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The Macintosh Magazine

 Macintosh II

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monitors, speed, MS-DOS
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Macintosh SE

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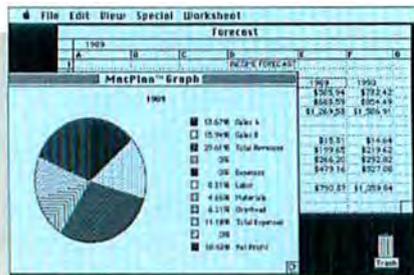
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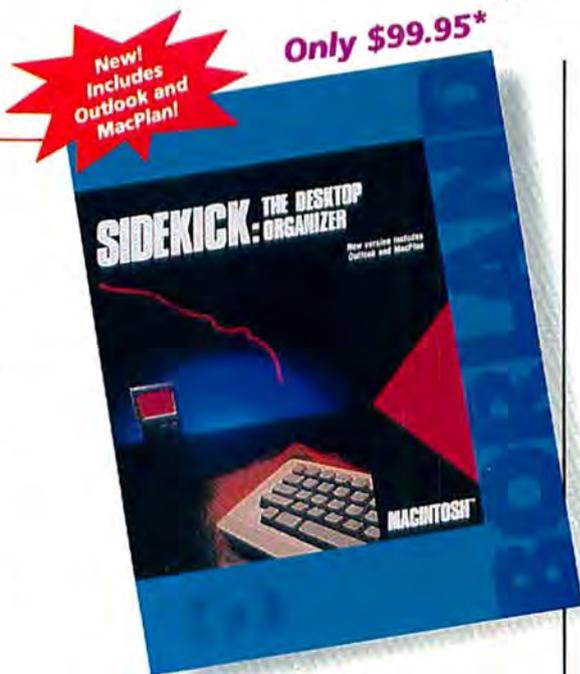
MacPlan does both spreadsheets and business graphs. Paste them into your Outlook files and generate professional reports.

SideKick: The Desktop Organizer, Release 2.0 now includes

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

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



Outlook: The Outliner

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- 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

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New Version!

System requirements:

Macintosh 512K or Macintosh Plus with one disk drive.

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Why are so many critics praising Reflex?

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Reflex lets you organize, analyze and report information faster than ever before.

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



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

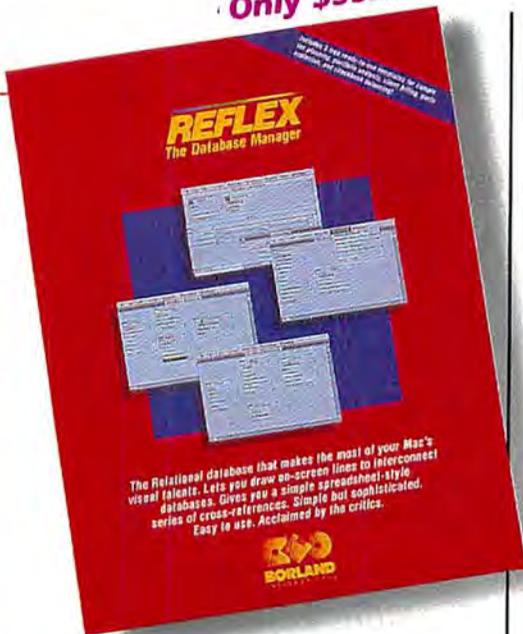
System requirements:

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

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If you use a Mac, get
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M52

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Turbo Pascal at a glance

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- ✓ Options include compiling to disk or memory, or compile and run
- ✓ No need to switch between programs to compile or run a program
- ✓ Streamlined development and debugging
- ✓ Compatible with Hierarchical File System
- ✓ 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
- ✓ Unlimited use of available Macintosh™ memory
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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:

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MACWORLD

May 1987

The Macintosh™ Magazine

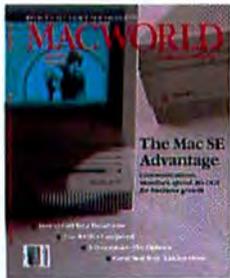
Departments

- 13 **Mac Bulletin**
Late-breaking news.
- 19 **David Bunnell**
- 27 **Letters**
- 43 **Commentary/Jerry Borrell**
- 52 **Contributors Notes**
- 55 **Steven Levy**
- 67 **Verbatim**
AST's Ash Jain on the new Macs and Mac add-ons.
- 171 **How To/Quick Tips**
Fit more files per disk, facts on fans, file-recovery fine points, and more.
- 181 **How To/Getting Started with Communications Gear**
A short course for beginning communicators.
- 191 **How To/Insights on OverVue**
Shift *OverVue* into overdrive.
- 203 **How To/Mac Pasteup Tools**
Pasteup for pennies with *Draw*, *Paint*, and *Write*.
- 216 **Updates**
Keep up with Mac software upgrades.
- 227 **Where to Buy**
Information on products in this issue.
- 240 **Best-Sellers**

95 Macworld News

- *Desktop Express* A new era in electronic mail.
- *Color Workstation* Mac II-based professional graphics.
- *EduDisc* Do-it-yourself interactive video courseware.
- *Ten Years After* Apple celebrates its first decade.

Plus, reports on a PostScript digitizer, the first Mac WORM drive, *Grey Paint*, *Laser Paint*, and more.



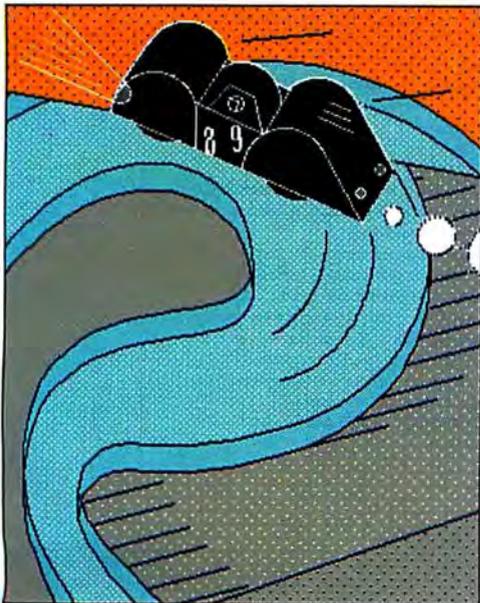
On the Cover
For an in-depth look at the new Macintosh SE, see p. 112. On screen, text wraps around an irregularly shaped graphic—an effect created with Xpress. Photograph by Fred Stimson.





Features

- 112 SE Close-up**
Features, options, performance, background—exploring the expandable Mac.
- 118 3-D, Take 2**
An in-depth look at 3-D software: five programs compared.
- 126 The Polyglot Macintosh**
The wide world of foreign fonts and word processors.
- 134 The Great Pretenders**
IBM and DEC terminal emulators.
- 142 BASIC Choices**
Comparing the compilers: Microsoft, Zedcor, and Pterodactyl BASICs.
- 148 Rounding the Bezier Curve**
Cricket Draw sets a new standard for graphic arts tools.



Reviews

- 152 A High-Wire Act**
Trapeze text-graphics spreadsheet.
- 154 A Gateway to Communications**
Intermail E-mail system.
- 155 Taking Control**
LabVIEW equipment control.
- 157 A Very Important Program**
V.I.P. visual programming language.
- 158 Accessible Art**
Graphidex graphics indexer.
- 159 A Case for a Perspective Base**
Gridmaker grid construction set.
- 161 Not-Quite-Ready Accounting**
Accountant, Inc. integrated accounting.
- 162 It's Only Logical**
LogicWorks digital logic design.
- 163 Grand Prix Racing**
Ferrari Grand Prix game.
- 163 Symbolic Scratchpad**
PowerMath symbolic manipulation.
- 164 Voila! Another Instant Outline**
Voila outliner desk accessory.
- 166 A Choice of Boundaries**
MapMaker, MacAtlas, EarthPlot.

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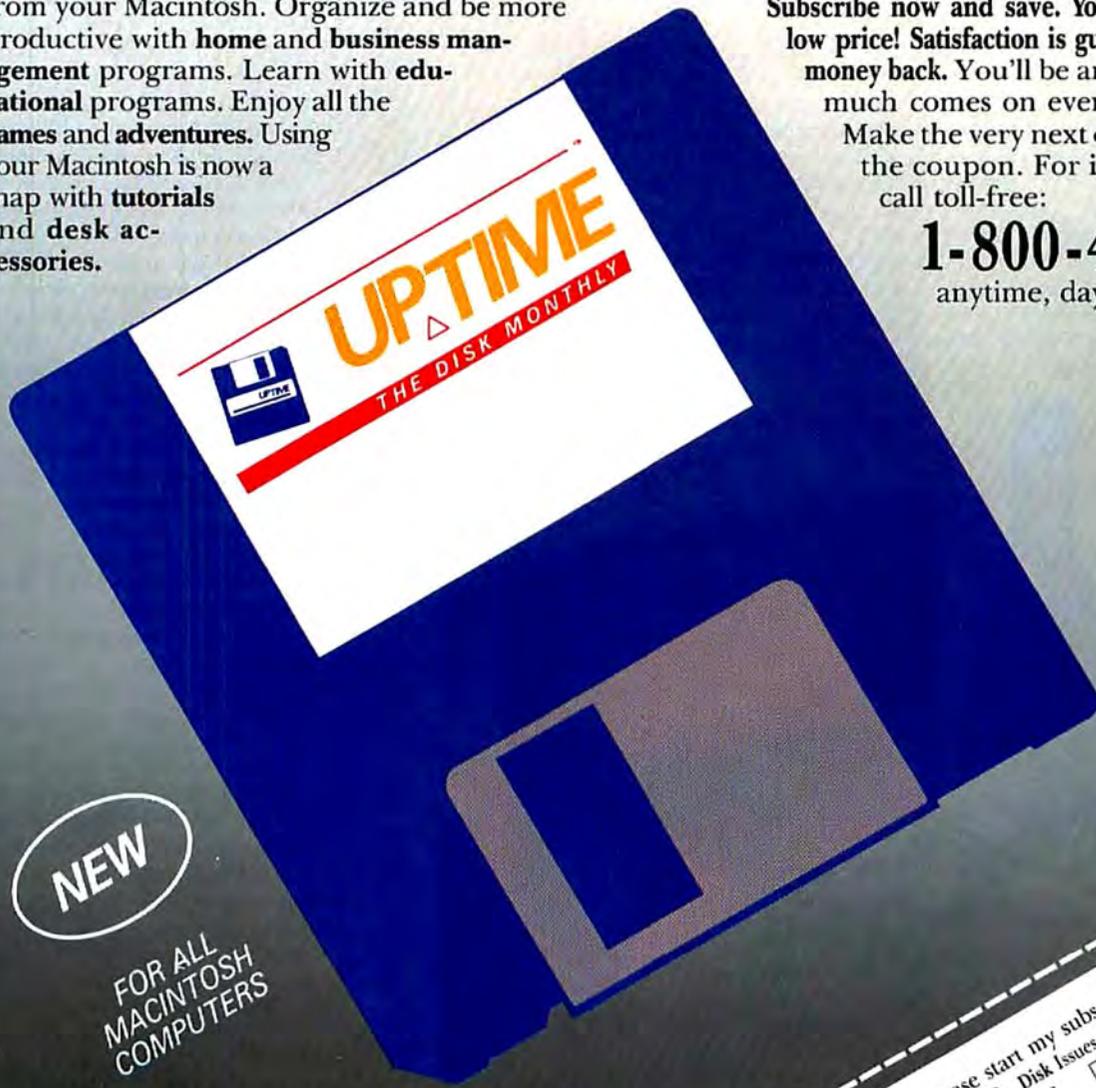
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Icon Review (Fall 1985): "OverVUE 2.0 is our favorite database workhorse... it simply offers the best balance of power and ease-of-use available on the market today."

Nibble Mac (Oct. 1985): "OverVUE is not only easy to set up, it's the easiest for data entry. Its tools for entering repetitive data minimizes typing time."

Online Today (electronic version — Nov. 1985): "OverVUE 2.0 is a heavy-duty data management tool... It does all the things a good relational database manager should."

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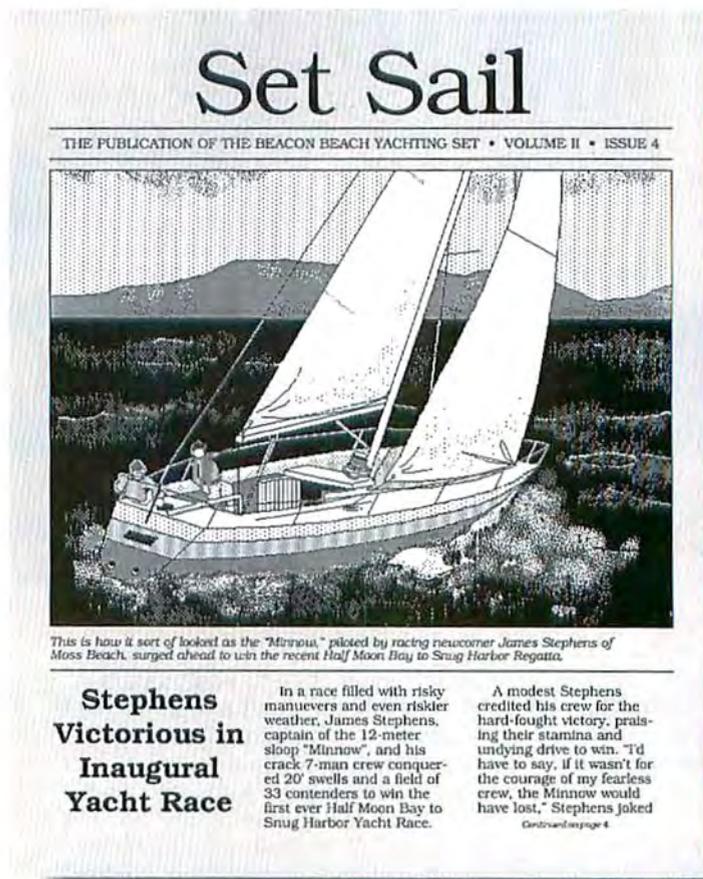
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Pictured here is the "Minnow," piloted by racing neophyte James Stephens of Moss Beach, surging ahead to win the Half Moon Bay to Snug Harbor Regatta. (Photo by George Chadwick)

Stephens Victorious in Inaugural Yacht Race

In a race filled with risky maneuvers and even riskier weather, James Stephens, captain of the 12-meter sloop "Minnow", and his crack 7-man crew conquered 20' swells and a field of 33 contenders to win the first ever Half Moon Bay to Snug Harbor Yacht Race.

A modest Stephens credited his crew for the hard-fought victory, praising their stamina and undying drive to win. "I'd have to say, if it wasn't for the courage of my fearless crew, the Minnow would have lost," Stephens joked

Continued on page 4.

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Charting the Future

► Color on the Mac adds a new dimension to business presentations, and tools already exist to help you get from the Mac screen to the slide projector. The Dunn Instruments film recorder has been around for a while, and last year Cricket Software upgraded *Cricket Graph* to work with the Matrix series of professional-quality film recorders and thermal color printers. Now there's a new way to convert black-and-white or color Mac documents to slides: ImageMaker, from Presentation Technologies of Saratoga, California. Priced at \$4995, plus \$149 for Mac driver software, ImageMaker produces slides with a very high resolution (8000-line) and a selection of 16 foreground and 6 background colors. ImageMaker combines phototypesetting techniques and plotter technology: beams of colored light go through negatives of ITC fonts to produce the text, and "styli" of colored light fill in graphic lines and shapes.

Mac II Cards

► National Semiconductor, the leading independent supplier of memory boards for DEC computers, is making its first venture into the micro-computer market with two products for the Macintosh II. The company's first Mac product is a memory card with 4, 8, or 16 megabytes of memory, using 100-nanosecond, no-wait-state, 1-megabit chips. The second product is a video buffer card that incorporates a new National Semiconductor DP

8500 graphics chip set. The card will offer a graphics interface of 8 to 32 bits. The company also expects to develop other products that take advantage of the two-billion-dollar corporation's proprietary technology. National Semiconductor's emergence as a Macintosh developer lends credibility to the Mac and may open some doors in Fortune 500 companies.

SuperMac Acquires a Parent

► SuperMac Technology, a manufacturer of Macintosh peripherals, has merged with Scientific Micro Systems of Mountain View, California, a major supplier of data controllers for the IBM PC market, including the OMTI controller built into most hard disk drives for both the Mac and IBM PC compatibles. SMS, a publicly traded company, exchanged 1,050,000 of its shares for all of SuperMac's common stock. SuperMac makes the DataFrame hard drives and recently released video graphics boards and high-resolution monitors for the Mac SE and Mac II.

Setting Type in Japanese

► Morisawa, the leading supplier of typesetting equipment and fonts in Japan, has made a deal with Adobe Systems to develop PostScript versions of their *kanji* fonts—all 8000 characters per typeface.

The Inside Story

► MacMemory, a Sunnyvale, California-based pioneer in upgrade boards for the Mac, now offers 20MB and 40MB internal hard drives for the 512K Enhanced Mac and the Mac Plus. The drives, for 3½-inch disks, fit in a modified bracket that also holds the Mac's internal 800K drive. MacMemory is betting on the custom bracket and the positioning of the drives to protect against the electromagnetic and radio-frequency interference inside the Mac—the same problem that led General Computer to build extra shielding into its HyperDrives and that eventually convinced Mirror Technologies to give up marketing internal drives.

Disk Drivers: Looking over Their Shoulders?

► Early this year, Kameran Labs filed for protection from creditors under Chapter 11 of the bankruptcy code. Coming after Micah's similar filing last fall, that makes two hard disk drive manufacturers that have been squeezed out of the crowded Mac drive marketplace. Ironically, the failures come as Mac owners clamor for expanded storage solutions; one manufacturer, for example, cited remarkably good sales in 1986, building up to a before-the-tax-changes rush, compared with nearly nonexistent sales at the end of 1985. More than one hard disk manufacturer predicts that only the strong will survive where now more than a dozen companies offer drives.

AST Offers MS-DOS Boards

► The Phoenix Technologies MS-DOS boards, mentioned in the April issue coverage of add-ons for the two new Macs, will be marketed by AST Research of Irvine, California. Both boards, which will probably be available by the end of the year, will allow the Mac user to run IBM PC programs in a window on the Mac desktop, allocating a portion of a hard disk for the alien operating system's documents and applications. The Mac86 board (\$599) for the Mac SE is equivalent to the IBM PC XT, based on the 8086 microprocessor; it works with programs that use the MDA and CGA displays. The Mac286 board for the Mac II (\$1499) works as fast as the IBM PC AT and includes 1MB of memory. It's compatible with IBM PC applications that use the Hercules Monochrome Adapter, as well as the other two graphics boards.

Traveling Incognito

► This spring Data Pacific, the Denver maker of a Macintosh emulator board for the Atari ST personal computer, plans to release a disk drive companion that lets the ST directly use Mac application and document disks. Simplifying the process of Mac-alike computing on the ST ought to bring more ST owners out of the woodwork and into Mac user groups.

(continues)

The Word Is Out

▶ The new 3.0 version of *Microsoft Word* has finally hit dealers' shelves (and upgraders' arms), producing sighs of relief from those frustrated by its predecessor's first-generation limits. At the same time, we're beginning to hear some cries of consternation: "The conversion to *Word* 1.05 may produce files that can't be opened from the desktop, especially long files." "Shift-Option-Click no longer works as a shortcut to paste selected text."

Tips are trickling in, too: If a keyboard shortcut for a Full Menu item (such as ⌘-D for character formatting) doesn't work, check to see if the Short Menu option is on. *Word's* many layers make fertile ground for exploration. Send us your discoveries; write to *Word* Tips, *Macworld*, 501 Second St. #600, San Francisco, CA 94107. We'll print the most helpful tips in an upcoming issue. We'll pay \$25 per published tip, with a special \$100 award for the best tip, selected by our panel of power users.

Database Buyers, Watch Out

▶ Succumbing to pressure from publishers of database management programs, Apple Computer has cut loose a high-end relational database and applications generator it had planned to release as Apple brand software. Code-named Silver Surfer and published in France as *4th Dimension* by ACI, the acclaimed database manager "is too good to be inside Apple," according to a company insider, and if published by Apple, "it would hurt third-party developers." Undaunted, ACI plans to form a subsidiary here to bring the

product to American users, perhaps as early as next month. In addition, ACI will publish an English-language version of *WriterPlus*, a sophisticated word processor that should compete with the new heavily feature-laden alternatives coming on the market.

Addressee: Recipient

▶ Loftus Becker, developer of *DAKey*, *Other*, and other shareware programs, may win the hearts of many Mac users with his latest offering: a desk accessory that addresses envelopes on the ImageWriter and the LaserWriter. The new program, *Envelope*, prints a single envelope or collects up to 100 names in a file for batch printing. The registration fee is \$10.

ThunderScan Goes Laser

▶ Andy Hertzfeld has reworked the software for Thunderware's ThunderScan device to improve scanning quality and to allow printing on PostScript printers such as the LaserWriter and the Linotronic 1200- and 2400-dot-per-inch typesetters. Due out this month, the new scanning software devotes 4 bits to each pixel, allowing more gradients of gray on high-resolution printers. Among the new features: the ability to include PostScript files for special effects, plus an expandable pull-down menu of PostScript commands, which convert into properly formatted PostScript code.

Subterranean Report

▶ Reports of the demise of the Mac Underground are somewhat exaggerated. The bulletin board and mail-order service's originator, On-Line Publishing, declared bankruptcy, leaving some mail-order customers in the lurch. But under the auspices of Buck, Wheat, & Associates, the Underground's nationwide bulletin board and weekly electronic magazine continue, with many of the same people involved.

Jazz's Successor

▶ At Apple's extravaganza in March to roll out the two new Mac models, Lotus Development previewed a new product code-named Galaxy that was originally intended as an upgrade to *Jazz*. Yes, it has macros—actually, a program language that provides even more power than a macro editor, plus integration of the six modules. Due to be released this summer, it offers an upgrade path for *Jazz* users who have a 512KE or better.

Musical Standards: A Work in Progress

▶ At the last meeting of the MIDI Manufacturers Association, music-software developers took a big step toward establishing a standard file format that would allow musicians to move freely from one Mac music program to another, taking advantage of the strengths of each on the way to a finished score or recording. At the January meeting the group agreed on some principles for the standard; since then Dave Oppen-

heim of OpCode Systems has been working on a specific proposal to present in June. If it's accepted, sequencers and other programs that recognize the interchangeable files could appear by the end of the year.

IBM Picks PostScript

▶ IBM Corporation has settled on Adobe Systems' PostScript page-description language as the standard for as-yet-unannounced desktop publishing products from Big Blue. Winning IBM's seal of approval puts PostScript way ahead in the competition for standard-bearer among the page-description languages that convert documents from the screen to a laser printer. PostScript is used by the Apple LaserWriter, the Linotronic typesetting machines, and by at least 65 other printers and programs; QMS even offers a PostScript conversion kit for Xerox's 2700 line of laser printers.

At last, Archimedes

▶ Borland International announced *Eureka: The Solver* (\$195), a versatile formula solver that handles dozens of mathematical, statistical, and financial functions—from solving simple linear equations to solving complex financial problems and then plotting a graph and printing a report. Twenty-nine functions are built into the program, which works with the 68881 math coprocessor that will be available on some boards for the Mac SE and Mac II. □

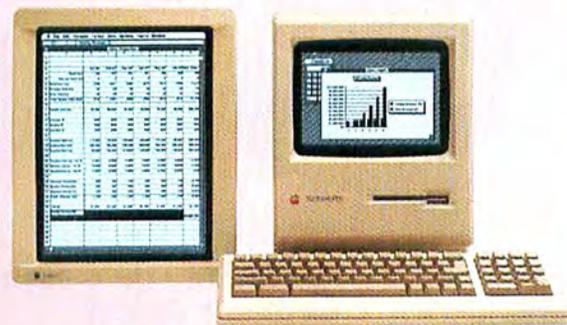
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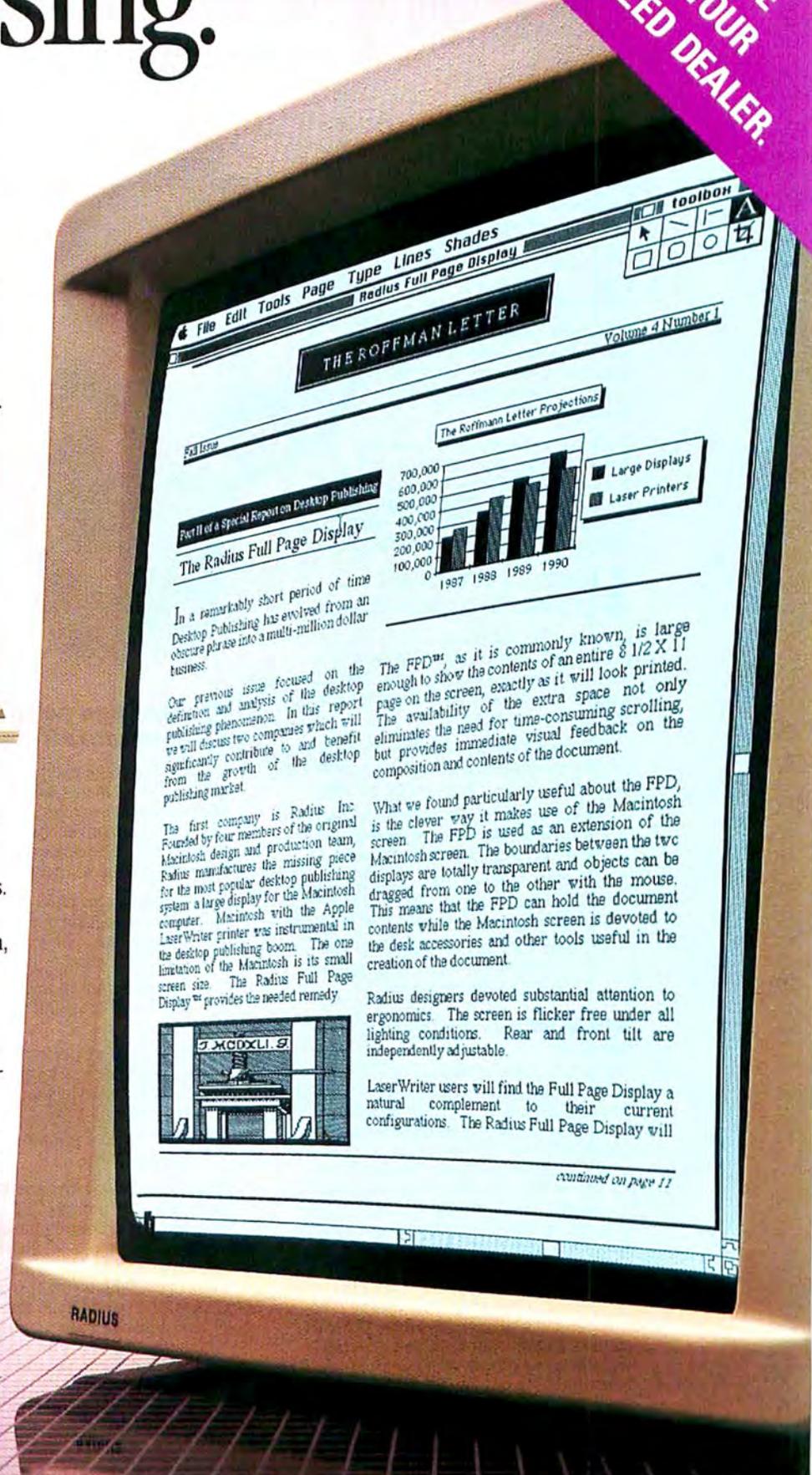
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continued on page 11

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If you're like most people your time is valuable. You believe you should, and could, be more effective managing your daily tasks. Perhaps you've even tried conventional methods of increasing efficiency—making lists of priorities, delegating, keeping diaries, etc.—only to find little has changed because you're still wasting valuable time.

That's why we wrote this guide. We want to explain four ways to improve the way you work by using the power of MORE and a Macintosh.

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1 Start a revolution at your next meeting.

How often do you come away from a meeting satisfied with the results? Probably not as often as you would like. Here are some simple ways to get more accomplished at your next meeting:

- Have a specific objective in mind; as the meeting progresses, be sure you're still dealing with the same problem.
- Only cover things that cannot be put across in other ways—bulletins, manuals, direct contact with supervisors, etc.
- Don't try to cover more ground than time will permit. You can't solve the world's problems in a 30-minute staff meeting.
- Prepare for the meeting. Find out what the other people attending need to know before the meeting.

Why MORE is so revolutionary in meetings.

Try taking a Macintosh and MORE into your next meeting. Start with an outlined agenda, develop the issues into a group action plan. The participants—even those who don't use a computer—can direct the content and organization of the plan. Graphic Tree Charts and Bullet Charts help you present the impact of your decisions. At any point, you can review what's been accomplished. Everyone gets a uniform set of meeting notes, on disk or printed. This frees the participants from having to take detailed notes. Everyone knows what was decided, so next time you sit down there won't be a debate. Spreadsheets started a revolution for people who work with numbers. MORE is starting a revolution for people who spend time in meetings.



What's different about this meeting? The Macintosh on the table is running MORE. With MORE in the meeting, ideas will be focused and presented better than ever before possible.

2 Manage people and projects effectively.

Managing people and projects can be very difficult. Some managers apply common sense, others learn by doing, others simply avoid the problem altogether. In an effort to simplify a complicated subject, here are a few things that will help any manager:

- Managing requires a great deal of talking and listening. It sounds easy, but it is a constant job that requires a concentrated effort.
- Job descriptions and boundaries should be provided for every person's job.
- Feedback on performance and encouragement improve motivation. Doing and saying nothing leads to stagnation.
- Find the best people you can and support them.

Now there's a way to manage people and projects better using MORE. Managers, executives, corporate planners and personnel staff can use MORE to outline their management ideas and instantly transform them into a Tree Chart. You can use Tree Charts for organizational charts, project flowcharts, decision trees, block diagrams or time lines. MORE also is a powerful tool for writing job descriptions and preparing employee reviews. As a project management tool, MORE is fast and flexible.

3 Create a time-saving Status Center.

The first step in becoming more time-efficient is to identify how you spend your time. Naturally, once you've figured how and why time is spent, you begin to do things that give you higher payoffs and more satisfaction.

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The next best thing to having a clock that runs backwards is having a Macintosh that runs MORE. With MORE you can set up a Status Center to organize the details of your daily work.



Some of the best ideas you have don't always happen in front of a computer. (That could change after you've used MORE.) For example, you can take your ideas from scraps of paper to a finished presentation in minutes.



daily work in an outline—your personal Status Center. You keep this outline up-to-date, using it to:

- List and organize your tasks
- Record names, addresses and phone numbers
- Keep your daily calendar
- Write and file notes and memos
- Track your expenses

MORE's power outlining lets you change and interconnect your lists with ease. You can use the Templates feature to store "boilerplate" such as an address form and call it up at any time. The calendar feature will generate a daily schedule automatically. Most of your writing and word-processing work can be done right in MORE. You can even dial a phone, record the time and date, and calculate a sum—all by pressing a key. MORE is the ultimate tool for desk-top productivity.

4 Process your ideas, then present them.

If you've ever had to prepare a presentation in a hurry, you know how frustrating and time-consuming the task can be. Technique is an important part of presenting your ideas effectively. Here are some simple steps that will take you from rough ideas to finished presentations:

- Make a "laundry list" outline of basic ideas.
- Become uninhibited with your ideas—don't edit on your first pass.
- Be generous with headings, call-outs, charts and illustrations.
- Allow yourself the flexibility to change your presentation, even at the last minute.

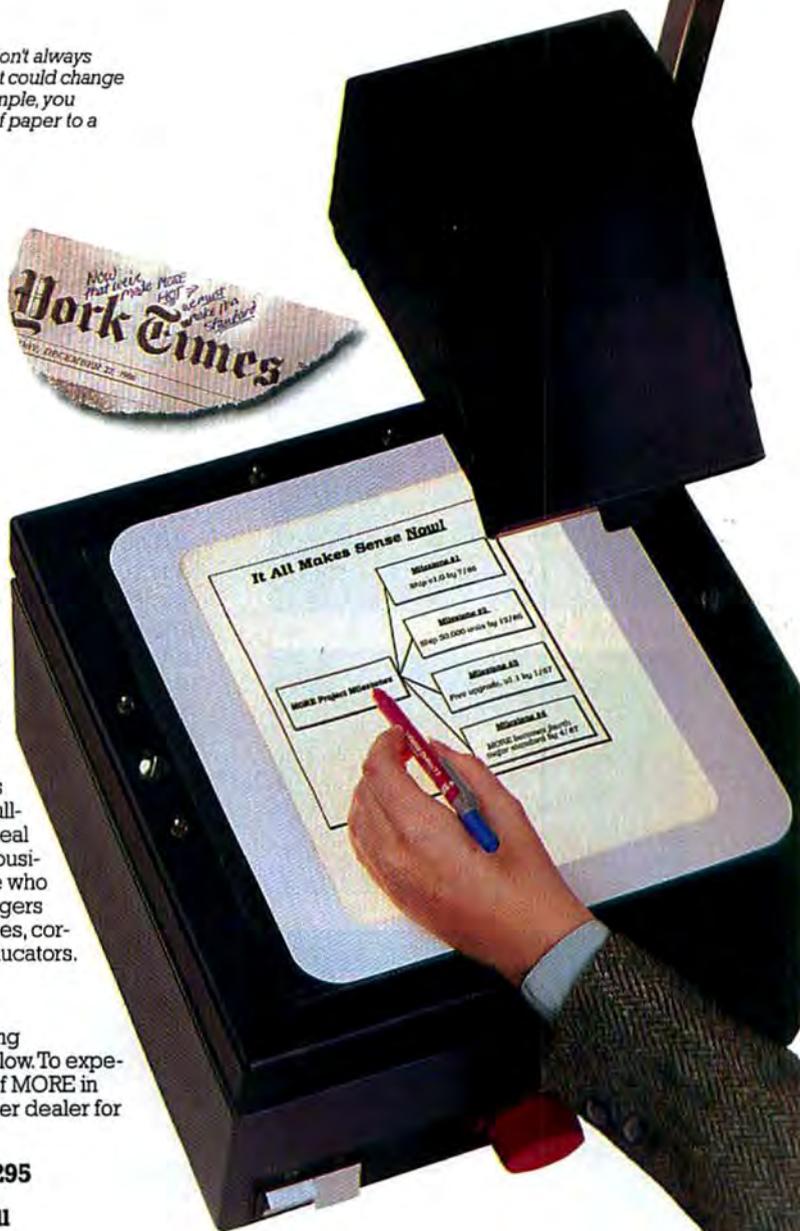
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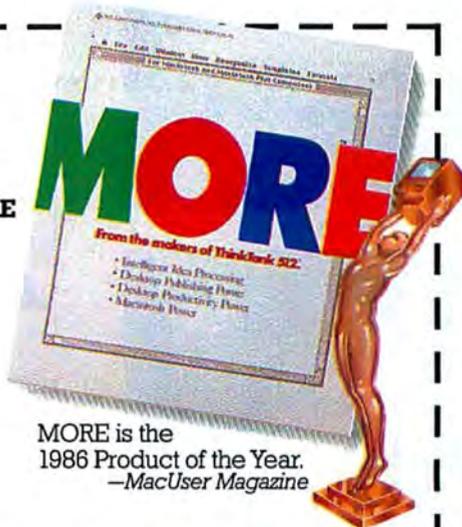
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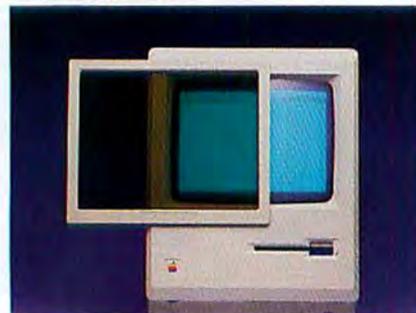
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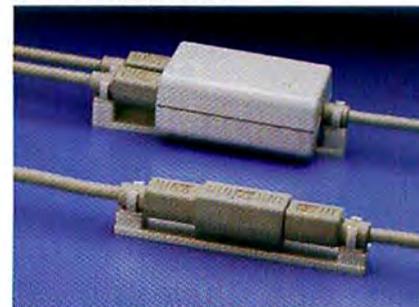
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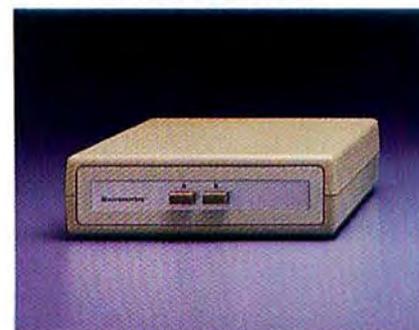
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The Software Inquisition



"Look and feel" has to rank as one of the most obnoxious bits of jargon ever to come down the personal computer pike. It may very well be the software equivalent to "scratch 'n' sniff," but with an odious meaning: scratch a program and sniff out a potential copyright violator. One thing is for certain—following the recent lawsuits that Lotus Development filed against Paperback Software for *VP-Planner* and against Mosaic Software for *The Twin* over their alleged copyright infringement of Lotus's *1-2-3*, look and feel has become one of the most widely debated and explosive issues currently facing the personal computing community. At New York's 47th Street Computer discount store, director of computer sales Bobby Orbach aptly described the state of the software industry in the wake of the lawsuit: "It don't look or feel too good."

That may be putting it mildly. Already a lot of software developers are feeling intimidated. They're worried that they might be violating somebody else's look and feel copyright. Suddenly lawyers are becoming part of the software teams making design decisions.

I think we all know what that means. It means that new software products will take longer than ever to reach the market. And skyrocketing legal costs are certain to be passed down to the consumer in the form of higher-priced software. Some industry analysts are even worried that the Lotus lawsuit will throw the software industry into a five-year tailspin in the courts, causing the U.S. to lose its edge over foreign competition. Leadership will pass to Europe, Japan, Singapore, India.

All for what?

How sincere is Lotus in its motives? Does it really want to safeguard the creator's right to benefit from creative endeavor—or is this just a question of Lotus clinging to its near-monopoly on the spreadsheet market?

I recently attended Esther Dyson's Personal Computer Forum in Phoenix, Arizona. It's an annual gathering of top personal computer moguls and execs. They

get together at the posh Pointe resort to network, talk shop, and shoot the breeze. This year they were also chewing on the notion of look and feel. It was one of the hottest topics of the three-day event. Everyone was extremely concerned about the consequences of the *Lotus* case.

All software companies have a look and feel skeleton rattling somewhere in their development closet. Where do you draw the line? After all, Lotus itself copied the look and feel of *VisiCalc*. MS-DOS is a CP/M look-alike. I've even heard that an early version of MS-DOS has Gary Kildall's name embedded in the code.

Is Digital Research going to sue Microsoft? Is Xerox PARC going to sue Apple over its pulldown menus, windows, and mouse? Will Doug Engelbart sue Xerox PARC? The potential hit list is endless.

At Dyson's forum I decided to find out more about Lotus's lawsuit from none other than Mr. Look and Feel himself, Mitch Kapor. It was a rare opportunity; I might add, since Mitch has been a less-than-public figure ever since he left the helm of Lotus last year. He gave an interview to *Inc.* magazine, then dropped out of sight.

In Phoenix he was as big as life in his trademark Hawaiian shirt—a surprise guest on a panel that discussed the coming of the 80386 machine. Even though my topic was a tad off the mark, I couldn't pass up the chance to ask Mitch the Big Question: "How would Lotus have been different if you hadn't been able to copy the look and feel of *VisiCalc*?"

While refusing to comment on the case specifically, Mitch went on the record by declaring that "the current litigation... has to do with products that are keystroke-for-keystroke emulations of other products—in other words, clones. The current litigation is not taking a position on issues other than that."

(continues)

■■■■■■ "Look and feel" is the most divisive issue facing the personal computer community since copy protection.

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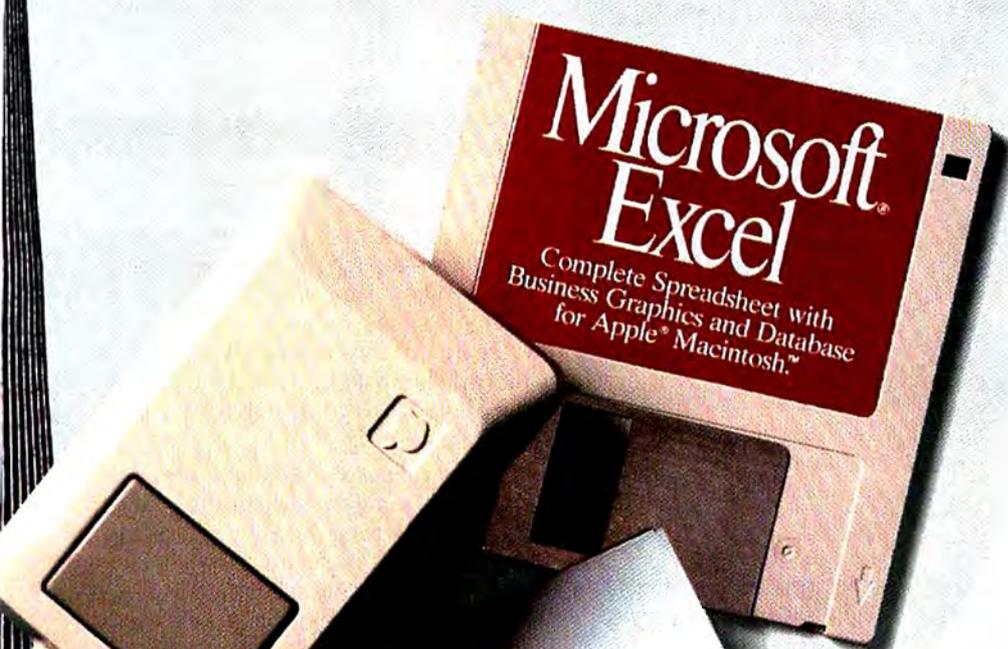
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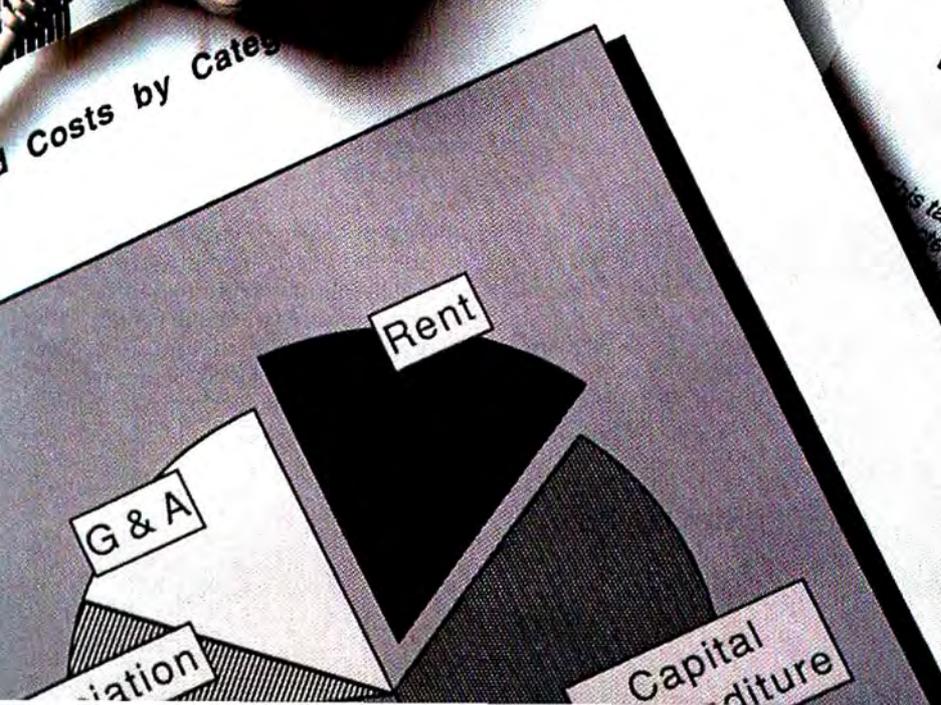
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Costs by Category



Marketing Department
 Pricing Analysis for New Model Introduction
 Prepared by John Ward
 Marketing Department

Variable Cost	\$1.25 per unit
Fixed Costs:	
Rent	\$65,000
Capital Expenditure	\$120,000
Depreciation	\$25,000
Advertising and Promotion	\$125,000
General and Administrative	\$50,000
Total Fixed Costs	\$385,000

This table presents the contribution from the new model at various prices and volumes.

