching



Check Selections
Thunder*'s Check Selection dialog box highlights a misspelled word and offers suggestions for correcting it as well as options to enter words in the main or supplementary dictionaries, or to view manuscript statistics.*

for suggestions about every word it doesn't recognize. You can click the Ignore button as fast as you like, but you still have to wait for the program to complete its search.

The main dictionary is not flawless—I found two spelling errors in it, and when possible it breaks an unrecognized word into two that it knows (my favorite was *hippies* made into *hip pies*). And if you really mangle a word in typing, the program won't know what to suggest, which means you have to take the long way around by adding a new word. Once you're in Check Selection, you can't delete an unwanted word or stray character if you find one.

Thunder is best for catching errors in short or common words, but then these are the little things that often escape notice. The product offers you the flexibility to check your document as you type or after you've completed it, and the ability to customize dictionaries easily and permanently.—*Jeffrey Bartlett*

FRED STIMSON

Honeywell's quadLynx is long, narrow, and styled with black ball and buttons. The smaller button incorporates both the click and hold functions.

The Mouse that Rolled

quadLynx

Trackball. ***Pros:*** *Separate "hold" button enables you to click and hold automatically.* ***Cons:*** *Click and hold buttons are awkwardly placed; connector to mouse port has screws that extend 2 inches beyond trackball unit; no provision for using both mouse and trackball.* ***List price:*** *$129.*

Turbo Mouse

Trackball. ***Pros:*** *Very comfortable to use; mouse connector permits both mouse and trackball operations.* ***Cons:*** *A two-button device, but both buttons do the same thing; when mouse is plugged into connector on trackball unit, thumbscrews project about 2 inches behind unit.* ***List price:*** *$129.95.*

A trackball is very much like an upside-down mouse. Instead of rolling the mouse on a tabletop, you twirl a ball with your fingertips—thereby moving the cursor on screen. You might want to consider using a trackball instead of a mouse if you have limited work space or never learned to maneuver a mouse without running off the edge of your desk. The two different trackball units evaluated here—Honeywell's quadLynx and Kensington Microware's Turbo Mouse—appear similar but function somewhat differently. Both are compatible with the Macintosh, Mac Plus, Apple IIc and Apple IIe. (Honeywell claims quadLynx is also compatible with the Lisa.)

quadLynx

The best feature of the quadLynx is a separate button that incorporates both click and hold functions. The larger of its two control buttons works like the Mac's single mouse button—click only, double click, or click-hold. The second button is the click-and-hold button, which was forgotten when the Mac mouse was designed.

Given the anatomy of the human hand, the buttons on the quadLynx are poorly positioned relative to the location of the ball. Depending on your hand size, you may have trouble reaching either button with your thumb or little finger if you don't first move your other fingers off the ball. I found that my hand ached after using the quadLynx for only a few minutes. However, the ball itself works smoothly.

Turbo Mouse

The Turbo Mouse's best feature is the placement of its buttons. Although the ball is a little noisy in use, this trackball fits nicely in the hand. It moves easily, and both control buttons are positioned where your thumb and little finger naturally rest.

There are, however, a couple of things about the Turbo Mouse design that I find peculiar. First, there are two control buttons, but they both do the same thing. The manufacturer claims that this feature accommodates both right- and left-handed users, but I would prefer to see a click-and-hold function on one of the buttons. Secondly, the trackball unit has a built-in mouse connector, which enables you to use either the mouse or the trackball. Unfortunately, when you connect the two, the thumbscrews project about 2 inches behind the trackball unit. To make the device more compact, the connector should be mounted in a recess on the bottom of the trackball unit.

If you think a trackball can speed up moving your cursor, you're probably right. But spend about 10 or 15 minutes using the device before you buy it. Make sure the buttons are easy for you to reach and press. The ball should roll smoothly. Look for extra features like a click-and-hold button or a built-in mouse connector. Then weigh all the features and choose your favorite. After all the trade-offs, I would pick the Turbo Mouse, because it feels good.—*Ken D. Schmeupe*

FRED STIMSON

Kensington's Turbo Mouse is square, with gray buttons and trackball, and a beige casing. The two control buttons accommodate right- and left-handed users and perform the same functions.

See *Where to Buy* for product details.

Object Logo Arrives

***Object Logo** 1.0*

Logo programming language. ***Pros:*** *Classless object-oriented environment with multiple inheritance. Excellent math package.* ***Cons:*** *No MacApp access. Not for commercial application. Arrays are only one-dimensional index lists.* ***List price:*** *Version 1.1 $79.95.* ***Requires:*** *512K (and external drive for 512K).* ***Copy Protection:*** *None.*

Programming the Mac in Logo has become significantly easier with the recent introduction of Coral Software's *Object Logo*, the only object-oriented Logo programming software available for the Macintosh. *Object Logo* is a fully functional programming environment for beginners, as well as for advanced programmers developing their own Macintosh applications. Current user groups include Alan Kay's Vivarium Project and scores of Logophytes in the still-active M.I.T. research labs, where Logo was developed.

Everything Is an Object with the Power of Multiple Inheritance

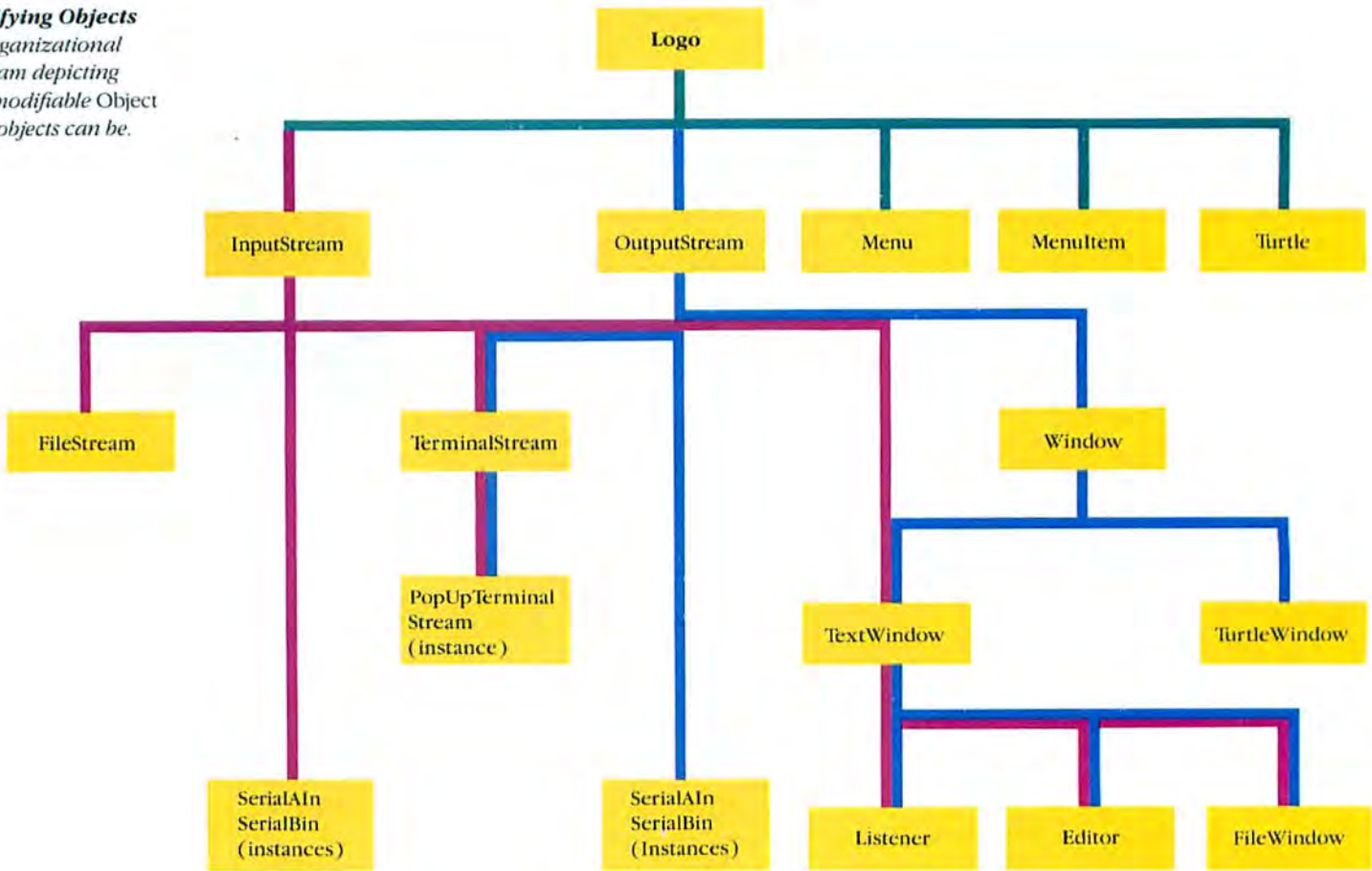
Object-oriented languages allow the programmer to develop applications in far less time than with traditional programming languages. (For a tutorial on object-oriented languages see "Object Orientation," *Macworld*, November 1986.) But *Object Logo* does not ignore the question of compatibility with the standard operations-oriented programs. It understands traditional Logo syntax, enabling you to build on your existing bank of data. This is its "Clark Kent" mode. It's possible to ignore the added dimensions of *Object Logo*'s object orientation by addressing the system in traditional Logo style. But when you are ready, *Object Logo* can step into the nearest phone booth and emerge the Superman of Logos. Beginning simply enough with the metaphorical transformation of the traditional turtle into a Logo object, you can create a new object that inherits the features of its parent. (See "Dazzling Dance of the Turtle.") For example, a set of instructions to create a window can be stored as an object and used over and over.

Object inheritance keeps you from having to reinvent the wheel. Further, *Object Logo* supports *multiple inheritance*. This powerful feature is found in only a few object-oriented languages, none implemented with the simplicity of *Object Logo*. And unlike traditional object-oriented languages that use separate *class* definitions to generate specific object *instances*, *Object Logo* does not force this artificial conceptualization. *Object Logo* objects are their own templates for new objects.

Unlike other static object-oriented environments, *Object Logo* can interactively create and clone objects, modifying their associated variables and procedures on the fly. Such a dynamic capability is vital to the design of "smart" user interfaces, which modify themselves based on patterns of user interaction.

Furthermore, *Object Logo* is totally object oriented. Its menus, windows, file input and output streams—everything—are realized as modifiable objects and orga-

Modifying Objects
An organizational diagram depicting how modifiable Object Logo *objects can be.*



nized conceptually, as shown in "Modifying Objects". The bottom line is, *Object Logo* delivers a souped-up object-oriented environment lacking only the browser and inspector interface typical of a full Smalltalk system, against which all other object-oriented environments are inevitably compared.

Notable Features

Object Logo's unparalleled math package offers unbounded integers and floating-point numbers, fractional math (type ½ + ⅓ and *Object Logo* will respond ⅚), and complex numbers. The real and imaginary parts of *Object Logo*'s complex expressions can each be an integer, a floating-point number, or a ratio. A host of primitives support all basic arithmetic operations as well as trigonometric and hyperbolic functions, exponents, logarithms, and financial functions.

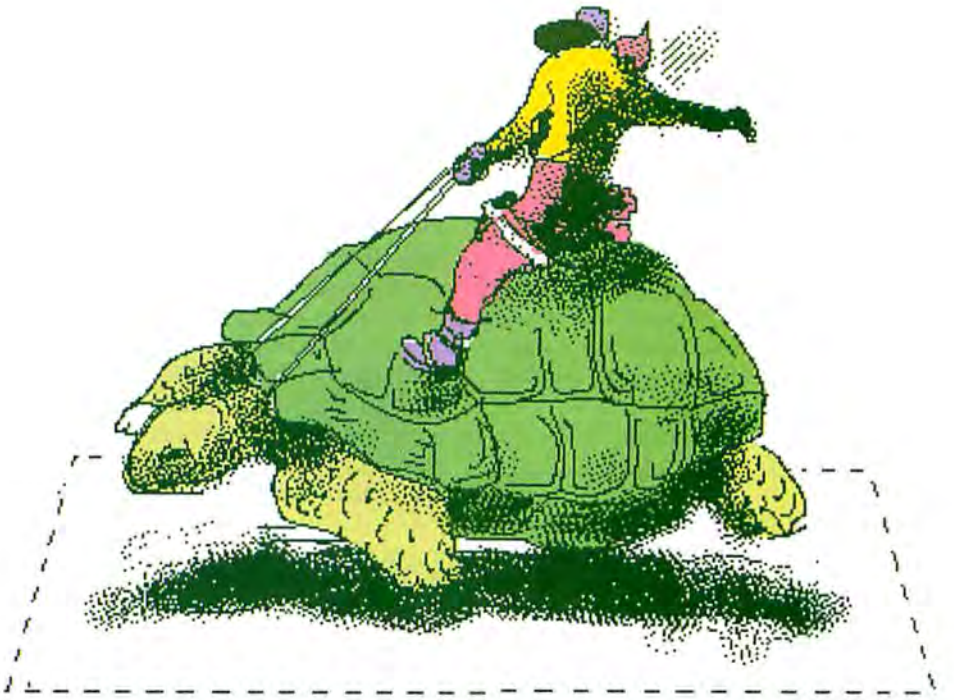
With Tracing, Stepping, and Watch Windows, *Object Logo* offers a full complement of debugging tools that encourage interactive prototyping. Pause and Continuation allow you to fix problems as they occur.

Object Logo also has the ability to define procedures that optionally accept any number of inputs. This is crucial to bomb-resistant user interfaces and efficient programming in artificial intelligence applications. User-selectable lexical and dynamic scoping of variables further increase *Object Logo*'s utility in advanced computing applications. And ample primitives are supplied to handle full menu and window interface features. With regard to Dhry or Whetstone crunching, you'll find the performance of *Object Logo*'s incremental native code compiler to be impressive.

Power Editing Features

Object Logo supports workspace-based editing with traditional Logo-style LOAD and SAVE commands. These standard primitives essentially read in and out a textfile-based snapshot description of the current state of a Logo environment. And for more readable source code, *Object Logo* also offers file-based editing.

A subtle but important feature of the interactive Listener window is its relentless production of a complete and uneditable history of your interaction with the program. A well-designed automatic cut-and-paste line editing operation leaves a full audit trail while providing the powerful editing features expected of Macintosh text editors.

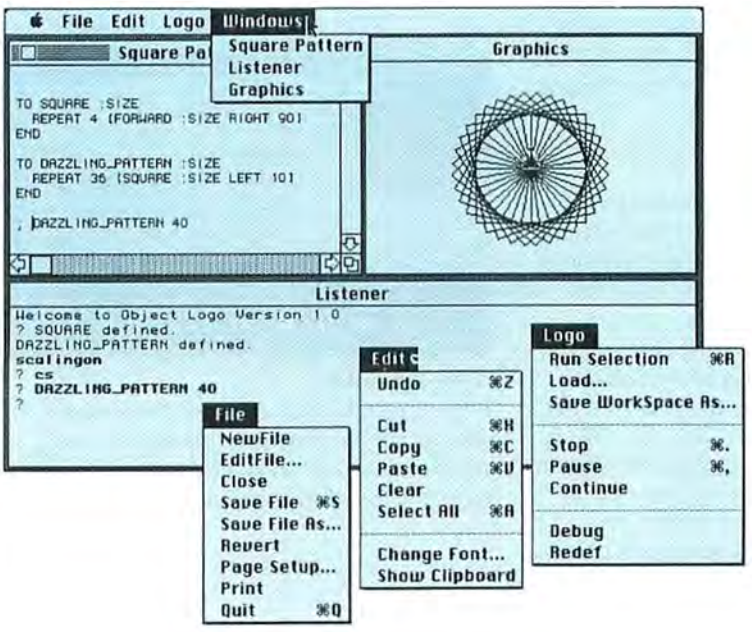


Compatibility with traditional Logo syntax, workspace-based editing, and the helpful session-documenting Listener ensure compatibility with the programming habits of experienced Logo users and provide a valuable degree of compatibility with classic Logo reference material.

Caveats and Recommendations

If you are looking for a development environment, such as C or Pascal, to produce stand-alone commercial applications or desk accessories, don't consider *Object Logo*. And although *Object Logo* provides easy access to most of the components of the standard Macintosh interface, Coral does not supply a MacApp-like generic application written in *Object Logo*. Such user-modifiable main-event loop code, supported by a wide range of user-interface and device-communication resources, would be invaluable to increase the productivity of experienced programmers and reduce routine errors by beginners.

All in all, though, none of *Object Logo*'s weaknesses are serious and, like the program itself, *Object Logo*'s documentation is excellent. *Object Logo* is truly breakthrough software at a bargain price.
—Jim Salmons



Dazzling Dance of the Turtle
An example of the traditional turtle performing a dizzying geometric dance is shown in the background. To the left are the instructions that transform the standard pattern into an object-oriented pattern that can be stored and used at a later date.

Meticulous Timekeeper

***Office Productivity System** 1.25a*

Time-billing and job-costing system. ***Pros:*** *Sophisticated, multiuser billing and job costing; extensive report and invoicing capabilities.* ***Cons:*** *Out-of-date documentation; server requires dedicated Mac.* ***List price:*** *Version 1.30 $475.* ***Requires:*** *512K.* ***Copy protection:*** *None.*

Ops Macintosh accounting may offer an embarrassment of riches, but few developers have addressed the specialized billing needs of consultants or professionals in fields such as law, civil engineering, and architecture. Recently Applied Micronetics, Inc. (AMI), joined Chang Laboratories and Satori Software (see "Mac Business Tools," *Macworld,* December 1986) with *Office Productivity System* (*Ops*), a time-billing and job-costing system. *Ops* not only handles many billing arrangements simultaneously, such as time and charges, cost plus, fixed fee, and reimbursables, but it also affords small to medium-size firms the tools to assess their productivity: detailed job-cost, aging, and employee-productivity reports. *Ops* is a complex program that includes seven separate modules. Four are used occasionally (Administration, Utility, Server, and Reporter, which add up to 286K) and three are in constant interactive use (Filer, Timer, and Biller, equal to 392K—just small enough for a 512K Mac). Despite their number, these menu- and table-driven programs are well organized. (AMI's goal is to reduce *Ops* to four modules, a project nearly completed as this review goes to press). The program also has an option to set up a multiuser system using a dedicated Mac.

Operating Ops

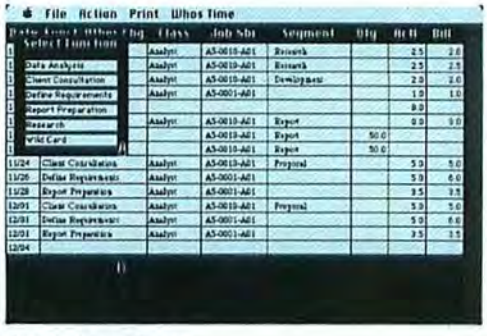
The modules are clearly divided according to function: Filer maintains client and job data; Timer posts time spent on a job; Biller edits and prints the bills; Reporter prints current and historical reports; Server administers the dedicated Mac; and the Utility program initializes, verifies, and reorganizes files, and purges old jobs from the system. The Administration program sets up and maintains system tables—billing categories and other constants accessed in the three main programs. Additionally, *Ops* maintains 12 separate data files such as an old bill file, and a job history file.

Before you set up the database with the Administration program, you must decide if a number of trades will be associated with each job; if rate schedules (up to six) will reflect changes in the cost of living; if classes will be set up for different billing rates within the firm; and if jobs will be subdivided for budgeting and cost-tracking purposes. Employee information can and often must include authorization level (1, 2, or 3); hourly rate; allowable classes; and load rate (costs to the firm beyond salary or billing rate). The final, customized, easy-to-use program offsets the initial difficulty of setting it up.

Filer, Timer, Biller, and Co.

Since Filer, Timer, and Biller are in use continuously (they do not work under *Switcher*), AMI provides a Goto feature to switch between programs. Choosing Filer, you set up your client and job data. Other information can include fee schedules, estimated charges, time segments, and what has been budgeted, billed, or not billed. To search for information in Filer you need to remember the "code name" or ID you've given to your job or client. Unlike *Pro Billing, Ops* does not automatically give you on-screen summaries of all clients and jobs (though Reporter can print out such lists). Fortunately, codes for contacts and jobs need not be numbers. You can use English names or alphanumeric combinations with up to 11 characters.

You enter time charges via Timer in a spreadsheetlike window (see "Ops's Timesheet"), where data is selected from tables



Ops's Timesheet

Clicking an item such as "Report Preparation" in this function table enters it into the timesheet. The charges shown are not yet posted to the jobs listed. Job "numbers" need not be numerical.

Previewing a Bill

Clicking on a job from the table shows you all current charges to be billed. Selecting a specific charge allows you to edit specific elements, add comments, or delete it entirely.

created in the Administration program. Up to 150 transactions can be entered for each employee before posting data for billing. Unfortunately, entry errors cannot be corrected, only zeroed out. That means that if erroneous times and charges are entered for several jobs, you have to change them manually in Biller by previewing entries posted to each job.

The timesheet is partially hidden during entry by a calendar that includes 28 days, a calculator, and numerous tables that you set up in Administration. You can relocate these items on the screen temporarily, but they revert to their default positions after each round of entries.

The Biller program allows an employee to review and edit invoices prior to billing (as well as to delete any erroneous transactions entered in Timer). You select a bill by name or number from a job table. Bills can include not only job and client information but outstanding balances due for less than 30, 31-60, 61-90, and more than 90 days; tax status; finance charges; any fee schedules; billing arrangements; and total charges and costs not yet billed to the job (see "Previewing a Bill"). *Ops* lets you scroll bills, print them in full detail, and reprint them as many times as you want before the next posting period—an improvement over programs that let you reprint only the trial bills. With Reporter you can print a job-cost report for all items not yet billed; a historical report that includes a summary of all billed charges, payments, and costs; employee productivity reports; and labels and envelopes for mailing.

Three-and-a-half Stars

The *Office Productivity System* offers stiff competition for *Rags to Riches Professional Billing* by Chang Labs and *Legal*

Billing by Satori Software. Like both the Chang and Satori programs, *Ops* contains merge features that allow you to include client information in word processing documents and, like *Professional Billing,* in a General Ledger. *Ops* alone, however, gives you the option of true multiuser access. And despite its many features, it's visually less cluttered than *Pro Billing:* activating new windows or tables closes old ones. I recommend *Ops* as potentially the best in its class, although with some reservations.

Ops can print in only two fonts: Times and Helvetica. (Chang has just introduced the capability for multiple fonts.) Also, a bug occasionally hangs up your Mac. Boilerplate descriptions are limited to 175 characters and comments to 120 characters—a serious restriction for lawyers—though development is underway to link additional comments. Menus vary from program to program, which increases the learning time. When employees post their time, they can't void mistakes. Posting moves all entries to Biller and thus routes errors to different job bills. Finally, the documentation is not current, though addenda are available, and the company is preparing a new manual.

These are not fatal flaws, only the marks of a complex program under development. In the meantime, you get a program that's more than adequate for the billing requirements of a medium-size business. *Ops* helps you analyze job costs and the progress of your firm; and as a shared resource it assists in the analysis of employee productivity. *—Michael Miley*

See *Where to Buy* for product details.

Stranger in a Strange Town

Tass Times in Tonetown

Graphic adventure game. ***Pros:*** *Challenging, unique game with sense of humor.* ***Cons:*** *May be too difficult to solve; graphics rather small.* ***List price:*** *$44.95.* ***Requires:*** *512K.* ***Copy protection:*** *Not copyable.*

Lewis Carroll would probably have appreciated Activision's *Tass Times in Tonetown.* Tonetown is the sort of place you might find through a looking glass, where it's great to be *tass* and *tone,* but not *Jonboi Waltune.* Pink hair and Ultra-touch TroppoWear jumpsuits are tass. Designer jeans and alligators on shirts are definitely Jonboi Waltune. As this suggests, the game demands that you familiarize yourself with a vernacular and logic peculiar to Tonetown.

Wave New World

Accompanied by your faithful dog, Spot, you cross into Tonetown through an electrically charged hoop, apparently invented by your brilliant and beloved Gramps, who has disappeared. Transformed in the Tonetown dimension, Spot becomes Ennio the Legend—your guide and protector during your journey.

Your copy of the *Tonetown Times,* provided with the game, tells you that Gramps has also mysteriously disappeared from Tonetown. And the paper makes uncomplimentary references to a certain Franklin Snarl, who is trying to take over the downtown. Your adventure is full of confrontations with the tass and the untass citizens of Tonetown, as well as threats from Snarl and his various minions. You must unravel a series of clues to rescue Gramps and save Tonetown from Snarl's evil plot—at the risk of your own life.

The Game's the Thing

Playing *Tass Times in Tonetown* is similar to playing such games as *Déjà Vu, Uninvited,* and *Mindshadow.* Clicking the appropriate points on a compass (or the Up and Down buttons) controls directional movement. Icons represent Get, Drop, Hit, Look At, Talk To, Buy, Tell Me About, and Enter actions. You can also type any command or series of commands in the text box. To pick up an object, you simply click on it; it then appears in a special inventory box beneath the scene. To drop the object, simply click on it in the inventory.

Tass Times lacks the familiar Operate command of *Déjà Vu* and *Uninvited.* You cannot, for instance, operate a key on a lock to unlock a door. You must type Unlock Door or Unlock, then point and click on the door.

You may save up to ten games in progress and load any one by selecting its number from the Load Game menu. Typing Quicksave any time you sense danger saves you from having to restart the entire game every time you make a fatal move.

The game's graphics, although imaginative and professionally constructed, sometimes lack detail and are relegated to a small part of the screen. A zoom feature that could expand the graphics to full screen would help. Occasionally animation graces some screens, but it is minimal. In any case, you can choose to play the game without graphics in a text-only mode.

Tough Enough

Although at first it seems easy to play, *Tass Times in Tonetown* grows much trickier as you progress. What makes the game so challenging is also what makes it

unique: the novelty of Tonetown, its mores, and its inhabitants. These same qualities make many clues difficult to decipher. You face challenges from some bizarre creatures and objects; to respond you must use unique materials available in the town and its surroundings. Success in Tonetown requires thinking like a Tonetowner, paying close attention, and skillfully using adventure-game techniques. A haphazard approach usually results in your demise.

Tonetown is a fascinating place in which to wander. Although Activision offers a help line, beginners and players of average skill may have trouble finishing the game. But even if you can't solve the whole puzzle, you can have fun checking it out. It's different and, well, ultra-tone.
–Rusel DeMaria

See *Where to Buy* for product details.

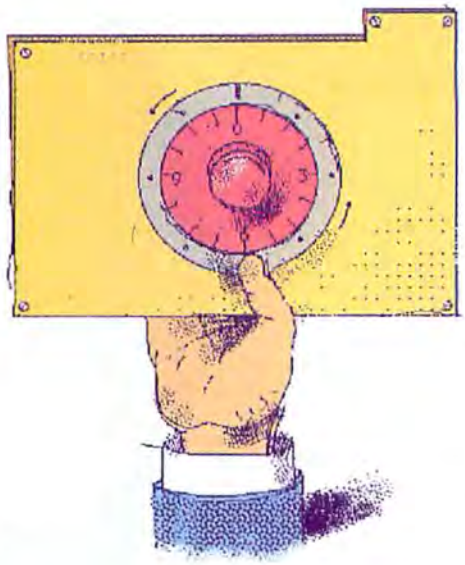
On the Safe Side

MacSafe *1.03*

File protection and encryption utility. ***Pros:*** *Hides protected files from the Mac desktop; provides password protection; copy-protects safes and files; "drop box" feature; multilevel file encryption.* ***Cons:*** *Safes and the files within them can easily be lost; awkward file-transport procedures between the Mac and the* MacSafe *desktops.* ***List price:*** *$139.95.* ***Requires:*** *128K; 512K with external drive recommended.* ***Copy protection:*** *None.*

If you're the only one who uses your Macintosh, you don't have a hard disk, and you always lock up your floppies, read no further–you already have a reliable file-protection system. However, if you're concerned about unauthorized access or damage to your files, Kent Marsh Limited now offers a partial solution. But while *MacSafe* hides files from the Mac desktop, assigns passwords, and encodes files, it doesn't adequately guard against accidental or deliberate destruction of files.

MacSafe creates file-storage areas called *safes,* which hide files from the Mac desktop and are password protectable. Like real safes, they can only be opened by using the proper "combination"–a password that cannot be changed unless the safe is open. Once you've created or opened a safe, instead of the standard Macintosh desktop you'll see a *MacSafe* desktop showing the files in that safe. Also on the desktop is an Action Palette you must use to move files in or out of a safe, scramble or decode a file (see "Safe and Sound"), and access on-screen help.