500,000	\$1.85	\$1.90	\$
550,000	(\$85,000)	(\$60,000)	(\$35,000)
600,000	(\$55,000)	(\$27,500)	(\$5,000)
650,000	(\$25,000)	\$5,000	\$37,500
700,000	\$5,000	\$37,500	\$70,000
750,000	\$35,000	\$70,000	\$102,500
800,000	\$65,000	\$102,500	\$135,000
850,000	\$95,000	\$135,000	\$167,500
900,000	\$125,000	\$167,500	\$200,000
950,000	\$155,000	\$200,000	\$232,500
1,000,000	\$185,000	\$232,500	\$265,000
1,050,000	\$215,000	\$265,000	\$297,500

David Bunnell

Now, my mind is pretty much an open system, as those of you who know me personally can attest. While I'm opposed to the general thrust of Lotus's look-and-feel offensive, I'm not insensitive to the issue of protecting intellectual property rights—within reason. If the look and feel of an interface has some truly unique aesthetic characteristics, then I think a case could be made for those characteristics to be copyrightable.

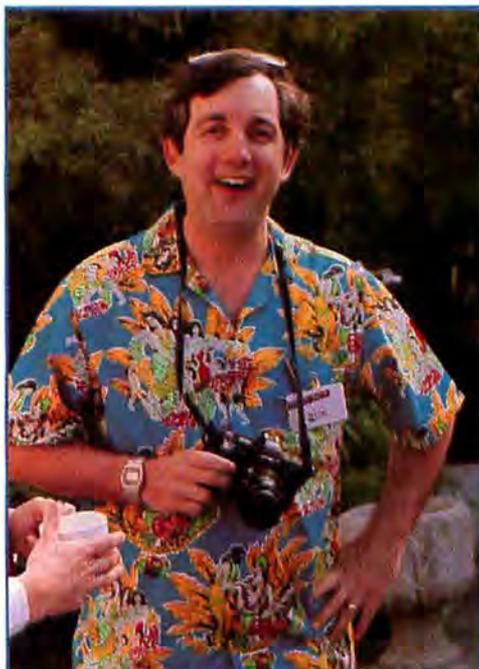
It seems odd to me, though, that "key-stroke-for-keystroke" emulation should be the issue here, as Mitch insists it is. In fact, I think the opposite is true. It's the look and feel of the screen that is really in contention. I believe that users would be deprived of a lot of potentially great software if the keystroke-by-keystroke standard becomes the rule.

For one thing, there are little kernels of familiar steps inside new programs, which make those programs much easier to learn. In this case, familiarity breeds competence.

I wasn't the only one at the forum who had arrived at this conclusion. Vern Raburn, chairman of Symantec, concurred. "People really benefit if we take existing interfaces instead of making them learn a whole new sequence just because we've got to come up with a product that doesn't infringe on look and feel." Raburn also noted the tremendous expense that corporations would have to incur to train employees to learn a new program from scratch.

Other cogent and powerful voices were raised at the forum against Lotus's position, particularly at the software litigation panel. Dan Bricklin, Software Garden president and cocreator of *VisiCalc*, is one of the prime drivers of the anti-Lotus movement. "Most of the developers I talked to... would like to be free to borrow from others as they see fit, in terms of the human interface," Bricklin declared. "They're aghast at borrowing code; they wouldn't consider doing that. In general, software advances by evolution. There are revolutionary steps, but lots of things are done through evolution. It occurs whenever somebody has to rewrite from scratch and that person's ego gets involved. You never copy exactly; you always embellish be-

cause of your ego. That's how we get the genetic mutation that makes evolution. Then you test the product in the marketplace to see if that mutation is good enough."



Mitch Kapor maintains that "the current litigation... has to do with products that are key-stroke-for-keystroke emulations of other products."

Bricklin's views were echoed by Ashton-Tate's chief scientist Robert Carr, who spoke out as a concerned member of the personal computer community. "The notion that the first person who happens to file for a particular look and feel is the one who can license it to everyone else and get rich from it is really destructive. We're all working with a very small screen," Carr observed. "There are only so many ways to have intuitive, transparent, easy-to-use interfaces, and we're all slowly borrowing from each other and evolving—getting closer and closer to convergence on a few very successful paradigms, metaphors, and syntaxes to use in interacting with the screen," he said. "If we make what I call arbitrary deviations—if for no other reason than to protect themselves legally, people purposely make their user interfaces noticeably different—that's going to stunt the growth of the industry. No one wants to learn five or ten different user interfaces."

Camilo Wilson, Lifetree Software president, was no less withering in his criticism

of Lotus's position. "The history of this industry, going all the way back to mainframes, is that we have always built on the shoulders of others' accomplishments. So why should Lotus get away with it when they have been a main beneficiary of that tradition? Not having that freedom anymore is outright damaging."

What really surprised me was how strong the anti-Lotus mood was among the industry leaders who attended the forum. In a show of hands at the litigation panel, only a few people out of the several hundred attendees were on Lotus's side. Clearly, the consensus of those present was that Lotus has made a serious mistake in pressing the look and feel issue. Reportedly, Paperback Software has vowed to fight this case "to the death."

On the other hand, there are some very vocal proponents of the lawsuit. Bill Gates, Microsoft chairman and CEO, belongs to this camp. "When is something plagiarism?" he asked. "Is some drawing of a mouse stealing the image of Mickey Mouse? When is music stolen? These are all tough questions, but we've managed to do well with the laws we have. Having a lawsuit will eliminate confusion, not create confusion. We're going to have a ruling from a judge."

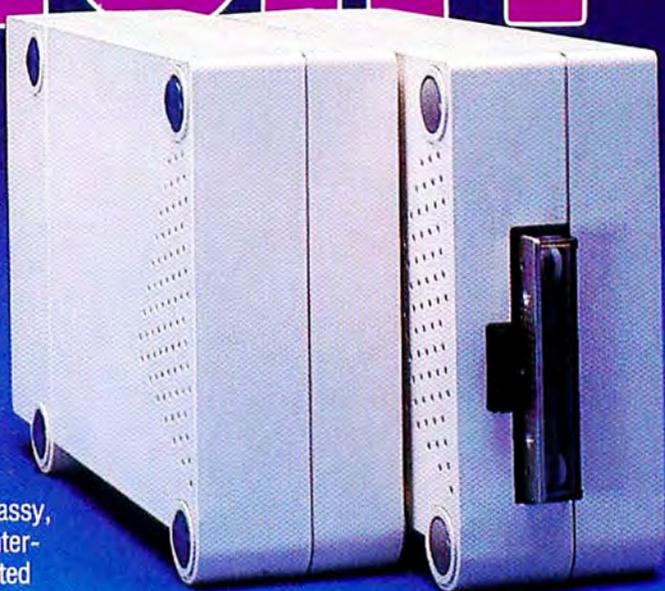
I, for one, have my doubts about the wisdom of going the courtroom route. In my opinion, letting the lawyers and the courts decide an issue that is so vital to the community as a whole is a big mistake. For that matter, the final decision may come out in a way that even Lotus may not welcome. Meanwhile, the whole software industry will grind to a halt while everyone sits around giving depositions.

I believe this issue should be resolved by everyone who has a stake in the outcome of the look and feel affair. There should be a consensus on policy by all the players involved. Once we agree, we can forge the path to legislation and get a proper law passed for the industry to follow.

I strongly urge you to pay close attention to the debate and to let your voice be heard. After all, this may seem like look and feel, but the crux of the issue is really freedom of expression and the future of personal computing. Let's look before we leap—and feel before we act. □

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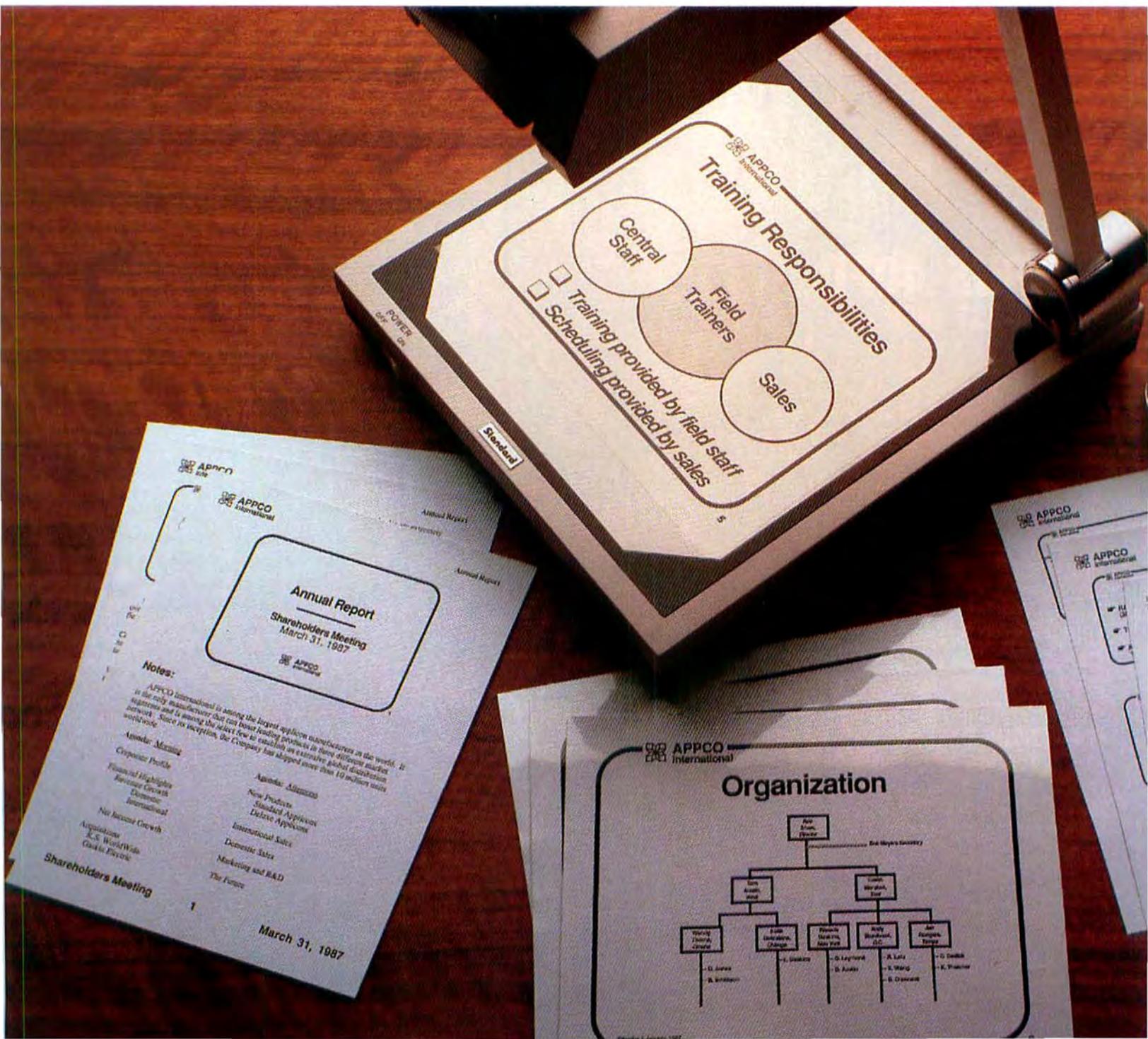
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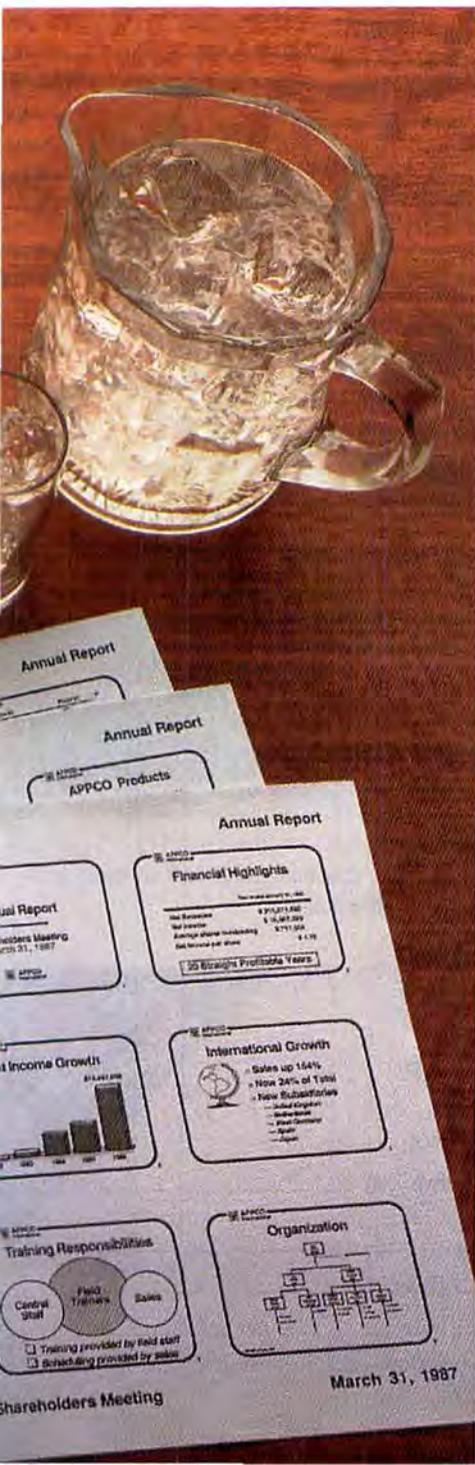
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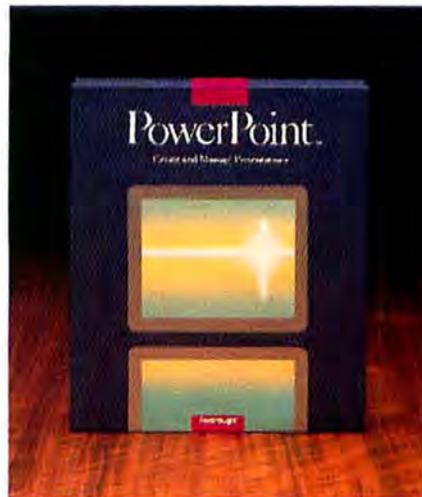
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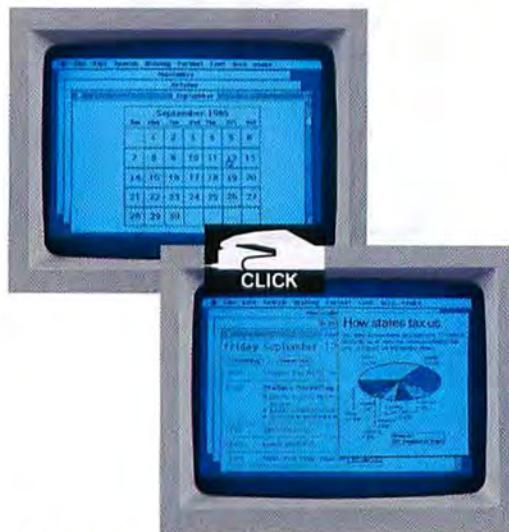
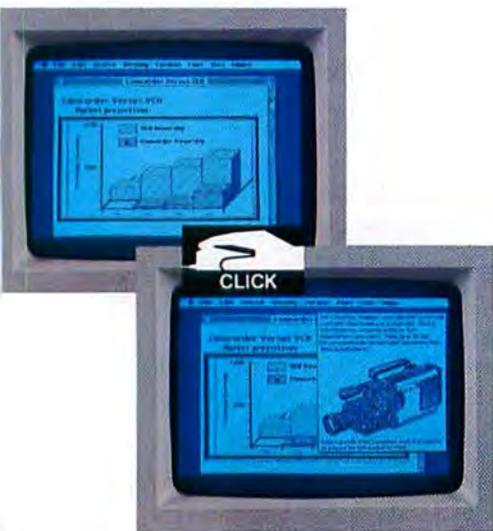
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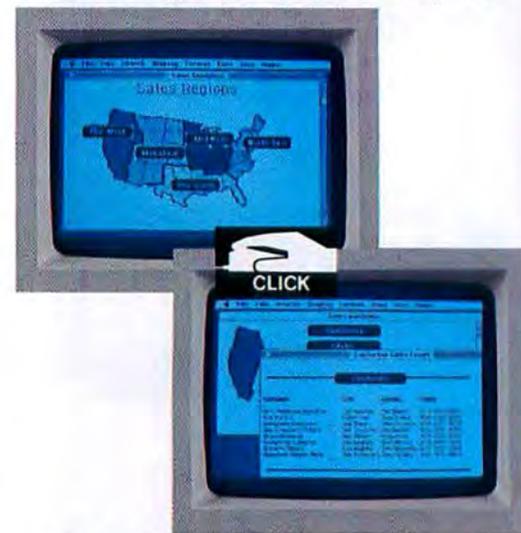
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Letters

A forum for Macworld readers

Disk Librarian Notes

A revised version of my shareware program *Disk Librarian* ["Taming Your Hard Disk," *Macworld*, November 1986] is now being distributed by Ideaform, under the name *DiskQuick*. The new version does not automatically process the hard disk when the program starts up; there is a menu item that catalogs the hard disk. It is available for \$38.50 postpaid from Ideaform, 908 E. Briggs, Fairfield, IA 52556, 515/472-7256.

Existing versions of *Disk Librarian* will remain in circulation, but all new development effort will be on *DiskQuick*. Shareware has been a fascinating venture, but for a lone programmer it can be hard to keep up with the mail.

John R. Goldin
New Haven, Connecticut

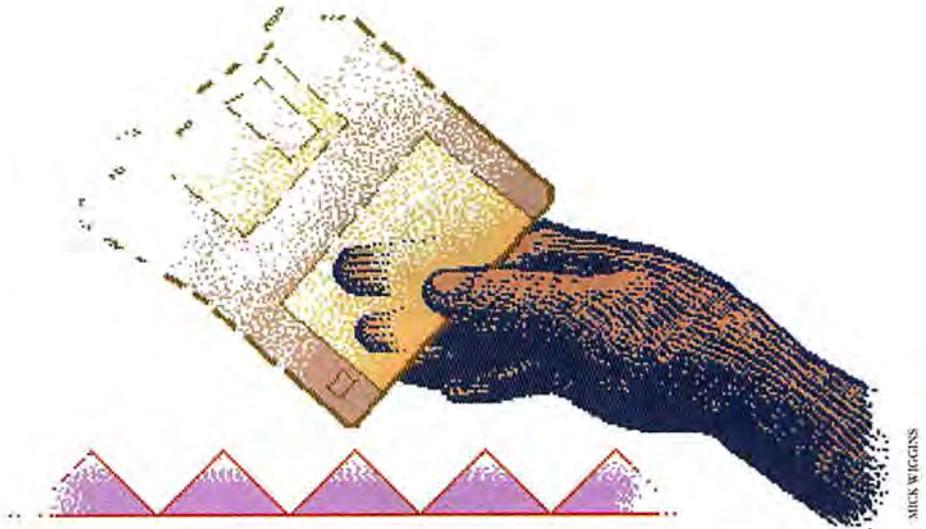
Corrections

Amcodyne's PbD ("Shopping for SCSI Storage," January 1987) has an 80MB capacity, plus a 20MB removable cartridge. It includes two ports and comes with a cable and backup software. SCSI addressing is possible using DIP switches. The PbD works with both HFS and MFS, and it's LaserWriter compatible. The list price is \$5495.

The list price for ProPlus Software's Market Pro (Reviews, January 1987) is \$395.

Microsoft Works, listed in the December 1986 Where to Buy, requires 512K minimum memory.

The review of ColorPress (Reviews, December 1986) was coauthored by Edwin Haskell. The Ragtime review (Reviews, February 1987) was written by Mike Krell.



The Scourge of Vaporware

I feel growing alarm about your treatment of vaporware products as if they were legitimate items for review. Why not concentrate on in-depth reviews of what is available? A separate column on vaporware or promised software would be entirely acceptable, but please don't mix the two together. Wishful thinking does not make software come into existence.

Jerry Freilich
Athens, Georgia

On rare occasions we do run a review of beta-version (prerelease) software if the subject matter and reader interest warrant it and if we have confidence in the future of the prerelease product. We realize that it's a balancing act to present fair, accurate, and timely information about this volatile field in a monthly magazine; for every reader like you who urges us to be cautious, we hear from several who want us to pass along every unconfirmed rumor we've heard about the latest bush-bush projects at Apple. For now, we'll try to point out clearly when we're talking about prerelease products. —Ed.

Arbiters of Style

I found the feature on word processing ["Writing Your Own Ticket," December 1986] informative. Now that easy-to-read, typographically advanced documents are becoming commonplace, what have software companies done to assist writers in making documents *understandable*? Are there grammar-checking programs?

William R. Pagels
Elkton, Maryland

Yes, products are coming on the market that analyze a document for subject/verb agreement, length of sentences, length of words, and so on. They include Doug Clapp's Word Tools, published by Aegis Development, and Mac Proof, from Automated Language Processing Systems. But some of us traditional publishing types think they'll never replace good copy editors who know a nuance when they see one. —Ed.

More Finder Alternatives

"Mac Desktop Tools" [January 1987] made no mention of *SuperStation*, one of the best Finder stand-ins, which can open documents directly, unlike *WayStation*. Incidentally, *WayStation* and *SuperStation* of-

(continues)

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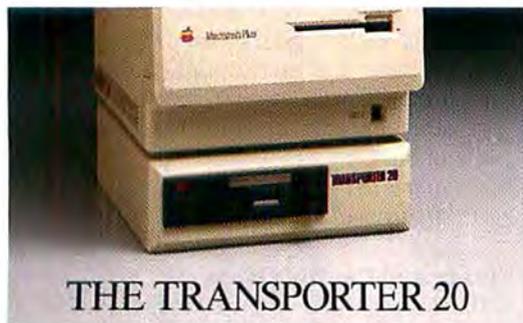
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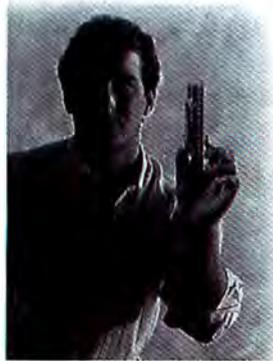


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Circle 1 on reader service card

Letters

fer another advantage; the system used to launch *WayStation* and *SuperStation* remains the active System file, even if the application you open is on another disk with its own System Folder, so you don't have to constantly double-click on the Finder to return control to the disk you want.

Also, your wordprocessor comparison ["Writing Your Own Ticket," December 1986] missed a feature of *Microsoft Works* that I find invaluable: when text is copied into *MacDraw* or the Scrapbook, the text formatting remains intact.

Bruce Long
Tempe, Arizona

More Alternatives

The best Finder substitute around is *Oasis* by Jan Eugénides. It is much like *WayStation* except both applications and documents can be launched directly. *Oasis* performs such file manipulation tasks as moving, copying, and deleting files. In addition, you can arrange your files in a custom layout on the *Oasis* desktop, so you can group applications and files logically.

P. Grover Cleveland
Grass Valley, California

Thanks for telling us about this new shareware offering, available from user groups and on-line services. At \$15 it's a bargain. —Ed.

Unfair Comparison

We found your comments on *Ragtime* to be accurate ["New on the Desktop," January 1987]. However, we were disappointed to see that our product was compared with a number of unreleased products. Of the five products in the review, *ReadySetGo* was the only one actually on the market with kerning and hyphenation. *PageMaker 2.0* had been postponed until March, maybe, and *LetraPage* [now *MacPublisher III*] and *Solo* [now *Scoop*] were even less definite. In contrast, *Ragtime 1.1* has been released by now; it includes soft hyphens and imports formatted text from *MacWrite* and spreadsheet files from *Excel* and *Multiplan*. Version 1.1 also imports graphics in TIFF format. Kerning will be addressed in a later release. Including these features in a

description of *Ragtime* would have put it on a more equal footing with the other (unavailable) products with which it was compared.

Karl Seppala
Ragtime Product Manager
Orange Micro, Inc.

In fact, the article was presented as a preview, not as a review; we specified that much of the information in the comparison chart was based on prerelease software. You have a point about the comparison being apples and oranges; we ought to have mentioned the features you planned to implement in forthcoming upgrades. —Ed.

WayStation Update

I'm glad that Prasad Kaipa likes my Mini-Finder substitute program, *WayStation*, but I want to correct the impression that it's a shareware program. On the contrary, *WayStation* has always been in the public domain, and I have never requested any payment for it.

By the time this is published, *WayStation's* successor, *PowerStation*, ought to be available through the usual dial-up networks, BBSs, and user groups. It allows hundreds of applications to be configured for launching and can launch or print documents.

Steve Brecher
Sunnyvale, California

Taxes and Capital Gains

"Mac Finance Tools" in the January 1987 issue claims that the tax distinctions between short- and long-term capital gains and losses have been eliminated by the new tax laws. That is incorrect. The Tax Reform Act of 1986 does phase out the long-term capital gains deduction, but there will still be some preferential treatment of such gains until 1988. More important, the act did nothing to change the treatment of long-term capital losses. Such losses will still be limited to \$3000 in excess of capital gains. Thus it is still important to track both short- and long-term capital gains and losses separately. Any financial management software that does not support such tracking should be downgraded.

Nello Lucchesi
Des Plaines, Illinois

(continues)

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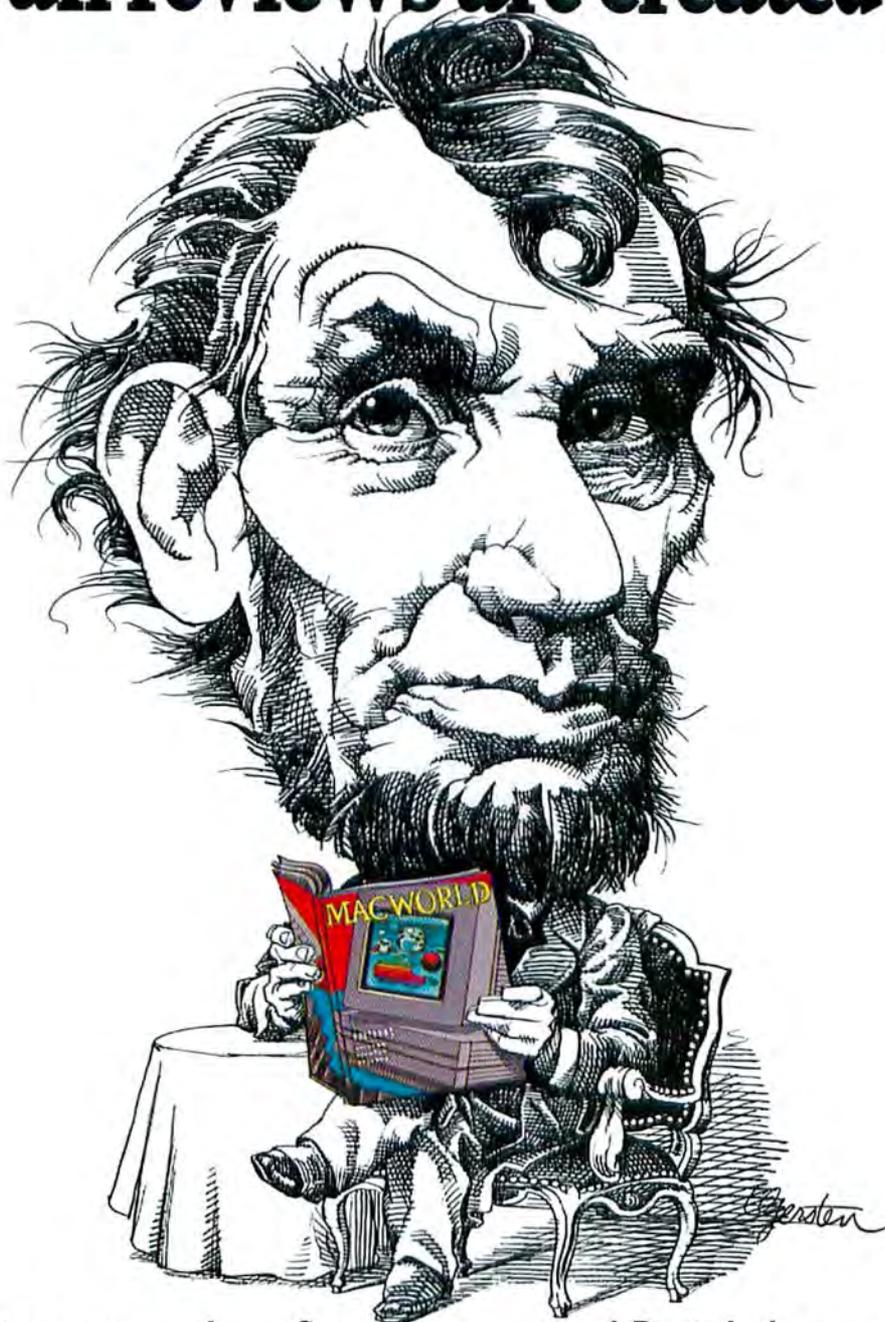
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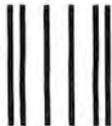
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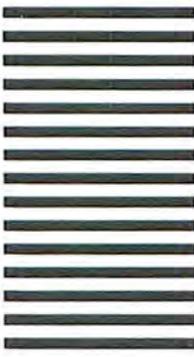
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Letters

Looking Back

Now that I have the 1986 Annual Index in the January 1987 *Macworld*, I realize I'm missing the September 1986 issue. How do I order a back issue?

*M3 Sweatt
La Jolla, California*

So glad you asked. Write to ask for a specific back issue (\$6 each, postpaid): Macworld Back Issues, 144 Townsend St., San Francisco, CA 94107. —Ed.

Laissez-faire Editorializing

David Bunnell's December editorial opposing protectionism for chip manufacturers was an excellent defense of free enterprise, until he got to the subject of a U.S. Federal Court's protection of Intel's microcode as intellectual property. Without a consistent and unwavering defense of the right to control one's own property, one cannot defend free enterprise, since private property is the foundation on which it rests. The court's decision should be hailed as a defense of property, the one thing that government is supposed to do.

*Doug Thorburn
Van Nuys, California*

Getting the Lowdown

A few corrections to the comparison chart that accompanied "Shopping for SCSI Storage" in the January 1987 *Macworld*. LoDown's 12-month extended warranty added to the standard 90-day warranty comes to 15 months total. Contrary to the chart's report, all our drives and tapes can have their SCSI addresses changed. We do offer backup software for an additional \$39.95. Most important, our tape backups *do not* do a mirror image backup. As I'm sure you're aware, a mirror image backs up the bad tracks from the hard drive and causes the users no end of heartburn when they try to restore the files on another hard drive.

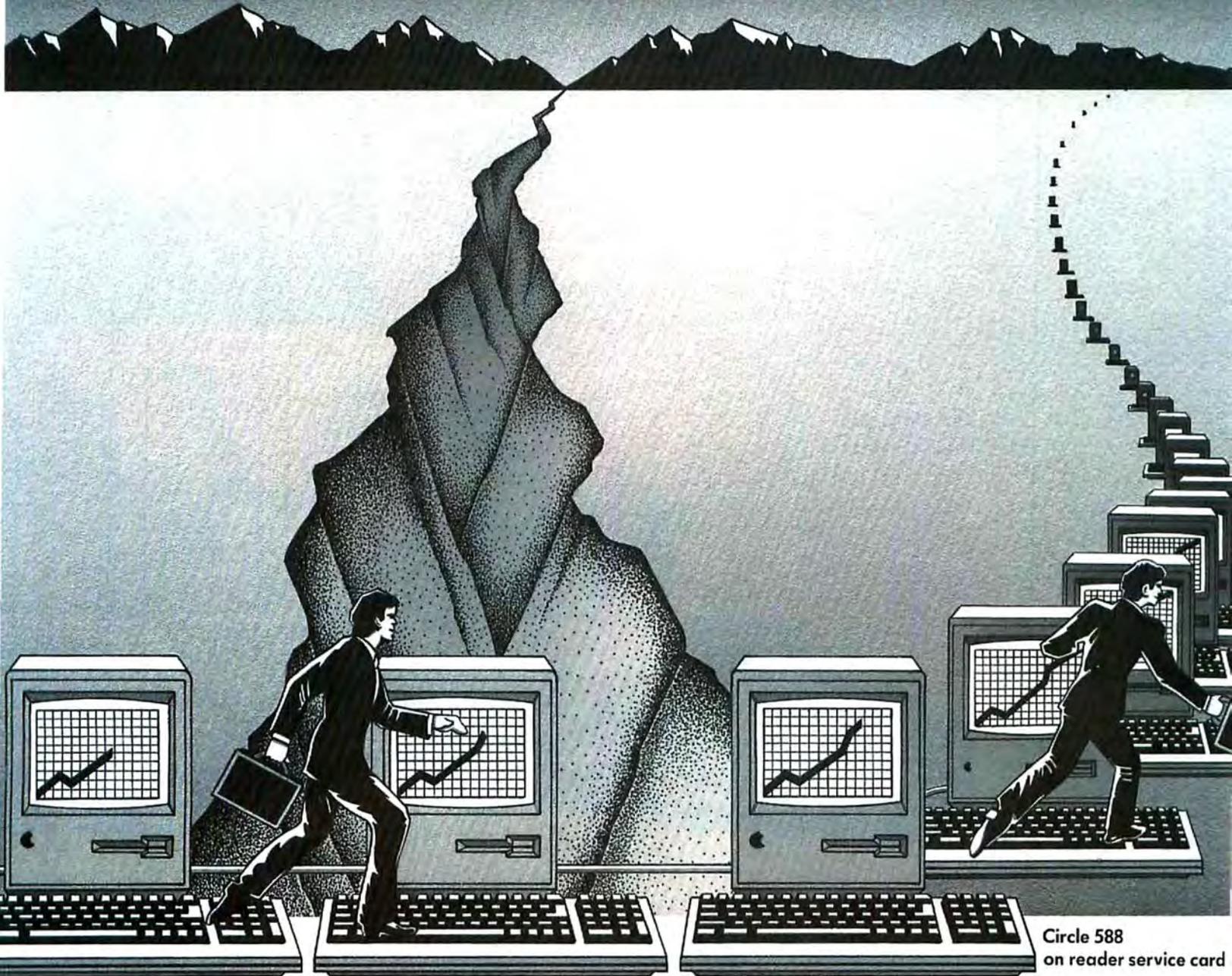
*Kathleen Anderson
LoDown
Scotts Valley, California*

A Memory Jog

Steven Levy's column "A Shut and Open Case" [*Macworld*, January 1987] grappled with an important issue. However, it com-

(continues)

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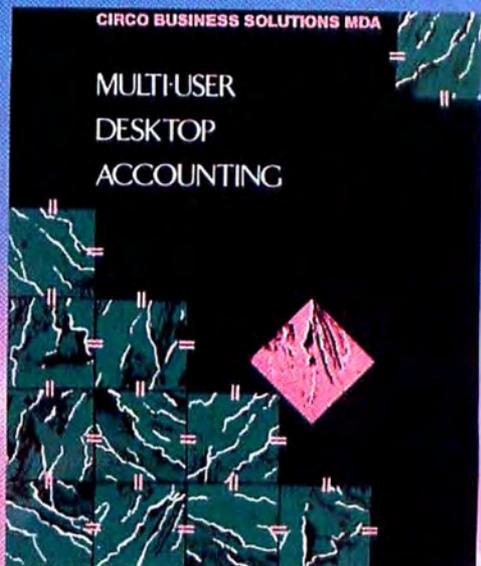
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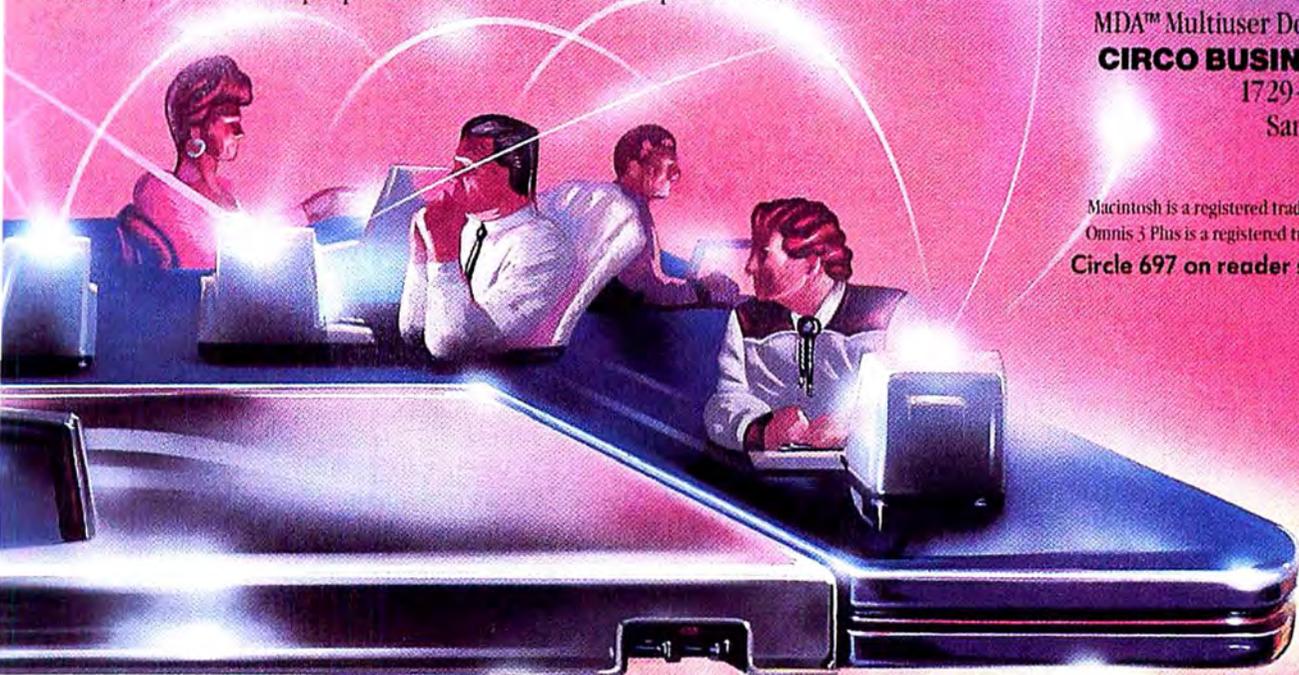
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Letters

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John G. Foley
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Laser Tips

After reading "Insights on the LaserWriter" in the January 1987 issue, I have a few comments to pass along. Some of our users regularly switch between weights of paper—60-pound paper in the cassette and 100-pound paper in the manual feed. They have not reported paper jams, but sometimes the toner does not fuse to the heavier paper. It doesn't brush off, but it chips off very easily. One user finished the fusing process by baking the paper in his oven at 350 degrees for 20 seconds (any longer and the paper ignites).

For labels, use Avery's laser label stock, part numbers 5160 through 5262.

The toner that we use to recharge cartridges seems to produce a nice black image on 20-pound xerographic paper; custom papers, such as 24-pound linen stationery, sometimes have the flaking problem. When we recharge the cartridge with toner specially formulated to compensate for the normal wear of the cartridge, we also replace any worn cartridge parts.

Harvey Cogen
Laser Toner Refill Company
Torrance, California

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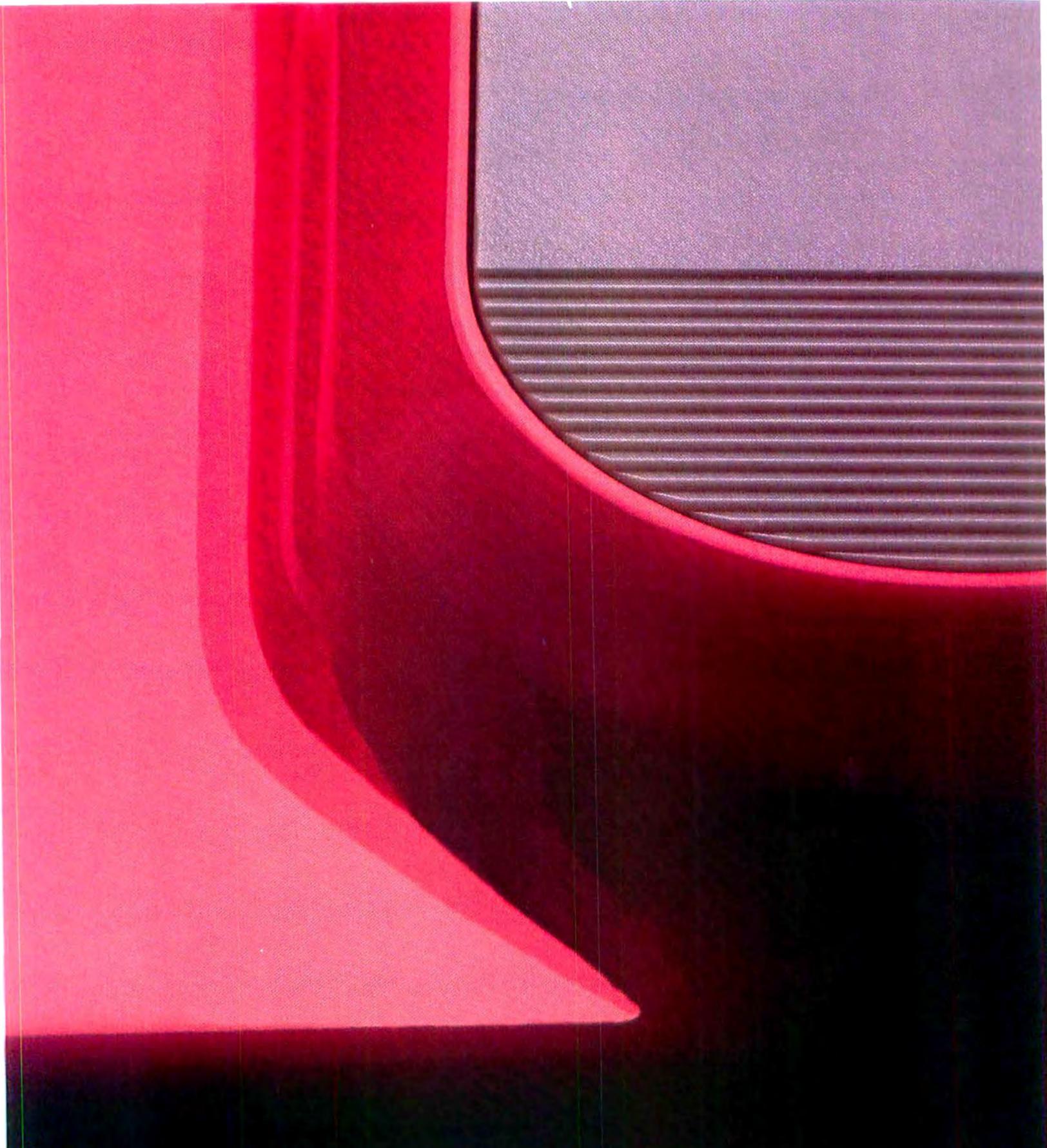
From left to right, the Mirror family: Magnum 800, Magnum Tape 20, Magnum Tape 40, MagNet 20X (not pictured), MagNet 30X, MagNet 40X, New MagNet 85/40, MagNet 85X, MagNet 172X, MagNet 340X, MagNet 40/40.

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The logo for Mentor software, featuring a stylized graduation cap icon to the left of the word 'Mentor' in a bold, red, serif font.

Mentor™ It's what MacLightning has become.

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Wading into the Macworld Expo

*A roundup of new products and trends
that surfaced at the show*

We sat in the booth of Satori Software, Satori president Hugh Rogovy and I, both slightly exhausted from trooping over the huge Macworld Expo exhibit floor. "Looks like it's time for me to have a booth designed," Hugh sighed, glancing at the imposing exhibit booths of Ashton-Tate, Manhattan Graphics, and others surrounding us. That note sums up the tenor of the January expo in San Francisco.

The expo has come much farther than the physical distance from the slightly seedy Brooks Exhibition Hall where it started, to the glistening new Moscone Center. With over 30,000 attendees, the expo was at once the harbinger of a new success for the Mac and the end of an era for Apple Computer. Apple seems to have severed a cultural link with the Computer Faires, still held in Brooks Hall, and grown akin to IBM and its related conferences. The Macworld Expo is less a place where people go to buy products and more a venue to demonstrate new technology.

Some participants will hold out for the informality of the early days. Charlie Jackson, president of Silicon Beach, vows to retain a simple booth and dress in trademark Hawaiian shirts. But the rest, Aldus, Cricket Software, Adobe, MacMemory, Dayna, Letraset, Living Videotext, and Apple itself, have all chosen to erect edifices that resemble little high-tech villages.