Under Lock and Key

MacSafe lets you create multiple safes, but unlike folders, safes cannot contain other safes. Instead, each contains a "secret compartment" that can have its own password. The compartment functions like a bank's drop box: users can move files into it without seeing its contents or knowing its password.

For additional security, *MacSafe* lets you scramble, or encrypt, your file data by offering two forms of file encryption: DES (Data Encryption Standard) and a quicker but less secure method called QuickCrypt. To encrypt a file you enter a code key (similar to a password), which you must remember or you'll be unable to decrypt your file. To prevent multiple encryption or use of the wrong decryption method, *MacSafe* has an Encryption Safety Latch, which you can turn off if you want to encrypt an already scrambled file for further protection. However, you're still vulnerable to one annoying quirk: if you try to decrypt a nonencrypted file, the Macintosh Bomb dialog box appears. Fortunately, this won't damage or destroy your file, but it can be disconcerting.

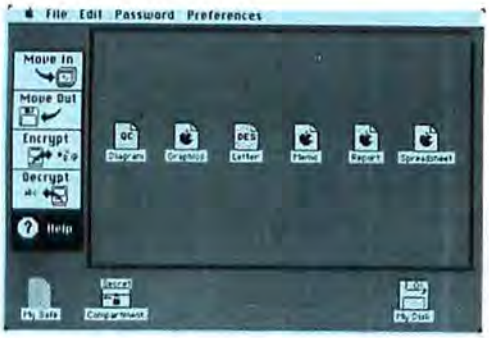
In addition to choosing an encryption method, you can select either disk-based or memory-based processing. Disk-based processing uses a temporary disk file to protect the original file from a system crash. While the faster memory-based option doesn't provide that extra measure of safety, your data is more secure because the encrypted file actually replaces the original file. Because the disk-based option writes the encrypted version as a new file to the disk, the original file is simply deleted from the disk directory and only its initial block is scrambled. Thus a resourceful hacker might still be able to access the original file with a disk-editing utility.

Although *MacSafe* requires special procedures to move files in and out of a safe (you cannot simply drag file icons from one location to another), safes don't actually contain files; they only function as hidden directories. Files stay in their original folders and just become invisible once they "enter" a safe. A file can't be opened or even moved to another disk until it has been removed from its safe. (A scrambled file must also first be decoded.)

Because *MacSafe* only copies directory entries, rather than moving files, it remembers the file path (the hierarchy of folders in which the file is stored) and automatically replaces files in their original folders once you've removed them from a safe. This can be disastrous if you attempt to move a file back to the Mac desktop after you've changed the file path. Once the file is in a safe, most of the folders in its file path can't be directly moved or deleted. However, you can, in effect, destroy the file by throwing away the highest level parent folder that contains it. When that happens, the file is permanently lost, even though the safe still contains its icon.

It's also surprisingly easy to remove a safe by unlocking it with the Get Info command and then dragging it to the Trash Can. The files assigned to that safe would still occupy disk space, but without the safe they'd be invisible and effectively lost. Furthermore, if the files originated from the Mac desktop or a single-level folder, that disk-storage space would be locked up and very difficult to retrieve. Consequently, even tucked away in a safe, your files are still susceptible to vandalism.

MacSafe can run concurrently with most desk accessories, such as Calculator and Alarm Clock, but it won't work with all backup software. Programs like *Copy II Mac* that create exact copies work perfectly, but file-oriented programs such as *HFS Backup* create unauthorized, and thus useless, copies of the safes. If you use a file-oriented method, you'll have to move your



Safe and Sound

The MacSafe *desktop shows the contents of a safe, but since safes are intended only for protective storage, files must be moved back to the Macintosh desktop before they can be opened.*

files back to the Mac desktop before backing them up.

MacSafe is an easy-to-use program with a manual and help file that are thorough, clear, and entertaining. But, even though initially it may seem like a tempting solution for protecting a single-machine/multiuser environment, it just doesn't measure up. The program's file-transport procedures lack the simple elegance of the Finder and its folders. But the real problem lies in its less-than-foolproof security measures. While *MacSafe* protects files from unauthorized access, it can't be counted on to prevent loss of data from carelessness or malicious mischief. *–Larry-Stuart Deutsch, M.D.*

See *Where to Buy* for product details.

Discovering What's Necessary

Desk Necessities

Collection of desk accessories and utility programs. ***Pros:*** *Provides useful information about files with a keystroke.* ***Cons:*** *Not all utilities work with all Macs; Shut Down is a dangerous and questionable function.* ***List price:*** *$29.95.* ***Requires:*** *128K; some functions require 1MB or HFS.* ***Copy protection:*** *None.*

MicroSparc's group of utilities and desk accessories has a touch of professional polish that assures you of its reliability. The *Desk Necessities* collection contains three desk accessories, four function keys (*F-Keys*) to add to your System file, and two utility programs, some of which you may find indispensable. F-Keys are not new to the Macintosh; its System file already contains four such built-in functions.

F for Information

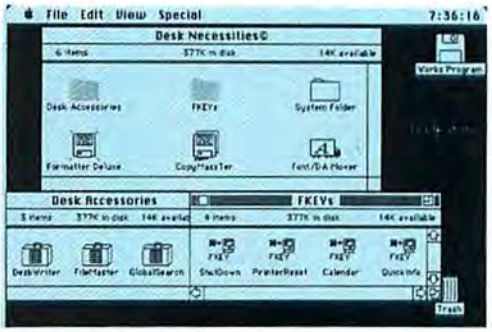
The *Calendar* F-Key displays a month's dates along with the time. *Quick Info* displays the amount of free space remaining on a disk, along with the amount of free RAM space. If you have more than one volume mounted, such as an external floppy disk drive or a partitioned hard disk drive, you can check the amount of free space on all volumes. *Printer Reset* is a godsend for users of the ImageWriter II. It repositions the print head without producing the dreaded paper jam, thereby allowing you to start printing the next document without worry. However, the last function–*Shut Down*–causes the system to shut down immediately from within the application you're working on, so if you forget to save your data files, you lose any changes you've made.

To install an F-Key, simply copy a function to the disk where you wish to install it, then double-click on the icon to run it. Once the function is installed, the program informs you which number key was assigned to it. The menu contains no clues to remind you which key activates which function: you just have to remember them, so be consistent in the order of installation.

More Options

You install the three desk accessories with the Font/DA Mover. *DeskWriter* allows you to create or edit a text file while running another application. Such a file can then be printed or saved to disk. *Global Search* enables you to search through any disk volume on line for a particular *search string.* Any files containing the string are then displayed, along with the list of folders the file is embedded in. This function is particularly useful for hard disk owners, but it requires HFS to operate. *FileMaster* performs several functions on files, such as delete or rename, while you run another application. You can also move or copy files from one folder to another but not from one disk to another.

CopyMassTer is an independent application that can save time for user-group librarians. The program copies the entire contents of an original disk into RAM; you can then make any number of copies simply by inserting another blank disk, without disk swapping. This utility requires 1 megabyte of RAM. The manual neglects to tell you that the RAM cache must also be turned off, although the program does it for you.



Choices of Necessity

The full array of Desk Necessities' *nine utilities and F-Keys appears when you open the disk and its folders.*

Formatter Deluxe, the other separate application, allows you to format any number of blank disks simply by inserting them. However, this program, like *CopyMassTer,* has an annoying feature: when you finish a formatting session and click the Quit button, you must take the time to reinsert the *Desk Necessities* disk before the program will shut itself down.

While you may use some of these functions only occasionally, others will become favorites. Since I started using the *Quick Info* F-Key, I've wondered how I got along without it. And I no longer shout at my ImageWriter II about paper jams. Each item has a professional design not found in some public domain counterparts. But desk accessories require disk space: the F-Keys take from 7K to 9K each; the desk accessories and other utilities require 10K to 18K apiece. So you might want to choose one or two that are particularly appropriate for a disk with a specific application. *Desk Necessities* offers a variety that is both utilitarian and economical. *–Kenn Chapman*

See *Where to Buy* for product details.

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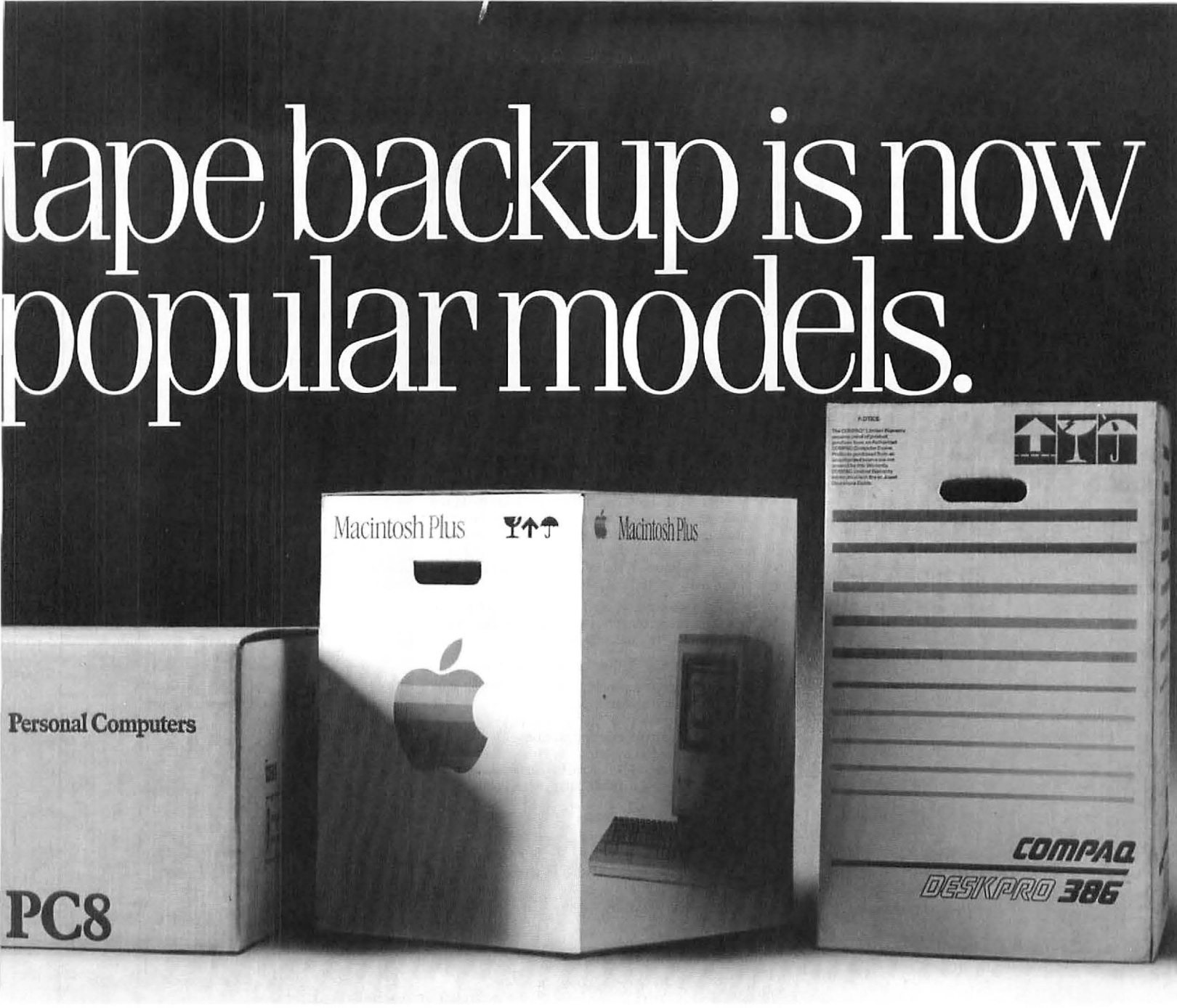
tape backup is now popular models.



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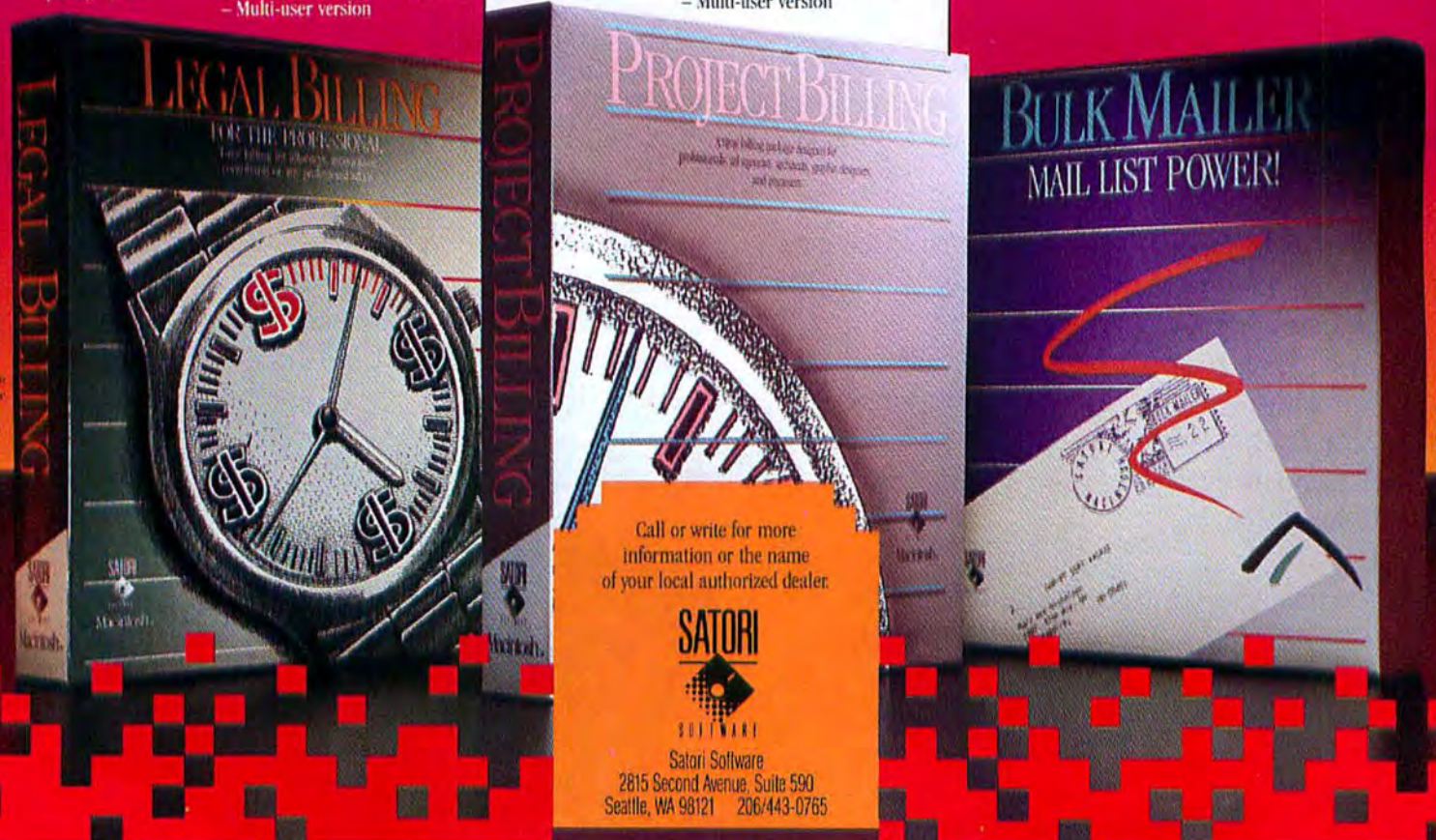

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New Products

Information on the Mac's latest software, hardware, and accessories

Edited by Eileen Drapiza

New Products includes Macintosh products that have been formally announced but not yet evaluated by *Macworld*'s editors. All prices are suggested retail prices. Please call vendors directly for information on availability.

SOFTWARE

Bullets & Boxes A LaserWriter font that includes a selection of slashes with varied kerning for constructing fractions, dingbats, and bullets that snap to the center of a grid within *MacDraw*. $39. Casey's Page Mill, 303/220-1463.

Composite Wing Optimization Enables aircraft designers and structural engineers to optimize a wing for modern one- to six-place aircraft built from advanced composite materials. Includes a noncompiled BASIC version for making modifications. 128K minimum memory; requires an external disk drive. $129. Aircraft Designs, Inc., 408/255-8688.

ComServe A modem server that lets you transparently share modems and serial devices across AppleTalk networks. Compatible with leading terminal emulators and with Hayes-compatible modems at 300 to 9600 bps. 512K minimum memory. $195 per server. Infosphere, Inc., 503/226-3620.

dBMan-Mac A *dBase III*-compatible database designed to run PC *dBase* applications on the Macintosh. 512K minimum memory. $249 each for the interpreter and the run-time version. Versasoft Corp., 408/723-9044.

DiskFit Series *DiskFit, Tape DiskFit,* and *Network DiskFit* are fully automatic, incremental backup systems for backing up to floppies and streaming tape. *Network DiskFit* is optimized for use with *AppleShare*. 512K minimum memory. *DiskFit* $74.95, *Tape DiskFit* $149.95, *Network DiskFit* $395 per file server. SuperMac Software, 415/964-8884.

Excellent Exchange Collections Introductory Tutorials, Advanced Tutorials, Utilities, and Personal Resources. Four template collections, compatible with *Microsoft Excel,* that include over 200 templates and macros for home, business, and technical use. 512K minimum memory; requires *Excel*. $50 per collection. Similar collections available for *Microsoft Works*. Heizer Software, 415/827-9013.

ExperInterface Builder An AI programming tool that enables users without programming ability to prototype applications by designing a complete user interface. The top-down approach to application generation lets you design and test program concepts before committing them to code. Includes sample programs. 1MB minimum memory. $395. ExperTelligence, Inc., 805/969-7871.

Expressionist A desk accessory equation editor that generates LaserWriter-quality mathematical expressions for any program that accepts pictures. Requires Times and Symbols LaserWriter fonts. $54.95. Allan Bonadio Associates, 415/282-5864.

Findswell File finder utility (or system extension) that adds a find button to the standard open dialog box. $54.95. Working Software (formerly Greene, Johnson, Inc.), 408/375-2828.

Fitting Analysis Enables designers and structural engineers to quickly determine the forces in a multifastener three-dimensional fitting. Includes a noncompiled BASIC version for making modifications. 128K minimum memory. $49. Aircraft Designs, Inc., 408/255-8688.

FormDesign First module of the *CForms* management system; allows you to create forms with a floating palette of special text, table, comb, field, and list tools. 512K minimum memory; requires at least 800K disk storage. $149.95. Clearview Software, 401/351-1930.

HEC-2 A stream channel analysis program for civil engineers. Includes a data editor, printing utility, and a complete program manual. 1MB minimum memory. $695. Dodson & Associates, Inc., 713/895-8322.

LaserSpeed A desk accessory print spooler with built-in queue management. 512K minimum memory. $99 per single-user copy; $499 per Office Pack. Think Technologies, 617/863-5595.

LearnWord 3.0 Three self-paced courses that provide hands-on training for *Microsoft Word* 3.0. Each package includes an audio cassette, a practice disk, and a command reference card. 512K minimum memory. $49.95 per course. Personal Training Systems, 408/559-8635.

MacFind Index of *Macworld, MACazine,* and *MacUser* available on *Microsoft File, Microsoft Excel, OverVue, Helix, Double Helix, Reflex, Record Holder,* or *FileMaker*

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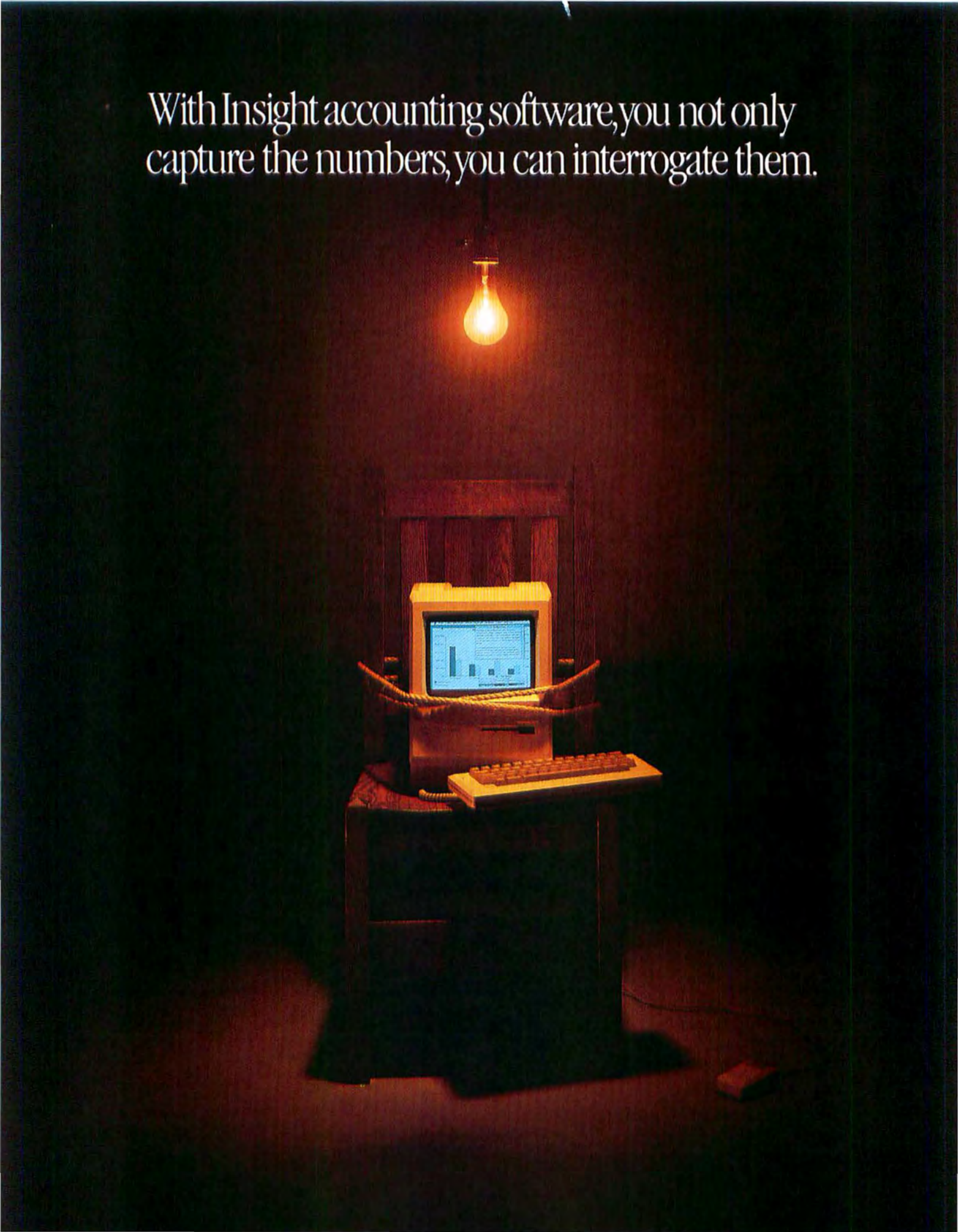

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templates. $12 for index through 1986; $15 through 1987. MacKay Associates, 402/483-0267.

MACH2 A multitasking FORTH-83 development system that provides an interactive environment for developing stand-alone, double-clickable Macintosh applications. *MACH2* comes with Edit/RMaker, sample programs, and technical support. $99.95. Palo Alto Shipping Co., 800/443-6784.

MacTAG (Teacher's Assistant Grader) A grade-sheet management program with a built-in editor that calculates total scores, standard deviations, student ranking, final letter grades, and grade distribution. Plots histograms and makes individual student grade reports. 512K minimum memory. $49. Paragon Courseware, 619/481-1477.

Master Tracks Pro Provides 64 tracks for real-time and step-time input, song editing, step editing, a system-exclusive librarian, and keyboard control mapper all in one package. 512K minimum memory; requires a Passport MIDI Interface Card and one or more MIDI-equipped instruments. $299.95. Passport Designs, Inc., 415/726-0280.

Memorandum An electronic equivalent to Post-it notes that gives you the ability to attach notes to spreadsheet cells, word processing and graphics documents, and database records. 512K minimum memory. $99.95. Target Software, 305/255-6095.

Order House Integrated business application written in *DoubleHelix*. 1MB minimum memory; requires a SCSI hard disk and MultiUser *Helix* for multiuser operation. $400 for run-time version. Elefunt Software, 415/843-7725.

PacerPrint Allows a DEC VAX running the VMS operating system to function as a server for a LaserWriter or other PostScript-compatible printers and makes the printer simultaneously accessible to both VAX and remote or local Macintosh users connected via *pcLink*. *PacerPrint* also serves as a spooler so you can monitor the printer queue status and assign print-job priorities. Price varies depending on VAX model. Pacer Software, Inc., 619/454-0565.

PC MacBridge/AFP Software that allows IBM PCs and compatibles to access Apple's *AppleShare* file server. *PC MacBridge/AFP* works with PC MacBridge/ATB, an AppleTalk board for the PC that lets the PC function as a node on an AppleTalk network, allowing it to communicate with other networked PCs, Macs, and PostScript laser printers. 512K minimum memory; requires PC MacBridge/ATB. $350 including PSPrint. Tangent Technologies, 404/662-0366.

PhotoPhile An indexing system for storing data pertaining to a collection of photographic slides or negatives. 512K minimum memory; requires two 800K disk drives or a hard disk. $199.95; $10 for a demo disk. Peripheral Visions, Inc., 503/640-1317.

PostCode and Micro-Set *PostCode* automatically translates the on-screen formatting from most Macintosh programs into correct coding for the Compugraphic MCS and Powerview typesetters. *Micro-Set* works in conjunction with a special 5¼-inch disk drive to transfer files to a Compugraphic-compatible floppy disk. 512K mini-

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48 Account numbers can be alpha or numeric
49 Delivered with predefined chart of accounts and statements
50 Complete pre-closing month-end reconciliation
51 Customize your own check forms
52 Delivered with predefined check form
53 Unlimited number of check forms allowed
54 Unlimited number of banks and checking accounts allowed
55 Complete bank statement reconciliation
56 Complete processing of stop payments
57 Void a single check or a range of checks
58 Inquire into a specific vendor or range of vendors
59 Complete check generation
60 Also, posting of handwritten checks
61 Miscellaneous cash disbursements
62 Vendor and voucher info available by just pointing and clicking
63 Complete voucher entry
64 Unlimited number of terms codes
65 Complete debit-memo processing
66 Multiple payments allowed
67 Complete discount handling and calculating
68 Both Aging and Past Due Reports
69 Custom aging periods
70 1099 Form Reporting
71 Project Cost Reporting
72 Complete cash requirements reporting
73 Both standard and recurring vouchers allowed
74 Unlimited number of vendors, transactions, etc.
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Circle 674 on reader service card

True Stories in Typesetting

"Linotype and Macintosh™ gave us the edge in text and graphics."

Bert Monroy

Weissberg Associates, in New York City, is a growing ad agency which specializes in retail advertising. Bert Monroy, technical consultant, tells how an in-house text and graphics system gives Weissberg a competitive edge.

"In our business, time is of the essence."

"We specialize in retail advertising, where fast turnaround time is an absolute necessity.

"You can have a sale or some kind of special event, it's Tuesday afternoon and you have to have finished material to the newspaper by that Friday so it can run on Sunday. That's a tremendous time constraint and if you use outside suppliers, you have to pay 100% overtime. Small agencies just can't afford to have those kind of costs.

"We needed a faster, more economical way to service our clients."

"We decided to automate our production."

"Weissberg Associates wanted an in-house computer-text-and-graphics system to cut down on production costs and to enhance the quality of their output. I primarily started with Macintoshes because of their graphics capabilities.

"Then I had to choose output devices that could produce extraordinary text and graphics, and were still completely compatible with the Macintoshes. I knew Linotype had the right equipment available but it had only recently been introduced.

"We purchased the Series 100 equipment including the PostScript™ RIP, the ML-314 Processor and of course the Linotronic 300 laser imagesetters, which can set both text and graphics."

"We got much more than we bargained for."

"Naturally we had high-quality output immediately. But with Linotype's Series 100 system, our artists could cut down on time and materials, too. Before, the artist only prepared the layout, but now he can do his own mechanicals – on screen! He can see the type, play with it, rejustify it – even move it around a million ways if he wants to.

"Our artists create images on the computer and do the work in one to two days at the most, with no outside cost. And if they want to make revisions, it's easy. Everything is internal so we have more control, and cost- and time-savings are phenomenal. And because we can offer lower costs to clients as a result, we have an edge on the competition.

"With in-house output, our clients profit from savings in time, cost and materials, and we come out one step ahead of other agencies. Linotype has helped us bring our production in-house very economically, and that 'one step' has become the foothold for our future growth."

If you'd like to know more about the Linotronic 300, 100 or the Linotronic 500 wide-line (108-pica) laser imagesetters, 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 computer and output on a Linotronic 300 laser imagesetter.

Linotype

Circle 691 on reader service card

"The Datacopy 730 remains the premier low-cost scanner for the PC." —*PC Magazine*

September 30, 1986

A personal computer and printer aren't enough for serious desktop publishing. You also need the finest *scanner* available.

PC Magazine tested nine scanners. Their "Editor's Choice": The Datacopy 730.

In fact, according to ***PC Magazine,*** the only scanner that performed better costs more than ten times as much.

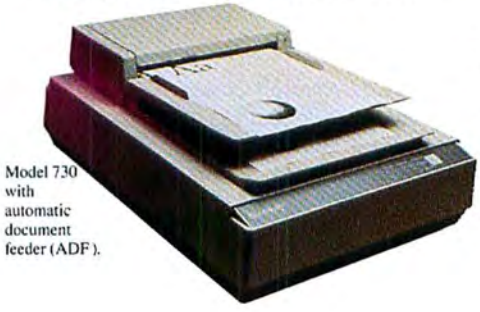
The 730's flatbed configuration is one reason why. The stationary flatbed scanner eliminates distortion, gives you greater alignment control, and lets you rescan documents or portions you select, precisely. Plus, the flatbed lets you scan bound documents including books and magazines.

For sheet-fed convenience, you can easily install the optional automatic document feeder (ADF).

Datacopy's powerful imaging software for the Macintosh or PC gives you exceptional versatility. You can control resolution and scan size, perform sophisticated image editing and more.

Add power to your PC with Datacopy's OCR Plus, the only user-trainable OCR software.

Let our MicroFax give your PC both full Group III facsimile and data communications capability.



Model 730 with automatic document feeder (ADF).

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The Eye of the Computer™

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Mountain View, CA 94043 Fax: 415-965-3474

Circle 637 on reader service card

mum memory. $1495 for complete system. Mumford Micro Systems, 805/969-4557.

Reflection for the Macintosh Hewlett-Packard 2392A terminal emulation, including error-checking file-transfer software for use with HP 3000 and HP 9000 hosts that can run in the background. 512K minimum memory. $199. Walker Richer & Quinn, 206/324-0350.

Roadwar 2000 A futuristic strategic adventure game with 19 vehicle types that players can modify for terrain, attack, defense, speed, and durability. 512K minimum memory. $39.95. Strategic Simulations, Inc., 415/964-1353.

Salary Magic A salary-negotiation and office-management package that integrates a spreadsheet and database for calculating, recording, and printing information. 512K minimum memory. $395. Magic Software, 402/291-7809.

SimpleSpan A desk accessory that enables architects and engineers to select beam size quickly, given availability of lumber or steel and typical span and loading conditions; includes built-in section table. 512K minimum memory. $99. CompServCo, 800/272-5533.

Smart Words College Prep Vocabulary and Essential Business Vocabulary each contain 300 carefully selected words, presented with definitions, synonyms, antonyms, and sentences demonstrating usage. Includes learning and testing exercises and a game. 512K minimum memory. $49.95. Addison-Wesley, 617/944-3700.

SMUG Fonts Part 1 A collection of over 200 public-domain fonts bundled with a fonts tutorial, utilities, and an electronic directory of SMUG Fonts. Free to any member of a Macintosh user group; $35 suggested donation for disk, copying, and a local BBS project. Shenandoah Macintosh Users Group, 703/433-1527.

Strictly Business Accounts Payable Functions as a companion to Strictly Business General Ledger or as a stand-alone accounts payable accounting program. 512K minimum memory. $395. Future Design Software, 714/546-3811.

HARDWARE

Data Exchange and Data Tower Series Data Exchange is a SCSI storage subsystem consisting of a 320MB SCSI hard disk and software that links the Apple IIe and IIGS with the Mac Plus for file sharing and data exchange. Data Tower is a SCSI hard disk drive subsystem in a deskside pedestal. Available capacities are 140MB, 240MB, or 320MB with an optional SCSI interface card for the Apple II family. Data Exchange $7995; Data Tower 140MB $3995; 240MB $4995; 320MB $6495. CMS Enhancements, Inc., 714/549-9111.

Dyaxis A disk-based, digital, audio-editing system that performs functions normally required in audio postproduction, including editing, multitrack, stereo and mono mixing, panning, and special effects like tape looping and digital enveloping. Requires a Mac Plus. Under $15,000 with one hour of recording time. Integrated Media Systems, 415/592-8055.

(continues)

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$79.95

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Circle 317 on reader service card

THUNDERSCAN® IS SO IMPROVED YOU WON'T BELIEVE YOUR EYES.

Ever since ThunderScan started zipping back and forth inside the ImageWriter,™ it's been famous for eye-popping graphics. And now, the most popular Macintosh™ scanner is better than ever. With exciting new features you won't find on scanners costing ten times as much. True halftone capabilities. New file formats. Special effects. And more.

Now you have a choice of true halftones or dithered bitmaps.

ThunderScan halftones are really something to behold.

Because ThunderScan returns true gray shade information to the Macintosh. Not just dithered bitmaps like most scanners. So even the most subtle details are captured. And with ThunderScan's sophisticated software palette, you can alter any image to your art's desire.

ThunderScan is compatible with desktop publishing software.

ThunderScan images can now be saved in a variety of formats, including PostScript® (EPSF), MacDraw™ (PICT) and TIFF. That means complete compatibility with PageMaker® 2.0 and other advanced desktop publishing programs. So you can grace the pages of your publications with honest-to-goodness halftones generated by LaserWriter.™ Like the images you see in this ad. And wait 'til you see the output from higher resolution printers like the Linotronic® 100. Incredible!

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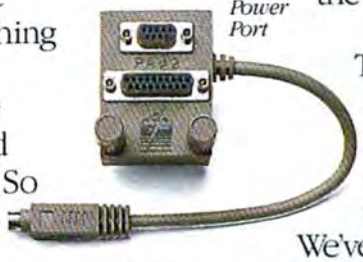

Power Port

Especially effective are ThunderScan's special effects. Straight line screens. Rotations. And frames. Plus, we've added a lasso that lets you control the shading of irregular shapes.

We've even made a major hardware improvement. It's called Power Port.™ Just plug it in and ThunderScan is Macintosh Plus and SE compatible. With no additional accessories. And, Power Port can power most serial port peripherals.

Yes, the new improved ThunderScan is sure to raise some eyebrows. And its price is definitely a sight for sore...well, you get the picture.

$249 Complete

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Thunderware

ThunderScan® FOR MACINTOSH®

21 Orinda Way, Orinda, CA 94563 (415) 254-6581

Circle 167 on reader service card.

FastPath3 AppleTalk-to-Ethernet gateway that can link an entire AppleTalk network to Ethernet and allow access to host computers over thin Ethernet cable. $2750. Kinetics, 415/947-0998.

Image Scanner Input resolution with true halftoning that produces photographic-quality output. Connects to the SCSI bus and scans a full page in 12 seconds at 300 dots per inch, with 32 shades of gray. 1MB minimum memory. $1295. LoDown, 408/438-7400.

MagNet 40X, Magnum Tape 40, MagNet 340X MagNet 40X is a 40MB SCSI hard disk bundled with *MacServe;* it features multiuser disk serving, print serving, print spooling, disk cache, and password protection. The Magnum Tape 40 is based on the 3M tape-drive system; backup software included. The MagNet 340X is a combination 340MB hard drive and tape backup. MagNet 40X $1795, Magnum Tape 40 $495, MagNet 340X $13,995. Mirror Technologies, 612/426-3276.

Nucleus Series AppleTalk network servers in the following capacities: 20MB $1795, 40MB $3295, 80MB $5200, and 120MB $7900. Reach Technologies, 512/280-1977.

Orion Accelerator board for the Mac 512K and Mac Plus with special implementation of the Motorola 68851 (memory management unit). 2MB expandable to 4MB, 16MB, or 32MB. About $2000. Peak Systems, 512/329-1020.

TOPS Repeater and TOPS Star TOPS Repeater extends the maximum length (1000 feet) and number of machines on an AppleTalk network. The TOPS Repeater overcomes electrical limitations by receiving incoming network signals and regenerating and retransmitting them at full voltage. It also enables alterations of the standard AppleTalk configuration, allowing several buses to be linked so that they behave as one logical LAN. TOPS Star transforms bus networks into stars for running AppleTalk through phone lines. TOPS Repeater $189, TOPS Star $1500. Centram, 415/549-5900.

Totem Bernoulli Drive Series A line of single and dual fixed, removable, and combination drives ranging from 20MB to 140MB. $795 to $3995. Bering Industries, 408/438-8779.

Whizzard Motorola 68020-based accelerator board for the Mac Plus; no additional memory. $795. CompuSpand, 800/323-2778.

ACCESSORIES

Mac Plus Bag and ImageWriter Bag Both carrying cases are made of padded Cordura with YKK two-way zipper, wraparound nylon straps, antiskid shoulder gripper, and leather snap handle. Mac Plus Bag stands 16½ inches high; has padded pockets inside for mouse, keyboard, and 400K or 800K external disk drive. Briefcase-style printer bag has large inside pockets for papers and manuals. Five colors available. Mac Plus Bag $79.95, ImageWriter Bag $45.00. West Ridge Design, 503/248-0053.

Mac Plus Case and Print Plus Case Both bags are made from Cordura nylon with removable closed-cell foam panels, YKK coil

(continues)

WITH PAPER PLUS 500 YOUR LASERWRITER WON'T NEED A BABYSITTER.

If your laser printer needs a babysitter to feed the paper tray every 10 to 15 minutes, you need PAPER PLUS 500™; the new sheet feeder from The Laser Connection.

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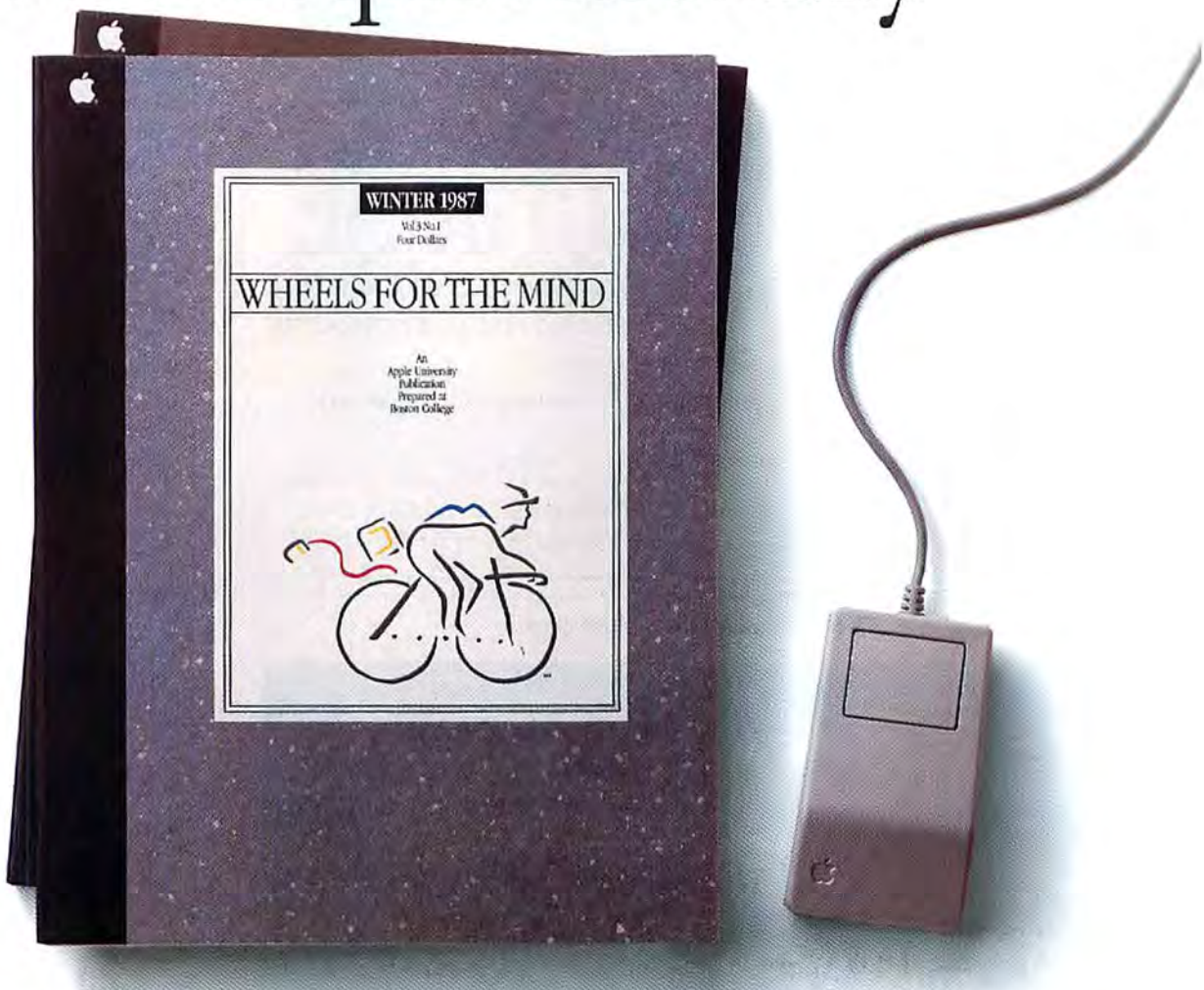

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zipper, and nylon wraparound straps with antiskid shoulder gripper. Mac case is 17 inches high; matching printer case is 15 inches high. Mac Plus Case $39.95, Print Plus Case $37.95. Alpenlite, 805/653-0431.

PC Visor A detachable plastic hood that attaches to the screen with velcro fasteners. Shades the CRT from more than 50 percent of overhead and side lighting. $9.95. Quality One Production Services, 408/293-7226.

Shipping Cases Lockable hard-sided shipping cases for Macs, Mac Pluses, and peripherals. Sizes and prices vary according to items included. Custom cases available. $104-$250. Fiberbilt, 212/675-5820, 800/874-4176.

Sofbags System Traveling Macintosh luggage of Cordura and tricot-coated foam that lets you carry a Mac, keyboard, mouse, and external drive or hard disk without disconnecting them. Available in a variety of colors. Prices range from $45 to $120. M.S. Baker & Co., 518/873-2666.

Stroller and Hugger The Hugger is a desktop tilt-and-rotate base for the Mac Plus, keyboard, external drive, and mouse. The Stroller is a Cordura nylon carry-cover with a zippered pocket for manuals. Hugger $39.95, Stroller $59.95. ORMSystems, 406/587-3869.

TakeCover This ripstop nylon cover doubles as a lightweight carrier for moving your Macintosh without having to unplug peripherals. Pockets for Mac or Mac Plus keyboard, mouse, and 400K or 800K drives. $34.95. Tacklind Design, Inc., 415/322-2257.

The Bag Nylon-lined Colombian leather bag with inside pockets for keyboard, mouse, and external drive; two outside pockets hold manuals, disks, and books. Wraparound leather handle and detachable shoulder strap with Fastex fasteners. $149. CompuCover, 800/874-6391, 800/342-9008 in Florida.

To have your product considered for inclusion in New Products, *send an announcement with product name, description, minimum memory, peripherals required, pricing, company name, and phone number to New Products Editor,* MacWorld, *501 Second St. #600, San Francisco, CA 94107. We reserve the right to edit press releases.* □

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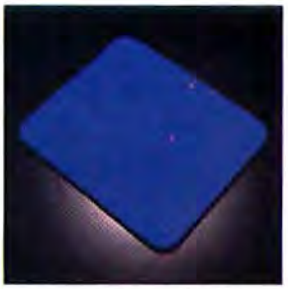

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Circle 373 on reader service card.

"Can w

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It's done with TOPS,® the easiest to learn, easiest to operate Local Area Network yet designed. You can now access Lotus 1-2-3™ files located on a PC, for example, and modify them on your Macintosh under MicroSoft™ Excel.™

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Installation is quick and straightforward—less than four minutes for a Macintosh, fifteen minutes for a PC.

It's all done so easily and success-

e talk?"

fully that within the first month TOPS was available, it was already installed in over 100 Fortune 500 companies.

This talk is also remarkably cheap. TOPS is $149 per Macintosh, $389 per PC.

As if that weren't enough good news, we are pleased to also announce one of this year's major advances in desktop publishing. Now, using TOPS PRINT™ you can have all your PCs share Apple's LaserWriter.™

TOPS and TOPS PRINT are available at Businessland and other fine computer dealers. For the dealer nearest you, call 800-222-TOPS (in California call 800-445-TOPS).

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PC MAGAZINE

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Circle 524 on reader service card

FileMaker Plus From Forethought

Now, the only Mac database ever to get both *MacUser's* and *InfoWorld's* highest ratings does even more, with even more ease.

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Filemaker™ Plus lets you do these any way you want, or does them *for* you if you want. An extra disk full of templates gives you a whole set of typical formats, so all you have to do is fill in the blanks.

And in addition to doing what a database is supposed to do — calculations, summary reports, sorting — FileMaker Plus does everything you *wish* a database would do. View multiple records on a screen. Pull information from different files together. Include graphics in your fields and reports. Print mailing labels 3 or 4-up, or more.

Your information takes much more human form. It makes more than sense. It makes an *impression.*

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

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

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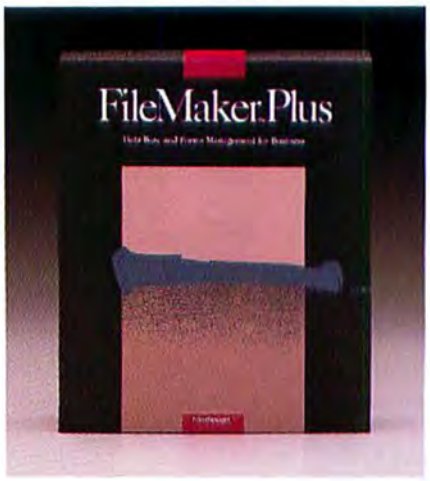

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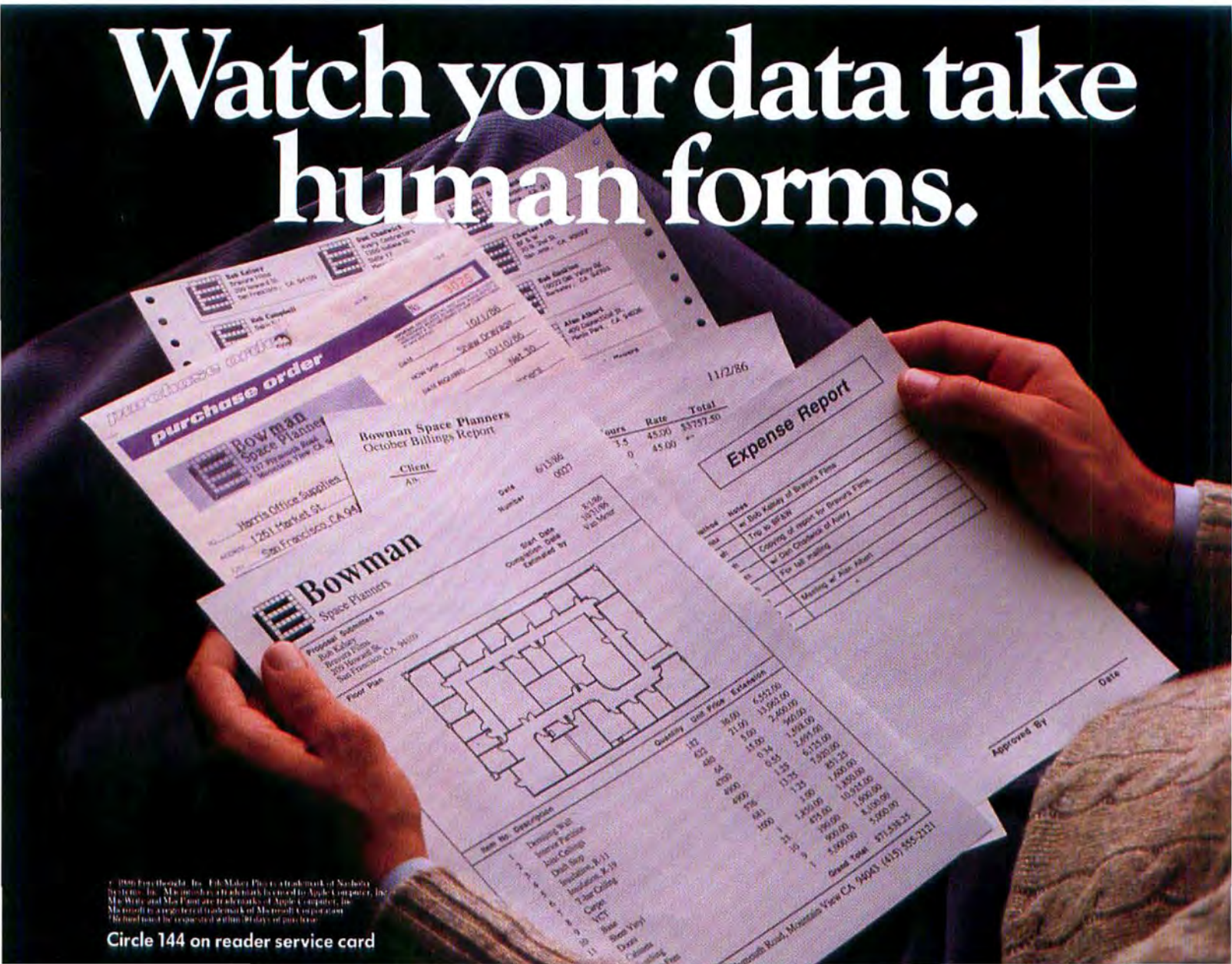

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Quick Tips

Answers to your questions

by Lon Poole

In February I described a labor-intensive method for adding more than 15 desk accessories to the Apple menu. Several readers inform me there's an application that greases the skids considerably. William J. Lamping, of Bloomfield Hills, Michigan, writes, "The DA Installer+ in *Quick and Dirty Utilities, Volume 1* allows even nonhackers like me to add up to 36 desk accessories to the System file on a Mac Plus or Mac 512K Enhanced."

Some of the extra 21 desk accessory slots are nominally reserved for other purposes. These include serial-port hard disks, RAM disks, RAM caches, disk or file servers, SCSI hard disks, and of course "future use." If you're using these items, you won't be able to install the full 36 desk accessories. DA Installer+ seems to have reasonable safeguards against rude collisions. It's available on both volumes of *Quick and Dirty Utilities* ($39.95 per volume) published by Dreams of the Phoenix, P.O. Box 10273, Jacksonville, FL 32247, 904/396-6952.

Q Key Caps for Posterity

Is there any way to print the keyboard map displayed by the Key Caps desk accessory? Hitting ⌘-Shift-4 does not do the job.

Kunio Mitsuma
State College, Pennsylvania

A When you type ⌘-Shift-4, Key Caps highlights the keys you press before the Mac can print the screen. What's worse, you can't print the keyboard map at all while pressing the Option key, because ⌘-Shift-Option-4 doesn't do anything.

You need a camera. No, not a Polaroid camera, I mean a *Camera* desk accessory. You set *Camera*'s timer from 1 to 60 seconds; after the specified time has elapsed, *Camera* takes a picture of the screen and either prints it on an ImageWriter or puts it in a *MacPaint* document—your choice. *Camera* is available from user groups, such as Berkeley Macintosh User Group, 1442A Walnut St. #62, Berkeley, CA 94709, 415/549-2684. Or call 800/538-9696 ext. 500 for the name of a user group near you. This desk accessory is also available from on-line information services, such as CompuServe's MAUG; it is file CAMERA.DA in DL1.

Q Start-up Screen

I've heard it's possible to change the start-up screen using Paint Cutter or *Screen Maker*. I tried both of these applications with a Hard Disk 20 without any tangible results.

Maxwell J. Richards
Smithtown, New York

A The two programs you mention and a third one, *SuperPaint,* can replace the routine "Welcome to Macintosh" screen with something more inspiring. All three convert the upper-left corner of a *MacPaint* document to a start-up screen, which you name and save in a folder you designate. When you want to activate a custom start-up screen, name it StartupScreen (no spaces in the name) and put it in the System Folder on your start-up disk.

Screen Maker simply converts an existing *MacPaint* document to a start-up screen. Paint Cutter lets you shift the picture in the document so you get exactly what you want in the upper-left corner before conversion; use the Show Page command in the Options menu. *SuperPaint* has a full complement of painting tools you can use to modify a picture—or even create one from scratch—and then save it as a start-up screen.

Paint Cutter comes as part of *Accessory Pak 1* ($39.95) from Silicon Beach Software, P.O. Box 261430, San Diego, CA 92126, 619/695-6956. *SuperPaint* ($99) is also from Silicon Beach. *Screen Maker* is public domain software, available from user groups such as Boston Computer Society, One Center Plaza, Boston MA 02108, 617/367-8080. Or call 800/538-9696 ext. 500 for the name of a user group near you.

Q BASIC Headlines

How can I get Chicago font or any headline on my reports when I print to the ImageWriter from a *Microsoft BASIC* 3.0 program?

Wilfred A. Malmlund
Redondo Beach, California

A The key to printing different fonts, font sizes, and font styles—not to mention graphics—from a *Microsoft BASIC* program is the WINDOW OUTPUT # statement. It diverts output from the screen to the printer. For a sample program, see "BASIC Font Printing."

Before using WINDOW OUTPUT #, open the printer as an output device using a statement such as OPEN "LPT1:" FOR OUTPUT AS #1. You'll find additional information on this type of printer output on pages 41-44 of the *BASIC* 2.0 manual.

After the WINDOW OUTPUT # statement, use a WIDTH # statement to set the line width at the printer. Then you can print text and graphics using any statements that would otherwise display on the screen. To change fonts, font sizes, and font styles, use CALL TEXTFONT, CALL TEXTSIZE, and CALL TEXTFACE statements.