The expo brought revelations in both marketing and technology. First prize for marketing acumen and celerity goes to Letraset, subsidiary of the \$6-billion giant Esselte Pendaflex Corporation. Letraset decided that *LetraPage*, née *MacPublisher*,

was not a winning product, and acquired the rights to market Manhattan Graphics' *ReadySetGo* the night before the show began. *MacPublisher* will now be sold by its developer. Combined with the acquisition of a gray-scale paint package, known as *Grey Paint* before its release, Letraset demonstrated its intent to be a major supplier in desktop publishing.

Ashton-Tate deserves an award for retaining the interest of potential buyers despite continuing delays of its *dBase* product for the Mac.

Newcomers such as *Trapeze* seem bent on making the spreadsheet market hotter. Magic, a start-up firm in Nebraska, was also showing a spreadsheet with flexible cell arrangement.

Compugraphic (CG), the world's largest seller of typesetting equipment, has decided to reenter the Macintosh market, and quietly let it be known that its typesetters will have PostScript drivers. CG has ignored Apple since developing a line of desktop publishing products based on the Lisa, only to learn that the Lisa was going to be discontinued (to its credit, CG continues to service the 200-plus purchasers of the system). Bree Communications of Canada announced software that converts CG typesetting codes for Macintosh documents.

Ann Arbor Software demonstrated *FullWrite*, a word processor that "gives you the look of desktop publishing" without the pain. Point well taken, but the product still needs some development work. Also in the realm of DTP were myriad announcements on scanners: Abaton, Dest, Datacopy, and Microtek showed scanners, some with OCR software. Their flatbed scanners are in the \$3000 price range.

Other exciting scanner developments—products based on a Canon device that cost about \$1500, shown by New Image Technology and LoDown. These scanners input a full page of text in about 15 seconds. The surprise DTP software of the show was from Quark, whose *XPress* software will further broaden this field.

Data storage was no disappointment: prices fell, larger-volume products were announced, and the first optical disk for the Mac debuted. Mirror Technologies, LoDown, Northern Telecom, Peripheral Land, and CMS Enhancements showed 340-, 155-, 265-, 230-, and 320-megabyte drives respectively. LoDown offered two versions of write-once, read-many (WORM) optical drives with 400MB and 800MB on each removable platter. Warp Nine announced an internal 20MB drive for the Mac at \$499.

In addition to numerous Big Pictures, MegaScreens, and Full Page Displays, two new large screens appeared from Nutmeg Systems and Network Solutions. Nutmeg's screen uses a very high-quality Xerox monitor, while Network's Stretch Screen Display uses the same Monitorm 19-inch display found in the MegaScreen and the Big Picture.

Print spoolers became hot items for the LaserWriter: SuperMac and Ergotron showed software and hardware spoolers, respectively.

Hardware accelerators for the Macintosh Plus made an advance—Levco reduced

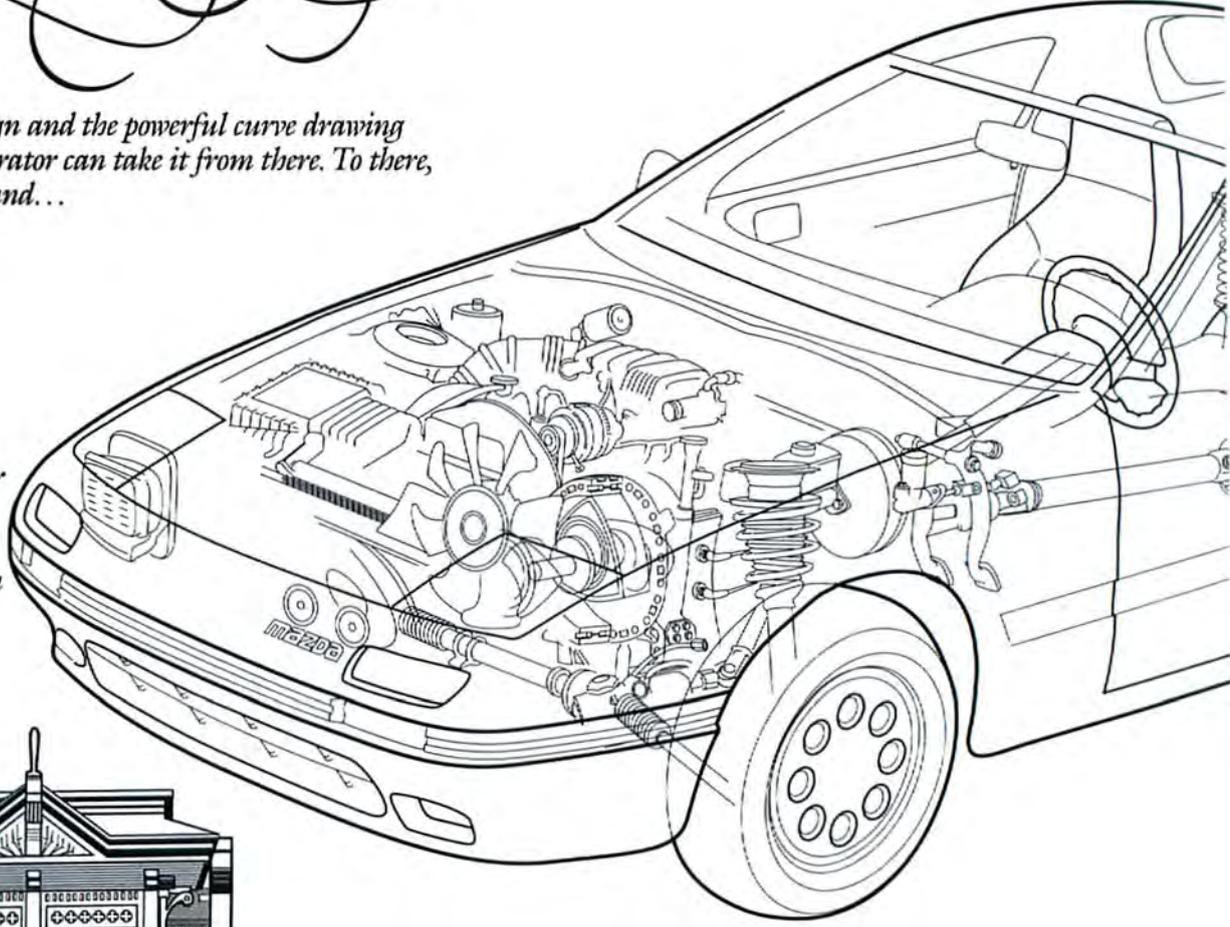
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Artifactory

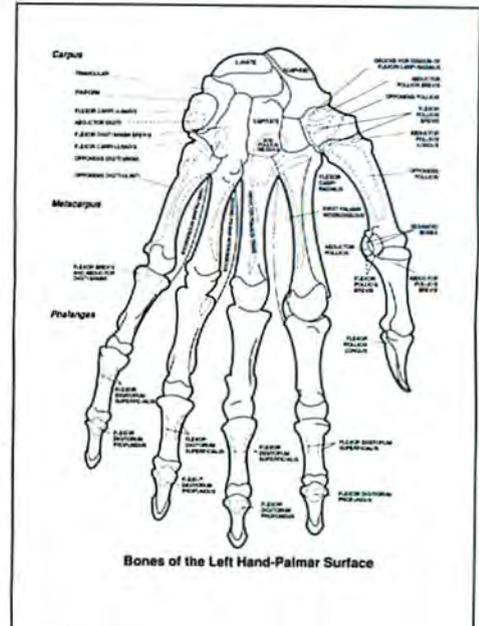
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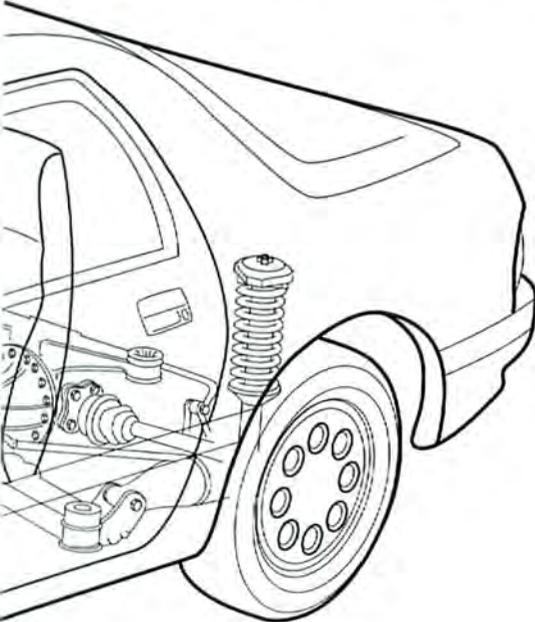
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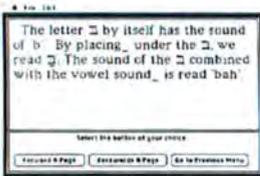
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Commentary/Jerry Borrell

its Prodigy 4 price to \$5000 while Mac-Memory showed its 16-MHz, 68000-based upgrade (including a SCSI port) for the Mac, costing about \$1500.

Graphics fared particularly well. Adobe gave its first public demonstration of *Illustrator*; Cricket presented *Cricket Draw*—both powerful PostScript drawing programs. LaserWare showed *LaserPaint*, which incorporates features of *MacPaint*, *MacWrite*, and *MacDraw*, and PostScript text effects.

Even engineering has begun to perk up on the Mac. MacNeal-Schwendler, producer of well-known software for engineers, showed its second Mac product. Anzel Software's *Frame* and *Beam Mac* software, like MacNeal's, supports engineering analysis tasks. Pole Star of Vancouver, British Columbia, announced a new two-dimensional CAD package. Continuing the onslaught from the cool North, Capilano Computing (also of Vancouver) showed an electronic CAD package.

Communications products from Farallon, Reach, Peripheral Land, and Infosphere appeared. Farallon's network software helps track down the problems in your network. Reach has produced a diskless file server, and Peripheral Land showed a fiber-optic AppleTalk network. Infosphere has developed a new category of product, the modem server, that will save us from having to connect modems to black boxes so that several users flip a switch to share to the same modem.

Many of us wondered at the presence of Hewlett-Packard on the show floor, but it was perfectly reasonable because HP is the largest seller of pen plotters that can produce CAD and engineering plots.

SmethersBarnes was running an early version of what may be the first visual application-programming language for the Macintosh. Many people missed the point that the company was demonstrating a concept that could make life a lot easier for many of us.

That's a hurried sketch of what I observed in three furious days of activity in San Francisco. My prediction for the Boston Macworld Expo in August: pretty much the same. Only more so. Stay tuned. □



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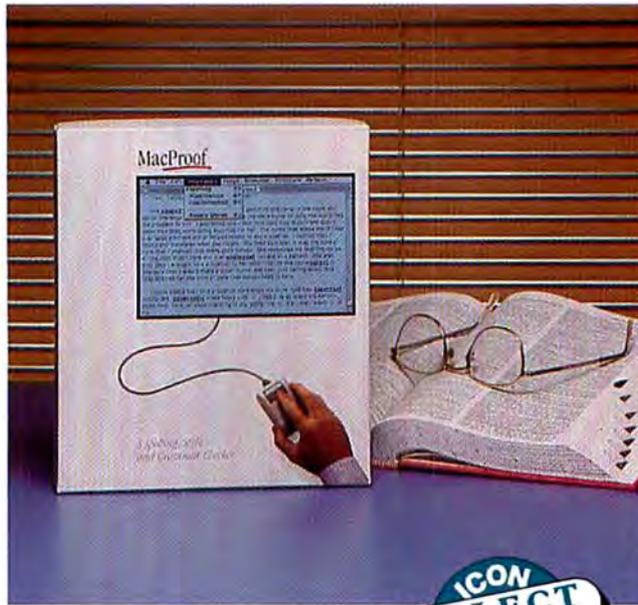
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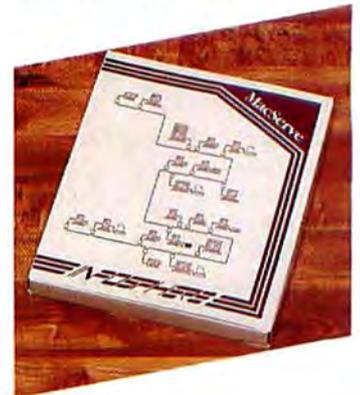


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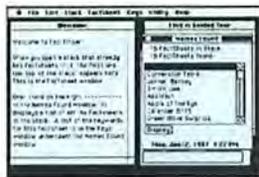
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Requires 512K or Mac Plus & 5-meg cartridge; cable included



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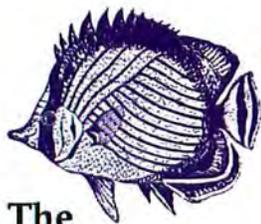
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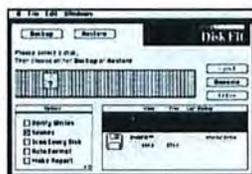
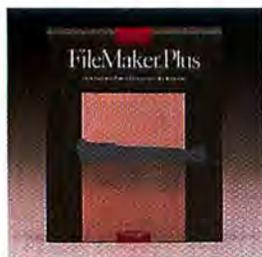
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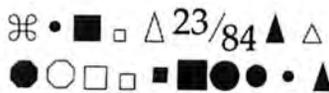
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Contributors Notes

Jeffrey Bartlett ("The Polyglot Mac") spent the last two years bilingually immersed as Fulbright Lecturer in American Studies at the Universidad de Deusto in Bilbao, Spain. Before that, he was the original Macworld copy editor. Now he's a free-lance writer based in Berkeley, California.

Al Cini ("The Great Pretenders") is president of Computer Methods Corporation, a consulting firm in Marlton, New Jersey, that specializes in integrating DEC and Macintosh systems.

Jim Heid ("BASIC Choices" and "Getting Started with Communications Gear") is a contributing editor of Macworld and the author of dBase Mac in Business, published last year by Ashton-Tate Publishing Group. Each month he turns his attention to a different topic in his column on Mac fundamentals.

Rick LePage ("Insights on OverVue") has been writing about personal computers and telecommunications for six years. His interest in the Mac began with an Apple Lisa that landed on his desk for an extended trial. In June 1985 he cofounded the respected MacInTouch newsletter published monthly by Ford-LePage in Framingham, Massachusetts.

Anthony Meadow ("The Polyglot Mac") is editor of the Newsletter for Asian and Middle Eastern Languages on Computer. He's also president of Bear River Associates, a Macintosh software-development company in Berkeley, California.

Erfert Nielson ("3-D, Take 2") was a founding member of the Macworld staff. Now a contributing editor, she continues to specialize in graphics on the Mac.

Salvatore Parascandolo ("Mac Pasteup Tools") has worked in the computing field for 17 years. He is currently senior computer scientist at Computer Sciences Corporation in San Diego, where he does systems programming. □



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Requires 512K & 2nd drive, or Mac Plus

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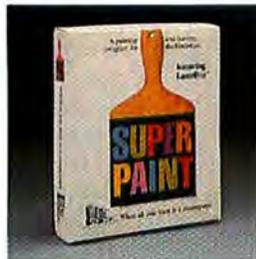
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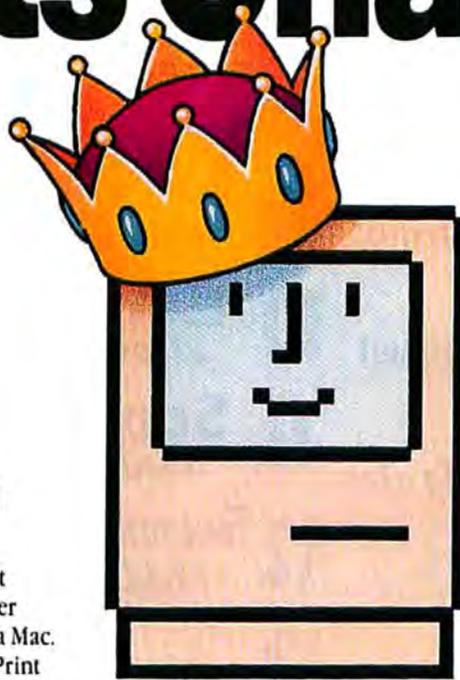
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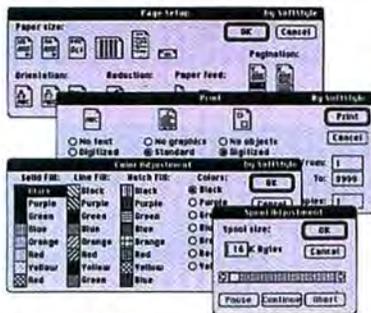


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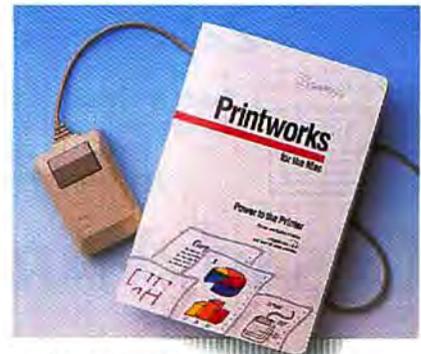
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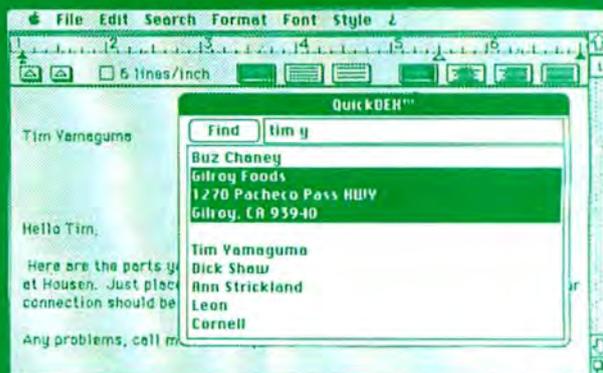


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The Making of the Macintosh II

*A backstage look at the creation of the new machine
and the unsung heroes who designed it*

Before embarking on a column about the designers of the Macintosh II, I first had to wrestle with an ominous question. Was this a machine with sufficient character to justify a curiosity about its originators? I must confess that my first glimpse of the machine was disorienting and slightly depressing. Its massive footprint made me marvel that none of its numerous code names was "Bigfoot." To one accustomed to the compact, feisty Macintosh box, the "open Mac" seemed something cooked up by the geometry police from IBM-land.

Thankfully, that disquieting first impression soon dissipated. The turning point came when I noticed something in the upper-left corner of the super-crisp black-and-white display. The little Apple icon that pulls down the desk accessories faithfully replicates the blazing colors—*colors!*—of Apple Computer's logo. The purity and resolution of the color is something I've never seen before in a display, and it's both a technical tour de force and a promise of the creative power within the machine.

The message was clear: with the Mac II, We're Not in Kansas Anymore. Not being in Kansas anymore is what the Macintosh is all about. With this reassurance, I could proceed with a clear conscience to relate the inside story of the Macintosh II.

Let us go back to what some people refer to as the Dark Days of Macintosh. It is early 1985, and after a successful launch, the Mac's vital signs are not good. The business market in particular has decided that the limitations of the Mac—particularly its closed architecture, limited storage, and sluggish performance—keep the machine

in the realm of toyland, merely aspiring to be a capitalist tool. The people at Apple were considering various responses to this perception. Most notable was a computer being designed around the powerful Motorola 68020 microprocessor, a project known in-house as "Big Mac." Another contender was a powerful personal computer code-named "Jonathan."

The Dhuey Decimated System

The odds seemed slim that the ultimate solution would begin with a diminutive, bearded engineer in his twenties named Mike Dhuey. Though respected for his design skills, Dhuey had been associ-

ated with a number of products that had never reached the marketplace. Things like the Apple Phone. Color Lisa. The Gray Scale Mac. The Apple File Server.

Students of Apple history, though, will note Dhuey's pedigree; he is the same kind of grass-roots hacker as his predecessors—Woz, Burrell Smith, Andy Hertzfeld. Initially charmed by computers as a 13-year-old in Wisconsin, Dhuey was blown away by the Apple II as a teenager and later was a founder of the Madison Apple user group. His first trip to Silicon Valley was to interview for a job at Hewlett-Packard, but he

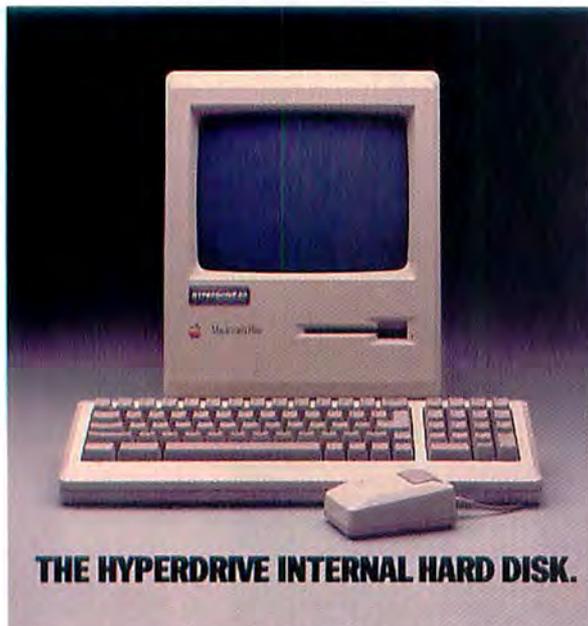
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Present at the re-creation: hardware designers Mike Dhuey and Brian Berkeley.

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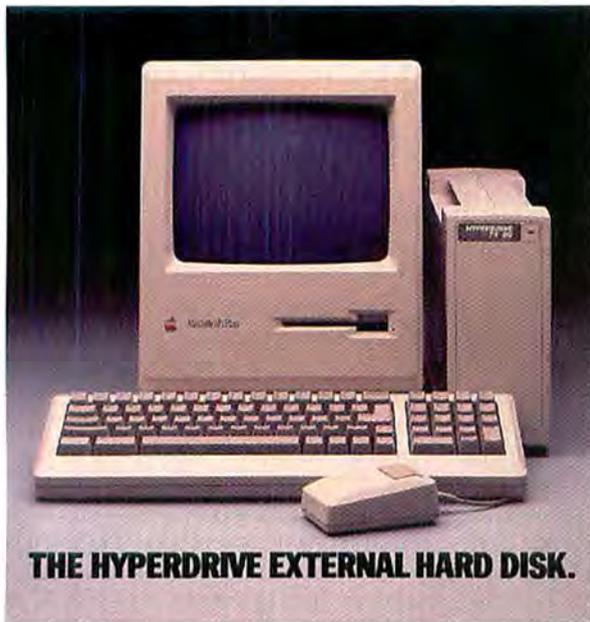
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Steven Levy

spent part of the visit dropping in on Apple and setting up an interview there. Guess where he wound up.

By early 1985, Dhuey was sitting at Apple with his soon-to-be-killed File Server. Not one to brood, he was trying to figure out his next project. "I like more control of my destiny, so I like to propose things," he explains. "I wanted to design Apple's next computer." He realized that the equipment he had most recently created—a hardware server based on the same 68000 chip as the Mac (not to be confused with the *AppleShare* software released by Apple last January)—might easily be converted to a computer that could be the next iteration of the Macintosh, regardless of Big Mac. Unlike the original, this would be an open-architecture machine that the user could modify. Yet it would maintain software compatibility. As Dhuey put it in a memo, "The Macintosh II is designed to combine the Macintosh software base with the expandability of an Apple IIe." A suggested code name was "Little Big Mac."

About the same time, a hardware engineer by the name of Brian Berkeley, who had worked on the analog portion of the original Mac (stuff like video display and power supply), was drafting his own memo. The subject was "Future Product Strategy; Survival." Berkeley, an athletic, mustachioed 30-year-old, thought that the gap between the Mac 512K and the projected Big Mac was "as wide as the Grand Canyon." Something should fill that chasm, he argued: a high-volume computer with a 12-inch display (bigger than the original Mac's 9-inch screen, smaller than the Big Mac's 17-inch monitor) and more power. This would be "MiddleMac."

Obviously these guys were destined to get together. However, this took some urging, because their only previous contact had been when Berkeley, while testing some equipment near Dhuey's cubicle, accidentally sent out radio interference that wiped a morning's work from Dhuey's computer. But once the two engineers recognized the similarity of their goals, they realized that collaboration was inevitable. And as it turned out, they share a passion for high-quality consumer electronics. Both of them, for instance, own Sony projection televisions.

Making Milwaukee Famous

Apple allows its engineers relative freedom, but it was not long before some manager asked about this "underground thing" that Dhuey and Berkeley were supposedly working on. Once explained, the

project got a tacit go-ahead. This was around the time that Jean-Louis Gassée arrived at Apple to head the Macintosh division; eager to produce a successor to the Macintosh, Gassée became an early supporter of what was by then called "Milwaukee," inspired by a picture of the city's skyline sent to Dhuey by his mother. But there was still some light treading to do. With Steve Jobs still at Apple, pockets of the original Macintosh religion were formidable. A primary commandment of that faith was Thou Shalt Not Open the Box. So in his memos, Dhuey avoided the troublesome word "slots."

However, the Macintosh's troubles finally caused even Jobs to relax the dogma. One day Jobs and Apple's chief scientist, Alan Kay, dropped by Dhuey's cubicle. "Do you think it should have slots?" Jobs asked the designer. "Yes," replied Dhuey. Jobs turned to Kay and asked what he thought. Kay agreed.

"All right," said Jobs, and from then on Dhuey could use the S word without fear. In fact, a later code-name for the machine was "Reno," in honor of the slots. Other code names included "Uzi," which was discarded as too militaristic; "Beck's," named after Brian Berkeley's brew of choice; and "Paris," in honor of Gassée. Jean-Louis, incidentally, was the person who decided that the machine should have six slots.

For the next several months, design proceeded while various Apple people tried to decide what features the computer should have. According to Ron Hochsprung, a systems engineer who joined the project early, "There's a big difference between an Apple II and a Cray supercomputer. You have to choose where in the middle you're going to be."

Meanwhile, Brian Berkeley's main emphasis was on developing the monitor's breakthrough design, which provides rich color in the same package with stunning monochrome resolution. "I knew it would take no less than a complete, major, revolutionary step in display technology," he says. Considering that the designers are videophiles, it was no surprise that Sony was chosen to manufacture the monitors. But few would guess that the monitor plans were so integrated into the machine design that, until fairly late in the process, the designers placed the computer's power supply in the monitor. When they finally discarded that idea, the already bulky main component of the machine—which con-

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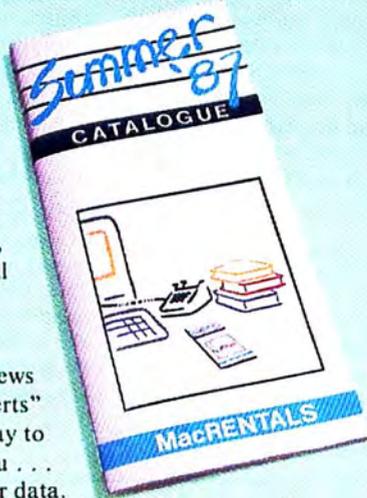
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tains the main circuitry, the microprocessors, the slots, and room for two floppy drives and a hard disk—had to be enlarged by four more inches.

Then came the Bus Wars. There were several hot contenders. For a variety of technical reasons, Ron Hochsprung spearheaded a movement to go with a logical architecture called NuBus, which provides a way of mixing and matching cards in the slots that is consistent with the Macintosh's renowned ease-of-use.

The biggest step, though, came in the autumn of 1985, when it became clear that the computer was more than a year from completion. By that time, the marketplace would be demanding considerably more power from its computers, and the IBM world would be ready with units built around the mighty 80386 microprocessor. The logical step was to switch from the merely powerful 68000 chip to the lusty 32-bit 68020 microprocessor. But this additional power forced Apple to reposition the new machine in its plans.

In any case, a decision was imperative, and Jean-Louis Gassée was key in making

that decision. His choice was Little Big Mac. Gassée says that one factor was the machine's projected compatibility with the current Macintosh software base. Ultimately, he says, "It was a question of people. I felt that Mike Dhuey was capable of doing it." Within a matter of weeks, Apple back-burnered Big Mac (which was moot once its designer joined Steve Jobs to form a new company called NeXT) and postponed (and later killed) Jonathan.

The successor to the Macintosh was chosen. Apple placed its chips on the Macintosh II.

Up from the Skunkworks

By then things were very busy on the Mac II project. Whereas the hardware engineers working on the machine in the summer of 1985 could describe the project as an obscure "background skunkworks," by the end of the year dozens of people were involved. Apple assigned John Medica to be the "champion," the one who pulls together all the teams and assumes responsibility for getting the product out the door. It was a role that Medica had filled admirably with the Apple IIc and the Apple IIGS.

Unlike the original Macintosh project, which carried on in relative isolation until fairly late in the process, the Macintosh II drew wide participation from within Apple. "It was the largest product we've ever done at Apple Computer," says Gassée. For instance, the new sound capabilities were provided in part by engineers from research and development, and a crew of software wizards came on to handle the tricky task of empowering the machine and maintaining compatibility with the Macintosh software base. A fellow named David Fung, who worked on the beefed-up ROM chips, was nicknamed "Fungfeld" as a tribute to Andy Hertzfeld, the man behind the original Mac ROM. A 23-year-old named Ernie Beernik brilliantly recrafted the QuickDraw graphics routines to accommodate color.

T-shirts were printed bearing the various code names. Parties held. Deadlines set, sometimes met. Optimists believed that the machine could be finished by No-

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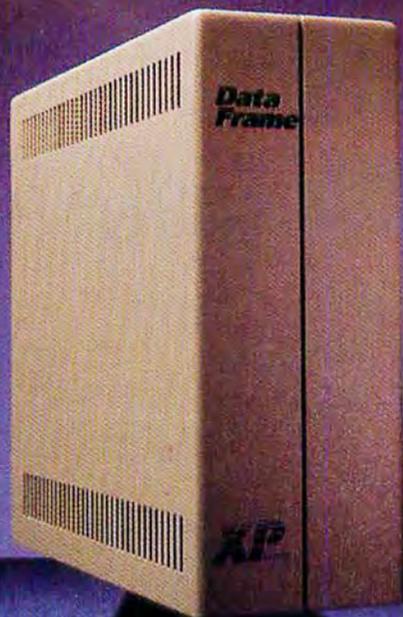
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Steven Levy

ember 1986. Realists hoped for a January 1987 completion. No one was really shocked when the announcement date was pushed back to March. By that point, everyone agreed that the Macintosh II was, in computer parlance, a big win. And Mike Dhuey would finally see one of his products shipped.

A Machine for the Rest of Them

A few weeks before the announcement date, Dhuey and Berkeley have a meal at a falafel joint near Apple headquarters in Cupertino. Since I'm going along for lunch, they leave Dhuey's Porsche behind, driving instead in Berkeley's souped-up Mercedes. While wolfing down Bulgarian Beef pitas, they give a designer's-eye view of the philosophical difference between the original Macintosh and the Macintosh II. Although he emphasizes that the original Mac was great, Dhuey thinks that its proscriptive attitude—the religion that decreed no cursor keys and a closed box—was overly indulgent. "Steve Jobs thought that he was right and didn't care what the market wanted. It's like he thought everyone wanted to buy a size nine shoe."

"The Mac II is specifically a market-driven machine, rather than what we wanted for ourselves," continues Dhuey. "My job as an engineer is to take all the market needs and make the best computer. It's sort of like musicians—if they make music only to satisfy their own needs, they might lose their audience. I'm proud to bring together a machine that can do the Mac software base and also be so powerful in doing other things."

Berkeley concurs. While the original Mac crew said that they built a machine for themselves, he says, "I built this for everybody else. And myself, too."

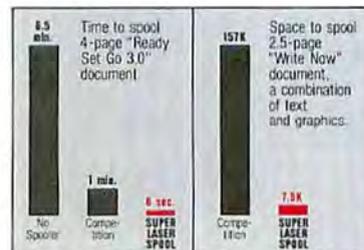
So that's how it happened—a proposed product that kept the faith with its predecessor survived internal competition and became the state-of-the-art Apple computer. True, the story lacks the romance of the original Mac team, which flew the pirate flag and hijacked the personal computer world into believing in a new vision. Yet it is encouraging that Apple has acted on its boast that, to stay alive, it would raise the technological ante of the personal computer poker game. And it is downright inspiring that Apple has once again relied on unheralded young engineers to develop this project. Like the Macintosh II itself, the story is less conventional, and more impressive, than it seems at first glance. □

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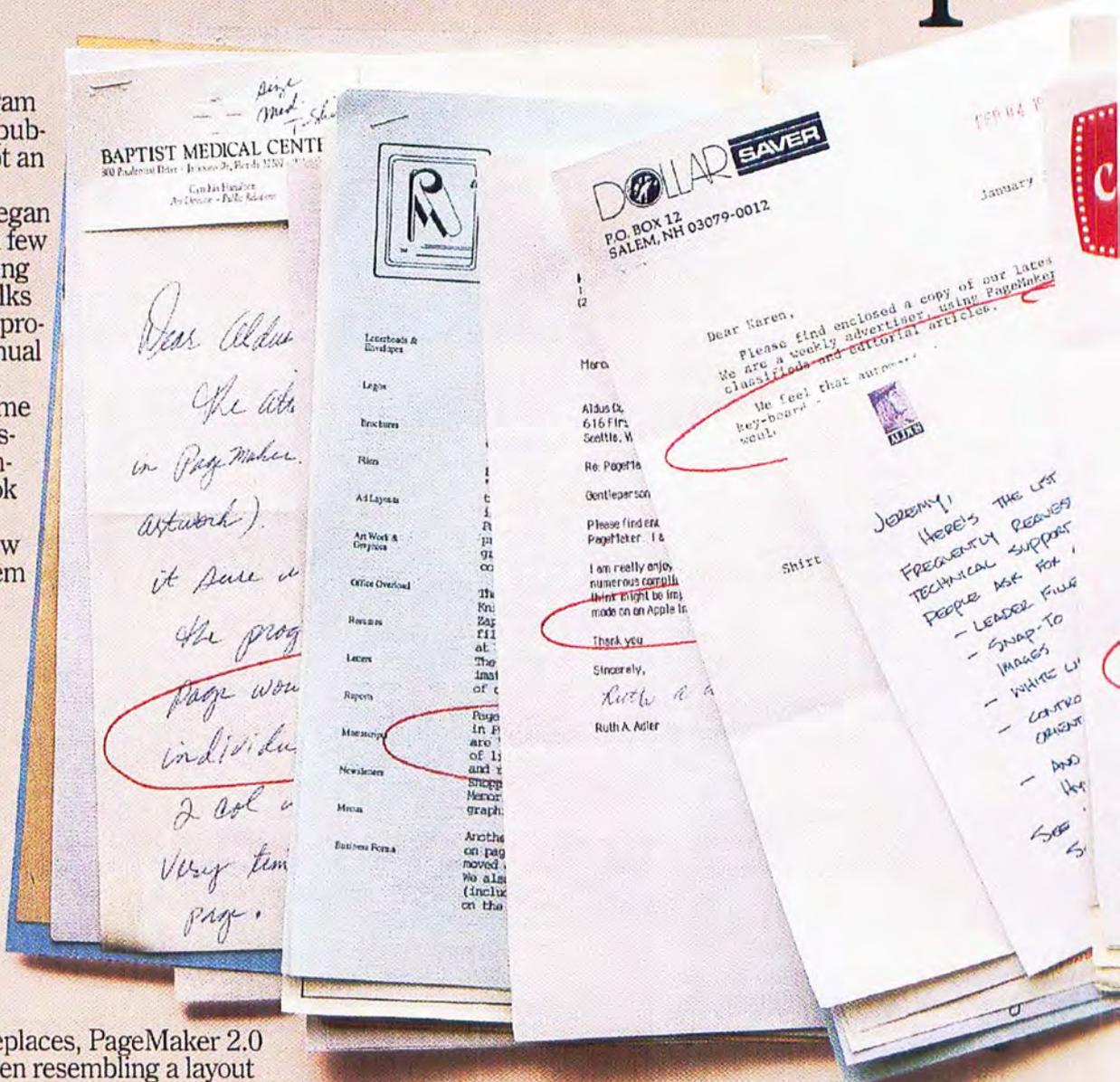
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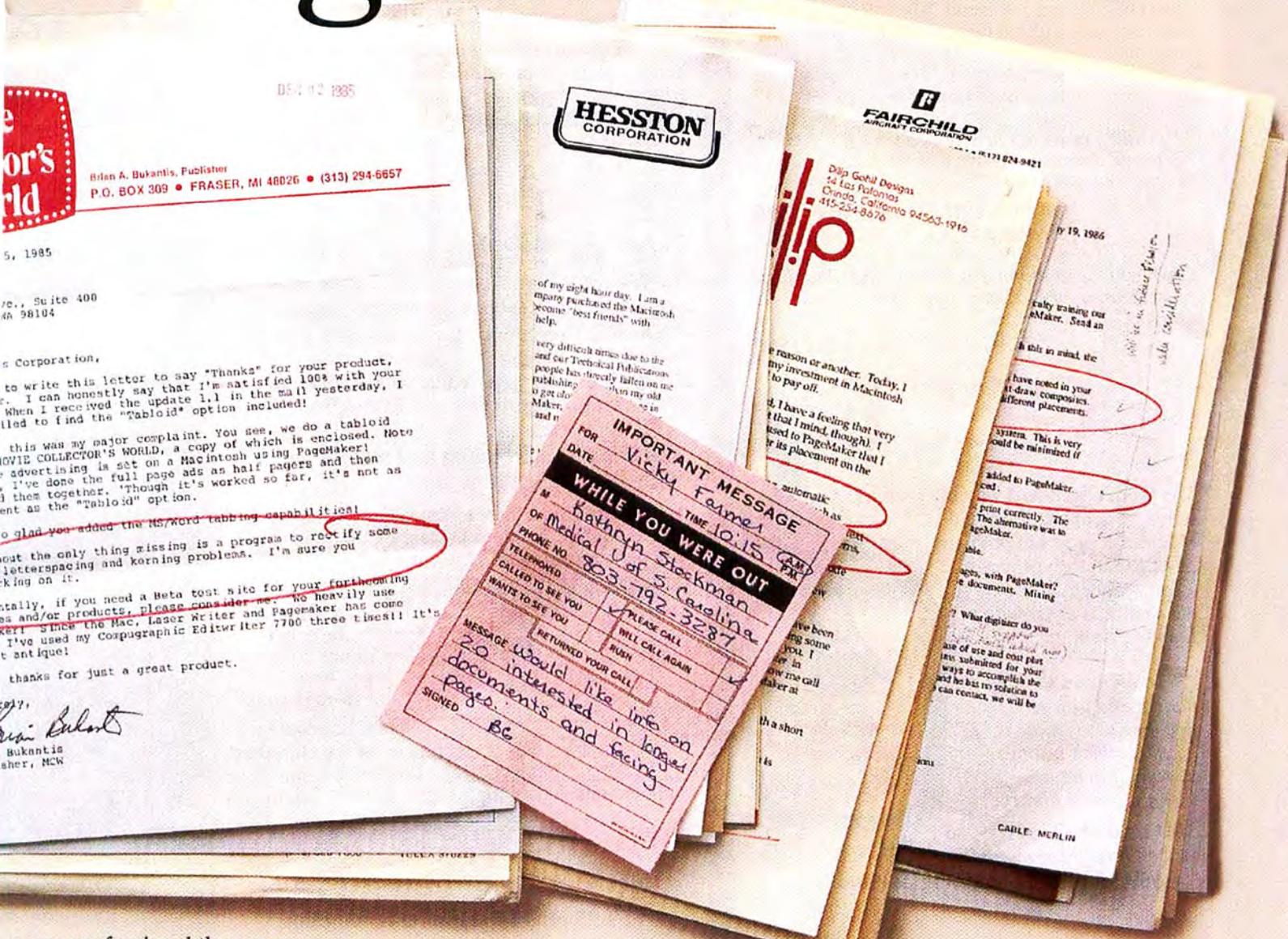
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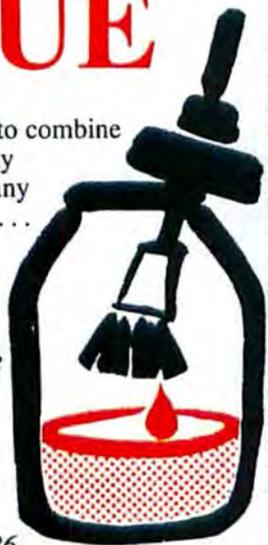
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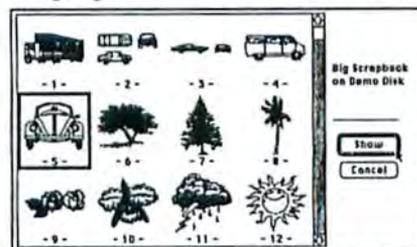


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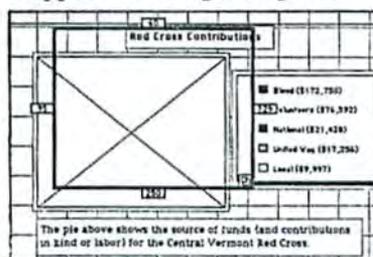
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Verbatim

An interview with Ash Jain, vice president of AST Research.



Ash Jain heads the Apple products division of AST Research, a major maker of IBM PC peripherals since 1982 and now boasting one of the largest families of add-on products for the Mac, from hard disk drives and tape backups to modems and accelerator cards. His experience in the field of computer design and management covers the map, geographically and technologically. He has worked with more than a dozen companies—as a project engineer for a team that developed one of the first brain scanners, as head of a division of Telefile that built mass storage devices for minicomputers, and on and on. In fact, in 1978 he led a group of engineers at Basic Four who were designing a microcomputer based on the Motorola 68000, the same chip the Mac uses. “In retrospect,” he says, “it was so much like the Mac II that it’s startling.”

With his background in both mini- and microcomputers and his experience with both the PC and the Mac, Jain lends an interesting perspective to the ongoing discussion of the Mac, its newest variations, and its prospects for the future.

What does AST do, and how does it fit into the Macintosh community?

AST was founded in 1980 by three young engineers who were working for large corporations in Orange County and found no job satisfaction. They wanted to work in an environment where people could go to work and be happy—not just to make money.

They started their company (an acronym for the founders’ initials: Albert, Safi, and Tom) with a research contract to build a computer communications system. After a year of work they delivered the system, and then they looked for opportunities.

They had \$50,000 in start-up capital and were looking about the same time the IBM PC was announced. They had experience with the mainframe/plugin-compatible market and minicomputers and thought that this might be the opportunity to start with microcomputers.

They made a memory card. It’s funny that no matter how much memory you start out with, you always need more. A few products later came SixPak: memory, clock, serial port, game port, battery backup. The SixPak made AST famous; at one point it provided 75 percent of the company’s revenue. It has become a standard for IBM computers—with more than one million units installed. Revenues grew from \$50,000 in the first year to to \$170 million in fiscal 1984 when the company went public.

In 1984 everyone was looking at AST. The major players in the PC add-on market had all appeared: AST, Quadram, Tecmar, and Persyst. Tecmar’s figures are not public,

but we believe that Quadram was the biggest manufacturer until the close of 1984; then AST was the largest. In 1984 we broadened the product lines to include networking and data communications products.

How large is the company overseas?

We have always had a good international market. Today it accounts for around 20 percent of revenues. How is the company doing financially? The initial stock offering was at \$7, and yesterday it was selling for \$16. For the 1986 fiscal year our annual report showed \$170 million in revenues. We now employ over 1000 people.

When did you join AST?

In 1984. I had been at Datatron, heading the division that made add-on products for the IBM PC. I had developed three products, a SixPak-like card, a memory card, and a card with two serial ports. In 1984 management changed, and I left. I approached AST with the idea of starting up an independent business unit that would allow the company to continue growing without draining its already stretched resources. AST was growing so fast that this seemed to make sense.

Where are you from?

I was born in Punjab, India, but I moved all over the country—I was an army brat. My father was in the British and then the Indian Army. My education took place primarily in Bombay and New Delhi. I received a B.S.E.E. in telecommunications

(continues)

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It's funny that no matter how much memory you start out with, you always need more.

from Jabalpur University in Madhya Pradesh in 1967.

From there my first job was with Phillips for three-and-a-half years. I started as an applications engineer and then became the editor and publisher of the Phillips *Electronics Application News*—the first electronics magazine in India.

What was the Indian electronics market like then?

Fairly primitive. Mostly passive components (resistors and capacitors), and a few active components. There were only a few semiconductor products. One manufacturer was offering four integrated circuits in 1970.

When did you leave India?

In 1971. I emigrated to the United States and flew straight into New York. I had a relative in New Orleans, so I went there and obtained a job as an electronics draftsman for \$1.90 an hour. I had sent out 300 resumes, and that was the best that I could do; the electronics industry was in the pits then. I moved from schematics to printed-circuit-board layout to supervision of the department. Then as a technical assistant I learned Focal programming on the PDP-8. After six months I had moved to the position of project engineer. The company was Tano, a subcontractor for Litton, working on submarine defense systems.