(continues)

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```
'This BASIC program shows how to print any
'font, size, and style text and how to draw
'graphics on a printer

'Fonts and styles are known by number in BASIC.
'Assign some numbers to mnemonic variables.
Chicago=0
Geneva=1
NewYork=2
Athens=7
LosAngeles=12
Plain=0
Bold=1
Italic=2
Extended=64
    'Open the printer as output device #1. Present the
    'standard dialog boxes for Page Setup and Print.
OPEN "LPT1:PROMPT" FOR OUTPUT AS #1
    'Redirect output to device #1, the printer.
WINDOW OUTPUT #1
    'Set the maximum line width for no word wrap
WIDTH #1, 255
    'Set text attributes for the title.
CALL TEXTFONT(NewYork)
CALL TEXTSIZE(14)
CALL TEXTFACE(Bold+Extended)
    'Print the title.
PRINT #1, ""
PRINT #1, ""
PRINT #1, TAB(18); "The Balloon of the Mind"
PRINT #1, ""
    'Change text attributes for regular text.
CALL TEXTFONT(NewYork)
CALL TEXTSIZE(12)
CALL TEXTFACE(Italic)
    'Print some regular text.
PRINT #1, TAB(25); "Hands, do what you're bid:"
PRINT #1, TAB(25); "Bring the balloon of the mind"
PRINT #1, TAB(25); "That bellies and drags in the wind"
PRINT #1, TAB(25); "Into its narrow shed."
PRINT #1, ""
CALL TEXTSIZE(10)
CALL TEXTFACE(Plain)
PRINT #1, TAB(60); "W.B. Yeats"
    'Draw the biggest rectangle that fits on
    'a printed 8-1/2 by 11 page
LINE (1,1) - (639,751),,B
    'Nothing prints until the device is closed
CLOSE #1
```

BASIC Font Printing

Your BASIC program can change the font, size, and style of printed text, and it can print graphics. This program shows how.

As you send output to the printer, *BASIC* spools it to a disk file. After your program closes the output device, the printer begins to work on your file. You may close the output device explicitly with a CLOSE # statement or implicitly by ending the program.

EZ Labels

Tip: For easy disk relabeling, try Scotch brand Post-it Cover-up Tape in the 1-inch width. This removable white paper tape is intended for correcting work before photocopying. It sticks as well as a permanent label and won't fall off by accident. But lift a corner, pull, and it comes off easily and cleanly.

Obviously, you can write on Cover-up tape with a pen or pencil. You can also print on it with an ImageWriter. First use *MacPaint* or *MacDraw* to draw a rectangle slightly larger than the label near the top of the page, and print the rectangle on plain paper. Then stick a length of Cover-up tape within the rectangle and reposition the paper for reprinting on the same page. Finally, back in *MacPaint* or *MacDraw*, type your label contents inside the rectangle and print again. Remove the label from the paper and place it on your disk.

Thomas A. Lang
Temple City, California

You can also print these labels on a LaserWriter. To print the second pass with the label in place, use the manual-feed guide. Insert the paper face up, top edge first. MacPaint *has no manual-feed option, so insert the paper in the manual-feed guide before choosing Print Final from the File menu.*

Undo LaserWriter Start-up Page

Tip: For those who are tired of seeing the test/start-up page every time they turn on their LaserWriters, the following steps stop it from printing. You'll need an ImageWriter I cable and *MacTerminal* or some other terminal program.

1. Unhook the AppleTalk cable from the LaserWriter.

2. Connect one end of an ImageWriter cable to the LaserWriter's 25-pin connector and the other end to the Mac's modem port.

3. Set mode switch on the back of the LaserWriter to 9600.

4. Start *MacTerminal* and choose Compatibility from the Settings menu. Select the following compatibility settings: 9600 baud rate, 7 bits per character, no parity, no handshake, computer-to-computer connection, and the modem connection port. Then choose Terminal from the Settings menu and select the following options: TTY terminal and Local Echo.

5. Type, all in lowercase letters, *executive* and press Return. The LaserWriter responds with a trademark and copyright message on your screen that ends with "PS>."

6. You are now ready to send the LaserWriter commands. Type *serverdict begin 0 exitserver* and press Return. The LaserWriter responds "%%[exitserver: permanent state may be changed]%%." If it doesn't, type ⌘-C and ⌘-D. Then if you see "PS>," try step 6 again. Otherwise restart at step 5.

(continues)

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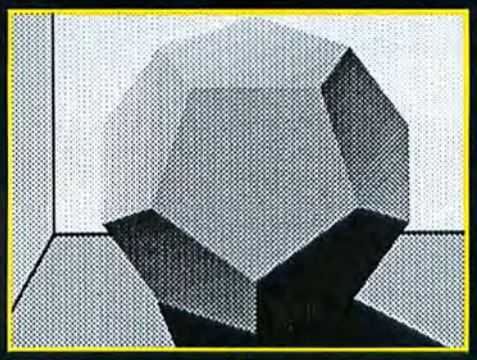

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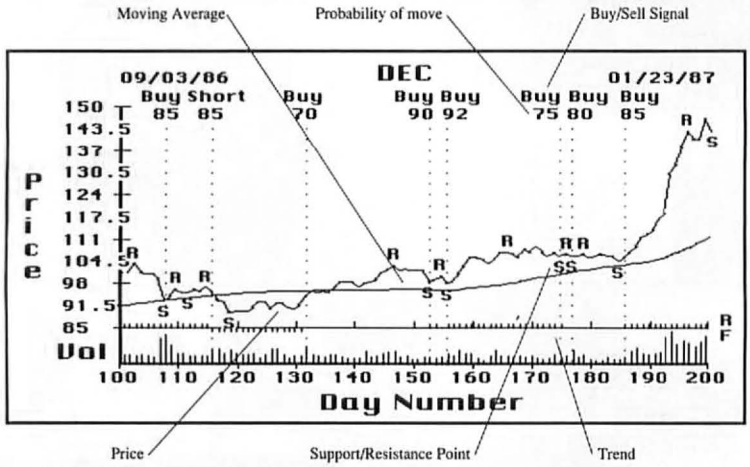

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7. Choose Terminal again from *MacTerminal*'s Settings menu, and turn the Local Echo option back on. Then type *statusdict begin false setdostartpage end* and press Return. Press ⌘-D and wait a couple of seconds. If you make a mistake and the LaserWriter sends you an error message, press ⌘-D and restart from step 5.

8. Quit *MacTerminal* and undo the changes you made to cabling and the mode switch in steps 1 to 3.

To turn on printing of the test page again, go through the same procedure except, at step 7, type *statusdict begin true setdostartpage end.*

Much of this information comes from *PostScript Language Reference Manual* by Adobe Systems Inc. (Addison-Wesley Publishing Co., 1985). The appendix has detailed information on the LaserWriter that is not found in Apple's LaserWriter and LaserWriter Plus manuals.

Danny Kumamoto
Cambridge, Massachusetts

You can connect a Mac Plus, Mac SE, or Mac II to the LaserWriter's 25-pin port with an Apple II Printer-8 Cable (Apple part number A2C0314), or to the LaserWriter's 9-pin port with a Macintosh Peripheral Cable (Apple part number M0196). For a Mac 512K, you can use the cable that comes in the ImageWriter Accessory Kit for Macintosh (Apple part number M0150).

Self-Adjusting Excel Columns

Tip: Danny Goodman's outstanding book, *Hands On Excel* (Scott, Foresman and Company, 1986), encouraged me to write my own macros. The one shown in "Fat Finder" automatically searches a column for the cell with the longest entry, so that I can set the column width to match. This is handy when you have a lot of entries that vary considerably in length.

Before running the macro, you must note the approximate number of cells whose lengths you want checked. Then click the first cell of the range. Press Option-⌘-W to start the macro, or use the Run command from the Macro menu.

The macro asks how many cells you want it to check. Enter the number you noted earlier. The macro inserts a temporary computation column and, within it, highlights the number of cells chosen. An alert box asks you to confirm that the selection is at least as long as the range of cells

(continues)

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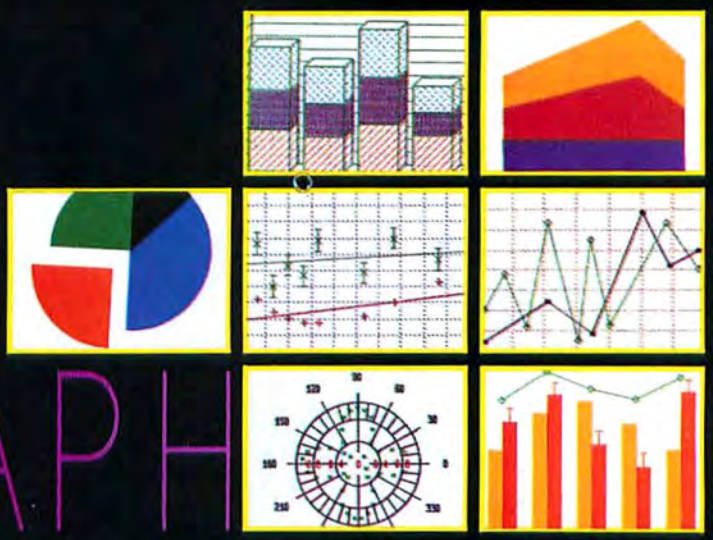

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Fat Finder

This Excel *macro finds the cell with the longest value from a column of cells. You select the first cell in the column, specify the length of the column, and adjust the column width when the macro finishes.*

	A	B
1	width.column	Option-Command-w
2	=ECHO(FALSE)	Turn screen update off
3	=DEFINE.NAME("start",SELECTION())	Name start cell
4	=SELECT("C:C")	Select column of start cell
5	=INSERT(1)	Insert a col. for computing lengths
6	=SELECT(!start)	Reselect start cell
7	=INPUT("How many cells?",1,"Column Width")	Ask how many cells in column
8	=IF(A7=FALSE,GOTO(A38))	Stop macro if Cancel clicked
9	=SELECT(SELECTION():OFFSET(SELECTION(),A7,0))	Select that many cells
10	=SELECT(OFFSET(SELECTION(),0,-1))	Select cell range for computing lengths
11	=SELECT(,"R[-1]C")	Make last selected cell active
12	=ECHO(TRUE)	Turn screen update on
13	=ALERT("Check selection length",1)	Ask if selected "length" range is long enough
14	=IF(A13=FALSE,SELECT(!start))	If Cancel clicked, reselect original cell
15	=IF(SELECTION()=!start,GOTO(A38))	and stop macro
16	=ECHO(FALSE)	Turn screen update off
17	=DEFINE.NAME("length")	Name cell range for computing lengths
18	=FORMULA.FILL("=LEN(RC[1])")	Fill range with string-length formulas
19	=SELECT("R[1]C")	Select a cell for computing max length
20	=DEFINE.NAME("max")	Name the max-length cell
21	=FORMULA("=MAX(length)")	Find MAX of all string lengths
22	=SELECT("R[1]C")	Select a cell for matching that length
23	=DEFINE.NAME("match")	Name the match cell
24	=FORMULA("=MATCH(max,length,0)")	Find the cell whose length matches max
25	=SELECT(INDEX(llength,lmatch))	Select the max length
26	=SELECT("RC[1]")	Select corresponding cell in original list
27	=DEFINE.NAME("widest")	Name widest cell
28	=SELECT("C[-1]:C[-1]")	Select column used to compute lengths
29	=EDIT.DELETE(1)	Delete it
30	=SELECT(!widest)	Select widest cell
31	=DELETE.NAME("length")	Delete named cell reference
32	=DELETE.NAME("start")	Delete named cell reference
33	=DELETE.NAME("max")	Delete named cell reference
34	=DELETE.NAME("match")	Delete named cell reference
35	=DELETE.NAME("widest")	Delete named cell reference
36	=RETURN()	End macro
37		
38	error	
39	=ALERT("Too few cells! Macro takes a hike!",2)	Present alert box
40	=SELECT("C[-1]:C[-1]")	Select column used to compute lengths
41	=EDIT.DELETE(1)	Delete it
42	=SELECT(!start)	Reselect Start cell
43	=DELETE.NAME("start")	Delete named cell reference
44	=RETURN()	Cancel macro

you want checked. Then it selects the cell with the longest entry, and you can manually set the column to that width.

By including a COLUMN.WIDTH command, I could have made the width setting automatic. But manual width setting is more accurate with the proportional fonts people normally use.

The macro is mistake-proof. If you don't enter a number of cells, *Excel* asks you to try again. If you enter too small a number, the macro shows you your error. The macro runs quickly enough so that entering a number 100 greater than needed won't slow things down unless you have several big spreadsheets open at once. If you click the Cancel button in any box, everything returns to its original state.

Michael Alexander
London, England

This macro always finds the cell with the most characters, but that may not be the widest cell. For example, Fish, Bird, *and*

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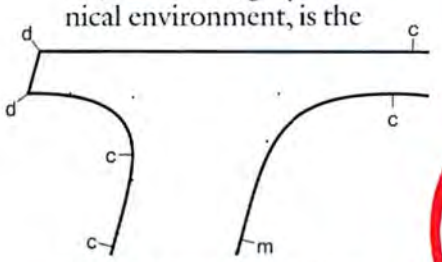

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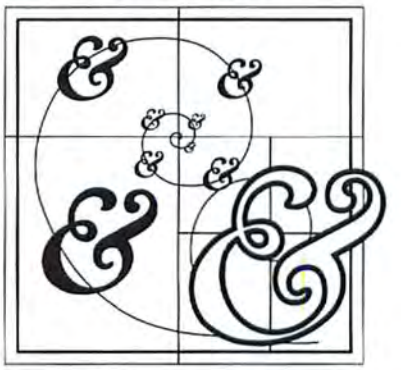

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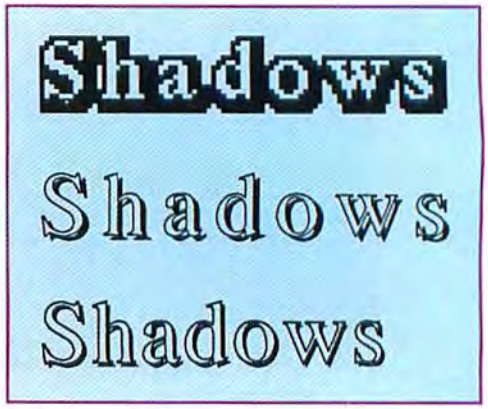

Dark Shadows

Shadow-style text prints differently in MacWrite *and* Microsoft Word *than in* PageMaker. *Shadow plus Outline prints the same in all three applications, but looks different from what you see on the screen.*

Worm *all have the same number of characters, but* Worm *is longer. Proportional fonts are the culprit here. Since you can set column width manually, you can allow for such variations by making the column a little wider than is absolutely necessary.*

Two Shadows

Tip: If you move text from *MacWrite* version 4.5 to *PageMaker* version 1.2, as many of us do, be aware that what you get in *PageMaker* may not be exactly what you saw in *MacWrite*. The two applications print shadow-style text differently, as shown in "Dark Shadows."

On the *MacWrite* screen, Shadow looks different from Shadow with Outline. But there is no difference between Shadow and Shadow with Outline on an ImageWriter, LaserWriter, or LaserWriter Plus when printed from *MacWrite* 4.5. *PageMaker* 1.2, however, gives you true shadow effect on the printer.

Bill Chaney
West Lafayette, Indiana

Everything you say about MacWrite *also goes for* Microsoft Word *versions 1.05 and 3.0.*

Send tips or questions to Quick Tips, Macworld, *501 Second St. #600, San Francisco, CA 94107. Send electronic mail to CompuServe 70370,702 or The Source BCW440. All published submissions become the property of* Macworld. □

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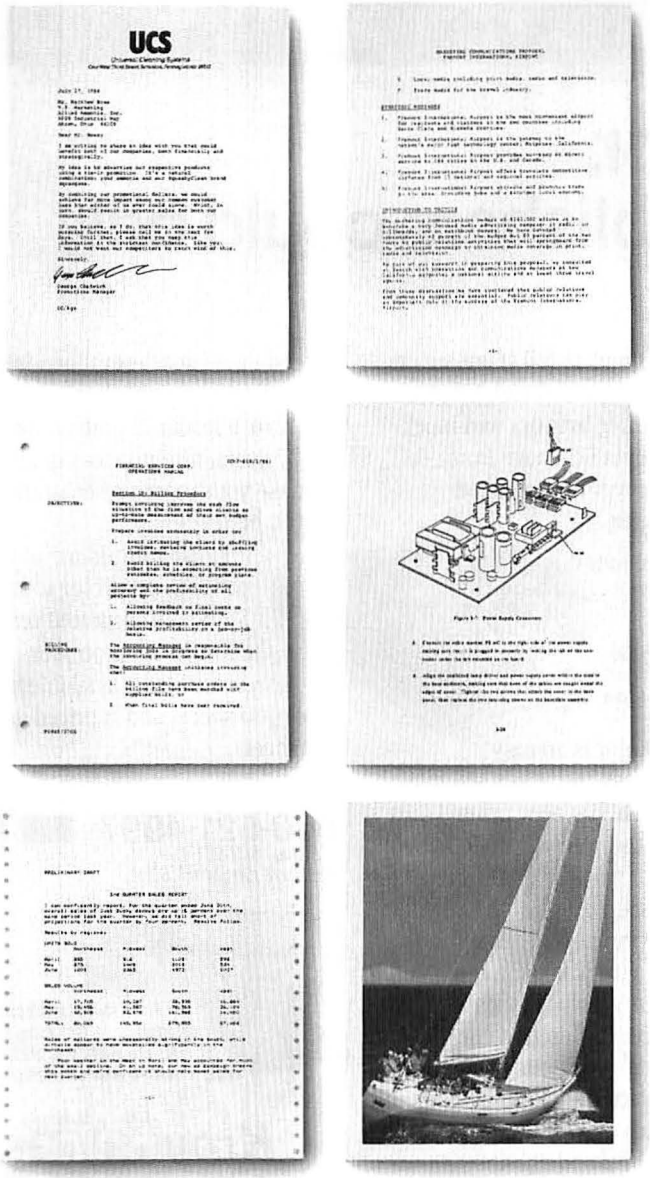

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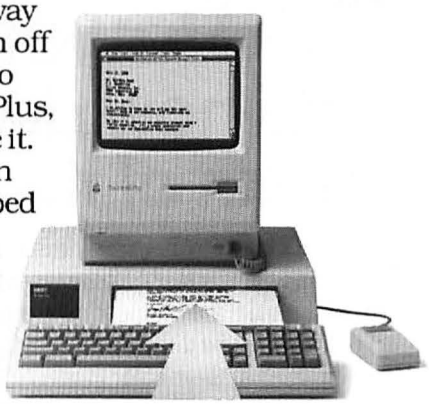

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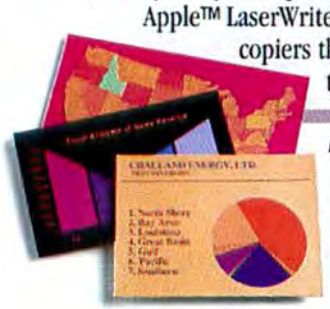

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Getting Started with Database Managers

Sorting out fields and records, understanding relationships, and other data basics

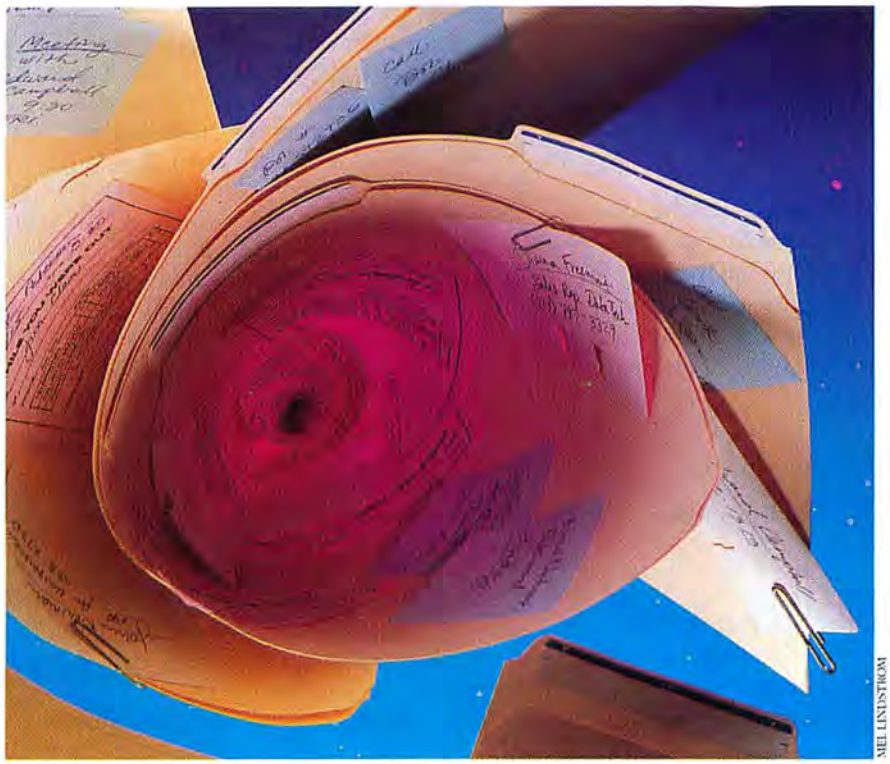
by Jim Heid

The evidence is conclusive that life is filled with facts to file. In any office, near the "You don't have to be crazy to work here, but it helps" sign, file cabinets entomb paper that has run the course from in-box to out-box. Rolodex files swell with cards and Post-it notes spread like moss on the surface of an overcrowded folder holder. And "while you were out" messages stack up in a corner, each one a clear reminder of *why* you were out.

If this describes your workplace, the notion that a computer can get you organized and keep your head above paper can be enticing enough to inspire a purchase. But this inspiration is often built on the vague idea that computers have miraculous powers of organization, that putting one on your desk will somehow give you one-key access to those tedious tidbits you have to root for now.

Speed, disk storage, and eraserless revisions do give a computer powerful filing capabilities, when it's tapped by a *database manager*. These electronic file clerks let you store, sort, retrieve, revise, and print information. You can store an entire file drawer of facts and figures on a floppy disk, and locate any one of them in the time it would take you to open the drawer.

But a database manager isn't a panacea for organizational ills. For one thing, a computer database can't create itself. You have to decide how to organize your information and then set up the database manager accordingly. And information doesn't file itself in a database; you (or someone else, if you're lucky) have to set aside time for the torturous task called data entry. A database may allow effortless retrieval, but it requires endless maintenance.



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Data Basics

Unlike a file folder, database managers don't let you stuff information anywhere just to get it out of sight. They hold data within a rigid structure, and planning that structure is the most important step in setting up your database. You can reorganize an electronic database after you've entered data, but it's no easier than reorganizing a paper filing system.

A database structure is formed by two building blocks: *fields* and *records*. A field is a single piece of information for an entry; together the fields for an entry make up the record (see "A Matter of Record"). In a database version of a Rolodex, for example, all of the information on a single card is a record and each element—first name, last name, company, zip code—is a field. When you define a database's structure, you

(continues)

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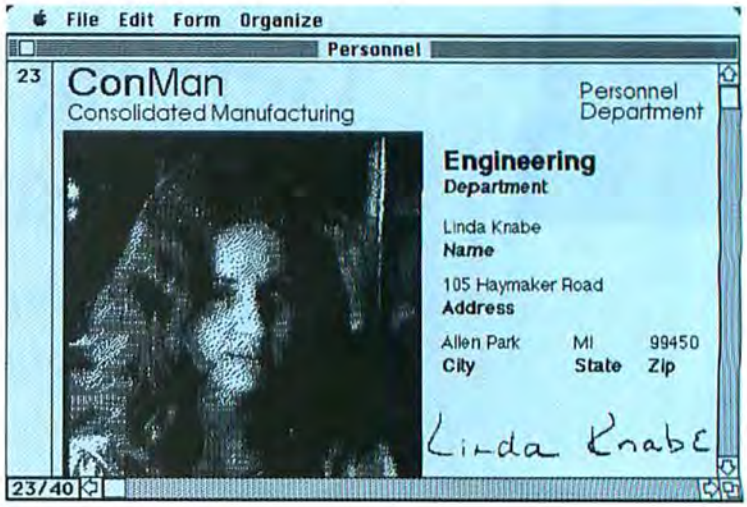


This Microsoft File *database stores personnel information, with graphic fields holding the employee picture and signature.* File *is one of several database managers that lets you lay out forms that resemble paper forms.*

create fields and give each one a name that reflects its contents, such as First Name or Street Address.

In addition to defining the structure, creating a database involves specifying how information will be presented on screen. The screen layout of fields and their names is called a *form*. Most programs provide a preset, quick-and-dirty form layout to use when you just can't wait to start entering data, and also let you design your own forms that mimic the paper forms you're trying to avoid. Macintosh database managers tend to offer more design options than a decorator supply house, allowing you to choose fonts and styles, draw lines and boxes, and add graphics, such as company logos. Many database managers also let you view and enter data in row-and-column format.

Different Fields for Different Yields

Database managers provide different types of fields for different kinds of information. All data managers offer two basic types. *Text fields* hold letters, numbers, and any other keyboard character. *Number fields* hold numeric values—an employee's hourly wage in a personnel database, or a balance-due value in an accounting database.

Most data managers provide additional field types. *Date fields* hold only date values. *Picture fields* hold graphics that you paste in from the Clipboard. *Logical fields* hold only one of two values: yes or no. For instance, you might create a logical field called Past Due, which would indicate whether a client's account was paid up. *Formula fields* obtain their values not from the keyboard, but by processing values in other fields according to a formula you specify. One typical formula field is a Gross Pay field that multiplies the value in an Hours Worked field by that of an Hourly Wage field.

One way to improve your accuracy in data entry is to use a program that lets you assign *range checking* values to fields. You might specify, for example, that an error message be displayed if someone enters six digits in a Zip Code field. If your company opened in 1985, you could tell the data manager to reject employee hire dates earlier than January 1, 1985.

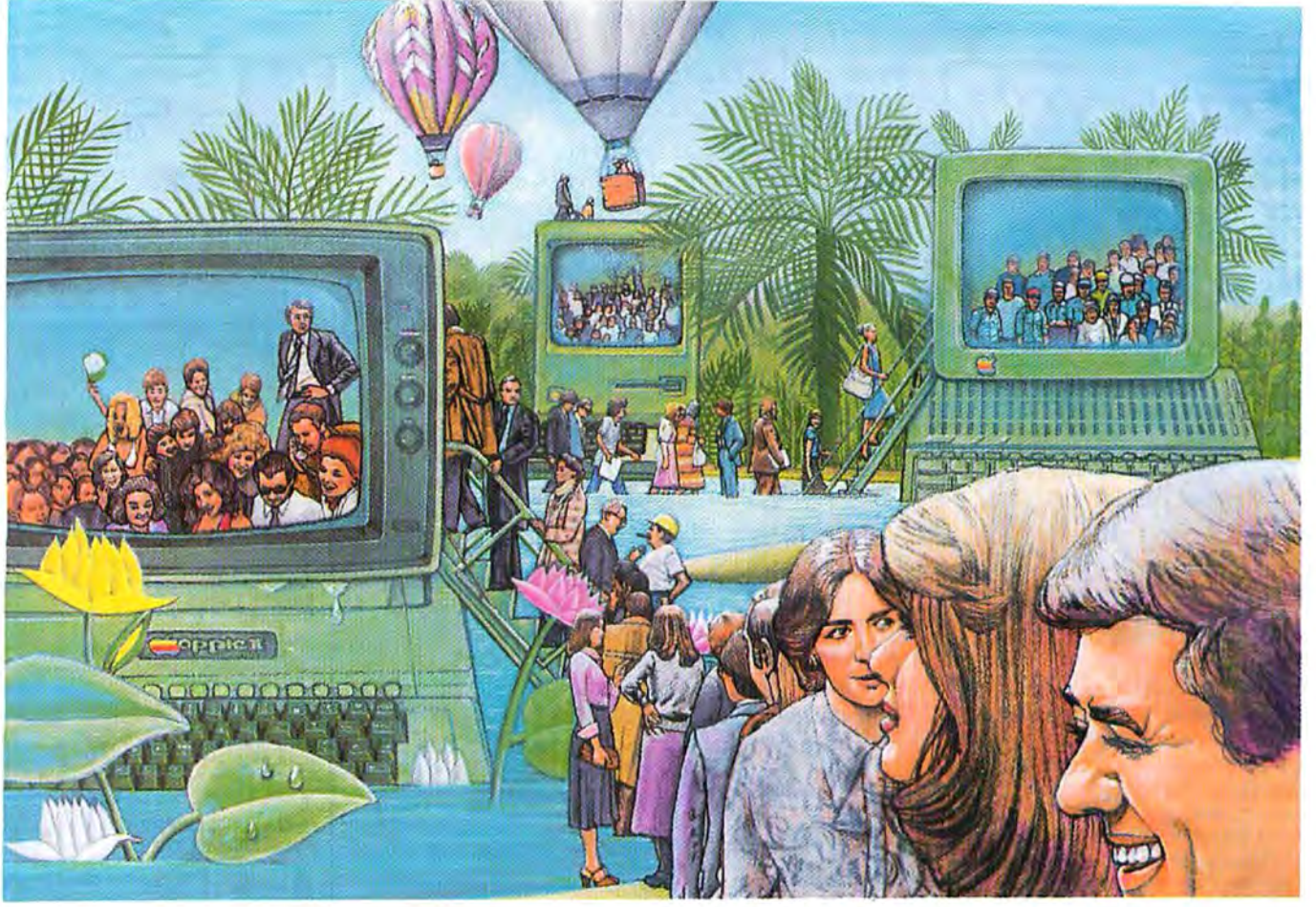
If text fields can hold any character, why are there special fields for numbers, dates, and yes or no values? One reason is to guard against inaccuracy. Most database managers won't let you store a text value in a number field, and would, therefore, thwart someone typing a lowercase *l* for the number *1*, or an uppercase *O* for a zero. Similarly, a program that provides date fields rejects entries that aren't valid dates.

Some programs, such as *dBaseMac* and *OverVue,* offer data-entry shortcuts that cut down the amount of typing you need to do for some fields, thereby reducing the chance for error.

A Sorted Tale

Using appropriate fields is also important when it comes to sorting data. Say you want to sort an employee database according to each employee's date of birth. If you stored the birthdate values in a text field, your database manager would place values beginning with December ahead of those beginning with September, because *D* pre-

(continues)



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cedes *S*. When you use a date field, however, the program recognizes that September precedes December, and sorts your records accurately.

A database manager's ability to sort information in alphabetic or numeric order makes your data more useful by letting you look at it from different perspectives. In a personnel database, you can view a list of employees sorted according to salaries, date of hire, or number of sick days taken. You can view a database of videotapes according to title, star, running time, or genre.

But what if you want to view an employee list organized by salary within each department, or an alphabetized list of horror movies presented in the order they were made? That's where *sorting levels* come in. Most database managers let you sort data according to multiple levels: last name, then first name; last name, then first name, according to hire dates, according to department; last name, then first name, according to age group and income, sorted by city. Multiple sorting levels multiply the angles from which you can view your data.

Golden Retrievers

Unlike the file cabinets I have known, a database manager doesn't teleport information it receives into the Twilight Zone. When you want to find something, you can do so in a few ways. The simplest is *browsing:* moving from one record to the next, either to view the records you just sorted, or to admire how much better they look on a screen than in a box of index cards. When you locate the record you want, you can alter it or just move on to the next.

When you're looking for something specific instead of just browsing, you use what are called *search specifications* or *search criteria,* phrases that tell your database manager what to look for. A search can be simple ("find Dave Byrd's record"), complex ("find all male employees in accounting earning more than $35,000"), or downright impossible ("find all Mets fans in Boston").

When you perform a complex search, you use *search operators,* characters like the greater-than and less-than signs (> and <), to find entries above or below a certain value. You also use the *logical operators* AND, OR, and NOT to combine search criteria. In the complex search example above, the logical AND appears twice: "find all employees whose Sex field is male

(continues)

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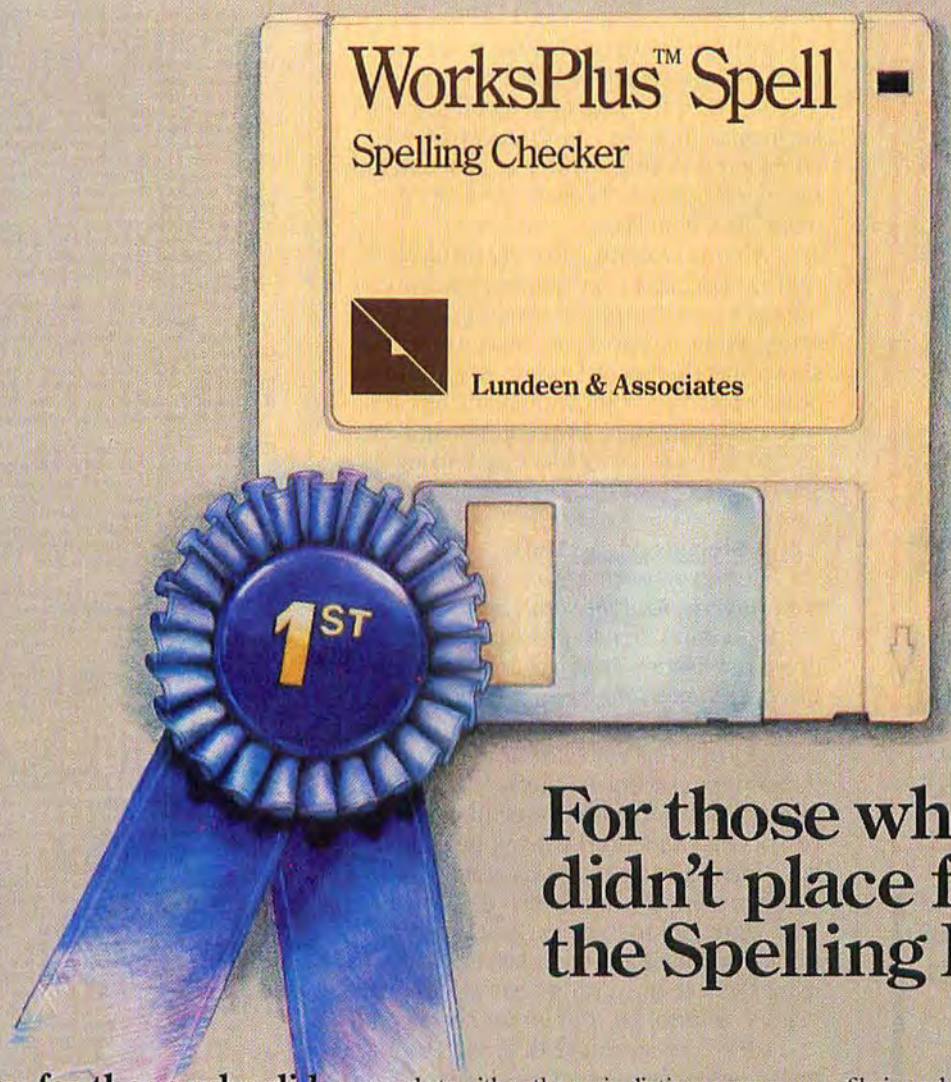

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AND whose Department field is accounting AND whose Salary field is greater than 35,000." With the logical AND, all the criteria must be true for a given record to be considered "found." With a logical OR, only one need be true: "find all clients in Minneapolis OR St. Paul."

All this searching usually results in a *report,* a printed copy of the records meeting your search criteria, sorted in a specific order. While a report can be a form that shows just one record, it's more typically a *columnar report* showing many records, with each field in its own column and each record in its own row, like baseball team standings or stock exchange tables.

A Merger of the Mails

Between hosting *Star Search* and haunting the *Tonight Show,* how does Ed McMahon find time to personally address those publisher's giveaway mailings? He's discovered *mail merge,* a variation on the reporting theme that involves merging a stock form letter with a database to produce "personal" form letters. Mail merge is often performed with powerful word processors like *Microsoft Word,* but a database manager that lets you create lengthy text items on a form can also do the job.

With mail merge, you first type the stock portion of a letter, inserting field names where the custom text will appear. Using *conditional statements* such as IF ... THEN, you can create different letters based on information in the database, congratulating clients with paid-up accounts, or telling clients whose accounts are overdue to reach for their checkbooks.

Let's Get Relational

When searching for a database manager, you'll run head-on into the brick wall known as *relational* database management. Though the term causes great confusion, the difference between the two types of databases is actually simple. The type I've discussed so far is the *single-file* database, where one file contains all the fields and records in the database. A relational database, however, comprises two or more files linked by the database manager to allow one file to access data in the others. It also provides the most headaches for newcomers to data management.

Unlike a single-file database, a relational database isn't easily compared to a real object like an index-card file. If you close your eyes and pretend, you can com-

(continues)

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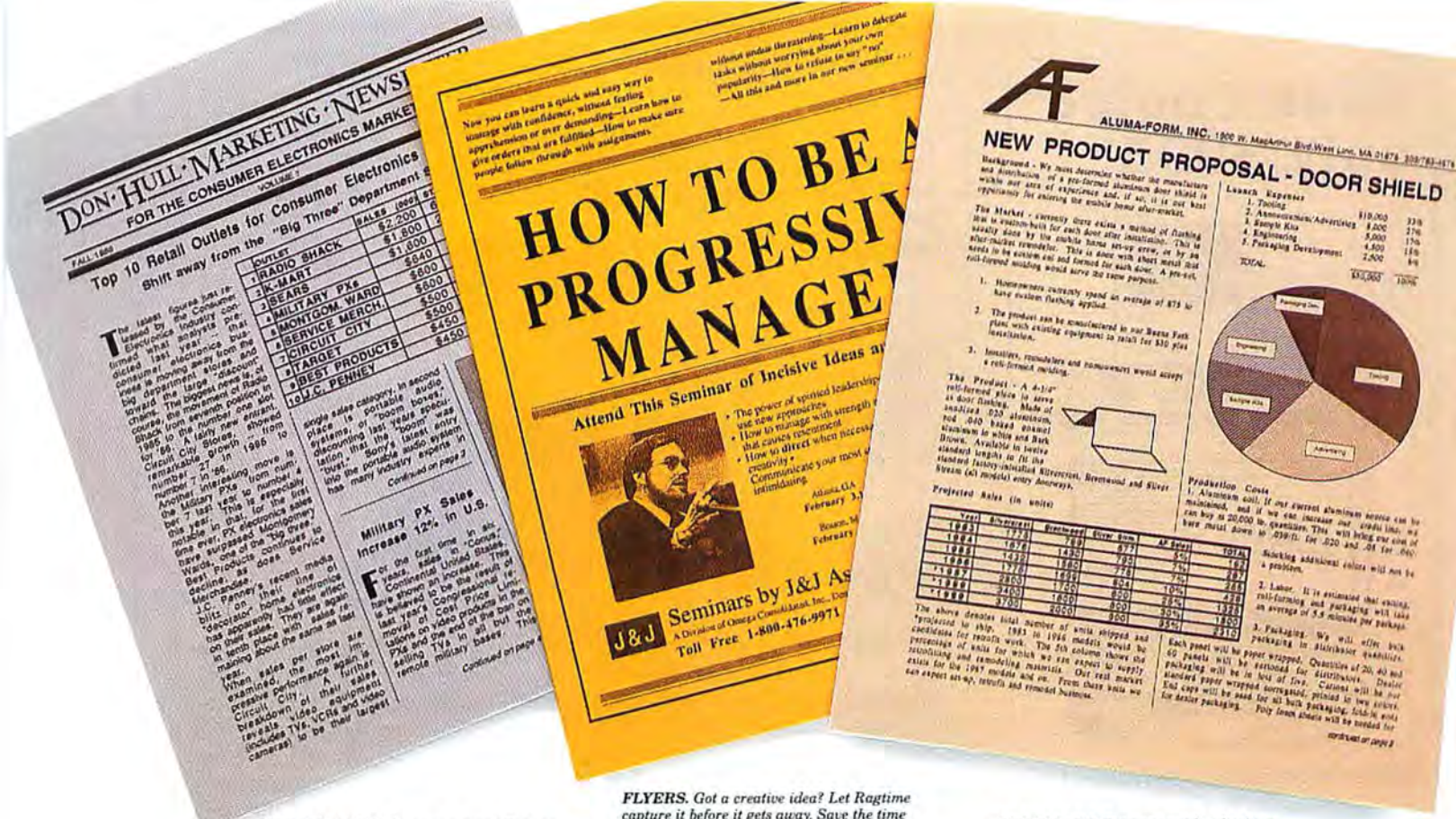

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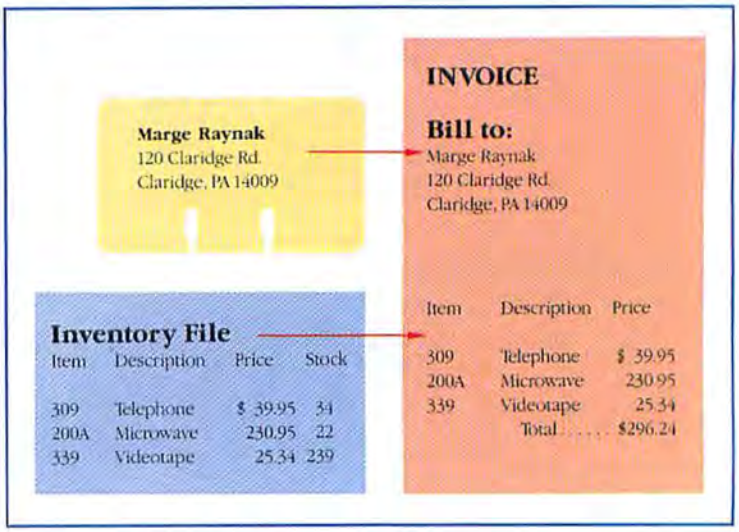
When Files Relate
Relational database managers combine data from more than one file. Here, an address from a client address file is combined with product information from an inventory file to produce an invoice. The invoice total can be generated by a formula field.



pare it to a cross-referenced filing system. In such a system, an employee's personnel entry might say "see the payroll file for this employee's salary history." In the payroll file, each employee's salary history could be accompanied by a note saying "see the personnel files for this employee's address and Social Security number." By cross-referencing the two files, you eliminate the need to store each employee's address and Social Security number in the payroll file and the need to store payroll information along with the personnel history (see "When Files Relate"). Elimination of redundancy is a relational database's strong suit.

Another relational-database plus is that cross-referencing is automatic. An employee's address and Social Security number can appear on screen next to his or her payroll information. When employees leave, you can expunge all references to them by deleting their records in just one file.

But these strengths don't mean that every data-management task demands a relational program. Unfortunately, there is no sharp boundary separating single-file applications from multifile applications, so deciding when to make that leap can be difficult. As a rule, consider a relational data manager, such as *Reflex* or *dBaseMac,* when the data you're storing could be used in more than one way, or when you find that you're entering the same information in separate files.

At the head of the relational data management class are *applications generators,* programs that enable you to create data-management applications tailored for specific tasks such as inventory management or client billing. Such applications, often custom designed for a single company, allow people who don't need to understand the technicalities of data management or file structures to use the information on the database. With an application generator, someone sets up the needed file structures, relationships, range-checking routines, and search-and-sort specifications, and then ties them all together with (ideally) self-explanatory pull-down menus and dialog boxes. The advantage: anyone can use the application immediately, without having to master the data manager. The drawback: a change in reporting needs or business practices requires that the application be modifed, and that could bring work to a halt while the changes are made.

Variations on the Theme

Every database manager handles the details of field formatting and range checking in its own way, but most work within the standard framework of fields and records. There are some interesting exceptions. Forethought's *Fact Finder* is a free-form data manager that lets you store large chunks of text and search for particular entries according to *keywords* that you specify. *Fact Finder* isn't for traditional filing chores, but it's ideal for managing research notes, article abstracts, and other text-oriented databases.

Another filer with a twist is Symmetry Corporation's *PictureBase,* an "art manager" that can keep track of a library of *MacPaint* pictures. You assign keywords to pictures—Outdoor Scenes, Company Symbols, and so on—to use for searching (see *Macware Reviews, Macworld,* July 1986).

(continues)

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Helix	Odesta Corp.	800/323-5423 312/498-5615	$175
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Database Records
A listing of some representative database managers from each class. This isn't a complete list, nor does it imply that a product listed in one class isn't appropriate for a different task. Helix, Reflect, *and* dBASE Mac, *for example, both have powerful forms-layout features.*

Before shopping for a database manager, first assess the way you work with information now, and then try to find the program that will make the transition to electronic filing as smooth as possible. If you need to create data entry forms that resemble their paper counterparts, you'll need a program with complete form-layout features. For complex accounting or inventory applications, a relational program is in order. For maintaining a mailing list, a simple filer is all you need. To find out which programs suit which tasks, see "The Database Shopper," *Macworld,* August 1986. Here, "Database Records" lists some popular database managers.

A database manager can streamline your filing, provided you realize it isn't a surefire cure for disorganization. If you learned filing from Oscar Madison, that slob's slob of a sportswriter from the *Odd Couple,* your records will be as disorganized electronically as they were on paper.

And some tasks are better handled on paper. Flipping through Rolodex cards is still faster than typing search criteria. And until the Mac has a sauce-proof keyboard, recipes belong in card files and cookbooks. Don't try to shoehorn the computer into areas of your filing life that work efficiently now. Even Oscar Madison always knows which dirty sock holds the witty, poignant conclusion he planned to tack onto his next column.

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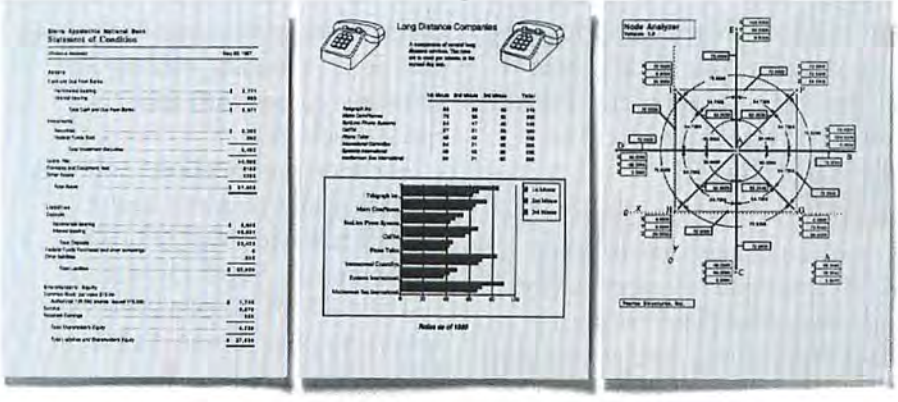

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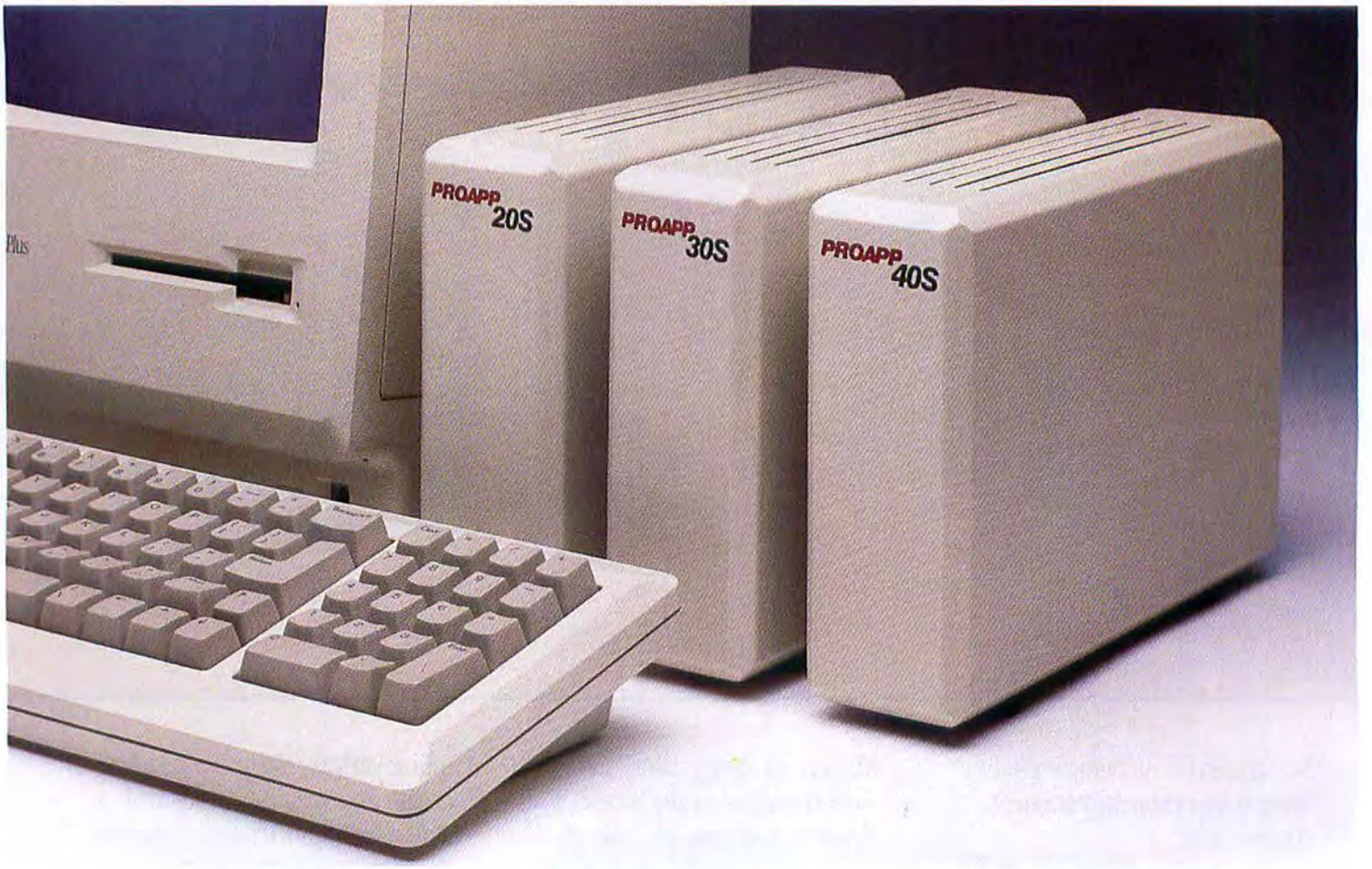

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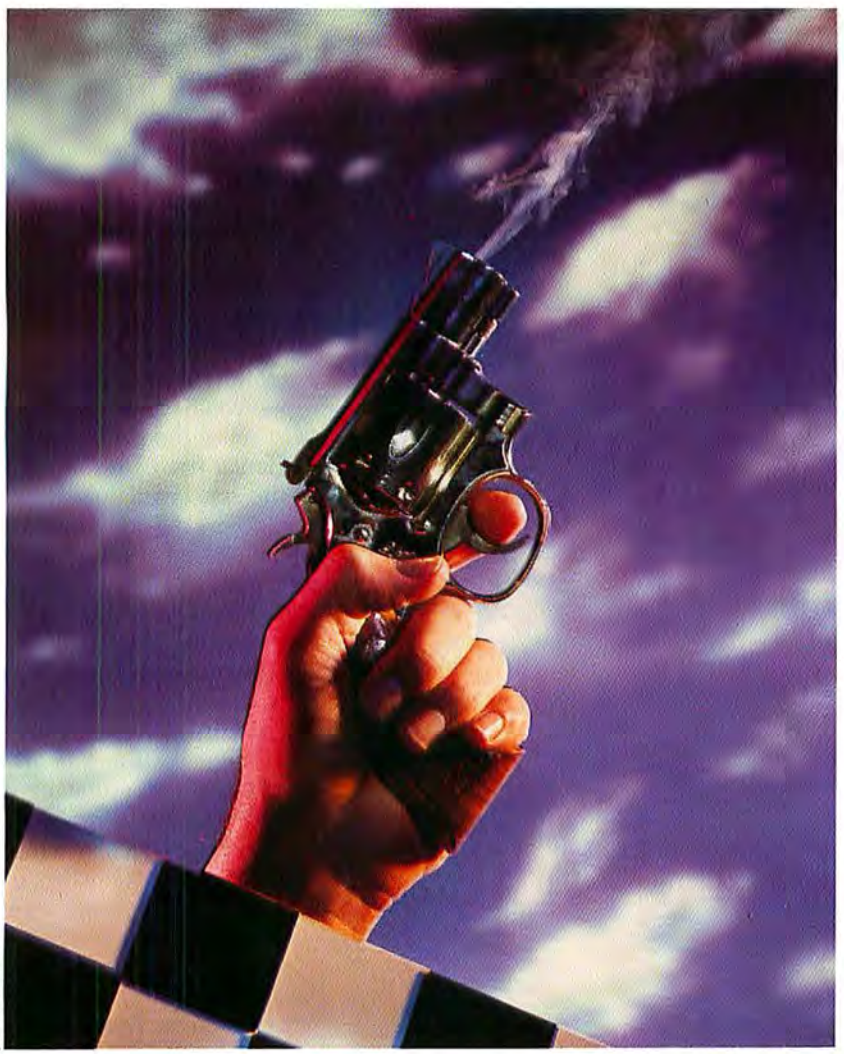
Pick up the pace of your page layout with tips on version 3.0

by Charles Seiter and Kevin Rardin



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The name *ReadySetGo* version 3.0 is misleading—it resembles earlier *RSG* versions less than *MockWrite* does *Microsoft Word* 3.0. More than a dozen new page-layout features, a simple but capable text editor, direct import of graphics, and PostScript control add so much that version 3.0 is virtually a new program. The new features are fast and powerful, but not quite exhaustively explained in the 60-page magazine-format *RSG* 3.0 manual.

The following tips refer exclusively to 3.0 features, since these take *ReadySetGo* far beyond its earlier capabilities. The tips have been collected from a variety of sources, from people working on simple three-fold brochure layouts to designers tackling 300-page books. Lisa Grey at Manhattan Graphics (developer of the program now marketed by Letraset) deserves special mention for the expert advice on *RSG* she lent to this article, and thanks also to Robert Cowart, author of *Microsoft Works for the PC,* for valuable tips.

Spellbound

The spelling checker built into *RSG* 3.0 begins at the insertion point (the I-beam) and works forward through the text. Thus if you are adding pieces of text to the end of a long document—assembling a book chapter by chapter, for example—you can check spelling on new parts as they are added, without wasting time rechecking spelling in the earlier parts of the document.

Last-Minute Save

When you reopen an *RSG* 3.0 document saved from an earlier session, the document opens to the page where you

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last saved. If you save from page 48 of a 50-page document, you get to wait through 47 pages of scrolling before the program settles down to business. So before saving a document at the end of a work session, choose Go To Page # from the Special menu (or, on the selection bar at the bottom of the screen, click on the number of the page where you want to resume).

The First Shall Be Last

RSG 3.0 provides a useful facility for defining right- and left-side master pages. This allows you to format facing pages with running headers, for example. If you format a document with a cover page (defined as page 0) as the right-side master, however, *RSG* 3.0 makes every even-numbered page a cover. So for covers and other prefatory artwork, use the *last* pages of a document, which you may format independently without gumming up earlier pages. However, if you don't want page numbers and headers on front matter, turn off the Use Master option on the Special menu while working with those pages.

Making It Snappy, or Not

If you have defined master pages and must subsequently redefine the layout for a particular page, turn off the Snap To option on the Special menu and position headers and footers outside the grid blocks at the top and bottom of the page, but inside the page margin. By doing so, you'll avoid obliterating predefined running headers and footers when placing new text blocks near the top and bottom of the page.

It Figures

One of version 3.0's greatest strengths is its ability to flow text automatically around graphics inserted anywhere on a page. Arranging text around irregular shapes yields particularly striking effects. Select the picture block containing the graphic and toggle off the Run Around option (under Specifications in the Special menu). Place this picture block over the text you want to fit around it. Then create a text block, toggle on Run Around for the new block, and shape it to cover part of the picture. The idea is to protect the figure by papering it with empty text blocks, which will be transparent when printed to show the figure underneath. You may need an odd set of blocks to make an adequate, close-fitting cover for the picture. When

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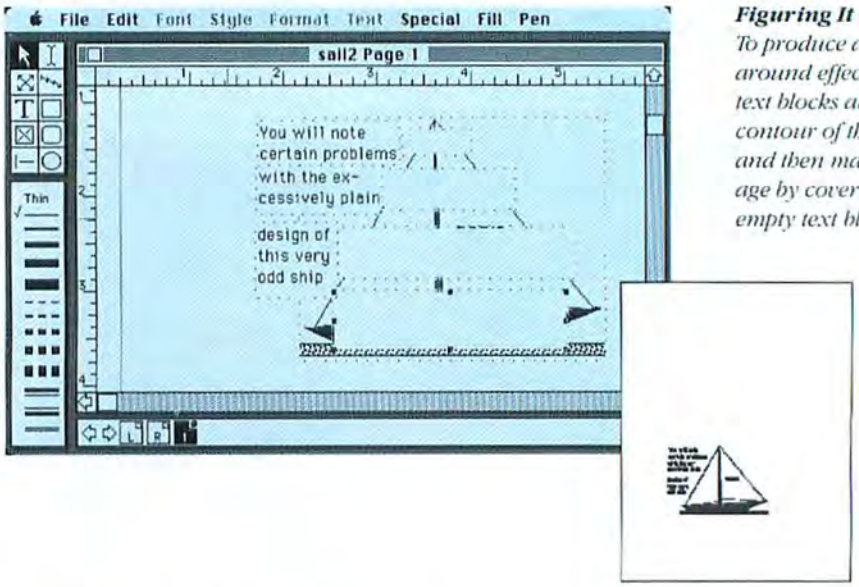

Figuring It Out
To produce a run-around effect, assemble text blocks along the contour of the image, and then mask the image by covering it with empty text blocks.

the page prints, the text in adjacent blocks prints right to the edges of the transparent text blocks, contouring around the picture (see "Figuring It Out").

RSGutters

One simple way to leave page gutters is to define left-side and right-side master pages with long, thin rectangles filled with white and inserted at the inside margin of each page. Just select the rectangle drawing tool, click and drag the appropriate rectangular gutter, select the solid white pattern from the Fill menu, and adjust your gutter rectangle's size (to .0001 inch, if you like) with Specifications from the Special menu. Another method is to define a long, narrow text-block gutter on the master pages—that way you can put dingbats or very small notices on selected pages.

You can also make gutters on the first page by defining a custom grid (changing the Inside or Outside spacing in Grid Setup under Design Grids). When you add subsequent pages using the Insert Pages command, the gutters alternate on even and odd pages. You can't put any text, pattern, or graphics in the gutter space (it's now defined as strictly off-limits), but it's an easy way to make gutters.

Through the Linking Tunnel

The linking tool connects text blocks so that text automatically flows across column and page boundaries throughout a document. Use it at the beginning of your page-layout session *before* you fill text blocks you want to link.

To link blocks in a continuous chain, click on the starting block, click each successive block, and then double-click in the ending block. Pay particular attention to the linking icon in the *RSG* toolbox. When you click on the starting block, the linking tool does not flash. When you click on successive blocks, the icon flashes once. When you double-click on the ending block, the linking icon flashes three times.

To insert a new block into an existing chain, click on the linked block immediately above where you want the addition and then click once on the new block. Finally, reselect the pointer tool, and the block goes into the existing chain. Unlink a block from a chain by a ⌘-click on the block. The rest of the chain relinks.

To insert a block before the first block, hold down the Option key, click on the original opening block and then on the new block, then release the Option key.

Everything Must Chain

Because linking is so important in *ReadySetGo* 3.0, think of the chain of blocks as the basic processing unit. The spelling checker and the text-editing functions all act as if the "document" on which they operate is the linked chain.

By using shift-click with the linking tool, you can chain a graphic block to a text block. This allows you text-editing flexibility for figure captions without fear of losing the captions when new text reflows through your document.

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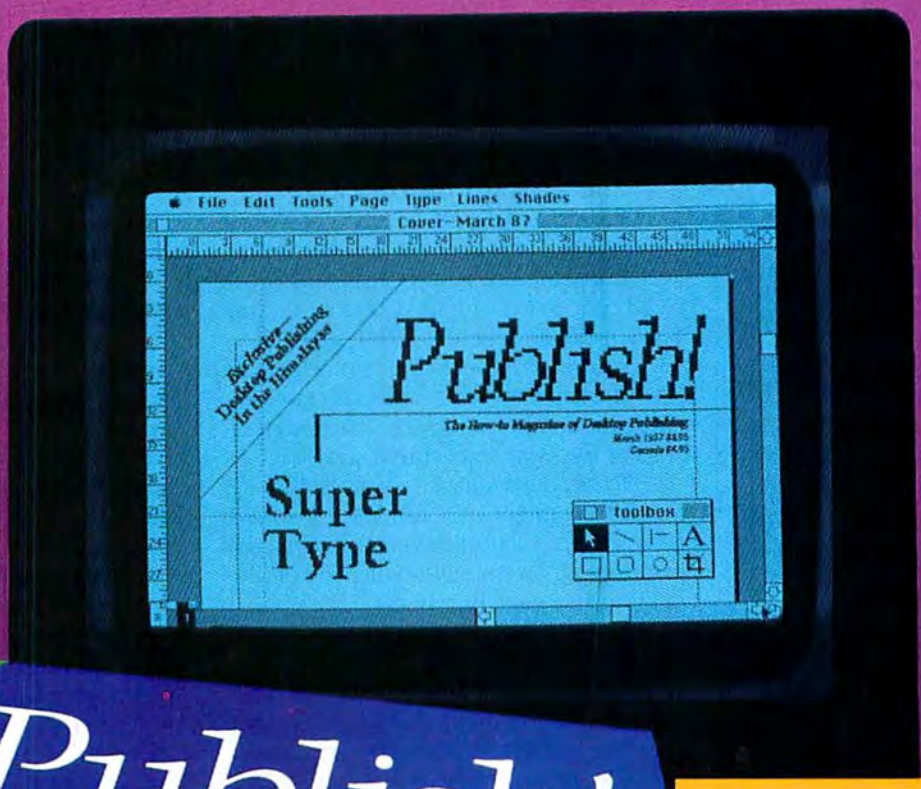

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Getting the Point about Picas

For most specifications in *RSG* 3.0, you should work with picas and points; typographers normally measure with these units instead of inches or centimenters. There are 6 picas per inch and 72 points per inch (12 points per pica). A good rule of thumb is to set your first few tabs at 1-pica increments and see how the page looks (in most typeset publications, a 1-pica paragraph indent is common).

RSG 3.0 automatically converts your input to correct pica/point notation. Enter 11.7 as a width specification and *RSG* displays it as 11.07; enter 10.14 and the program gives you 11.02.

The Narrow World of Tabs

Tabs in *ReadySetGo* 3.0 are powerful, but their use is perversely counter-intuitive and unlike tab use in any other Macintosh word processing or page-layout program. You specify an indent location for each tab–you can have as many as nine tabs per line in each text block–and each tab carries with it either an *RSG*-calculated measure or a specific measure you supply.

To tab out a table of contents, for example, you might want three left-justified tabs at 1-pica increments and a single right-justified tab on the right-hand side of the column (for page numbers).

To set these tabs on a text block 30 picas wide, you access the Tabs dialog box, type 1 into the first indent block, 2 in the second, and 3 in the third box. Leave the measure box blank. The program calculates the measure from the right margin of the page, so that a tab set at 1 pica with no measure on a 30-pica page actually occurs 29 picas from the right margin. The second tab in this example is set at 28 picas, and so forth. If you type a line more than 28 picas long after this second tab, it will wrap around.

To set the final right-aligned page-number tab, type in 29 in the fourth box and click the R button. Then toggle on the four tab buttons to set the proper indents and tabs for the table of contents (see "Tabs Lineup").

Tabs in *RSG* 3.0 are actually tab *columns,* with the measure specifying the width of the tab column. Within the tab column, tabs can be set normally to left, right, center, or justified. This feature is handy for setting up columnar data, such as lists of numbers pulled from a spreadsheet.

Tabs Lineup

The tab settings in this dialog box set up a table of contents 30 picas wide with left-justified tabs for headings indented 1, 2, and 3 picas, and a right-justified tab for the page numbers at the right margin.