Indian engineers have risen to great prominence in many of America's high-

tech companies. It seems ironic that one of the world's oldest civilizations contributes so visibly to high technology.

In the early 1960s and 1970s many Indian nationals came here for higher education and for professional career opportunities—especially in engineering and medicine. Maybe 50 percent remained in the United States. A significant number of those people have since advanced in a commercial career path. Ten years from now this probably won't be true, because the flow of emigration has changed. During the last decade Indians coming into the United States were in business, from places such as Africa and Asia. You could point to similar trends with other nationalities in other fields: fashion, design, food, and more. The thing that makes America so interesting is that the culture is able to absorb input from the rest of the world.

Since coming to the States, you've worked for more than a dozen companies in high technology and started up your own firms. What have you learned from all of those years in the industry?

(continues)

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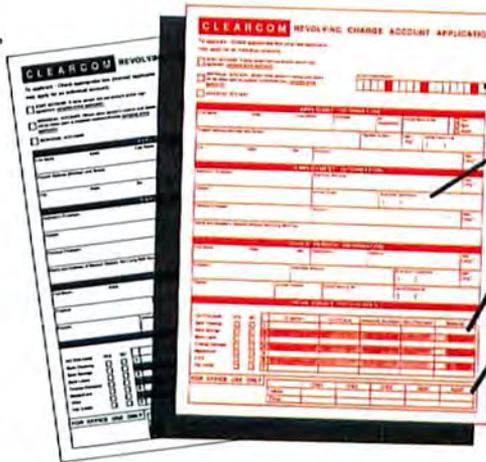
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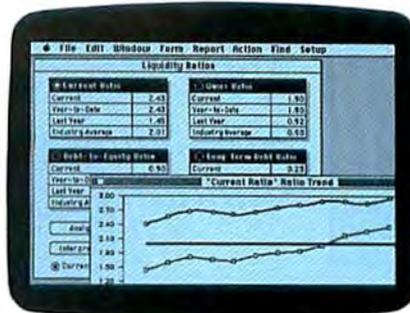
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What has your business unit done since it began in 1984?

When we began I knew nothing about Apple. 1984 was a very bad year for Apple. It was having failures in spades: the Apple III, the Lisa, and the criticism of the new machines introduced in January of 1984—the IIc and the Mac—because of their closed architectures. Dealers were migrating to the more profitable IBM PC market, and there were problems with sales channels.

You might wonder about AST's wisdom in creating the division at that time. Tom Yuen had a vision of Apple; he felt that because of its size it would not wither away, although he did not know at what point the turnaround would come. We decided to test the waters, to get to know the market. I had enough experience in marketing, engineering, design, and manufacturing to encourage AST to invest a little capital in the effort.

Since the philosophy of AST has been to make add-in or add-on products and not to become involved with modifications to the host computer, we couldn't do much for the Mac market. It didn't make much sense, either, to add a 40-megabyte drive for use through the Mac's serial port. So we could only produce Apple II products. In September of 1984 we introduced a multifunction

card for the Apple II: clock, modem port, printer port. We didn't make a lot of money, but it allowed us to test the market, the retailers, and the users. It introduced us to Apple computer. The second product was a 2MB memory card for the Lisa. Then in the spring of 1985 we showed a combination 10MB hard drive and tape backup for Apple II computers. At that point we were still a group of only five people who did all of the engineering, manufacturing, marketing, and sales.

But you did have access to resources at AST?

Yes. And by the summer of 1985 we felt that we understood the Apple market. But there was little opportunity, and by that time the market had deteriorated even more.

In the spring of 1985, the reorganization started at Apple. John Sculley took charge and made it plain that Apple would be market driven—that the architecture would be opened and that there would be a new effort in the business market. But we

(continues)

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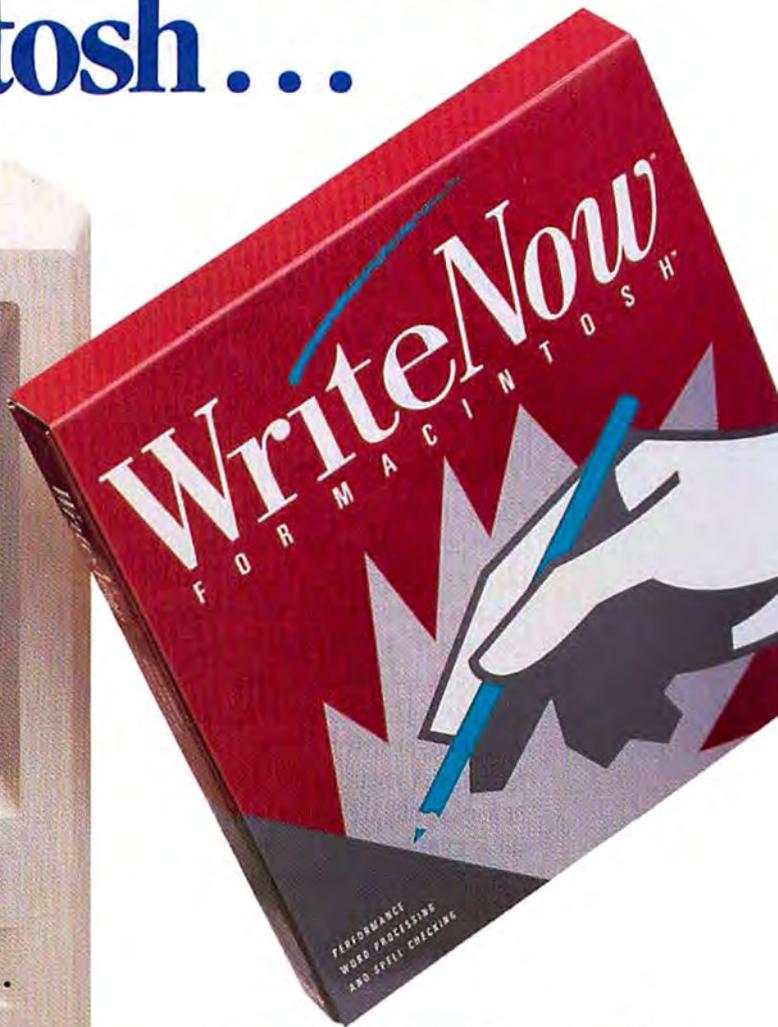
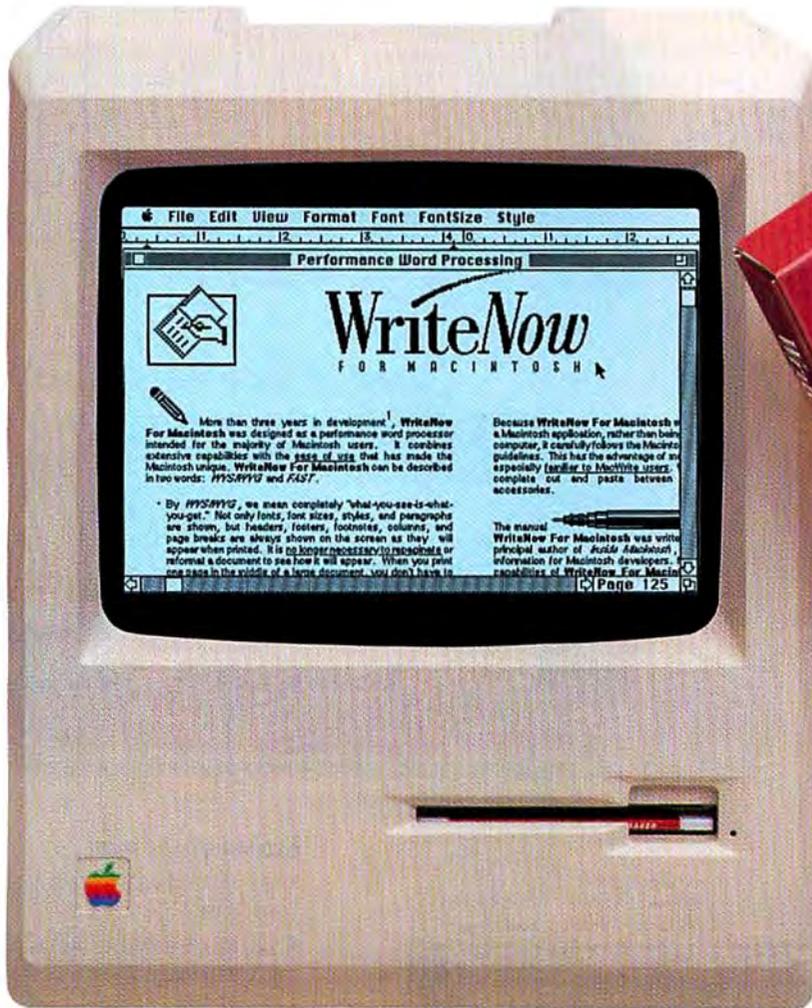
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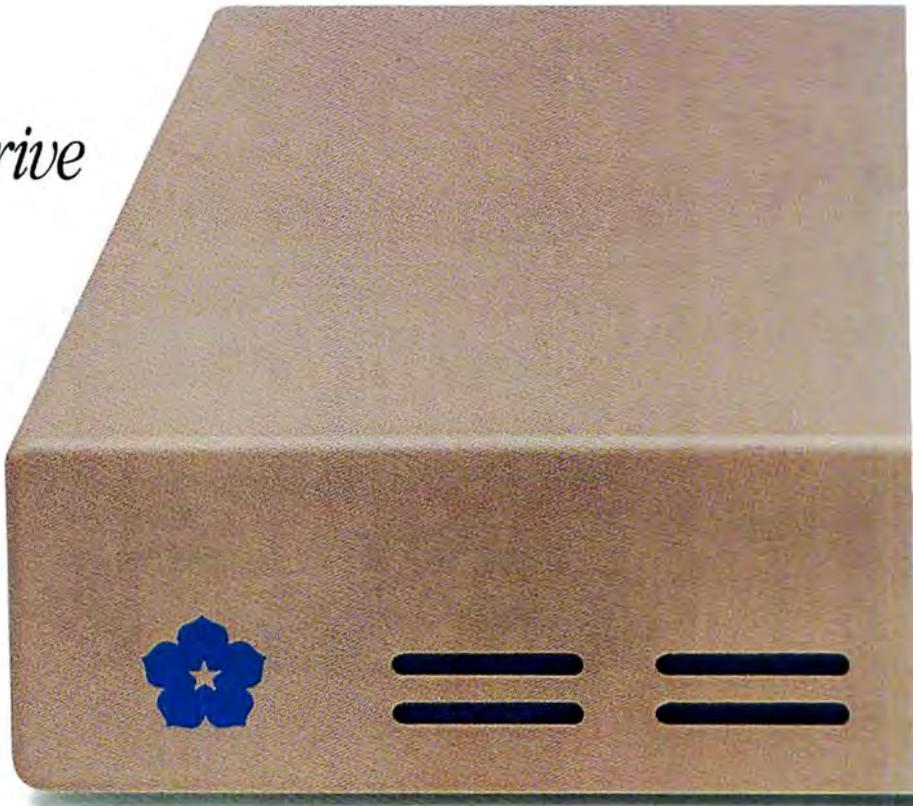
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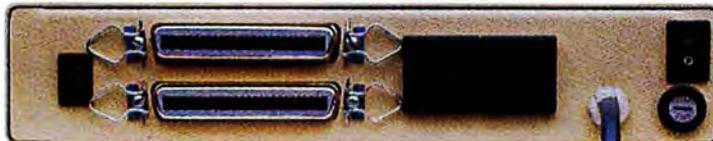
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Buying market share by lowering prices is a disservice to the consumer.

didn't know if it was a certain thing. Safi Qureshey, president of AST, met with John Sculley in September of 1985. Sculley explained how the new direction at Apple was going. Safi was convinced that he was sincere and that he would be successful and that there would be more opportunities for us soon. So we increased our staff and continued with products for the Apple II, to be ready for the new open-architecture Apples.

What made you decide to offer an 80MB hard drive for the Mac?

We already had the product on the PC side of our business. It was relatively easy to port it over to the Macintosh side. So when the Mac Plus was announced we offered the AST-4000 at the same time. 1986 proved that AST was right.

How?

From the initial small investment in the IBU [independent business unit], major products were happening. Our staff went from 5 to 18 that year because of the Mac Plus market. We made a modest profit that year as a group. The 4000 was our unit's most successful product, followed by the AST-2000, a combination 20MB tape and disk drive.

How did the 4000 succeed in the Mac market? You couldn't be selling it to individuals.

We sell the product through about 500 dealers. We know that the average system goes into a configuration of a LaserWriter, a 4000, and about four Macs connected by AppleTalk. They sell with the Infosphere product *MacServe*, a disk server that allows the hard drive to be partitioned among the users over AppleTalk.

Evan Solley, president of Infosphere, has announced that his company has sold over 25,000 "nodes" of *MacServe*, so there must be several thousand of the 4000 products out there.

AST doesn't give out numbers, but yes, there are many thousands. We also know that about 60 percent of the drives are in small businesses, about 20 percent in corporations, and about 20 percent in vertical applications.

What is the impact of Apple's new file software, *AppleShare*?

It establishes AppleTalk networking as legitimate and provides a standard reference for users and third parties.

Who are your competitors in the large-volume drive business today? We saw several products from Northern Telecom, LoDown, and Mirror at the Macworld Expo—with even larger capacity than your current products.

Yes, but they are not selling those products in volume, as we are.

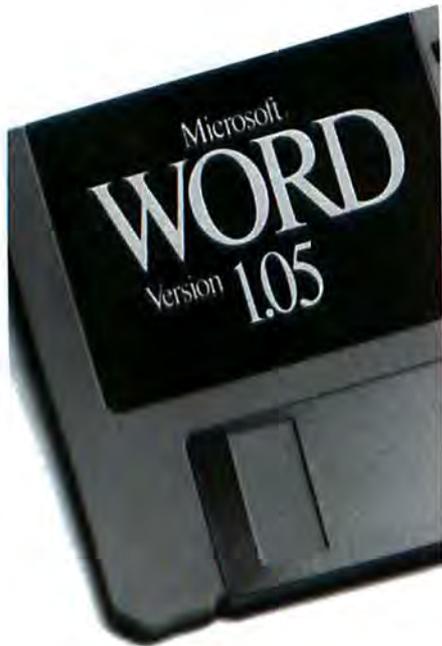
Some people refer to your drive as a vacuum cleaner because of its noise.

I believe that was true for the early part of 1986. We changed the power supply/fan assembly to reduce the noise to a more acceptable level. However, your question indicates that the original impression is hard to change! People buy our drive because of its reliability, performance, and track record. For example, we test each AST-2000 in excess of 100 million read and write operations.

Prices for hard drives are coming down rapidly—will AST prices decrease?

We address cost issues as the situation requires. At present we are selling profitably. Our 20MB drive sells at the same price as the Apple product—that is, \$1295, including all the SCSI cables. For \$2495 you get a 20MB tape backup as well, which includes a .25MB RAM cache.

(continues)



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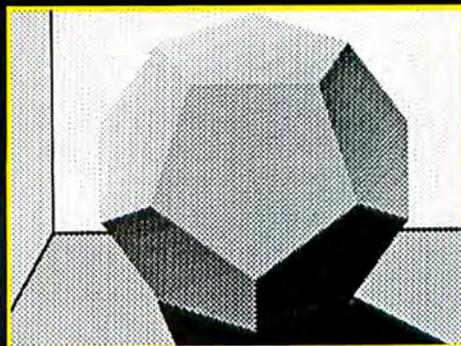
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Circle 560 on reader service card



The SE is an exercise in engineering... a step toward allowing buyers to customize the machine.

True, a lot of people are trying to sell drives at commodity prices, but by the end of 1987 they will not be there. One company has already died, another is laying off, and two others are in trouble. Major companies in your magazine. Buying market share by lowering prices is a disservice to the consumer. It ensures a lack of profit for the manufacturer, and in the end the user pays.

In other words, where do Micah's buyers go for support?

Exactly.

Apple has announced several new products of its own. Can you continue to compete with Apple's storage products?

Yes, by providing more functionality and features. To date, our products have not overlapped exactly with theirs. We have been selling our tape drive for a long time, for example, and there was no competition from Apple.

There is another difference. We sell through distributors. Apple dealers must buy directly from Apple. We can sell to independent dealers or to Apple dealers.

Many drive vendors are beginning to sell directly to buyers through advertisement. Will AST do this?

AST will probably never sell directly through the mail. We feel our products have significant technical value, and the users deserve personal attention and support from the retailer to address their needs.

What do you think of Rodime (supplier of the Apple HD-20SC and others) entering the retail market?

Anyone can build a drive—buy the electronics, bend some sheet metal. We do a lot more than sell a hard disk drive; we produce complete storage solutions.

What do you think of the Mac SE?

My initial reaction: it is an exercise in engineering. The machine takes one more step toward allowing buyers to add peripherals or to customize the machine to their application with memory, speed, terminal emulation, MS-DOS, peripherals, and large-screen displays.

Several developers have said that there will be heat problems with the SE when expansion cards are added to the machine. What has been the experience at AST?

I disagree with those developers. Apple has been precise about this, releasing information about exactly how much power may be drawn from the power supply; if the developer adheres to this, there won't be any problems.

What add-ons will AST supply for the SE, and when?

Our immediate SE enhancement products include the AST-Pak, a family of multifunction solutions. It provides a base choice of memory only or a combination of memory, 68020, and 68881. The base card functionality can be extended by a choice of I/O options from AST and other hardware manufacturers. Our other product is called the Mac86, an 8086-based coprocessor card that provides PC XT compatibility.

We plan to ship those products shortly after the announcement of the SE and the Mac II. Others, such as 3278/5251 terminal emulation, image processing, and graphics products, will appear over the course of 1987.

Is the hard drive the key feature of the SE?

Well, let's say that a second drive (floppy or hard) is a key feature. The other, of course, is the ability to include an add-on card.

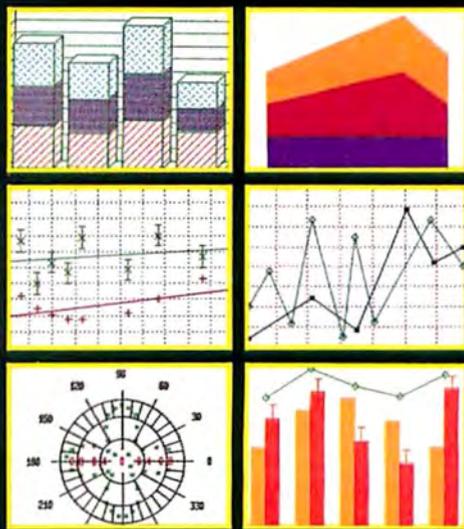
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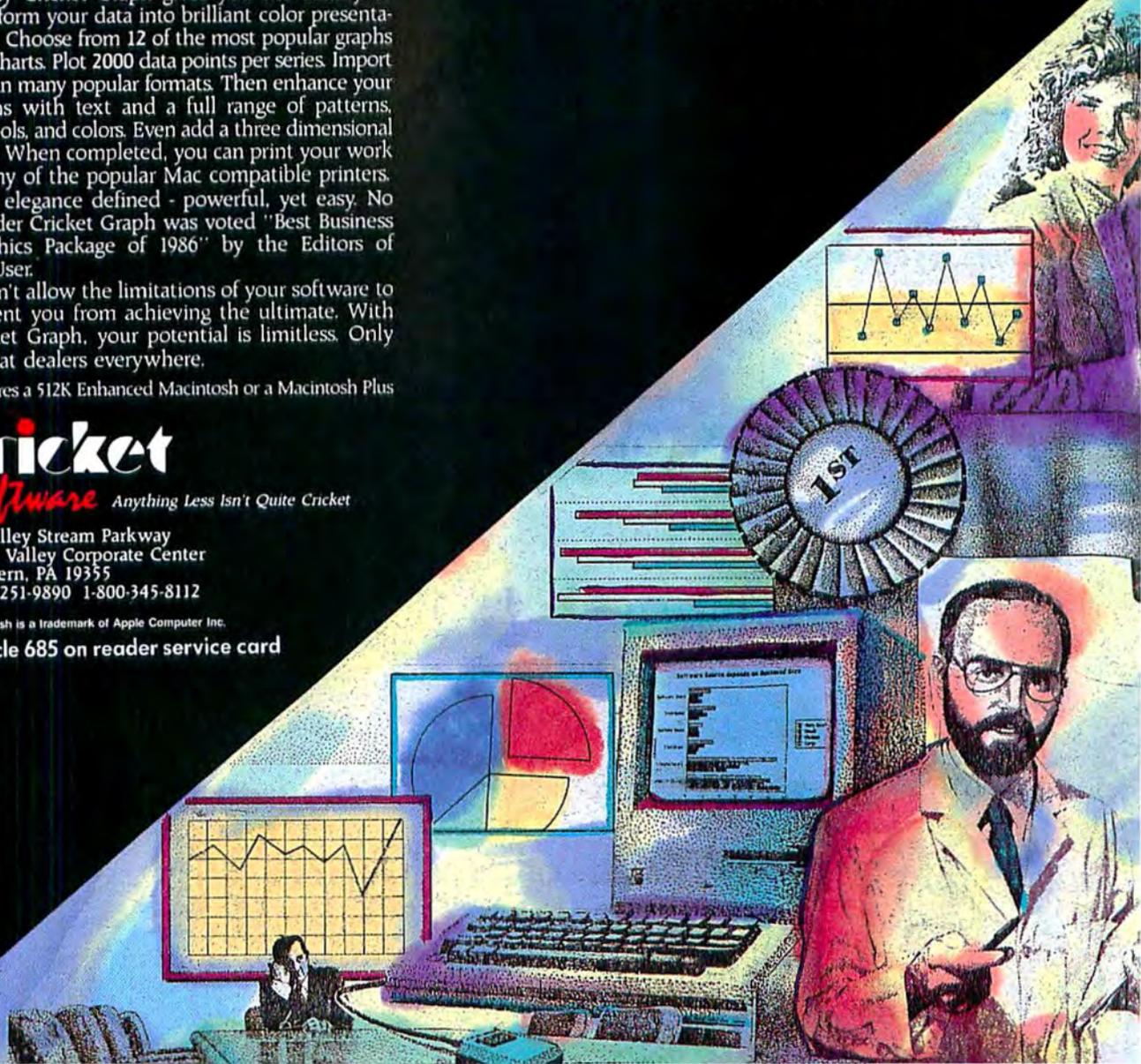
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Circle 685 on reader service card





UNIX is alive and well. There will be more impetus for UNIX when the Mac II is shipping.

Is there a real need for a multifunction SixPak-like card for the Mac? Unlike the IBM PC, the Mac already includes multiple ports, clock, and battery.

The term is generic; the product from AST will not be multifunctional in the same sense as the PC product. Rather, it will offer the SE multiple enhancements.

One of your enhancements for the SE is a 68020 accelerator card. What does it say about a machine when one of the first add-ons increases performance?

Several companies have already shown that the performance of the 68000-based Mac can be improved—Levco and SuperMac, for example. We could have done the same in

the past, but AST prefers to make add-on products that are legitimate extensions to the manufacturer's plans.

Still, your product will upgrade a new product.

Well, I agree, but then one of our largest markets is performance add-ons for the IBM PC. The difference may be that with the AST-Pak we are expanding the opportunities for the computer. The SE fits on a desktop. The Mac is intimate while the PC is intimidating. Providing the SE with more memory, speed, and add-on capability extends the demands and applications that it may fill.

What about the Mac II?

Macintosh II, the computer everyone has been waiting for. What about it? It's not a personal computer. It's not a desktop computer. Therefore it must be a workstation.

What about expanding the Macintosh II?

We will serve three areas: memory, multi-function, and communications. The AST-ICP is an internal communications processor with its own 68000, .5MB of RAM, full NuBus arbitration support, and two SCC chips that provide four synchronous or asynchronous ports.

Why so many ports?

The Mac II is not a stand-alone PC; it's closer to a workstation. Its applications are different from the SE's. The Mac II can serve as a departmental computer to which other computers or terminals may be connected. You could add four of the ICP cards and hook up 16 different users under UNIX.

(continues)

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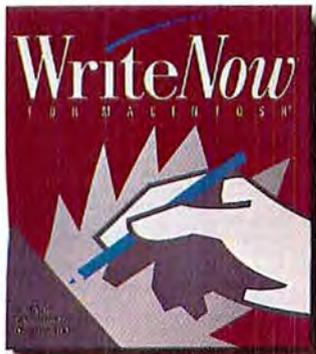
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Hacker II: The Doomsday Papers	32.00	Indiana Jones: Revenge of the Ancients	25.00
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Broderbund Ancient Art of War	27.00	Sinbad, S.D.I., or Defender of The Crown	32.00
Bullseye Software		The Uninvited	30.00
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Ferrari Grand Prix	35.00	PBI Software	
Electronic Arts Autoduel	34.00	Strategic Conquest Plus	35.00
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Infinity Software, LTD		Sierra On-Line Black Cauldron	25.00
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Disk Drives/Hard Disks/Upgrades

AST Research		MaxPlus (2MB Upgrade w/MaxRam/MaxPrint/MaxChill)	259.00
AST-2000	1795.00	MaxPlus 2x4 (2.5MB Upgrade with 1MB Chips-Hyperdrive Compatible)	519.00
20 MB External Hard Disk with 20-MB Cartridge-Tape Backup for the Macintosh Plus.		MaxPlus & MaxPlus 2x4 Bundle	749.00
AST-4000	4699.00	MaxSave (Internal Recoverable Ram Disk For the MacPlus)	75.00
74 MB External Hard Disk with 60-MB Cartridge-Tape Backup for the Macintosh Plus.		MaxPack (MaxPlus and MaxSave Bundle)	319.00
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MacSnap Model 524 (512K to 1MB Upgrade)	139.00	Mirror Technologies	
MacSnap Model 548 (512K to 2MB Upgrade)	389.00	Magnum 800K External Drive	229.00
MacSnap Plus 2 (MacPlus to 2MB Upgrade)	259.00	MagNet 20X (External 20MB Hard Drive w/ Cable)	779.00
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Ehman Engineering		Magnum Tape 20 (20MB Backup)	929.00
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Imega		MacBottom HD-21 (20+Mb SCSI Hard Disk)	869.00
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Bernoulli Box 10MB w/SCSI	1059.00	MacBottom HD-40 (40Mb SCSI Hard Disk)	1289.00
Bernoulli Box 20MB w/SCSI	1199.00	MacBottom 20 (20+Mb Serial Hard Disk for Mac 512k & MacPlus)	869.00
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Bernoulli Box 2-10MB w/SCSI	1599.00	McD 800K External Drive	189.00
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Hayes Microcomputing		Prometheus	
Smartmodem 1200	379.00	Promodem 1200 (Hayes Compatible)	279.00
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Transet 1000-512K	359.00	Couner 2400 (Hayes Compatible)	419.00
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Flip 'n' File II/Micro	18.00	MNS-300 (Dolby Bass, Treble)	99.00
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The Pocket Pack (holds 6 disks)	9.00	MacMemory, Inc. MaxChill (Internal Piezo-Electric Fan)	37.00
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The Easel (holds 20 disks)	12.00	MousePad 9" x 11" Size	9.00
The Library (Carousel-Holds 80 Disks)	29.00	MPH Computer Products MAC-B-COOL	99.00
I/O Design MacPlus Carrying Case	69.00	Ribbons Unlimited Available in Black, Blue, Brown, Green, Orange, Purple, Red, Yellow, Silver & Gold	
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Micro Cabinet (holds 45 disks)	15.00	ImageWriter Rainbow Pack (6 Colors)	25.00
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For those of you going places, here's a little something that solves big storage problems in the time it takes to say "who has the Farnsworth financial files?"

Introducing Totem.™

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

Translated, that's 25 times the storage you get on one standard floppy.

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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Verbatim

IBM described the AT as a departmental workstation or computer when it was announced, and yet it has not proven to be such a machine. Could the expectations for the Mac II also be off target?

We don't know about the potential for the Mac II yet. In general, our products for that machine are a long-term investment for AST—it's a machine that will gradually establish itself as universities, vertical sellers, and corporations develop it. We'll see the fruit of all our labors a year from now. However, there will be immediate users due to the machine's power and compatibility with existing Mac applications.

Your expansion cards for the Mac II will only run under UNIX, but UNIX may not be ready until late in 1987.

True, UNIX may not be ready until late 1987. Not true, though, that AST-ICP will run only under UNIX. It'll work fine under the Mac operating system as well. Several communications drivers and applications are in development by third parties for both the Mac operating system and UNIX.

Where is UNIX? And when it comes why won't it be friendly?

UNIX is alive and well. There will be more impetus for UNIX when the Mac II is shipping. You have to understand, UNIX is a major undertaking; it takes more than one year. I remember at Basic Four we took two years to adapt UNOS to run on our machine. At least give Apple credit for offering the software in this time frame.

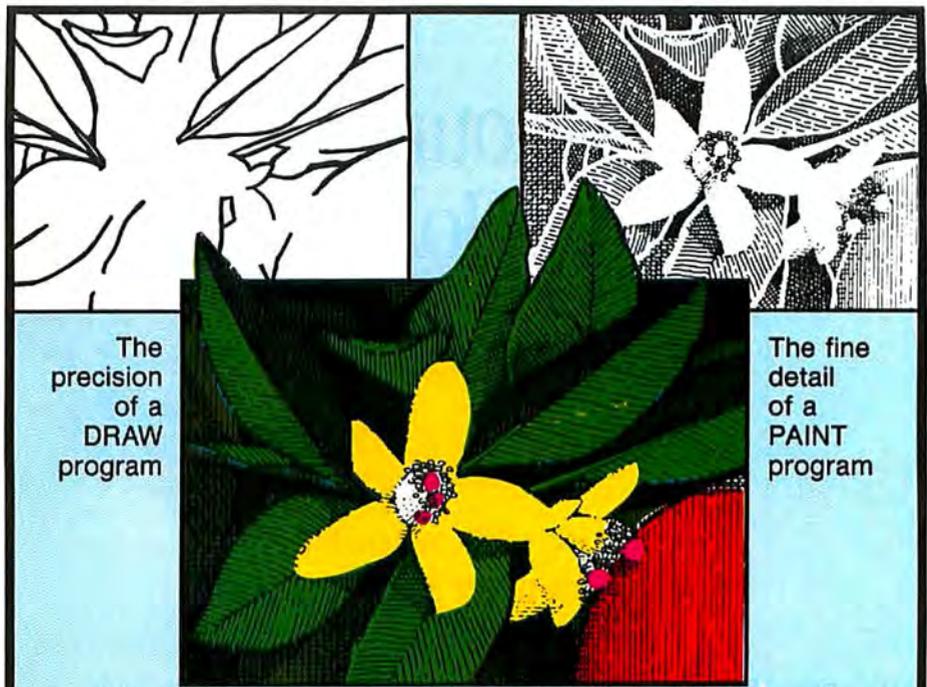
What about other products for the Mac II?

Next is the AST-RM4, the memory card with 4MB of RAM, using 256K chips.

Why won't users simply add memory on the system board?

At present, with 256K SIMM strips only 2MB can be added there. So there is a need for more memory, particularly if you are using UNIX. When 1-megabit chips become economical in the later part of 1987, our add-on card will provide larger capacity.

(continues)



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DRAW
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The fine
detail
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SuperPaint

Graphics for the Macintosh will never be the same again. Before it was paint or draw. One or the other. Now, nothing less than both will do. With SuperPaint, you can edit dot by dot in the PAINT layer and you can create and manipulate objects in the DRAW layer.

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feature allows you to magnify and work on dots in the paint layer at an amazing 300 dpi resolution! These high resolution images can be pasted directly into your word processor or page layout program.

SuperPaint. When all you need is a masterpiece!

(compared to other paint programs) "SuperPaint is the clear winner and... MacPaint's heir apparent."

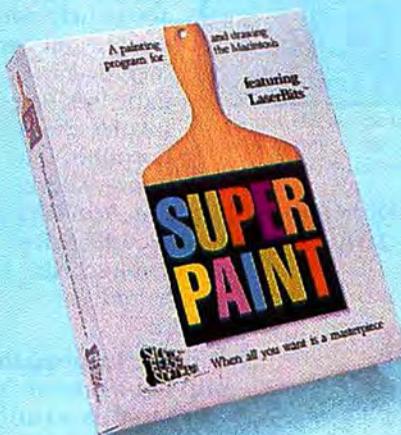
Adrian Mello, MacWorld, Jan '87

"SuperPaint is the hottest graphics package currently available."

Bob LeVitus, MACazine, Jan '87

"Is SuperPaint really super? Absolutely."

Sharon Aker, MacUser, Feb '87



Suggested Retail Price: \$99.00

System Requirements:

Macintosh 512K, Plus, XL (1 mb)

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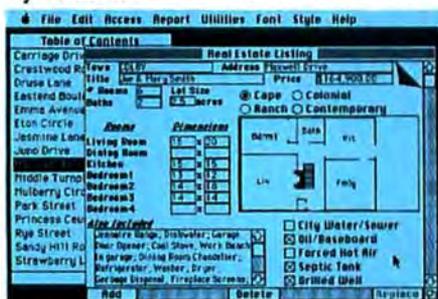
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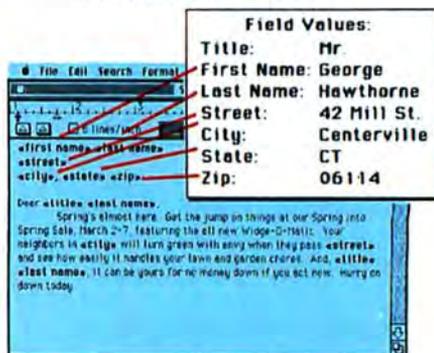
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Verbatim

The third product is the Mac286, a two-card set that allows MS-DOS to operate concurrently with the Mac operating system. For example, you will be able to open the Mac calculator and the DOS *Sidekick* calculator from Borland and have them work together on the same screen. Or open two windows and run *Excel* in one and *1-2-3* in another. The Mac286 has 1MB of RAM, an Intel 80286, an 80287 option, and an IBM-compatible floppy drive controller with DMA [direct memory access].

AST already produces a video digitizer for the Apple IIGS. Are you likely to produce a similar product for the Macintosh?

Yes.

Similarly, AST produces graphics boards for the IBM PC market.

Yes, it is always possible to import technology from our PC division to the Apple group. However, the Mac is several steps ahead of the PC in terms of graphics, so it's not certain how we will adapt our products for the Macintosh.

What synergy will be derived from AST having an IBM group?

I like that phrasing. AST is the PC group. The PC group provides us with expertise and support on the DOS aspects of our projects, in manufacturing, even in marketing. Our biggest advantage will be in importing data communications, networking, and custom gate-array chips with their help.

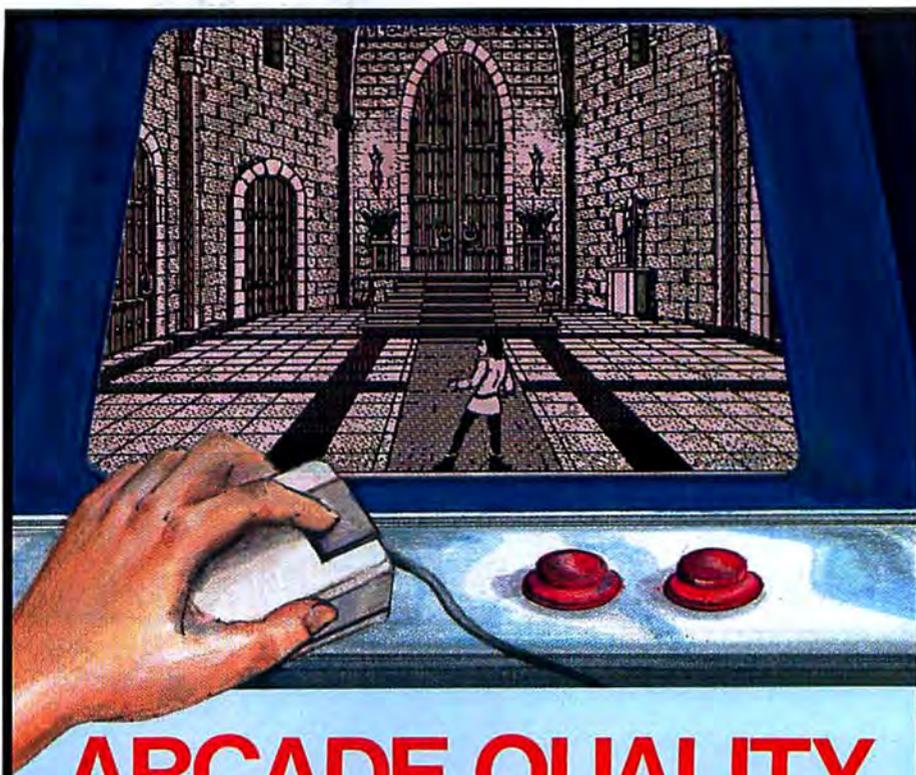
Is Apple concerned that proprietary information about its products could enter the PC arena from AST?

No, I don't believe so. AST does not have a relationship with IBM like that between Apple and AST. We find out about IBM products from the media and IBM press releases. We have no prior knowledge of what IBM is going to do.

Does Apple have competition in the personal computer market?

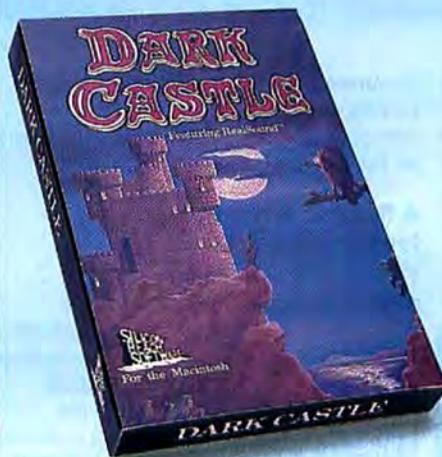
In the personal computer market there is no question that Apple is ahead, and the major player in its market, IBM, is ex-

(continues)



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Enter the Dark Castle at your own risk. Watch out for trap doors, boulders and lightning bolts! Fight off rats and bats, knife-throwing guards, mutants, vultures, flying griffins, magic brooms, the relentless floating eye, dragons and the sadistic torturer! And throughout it all you'll hear the famous Silicon Beach RealSound™.



"The first game that I have seen on any computer that will rival an arcade game."

Robert Forras,
MacTimes, Nov-Dec '86

"Silicon Beach has produced another startling advance in computer games. The game is spectacular."

Linda Kaplan,
MacUser, Feb '87

"This is the coolest Macintosh game I've ever seen."

Bob LeVitus,
MACazine, Dec '86

"Dark Castle provides the highest quality graphics and sound of any Macintosh game available."

Ken Goehner,
MacWorld, Mar '87



Suggested Retail Price: \$49.95

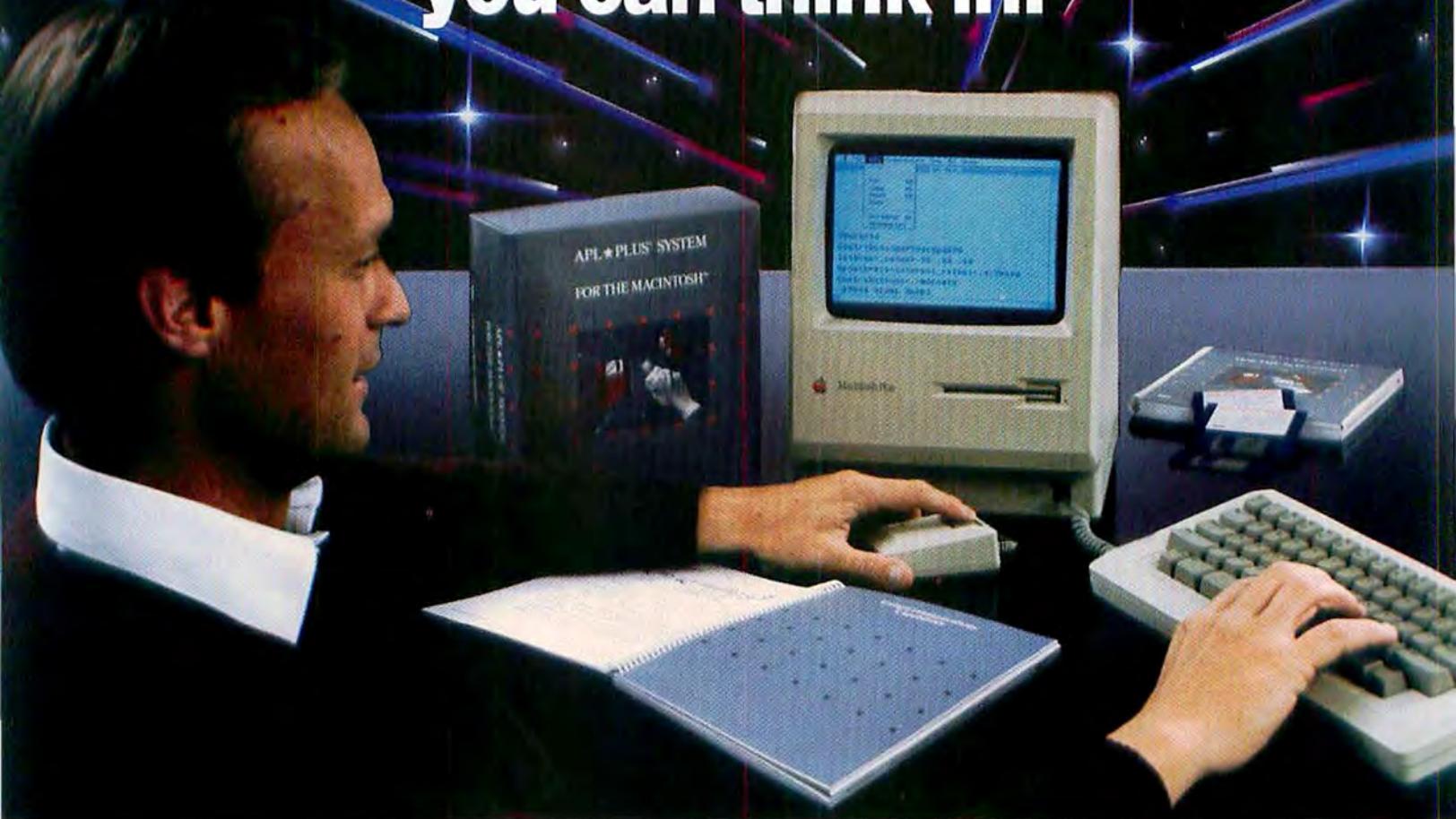
System Requirements:
Macintosh 512K, Plus

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```

BASIC
20 S=0
30 FOR I=1 TO 100
40 INPUT X
50 IF K=0 GOTO 80
60 S=S+X
70 NEXT I
80 PRINT S/(I-1)
    
```

BASIC
A program to calculate averages

```

APL★PLUS
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command will work with small or large blocks of data. With its concise and compact notation, you'll solve problems as fast as you can think about them.

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Verbatim

pected to shy away from personal computers, at least at the low end. The others: Compaq, Tandy, Zenith, and the Japanese clone manufacturers are not technology leaders; they were able to take advantage of DOS. When IBM changes the direction of its products, where will all of these companies be? And Apple will benefit from any changes at IBM because there will be a disruption of the PC market. But DOS is entrenched—it will be there for quite a while, even if it is in decline. In the non-DOS world are Atari and Commodore, on a much smaller scale, and that's it.

Will there ever be Mac clones?

Bill Campbell, Apple's executive VP of sales and marketing, has stated something to the effect that Apple will defend its proprietary technology to the end of the world and spend its last penny to do so.

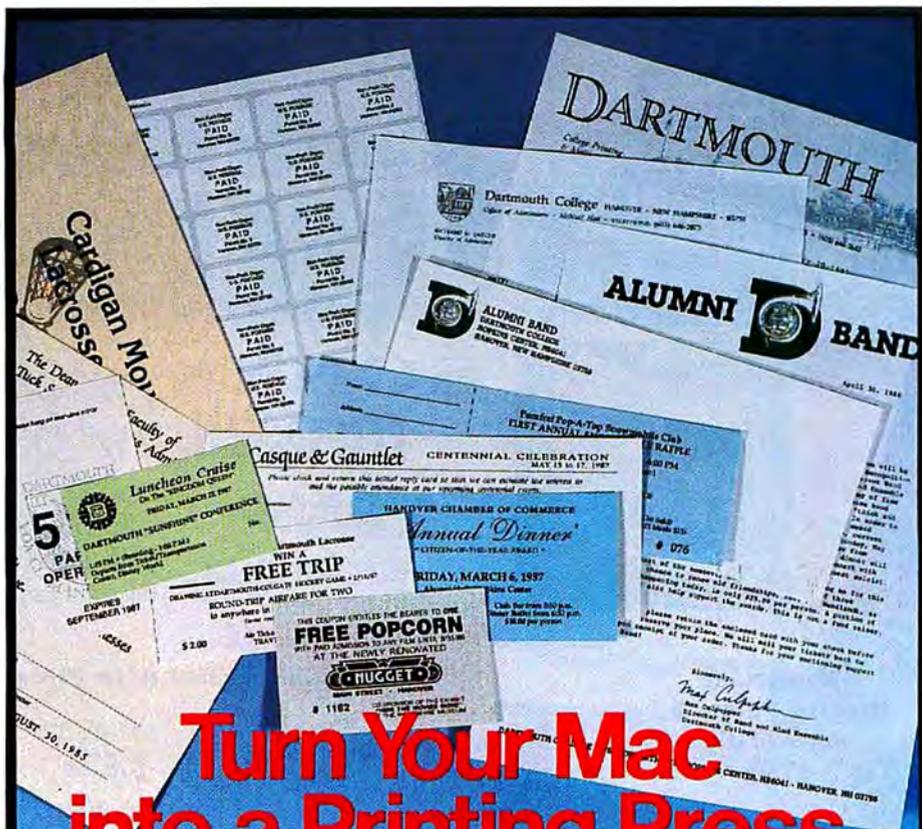
Windows is gaining momentum. Do windows give the IBM PC the strengths of the Mac?

Again, IBM PC developers are not technology leaders. Look at the Mac II—you can run umpteen displays from it, and the displays can be a contiguous screen or multiple windows that interact with one another. When *Windows* finally catches up with Apple, Apple may be into its next generation.

What is your vision for personal computers over the next ten years?

The total integration of voice, communications, and video technology must take place. I'm not sure when—certainly in my lifetime. In each of these areas, technology is leaving the labs and moving into commercial products. Over the next two years, voice recognition will become an important user interface, for example. All we need is for major corporations to invest to make it all coalesce on a mass scale. The videophone would be an example of the kind of development that would require multicorporate efforts; companies like AT&T and IBM need to invest to turn the new technologies into commercially feasible products. □

Interviewed by Jerry Borrell



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John Lutz did!

John Lutz, Director of Printing at Dartmouth College, uses Silicon Press to produce a world of print materials such as multiple format letters, forms, mailing labels, price labels, awards, football and theater tickets, parking permits, badges, desk placards, bin markers... you name it!

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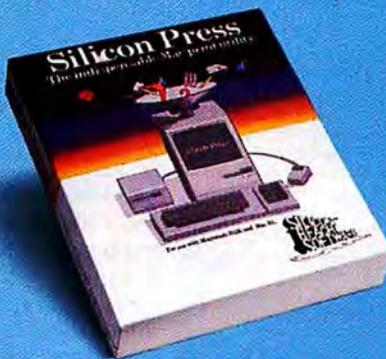
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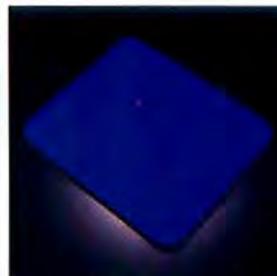
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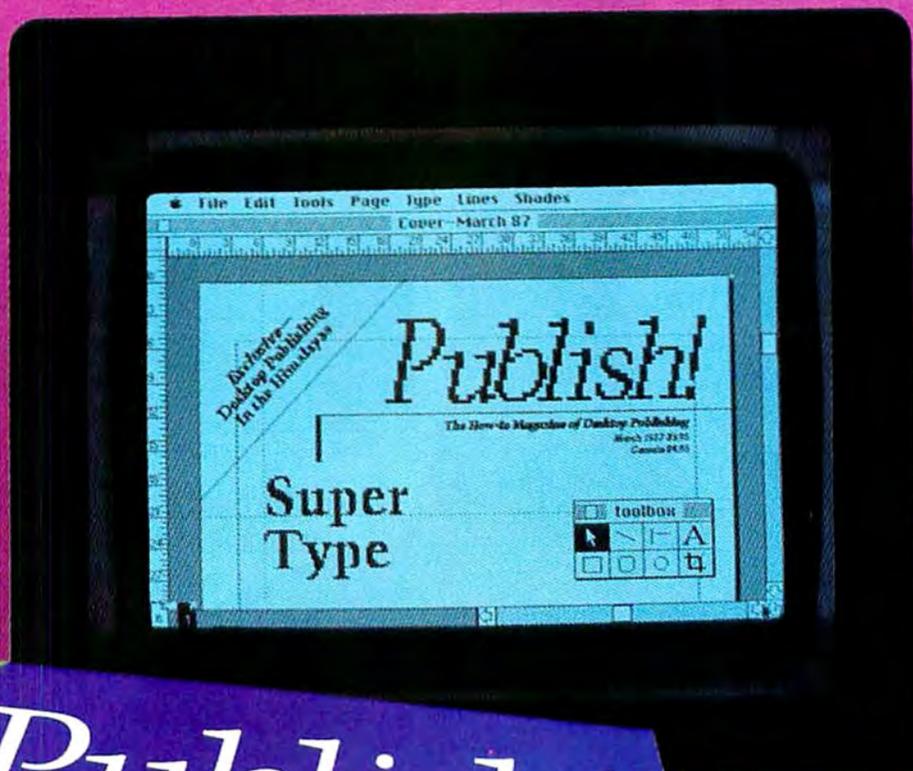
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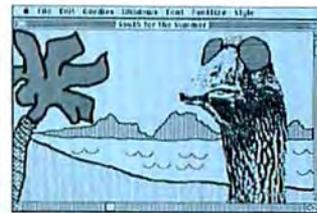
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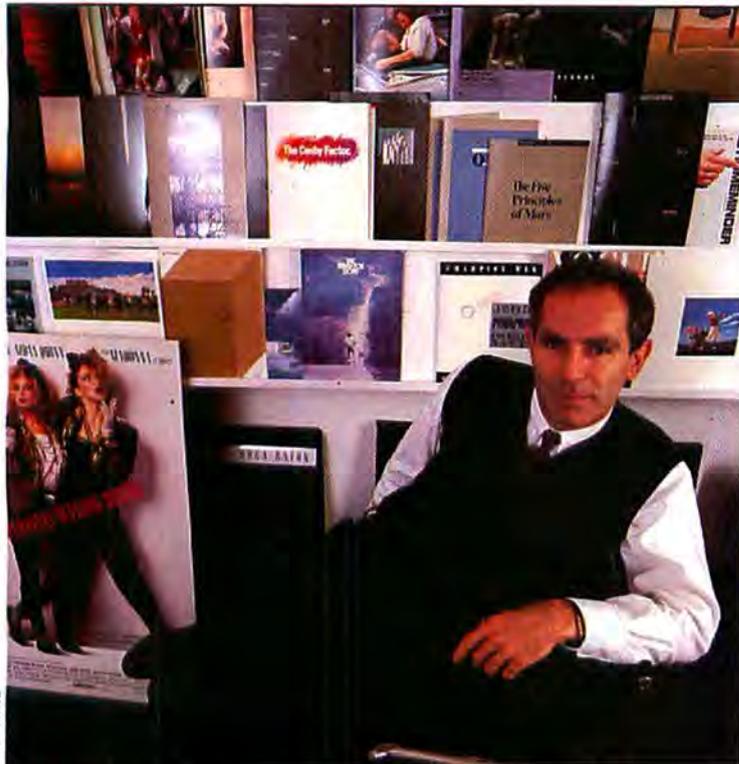
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Macworld News

by Daniel Farber



The Macintosh has become standard equipment for designers at Gips/Balkind Associates in New York City, says cofounder Aubrey Balkind.

Designing with the Mac

T Within two sedate New York City brownstones, the GBA Group (Gips/Balkind, Associates) produces promotional videos for businesses, music videos, films, TV commercials, and trailers for films. Movie posters featuring Meryl Streep, Madonna, and other Hollywood luminaries line the walls, showing off GBA's impressive collection of promotional work. And on al-

most every desk in the four floors of offices rests a Mac, which is used for everything from bookkeeping to graphic design.

From putting together sedate annual reports and corporate identity packages to designing slick Hollywood movie posters, the Mac is at work. Aubrey Balkind, one of the firm's founders, pushes the staff to use the Mac in aggressive new ways. For example, the designers toss ideas back and forth via electronic mail. And since GBA

has seeded several clients with Macs of their own, MCI Mail speeds up communication with them, too.

The GBA team relies on a Linotron 300 typesetter for producing finished, ready-to-print documents, thus eliminating the need for numerous exchanges between typographer, printer, and designer. The company also uses applications like *PageMaker* and *MacPaint* to develop materials and recently produced a magazine completely on the Mac from word processing to production.

Balkind is intent on standardizing the company on the Macintosh, so that its energy can be focused on creating rather than executing designs.—Elinor Craig

Ten Years After



The theme of Apple's tenth anniversary bash in mid-January was "Over the Rainbow"—a theme inspired perhaps by the trajectory of Apple's stock, which had just passed the \$50 mark. Whatever the rationale, the Santa Clara Convention Center was decked out like the Emerald City, complete with hired munchkins and colossal rainbows of balloons and flashing lights. Some 8000 tuxedoed and begowned Apple employees and friends danced to Huey Lewis and the News' latest hit, "It's Hip to Be Square," which seemed to be the party's secondary theme.

One of the event's highlights was the Apple Museum, an exhibit of Apple memorabilia and a crash course in the history of Apple Computer. Written and pictorial summaries of the last ten years lined the museum's walls, accompanied by historic memos, photos, and ads.



The exhibit for 1976 featured photos of Jobs, then 21, and Wozniak, 26, who that year designed and built the Apple I in Jobs' garage. The company's first ad, offering the Apple I for \$666.66 in *Interface Age*, was included in the display.

Apple's second year brought the introduction of the Apple II, and 1978 marked the debut of the Disk II drive, which replaced the then-current tape-drive technology. In 1980 Apple stock went public. Announcement of the Lisa and the Apple IIe came in 1983, and in April of that year the *Wall Street Journal* noted that Apple had made the Fortune 500. The year 1984, of course, brought the announcement of the Macintosh; a videotape of the classic "1984" commercial, which aired only once—during the '84

(continues)



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Ten Years After (continued)

Super Bowl—played repeatedly at one exhibit.

Several ad campaigns were featured as well, including the "test drive a Macintosh" promotion, which invited potential buyers to take a Mac home for a test run, and the issue of *Newsweek* from 1984 in which every ad was for the Macintosh or related products.

Another exhibit included about one hundred T-shirts of various vintages, by-products of numerous Apple projects and departments, from "Wheels for the Mind" to "Project Jonathan." Large color photos depicting Apple computers being used in creative ways lined the walls. The museum also contained its share of relics and curiosities, including an early Macintosh prototype with a 5¼-inch drive.

I hope Apple will find a permanent home for the Apple Museum. It offers a fascinating, if abbreviated, look at the evolution of Apple, from garage to Oz in only ten years. —*Erfert Nielson*

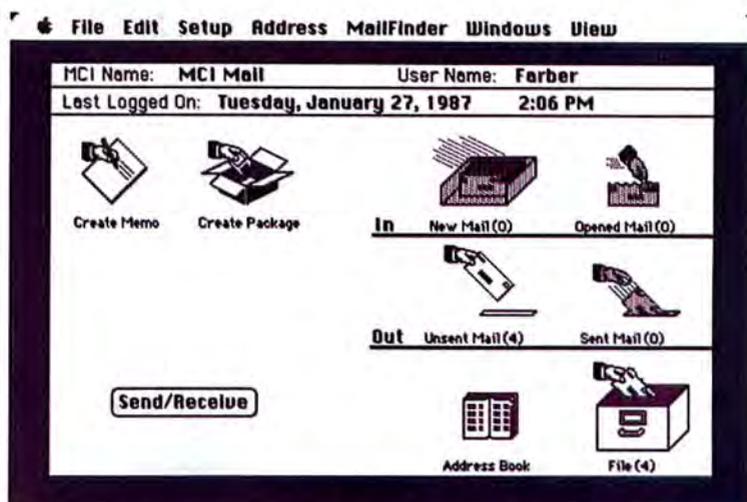
useful for storing archival data, such as medical records and audit trails. The drive connects to the SCSI port on the Mac and includes two SCSI ports for hooking up hard disks or tape drives. LoDown's WORM software allows multiple writes to the drive, so you can easily update files while preserving the integrity of the original. Updates appear as folders on the WORM drive's HFS directory. LoDown's WORM drives offer 400 or 800 megabytes of storage on the optical laser disks (for \$5995 and \$7995, respectively). For more information contact LoDown at 10 Victor Sq. #200, Scotts Valley, CA 95066, 408/438-7400.

Desktop Express

 In the domain of electronic mail, *InterMail* and *InBox* provide easy-to-use interfaces for local-area-network mail, but national and international mail services are too cumbersome for the average business user.

Desktop Express, a new program developed by Solutions, Inc., owned by Dow Jones and marketed by Apple, is breaking ground in a new era of electronic mail. Based on the user-interface design of *AppleLink* (Apple's own internal mail system, which was codeveloped with GEISCO, or General Electric Information Services, *Desktop Express* distributes electronic or hard-copy documents across the country via MCI Mail.

Apple's communications marketing manager, Peter Hirshberg, says *Desktop Express* marries desktop publishing and desktop communications. In plain words, that means you can zap any Macintosh document, such as a business report created with *PageMaker*, to anyplace in the



Desktop Express marries the Macintosh user interface to MCI Mail, eliminating the cryptographic elements of E-mail.

country with a few clicks of the mouse. Using the same technology as Solutions' *Glue*, *Desktop Express* allows you to view or print any document received, without having the specific application used to create the document. You can send text-only documents to other computers, and compatibility with *Lotus Express* is also in the works.

Desktop Express allows you to specify several delivery options besides the standard E-mail, including hard-copy postal delivery (normal, overnight, or four-hour service) and Telex. MCI has six print sites across the United States for hard-copy delivery service.

In addition, you can log on to the Dow Jones News/Retrieval Service or use MCI in its normal, nongraphics mode from *Desktop Express*.

The Mac on Campus

 Like many universities, the University of Utah has found itself in a financial bind when faced with replacing library card catalogues and "pony express" campus mail delivery with computerized systems. But the failure of state legislatures and the

federal government to fund electronic campus networks hasn't stopped schools from purchasing hardware and software on a limited basis and from working with companies like Apple that offer significant discounts on equipment.

Because it belongs to the Apple University Consortium (AUC), Utah's 25,000 students and faculty receive price breaks on equipment as well as technical assistance. Although the university doesn't yet offer computer literacy courses for credit, its various departments



University music labs are using the Mac to teach orchestration and composition.

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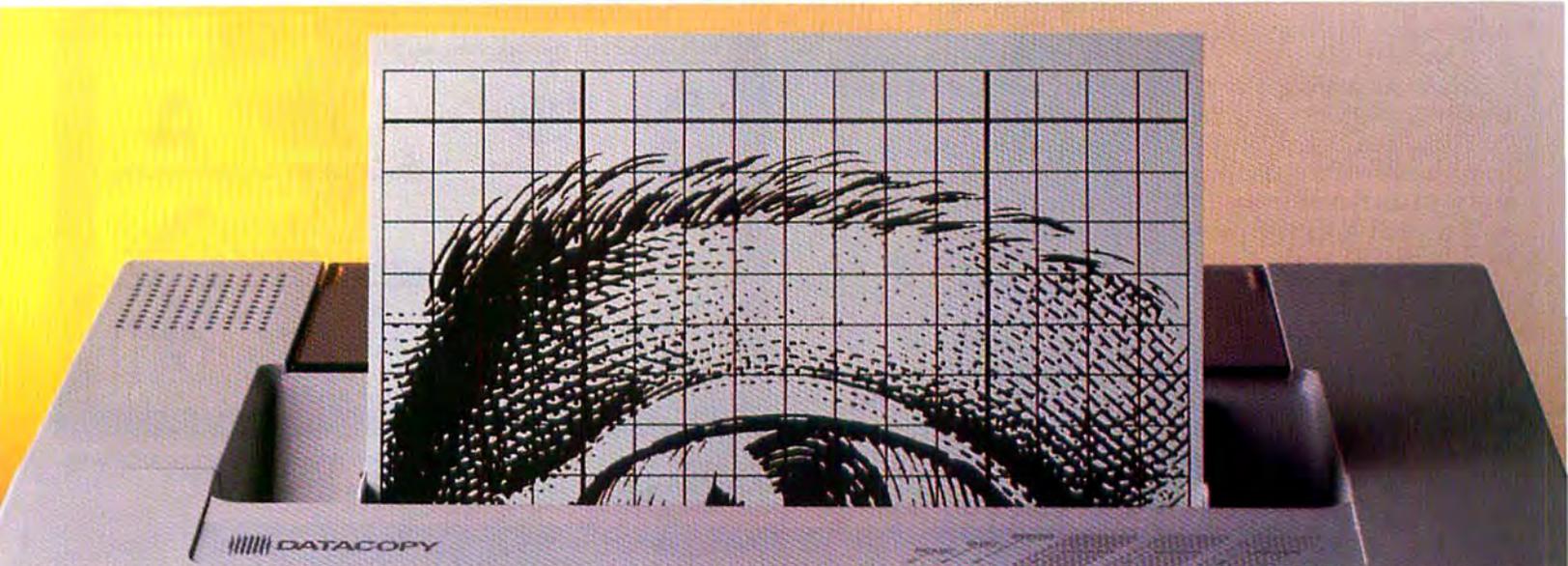


LoDown's WORM drive lowers the cost of archival storage to about \$10 per megabyte.

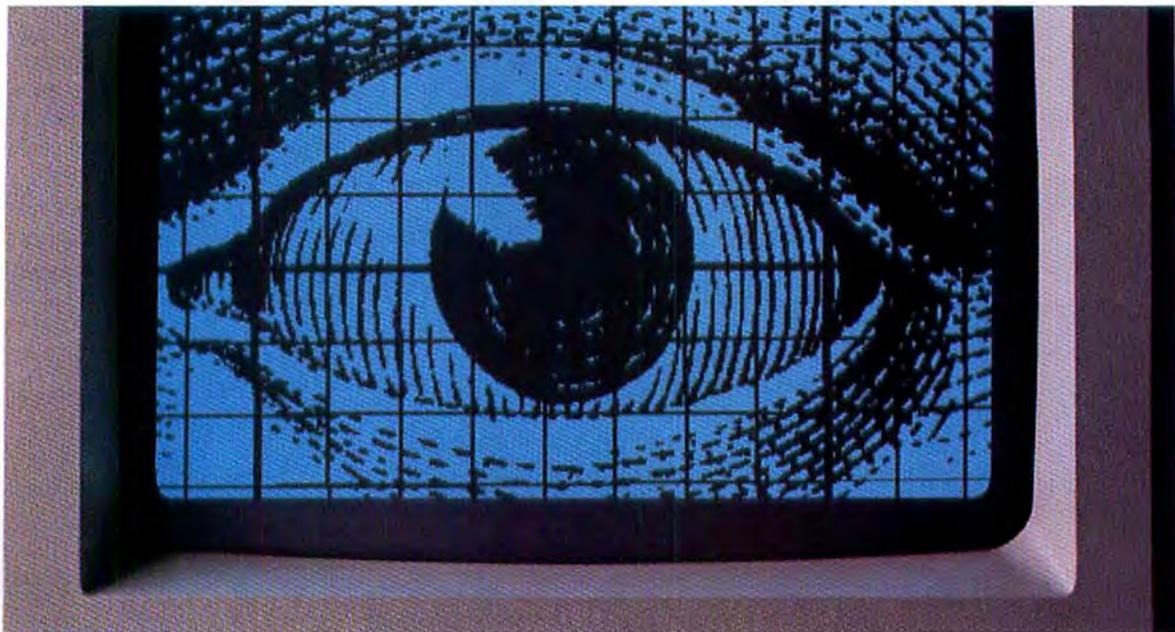
LoDown Optical Drive

 Optical disks have been much talked about but until now unavailable for the Mac. LoDown has announced the first optical WORM (write once read many) drive for the Mac. WORM drives are particularly

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The Mac on Campus (continued)

and colleges weave computer training into the curriculum. More than 200 Macs are available campuswide for student use. The mathematics department, for example, has a lab with 20 Macs, and the Computer Center Facility has 90. Even the school newspaper is prepared for typesetting, using 15 Macs, 2 ImageWriters, and a LaserWriter.

The Department of Music has a student lab with 6 Macs, each interfaced to a Yamaha digital MIDI. In addition, the department is setting up orchestration and composition studios equipped with Macintoshes. Last year, for a joint production with the Utah Ballet, the orchestra consisted of a MIDI-controlled Mac connected to synthesis equipment and was conducted via a MIDI timing device. Taking cues from the conductor, a professor tapped out each beat individually, and the Mac responded by controlling eight synthesizers and a drum machine.

These innovative uses of the Macintosh are similar to applications being developed at other AUC schools. But until more R&D funds become available, courseware and new applications will lag behind technological advances.

Chessmaster

Since most chess programs already play better than 95 percent of the general population, the casual player should choose a program by the features it offers, rather than by playing strength alone. Fortunately for those in the throes of indecision, *Chessmaster 2000* from Software Toolworks (distributed by Electronic Arts) does

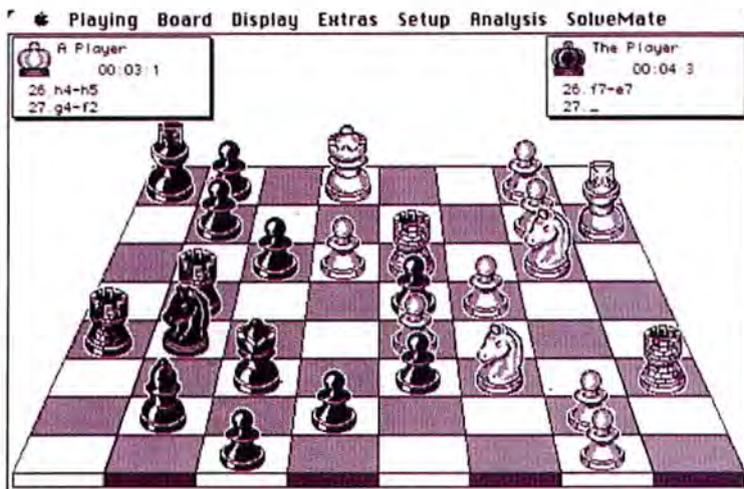
well on both counts, offering championship-level play (it recently gained top honors at the 1986 U.S. Personal Computer Chess Championships) as well as a multitude of features.

Chessmaster 2000 includes an optional 3-D display, a teaching mode that demonstrates all possible moves for each selected piece, and an annoying and often unintelligible voice that tells you when it's your move. (Fortunately, you can turn off *Chessmaster's* voice.)

You choose from 12 standard levels of play, ranging from five seconds to ten hours per move. In addition, *Chessmaster* has a Coffeehouse mode that introduces an occasional random move, an Easy mode that stops *Chessmaster* from thinking while it's your move, and a Newcomer mode that, as far as I could tell, simply has the program play bad chess.

Beginners can display board letter-number coordinates and captured pieces. You can also display a Thinking window, which shows the moves *Chessmaster* is currently considering.

Along with *Sargon III* and *Psion*, *Chessmaster 2000* provides chess players with the next best thing to a real live chess master.



The latest championship chess player on a Macintosh disk is *Chessmaster 2000*, which won the 1986 U.S. Personal Computer Championship.



Graphic designer Paul Souza's entry took grand-prize honors in Aldus's PageMaker design competition.

PageMaker Winner

Aldus Corporation's *PageMaker* design competition generated more than 350 entries, including books, magazines, catalogs, newsletters, and even newspapers. The grand-prize winner was selected from among 16 finalists who won monthly competitions during the five months the contest ran. Paul Souza, a designer for WGBH, a public television station in Boston, took the prize. Souza's

entry was a 300-page proposal for creating a series of interactive videodisks based on the acclaimed public-television science series, *NOVA*. The proposal included a storyboard describing a prototype *NOVA* videodisk program. For his effort, Souza received an all-expenses-paid trip for two to Venice, home of Aldus Manutius, the Renaissance printer-scholar for whom Aldus Corporation is named.

UpTime: The Disk Monthly

At the last Macworld Expo, the January issue of *Macworld* appeared in *Guide*, a hypertext system from Owl International. This clever example of promotional aplomb showed off the presentation capabilities of *Guide*. While a hypertext magazine is a bit of a novelty, the notion of a disk-based magazine is not. *UpTime*, by Viking Technologies, has been in business for almost a year now, offering its customers a monthly potpourri of news and reviews, desk accessories, home-

(continues)

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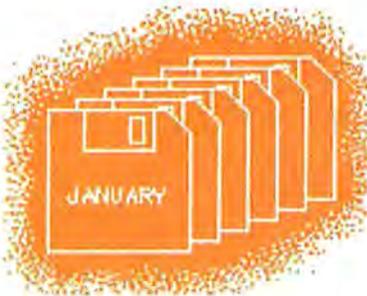
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UpTime: The Disk Monthly
(continued)

management products, utilities, and games—lots of them—at a substantial discount. At the time of this writing, Viking claimed around 10,000 Macin-



tosh customers, 40 percent of whom are annual subscribers.

To get the ball rolling, *UpTime's* early issues contained old public domain and shareware programs purchased and upgraded by Viking. Small utilities like the *MacWrite File Doctor*, *Label Magic*, and *Auto-Black* were helpful items, while programs like the fixed-interest-rate *Loan Amortization* were of limited utility (adjustable mortgages being the norm now). And since *UpTime* ran (rather slowly) in *Microsoft BASIC*, copying programs required copying the run-time *BASIC* along with them.

By the fifth issue, however, *UpTime* became a stand-alone program, and its speed and the programs it contained improved. *Money Matters*, an investment calculator, was bundled on the same disk with the *Talking Moose* and *Tao*. As *UpTime's* list of contributing programmers continues to grow, each issue seems to have at least one really good feature program. And the games continue to appear in abundance: *MacSevens*, *Yabtzee*, *Great Snake*, *Star Trek Trivia*, *Mac-Football*, to name just a few.

As one might expect in a disk-based magazine that keeps a jealous eye on program space (and takes the 128K Mac as the common denominator), the

other half of the magazine—the news and reviews sections, letters from subscribers, tips on new products—reads like a collection of newsbriefs: short, to-the-point, but not much substance. Even so, with each disk *UpTime* evolves. By the sixth issue, its interface aesthetics had improved considerably, and handy items like *Rolodesk* and the excellent *X Ref*—a cross-referencing utility—were included.

As *UpTime's* first year draws to a close, there's evidence that readers are pushing the magazine toward including more productivity and creativity products and away from flimsy editorial and gimmicks.

For more information, contact Viking Technologies, Inc., P.O. Box 299, Newport, RI 02840, 800/437-0033, 401/849-4925. —Michael Miley

Moonlighting



As Maddy, the owner of a swank detective agency, Cybill Shepherd leans her silk-clad arm against her desk and stares at the information spilling onto the Macintosh screen. Nancy Drew never had it so good. ABC's "Moonlighting" is one of the few weekly television shows that presents a somewhat realistic picture of the high-tech tools a modern office might use.

Thanks to Mel Fisher, set-dressing lead on the "Moon-



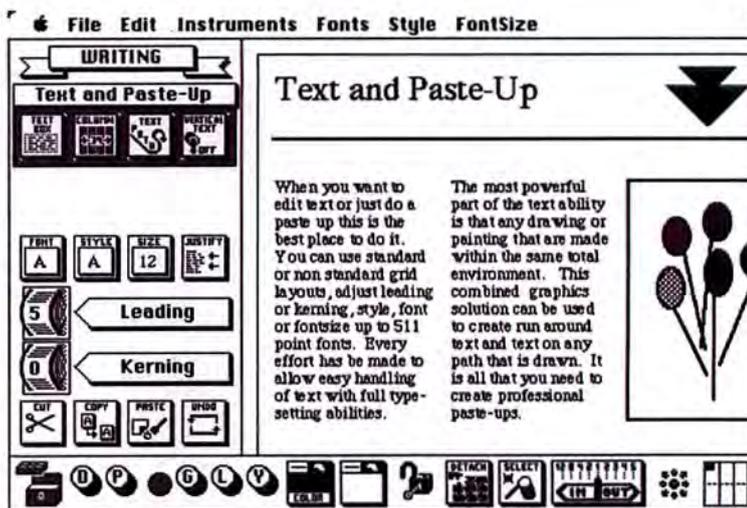
Maddy and Dave couldn't get along with or without a Mac.

lighting" crew, the Mac has made its debut in a supporting role on this notorious comedic drama. Fisher had used the Mac in her own interior design business and discovered she could use it for set design in the studio. So when it came time to put a computer on the set, Fisher knew what she wanted.

If you could put the Mac on display before millions of attentive yuppie viewers, Apple would loan you one too. In the meantime, keep your eyes peeled—maybe one day you'll see Maddy or Dave actually using the Mac. —Elinor Craig

Text can be entered in *LaserPaint* or pasted into a document from another application. The program lets you combine type fonts, styles, and sizes within a block of text, as well as adjust leading and kerning. *LaserPaint* arranges text in columns of preset or custom widths. *LaserPaint* can wrap text around a shape or illustration and can fill a selected shape with text. Finally, the program allows you to attach text to a path, such as a simple curve or a complex spiral.

For graphics, *LaserPaint* offers bezier curves, spirals, and



LaserPaint, with its unique interface and high-resolution editing capabilities takes a different approach from most text-and-graphics programs.

LaserPaint

No program can do everything, but it appears that LaserWare's *LaserPaint* is going to give it a try. A look at a prerelease version revealed a promising program that combines object-oriented graphics, bit-mapped graphics, and text. That description could apply to other Macintosh graphics programs, including *SuperPaint* and *GraphicWorks*, but *LaserPaint* emphasizes text capabilities, placing itself in a nebulous area between a graphics application and a page-layout program.

the ability to combine multiple line widths (from 1 to 99 pixels) in a single object. Unlike *MacDraw*, *LaserPaint* saves drawings in PostScript format, providing a wider range of text and graphic effects. Printed drawings can span up to six pages, and the program takes full advantage of a printer's resolution (300 dots per inch on the LaserWriter; up to 1250 dots per inch on some phototypesetters). Several alignment aids make it easier to create color separations.

LaserPaint offers several

(continues)

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co-workers
print jobs to finish is a thing of the past. The print jobs in the LaserServer can be prioritized, rearranged, and deleted. As well, unauthorized users can be denied access to the LaserWriter.

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LaserPaint (continued)

handy features in the realm of bit-mapped graphics. For precision work, a bit map (a pixel-by-pixel representation of a drawing) can be displayed and edited at full resolution, up to 1000 dots per inch. An adjustable airbrush gives graphic artists more flexibility than *MacPaint*'s single-size, single-density spray can; *LaserPaint*'s airbrush even offers a splatter option, making its effects all too real. *LaserPaint* also provides *friskets*, or stencils, that allow you to "cut out" an area and spray-paint over it.

LaserPaint has an impressive repertoire of features. However, viewing a program and using it are two different matters. A program with a vast number of features runs the risk of being difficult to learn and use. Fortunately, *LaserPaint* offers a unique option: you can select frequently-used icons and edit the images or move the icons to a more accessible place on the screen, creating a personalized user interface. I hope more programs will offer this capability in the future.

It remains to be seen if *LaserPaint* is the definitive graphics/page-layout program. But at the very least it takes an ambitious step toward an integrated text-and-graphics approach to desktop publishing.
—*Erfert Nielson*

Color Workstation

Lightspeed of Boston is developing a graphic-design workstation for the Macintosh II. The system includes color page-design software and allows you to compose pages, combining photographic-quality images, text, and line art. Pages can be output to a Seiko thermal

printer for proofing at 203 dots per inch, and final film is sent to a Scitex color prepress system. The Lightspeed system does not use PostScript or accept nontext files from Macintosh applications. The system uses a 300-dot-per-inch color scanner to input graphics.

Initially, Lightspeed is selling turnkey systems, including Macs, and targeting corporate environments. The Mac II version is a subset of the company's \$100,000 graphics workstation, which works on the Sun. Users of the Mac II Lightspeed workstation will be able to share files with Lightspeed Sun systems. For more information contact Lightspeed, 47 Farnsworth St., Boston, MA 02210, 617/338-2173.

An On-Line Service You Can Bank On

Finally, there is electronic banking for Macintosh users. Spectrum, from The Chase Manhattan Bank, offers low-cost home banking plus planning and investment services. The basic



service, which costs \$5 per month, lets you pay bills, transfer funds between accounts,



The Imagizer from Comtrex Limited allows you to store video input as PostScript files on the Mac and to print images with a 256-level gray scale.

check account balances, and track account activity.

Additionally, Spectrum gives you on-line access to a variety of investment and financial advisory services and databases, like Standard and Poor's Online. There are also financial-planning, portfolio-management, and investment-analysis services. If you open up a special brokerage account with Rose & Company, a discount broker, you can also use Spectrum to trade stocks and options.

You connect to Spectrum via a toll-free telephone number, and you pay \$3 to \$5 per month for most additional services. Company stock reports and more than 30 stock quotes per month are also available; however, the charges for these vary.

Fully supporting the Macintosh interface, Spectrum may just be the wave of the financial future for Macintosh users. For more information, contact The Chase Manhattan Bank, Electronic Banking Division, 6 E. 43rd St., New York, NY 10036, 800/522-7766. —*Steve Mann*

Imagizer

Comtrex Limited has introduced the Imagizer, an imaging system that stores video input in the Mac as a PostScript file. Imagizer files can be printed on the LaserWriter or other PostScript-compatible printers with up to 256 shades of gray, resulting in images with the quality of newspaper photographs. The \$1995 Imagizer comes with an 850-line high-resolution camera (cost without the camera is \$950). For more information contact Comtrex at P.O. Box 5500, Newport Beach, CA 92662, 714/673-4200.

Edudisc

Silas Mariano, division chief of the California Youth Authority's Training Division, will be the first to concede that the California Youth Authority is—or was—a mainframe kind of

(continues)

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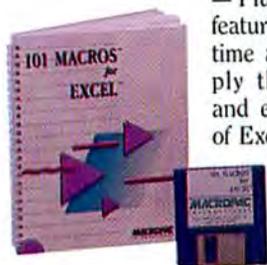
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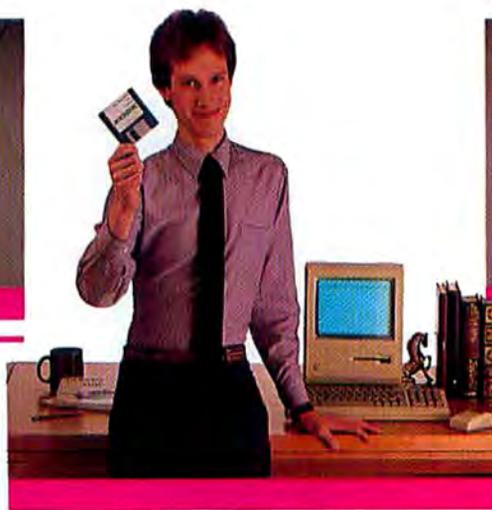
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Edudisc (continued)

place. But Mariano had a vision. He saw micros being used everywhere for everything throughout the system, including employee training.

Fortunately for Mariano's vision, Edudisc's *Mentor/Mac-Video* authoring system for the Mac was available. Designed for nonprogrammers, it provides a set of do-it-yourself curriculum formats into which an instructor plugs subject material to create interactive video courseware.

The Youth Authority facilities are staffed around the clock, so an automated, self-directed, interactive training system like Edudisc's proved to be ideal. Mariano figures that 15 to 18 minutes of coursework using the Edudisc system on the Mac saves 2 hours of lecture time.

Mentor's instructional formats provide text, graphics, video, multiple-choice, and fill-in-the-blank options. The course designer chooses between relational and linear formats, or combinations of both.

The *Mentor* authoring system works together with the *MacVideo* optical-disk editing system. The Mac is used to control and edit the scenes or images in a course.

Eventually Mariano hopes to set up his Edudisc-based training system in ten institutions and six training centers around the state. The first course, "Personal Safety Device," reduced training time by 75 percent and increased information retention among the corrections officers who took the course.

In addition to the California Youth Authority, the Edudisc system is in place at several colleges and universities, including Boston College, Dartmouth, and Harvard, as well as at a Big Eight accounting firm, and even at the Tennessee Valley Authority. For more information contact Edudisc at 1400 Tyne Blvd., Nashville, TN 37215, 615/373-2506. —Eric Olson

Photo Retouching on the Mac

 Graphic designers and desktop publishers often complain that digitized images printed on the LaserWriter often look cloudy and lack the refinement of photographs. A new program, code-named *Grey Paint*, that lets you touch up images such as scanned photos on the Mac should help to alleviate that problem. Developed by Fractal Software and to be published by LetraSet, *Grey Paint* allows you to retouch scanned images in up to 65 shades of gray. The program has many special features including an on-screen look-up table for editing contrast and brightness, user-definable brushes, anti-aliasing, and seven zoom levels. The palette of editing tools provides a variety of functions. Charcoal, for example, lets you shade im-

ages—the more you apply it, the darker the image gets.

You can output the program's files to the LaserWriter or save them as PostScript files. The program supports Thunder-Scan, MacVision, Abaton, and Microtek scanners, and Scan MacVision, Abaton, and Microtek from within the program. For more information contact LetraSet at 201/440-8620.

Init, Not out of It

 The new System file (version 3.2 or higher) features one little-noticed advantage. You can customize it by copying Init files to the System Folder. (However, beware that placing multiple Inits in one System Folder can



For those of you unsatisfied with the standard beige veneer of your Macintoshes, one enterprising company will paint your machines in a rainbow of colors.

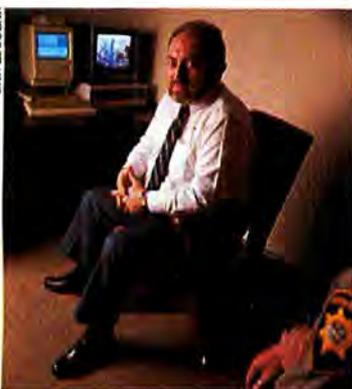
Color Mac

 While working at Pixar, a Steve Jobs company that produces a high-end computer graphics machine, David Seigel disassembled his Mac and spray-painted the plastic shell the same granite color as the Pixar computer. This was the beginning of Seigel's new company, *aesthetics*, which is putting designer Macs on desktops. For about \$200, you too can have your Mac painted whatever color suits your taste. For more information, contact *aesthetics* at 365 Forest #4E, Palo Alto, CA 94301, 415/326-3936.

produce unpleasant results.) To modify earlier versions of the System file with Init resources, you had to use a resource editor (or a special installer program) to install them directly into the System file.

Among the more amusing Inits is *MacWait* by Bob Finch. It replaces the standard, static watch icon with one whose hour and minute hands rotate while you wait for something (else) to happen. Two other less-than-serious Inits are *Sound Init* and *Beep Init*. Together with sound files digi-

(continues)



Interactive video systems have streamlined employee training at the California Youth Authority, say Silas Mariano.

A launch feature integrates other Mac applications into the program, and a transport feature allows for conditional branching to any point in a course, or branching from multiple points to a single location. *Mentor* also provides tools for creating lessons and tests.

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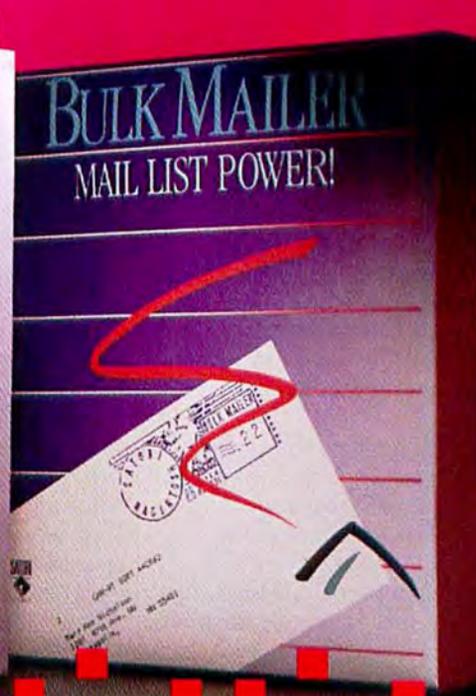
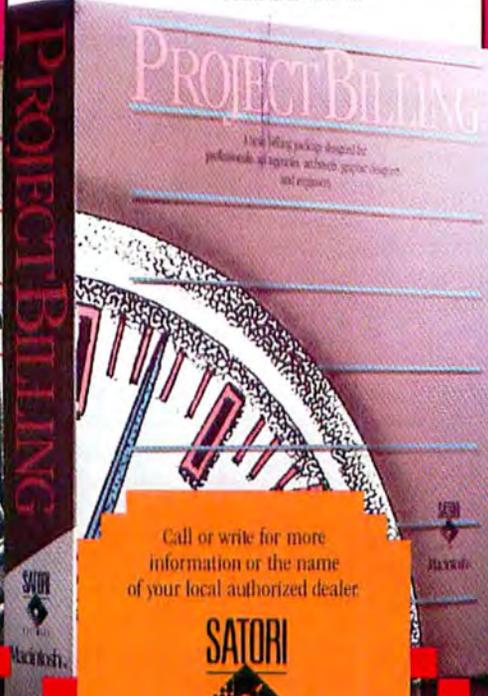
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Init, Not out of It (continued)

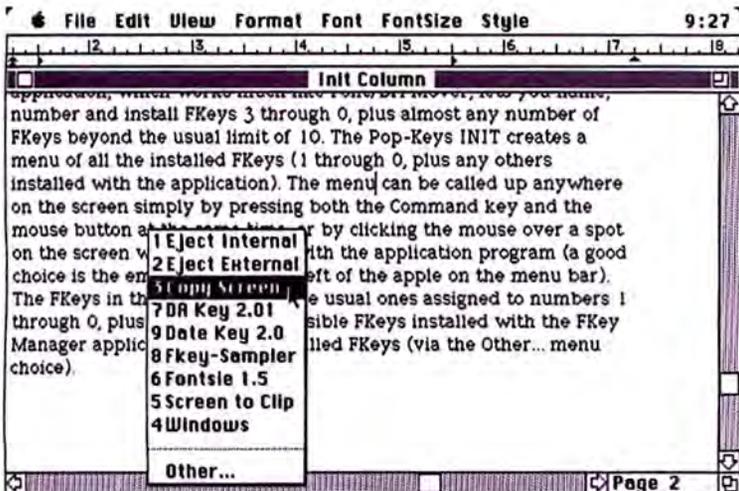
tized with MacNifty Central's *SoundCap*, these Inits let you replace the familiar Macintosh start-up and alert sounds with the recordings of your choice. The sound files available for use with *Sound Init* and *Beep Init* include replays of HAL's "I'm sorry Dave, I'm afraid I can't do that," from *2001*; "I'm

Another Init, *JClock* by Jim Sulzen, places a small clock on the far right end of the menu bar. It comes in two forms: one displays hours and minutes in 12-hour format; the other, hours, minutes, and seconds in 24-hour format.

Password by William Steinberg comes in three forms: an application, F-key, and Init. Put the Init in your System Folder and thereafter, each time you

through 10, plus any others installed with the application. The menu includes an "other" selection, which allows you to open any F-key that is not already installed.

The number of Init resources is constantly growing. But be careful; they can become as addictive as desk accessories and fonts. If you are interested in Inits, check with your local user group or an on-line service such as CompuServe or GENie. —Robert C. Eckhardt



Init files include screen savers, digitized sound files that let you replace the Mac beep, and F-Key menus that can pop up anywhere on screen.

trying to think, but nothin' happens," a vintage Three Stooges line; Road Runner's "meep meep;" David Letterman's broken window; the ignition sounds of a Porsche; Monty Python's "I see you've got a machine that goes ping;" "They're here," from *Poltergeist*; and many others.

In a more serious vein, *Auto-Black* is an excellent screen saver. The Mac screen will black out several minutes after the last key press or mouse click. A small clock displaying the correct time bounces around on the screen to remind you that the computer is still turned on. Unlike many other screen savers, this one will not disrupt printing jobs or telecommunications.

turn on your Mac, the Init file demands that you enter the correct password before it allows the start-up process to continue.