Kerning for Beginners

Kerning allows you to adjust the space between two characters. This capability is common in professional typesetting systems, but *ReadySetGo* 3.0 was the first desktop publishing program to make it available to the Mac. Kerning, especially in headlines, makes the difference between amateurish and professional-looking material (think of the word *Waves* in a headline).

RSG 3.0 allows you to kern an entire block of text or a single paragraph, but kerning a multipage text block can take an incredibly long time and may crash your system. Instead, kern short, paragraph-length text sections one at a time. And be selective; with most plain text fonts, there's not much to kern.

More to the point, you can select (by dragging) any pair of characters and manually kern them for optimum aesthetics. On a Mac Plus, use ⌘-Arrow Left to bring characters closer together and ⌘-Arrow Right to spread them apart. On a 512K Mac, you can kern directly in points, pushing letters together with the Kern option and separating them with Letterspace.

Beware: you can kern letter pairs into oblivion, squeezing them together so completely that they can no longer be Letterspaced apart, leaving only the leftmost character visible. In this case, you will have to cut the damaged section and enter the text again.

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How Do They Do That?

Using the Format menu to kern paragraph-length sections of text tells the program to use the "available kerning pairs." But, you may ask, where are these kerning pairs? They are built into the FOND (font directory) resource for Macintosh fonts, which contains character-width and kerning-pair information for each LaserWriter font. FOND automatically loads into the System file when you use Font DA/Mover version 3.2 or later to install a LaserWriter font on your Macintosh. You must be using System 3.2 and Finder 5.3 or later for the FOND resource to operate correctly.

Makers of LaserWriter fonts—such as Adobe Systems, Allotype Typographics, CasadyWare, Century Software, and Image Club—build the FOND resource into the screen font versions of their typefaces, which are loaded into the System file at the time of installation (see "Font Facts," *MacWorld,* February 1987, for a discussion of laser fonts). This kerning-pair information properly sets the type to be as legible and readable as possible for printing on a LaserWriter.

More Fun with Fonts

You can include many fonts on a single *ReadySetGo* 3.0 page. Keep in mind, though, that the more downloadable fonts you use, the longer it takes the LaserWriter or LaserWriter Plus to print the page. Publications with downloadable fonts print more quickly on the LaserWriter Plus than they do on the LaserWriter. However, if you plan to print an *RSG* 3.0 publication on a Linotype Linotronic 100 or 300 imagesetting device, watch the number of downloadable fonts you use. Practical experience dictates that you are limited to a maximum of three downloadable fonts per page. Remember that a roman face constitutes one font, an italic face is yet another, and bold italic a third—even if they're all Palatino.

Heads and Subheads

One of the keys to a polished look in your publications is maintaining consistent vertical spacing between section headlines and subheads and the text that sandwiches them. *RSG* 3.0's finest Snap To grid spacing is still too coarse to give you adequate control over vertical headline spacing. The solution? Keep all sections in the same text block with the space above and below heads preset by *RSG* linespacing or by carriage returns in the word processor.

Just like Starting Over

Suppose you have a long document and suddenly find you need to reformat the whole thing. Mercifully enough, for simple documents *RSG* 3.0 makes this easy. Define new left and right master pages and then choose Insert Pages from the Special menu. Pick the number of pages you need, select Duplicate Current Page, and toggle on the Global Link option. This creates a new set of empty pages in the new format, starting at page one, and flows all the old text onto these new pages. Then delete the now-empty pages in the old format left at the end of the document. □

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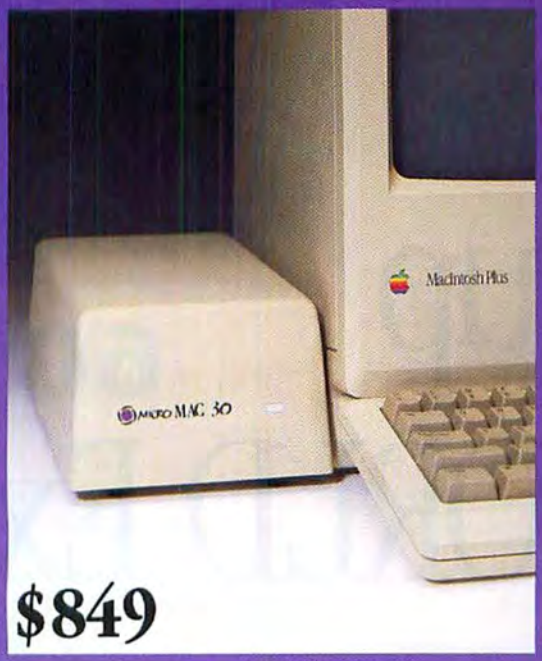

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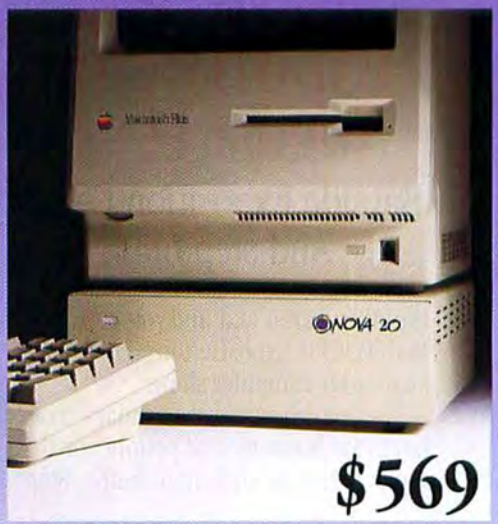

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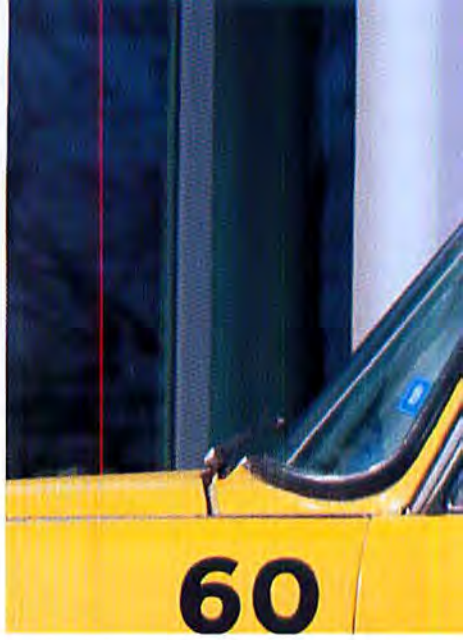

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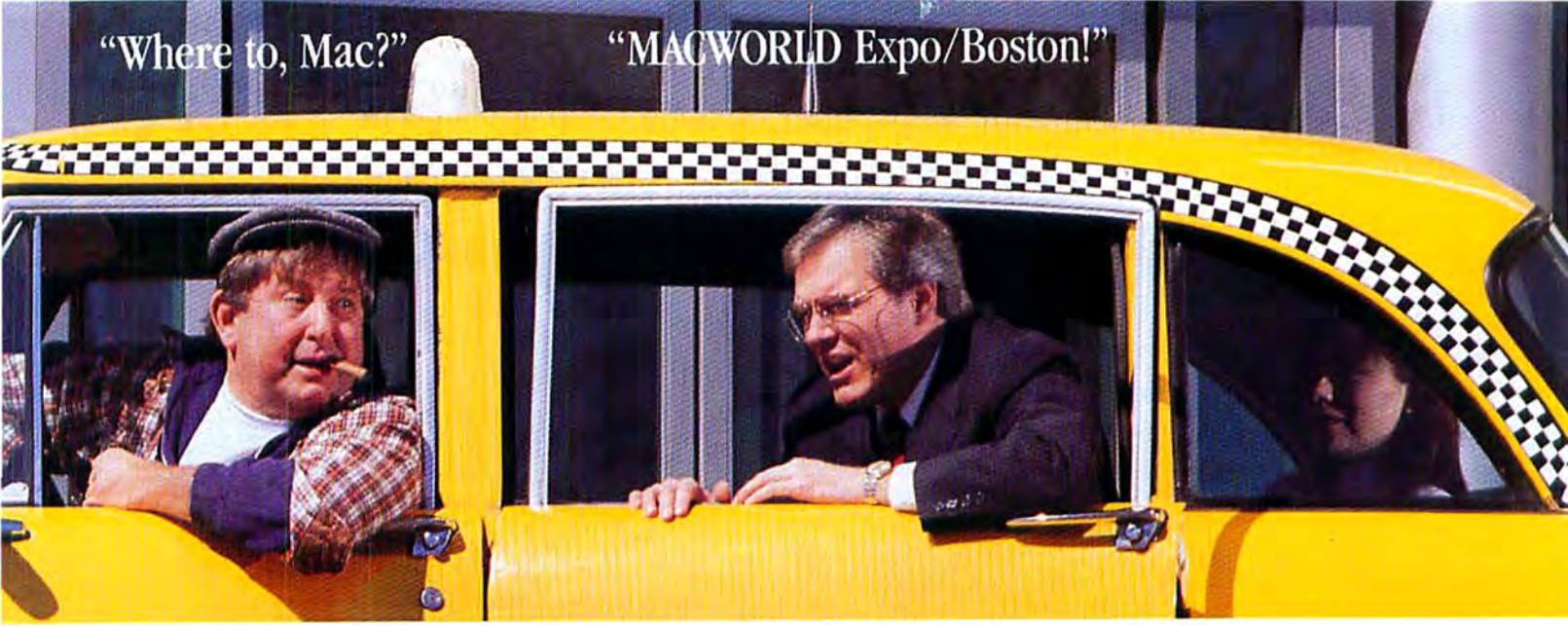

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Mac Publishing Tools

Avoiding pitfalls on the path from ImageWriter to LaserWriter

by Arthur Naiman

As of this writing, there are about 50,000 LaserWriters out in the world, and many other laser printers and typesetters that can also accept Macintosh output (because they use PostScript, Adobe's powerful page-description language). Using one of these PostScript devices can give your pages a professional look far beyond what's possible with typewriters and letter-quality printers.

Many of the people who use PostScript devices don't own one or even have constant access to one. They either pay for time on one at a copy shop or another retail outlet, borrow time on a friend's, or wait for a turn on a company laser printer. Their time on the device is limited and precious, so it makes sense to maximize it. This article describes a number of ways to do just that. (If you're lucky enough to own a LaserWriter or have access to one on a steady basis, see "LaserWriter Tips.")

The resolution of PostScript devices varies quite widely. Resolution (the fineness of an image) is measured in dots per inch (dpi), the number of dots in a line one inch long. But since printed images are two-dimensional, comparing dots per square inch (dpsi or dpi^2) makes more sense if you really want to understand the effect of increasing resolution.

Before I talk about how to prepare for using a PostScript printer or typesetter, I'll describe how they differ in terms of dpi and dpsi, plus how those numbers compare to each other, so you can figure out which device you want to produce your final pages on.

SCOTT BALDWIN

Comparative Resolutions

Even at the low end, the LaserWriter and similar laser printers produce output that looks typeset to anyone but a graphics professional. At the high end is the Linotronic 300 typesetter; its capabilities put it far above the machines you'll find in the average type shop.

A normal text printout on the ImageWriter (from a word processing program like *MacWrite* or *Microsoft Word*) has 80 dpi across and 72 down; if you choose Tall Adjusted, you get 72 by 72. So the resolution of an ImageWriter printout varies from 5760 dpsi in a regular Tall printout to 5184 dpsi in a Tall Adjusted printout.

The LaserWriter and most other laser printers that use PostScript have a resolution of 300 dpi, which amounts to 90,000 dpsi—about 16 to 17 times that of the ImageWriter. But that's nothing compared to what conventional typesetting machines can do.

The 1270-dpi Linotronic 100, for example, has 1.6 million dpsi, about 18 times the resolution of a LaserWriter and almost 300 times the resolution of an ImageWriter. The 2540-dpi Linotronic 300 has 6.45 million dpsi, more than 70 times the resolution of a LaserWriter and well over 1000 times the resolution of an ImageWriter.

In my experience, a 300-dpi laser printer is good enough for most purposes. I produced a 432-page book on the LaserWriter and have shown it to literally hundreds of people, every one of whom (except, of course, those involved in printing or publishing) simply assumed it was produced on conventional typesetting equipment.

I'm not saying that that level of quality is good enough for every purpose; if you're producing a glossy graphics magazine and

(continues)

This article is adapted from *The Macintosh Bible* by Dale Coleman and Arthur Naiman, published by Goldstein & Blair, Box 7635, Berkeley, CA 94707 ($21 ppd).

printing it at a premier printer such as Dai Nippon, you'll want to go for the Linotronic 300. If you want something in the middle range (which is where most typesetting falls), the Linotronic 100 gives you a very professional job at a fraction of the usual cost.

Proofing before Printout

If you don't use a PostScript device for everyday printing, you're going to be proofing pages on an ImageWriter. Although that's not usually a problem, there can be some discrepancies in the output. That's because both the ImageWriter and the Mac's screen use QuickDraw routines to create their images, while the PostScript printer (naturally) uses PostScript.

Although a lot of brilliant programming has been done to allow QuickDraw and PostScript to talk to each other, what you see on the Mac's screen and on an ImageWriter will always vary somewhat from the output of a PostScript device.

This means there's no substitute for hard copies on a PostScript device. For example, if you're planning to do final output on a Linotronic, you definitely should proof your work on a LaserWriter, since its output is a lot closer to typeset material than the ImageWriter's output is. The resolution will be higher on the Linotronic, of course (that's why you're using it), but the position of all the elements, and the overall look of the page, will be the same.

There are exceptions to that rule. For example, the Linotronic can print all the way to the paper's edge (a width of either 8½ or 11 inches), while the LaserWriter can't print wider than 8 inches. In addition, the Linotronic doesn't smooth bit-mapped images. If you want the images smoothed, print them out on a LaserWriter and then manually paste them over the equivalent unsmoothed images in the Linotronic output.

Rent-a-Printer

If you don't know someone who owns a LaserWriter or another PostScript device, and you don't have access to one at work, you'll have to pay for time on one. This is usually pretty easy to do. Businesses are springing up all over, particularly in big cities and near universities, that let you come in with a Mac disk and print on a LaserWriter; a fair number also have other PostScript devices.

Renting time can be surprisingly inexpensive. For example, a number of places in Berkeley, California, charge just $5 an hour for LaserWriter use and only 15¢ to 20¢ a page. One place even gives you the first 25 copies free. Of course Berkeley is the home of the 2¢ photocopy—but wherever you live, you should be able to find access to a laser printer at a price you can afford.

If you can't find a place in the phone book, check with a local Macintosh user group; in fact, do that first—unlike the *Yellow Pages,* user groups can tell you which businesses know what they're doing, charge the least, and so on. If no user group in your area knows of a rental place, look into remote typesetting services; many of those services also provide LaserWriter output.

Preparing the Disks

Once you've found a LaserWriter to rent, you might as well format your documents and set up your disks ahead of time, to cut down on expenses.

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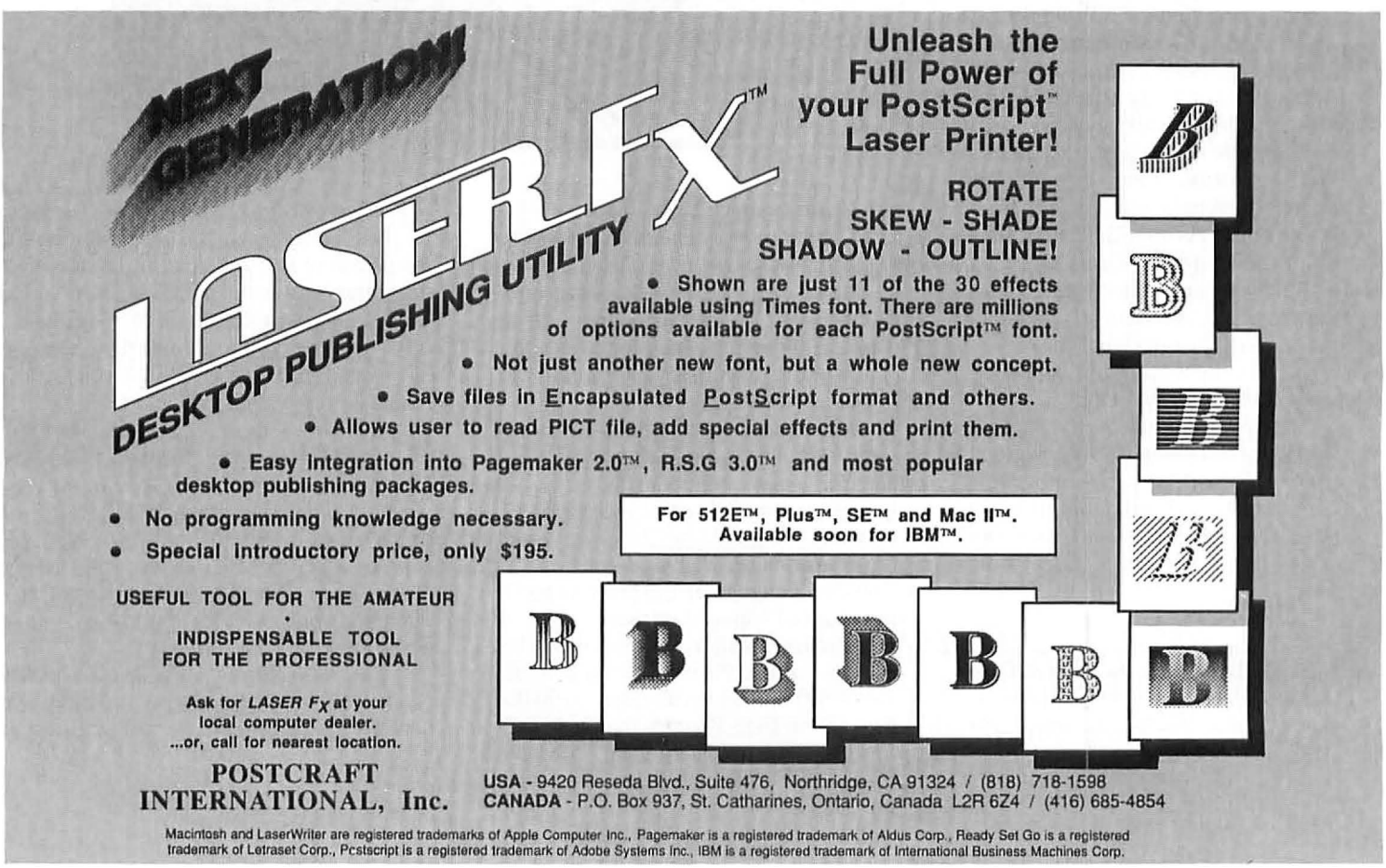

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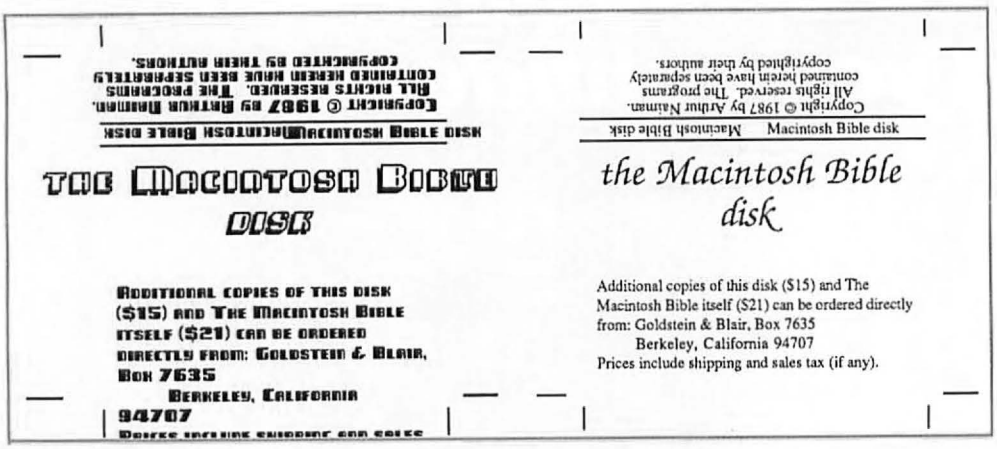

Font Switcheroo

Because MacDraw *identifies fonts by the order in which they were installed, printing with someone else's System disk can lead to surprising results.*

First, make sure the disk you bring with you contains the software you need; the rental place may not have the application you used to create your document or the same version of the application. The same goes for fonts. Call beforehand to make sure the shop has the right laser fonts installed on its printer; if not, be sure they're on your disk.

Remember that unlike ImageWriter fonts, laser fonts have two parts, a screen font that represents the font on the screen and a printer font file that supplies the PostScript instructions for producing the font on the printer or typesetter. You install the screen font in the System file with the Font/DA Mover just the way you do an Imagewriter font, and you simply place the printer font file in the System folder (except when using Adobe fonts, whose printer fonts must also be installed).

It's always a good idea to use your own System file, but if you're using *MacDraw,* it's a necessity. Amazingly, all versions of *MacDraw* up to 1.9 (the current version, as of this writing) recognize fonts by the order in which they were installed in the System file, not by their ID numbers or their location on the menu. Needless to say, the chance that both you and the copy shop installed the same fonts in the same order in your respective System files is about one in a trillion (see "Font Switcheroo"). (This is not a problem with *MacDraw* drawings once they've been pasted into documents created by other applications–as long as the same System was used to create those documents as was used to create the *MacDraw* drawings.)

Next, if you haven't already done so, change the fonts in your document to laser fonts. Then open Chooser (on the Apple menu) and select the LaserWriter icon. If you're using Chooser version 2.3 (or later) and System version 3.2 (or later), you can do this without having a LaserWriter actually attached to your system, as long as you have the LaserWriter file in your System Folder and have connected AppleTalk on the Control Panel. If you're using older System software that offers Choose Printer instead of Chooser, you can select "no

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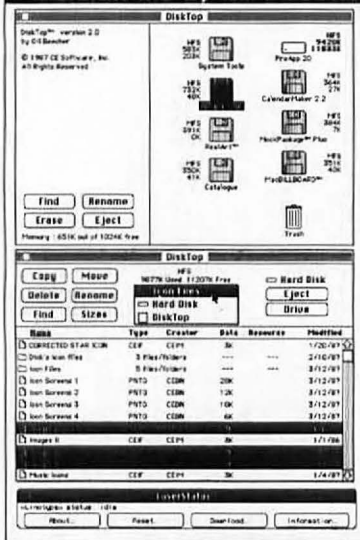

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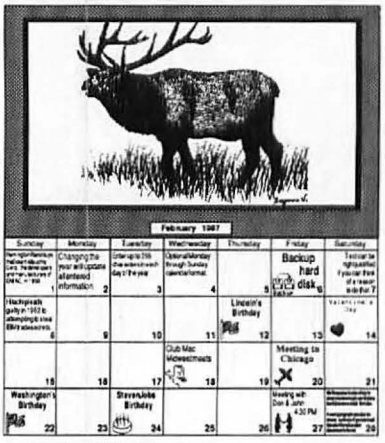

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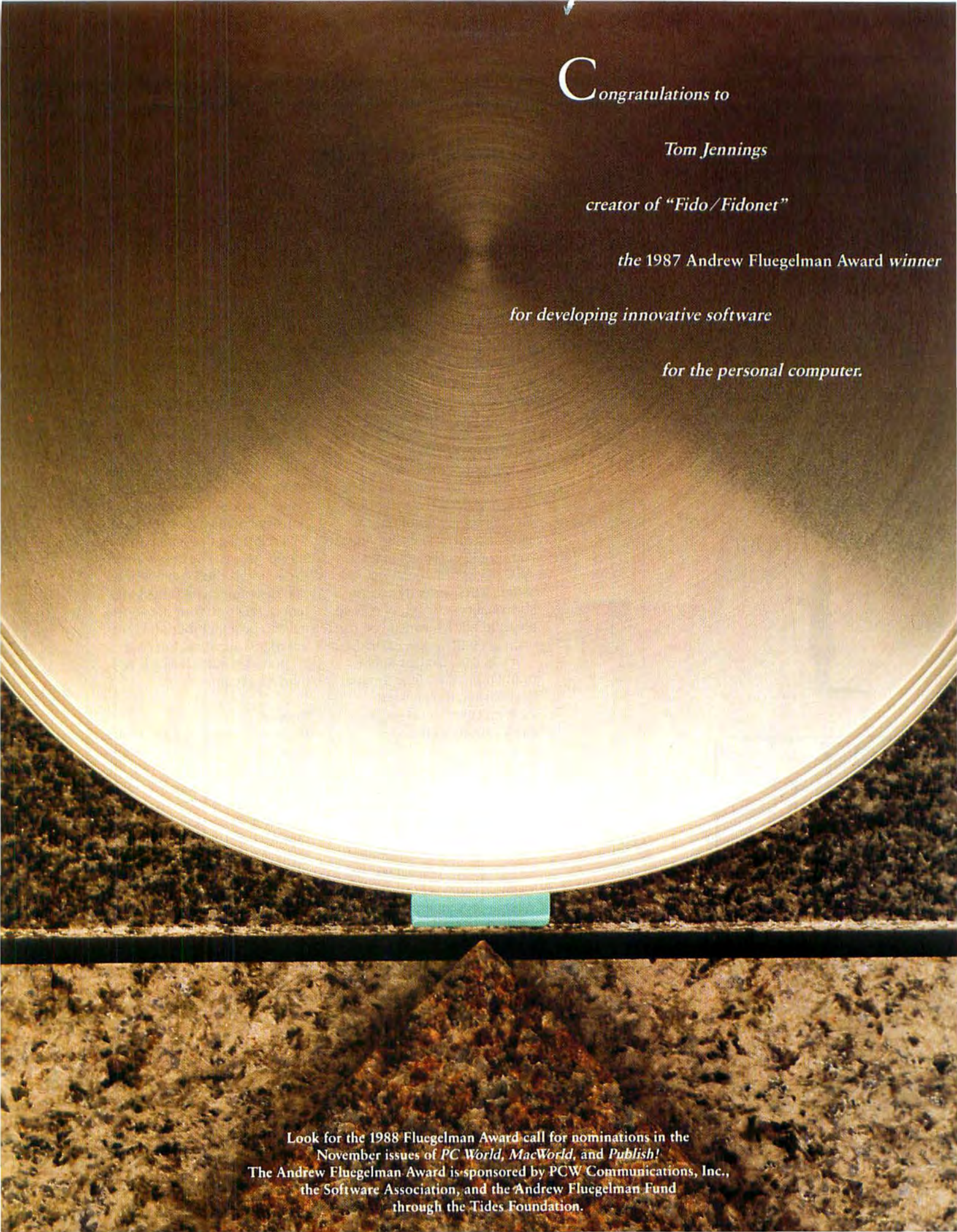
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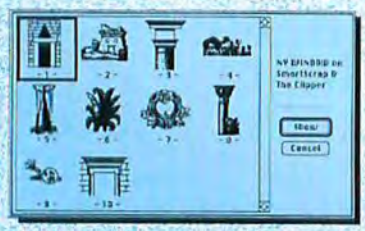

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LaserWriter Tips

If you're lucky enough to own a LaserWriter, you can try out these tips to help you make the most of it.

Toner
Before installing a new toner cartridge in a LaserWriter, rotate it gently from side to side—that is, lift the right side, then the left; it's roll you want, not yaw. If you don't do this, the images you get may not be dark enough. (You may also have to break in the cartridge by printing 30 pages or so.)

If you rock the cartridge whenever pages start to look light, and keep the print-density dial set low until the cartridge is really on its last legs, you should easily get at least 4000 pages from each cartridge, with perfectly acceptable quality—except, of course, for solid blacks, which you can't even get with a new cartridge.

If you can't find an Apple-brand toner cartridge for your LaserWriter, the Hewlett-Packard LaserJet cartridge works just as well.

Paper
Laser printers put images down on paper the same way photocopiers do, so the kind of paper specifically designed for use in copiers—often labeled *xerographic*—is what you want for the LaserWriter.

For a presentation, you'll naturally prefer a heavy, opaque paper. But for everyday use and for reproducing documents, choose the cheapest paper you can find. Here's why: when humidity is high, sheets of paper stick together, so paper manufacturers put powder, called *dusting*, between them. Generally, the more expensive a paper is, the more powder is used. Particles of powder may bond to the paper along with the image, producing a rough, uneven surface. So cheap paper, with little or no dusting, is best.

Avoid buying paper at $6 or $7 a ream (500 sheets) in stationery stores. Look for inexpensive copier paper for $2 to $3 a ream at a discount paper supply house. The best source I've found is the Costco wholesale discount chain (check the *Yellow Pages* in your area). You have to be a member and buy ten reams at a time, but plain 20-pound bond sells for less than $2 a ream.

Power
If you leave your Mac on all the time, why not the LaserWriter? Because it draws up to 760 watts, and at that rate it would cost you $25 to $100 a month—$300 to $1200 a year to run it 24 hours a day. (Granted, 760 watts is the LaserWriter's peak demand; it doesn't draw that much standing idle. But leaving it on continuously will still cost more than it's worth.)

printer" by clicking on the space just below the last printer listed. (But why would you be using out-of-date System software? The new stuff is free.)

Once you've selected the LaserWriter, go back into your application, open the Page Setup window (on the File menu), make any changes you want—or no changes—and click OK. It's very important not to skip this step, even if you make no changes; using Chooser alone is not enough to switch from one kind of printer to another.

Finally, go through your document to check format elements such as page breaks. ImageWriter page setup has different margins from LaserWriter page setup,

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Preface

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Marginal Printing

Pay attention to details when converting a document from ImageWriter format for the LaserWriter. In this example, the LaserWriter clipped the characters at the edges of the text because the maximum ImageWriter column width is too wide for the LaserWriter.

and there are other incompatibilities, so you may need to make adjustments. Once you've done that, you're ready for the LaserWriter.

Remote Typesetting by Disk

Let's say 300 dpi isn't good enough for you, but your budget's a little tight this month and you don't see how you can afford to buy that Linotronic you've had your eye on. (It probably wouldn't fit in the closet anyway.) Don't despair.

Many of the places that rent laser printers by the hour also rent time on PostScript typesetters, and there are several services that will accept your mailed or messengered Mac disks for printing on their own PostScript typesetters.

The cost for remote typesetting usually runs from $5 to $15 a page (some places also have a one-time registration charge of about $50). Many of these services let you send data via modem—although long documents can take forever.

Whether you send the document by phone or by mail, include a message detailing exactly what you want. (This is always a good idea, but it's an absolute necessity with *MacDraw*.)

One remote typesetting service I've had good luck with is the Macintosh Typesetting Club of Aptos, California. To find others, check with a local user group.

LaserWriter Specifics

Because the LaserWriter takes much longer to set up a page than to print it, you'll save a lot of time by asking for multiple copies of a document instead of reprinting it several times. (This is also true of other PostScript devices.)

For double-sided printing, note that the LaserWriter prints on the underside of sheets fed from the paper tray and on the upside of hand-fed sheets.

The maximum print area a LaserWriter can use on a standard U.S. letter-size sheet of paper (8½ by 11 inches) is 8 by 10.92 inches, centered on the page. The width limitation is the most significant; it means you must always have at least a ¼-inch margin on each side. (The required 1/10-inch top and bottom borders are, of course, trivial.)