But perhaps the most useful Init resource so far is *FKey Manager* by Carlos Weber. *FKey Manager* is actually two Init files, Pop-Keys and KeyPad, and an application. The KeyPad Init converts either the Mac Plus numeric keypad or the numbers across the top of the keyboard (you set one of the two options with the application) into one-key-press F-keys. The application, which works much like Font/DA Mover, also lets you name, number, and install almost any number of F-keys. The Pop-Keys Init lets you call up a menu, anywhere on the screen, of F-keys 1

Color Laser Output



Kroy Sign Systems, a company best known for its lettering machines and copy centers, has introduced a process for adding color to laser-printed or photocopied materials. The Kroy Kolor system offers a choice of 60 glossy or matte enamels and metallic foils for embellishing documents such as signs and menus. To apply color, a laser-printed or photocopied page is passed through the Kroy Kolor processor, a \$995 device that applies heat and pressure to bond the colored ink to the



Desktop publishing with a twist: Kroy Kolor adds color to laser-printed images.

toner-covered areas on the original. The process takes about 15 seconds per page; a sheet of Kroy Kolor film costs

about 50 cents. Kroy also markets a library of templates and symbols for creating signs on the Mac. The company plans to market the system to desktop publishers, copy centers, and its existing base of lettering-machine customers. For more information contact Kroy at 7560 E. Redfield, Scottsdale, AZ 85260, 800/521-4997.



The latest in mouse maintenance, the Mouse Cleaner 360 from Ergotron.

Mouse Patrol



The Macintosh requires little maintenance—you don't have to change the oil every 5000 miles or rotate the tires. The mouse, however, tends to collect debris like a vacuum cleaner. Eventually this build-up of grime will cripple your mouse. Mouse Cleaner 360 from Ergotron appears to be a good, relatively inexpensive (\$15.95) mouse cleaner. A Velcro-coated ball with tiny scrubbers laced with cleaning solution fits into the socket of the mouse. You roll the cleaning ball in the mouse to remove the dirt. For more information contact Ergotron, Inc., 1621 E. 79th St., Minneapolis, MN 55420, 800/328-9839, 612/854-9116. □

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 Basic Interpreter 3.0 (NCP) 65.
 Chart 1.0 (42 chart styles, CP) 72.
 Multiplan 1.1 (63 col. by 255 rows, CP) 111.
 File 1.04 (flexible data manager, CP) 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) 225.
 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) 49.
 GraphicWorks (newsletters, ads, posters) 49.

Monogram ... NCP
 Forecast (tax planning) 41.
 Dollars & Sense (home, small business) 81.

New Canaan MicroCode ... NCP
 MDCFinder (requires 512k) 20.
 Mac Disk Catalog II (requires 512k) 32.

Odesta ... NCP
 Helix (req. 512k, external drive) 105.
 Double Helix (relational, custom menus) 279.

OWL International ... NCP
 Guide (hypertext, free-form info) 89.

Palantir ... CP
 MathFlash, WordPlay or MacType 26.
 Inventory Control, GL, or AR each 49.
 inTalk (communication to emulation, NCP) 79.

PBI Software ... NCP
 Icon Switcher (customized icons) 14.
 Icon Fun & Games or Business Libraries 14.
 HFS Locater (DA organizer for HFS) 27.
 HD Backup (supports MFS, HFS) 29.

Peachtree ... CP
 Back to Basics GL, AP, or AR each 89.

Artificial Intelligence.

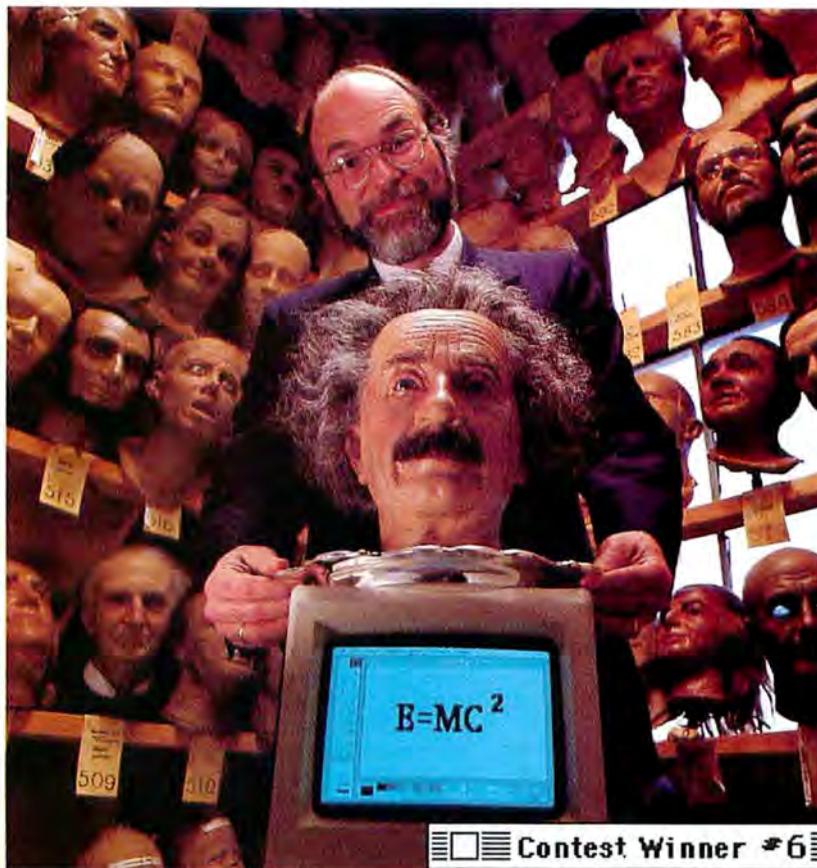
Guess who's coming to dinner?

You're having a party, right? And you need someone to round out a guest list. How about a person with real presence, let's say twentieth century, male, perhaps a bit controversial? Diamond Jim Brady? P.T. Barnum? I know—Albert Einstein. He'd be perfect! Relatively speaking. What a conversation piece!

Just call our latest contest winner, Robert Dorfman. He's got AI right on the shelf. He's maybe a little bald, and could use some arms and legs, but that's nothing Mr. Dorfman can't take care of with a little vinyl, plastic, fiberglass and some genuine human hair. But we should warn you—the famous professor won't come cheap. After all, in Mr. Dorfman's line of work, everyone has a price on their head.

Double or nothing.

We've finally found a winner who's head and shoulders above the other entries. Mr. Dorfman's father started creating lifelike figures over thirty years ago, and now Dorfman Museum Figures can be found in exhibitions from Cape Cod to Singapore. There's even one of the boss himself, which he takes a few hairs off



Contest Winner #6

Name: Robert Dorfman

System: Two Mac 512's;
two MacPlus'

Applications: Maintains
a database of 700 human
heads.

each year to maintain the resemblance to his own distinguished, but receding pate.

Fortunately, Mr. Dorfman is no dummy. He uses *OverVUE* to categorize his 700 different heads, as well as to keep up with his 2000 contacts in museums all over the world. *Excel* comes in handy for budgeting, sales, and for creating detailed cost analyses on each figure.

And, what about you? How does your Mac help you get ahead? Your story could be worth \$500 in free add-ons and software. Write away!

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Hitchhiker's Guide, Trinity, Moonmist,
Ballyhoo, (standard) each \$24.
Invisiclués (hint booklets) each 6.
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) 33.
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) 42.
Simon & Schuster ... CP
Star Trek—The Kobayashi Adventure 24.
Sir-Tech ... CP
Mac Wizardry (high-rated fantasy) 36.
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) 1795.
AST 4000 (74 MB, 60 MB tape) 4695.
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 ... 1 year
MacSnap Memory Upgrades
Mac Snap 524 (512k to 1 Meg) 149.
Mac Snap Plus 2 (Mac Plus to 2 Meg) 269.
Mac Snap 548 (512k to 2 Meg) 389.
Ehman Engineering ... 1 year
800k External Disk Drive 219.
Ergotron ... 1 year
MacTilt (includes external drive bracket) 75.
MacBuffer 512k call
MacBuffer 1024k call
Hayes ... 2 years
Smartcom II (communications software) 89.

Smartmodem 1200 or 2400 call
InterBridge (connect Appletalk networks) 599.
IOMEGA ... 90 days
Bernoulli Box (dual 10 MB w/SCSI) 1649.
Bernoulli Box (dual 20 MB w/SCSI) 1895.
Bernoulli Box (dual 10 MB, Appletalk) 2195.
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 35.
A-B Box (for the Mac Plus) 65.
Control Center 65.
System Saver Mac (complete with fan) 65.
Turbo Mouse 89.
Koala Technologies ... 90 days
KAT Graphics Tablet 169.
MacVision (digitizer) 175.
Kraft ... 1 year
3 Button QuickStick 49.
Mirror Technologies ... 1 year
Magnum 800k External Drive 229.
MagNet 20x (w/MacServe) 849.
Magnum 20 Tape Backup 929.
MagNet 30x (w/MacServe) 995.
MagNet 40/40 (40MB, 40MB tape) 2695.
MagNet 85x (w/40MB tape) 4595.
Personal Computer Peripherals ... 1 year
MacBottom Hard Drive 20MB (serial) 879.
MacBottom Hard Drive 20MB (SCSI) 879.
MacBottom Hard Drive 30MB (SCSI) 999.
MacBottom Hard Drive 40MB (SCSI) 1295.
Summagraphics ... 90 days
MacTablet 6" x 9" (stylus driven) 299.
MacTablet 12" x 12" (sketching) 389.
Systems Control ... 2 years
MacGard (surge protection) 55.
Thunderware ... 90 days
Thunderscan (high-resolution digitizer) 179.
Western Automation ... 1 year
DASCH RAMdisk 2000k 459.

DISKS

Single-sided Diskettes
Sony 3½" Disks (box of 10) 15.
MAXELL 3½" Disks (box of 10) 15.
Fuji 3½" Disks (box of 10) 15.
Verbatim 3½" Disks (box of 10) 16.
3M 3½" Disks (box of 10) 18.
Double-sided Diskettes
Sony 3½" Disks (box of 10) 23.
MAXELL 3½" Disks (box of 10) 23.
Fuji 3½" Disks (box of 10) 23.
Verbatim 3½" Disks (box of 10) 24.
3M 3½" Disks (box of 10) 25.

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
External Disk Drive Cover 4.
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) 59.
Macinware Plus (Mac Plus carry case) 69.
Innovative Concepts
Flip & File Micro (holds 25 disks) 9.
Flip & File (holds 40 disks) 18.
Innovative Technologies
The Pocket Pak (holds 6 disks) 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) 15.
Teakwood Roll-top Case (holds 90 disks) 22.
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.

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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.

Mac products from M

Personal Computer Peripherals ... NCP	
HFS Backup	\$39.
ProVUE Development ... NCP	
OverVUE 2.0 (power-packed database)	149.
Mail Manager Template	29.
Personal Finance Template	29.
Rubicon Publishing ... CP	
Silver Palate Collection (NY's finest!)	29.
Dinner At Eight (recipes to wines)	35.
Dinner At Eight-Silver Palate Bundle	59.
Satori ... NCP	
BulkMailer (mailing lists)	75.
BulkMailer Plus (up to 90,000 names)	225.
Legal Billing (attorneys to accountants)	389.
Project Billing (architects to engineers)	449.
Silicon Beach Software ... NCP	
Accessory Pak 1 (useful utilities)	21.
Silicon Press (printer utility, 512k)	42.
SuperPaint (advanced graphics program)	55.
Simon & Schuster ... NCP	
Mac Art Department (req. Paint program)	24.
Paper Airplane Construction Kit	24.
Typing Tutor III (learn to type!)	35.
J. K. Lasser's Income Tax	59.
SoftStyle ... NCP	
Colormate Art (Colormate images)	29.
Colormate (color printing utility)	49.
Laserstart (Hewlett-Packard Laserjet)	59.
Decision Map (make better decisions, CP)	79.
Software Discoveries ... NCP	
Record Holder (data manager)	42.
Software Ventures ... NCP	
Microphone (communications)	59.
Solutions, Inc. ... NCP	
SmartScrap & The Clipper	42.
Glue (creates "print to disk" capability)	42.
Springboard	
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)	29.
Early Games (ages 2-6, counting, CP)	29.
State of the Art ... CP	
Electric Checkbook (print checks)	29.
SuperMac Technology ... NCP	
SuperSpool	39.
Survivor Software ... NCP	
MacMoney (financial planner)	42.
Symmetry ... NCP	
Acta 1.2 (outline/writing desk accessory)	39.
PictureBase (clip art manager, 512k)	45.
T/Maker ... NCP	
ClickArt Personal Graphics	29.
ClickArt Effects	29.
ClickArt Publications	29.
ClickArt Letters Vol. 1 or Vol. 2	29.
ClickArt Holidays (Easter)	29.

MacConnection Special of the Month through May 31, 1987

T/MAKER Write Now

Steve Jobs claims "this is the word processor we built and designed Macintosh for..." Write Now is a fast, general-purpose word processor with simple page layout capability. Easy to learn and use, Write Now can accommodate any size Mac (512k recommended for spelling checker).

- Not copy-protected
- Extensive Undo feature
- On-screen multi-column editing
- Built-in spelling checker with 50,000 word dictionary

Write Now \$99.

ClickArt Business Image	29.
Bombay, Plymouth, or Seville Laser font	59.
Write Now (word processor)	special
Target Software ... NCP	
Merriam Webster's Thesaurus	29.
MacLightning (interactive spell checker)	53.
Medical or Legal Dictionary	53.
Voilal (desk accessory outliner)	53.
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)	69.
Lightspeed Pascal (includes debugger)	89.
Lightspeed C (top-rated C Compiler)	129.
TML Systems ... NCP	
TML Source Code Library	59.
TML Database Toolkit	65.
TML Pascal (compiler, req. 512k)	69.
TrueBasic ... NCP	
True BASIC (fast, flexible & portable)	89.
Algebra II, Pre-calculus, Calculus, Trigonometry, 3D Graphics, Discrete Math, Probability & Chippendale utilities	each 36.
TrueSTAT (statistics)	59.
Runtime (create stand-alone applications)	59.
Unicorn ... CP	
Animal Kingdom (ages 6-12)	29.
Decimal Dungeon (math, ages 9 and up)	29.
Fraction Action (arcade style math game)	29.
Mac Robots (pre-school program)	29.

Math Wizard (math games, ages 5-10)	\$29.
Read-A-Rama (reading, ages 5-8)	35.
William & Macias ... NCP	
myDiskLabeler (design & print labels)	25.
myDiskLabeler w/Color (req. Imagewriter II)	34.
myDiskLabeler w/Laserwriter option	39.

GAMES

Accolade ... CP	
Hardball (baseball simulation)	27.
Activision ... CP	
Championship Star League Baseball	22.
Mind Shadow (Who am I?)	27.
Hacker (you're on your own!)	27.
Hacker II (breach Russian computer)	30.
Borrowed Time (murder mystery)	27.
Shanghai (Mah Jongg strategy)	27.
Alter Ego (male or female version)	36.
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)	21.
Avalon Hill ... CP	
MacPro Football (req. 512k)	32.
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)	35.
Fokker TriPlane Flight Simulator	35.
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.
Epyx ... CP	
Rogue (strategy dungeon classic!)	24.
Temple of Apshei (4 levels)	24.
Winter Games (Olympic events)	24.
Hayden Software ... CP	
Perplexx (scrabble-type game)	24.
Sargon III (9 levels of chess)	29.
Infinity Software ... CP	
Grand Slam (tennis, req. 512k)	28.
Infocom ... CP	
Leather Goddesses of Phobos (standard)	24.

1-800/Mac&Lisa 700C

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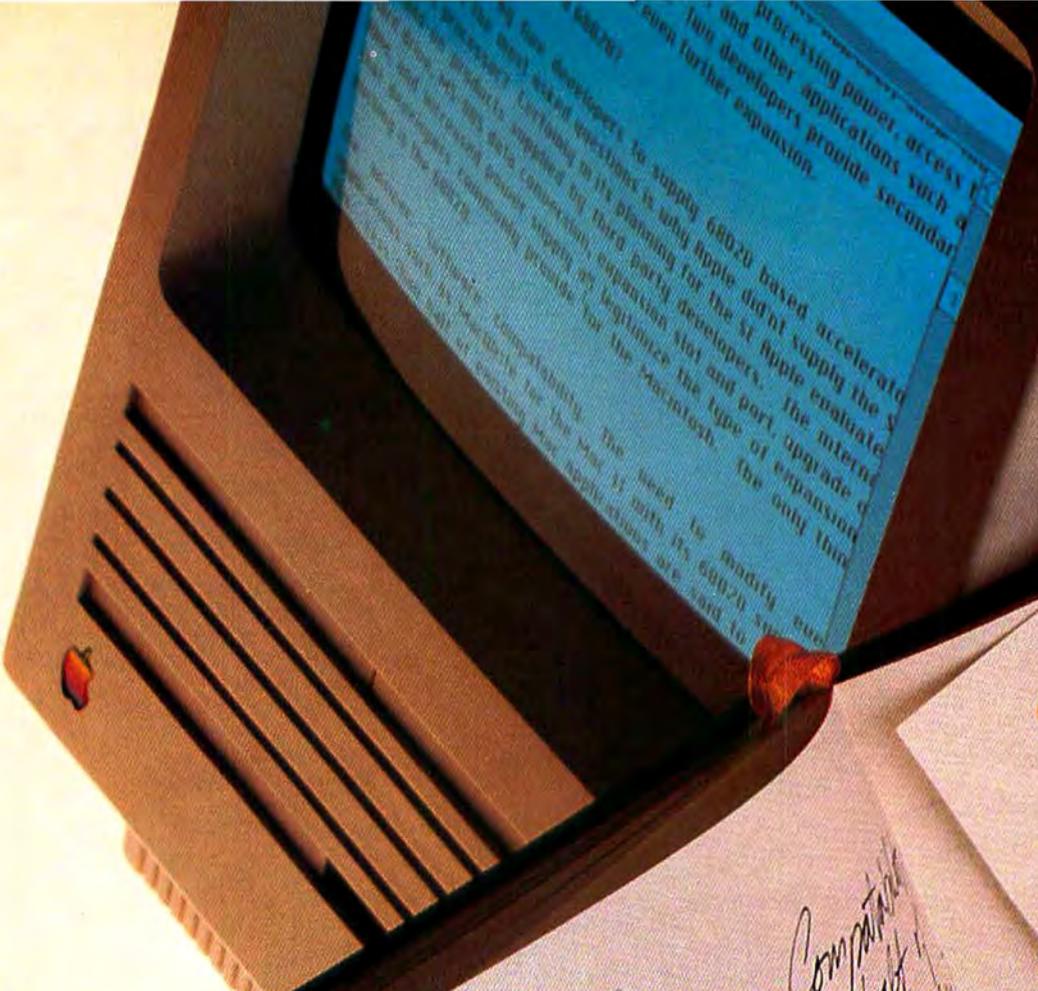
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*Defective software replaced immediately. Defective hardware replaced or repaired at our discretion. Some items have warranties up to five years.



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and other applications such as
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Software Compatible
Less than half
of all Apple II are
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SE Close-up

Investigating the performance, potential, and purpose of the new, single-slot Mac

by Jerry Borrell

Many of us are in a quandary over the Macintosh SE. Where does it fit into the Macintosh product line? Should you buy a Plus, an SE, or a Mac II? What are the growth possibilities for a Mac SE? The answers to these questions depend on several considerations, including cost, performance, your present and future computing requirements, and, most important, whether you want to expand your Mac.

At first glance the Macintosh SE appears to be a lesser sibling of the more expandable Macintosh II. The most obvious limitation is that the SE lacks the Mac II's off-the-shelf processing capability, provided by the high-powered 68020 and 68881 chips (see "Why Didn't Apple Include a 68020?" for the inside story). What's more, the SE has only one slot and a small screen.

Despite these limitations, some recent announcements demonstrate the SE's potential strength in several areas: processing power, access to large-screen monitors, communications, and the ability to run MS-DOS programs.

But before we get into the SE's expansion options, let's take a closer look at the machine's innate merits. Its small footprint, software compatibility, and lower price make it an attractive alternative within the Macintosh product line. At the very least, the SE allows modifications to its logic board and cabinet—modifications that would void the warranty of previous Macs. Most developers for the SE will also produce external products for the Mac Plus, so Mac owners should not despair.

The performance enhancements of the machine, while significant in engineering terms, are less reason to buy the SE instead of the Plus. Decreasing the time of a two-second disk access by 30 percent, for example, may not warrant the expense of shifting to the SE (see "How the SE Really Differs").

The Accelerator Issue

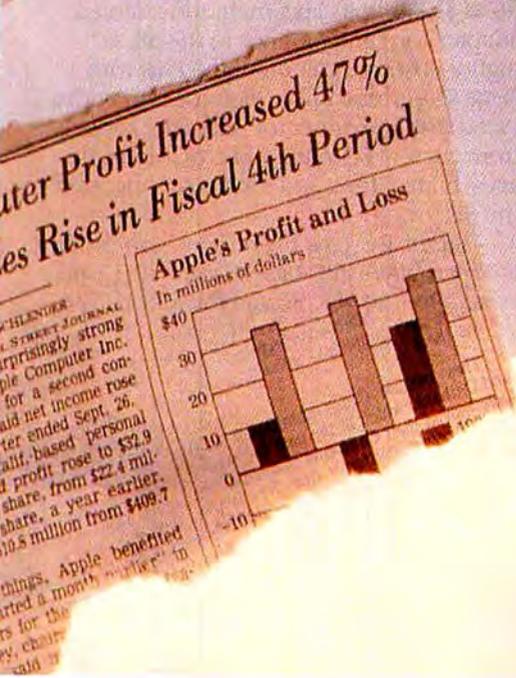
If, after a second look, you're convinced that the SE does indeed have something to offer, you may wonder about the wisdom of adding \$2000 to \$3000 worth of modifications. This is particularly true for a CPU upgrade, which brings the cost of an SE above the base price for a Mac II. A fair comment, and one acknowledged by developers of accelerators for both the Mac Plus

and the Mac SE. They also point out that some users will continue to demand the small size and portability of the current Mac. Programmers and engineers have, to date, made up the largest group of purchasers of Macs improved with 68020s, providing developers with a lucrative market. A significant number of users are also expected to seek a lower entry cost to Macintosh computing than that offered by the Mac II, but they will still want the option of upgrading their machine's performance at a later date.

One criticism of accelerator cards remains to be addressed. Ron Hochsprung, Apple's Macintosh II hardware team leader, points out that add-on cards will have to access system resources (serial ports, video) via the SE's digital card. Therefore, the CPU will have the same 4-megabyte memory address limitations as the Mac Plus, penalizing users who want access to greater memory. More memory could be accessed through a mapping technique, requiring additional logic and thus a sacrifice of processing time. Some developers will use such techniques but at the cost of performance, the purpose of adding the accelerator in the first place.

The Right 68020

Three developers of 68020 upgrade cards—Levco, General Computer, and AST—share one goal; they all intend to pro-



vide a connection on their card that will permit the addition of other products. Each will make the specification of this connection available to third parties. However, none of the companies' secondary connectors are compatible. Most accelerator cards will support large screens. Levco's Prodigy SE and General Computer's Hypercharger 020 support E-Machines' monitor (see "Up on the Big Screen," *Macworld*, January 1987). Radius, MacMemory, AST, and Peak Systems were still finalizing product plans at press time.

Of these contenders, General Computer and Levco have more experience in building accelerator cards for the Mac, as they are producing second- and third-generation cards, respectively. AST, on the other hand, is a two-hundred-million-dollar company with greater muscle in marketing and support.

Here are several tips to help you evaluate an accelerator card:

- Find out if there are options for a floating-point chip and MMU.
- Check for an optional operation mode for the Mac's on-board 68000 so that you can run software that proves incompatible with a 68020.
- Check for AppleTalk compatibility.
- Run application programs, such as 3-D graphics programs or the Calculator, that require floating-point calculations from the 68881. (If a 68881 is provided, it

should verify the developer's proper use of Apple's SANE calls.)

■ Beware of custom start-up software. Such software can conflict with applications that require start-up capacity, such as Apple's *AppleShare*.

■ Investigate the RAM upgrade path.

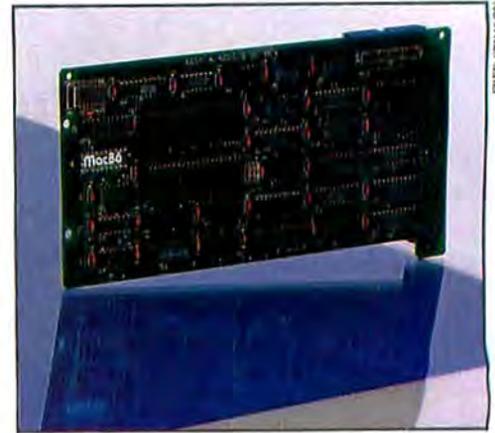
■ Ask about available secondary bus connectors.

■ Compare warranties.

Apple has provided third-party developers with clear statements about power-consumption tolerances for the SE. Accelerator cards generate the most heat because of the additional CPU, RAM, and other chips they hold. As the SE is a new machine, we have been unable to run reliability tests; thus, we cannot make recommendations beyond advising caution.

Adding a Large Screen

Many of us wish the Mac SE had a larger screen or a color display. In fact, the cathode-ray tube (CRT) is the only part of the Macintosh that remains the same. Apple's engineers did consider adding a 12-inch or larger monochrome display to the SE. Beyond the size of the entire machine, many engineering changes would have been needed. Maintaining the look and feel of current machines on a larger screen would require a CPU processor with twice the operating speed—16 megahertz. As with the 68020, this would diminish soft-



The IBM PC Within

The AST Mac86 is an 8086-based coprocessor board that lets you run MS-DOS applications. The Mac86 allows users to cut and paste text between MS-DOS applications and those running under the Mac's native operating system.

ware compatibility. And retooling to manufacture a larger machine would have taken 18 months, too much time for a spring announcement. Radius and E-Machines increase the video refresh rate with additional logic.

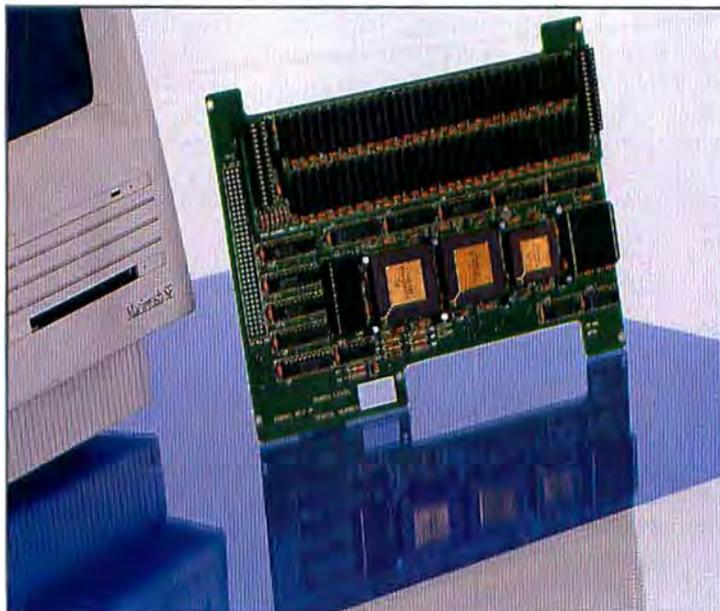
The emotional issue of the Mac's compact size is a factor too. Jean-Louis Gassée, Apple's vice president of product development, says that the SE is not the last Macintosh Apple will announce in the current cabinet size. Many of us don't want to, or cannot, sacrifice a desk to a machine the size of the Macintosh II. A color SE was never considered for all of the reasons mentioned, and because the smallest practical CRT has a 13-inch face.

This is welcome news for vendors of large-screen displays, for there are now two ways to add their products. For as little as \$1000, you can simply add a screen adapter card and monitor to the SE. At higher cost, you can outfit the Plus with a large screen and an accelerator card with a video display connector. All of the screens from current suppliers (MicroGraphic Images, E-Machines, and Radius) connect to the SE.

Sigma Designs of Fremont, California, is expanding its PC-based Laservue Display System for the Mac SE and the Mac II. The

A New Prodigy

In its basic configuration, the Levco Prodigy SE board has a 16-MHz 68020, 1MB of RAM, and a built-in RAM disk. Users can add up to 8MB of RAM, a 68881 floating-point coprocessor, and a 68851 PMMU.



Laservue works with both 15- and 19-inch monitors at 1664 by 1200 resolution.

SuperMac, producer of the DataFrame hard drive, intends to offer a single-card adapter and a 19-inch monochrome monitor for about \$1200. In addition, you will be able to reconfigure the product at 1024 by 768, 1280 by 1024, and 1340 by 1024 spatial resolution. According to SuperMac president Steve Edelman, these configurations are necessary to display opposing 7- by 11-inch pages at the same resolution as current Macs.

Both E-Machines and MicroGraphic Images provide single-card adapters for the SE, which cost \$1995, in addition to existing products for the Mac Plus. MicroGraphic Images takes the approach of the accelerator vendors, providing a secondary bus so that you can add cards for other applications (such as communications). The MicroGraphic Images card doesn't support NTSC output, unlike the first version of the product for the Mac. It does, however, have an option for a 68881 coprocessor.

There are several issues to be aware of with large-screen monitors. First, although installation has become easier, I recommend that you have a dealer install your monitor. Second, only certain combinations of monitor adapters and accelerator cards will be compatible—the MicroGraphic Images card, for example, is unable to connect with the Prodigy SE accelerator. Finally, none of the developers allow separate monitor and adapter sales so that a group of users with their own adapters can share a single monitor. Nor can adapters for the SE be used with the Mac Plus or the Mac II (with the exception of E-Machines' \$400 add-on card, which allows one monitor to work with either a Plus or the SE).

Connecting to IBM Mainframes

The biggest difference between the SE and the Mac Plus may be the number of communications options available for the two machines. Several vendors have announced options that allow easy modification of the SE for communications via Ethernet and over fiber-optic cable. However, we are faced with the limitations of a single slot. Initial products occupy the only available slot in the SE, but most vendors indicate that they will connect with secondary buses on accelerator cards, providing more flexibility.

Why Didn't Apple Use a 68020?

Given the rush by six developers to supply 68020-based accelerator cards, many are curious why Apple didn't supply the SE with this processor. Certainly in planning for the SE, Apple evaluated the add-on products supplied by third-party developers. The internal hard drive, MS-DOS data conversion, expansion slot and port, upgrade of RAM, and increased power supply all legitimize the types of add-ons that developers commonly produce for the Macintosh. The only thing missing is a 68020.

The answer: software compatibility. The need to modify even applications such as *MacWrite* for the Mac II with its 68020 supports this conclusion. Less than half the existing Mac applications are said to operate unmodified on the 68020. Apple's engineers knew they would have to sacrifice the possibility of hardware upgrades from the Mac Plus to the Mac SE; they could ill afford to create problems with the compatibility of software as well.

Cost was also a factor. At the time the SE was in planning, the 68020 cost over \$350. Jack McHenry, engineering manager for the SE, felt that if the 68020 was offered, support for the floating-point processor and MMU, or memory management unit, would have to be considered as well. Total price for these semiconductor devices alone was over \$1000. The 68000, on the other hand, costs as little as \$20 for a single unit.

In any case, the MMU required for support of the UNIX operating system was at press time (in February) unavailable commercially.

As installed 68020 upgrades for the Mac Plus number in the low hundreds, market demand appears to show that few people are willing to pay the price required for a 68020. Curt Johnson, president of Levco in San Diego, leading seller of 68020 upgrades for the Mac Plus, says his company received many complaints about the \$7000 price tag on its upgrades. In truth, the semiconductor parts alone, at the time of the Prodigy's announcement, cost over \$5000. Subsequent price drops allowed the company to decrease the price of the Mac Plus upgrade to under \$5000, and \$3000 is the target price for the Prodigy SE card.

The final factor in retaining the 68000 for the SE was efforts by Apple engineering to reduce the number of integrated circuits (ICs) on the logic board. The gate array chip on the logic card replaces 16 ICs on the Mac Plus card. The result: lower cost, more speed, less power consumption, and greater reliability. While Apple had years to work with the logic card of the Plus, developing an equally efficient card based on the 68020 and implementing a gate array would have required even more time.

How the SE Really Differs

Here's a summary of the main ways the SE has changed from the Plus.

Performance The SE really is faster. The speed increase is due to hardware improvements, such as the gate arrays and use of a standard SCSI connector, and firmware improvements that make RAM access for the CPU and video refresh more efficient. The enhancements are more apparent in operations such as the chaining of multiple SCSI devices.

ROM The shift from 128K to 256K ROM allowed many additions to firmware, bringing more than speed improvements. The font and script managers are the best examples. They are improved so that non-roman character alphabets can be added. Kerning is now in the ROM, which will benefit desktop publishing packages. And there are now five fonts in ROM—up from two.

AppleTalk protocols were added to ROM, as well as additional code to support *AppleShare* (see "AppleShare—Multifaceted Networking," *Macworld*, March 1987). Apple's SANE routines have been improved. Some bugs in the SCSI driver were fixed. An important change was made to "style rec-

ords" so that the SE can use and retain information from color applications on the Mac II.

Desktop Desktop changes are based on ROM improvements. The Trash Can fattens when it contains documents. Submenus appear in the control panel—hints of future additions? CleanUp under the Special menu now allows both window and individual icon selection. Most important, there are now both Shutdown and Restart menus in the Special menu. Shutdown is no longer automatically followed by a reboot.

A hidden addition to start-up: if the \mathbb{N} , Shift, Option, and Delete keys are held down, the hard drive is ignored during start-up. A useful feature, should the hard drive become corrupted.

Power supply The video and digital power supplies are separate. Overall, they now provide an additional 1½ amperes. The power supply is rated for up to 15 years of full-time operation.

Serial ports Both 9-pin serial ports are retained. Port A is now able to receive and send asynchronous data for IBM protocols.

Drives We have a choice of one 20MB and one floppy, or two floppies. The 25-pin disk

port is retained, so a third floppy or a serial Hard Disk 20 can be used as well. Apple has added a standard 50-pin SCSI connector internally. This improves performance and makes the addition of an internal hard drive easier for both Apple and third parties.

ADB The desktop bus expands keyboard options and allows for additional input devices. In the past, tablets have taken up one of the serial ports. They can now be chained together with the keyboard. Support for the ADB was added to the ROM. Consequently, mouse interaction is much faster.

Speaker To improve sound, the speaker has moved to the front.

Diagnostics Diagnostics that allow dealers to perform tests via a serial port have been added to the ROM.

Utilities The HD-SC setup is added. This formats the internal or external hard drive. It also provides driver updates and is used to replace drivers corrupted by disk or system crashes. *Disk First Aid* software, which can help recover damaged files, is shipped on the system disk.

One of the most promising products comes from Avatar—the MacMainframe SE, which allows the Macintosh to emulate the IBM 3270/79 family of terminals. The card with emulation software costs about \$1000, occupies the 68000 expansion slot, and provides a coaxial cable fixture (BNC) that

connects to an IBM terminal cluster controller. The card is superior to the AppleLine product from Apple because it bypasses the Mac's serial port and therefore, unlike AppleLine, accepts data at the 2.5MB rate of the IBM controller. Avatar has also been able to implement cut-and-paste in the IBM environment by means of Mac functions not provided with Apple's product.

Bob Van Anel, Avatar's product manager, predicts that the product will be a boon for applications like accounting. Big Eight firms, such as Peat, Marwick, Mitchell, have accountants stationed in companies for days, weeks, or months. Their staff members are equipped with Macs, on which they run accounting ap-

plications, but they need access to the mainframes in the clients' facilities. The MacMainframe SE provides this access.

Connections to minicomputers and workstations are improving too. Kinetics, producer of the FastPath Ethernet connection for the Mac Plus, sells the EtherPort SE card for the SE. Currently, FastPath is a peripheral for the Plus that provides access to other computers via Ethernet. The EtherPort SE will be a single-card solution or an add-on for accelerator cards with secondary buses.

Ethernet Accesses UNIX Workstations

Because it can carry AppleTalk protocols over longer distances than the copper AppleTalk cables from Apple, Ethernet is important beyond being a de facto network standard for other CPUs. The range of the network depends upon whether the cabling conforms to standard Ethernet 10base5 for 500 meters, or is thin Ethernet (sometimes called Cheapernet) 10base2 for up to 200 meters. Standard Ethernet allows up to 256 Macs to be attached to the network, rather than the 32 possible with AppleTalk cabling. Thin-Ethernet permits up to 32 CPUs per segment, and many segments may be joined by using repeaters.

Kinetics also provides intermediate levels of communications protocols for file transfers under UNIX, the TCP/IP protocols standard in many UNIX-based workstations. Apple is also contracting to have

NFS, an equivalent protocol developed by Sun Microsystems, made available for the Mac. These two protocols will allow Macs (which can connect to Ethernet) to access the data available on the nearly 100,000 workstations and computers running UNIX.

3Com, maker of the 3Server products, now provides an internal card for the SE, which connects the Mac to 10base2 Ethernet cabling.

Did They Forget MS-DOS?

In short, no. Even Apple makes an MS-DOS bridge: a single card for the 68000 expansion slot that allows the Mac SE to connect to an Apple-supplied 5¼-inch drive and *Passport*, which supports file-transfer routines. Apple recognized that many of us may need to read files from IBM PC-formatted floppies. Don't confuse this with the ability to run MS-DOS programs on the SE; data may only be read into the Mac, not viewed or manipulated, unless the applications running on the Mac are able to read and accept such files. There are many such examples, including *Excel* and *Word*. Apple has asked vendors to develop Visas—filters that will translate files for their programs' files.

Dayna Communications, of Mac-Charlie fame, intends to provide a floppy drive competitive with the Apple drive. It will read files but will have a coprocessor and firmware, enabling DOS applications to run on the SE.

AST's Mac86 is a coprocessor card with an 8086 that occupies the expansion bus. The 8086 and a floppy disk controller chip allow the 5¼-inch drive from Apple (or any compatible drive) to read and run MS-DOS programs. Under this scheme, part of the Mac's hard drive will be partitioned and used exclusively for MS-DOS and applications that run under it. Some files will be available to both DOS and the Mac operating system.

AST also offers the AST-Pak for the Mac. The AST-Pak supplies 1MB of memory and is upgradable to 4MB. Apple offers memory upgrades for the SE up to 4MB, but only with 1-megabit chips, currently too expensive. The AST-Pak uses 256K DRAMs, providing a cheaper memory upgrade. The AST-Pak also supports two additional serial ports and an optional floppy disk controller chip that will allow yet another 5¼-inch MS-DOS drive to be added.



Levco Design Tandem

Duane Maxwell (left) designed the Prodigy SE's software for compatibility and improved performance. Doug Gilbert (right) designed the hardware for the Prodigy SE, as well as for earlier Prodigy products.

The options for DOS, then, are based on more limited Apple products and third-party products that compete on price or functionality.

Choosing an Upgrade Path

The SE has the opportunity to be an exemplary personal computer. Having worked for several weeks with Apple and developers, I think that it is fair to say that the torturous upgrade path is near the end. Apple has begun to listen to its customers and to produce its computers based on our needs—despite the cost to some of its long-standing developers.

On the other hand, we have been given a computer that is no longer as simple as the original Mac. It is not as easy to buy this machine as it was previous Macs, and in some cases, other machines are more suitable. Potential SE buyers who need to plan for growth must spend more time considering what products to add and whether they are compatible with other products. The options are so varied that we will have to continue to observe and inform ourselves about the real, valiant efforts and the failures. □



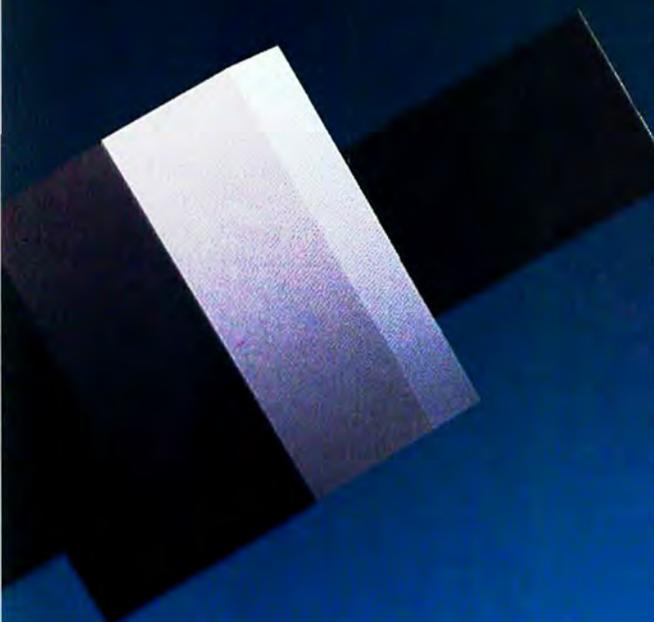
SuperMac's SuperView

The SuperView board provides black-and-white graphics with up to 1365- by 1024-pixel resolution and works with SuperMac's 15-inch monitor and the 19-inch monitor shown above.

3-D, Take 2

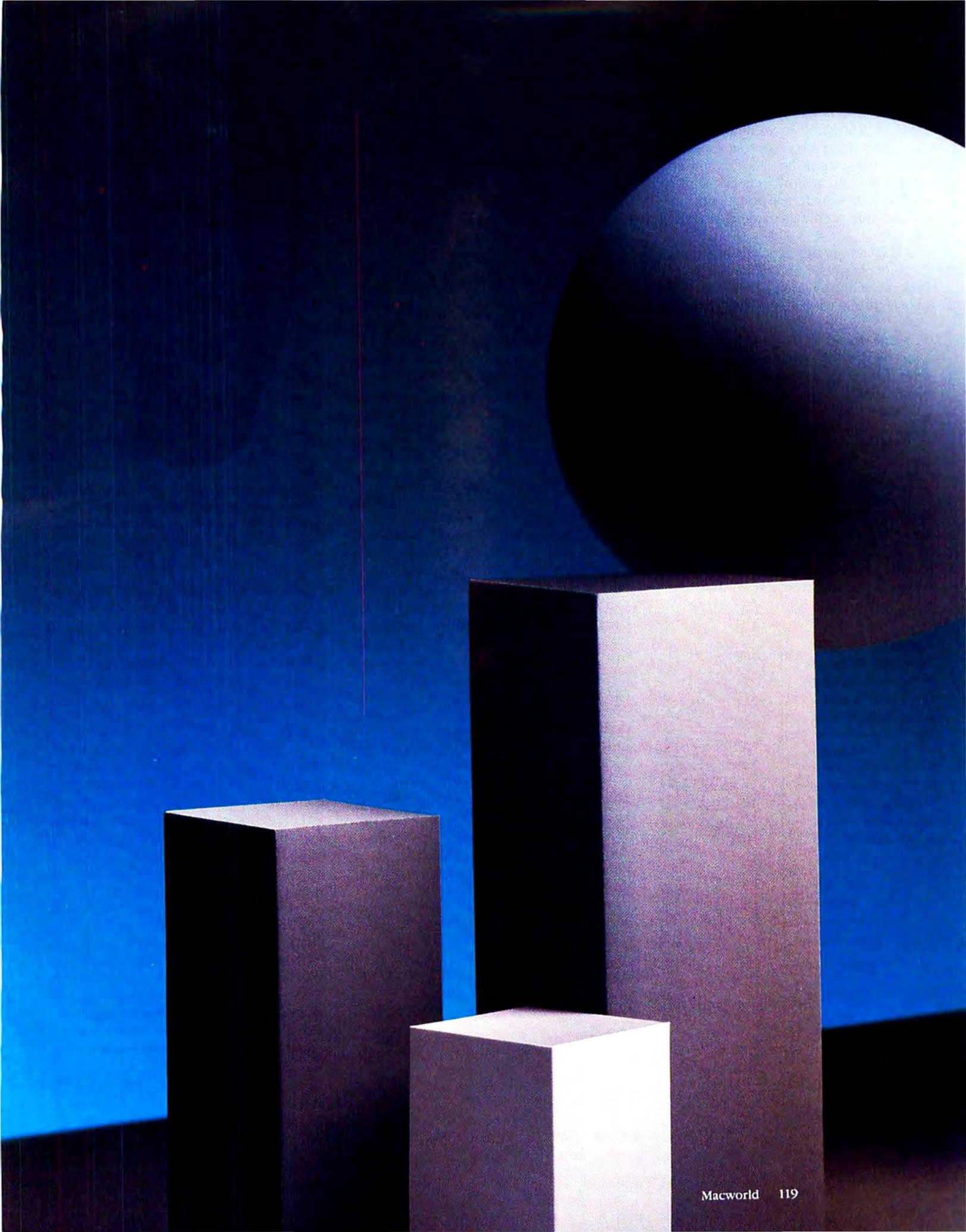
3-D graphics programs multiply and mature

by Erfert Nielson



Things have changed since *Macworld* last looked at 3-D graphics software. The four programs reviewed last year in the June issue—*Mac3D*, *MacSpace*, *Easy3D*, and *MacModel*—have all been improved. In fact, *Easy3D* and *MacSpace* have evolved to the point where they're now offered in separate “professional” versions known as *Pro3D* and *SpaceEdit*. In addition to enhanced versions, there have been some new arrivals to the field, among them *Phoenix 3D* from Dreams of the Phoenix.

Each of the five programs in this 3-D reprise offers a unique approach to the problem of representing three-dimensional objects on a two-dimensional surface. This disparity in features, interface, and



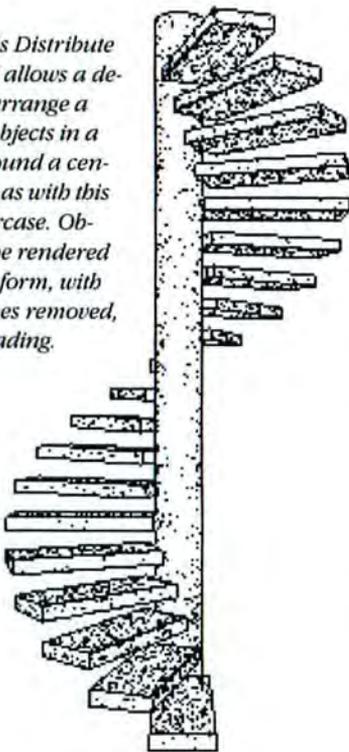
output makes the programs difficult to compare directly. If you're in the market for a 3-D package, however, the evaluations and the features comparison table in this overview will help you sort out your options. If you're thinking of upgrading a package you already own, check the table footnotes; these will help you identify product enhancements made during the last year.

Throughout this article, 3-D graphics terms that might be unfamiliar to some readers are introduced in italics. For definitions of this 3-D argot, see "A 3-D Glossary."

MacModel

The simplest of the programs reviewed, A.P.P.L.E. Co-op's *MacModel* is a good introduction to some of the basics of 3-D design, including the concept of *Cartesian coordinates*, or the *x*-, *y*-, and *z*-axes. You build models with the program's five *primitives*: cube, sphere, cylinder, cone, and polyhedron. Objects are displayed in three *orthogonal views*—front, top, and right—allowing you to position them in relation to one another. The basic shapes can be molded into composite objects by means of *subtraction*, *intersection*, and *union*, as well as stretched, shrunk, and rotated.

Figure 1
MacModel's *Distribute* command allows a designer to arrange a group of objects in a line or around a central point, as with this spiral staircase. Objects can be rendered in outline form, with hidden lines removed, or with shading.



Although *MacModel* is adequate for producing simple objects, the program has some drawbacks. *MacModel*'s mottled, grainy shading, for example, is in my opinion less attractive than the shading methods used by other 3-D programs.

Object presentation is not *MacModel*'s only flaw; some features of object generation and manipulation could have been better implemented. While most Mac graphics programs let you "open up" shapes on the screen by dragging them to the desired size, *MacModel* places objects of a preset size on the screen, forcing you to resize them later if necessary. In addition, the procedures for rotating objects in 3-D space and changing the viewing angle are less intuitive than those of most of the other programs reviewed. While you can edit a polygon's *vertices*, the procedure is somewhat roundabout. Finally, *MacModel*'s lack of icons makes it a less-than-ideal Macintosh application.

To its credit, *MacModel* has some capabilities that set it apart from many of the other 3-D programs. For example, *MacModel* provides dimensioning—when you double-click on an object, you see its measurements (in metric or English units) along each axis. You can change the object's position, attitude (angle), or size in the dialog box that appears. Other unique features include radial alignment, to automatically position objects around a central point (see Figure 1); several light sources per scene; and the ability to calculate an object's mass and volume. Architects and designers who need dimensioning capabilities might find *MacModel* an inexpensive addition to their drawing tools.

Version 4.3 offers several enhancements over version 3, which was reviewed last year. The latest upgrade works on the Mac Plus, prints faster than the previous one, and provides more precise object sizing and positioning. While the alignment tool formerly aligned objects only along matching faces (top with top, for example), a new alignment tool allows you to align objects on any face (top with bottom, left with right, and so on). Finally, source code is provided for those who wish to write programs that work with *MacModel*.

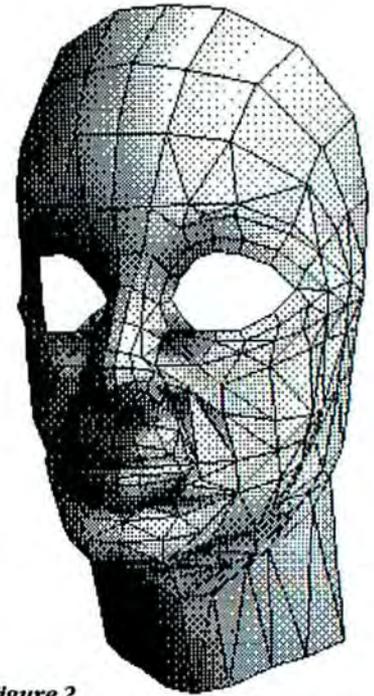


Figure 2
Objects produced with Phoenix 3D can take advantage of a number of shading options. This face is smooth-shaded, softening the transition from one gray to another.

At \$50, *MacModel* is one of the least expensive 3-D packages. This alone might tempt me to recommend it to beginners, if not for the introduction of a 3-D application that offers a more intuitive user interface, superior shading, and a lower price: *Phoenix 3D*.

Phoenix 3D

Dreams of the Phoenix is known for offering high-quality software at a uniform price of \$39.95. *Phoenix 3D* is no exception to this formula: the program offers a 3-D modeling environment with an impressive number of features (see Figure 2). The program is well designed, with an icon-based approach that won't intimidate newcomers to 3-D graphics modeling.

Phoenix 3D provides one tool palette for creating shapes and another for editing them and positioning them in 3-D space. As in *MacPaint* or *MacDraw*, you click an icon and drag the corresponding shape to the size you want. Available shapes include six polygons from triangle to octagon, as well as sphere, cylinder, cone, and torus. *Radially symmetrical* objects can be pro-

A 3-D Glossary

Absolute coordinates The location of a point in relation to a fixed point of origin.

Axometric view A view that shows three sides of an object to provide a 3-D view. Horizontal and vertical distances are drawn to scale, but diagonal lines are distorted.

Camera view The vantage point from which a 3-D scene is viewed.

Cartesian coordinates The location of a point in 3-D space, represented by three axes at right angles to each other (orthogonal axes). The *x*-axis represents width, the *y*-axis, height, and the *z*-axis, depth.

Explode To separate an object's surfaces and move them apart by a specified distance.

Hidden-line removal A method of rendering 3-D objects that hides background lines and surfaces that would be obscured by others in the foreground. An object with hidden lines removed could be

considered opaque rather than transparent (see *wire-frame modeling*).

Intersection A method of combining two objects into one. The area where the objects overlap remains, creating a new object.

Orthogonal view A "straight-on" view of an object (front, top, or side) that is perpendicular to both the viewing angle and the lines of projection. No lines indicating depth are shown.

Primitive A basic shape, such as a sphere, cube, or cone, on which to base a 3-D object. Some 3-D modeling programs provide a library of primitives that can be modified to produce more complex objects (see *intersection*; *subtraction*; *union*).

Radial symmetry A radially symmetrical object is generated around a central axis, much like an object is shaped on a lathe. Many 3-D programs

allow you to set the number of segments the object should have.

Relative coordinates A point's location in relation to the last point entered, or the relative distance between the two points.

Subtraction A method of combining two objects into one. The subtracted object "carves away" the overlapping portion of the second object.

Union A method of combining two objects into one. The objects are "fused" into a single object. (Also called a *merge*.)

Vertex The intersection of two or more lines in a polygon. Some 3-D graphics programs allow you to move vertices to reshape objects.

Wire-frame modeling Rendering a "transparent" 3-D object to show background as well as foreground lines (see *hidden-line removal*).

duced with the Arbitrary Cylinder tool. The Arbitrary Polygon tool allows you to draw a polygon with up to 22 sides, which can then be converted to a 3-D prism or pyramid.

The program's Transformation tool palette consists of icons that let you rotate an object in any direction, spin it clockwise or counterclockwise, shrink or enlarge it, and move it along any axis. Object movement is intuitive; when the Transformation tools are employed, the object is represented by a pyramid that reflects the object's position as you move it. The number of degrees of movement is displayed as the object is moved.

Double-clicking a tool brings up a dialog box that lets you set various attributes, depending on the type of object. For example, double-clicking the sphere tool allows you to specify starting and ending longitude and latitude, as well as the number of facets. Setting the ending latitude at 90 degrees rather than 180 degrees would produce half a sphere, for example.

One of the program's most useful features is its ability to manipulate a vertex, a face, or several faces of a shape. Simply click on a vertex or select an area, and then drag the selection to modify the object.

When an object is edited to your satisfaction, you can render it in any of six styles, from *wire-frame modeling* to *hidden-line removal* to various shading options, with framed or unframed faces.

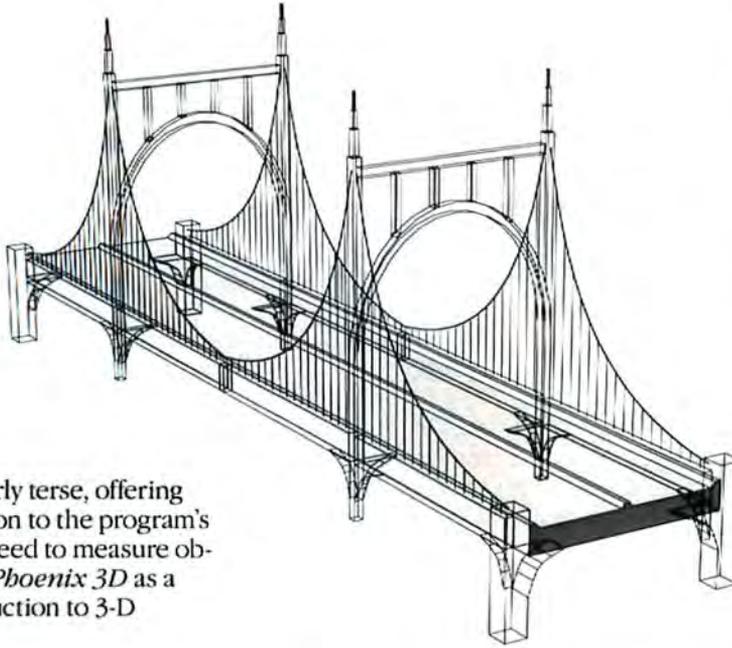
When shading an object, you can use one or both of two light sources, quaintly called the Sun and the Moon. You can adjust the direction and intensity of the two light sources, as well as the shading of individual objects.

Other notable features include the ability to add up to 20 text labels per model, zoom in on a selected area, adjust the viewing angle, *explode* a model, and switch between orthogonal and perspective projections. Not bad for \$39.95.

Although it's a fine program, *Phoenix 3D* does not do everything. The program lacks dimensioning capabilities, as well as simultaneous orthogonal views (six separate views are available, however). The

Figure 3

This Mac3D bridge is primarily a wire-frame model, with shading added to the base to make it appear solid. In addition to the flat shading shown here, version 2.0 provides six adjustable light sources for realistic lighting effects.



manual's tutorial is fairly terse, offering only a brief introduction to the program's features. If you don't need to measure objects, I'd recommend *Phoenix 3D* as a good, low-cost introduction to 3-D graphics.

Mac3D

Challenger Software's *Mac3D* is a good choice for creating technical drawings. The program's ability to measure edges and boundaries, display angles, and create scaled drawings, combined with text-insertion and multipage-output capabilities, makes it suitable for simple architectural and engineering applications. *Mac3D* is not a professional CAD application like *EZ-Draft* and *MGMStation*, which offer such features as area calculation, spline curves, fillets, and multiple layers—but *Mac3D* is considerably cheaper than those programs, and will suit the needs of many designers.

Mac3D is similar in features and operation to *MacDraw*, making it easy to learn for those familiar with Apple's drawing program. In fact, *Mac3D* doubles as a two-dimensional graphics program, allowing you to create a floor plan accompanied by a 3-D model of a building's exterior, for example. Like *MacDraw*, *Mac3D* presents a menu full of shapes, or primitives, on which to base drawings. Select a primitive and use the resizing handles to drag it to the appropriate size and shape. Click the Depth button to extend an object along the z-axis.

Mac3D's flexible editing options let you move vertices, edges, or faces, molding objects into complex shapes. Other editing

features round or bevel corners, reset line width, or explode an object. To position an object in space, you can rotate it on any axis by using a unique circular scroll bar or change the viewing angle by adjusting the camera view. When it comes to object presentation, *Mac3D* can display a wire-frame, hidden-line, or shaded model.

Mac3D concentrates on object measurement. A Dimension command measures edges or boundaries in inches, centimeters, or pixels. You can set a drawing's scale (1 inch equals 10 feet, for example) and change it at any time. When you reset the scale, rulers and dimension lines reflect the new scale; accompanying text can also be rescaled if you wish.

Version 2.0 of *Mac3D* offers a number of notable improvements over 1.0, which allowed you to add any of 96 fill patterns to an object, much like *MacDraw*. The current version also lets you set the location and intensity of up to six light sources, producing realistic object shading. When you print a document, *Mac3D* takes advantage of the resolution of the printer being used. The LaserWriter offers 32 grays; more are available on devices with higher resolution (see Figure 3).

Version 2.0 also includes an expanded tool palette. Four new tools—regular polygon, regular polygonal prism, regular polygonal prism with hole, and geodesic sphere—are offered. In addition, you can add up to 18 custom tools—user-created objects—to the palette. If you frequently

use a certain architectural element in your drawings, for example, you can install it in the tool palette, obviating the need to re-create the element. *Mac3D* is the only 3-D program that lets you create a menu-based symbols library.

Another enhancement, Reduce to Fit, allows you to view an entire drawing at once. This feature is essential for multipage documents. A Reduce command progressively reduces an image by about 50 percent, and Enlarge progressively enlarges the reduced view until the image reaches its original size.

Another new command produces an orthogonal instead of a perspective view. Orthographic projection removes lines indicating perspective, simplifies object manipulation in complex scenes, and speeds up rendering. Other improvements include the ability to extrude two-dimensional outlines to add depth, automatic document scrolling when certain tools reach the edge of the drawing area, a Remove Hidden Surfaces command for plotter output, the ability to import and export ASCII text files, and speed improvements for several operations.

I have only a few complaints about *Mac3D*. My preference when positioning objects is to see simultaneous views; *Mac3D* lacks this feature (you can change the viewing angle, but you can't see more than one view at a time). I also found object rotation in *Mac3D* less intuitive than in *Phoenix 3D* or *Pro3D*, in which you can "grab" an object and move it instead of having to manipulate a separate scroll bar or type in degrees of rotation. A few menu selections seem arbitrarily placed: shading options are in the Arrange menu, for example, and the Setup Lighting command is in the Layout menu—but these are relatively minor quirks in an otherwise admirable user interface. All in all, *Mac3D* is an easy-to-use, moderately priced two- and three-dimensional modeling program that many designers and artists will find adequate for their needs.

Pro3D

Enabling Technologies' *Easy3D*, which was reviewed last June, offers a superb example of a simple, well-designed user interface. To rotate an object in space,

for example, you grab it with a hand icon and swing it around a center point; the angle of rotation is shown both graphically and numerically. Similarly, to adjust the viewing angle you slide an eye icon up or down a scroll bar. *Easy3D*'s successor, *Pro3D*, builds upon the original program's foundation, integrating a number of new features that make it more sophisticated but still relatively easy to use.

Pro3D allows you to construct 3-D objects by the union, intersection, or subtraction of primitives, such as a cube or a sphere, or by means of two tools, the Lathe and the Profiler. Like *Easy3D*, *Pro3D* concentrates on adjustable lighting; you can set the ambient lighting as well as a number of separate light sources to produce realistic renderings. Portions of objects can be assigned different shades, allowing you to "emboss" dots on a pair of dice, for example, or place stripes on a flag.

Pro3D's main improvement over its predecessor is the new Profiler tool, which replaces *Easy3D*'s Jigsaw. With the Jigsaw, you "cut out" a freehand shape of a single thickness. The Profiler allows you to combine numerous sections, or ribs, into a complex object (see Figure 4). Each rib can be assigned a different shade, resized, rotated, or reshaped. Outlines created with the Profiler can be saved for later use.

The Lathe tool, which produces radially symmetrical objects, has been improved. *Pro3D*'s Lathe allows you to add or delete points in an outline, as well as drag

them to new positions. Like Profiler outlines, Lathe outlines can be saved for future use.

Another significant enhancement is *Pro3D*'s ability to take advantage of high-resolution printing, producing 32 shades of gray with the LaserWriter and 100 shades with high-resolution devices such as the Linotype Linotronic 300. While *Easy3D* can save files in *Easy3D* or *MacPaint* format, *Pro3D* adds the ability to save files in PICT format for transfer to object-oriented drawing programs such as *MacDraw* or page-layout programs such as *PageMaker*, as well as PostScript or EPS (Encapsulated PostScript) format, for printing on high-resolution PostScript-compatible printers.

One of *Easy3D*'s strong points is its variety of shading options, with adjustable ambient light, custom lighting with up to four light sources, and four preset lighting schemes. *Pro3D* adds four more preset schemes and allows you to change the shading of an object after it is created.

While *Easy3D* provides no dimensioning, *Pro3D* allows you to create your own measurement scale by specifying the number of pixels per unit (for example, 10 pixels equal 1 foot). When you're creating an object with the Lathe or Profiler, dimensions are shown in *relative* or *absolute coordinates*.

In my opinion, although *Pro3D* is significantly more sophisticated than *Easy3D*, it is still primarily a tool for graphic artists rather than architects or engineers. Cer-

tainly the program can be used for some architectural and engineering applications, but it's lacking in several areas. For example, *Pro3D* provides no text capabilities, nor is its dimensioning adequate for many engineering tasks. In addition, *Pro3D* objects are relatively difficult to edit. Although you can manipulate individual



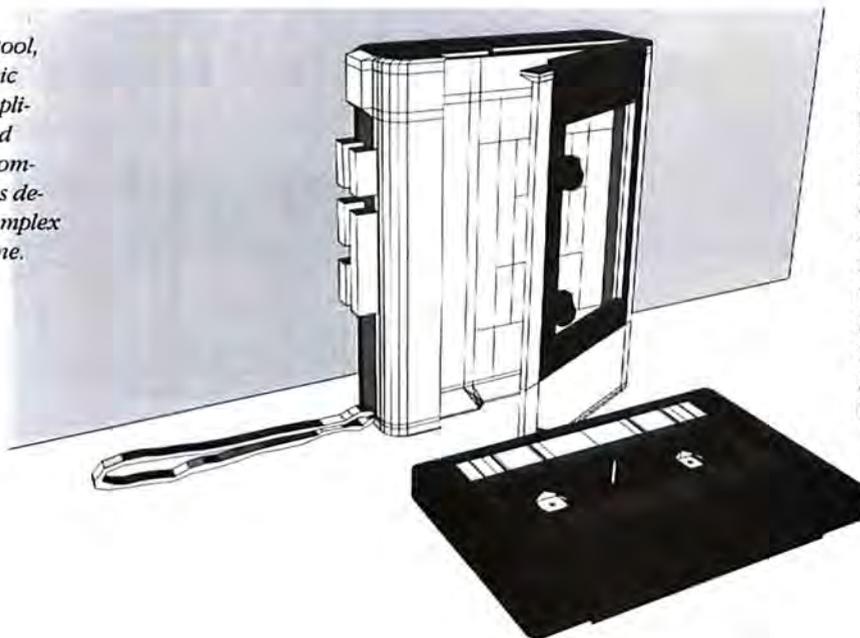
Pro3D is primarily a tool for graphic artists rather than architects or engineers.

points of an object with the Lathe or the Profiler, once the object is rendered you can't edit vertices, as you can with several other programs; you must return to the Lathe or Profiler to reshape an outline before redrawing an object. (Fortunately, you can selectively turn off the redraw function, saving a great deal of time by not redrawing every object in a multiobject scene.) Don't get me wrong—*Pro3D* is an excellent program; it is unsurpassed for striking shading effects. But for CAD applications you might want to turn to a program like *SpaceEdit*.

SpaceEdit

Like *Mac3D*, Abvent's *SpaceEdit* lets you draw objects in either two- or three-dimensional space. Use the program's creation tools to draw two-dimensional shapes: rectangles, circles, arcs, lines, polygons, and freehand shapes. To add the dimension of depth, click on the prism tool and enter the desired depth in the resulting dialog box. While an object is being created, the cursor's position on each axis of 3-D space is shown at the bottom of the screen in the program's *geometry bar*. Shapes are simultaneously displayed in four views: top, front, side, and *axonometric*.

Figure 4
Pro3D's Profiler tool, which allows basic outlines to be duplicated, edited, and combined into composite objects, lets designers create complex scenes like this one.



3-D Overview

	MacModel	Phoenix 3D	Mac3D	Pro3D	SpaceEdit
Object Generation					
Library of primitives	•	•	•	•	1
Union, intersection, subtraction	•			•	
Axial rotation (lathe)		•	• ²		•
Lateral symmetry (mirror)				• ²	•
Freehand drawing tool		Arb Poly tool	•	in Lathe or Profiler ²	• ²
Creates symbols library	•	Merge command	• ²	•	• ²
Screen autoscroll	•		• ²		
Displays coordinates	absolute		•	<i>absolute or relative</i>	<i>absolute or relative</i>
Displays angles	•		•		•
Works with large screen ³	• ²	•	• ²	• ²	•
Object Manipulation					
Edits vertices	•	•	•	in Lathe or Profiler	•
Edits edge, face		•	•	in Lathe or Profiler	•
Stretches, enlarges, reduces	•	•	•	•	• ²
Aligns objects	<i>to any face</i>		•	• ²	•
Rounds corners			•	<i>in Lathe or Profiler</i>	
Grid	adjustable	fixed	adjustable	fixed	adjustable
Object Measurement					
Units	in., ft., mi., mm, cm, m, km		in., cm, pixels	<i>user-defined</i>	in., ft., cm, m
Overall dimensions	•		•	• ²	•
Length of edge			•	<i>in Profiler</i>	•
Perimeter/area of face					•
Mass and volume	•				
Object Display					
Simultaneous views	3			4	4
Shading	•	4 styles	• ²	•	
Light sources	adjustable ambient, 1 spot	2 spots		6 spots adjustable ambient, 4 spots, 8 preset	
Wire-frame		•	•	•	•
Hidden lines and surfaces	•	•	•	•	• ²
Text		•	•		• ²
Explodes model		•	•		• ²
Multiple layers					• ²
Output					
ImageWriter	multipage	single page	multipage	single page	single page
LaserWriter	low resolution	low resolution ⁴	high resolution	<i>high resolution</i>	<i>high resolution</i>
Plotters			•		<i>more supported</i>
Other					
Version number	4.3	1.01	2.0	1.00	0.9
Min. memory/hardware req.	512K	512K	512K	512K	512K
Saves data as ...	object	object, MacPaint, text ⁵	object, PICT, text	object, MacPaint, <i>outline, PICT,</i> <i>PostScript</i>	object
Pastes from MacDraw			•		
Copy protection	none	none	none	none	<i>key disk</i>
Price	\$49	\$39.95 ⁶	\$249	\$349	\$625
Upgrade policy	about \$10	\$5-\$10 plus original disk	\$30 for reg. owners		credit toward purchase for MacSpace owners

SpaceEdit has many capabilities that make it a logical choice for technical drawings or architectural renderings (see Figure 5). The program displays the dimensions of objects' edges in inches, feet, centimeters, or meters. You can edit vertices, edges, or faces; create radially symmetrical objects; zoom in or out on selected areas; and add text to a drawing. Unlike most of the other programs reviewed, *SpaceEdit* offers no shading; objects are displayed as wire frames or with hidden lines removed.

SpaceEdit is far more sophisticated than Abvent's first 3-D offering, *MacSpace*. Some of the more important enhancements are multiple layers (up to six), which could prove useful for architectural applications), the addition of text, the ability to create a library of shapes, a freehand drawing tool, support for additional plotters, display of absolute or relative coordinates, the ability to export documents to *MacDraw* or *MacDraft*, larger documents (limited by disk space rather than limited to about 50K), and hidden-line removal.

A unique heliodonic view simulates a view from the position of the sun at a pre-set season (spring or fall equinox or summer or winter solstice) and user-specified latitude and time of day. This option can help architects and designers calculate how much sunlight will strike a given face of a structure at various times of the year.

Another impressive improvement is windowing, which lets you specify certain areas as transparent in an object with hidden lines removed. With this feature, you can "see into" a model of a building through windows and doors, for example. For flashy presentations, another new option lets you define a path through a 3-D scene and "move through" it in an animated sequence.

Although *SpaceEdit* greatly improves upon its predecessor, the program still has some problems. First and foremost among them is a somewhat awkward user interface. I realize that a program as sophisticated as *SpaceEdit* is more difficult to learn and use than programs with fewer features—that's not the problem. Here is an example of poor, or at least "un-Mac-like," program design: the program's four views are not labeled "top," "front," and so on. This is not a major flaw, since you quickly learn which window is which after using the program for a time, but such an omission makes it slightly harder to learn an already complex program. Another example: rather than simply selecting an object and deleting it with Cut or Clear, you must activate the Modification menu, click on a Delete Object icon, click on the object, and confirm your decision to delete it.

A more significant anomaly is *SpaceEdit*'s designation of the *z*-axis for height and the *y*-axis for depth, while the reverse is true for all the other 3-D programs reviewed. This could prove extremely confusing to someone accustomed to the traditional representation of Cartesian coordinates. (The manufacturer's explanation was that other views are based on the top view, which is most likely to be used for the initial drawing in architectural applications; while this makes some sense, I still found it difficult to get used to *SpaceEdit*'s coordinate system.)

Finally, *SpaceEdit*'s manual, although an improvement over the *MacSpace* manual, is still only fair, adding another hurdle for those learning the program.

The combination of simultaneous views and the ability to edit vertices, edges, and faces, as well as plotter support, precise measurement capabilities, and the enhancements already mentioned, make *SpaceEdit* a powerful program. If you don't mind wrestling with a mediocre manual and an unusual user interface, learning to use *SpaceEdit* should be worth your while.

3-D Decisions

When this article went to press, two additional 3-D CAD programs were in development. Before you make a buying decision, you might want to take a look at Visual Information's *Dimensions* and Diehl Graphsoft's *MiniCad*.

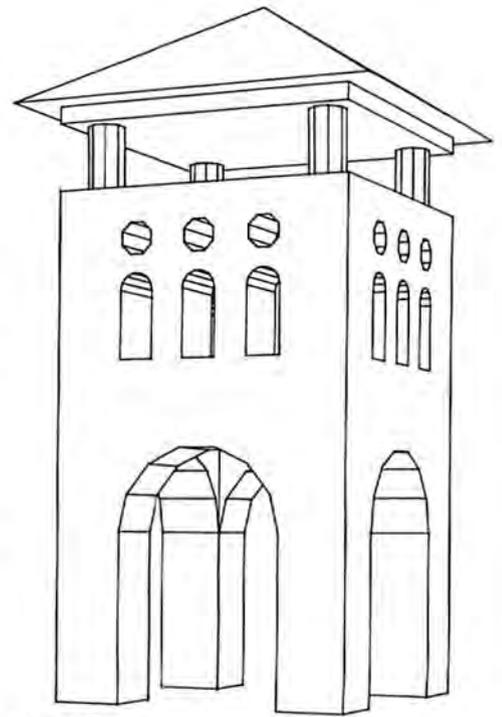


Figure 5
SpaceEdit's hidden-line-removal option is ideal when using a plotter to produce models such as this building.

Of the programs reviewed, *MacModel* and *Phoenix 3D* would make good teaching tools for those new to 3-D graphics, because of their relative simplicity and low prices. (I prefer *Phoenix 3D*'s user interface, but *MacModel* would be preferable for designers who need to measure objects.)

Either *Pro3D* or *Mac3D* could be appropriate for product designers or artists. *Mac3D*'s dimensioning and text capabilities make it suitable for technical illustrations, while the program's new shading features will attract artists. *Pro3D*'s myriad lighting options enable designers to create remarkably detailed, multishaded drawings, while the Profiler tool adds a new element of precision to object creation.

SpaceEdit's multiple layers, plotter support, and scaling capabilities make it appropriate for architectural or technical illustrations. It's more expensive and harder to learn than the other programs reviewed, but more sophisticated as well. □

Note: Italicized entries indicate program enhancements added since June 1986 review.

¹According to an Abvent representative, libraries of *SpaceEdit* objects will soon be available.

²Program enhancement added since June 1986 review.

³Several of the programs had not been tested on all of the large screens currently available.

⁴Version 1.2 of *Phoenix 3D*, which arrived just as this article went to press, offers full PostScript support on the LaserWriter.

⁵Version 1.2 saves files in PICT and PostScript formats as well.

⁶Version 1.2 sells for \$49.95.

The Polyglot Macintosh

*A look at languages from all over
the globe, Macintosh-style.*

by Anthony Meadow and Jeffrey Bartlett

From its inception, designers of the Macintosh wanted it to be an international computer. Its graphics-based user interface and icons, and its use of the mouse, which replaces typing commands, were two crucial steps toward implementing the idea that "the rest of us" would not refer only to speakers of English. The Macintosh is by far the Apple computer most widely sold outside the United States. According to Pam Miracle, Apple's international public relations manager, foreign purchases amount to more than 30 percent of total Mac sales (although this figure includes other English-speaking countries, particularly Canada, Great Britain, and Australia). Apple has developed versions of the System and the Finder for all the major languages spoken in Europe and ships 21 versions of the Mac internationally. The Japanese version has been out for about a year. Apple has demonstrated Arabic and Hebrew versions and is presumably working on other "difficult" languages too.

The Mac's international success is due in large part to easy *localization* of software. All programs in the Mac's ROM are written in assembly language, which requires no conventional alphabet. Using *ResEdit*, you can translate a menu or title into another language in minutes; there is no internal code in English. Localization has made possible the development of specialized fonts and word processing programs for a number of languages. It's easy to add or change a language on the Mac; in most cases, all it takes is a font editor and a utility to reconfigure the keyboard layout

(see "Ad Hoc Alphabets"). As a result, the idea of internationality means not only that the Mac can be sold overseas, but that it can be used domestically to teach and correspond in languages other than English. In this country, the primary customers for language-specific fonts and word processors are native speakers, schools and universities, and various branches of government. What follows is an overview of foreign-language word processing solutions, from those capabilities built into the Mac's System file to fonts and word processing programs you can purchase for specific language families.

Teaching Your Mac a Language

Even without additional software, the basic English-language Mac can interact with foreign languages. Interaction is accomplished through the Key Caps desk accessory, which allows you to add diacritical marks from other languages (see "Keyboard Accents"). *Diacritics* are accents or other marks used with a standard character to indicate a pronunciation (phonetic value) different from the one the character normally has.

Currently you can type on your Mac in French, Spanish, Italian, and German. However, other Western languages (such as Swedish, Norwegian, Finnish, Czech, Hungarian, and Polish) as well as non-western languages (such as Japanese, Chinese, and Arabic) require many more accented characters than can be produced with standard Mac fonts; neither system-supplied fonts, such as Geneva and Monaco, nor LaserWriter fonts, such as Helvetica and Times, are sufficient. As a result, several software developers have come up with font packages to help you use those languages correctly.

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отпутовао је из Т
свршио истрагу, м



Macintosh Plus



LES DÉRIVES DE LA CAMPAGNE CUI
LE MONDE
diploma
Publication mensuelle - 5
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Ad Hoc Alphabets

If you want to use a language that is not yet on the Mac, you can create it yourself. Excellent tools are available for developing fonts, the most basic of which is a *font editor* (see "Font Facts," *Macworld*, February 1987). The one I prefer is *Fontastic* from Altsys Corporation. Fonts created with *Fontastic* can be printed on either the ImageWriter or the LaserWriter, although *Fontastic's* bit-mapped fonts don't look as good on the LaserWriter as the built-in fonts do.

Developing a screen font can take a lot of work, and developing the corresponding PostScript font for the LaserWriter can take considerably more time, especially if you're trying to give the font a range of sizes, such as 9 to 24 points. Designing fonts is an art—it takes time to learn it well.

Another useful tool for developing language fonts with non-Western scripts is *MacKeymeleon*, an inexpensive utility that lets you design a keyboard layout to work with most languages. The standard Macintosh keyboard layout supports some diacritics but not enough for many languages. *MacKeymeleon* makes it easy to add diacritics as well as assign characters to specific keys. In addition to a keyboard-layout editor, *MacKeymeleon* contains a desk accessory that allows you to switch keyboard configurations and an installation program. Developed in Quebec, it provides menus for the program in French as well as in English.—*Anthony Meadow*

Before you buy a special set of fonts, look for the following qualities: completeness (does the font have all the characters you need for your language?); efficiency (are the characters laid out on the keyboard in a way that makes it easy to type in the language?); compatibility with printers (does the font work with the printer you use?); and sizes (does the font have a wide enough range of sizes to be useful?).

Fonts of the World

Ecological Linguistics of Washington, D.C., has developed integrated sets of fonts, string-comparison resources, and keyboard desk accessories for dozens of languages. Each package comes installed in a System file. You choose the default font for your applications in this system, and by pressing the Caps Lock key, you can switch between the foreign language and English (in a Geneva-like font), so that even applications (like *Excel*) that use only a single font become bilingual. And rather than merely replacing English letters with other letters that sound like them, the program re-designs the keyboard layout for each language, making typing as easy as possible.

Fonts are available for many language families: Eastern European and Caucasian (including Russian, Greek, Byelorussian, Ukrainian, Bulgarian, Georgian, and Armenian); Indian (including Hindi, Sanskrit, Gujarati, Gurmukhi, Bengali, Kannada, Khmer, and Thai); and Tibetan (including Tibetan and Burmese). Other languages are under development.

Linguists' Software of South Hamilton, Massachusetts, has also developed sets of fonts. Each font comes in six sizes—usually 9, 10, 12, 18, 20, and 24 points. The company's *MacTransliterator* has a set of letters sufficient for 75 languages and includes 50 diacritical marks that can be used in combination with any letter. *MacPhonetics*, a font containing the International Phonetic Alphabet, was designed for linguists and can be used for writing in most languages. *Tèch*, a font containing characters useful in mathematics, engineering, and science, is also available.

In addition to fonts for French, Spanish, and German, Linguists' Software offers several more exotic sets. *SuperGreek* includes all the special marks used in classical scholarship; *SuperHebrew* includes both a classical and a modern font, as well as a right-to-left desk accessory; *MacCyrillic* covers Russian, Ukrainian, Serbo-Croatian, and Bulgarian; *MacKorean*, which prints in Korean, comes in three styles; and *MacKana*, for Japanese, includes hirigana, katakana, and 70 kanji characters, though it performs only simple tasks. It cannot be (nor does it attempt to be) a solution for Japanese word processing.

Fonts from both Ecological Linguistics and Linguists' Software come in a reasonable range of sizes and can print with both the ImageWriter and the Laser-

Writer (see "Foreign-Language Fonts"). Ecological's fonts are designed to work with a keyboard layout that has been optimized for typing in that particular language. Each font also comes with a resource that compares strings in a manner appropriate for that language. The fonts developed by Linguists' Software come with neither keyboard layout nor string-comparison resource, so the fonts from Ecological Linguistics are generally easier to use. Linguists' fonts, however, are in many cases more complete because they contain the marks and symbols that scholars use, although this feature varies from language to language.

For example, if you compare the Greek fonts offered by both companies, you'll find that Linguists' Software includes all the characters used in writing both modern and ancient Greek, as well as a large number of special symbols, diacritical marks, and accents used by scholars. The corresponding font from Ecological Linguistics includes all the Greek characters but lacks special accents and diacritical marks. So if you write in modern Greek and don't need diacritics, Ecological's font is a good buy. On the other hand, if you study ancient Greek and work with critical editions of texts, *SuperGreek* from Linguists' is definitely the choice.

The Eastern Way

Some languages—such as Hebrew, Arabic, and Persian—are written from right to left. Other languages, including Chinese, use thousands of characters rather than dozens. Still others, such as Japanese, use several different writing systems. These languages cannot be computerized without extra work. Usually this means developing a word processor specifically for that language. Until a year ago, there were very few such programs. Now several are available, with others soon to follow.

Hebrew

Since Hebrew is written from right to left, any word processor designed for it should not only handle this feature of the language automatically but should also be able to work with left-to-right languages such as English. Ideally, you should be able to mix Hebrew and European languages on the same line, and vowel signs should be included in each Hebrew font.

HaKotev, developed by Eastern Language Systems, is a worthy attempt at combining word processing in Hebrew and English, but it has some major limitations. Although it provides three different Hebrew fonts, you can use only one at a time. English and Hebrew can be typed on the same line, but only one English font is available. Moreover, all fonts must be the same size, and only one document can be open at a time.

On the other hand, the program provides three keyboard layouts, so whatever form of Hebrew typing you know is probably supported. Using *HaKotev* is certainly better than using *MacWrite* and a Hebrew font, but until it is improved, it cannot be strongly recommended.

Keyboard Accents

Accent:	To produce this:	Type this:	Then type this:
Grave	à è ì ò ù À	Option-` Option-`	letter A
Acute	á é í ó ú É	Option-e Option-e	letter E
Circumflex	â ê î ô û	Option-i	letter
Umlaut	ä ë ï ö ü ÿ Ä Ö Ü	Option-u Option-u	letter A, O, or U
Others	ā ō ñ Ā Ō Ñ ç Ç â Ă ø Ø ß	Option-n Option-n Option-c Option-C Option-a Option-A Option-o Option-O Option-s	letter letter

Keyboard Accents

This table shows you how to type the accent marks built into the Mac system. Certain capital letters cannot be accented—a major inconvenience with some languages—although their lowercase counterparts can be.

בראשית 1 1 בראשית אלהים אֵת
הַשָּׁמַיִם וְאֶת הָאָרֶץ:

Постојë наравно могућности да свë
потрајë много дужë да сë пронађу
најзаобилазнији путеви да сë воли.

Οὕτως γὰρ ἠγάπησεν ὁ θεὸς τὸν κόσμον,
ὥστε τὸν υἱὸν τὸν μονογενῆ ἔδωκεν,
ἵνα πᾶς ὁ πιστεύων εἰς αὐτὸν μὴ ἀπόληται
ἀλλ' ἔχη ζωὴν αἰώνιον.

A Linguists' Software Sampler

All of these examples were printed in 14-point type. The LaserHebrew text comes from *Genesis 1:1*, the LaserCyrillic example is a Serbian text, and the LaserGreek at bottom spells out the text from *John 3:16*.

Arabic

Like Hebrew, Arabic is written right to left, so an Arabic word processor should support both Arabic and European writing styles. Arabic has another complication: many letters change shape depending on their position in a word—whether they occur at the beginning, middle, end, or alone. To be useful, a word processor must be able to automatically determine which letter form should be displayed.

AlKaatib is an Arabic word processor developed by Arabic Software Associates; Persian and Urdu ver-

sions are also available. Although three Arabic fonts are provided, you cannot use multiple fonts or font sizes simultaneously; nor can you enter text in another language. *AlKaatib* automatically displays the correct letter form and appropriately redisplayes words when editing operations change them. Several keyboard layouts are available, and these can be used with the mouse to enter text (see "An Arabic Version").

AlKaatib is sufficient for writers of Arabic, but not if they expect to mix in much English. Because of its font limitations and its inability to handle other languages, the program is seriously flawed. It too is preferable to using *MacWrite* and an Arabic font, but in its present form, it can't be heartily recommended.

An Arabic Version

This keyboard layout is one of three provided by *AlKaatib*. The larger-sized Arabic scripts are beautifully drawn. Notice the specially shaped cursor.



Chinese

Chinese has been very difficult to computerize because it has over thirty thousand characters (though perhaps only three thousand are in common use). This challenge has fascinated many people—over three hundred different methods of computerizing Chinese have been proposed during the last twenty years, though no standard has yet emerged. Therefore, a Chinese word processor should support multiple methods of text entry. Since each method requires separate skills from the user, different users may prefer different methods.

You should consider other important criteria as well when selecting a Chinese word processor. One is the size of the character set: the program should contain enough basic characters so that you're not forced to spend much time creating new ones. And it should be easy to add characters not provided by the program. Finally, the word processor should resemble other Macintosh applications—the user interface should be easy for beginners and have built-in shortcuts for more experienced users.

FeiMa

The first Chinese-language word processor for the Macintosh, *FeiMa*, was developed by the Wu Corporation of Connecticut and is marketed by Unisource Software. The original version of *FeiMa* was developed for a custom-made computer in 1982, but it has been rewritten for the Mac, so the current version follows the Mac user interface guidelines.

FeiMa is designed to make the Macintosh useful for someone who knows Chinese but not English. The menus are in Chinese, although the documentation includes English translations. The program has three modes, called *environments*. The System environment performs most of the functions of the Finder. Files can be copied, deleted, moved, and renamed using commands available on the File menu in the Sys-

High-Performance Machines

Porsche CEO Peter Schutz with some favorite toys. Schutz, shown here in his Stuttgart office, also has a Mac at home.



PHILLIPE GONTIER

tem environment. This is not the normal Mac way of doing things, but it works. The Finder can't display Chinese file names because it can't work with such a large character set.

The Dictionary Utility environment provides access to the dictionary of Chinese characters. The basic set consists of 2450 characters, none of which can be modified. The *user dictionary* allocates space for another one hundred characters in each document. You can select characters from an alternative dictionary of 3080 characters or create new ones yourself (see "A Chinese Dictionary").

FeiMa's word processing environment is similar to *MacWrite's*, except that it supports five methods of entering Chinese in addition to ordinary English: *pinyin*, in which pinyin pronunciation is entered and you choose the character you mean; a *radical* typewriter, in which you enter basic strokes that make up a character; a Chinese typewriter, in which a huge *virtual* keyboard of 70 columns by 44 rows appears on screen and you scroll to the appropriate character and click on it; a *create pad* that lets you draw a character with the mouse; and a *stroke pad*, on which the program displays all characters that have a designated number of strokes, and you click on the one you want.

You can print files in their entirety or select and print a portion of a file. Cut, Copy, Paste, and Undo functions are supported. The Clipboard can be displayed or cleared, and an optional utility translates Chinese characters from the simplified forms of pinyin to traditional forms, and vice versa.

Another Version

Another Chinese word processor was introduced to the United States at the Comdex trade show in November 1986: *BrushWriter*, from Kaihin Technology of Singapore. It was developed for Chinese speakers, so again, all menu items appear in Chinese.

BrushWriter supports many input methods, including the radical typewriter, pinyin, telex code, GB code (similar to ASCII in the United States), and row/column code. Kaihin has developed its own method as well, called *KIM* (Kaihin Input Method). You enter characters stroke by stroke as in the radical method, but *KIM* is implemented differently. Normally strokes must be entered in a traditional order, but with *KIM*, up to four strokes can be entered in a different order, as long as they ultimately compose the same character. In some cases, incorrect strokes can be entered and corrected automatically. This feature can help teach you the proper method of entering strokes, which is useful for anyone learning Chinese.

Characters are available in three sizes and can be edited and printed both horizontally and vertically. Additional characters can be created with a built-in font editor. Type styles include underline, bold, shadow, hollow, and reverse. Kaihin Technology also offers al-

phabets for other languages, including English, German, French, Spanish, Greek, Russian, and Japanese.

Both *FeiMa* and *BrushWriter* support about a half-dozen methods of entering Chinese. Each has a dictionary of several thousand Chinese characters, and both provide ways of entering additional characters that are not in the basic dictionary. *BrushWriter's* interface seems to be a bit closer to the spirit of the Mac than *FeiMa's*, but even here, you won't find any striking differences.

Although the two programs have similar capabilities, at \$280, *BrushWriter* is significantly less expensive than the \$400 *FeiMa*. But because *BrushWriter* is just beginning to be sold in this country, it's not yet supported. On the other hand, *FeiMa* was developed in America, has been available for more than six



A Chinese Dictionary

You can select any character from *FeiMa's* dictionary by clicking on it, as if you were using enormous Key Caps. Notice the overview of the current position shown at the top of the window (between 15 and 20).



Faces of the East

The Raba Contel Apple distributorship in New Delhi. The graceful calligraphy on screen forms the Urdu word for nightingales.



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months, and is fully supported. Since both programs function well and each has its share of pros and cons, deciding which one to buy may be something of a toss-up.