What's more, few programs can fill the entire print area. *MacDraw*, for example, can only fill an area 7.68 wide by 10.16 high, and *MacWrite* requires a 1-inch left margin.

The print-area restriction is even more dramatic on legal-size paper (8½ by 14 inches). On this the LaserWriter can only fill an area 6.72 inches wide by 13 inches high, requiring margins of more than ⅞ inch on each side and ½-inch top and bottom borders. (Similar restrictions apply for the common European paper sizes, A4 and B5.)

The LaserWriter's memory is responsible for these limitations. Even though it has 1.5 megabytes of RAM, that's only enough to image 87 to 88 square inches per page (which translates into 8 by 10.92 inches or 6.72 by 13 inches). To really process a page adequately with PostScript, a printer ought to have at least 2MB of memory, and ideally, 2.5. Many other PostScript printers and typesetters do have that much memory, but the LaserWriter scrapes by with 1.5MB.

Remembering these size limitations is important when you're proofing something on the ImageWriter that you'll ultimately print on the LaserWriter. Because the ImageWriter can print across a wider area than the LaserWriter can, be sure your document has generous margins; otherwise your image will be cropped along the edges when you print it on the LaserWriter (see "Marginal Printing). □

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Radco & Associates/Fit to Print, 17746 W. Sierra Hwy., Canyon Country, CA 91351, 805/298-7251

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Micro Dynamics, Ltd., 8555 16th St. #802, Silver Spring, MD 20910, 800/634-7638, 301/589-6300

MacPalette

by Microspot prints multicolored graphics & text from most Macintosh software using the Imagewriter II. MacPalette will colorprint documents from *MacDraw, MacDraft, MiniCad, MacProject, MacWrite, JAZZ, Microsoft Chart, Word, Excel* etc. (not *MacPaint.*) It prints black as a true black instead of mixing a black. $69.

CompServCo, 800 Freedom, Slidell, LA 70458, 800/272-5533 or 504/649-0484

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LogiWorks is an interactive digital logic drawing and simulation package for the Macintosh. Features:

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Capilano Computing, 300-1120 Hamilton St., Vancouver, B.C., Canada, V6B 252 604/669-6343

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Phillips Software, 1633 Commonwealth Ave., West Newton, MA 02165, 617/332-1373

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Softflair, Inc., 2100 W. 53rd St., Minneapolis, MN 55419, 612/924-3404

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Allotype Typographics, 1600 Packard Rd. #5, Ann Arbor, MI 48104, 313/663-1989

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B. Knick Drafting, 313 Marlin Pl., Melbourne Beach, FL 32951, 305/727-8071

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The Mac Library, 17280 Newhope St. #4, Fountain Valley, CA 92708, 714/957-5767, 800/426-2777 (CA), 800/622-4774 (Nat'l)

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The Macworld Directory is a comprehensive listing, by category, of products and services available for the Apple Macintosh. It provides advertisers with a low-cost advertising alternative and our readers with an easy reference guide.

FORMAT: The standard format includes a product ID, a 300-character descriptive ad, and a company name, address, and telephone number.

Advertisers may choose among categories already in use, or they may create their own. Display advertisers can cross-reference their current ad to the Macworld Directory for increased exposure.

RATES: Listings are accepted for a three-time consecutive insertion at a rate of $775. We offer a six-time insertion at $1320 that reflects a 15% frequency discount. Listings must be prepaid (except for established display advertisers) upon submission of ad copy. Checks, money orders, Visa, and MasterCard are accepted.

DEADLINE: For copy deadlines and further information please contact Niki Stranz, your Macworld Directory Account Manager, at 415/546-7722 or 800/435-7766 (800/435-7760 in California). Please send copy and prepayment to the Macworld Directory, 501 Second St. #600, San Francisco, CA 94107.

Advertiser Index

Reader Service Number		Reader Service Number	
463	AST Research, Inc., 8-9	689	Megasoft, 200
622	Abaton, 24-25	97	Mesa Graphics, Inc., 202
552	Adobe Systems, Inc., 193	675	Meta Software, 94
678	Adobe Systems, Inc., 46-47	235	Micrographic Images, 60
317	Aegis Development, 178	—	Microsoft Corp., 54-55, 80-81
306	Aldus Corp., 20-21	470	Microtech Peripherals, Inc., 217
—	Apple Computer, Inc., 44, 50-51, 181	694	Migent, Inc., 215
490	Bede Tech, 200	713	Mindwork Software, 16-17
627	Bering Industries, Inc., 106	40	Mirror Technologies, Inc., 39, 41
373	Best Computer Supplies, 183	230	Moneysworth, 58-59
578	Bible Research Systems, 182	633	Nantucket Corp., 74
716	Bootwear Software Co., 26	727	Network Specialties, 216
381	Borland, Intl., IFC-1	718	Open Mac Enterprises, 198
604	CE Software, 224	575	Orange Micro, Inc., 202-203
657	CMS Enhancements, Inc., 40	541	Owl Int'l., Inc., 34
—	CasadyWare, 56	45	PC Network, 72-73
607	Central Point Software, 22	450	Panamax, 242
175	Central Point Software, 23	—	Performance Electronics Packaging Services, 241
524	Centram, 184-185	304	Peripherals Computers & Supplies, Inc., 96
723	Co-Du-Co, 237	223	Personal Computer Peripherals Corp., 220
458	CompServCo, 82	560	Personal Training Systems, 214
330	CompuServe, 199	724	Postcraft, Int'l., Inc., 222
620	Computer Cover Co., 206	211	Practical Computer Applications, 48
722	Computer Expressions, 205	631	Precision Data Products, 200
271	Computer Friends, 6	194	Programs Plus, Inc., 92-93
717	Compututor, 243	334	Public Domain Exchange, The, 227
611	Coral Software, 211	577	Radius, Inc., 10-11
684	Cricket Software, 189	630	SBT Corp., 62
685	Cricket Software, 191	693	Safeware, 243
710	Cutting Edge, Inc., 192	—	Satori Software, 170
615	DEST Corp., 195	—	ScanCoFurn, 71
662	Data Tailor, Inc., 207	266	Silicon Beach Software, 61, 63, 65
281	DataViz, Inc., 70	640	SoftStyle, 104
637	Datacopy, 177	—	Software Library, 88
634	Diehl Graphsoft, Inc., 240	715	Solutions, Int'l., 226
562	Diskette Connection, 210	721	Spectrum Digital Systems, 174
600	E-Machines, Inc., 98	225	StatSoft, 194
602	Ehman Engineering, Inc., 102	618	Sun Remarketing, 204
674	Enchanted Software, Inc., 175	—	SuperMac Technology, 49, 52
676	Ergotron, Inc., 96, 182	711	Systematics General Corp., 83
683	Firebird Licenses, Inc., 108	639	T.B.S.P., Inc., 190
522	1st Aid Software, Inc., 194	332	T/Maker Co., 30
144	Forethought, Inc., 186	659	Target Software, 110
289	Forethought, Inc., 42-43	660	Target Software, 66-69
143	General Computer, 27-29	719	Target Software, 79
682	Greene, Inc., 56	643	Think Technologies, Inc., 7
530	I/O Design, 78	712	3M, 168-169
272	Icon Review, 84-87	167	Thunderware, 179
208	Ideaform, 202	469	True Basic, Inc., 53
249	Infosphere, IBC	483	Tussey Computer Products, 89
589	Internet, 38	134	USA-Flex, 212
728	JVC Magnetics Co. Ltd., 223	537	Uptime, 5
570	Jasmine Computer Systems, 76-77	459	Vision Technologies, 90
11	Kensington, 18, BC	729	Vivid Systems, Inc., 95
725	Kent Marsh Ltd., 240	439	Warp Nine Engineering, Inc., 36-37
658	Kroy, 196	714	Wenger Corp., 64
720	Laser Connection, The, 180	374	Williams & Macias, 188
664	LaserWare, Inc., 91	726	Zericon, 26
238	Layered, Inc., 172-173		
691	Linotype Co., 176		
—	Living Videotext, 12		
654	Logic Array, 208		
601	Lundeen & Associates, 201		
395	Mac Doctor Electronics, 33		
—	MacConnection, 112-115		
673	MacLine, 241		
1	MacMemory, 15		
368	MacRentals, 31		
16	MacStore, 242		
653	Macropac Int'l., 100		
—	Macworld Expo, 218-219		

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e. Professional
f. Reseller/VAR
g. Self-employed
h. Other

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2. 26-99
3. 100-499
4. 500-999
5. 1000 or more

3. Plan to buy:
a. Now
b. In 4-6 months
c. In 7-12 months
d. More than 12 months from now
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4. For how many personal computers do you buy products? (Include both company and personal units, please.)
1. 1
2. 2-4
3. 5-9
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5. How many of the above are Macintoshes?
a. 1
b. 2-4
c. 5-9
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1	2	3	4	5	6	7	8	9	10	11	12
13	14	15	16	17	18	19	20	21	22	23	24
25	26	27	28	29	30	31	32	33	34	35	36
37	38	39	40	41	42	43	44	45	46	47	48
49	50	51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70	71	72
73	74	75	76	77	78	79	80	81	82	83	84
85	86	87	88	89	90	91	92	93	94	95	96
97	98	99	100	101	102	103	104	105	106	107	108
109	110	111	112	113	114	115	116	117	118	119	120
121	122	123	124	125	126	127	128	129	130	131	132
133	134	135	136	137	138	139	140	141	142	143	144
145	146	147	148	149	150	151	152	153	154	155	156
157	158	159	160	161	162	163	164	165	166	167	168
169	170	171	172	173	174	175	176	177	178	179	180
181	182	183	184	185	186	187	188	189	190	191	192
193	194	195	196	197	198	199	200	201	202	203	204
205	206	207	208	209	210	211	212	213	214	215	216
217	218	219	220	221	222	223	224	225	226	227	228
229	230	231	232	233	234	235	236	237	238	239	240
241	242	243	244	245	246	247	248	249	250	251	252
253	254	255	256	257	258	259	260	261	262	263	264
265	266	267	268	269	270	271	272	273	274	275	276
277	278	279	280	281	282	283	284	285	286	287	288
289	290	291	292	293	294	295	296	297	298	299	300
301	302	303	304	305	306	307	308	309	310	311	312
313	314	315	316	317	318	319	320	321	322	323	324
325	326	327	328	329	330	331	332	333	334	335	336
337	338	339	340	341	342	343	344	345	346	347	348
349	350	351	352	353	354	355	356	357	358	359	360
361	362	363	364	365	366	367	368	369	370	371	372
373	374	375	376	377	378	379	380	381	382	383	384
385	386	387	388	389	390	391	392	393	394	395	396
397	398	399	400	401	402	403	404	405	406	407	408
409	410	411	412	413	414	415	416	417	418	419	420
421	422	423	424	425	426	427	428	429	430	431	432
433	434	435	436	437	438	439	440	441	442	443	444
445	446	447	448	449	450	451	452	453	454	455	456
457	458	459	460	461	462	463	464	465	466	467	468
469	470	471	472	473	474	475	476	477	478	479	480
481	482	483	484	485	486	487	488	489	490	491	492
493	494	495	496	497	498	499	500	501	502	503	504
505	506	507	508	509	510	511	512	513	514	515	516
517	518	519	520	521	522	523	524	525	526	527	528
529	530	531	532	533	534	535	536	537	538	539	540
541	542	543	544	545	546	547	548	549	550	551	552
553	554	555	556	557	558	559	560	561	562	563	564
565	566	567	568	569	570	571	572	573	574	575	576
577	578	579	580	581	582	583	584	585	586	587	588
589	590	591	592	593	594	595	596	597	598	599	600
601	602	603	604	605	606	607	608	609	610	611	612
613	614	615	616	617	618	619	620	621	622	623	624
625	626	627	628	629	630	631	632	633	634	635	636
637	638	639	640	641	642	643	644	645	646	647	648
649	650	651	652	653	654	655	656	657	658	659	660
661	662	663	664	665	666	667	668	669	670	671	672
673	674	675	676	677	678	679	680	681	682	683	684
685	686	687	688	689	690	691	692	693	694	695	696
697	698	699	700	701	702	703	704	705	706	707	708
709	710	711	712	713	714	715	716	717	718	719	720
721	722	723	724	725	726	727	728	729	730	731	732
733	734	735	736	737	738	739	740	741	742	743	744
745	746	747	748	749	750	751	752	753	754	755	756
757	758	759	760	761	762	763	764	765	766	767	768
769	770	771	772	773	774	775	776	777	778	779	780
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793	794	795	796	797	798	799	800	999			

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1. 25 or fewer
2. 26-99
3. 100-499
4. 500-999
5. 1000 or more

3. Plan to buy:
a. Now
b. In 4-6 months
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4. For how many personal computers do you buy products? (Include both company and personal units, please.)
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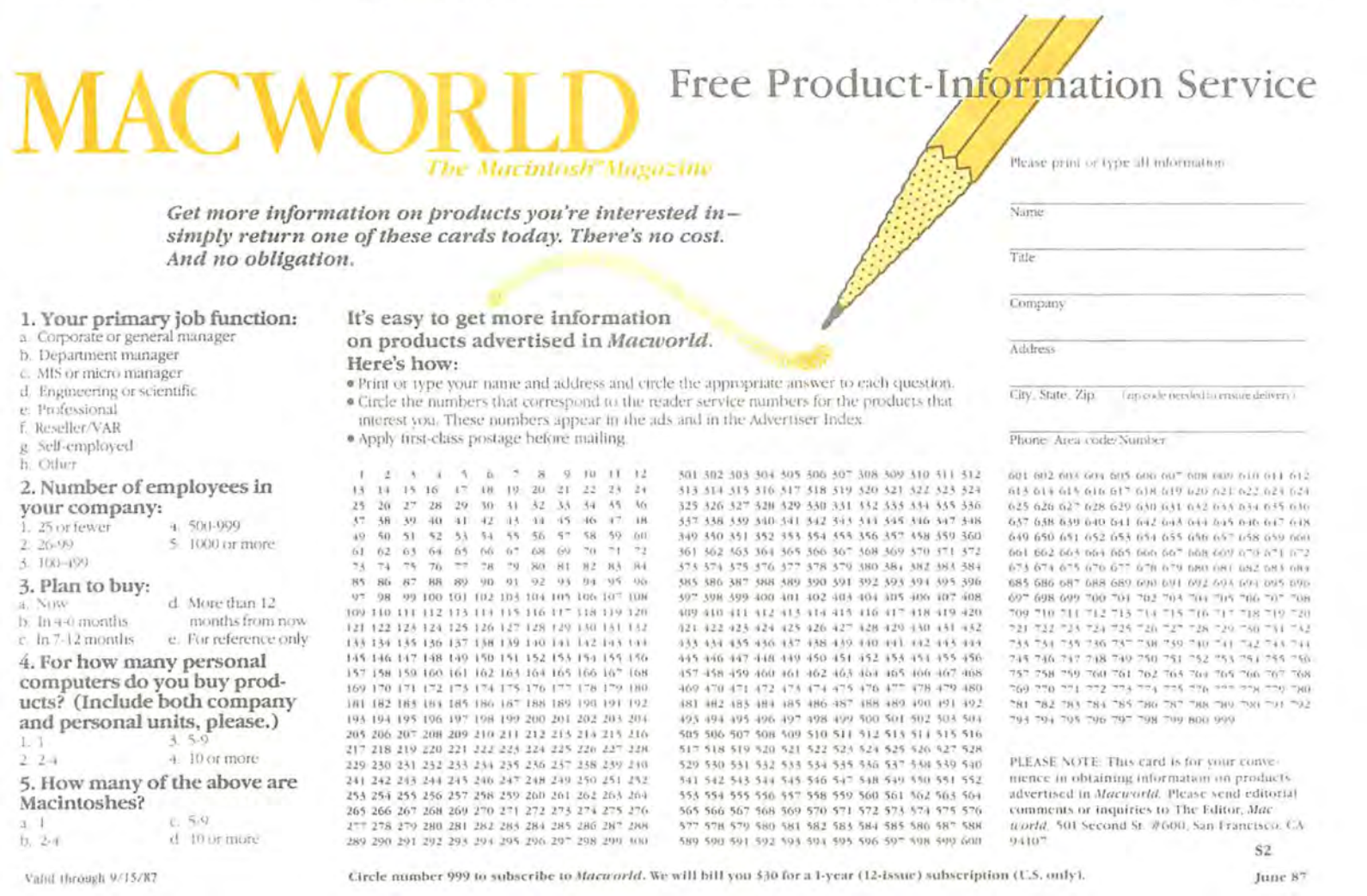

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Product Index

Reader Service Number

Software

Business

552 Adobe Systems, Inc., 193
678 Adobe Systems, Inc., 46-47
306 Aldus Corp., 20-21
716 Bootwear Software Co., 26
381 Borland Int'l., IFC-1
717 Compututor, 243
611 Coral Software, 211
684 Cricket Software, 189
685 Cricket Software, 191
662 Data Tailor, Inc., 207
674 Enchanted Software, Inc., 175
144 Forethought, Inc., 186
289 Forethought, Inc., 42-43
249 Infosphere, IBC
589 Internet, 38
725 Kent Marsh Ltd., 240
238 Layered, Inc., 172-173
— Living Videotext, 12
653 Macropac Int'l., 100
675 Meta Software, 94
— Microsoft Corp., 54-55, 80-81
713 Mindwork Software, 16-17
633 Nantucket Corp., 74
575 Orange Micro, Inc., 203
541 Owl Int'l. Inc., 34
560 Personal Training Systems, 214
630 SBT Corp., 62
— Satori Software, 170
225 StatSoft, 194
639 T.B.S.P., Inc., 190
643 Think Technologies, Inc., 7

Vertical

— Satori Software, 170

Data Management

381 Borland Int'l., IFC-1
144 Forethought, Inc., 186
653 Macropac, Int'L., 100

Word Processing

317 Aegis Development, 178
601 Lundeen & Associates, 201
713 Mindwork Software, 16-17
724 Postcraft Int'l. Inc., 222
332 T/Maker Co., 30
719 Target Software, 79

Communications

524 Centram, 184-185
281 DataViz, Inc., 70
249 Infosphere, IBC
589 Internet, 38
97 Mesa Graphics, Inc., 202
304 Peripherals Computers & Supplies, Inc., 96
334 Public Domain Exchange, The, 227
640 SoftStyle, 104
643 Think Technologies, Inc., 7

Educational

— Apple Computer, Inc., 44, 181
578 Bible Research Systems, 182
560 Personal Training Systems, 214

Graphics/Desktop Publishing

552 Adobe Systems, Inc., 193
678 Adobe Systems, Inc., 46-47
306 Aldus Corp., 20-21
716 Bootwear Software Co., 26
— CasadyWare, 56
717 Compututor, 243
684 Cricket Software, 189
685 Cricket Software, 191
683 Firebird Licenses, Inc., 108
289 Forethought, Inc., 42-43

Reader Service Number

664 LaserWare, Inc., 91
675 Meta Software, 94
713 Mindwork Software, 16-17
575 Orange Micro, Inc., 202-203
724 Postcraft Int'l. Inc., 222
334 Public Domain Exchange, The, 227
266 Silicon Beach Software, 61, 63, 65
640 SoftStyle, 104
715 Solutions, Int'l., 226
374 Williams & Macias, 188

Desktop Engineering

458 CompServCo, 82
634 Diehl Graphsoft, Inc., 240
97 Mesa Graphics, Inc., 202

Personal Business/Home

604 CE Software, 224
541 Owl Int'l. Inc., 34
374 Williams & Macias, 188

Entertainment

211 Practical Computer Applications, 48
714 Wenger Corp., 64

Languages/Development Systems

381 Borland Int'l., IFC-1
469 True Basic, Inc., 53

Utilities

317 Aegis Development, 178
607 Central Point Software, 22
522 1st Aid Software, Inc., 194
682 Greene, Inc., 56
653 Macropac Int'l., 100
97 Mesa Graphics, Inc., 202
640 SoftStyle, 104
659 Target Software, 110

Miscellaneous

306 Aldus Corp., 20-21
330 CompuServe, 199
208 Ideaform, 202
560 Personal Training Systems, 214
334 Public Domain Exchange, The, 227
— Satori Software, 170
660 Target Software, 66-69
537 Uptime, 5
374 Williams & Macias, 188

Hardware

Computer Systems

— Apple Computer, Inc., 50-51
711 Systematics General Corp., 83

Boards

395 Mac Doctor Electronics, 33
727 Network Specialties, 216
718 Open Mac Enterprises, 198

Digitizers/Scanners

622 Abaton, 24-25
637 Datacopy, 177
615 DEST Corp., 195
721 Spectrum Digital Systems, 174
167 Thunderware, 179

Display

271 Computer Friends, 6
600 E-Machines, Inc., 98
235 Micrographic Images, 60
577 Radius, Inc., 10-11

Modems

271 Computer Friends, 6
694 Migent, Inc., 215

Hard Disks/Storage

463 AST Research, Inc., 8-9
627 Bering Industries, Inc., 106
657 CMS Enhancements, Inc., 40
710 Cutting Edge, Inc., 192
602 Ehman Engineering, Inc., 102
143 General Computer, 27-29
570 Jasmine Computer Systems, 76-77
654 Logic Array, 208

Reader Service Number

470 Microtech Peripherals, Inc., 217
40 Mirror Technologies, Inc., 39, 41
— Performance Electronics Packaging Services, 241
223 Personal Computer Peripherals Corp., 220
— SuperMac Technology, 49, 52
439 Warp Nine Engineering, Inc., 36-37

Miscellaneous

175 Central Point Software, 23
1 MacMemory, 15
631 Precision Data Products, 200
618 Sun Remarketing, 204
729 Vivid Systems, Inc., 95
726 Zericon, 26

Accessories

Floppy Disks/Holders

562 Diskette Connection, 210
728 JVC Magnetics Co. Ltd., 223
689 Megasoft, 200
712 3M, 168-169

Miscellaneous

490 Bede Tech, 200
373 Best Computer Supplies, 183
723 Co-Du-Co, 237
620 Computer Cover Co., 206

Reader Service Number

722 Computer Expressions, 205
676 Ergotron, Inc., 96, 182
530 I/O Design, 78
11 Kensington, 18, BC
658 Kroy, 196
720 Laser Connection, The, 180
691 Linotype Co., 176
— Macworld Expo, 218-219
450 Panamax, 242
693 Safeware, 243
— ScanCoFurn, 71

Mail Order

373 Best Computer Supplies, 183
272 Icon Review, 84-87
— MacConnection, 112-115
673 MacLine, 241
368 MacRentals, 31
16 MacStore, 242
230 Moneysworth, 58-59
— PC Connection, 112-115
45 PC Network, 72-73
194 Programs Plus, Inc., 92-93
693 Safeware, 243
— Software Library, 88
483 Tussey Computer Products, 89
134 USA-Flex, 212
459 Vision Technologies, 90

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Updates

This list brings you highlights of software recently received but not yet tested. The first price is the upgrade cost for registered owners; the second is the current list price.

Acta version 1.2 now prints outlines directly and offers text file-conversion features. Symmetry Corp., 761 E. University Dr., Mesa, AZ 85203, 800/624-2485, 602/844-2199 in Arizona. Original disk swap or $10; $59.95 new.

Disk Ranger version 3.0 improves speed and display, has an enlarged catalog, and includes Ranger Reader, a new desk accessory that can find, read, and search *Disk Ranger* catalog files while you use other applications. Mainstay, 5311-B Derry Ave., Agoura Hills, CA 91301, 818/991-6540. $15; $49.95 new.

1st Base version 3.0 is fully HFS compatible. 1st Desk Systems, 7 Industrial Park Rd., Medway, MA 02053, 800/522-2286 or 617/533-2203. $25 plus $5 shipping and handling; $195 new.

1st Merge version 3.0 is fully HFS compatible. 1st Desk Systems (see *1st Base* for address). $25 plus $5 shipping and handling; $150 new.

1st Port version 3.0 is fully HFS compatible. 1st Desk Systems (see *1st Base* for address). $25 plus $5 shipping and handling; $295 new.

Hard Disk Util version 2.0 integrates the copier and patcher, is fully HFS compatible, adds several patch files, accepts user-entered patches via *UpLang*. Available on either 400K or 800K disks. FWB Software, Inc., Attn: HDU 2.0 Update, 2040 Polk St. #215, San Francisco, CA 94109, 415/474-8055. $25; $89.95 new.

InBox version 2.0 no longer requires a dedicated Macintosh. Think Technologies, Inc., 420 Bedford St., Lexington, MA 02173, 617/863-5590. Free; $350 starter kit (two personal connections plus one message center), $125 per additional personal connection.

inTalk version 2.11 has a new automated CCL (communications command language) script. Other improvements include a better file-transfer protocol and support for high-speed modems. Palantir Software, 12777 Jones Rd. #100, Houston, TX 77070, 800/368-3797, 800/831-3119 in Texas. $20 for the software upgrade, $30 for the manual upgrade; $195 new.

Legal Billing II Plus version 1.08 is a multiuser version that supports Apple's Communication Framework. Satori Software, 2815 Second Ave. #590, Seattle, WA 98121, 206/443-0765. $400 for registered owners; $1295 new.

Office Productivity System version 1.30 is a multiuser version that supports Apple Communication Framework. It also has an extended invoicing capability. Applied Micronetics, 3 Burnt Oak Circle, Lafayette, CA 94549, 415/283-4498. Free with original disk; $475 new.

Omnis 3 Plus version 3.24 supports network software such as *AppleShare* and *TOPS* and is no longer copy protected. Blyth Software Inc., 2929 Campus Dr. #425, San Mateo, CA 94403, 415/571-0222. Original disks plus $19 (free for purchases after February 1, 1987); single-user version $495 new; multiuser version from $995 to $3000 new.

Profit Stalker II version 1.3 supports the LaserWriter and the Clipboard and is fully HFS compatible. Button Down Software, P.O. Box 19493, San Diego, CA 92119, 619/463-7474. Free; $250 new.

Project Billing Plus version 1.3 is a multiuser version that supports Apple's Communication Framework and allows simultaneous entry of time and expenses by any user connected to the AppleTalk network and the *AppleShare* file server. Satori Software (see *Legal Billing II Plus* for address). $400 for registered owners; $1095 new.

SideKick version 2.0 includes Outlook, an outline processor; MacPlan, a spreadsheet desk accessory; and Xmodem, a file-transfer communications protocol. Borland International, Inc., 4585 Scotts Valley Dr., Scotts Valley, CA 95066, 408/438-8400. $34.95 for registered owners. Original disk plus $10 for those who purchased after December 1, 1986; $99.95 new.

Send upgrade announcements to Updates, Macworld, *501 Second St. #600, San Francisco, CA 94107.* □

Where to Buy

This section contains information about products featured editorially in this issue. Programs are not copy protected unless otherwise indicated. All prices are list prices. An asterisk indicates that a product review appears in this issue.

Public domain software is available through on-line information services, through user groups such as Berkeley Macintosh User Group (415/849-2684) or the Boston Computer Society's Mac special-interest group (617/367-8080), or through mail-order clearinghouses such as Educomp, 2429 Oxford St., Cardiff-by-the-Sea, CA 92007, 619/942-3838 or Public Domain Exchange, 673 Hermitage Ln., San Jose, CA 95134, 408/942-0309.

Pages 116 to 121
Illustrator: The Tracer's Edge

Adobe Illustrator
Version 1.0. Adobe Systems, Inc., 1870 Embarcadero Rd., Palo Alto, CA 94303, 415/852-0271, 800/292-3623. Key-disk copy protection. 1MB minimum memory; scanner recommended. $495.

Cricket Draw
Version 1.01. Cricket Software, Inc., 30 Valley Stream Pkwy., Malvern, PA 19355, 215/251-9890, 800/345-8112, 800/662-2444 in Pennsylvania. 512KE minimum memory; LaserWriter recommended. $295.

FullPaint
Version 1.0E. Ann Arbor Softworks, Inc., 2393 Teller Rd. #106, Newbury Park, CA 91320, 805/375-1467. 512K minimum memory. $99.95.

GraphicWorks
Version 1.1. Mindscape, Inc., 3444 Dundee Rd., Northbrook, IL 60062, 312/480-7667, 800/221-9884, 800/942-7315 in Illinois. 512K minimum memory; requires 800K drive storage. $99.95.

MacDraw
Version 1.9. Apple Computer, Inc., 20525 Mariani Ave., Cupertino, CA 95014, 408/996-1010. 128K minimum memory; 512K with external drive and LaserWriter or ImageWriter recommended. $195.

MacPaint
Version 1.5. Apple Computer, Inc., 20525 Mariani Ave., Cupertino, CA 95014, 408/996-1010. 128K minimum memory; 512K with external drive and LaserWriter or ImageWriter recommended. $125.

Microsoft Word
Version 3.0. Microsoft Corp., 16011 N.E. 36th Way, Box 97017, Redmond, WA 98073-9717, 206/882-8080, 800/426-9400. 512K minimum memory; requires 800K external drive. $395.

PageMaker
Version 2.0. Aldus Corp., 411 First Ave. S #200, Seattle, WA 98104, 206/622-5500. Key-disk copy protection; installs on hard disks. 512K minimum memory; requires external drive and PostScript printer. $495.

ReadySetGo
Version 3.0. Letraset USA, 40 Eisenhower Dr., Paramus, NJ 07653, 201/845-6100, 800/526-9073. 512K minimum memory; external drive recommended. $395.

SuperPaint
Version 1.0. Silicon Beach Software, Inc., P.O. Box 261430, San Diego, CA 92126, 619/695-6956. 512K minimum memory; Mac Plus recommended. $99.

Pages 122 to 129
Laser Wars

Dijit 1-PS
Diconix Inc. (a Kodak Company), 3100 Research Blvd., Dayton, OH 45420, 513/259-3100, 800/342-6649. Product specifications to be announced.

CG 400PS
Compugraphic Corp., 200 Ballardvale St., Wilmington, MA 01887, 617/658-5600. $29,995.

LaserJet
Hewlett-Packard Co., 1820 Embarcadero Rd., Palo Alto, CA 94303, 800/367-4772. 128K minimum memory; SoftStyle Laserstart driver recommended. $2495.

LaserWriter Plus
Apple Computer, Inc., 20525 Mariani Ave., Cupertino, CA 95014, 408/996-1010. 512K minimum memory; requires AppleTalk. $5799.

LZR 2665
Dataproducts Corp., 6200 Canoga Ave., Woodland Hills, CA 91365, 818/887-8000. 512K minimum memory; requires AppleTalk. $17,900.

OmniLaser 2108
Texas Instruments, Inc., Data Systems Group, P.O. Box 809063, Dallas, TX 75380-9063, 800/527-3500. 512K minimum memory; requires AppleTalk. $5995.

OmniLaser 2115
Texas Instruments, Inc., Data Systems Group, P.O. Box 809063, Dallas, TX 75380-9063, 800/527-3500. 512K minimum memory; requires AppleTalk. $7995.

PostScript Language Reference Manual
Addison-Wesley Publishing Co., 1 Jacob Way, Reading, MA 01867, 617/944-3700, 800/447-2226, 800/446-3399. $22.95.

PS Jet
The Laser Connection, P.O. Box 850296, Mobile, AL 36685, 205/633-7223. $2995.

QMS PS-800
QMS, Inc., P.O. Box 81250, Mobile, AL 36689, 205/633-4300. 512K minimum memory; requires AppleTalk. $4995.

QMS PS-800 Plus
QMS, Inc., P.O. Box 81250, Mobile, AL 36689, 205/633-4300. 512K minimum memory; requires AppleTalk. $5495.

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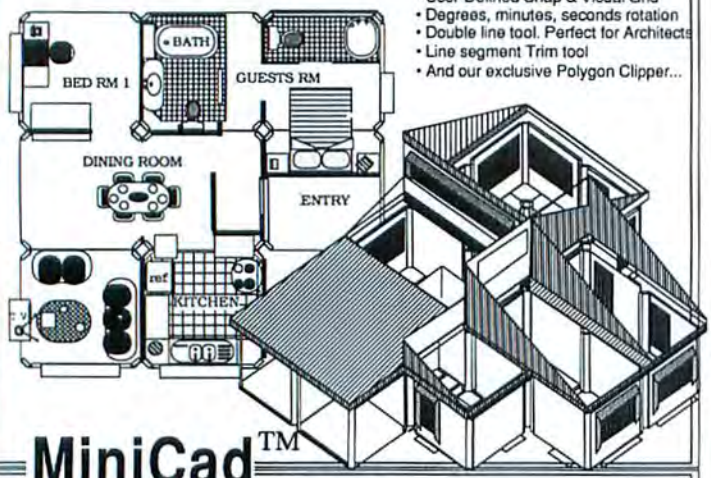

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Where to Buy

QuadLaser PostScript
Quadram Corp., 1 Quad Way, Norcross, GA 30093, 404/923-6666. 512K minimum memory; requires AppleTalk. $5495.

ScripTen
Qume Corp., 2350 Qume Dr., San Jose, CA 95131, 408/432-4000, 800/223-2479. 512K minimum memory; requires AppleTalk. Price to be announced.

Super 3D
Silicon Beach Software, Inc., P.O. Box 261430, San Diego, CA 92126, 619/695-6956. 512K minimum memory; other product specifications to be announced.

SuperModem 1200
SuperMac Technology, 950 N. Rengstorff Ave., Mountain View, CA 94043, 415/964-8884. Product specifications to be announced.

Pages 130 to 133
Approaching the Mac II

Graphix
SuperMac Technology, 950 N. Rengstorff Ave., Mountain View, CA 94043, 415/964-8884. 1MB minimum memory; requires Mac II. $495.

LoDown CD ROM Development System
LoDown, 10 Victor Sq. #200, Scotts Valley, CA 95060, 408/438-7400. 1MB minimum memory. Includes 155MB hard drive, 400MB WORM drive, and CD ROM player. $11,590.

LoDown WORM
LoDown, 10 Victor Sq. #200, Scotts Valley, CA 95066, 408/438-7400. 1MB minimum memory; requires SCSI port and Mac Plus, Mac SE, or Mac II. 400MB version $5995, 800MB version $7995.

Mac286
AST Research Inc., 2121 Alton Ave., Irvine, CA 92714, 714/863-1480. Requires Mac II and 5¼-inch drive. MS-DOS compatible. $1499.

ProSpin
Version 1.0. D2 Software, Inc., 3001 N. Lamar Blvd. #110, Austin, TX 78705, 512/482-8933. 512K minimum memory. $399.95.

Spectrum 1000/1
SuperMac Technology, 950 N. Rengstorff Ave., Mountain View, CA 94043, 415/964-8884. 1MB minimum memory; requires Mac II. $749, upgradable to Spectrum 1000/8 for $795.

Spectrum 1000/8
SuperMac Technology, 950 N. Rengstorff Ave., Mountain View, CA 94043, 415/964-8884. 1MB minimum memory; requires Mac II. $1495.

Pages 134 to 141
Programming from the Start

Seminars
Introduction to Macintosh Programming, 1-day seminar $325. Developing a Macintosh Program, 3-day seminar $770. Using MPW, 1-day seminar $325. MacApp and Object-Oriented Programming, 4-day seminar $1095. Registrar, Apple Computer, Inc., 20525 Mariani Ave. M/S 23-EG, Cupertino, CA 95014, 408/973-2726.

Inside Macintosh
Addison-Wesley Publishing Co., 1 Jacob Way, Reading, MA 01867, 617/944-3700, 800/447-2226, 800/446-3399. Volume 1, 2, 4 $23.99; volume 3 $19.18.

Macintosh 68000 Development System
Version 2.0. Apple Computer, Inc., 20525 Mariani Ave., Cupertino, CA 95014, 408/996-1010. 512K minimum memory; external drive recommended. $195.

Macintosh Programmer's Workshop
Version 1.02. APDA, 290 S.W. 43rd St., Renton, WA 98055, 206/251-6548. 512K minimum memory; requires 1.6MB disk storage; Mac Plus with hard disk recommended. Only for members. $150.

MacTutor, The Macintosh Programming Journal
MacTutor, P.O. Box 400, Placentia, CA 92670, 714/630-3730. $3.75/issue in U.S., $4.25/issue in Canada, $30/year by 3rd class, $45/year by 1st class, $60/year foreign.

Pages 142 to 151
Speaking of Spoolers

LaserServe
Version 1.1. Infosphere Inc., 4730 S.W. Macadam, Portland, OR 97201, 503/226-3620. 512K minimum memory; requires AppleTalk. Also compatible with AppleTalk ImageWriter. $95.

LaserServer
Version 1.0. DataSpace Corp., 185 Riviera Dr. #9, Markham, Ontario, Canada L3R 5J6, 416/474-0113, 800/387-0492. 512K minimum memory; requires AppleTalk. 2MB of RAM available. $2295.

LaserSpool
Version 3CD. MacAmerica, 18032-C Lemon Dr., Yorba Linda, CA 92686, 714/579-0244. 512KE minimum memory; requires AppleTalk. $100.

PC MacSpool
Tangent Technologies, 5720 Peachtree Pkwy., Norcross, GA 30092, 404/662-0366. 128K minimum memory; requires AppleTalk; other product specifications to be announced.

SuperLaserSpool
Version 1.0. SuperMac Software, 950 N. Rengstorff Ave., Mountain View, CA 94043, 415/964-8884. 512K minimum memory. $149.95.

Page 152
Presenting PowerPoint

PowerPoint
Forethought, Inc., 250 Sobrante Way, Sunnyvale, CA 94086, 408/737-7070, 800/622-9273. 512K minimum memory. LaserWriter and 800K disk storage recommended. $395.*

MacWrite
Version 4.5. Apple Computer, Inc., 20525 Mariani Ave., Cupertino, CA 95014, 408/996-1010. 128K minimum memory; 512K or Mac Plus with external drive recommended. $125.

Page 154
Reaction Positive

MicroChem
Version 0.9. Lextek Scientific, Inc., 600 W. Van Buren #502, Chicago, IL 60607, 312/346-6163, 800/237-3762 ext. 889. 1MB minimum memory; external drive recommended. $995; free upgrade to version 1.0 when available.*

Page 156
Sleek, Fast Accounting

Rags to Riches
Version 3.1 for Ledger, Receivables, and Payables; version 2.6 for Inventory and Professional Billing. Chang Labs, 5300 Stevens Creek Blvd., San Jose, CA 95129, 408/246-8020, 800/972-8800, 800/831-8080 in California. 512K minimum memory; Mac Plus with external drive recommended. Ledger, Receivables, and Payables $199.95–$399.95.*

Page 157
Bridging Network Boundaries

InterBridge
Version 1.05. Hayes Microcomputer Products, Inc., P.O. Box 105203, Atlanta, GA 30348, 404/441-1617. 512K minimum memory; network manager requires 1MB. $799.*

Fastpath
Kinetics, Inc., P.O. Box 3341, Walnut Creek, CA 94598, 415/947-0998. 128K minimum memory; requires AppleTalk and Ethernet Connector Kit. $2500.

PhoneNet StarController
Farallon Computing, 1442-A Walnut St. #64, Berkeley, CA 94709, 415/849-2331. 512K minimum memory. $1495.

TrafficWatch
Version 1.0. Farallon Computing, 1442-A Walnut St. #64, Berkeley, CA 94709, 415/849-2331. 512K minimum memory; requires AppleTalk. $195.

Page 158
Cash-Conscious CAD

MiniCad
Version 2.44. Diehl Graphsoft, 3246-K Normandy Woods Dr., Ellicott City,

(continues)

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MD 21043, 301/461-9488. Key-disk copy protection; requires at least 800K drive space; MacPlus and hard disk recommended. $495.*

EZ-Draft
Version 2.0. Bridgeport Machines, Inc., 500 Lindley St., Bridgeport, CT 06606, 203/367-3651. Key-disk copy protection. 1MB minimum memory; requires external drive; hard disk recommended. $2495.

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.

MacPlots II
Current mailing version 2.1 for business, version 2.5 for drafting. Computer Shoppe, P.O. Box 18344, Greensboro, NC 27419, 919/299-4843. Key-disk copy protection; requires 512K for drafting version and 128K for business version; Mac Plus and plotter recommended. Drafting version $295, business version $195.

Page 159
A Familiar Maze

Arcade Adapter/Mac Man
Version 1.1. Nuvo Labs, 225 Tank Farm Rd., San Luis Obispo, CA 93401, 805/544-5766. 512K minimum memory; requires standard Atari VCS joystick. $29.*

Page 160
Quiet Thunder

Thunder
Version 1.01. Batteries Included, 30 Mural St., Richmond Hill, Ontario, Canada L4B 1B5, 416/881-9941, 800/387-5707. 512K minimum memory; Mac Plus recommended. $49.95.*

Page 161
The Mouse that Rolled

quadLYNX Trackball
Disc Instruments, 102 E. Baker St., Costa Mesa, CA 92626, 714/979-5300, 800/824-3522. 128K minimum memory. $129.*

Turbo Mouse
Kensington Microware Ltd., 251 Park Ave. S, New York, NY 10010, 212/475-5200, 800/535-4242. 128K minimum memory. $129.95.*

Page 162
Object Logo Arrives

Object Logo
Version 1.1. Coral Software Corp., P.O. Box 307, Cambridge, MA 02142, 617/868-7440, 800/521-1027. 512K minimum memory; requires at least 800K drive space. $79.95.*

Page 164
Meticulous Timekeeper

Office Productivity System (Ops)
Version 1.30. Applied Micronetics, Inc., 3 Burnt Oak Circle, Lafayette, CA 94549, 415/283-4498. 512K minimum memory; requires external drive; Mac Plus and hard disk recommended. $475.*

BPI Entry Series General Accounting
Version 1.0. BPI Systems, Inc., 3001 Bee Cave Rd., Austin, TX 78746, 512/328-5400, 800/531-5252. 512K minimum memory; external drive recommended. $249.

Project Billing
Version 1.17. Satori Software, 2815 Second Ave. #590, Seattle, WA 98121, 206/443-0765. Key-disk copy protection. 512K minimum memory. $695.

Page 165
Stranger in a Strange Town

Tass Times in Tonetown
Activision, Inc., 2350 Bayshore Pkwy., Mountain View, CA 94043, 415/960-0410, 800/227-9759. Not copyable. 512K minimum memory. $44.95.*

Page 166
On the Safe Side

MacSafe
Version 1.03. Kent Marsh Limited,

Inc., 1200 Post Oak Blvd. #210, Houston, TX 77056, 713/623-8618, 800/325-3587. 128K minimum memory; 512K with external drive recommended. $139.95.*

Page 167
Discovering What's Necessary

Desk Necessities
Microsparc Inc., 45 Winthrop St., Concord, MA 01742, 617/371-1660. 1MB minimum memory. $29.95.*

Pages 197 to 206
Getting Started with Database Managers

dBase Mac
Version 1.0. Ashton-Tate Corp., 20101 Hamilton Ave., Torrance, CA 90502, 213/329-8000, 800/538-8000. 512K minimum memory; 800K external drive recommended. $495.

Factfinder
Version 1.1. Forethought, Inc., 250 Sobrante Way, Sunnyvale, CA 94086, 408/737-7070, 800/622-9273. 128K minimum memory; external drive recommended. $150.

MacPaint
Version 1.5. Apple Computer, Inc., 20525 Mariani Ave., Cupertino, CA 95014, 408/996-1010. 128K minimum memory; 512K with external drive and printer recommended. $125.

Microsoft Word
Version 3.0. Microsoft Corp., 16011 N.E. 36th Way, Box 97017, Redmond, WA 98073-9717, 206/882-8080, 800/426-9400. 512K minimum memory; requires 800K disk storage; Mac Plus with external drive recommended. $395.

OverVue
Version 2.1. ProVue Development, 222 22nd St., Huntington Beach, CA 92648, 714/969-2431. 128K minimum memory; external drive recommended. $295.

PictureBase
Version 1.2. Symmetry Corp., 761 E. University, Mesa, AZ 85203, 602/844-2199, 800/624-2485. 512K minimum memory; external drive or hard disk recommended. $99.

Reflex for the Mac
Version 1.01. Borland International, 4585 Scotts Valley Dr., Scotts Valley, CA 95066, 408/438-8400. 512K minimum memory; external drive recommended. $99.95.

Pages 209 to 216
Insights on ReadySetGo

ReadySetGo
Version 3.0. Letraset USA, 40 Eisenhower Dr., Paramus, NJ 07653, 201/845-6100, 800/526-9073. 512K minimum memory; external drive recommended. $395.

Pages 221 to 228
Mac Publishing Tools

LaserJet Toner Cartridge
Hewlett-Packard Co., 1820 Embarcadero Rd., Palo Alto, CA 94303, 800/367-4772. 1 to 3 $115, 4 to 9 $99, 10 or more $94.

LaserWriter
Apple Computer, Inc., 20525 Mariani Ave., Cupertino, CA 95014, 408/996-1010. 512K minimum memory; requires AppleTalk. $4999, LaserWriter Plus $5799.

Linotronic 100, Linotronic 300
Allied Linotype Co., 425 Oser Ave., Hauppauge, NY 11788, 516/434-0095. 128K minimum memory; requires AppleTalk. Linotronic 100 $31,950; Linotronic 300 $59,950.

MacDraw
Version 1.9. Apple Computer, Inc., 20525 Mariani Ave., Cupertino, CA 95014, 408/996-1010. 128K minimum memory; 512K, external drive, and printer recommended. $195.

MacWrite
Version 4.5. Apple Computer, Inc., 20525 Mariani Ave., Cupertino, CA 95014, 408/996-1010. 128K minimum memory; 512K or Mac Plus and external drive recommended. $125. □

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Macworld Best-Sellers

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Months on chart	Last month	This month	
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24	1	2	**Microsoft Word** *Microsoft*
16	3	3	**Microsoft Excel** *Microsoft*
12	4	4	**PageMaker** *Aldus*
7	7	5	**FullPaint** *Ann Arbor Softworks*
21	6	6	**MacDraw** *Apple Computer*
8*	5	7	**MacWrite** *Apple Computer*
8*	8	8	**MacPaint** *Apple Computer*
3	9	9	**SuperPaint** *Silicon Beach Software*
5	–	10	**MacDraft** *Innovative Data Design*

Education Software

8	1	1	**Math Blaster** *Davidson and Associates*
8	3	2	**Typing Tutor III** *Simon and Schuster Computer Software*
8	2	3	**Kids' Time** *Great Wave Software*
1	–	4	**Typing Made Easy** *QED Information Sciences*
3	–	5	**KidTalk** *First Byte*

Entertainment Software

8	1	1	**Flight Simulator** *Microsoft*
8	2	2	**MacGolf** *Practical Computer Applications*
4	3	3	**Dark Castle** *Silicon Beach Software*
4	5	4	**The Ancient Art of War** *Broderbund Software*
5	–	5	**Gato** *Spectrum Holobyte*

Networking/Data Communications

8	1	1	**AppleTalk** *Apple Computer*
8	2	2	**MacServe** *Infosphere*
4	4	3	**TOPS** *Sun Microsystems*
15	5	4	**MacTerminal** *Apple Computer*
8	3	5	**Apple Personal Modem** *Apple Computer*

Hard Disk Drives

Months on chart	Last month	This month	
4	1	1	**Apple HD-20SC** *Apple Computer*
7	2	2	**Apple Hard Disk 20** *Apple Computer*
8	3	3	**DataFrame 20** *SuperMac Technology*
5	4	4	**FX-20** *General Computer*
7	5	5	**HyperDrive 20** *General Computer*

Books

8	1	1	**Excel in Business** *Douglas Cobb, Microsoft Press*
7	2	2	**The Apple Macintosh Book** *Cary Lu, Microsoft Press*
7	3	3	**Inside Macintosh** *Addison-Wesley*
8	4	4	**The Printed Word** *David A. Kater and Richard L. Kater, Microsoft Press*
2	–	5	**Creative Progamming in Microsoft BASIC** *Steve Lambert, Microsoft Press*

Product Watch

Editors' choice:
Other recent products of particular interest.

4th Dimension *Acius* relational database manager and applications generator

FullWrite Professional *Ann Arbor Softworks* word processing software

VideoWorks II *MacroMind* animated color graphics

Source: Exclusive InfoCorp survey of more than one hundred Macintosh retailers and selected mail-order suppliers. Covers sales during February 1987.

** Formerly bundled with the Mac.*

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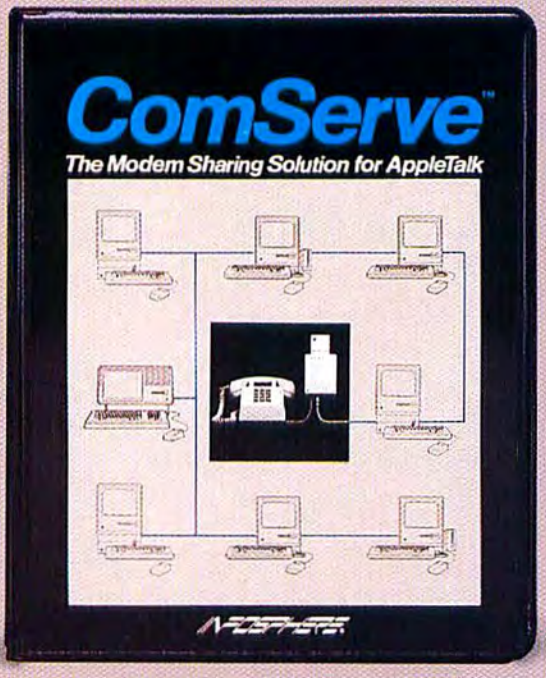

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