The Japanese Style

Any Japanese word processor must be capable of supporting four writing systems: *katakana* and *hirigana*, syllabic writing systems used for Japanese and foreign words, respectively; *romanji*, the English character set; and *kanji*, a set of Chinese characters adopted several centuries ago, in which most common words are written. Such a program should also facilitate converting katakana characters into kanji. Two standard sets of kanji characters, called JIS-1 and JIS-2, roughly correspond to the ASCII character set in the United States. When used together, they contain about 95 percent of the commonly used Chinese characters. A Japanese word processor should support both character sets and provide an easy way to add other characters to them.

EgWord, the only Japanese-language word processor for the Macintosh, was released in Japan two

years ago. Developed by Ergonomics Software Products International of Tokyo, it was well received in Japan, even though few Macs were around at the time. Apple Japan and Apple's Japanese distributor, Canon (which also manufactures the engine for the LaserWriter), encouraged Ergonomics to develop the product.

EgWord has several features that make it more sophisticated than most other Japanese word processors. One of the more important is its modifiable dictionary of kanji characters that can be used interactively via a desk accessory. All other Japanese word processors use a cumbersome process that forces you to quit the editor, start a dictionary utility to add new kanji characters, create the characters, and quit the dictionary utility before returning to the editor.

The program also uses a sophisticated method for converting kana keystrokes to kanji; phrases and even whole sentences can be converted at once. Other programs require you to press a Convert to Kanji key each time you enter the kana for a character. *EgWord* presents the possible kanji characters in order, from most likely to least likely. It also stores the kanji characters most often used for each combination of kana characters. In this way, the conversion process becomes customized and increasingly efficient.

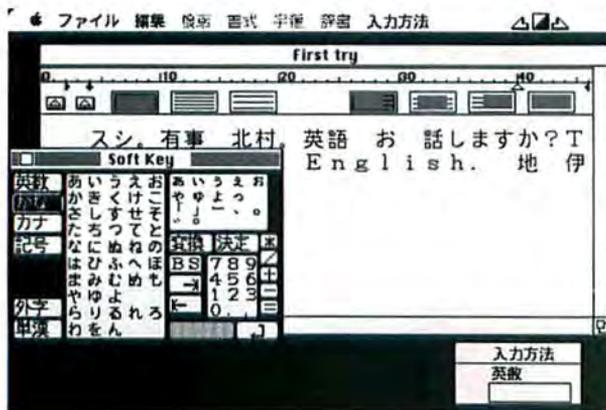
EgWord has some special formatting features commonly used in Japan, such as drawing horizontal and vertical lines. Up to five windows can be open at a time, and the program supports search-and-replace functions for all four writing systems (see "Character Scrolling"). Characters come in only two sizes, 12 and 24 points, but can be printed on either the ImageWriter or the LaserWriter, although no PostScript font is available. Both English and Japanese documentation are provided.

In addition to *EgWord*, Ergonomics has developed *EgBridge*, a desk accessory that lets you use Japanese within many Macintosh applications (including *MacPaint*, *MacProject*, *MacDraw*, *Microsoft Excel*, *Chart*, *File*, and *Multiplan*). *EgBridge* provides the same dictionary used by *EgWord* and the same method to convert katakana to kanji characters. Another desk accessory, the *Nibongo Notepad*, allows you to input Japanese and then copy and paste it into an English application.

Enhancements such as the JIS-2 kanji character set, vertical writing, multiple columns, and page-layout commands are now under development. *EgWord* is a must for any Mac user who works with Japanese. It has excellent facilities for converting to kanji, and as upgrades become available, the program can only get better.

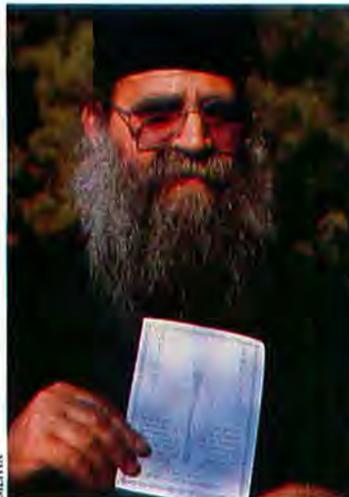
Character Scrolling

EgWord's Soft Key allows you to scroll through all the characters in the four Japanese writing systems. Clicking on a character enters it in the document.



Something Old, Something New

An Eastern Orthodox monk from the principal monastery on Mount Athos, Greece, shows off his MacPaint-generated Easter card. The monks' secluded, traditional life hasn't stopped them from adopting the Mac for word processing and administrative matters.





Foreign-Language Fonts

In this list, *f* stands for *font* and *wp* stands for *word processing program*.

ĜĤĤñã

European

Fluent Fonts—Casady Company; f
Fluent Laser Fonts—Casady Company; f
Fontagenix Foreign Fonts Edition—Devonian International; f
Mac the Linguist 2—Megatherium Enterprises; f
SuperFrench German Spanish—Linguists' Software; f
UltraFonts 1 & 2—21st Century Software; f

καὶ

Greek

GreekKeys—SMK GreekKeys; f
SuperGreek—Linguists' Software; f

薪

Chinese

BrushWriter—Kaihin Technology; wp
FeiMa—UniSource Software; wp

英語

Japanese

EgWord—Ergonomics Software Products International; wp
MacKana—Linguists' Software; only has 70 kanji characters; f

부산은

Korean

MacKorean—Linguists' Software; f

הַיּוֹר

Hebrew

Fontagenix Foreign Fonts Edition—Devonian International; f
HaKotev—Eastern Language Systems; wp
MouseWrite—Davka Corporation; wp
SuperHebrew—Linguists' Software; f + desk accessory

تخم

Arabic & Persian

Al Kaatib—Eastern Language Systems; wp
Fontagenix Foreign Fonts Edition—Devonian International; f
MacArabic—James Slater; f + desk accessory

АБВГД

Eastern European

Armenian—Ecological Linguistics; f
Cyrillic (for example, Russian, Serbian, Macedonian)—Ecological Linguistics; f
Fontagenix Foreign Fonts Edition—Devonian International; f
Georgian—Ecological Linguistics; f
MacCyrillic—Linguists' Software; f

འགྲེས་

Tibetan

Mongolian—Ecological Linguistics; f
Tibetan—Ecological Linguistics; f
Tibetan—John Rockwell; f (cost \$7 + preformatted disk)
Tibetan—Pierre Robillard; f (cost \$10 + preformatted disk)

पहले

Indian and Southeast Asian

Bengali—Ecological Linguistics; f
Burmese—Ecological Linguistics; f
Devanagari and Tamil—George Hart; f (cost \$10)
Gujarati—Ecological Linguistics; f
Kannada—Ecological Linguistics; f
Khmer—Ecological Linguistics; f
Lao—David Wyatt; f (cost 2 disks + mailer)
Lao—Ecological Linguistics; f
Malayalam—Ecological Linguistics; f
Sanskrit—Ecological Linguistics; f
Telugu—Ecological Linguistics; f
Thai—Ecological Linguistics; f

A Growing Fluency

Increasingly, word processing programs from third-party developers are appearing for the more difficult languages, but it's often hard to find out about them because few people use them, at least in the United States. Two newsletters keep up with fonts and word processors for other languages. The quarterly *Newsletter for Asian and Middle Eastern Languages* carries listings of products and articles on developing fonts and software that work with non-Western languages. *Wheels for the Mind*, a quarterly newsletter published by Apple, covers news of software and fonts developed at universities and colleges that belong to

the Apple University Consortium. As usual, user groups are also a fertile source of information as well as public domain and shareware products.

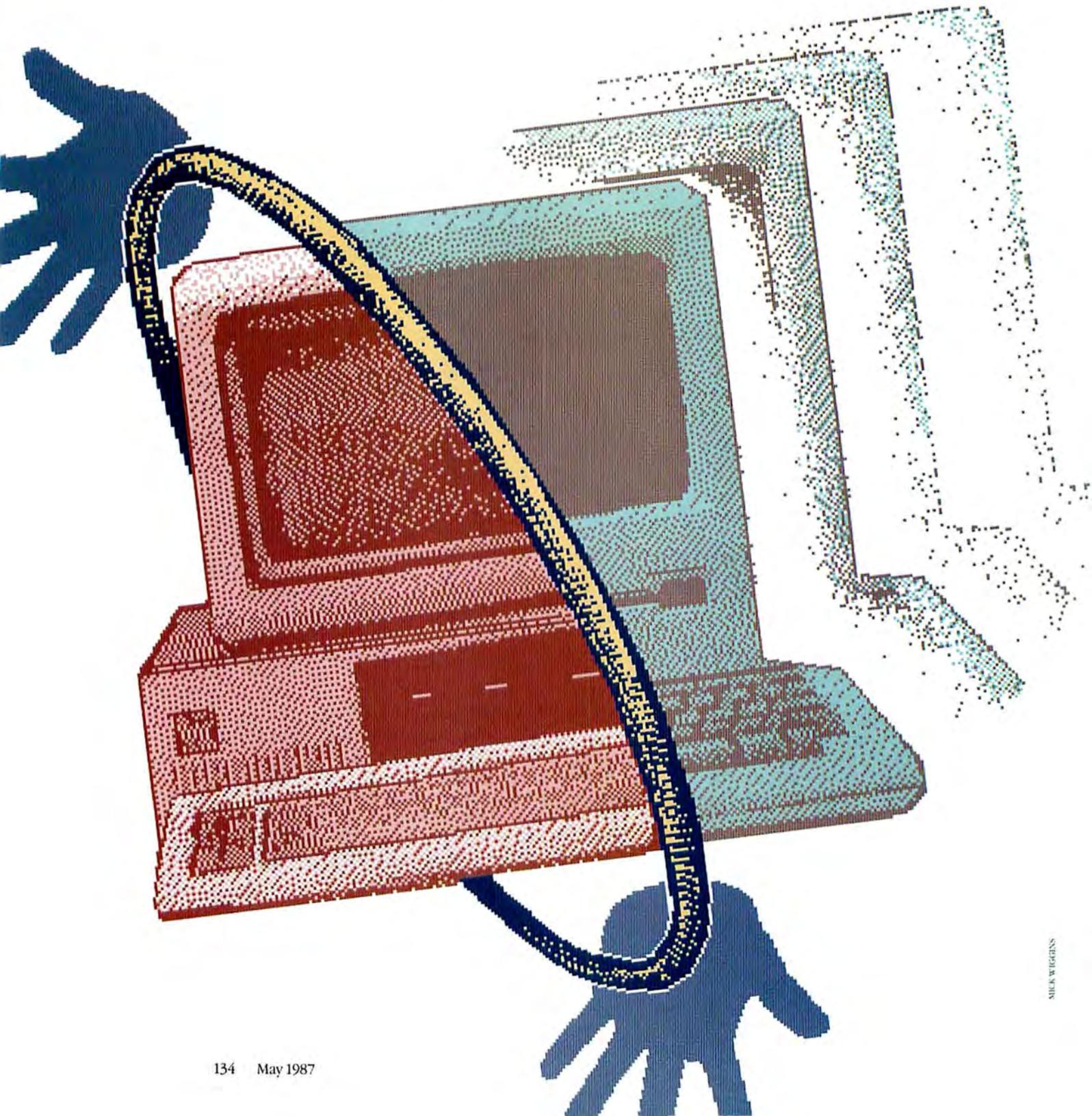
Even though relatively few of us communicate bilingually, having the opportunity to do so is as important for personal computer use as it is for other endeavors. It's nice to see that steps are being taken to give the Mac language lessons that will enhance its potential in international computing. □

See *Where to Buy* for product details.



The Great Pretenders

*Terminal emulators bring the Mac
on line with DEC and IBM hosts*



by Al Cini

You might think that making a Macintosh act like a DEC or IBM terminal would be easy. After all, the essential elements—a keyboard, a video display, and a communications port—are all there. But look closer: the size and resolution of the Mac's screen, the lack of special function keys on the keyboard, the different cables and communications protocols—these, along with other subtle factors, clearly distinguish the Mac from most other terminals. A successful terminal emulator must reconcile these differences while also taking into account factors such as ease of use. In addition, such products must accurately reproduce all of a terminal's many features and complexities.

An emulator's ability to faithfully imitate a particular terminal may seem to be its most important purchase criterion, but it actually makes more sense to shop for a terminal emulator package with the specific host computer and host application software in mind.

No Emulator Is an Island

A well-designed terminal emulator will make it easy for you to transfer information to and from other Mac applications. For instance, you should be able to copy text or graphics to the Clipboard. If you plan to transfer lots of information to other applications, make sure that the program works with *Switcher*. Transferring information between the terminal emulator and an application often requires some export capabilities. For example, in order to copy a table from a main-frame database report into an *Excel* or *Jazz* spreadsheet, the terminal emulator must convert the space between report columns into tabs.

If you need to transfer complete files between the Mac and a host, you should look for a terminal emulator that uploads and downloads Macintosh files. If you want to transfer graphic data to *PageMaker*, *Mac-*

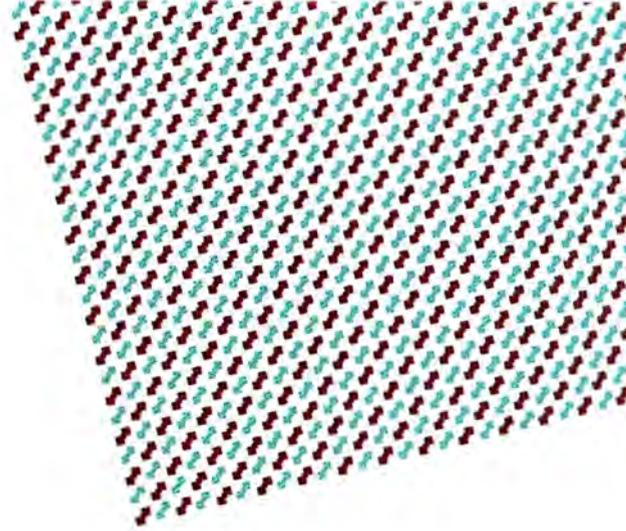
Draw, *MacDraft*, and other graphics programs, look for a terminal emulator that saves data in PICT format as well as text.

Macs and VAX

If you want to communicate with a Digital Equipment Corporation (DEC) VAX, and you don't have room for both a Macintosh and a VT-100 terminal on your desk, the natural solution is to buy a VT-100 emulator program for the Mac (see "DEC Terminal Emulators"). This shouldn't be hard—most Mac terminal emulator packages can emulate a VT-100. However, no two products do it in quite the same way.

For electronic mail and routine text editing, any VT-100 emulator might work, but for use with certain forms-management software, like *FMS* or *TDMS*, both of which run under the VMS operating system, you should ask some additional questions. Can the emulator display VT-100 attributes like boldface, reversed (white-on-black), underlined, and blinking characters? Can it accurately reproduce the VT-100 line-drawing character set? Will it display double-high and double-wide characters? Will the emulator display 132 columns? Are all the VT-100 function keys implemented and easily accessible?

The VT-100 provides a basic set of standard low-level functions defined by the American National Standards Institute (ANSI). Any terminal emulator that implements these standard functions can claim to be VT-100-compatible. But in fact, a VT-100 terminal offers several features beyond the defined ANSI standard, and many DEC host computer software products require them.



DEC Connections

Because a DEC host communicates asynchronously with its terminals, you don't need special hardware to connect a Mac to a host such as a VAX. While a rudimentary emulator that mimics a teletype lets you execute simple VAX/VMS or UNIX commands, you must have a VT-100 or VT-220 look-alike product to take advantage of the advanced text and graphic features available in VAX or UNIX applications.

In addition to its IBM persona, *MacTerminal* is also a fairly respectable VT-100 emulator. It displays boldface, reversed, and underlined characters, scrolling regions (portions of the screen that scroll independently), the line-drawing character set, and double-high or double-wide characters. The VT-100's blinking characters are difficult to emulate on a Mac, so most VT-100 emulators either ignore them or use a

different font or background shade to represent them. *MacTerminal* implements the VT-100's 132-column mode with a horizontal scroll bar.

MacTerminal version 2.0 allows you to redefine the behavior of the Backspace key so that it mimics the VT-100 Delete key—with version 1.1, you had to press Option-Backspace—and the new version properly handles the cursor-positioning (arrow) keys on both the old optional numeric keypad and the new Mac Plus keyboard.

Another VT-100 emulator, *VersaTerm*, adds a few helpful extras. It allows you to predefine several remote-host telephone numbers, which can be dialed from a menu. *VersaTerm*'s user-defined commands let you prerecord common (and often long-winded) host system commands and play them back later. If you work with a text editor like *EMACS*, *Vi*, or *EDT* on your

DEC Terminal Emulators

	MacTerminal	VersaTerm	VersaTerm-Pro	Tekalike	Mac240	InTouch
Text terminal emulation						
DEC VT-100	•	•	•	• (ANSI only)	•	•
DEC VT-220					•	
VT-640				•		
Graphics terminal emulation						
VT240/241 (ReGIS)					•	
Tektronix 401X		•	•	•	•	
Tektronix 4105			•	•		
Representation	n/a	bit map	vector: pan, zoom	vector: zoom	bit map	n/a
File transfer abilities						
Text capture	• (lines off top)	• (lines off top)	• (lines off top)	•	•	•
Host up/download	text/binary	text/binary	text/binary	download text/graphics	text/binary	text/binary
MacBinary	•	•	•		•	•
Xmodem	•	•	•		•	•
Kermit		•	•		•	
Graphics features						
Capture graphics	n/a	•	•	•		n/a
Color hard copy	n/a		• (Image-Writer II)	• (plotters)		n/a
Tektronix Graphics Input (GIN) mode	n/a	•	•	•	n/a	n/a
Macintosh integration						
Copy/paste	•	• (text)	• (text and graphics)		•	•
Copy table	•	•	•		•	•
Graphics to MacPaint (bit map)	n/a	•	•	•	•	n/a
Graphics to MacDraw (object-oriented)	n/a		•	•		n/a
Works with Switcher	•	•	•	•	•	•
Miscellaneous features						
Macros		•	•			•
Mouse cursor positioning	limited	•	•	•		

host system, *VersaTerm* will even let you use the mouse to position the cursor; the program sends the appropriate cursor-positioning command to the host when you click the mouse button while pressing the Option key. Unlike *MacTerminal*, *VersaTerm* correctly recognizes tab characters on the screen. *VersaTerm* also emulates 132-column mode differently than *MacTerminal*; by double-clicking on the title bar, you switch between the right and left sides of the screen.

There are, however, a few VT-100 capabilities, such as double-high and double-wide characters, that *VersaTerm* can't emulate. Such limitations may cause problems with certain kinds of forms-management software.

DEC's VT-220, an extended VT-100, offers among other things a larger keyboard with additional function keys. Function key definitions can also be down-

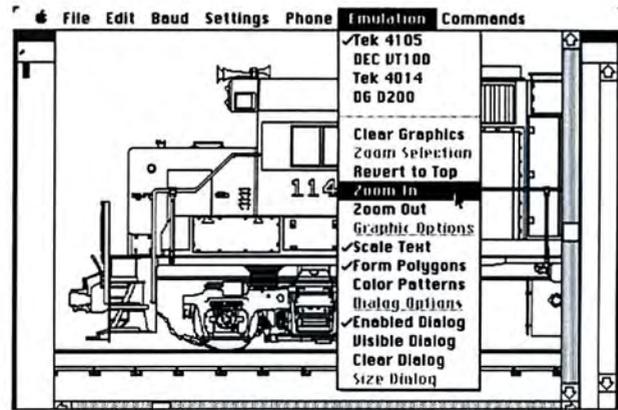


Figure 1
VersaTerm-Pro screen shot showing Tektronix graphics.

Pacer pcLink	MacMail Telecom	Microphone	Griffin Terminal	Smartcom II	MacLine	Visions Plus	MacKermit	Red Ryder	Telescope Pro
•	•	•	•	•	•	•	•	•	•
•						•			
			•			•			
n/a	n/a	n/a	bit map	n/a	n/a	vector	n/a	n/a	n/a
•	•	•	•	•	•	•		•	•
text/binary	text/binary	text/binary	text/binary	text/binary	text/binary	text/binary	text/binary	text/binary	text/binary
•	•	•	•	•	•	•		•	•
•	•	•	•	•	•	•	•	•	•
n/a	n/a	n/a	•	n/a	n/a	•	n/a	n/a	n/a
n/a	n/a	n/a		n/a	n/a		n/a	n/a	n/a
n/a	n/a	n/a	•	n/a	n/a	•	n/a	n/a	n/a
•		•		•		•		•	
•		•		•		•		•	
n/a	n/a	n/a	•	n/a	n/a	•	n/a	n/a	n/a
n/a	n/a	n/a		n/a	n/a	•	n/a	n/a	n/a
•	•	•	•	•	•	•	•	•	•
•	•	•	•	•	•	•	•	•	•

Beyond Terminal Emulation

Using a Macintosh to emulate a terminal is appropriate for people who simply want to run mainframe or minicomputer applications. But terminal emulation doesn't let the Mac user take advantage of the host's storage capabilities. Pacer Software's *pcLink* takes terminal emulation a step further.

In addition to VT-100 and VT-220 terminal emulation and file transfer capabilities, Pacer's *pcLink* lets you use a VAX, Prime, or Stratus host as a disk server. Once the *MiniMac* software has been installed on the host, Mac users can mount and unmount *virtual volumes* that reside on the host's hard disk. Users access virtual volumes as they would any other Mac disk volume; as with all disk servers, only one user at a time may write to a virtual volume.

In addition, Mac and VAX users can send documents to a LaserWriter printer spooler running on the VAX. A spooler-bound document is saved in a queue on the VAX's disk until it is printed. VAX users can also print to the LaserWriter by running a utility program to translate a text or graphics file into a PostScript file, then sending the translated document to the printer spooler.

Communications between the Mac and the host can take place over an RS-422 cable, a modem, Corvus's OmniNet, or AppleTalk and Ethernet (using Kinetics' FastPath gateway).

—David Usbijima

loaded from the host. White Pine Software's *Mac240* provides complete VT-220 terminal emulation and mimics almost all the VT-220's advanced functions. *Mac240* is especially suited for use with newer versions of DEC's VAX/VMS software, such as *All-in-1*, that use specific VT-220 functions.

Mac240 also displays all VT-100 graphics, the line-drawing character set, and elongated characters. The software emulates 132-column mode by displaying characters in a 6-point font, thereby squeezing up to 128 characters across the standard Mac screen.

Reproducing Graphics

You can now choose from a number of specialized terminal emulator products that let you run a DEC host's graphics software from the Macintosh. In evaluating a graphics terminal emulator, you need to find out how it resolves the differences between the Mac and the terminal screen's aspect ratio (the ratio between the number of horizontal and vertical pixels). Also find out whether the emulator converts color to gray shades.

White Pine's *Mac240* mimics not only DEC's text-mode VT-220 terminal, but the VT-240 (monochrome) and VT-241 (color) graphics terminals as well. *Mac240* substitutes fill patterns that you select for the VT-241's colors. DEC's graphics terminals accept graphic drawing commands from the host, called ReGIS (Remote Graphics Instruction Set) commands, to produce charts and diagrams on the screen. *Mac240* displays ReGIS images for those applications that demand it. A future version of *Mac240* will handle Tektronix as well as ReGIS graphics.

In addition to emulating a VT-100, *VersaTerm-Pro* from Peripherals, Computers and Supplies excels at Tektronix 4014 and 4105 series graphics terminal emulation (see Figure 1). Its handling of the 4105, which is simultaneously a terminal for text and graphics, is unique: text and graphics appear in separate windows, forcing you to switch between windows to see everything. The product lets you move graphics into other Mac applications not just as bit maps but as object-oriented pictures. You can transfer images captured from a mainframe to an object-oriented drawing package like *MacDraw* and print the image on a laser printer. *VersaTerm-Pro* not only automatically converts colors to fill patterns for display on the Mac's screen but also allows you to print the images in color on the ImageWriter II (see Figure 2).

Tekalike from Mesa Graphics similarly emulates the most common Tektronix graphics terminals, but unlike *VersaTerm-Pro*, when emulating a 4105 it displays text and graphics in the same rather than separate windows. While *Tekalike* has limited VT-100 terminal emulation—it handles only the ANSI-standard features of a VT-100—the program can output color images to a variety of popular plotters (see Figure 3). *Tekalike* also lets you enlarge text or graphics win-

dows to the full size of a large screen like the ones from Radius or E-Machines.

On Line to Big Blue

The most common way to log on to an IBM mainframe computer that runs the VM/CMS, TSO, or CICS operating system is with an IBM 3270-type terminal. These terminals differ from the Macintosh in many ways. The differences begin with the physical connection between the Mac and the host computer. The IBM host connects to the terminal via a coaxial cable and communicates using a synchronous communications protocol (either SDLC for the newer SNA products or Bi-Sync for the older ones). The Mac, on the other hand, normally communicates asynchronously—as do most minicomputers—and connects to modems and printers using a nine-conductor cable whose signals are defined by the RS-422 standard. In order to convert between the Mac and IBM protocols and cables, you need a box called a *protocol converter* that installs between the Mac and the mainframe.

With the protocol converter attached, 3270 emulation software connects the Mac to an IBM host (see "Mini and Mainframe Connections," *Macworld*, July 1986). For example, Apple's *MacTerminal* emulates an IBM 3278 terminal, with Apple's AppleLine performing

the necessary protocol conversion. *MacTerminal* implements the 3278's function keys in a pull-down menu. You can also invoke the function key codes from the keyboard with ⌘-key sequences.

Avatar's *MacMainFrame* adds to *MacTerminal*'s 3270 emulation by letting you transfer binary files between the Mac and the IBM host. The package includes protocol converter hardware, the PA1000T, for a single Macintosh. You install the software on the Mac as a desk accessory and use it from within *MacTerminal*. Once you install Avatar's *Host File Transfer* software on the mainframe, you can upload and download Macintosh binary files to and from the IBM host. In this way several Macs can share *Excel* spreadsheets and *MacDraw* documents via a central IBM system or even share files with IBM PCs using Avatar's PC file transfer counterpart. The PA1000T also contains an auxiliary asynchronous port, through which your Mac can connect to a VAX or other asynchronous host. The software lets you toggle back and forth between simultaneous sessions on two host machines.

Network users who need IBM 3278 terminal emulation may consider a Netway 1000A from Tri-Data. Because the Netway 1000A connects to AppleTalk, rather than to the Mac's serial port, up to 32 Macs can access the hardware, but only 16 users can work simultane-

IBM Terminal Emulators

	MacTerminal 2.0 (with AppleLine)	MacMainFrame (with MacTerminal)	Blue Mac (with DCPU/3270)	S/3Xlink (with Series II/III Twinax)	MacTerminal 2.0 (with Mac 5251)	Netway 1000
Terminal Emulation						
IBM 327X	•	•	•		•	• ¹
IBM 5251			•	• (5291)	•	
Printer			5256	5256		3287
File transfer abilities						
Text capture	• (lines off top)	• (lines off top)	•		•	•
Host up/download	text only	text/binary	text/binary ²	text/binary		• ³
Miscellaneous features						
Mouse cursor positioning	limited	limited	•		limited	•
Works with Switcher	•	•	•	•	•	•
Blinking cursor	•	•	•	•	•	•
Function keys	•	•	•	•	•	•

¹Up to 16 simultaneous sessions.

²File transfer available for System 3X only.

³File transfer only when used with MacMainFrame.

Macs Merge with VAX

In the beginning were the mainframe and the terminal. The idea of a large central host presiding over hundreds of users is a model that persists to this day. The growth of increasingly powerful desktop computers such as the Macintosh has given rise to a different model, one that splits (or distributes) the processing load between a microcomputer and the host.

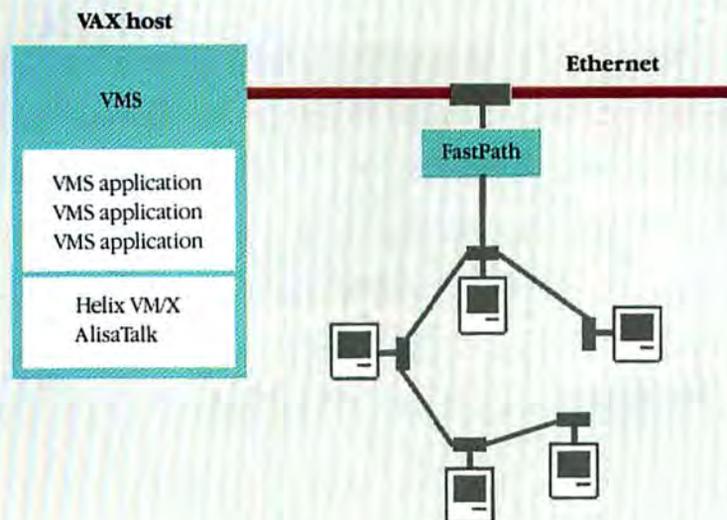
At Dexpo West, a conference for DEC computer manufacturers and users held in October 1986, several vendors showed products that merged Macs with DEC minis in new ways. The most notable Mac-related announcement was a combined effort by Odesta, Alisa Systems, and Kinetics, who together announced what could be one of the most significant products in Macintosh and VAX computing to date.

Odesta announced *Helix VM/X*, an icon-based relational

database that grants Mac users access to the VAX-resident database. *VM/X*, a derivative of Odesta's *Double-Helix*, consists of two components: the processing portion of the database resides on the VAX host, running under the VMS operating system, while the user module resides on a Mac. Users will be able to design and access the database from any networked Macintosh. Communication among the Macs in a work group occurs over AppleTalk; communication between the work group and the VAX goes over Ethernet, using the Kinetics FastPath or FastPath SC gateway (see "Bridging Worlds").

One significant feature of *VM/X* is that several users can simultaneously access the same database files. The key to the multiuser file system is AlisaTalk, a file server for the Mac developed by Alisa Systems of Pasadena, California. AlisaTalk

consists of a VAX-resident AppleTalk, a file server, and a LaserWriter spooler for the VAX. The AppleTalk portion lets the VAX receive AppleTalk messages—actually Alisa creates an AppleTalk network composed of separate VAX processes, or programs. AlisaTalk's file server lets Mac users create volumes that reside on the VAX host. Users of both Macs and VAX can access the volumes, which can contain any Mac- or VMS-generated files. However, no translation capability between the two file types is currently available. Finally, the LaserWriter spooler lets Mac users spool LaserWriter-bound documents to the VAX. VAX users can also print on the LaserWriter but must be running applications that output PostScript files.—David Usbijima



Bridging Worlds
Kinetics' FastPath gateway allows Macs on AppleTalk to talk to a VAX host via Ethernet. The AlisaTalk file server software and the database engine portion of Helix VM/X run under the VMS operating system on the VAX. The Mac-resident portion of Helix VM/X gives the database its Mac interface.

ously. Using Tri-Data's *MacWindows* software, users can initiate up to four interactive sessions, each displayed within a separate Macintosh window. Tri-Data also markets a complete 3278 keyboard to replace the Mac's. As part of a cooperative agreement, Tri-Data's product also works with Avatar's *MacMainFrame*, so network users can add file transfer capabilities.

Making 3X Connections

Users who need to connect to IBM System 34, 36, or 38 (referred to as *System 3X*) computers can choose from three products, all of which emulate the IBM 5150-type terminals: the *Blue Mac* and DCF II from Wall Data, KMW Systems' *S/3X Link* with the Series II or Series III Twinax Protocol Converters, or Mac/5251 from Perle GSD.

Wall Data's *Blue Mac* software works in conjunction with the company's DCF II protocol converter and lets you connect with IBM 370-series mainframes as well as System 3X minicomputer hosts. The product lets the Mac and an ImageWriter emulate an IBM 5251 terminal and an IBM 5256 printer. *Blue Mac* also lets you transfer binary or ASCII text files between the Mac and a System 3X host (the host must have Wall Data's *FTX* software installed). The DCF II protocol converter is available in models that connect 6, 10, or 18 Macs. The DCF II also offers a dialback security feature which helps authenticate the identity of a remote user.

Similarly, KMW Systems' *S/3X Link* software lets you use a Mac and an ImageWriter in conjunction with KMW's Series II or Series III Twinax Protocol Converter to emulate a 5291 terminal and a 5256 printer. The Series III lets you connect a single Mac to a System 3X host, while the Series II expands to accommodate multiple Macs. *S/3X Link* also lets you transfer text and binary files between the Mac and a host equipped with KMW's *Emulator Transfer Utility* software.

Perle GSD's Mac/5251 is a protocol converter that you use in conjunction with *MacTerminal* running in VT-100 emulation mode. The combination lets you log on to a System 3X host as a 5151 Model 11 workstation; however, you cannot upload or download files between the Mac and the host.

The Art of Impersonation

Selecting the right emulator is simple if you begin by listing the essential features of the host application you plan to run. If you're not sure which features an application requires, arrange to test the terminal emulator with the application. A few hours of research and practical experience will narrow the field substantially, and you'll end up with a look-alike that feels like the real thing. □

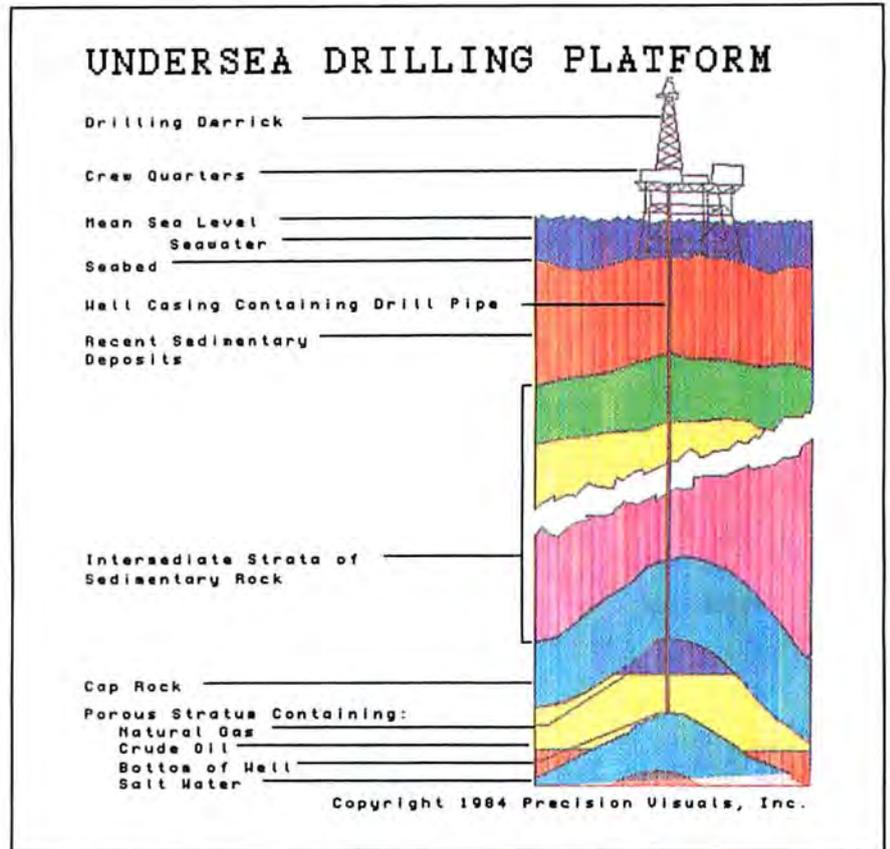


Figure 2
ImageWriter II color output from VersaTerm-Pro.

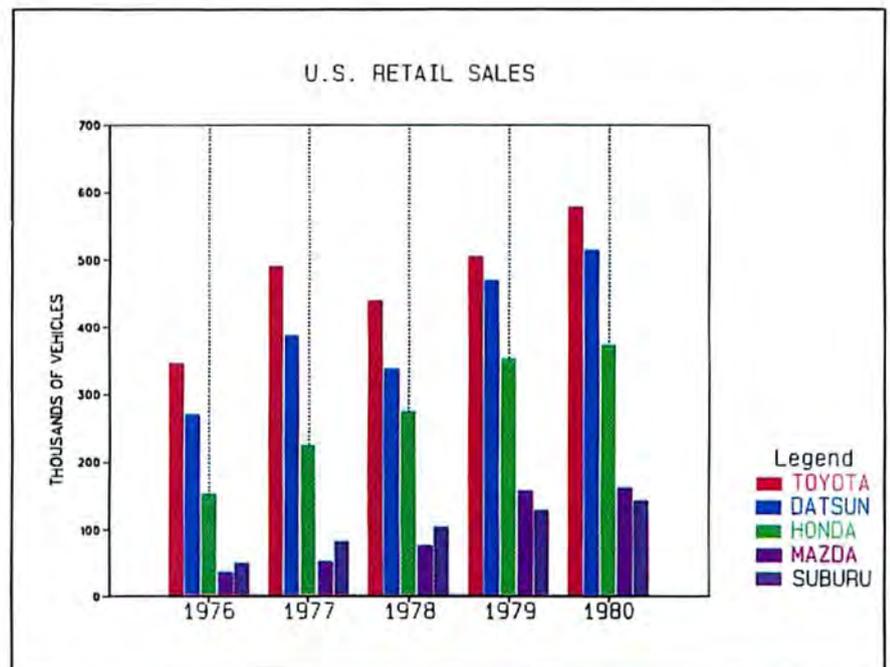
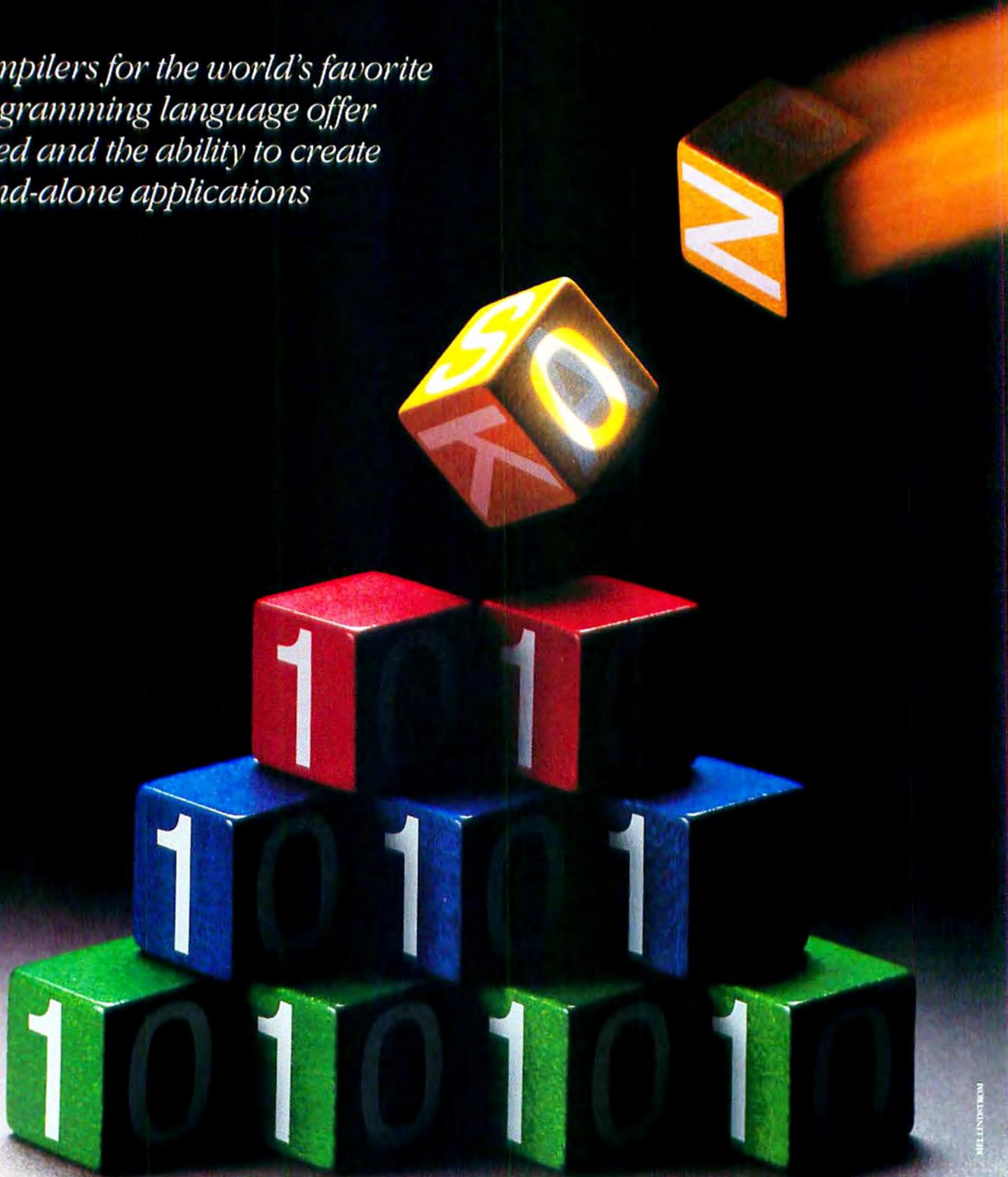
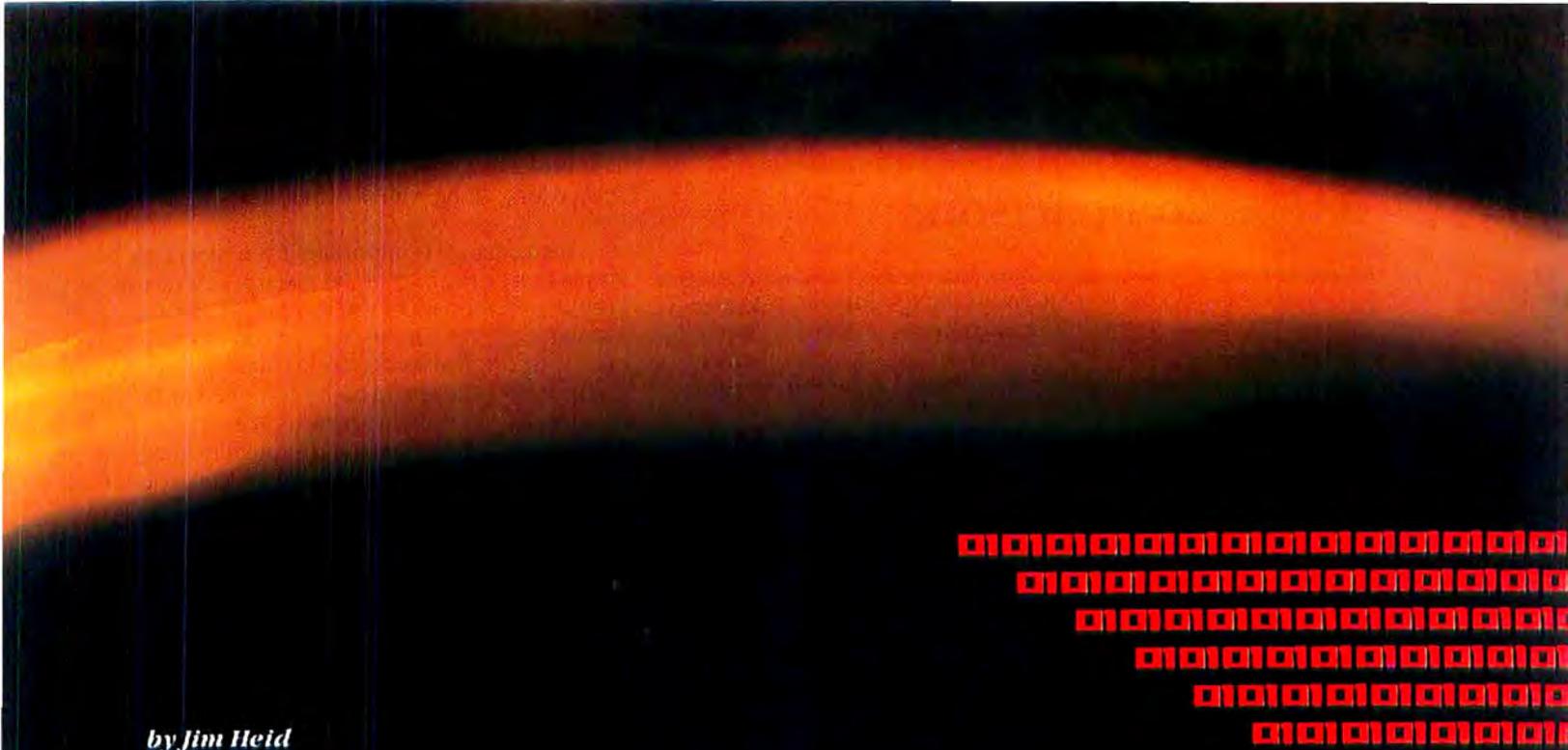


Figure 3
Tekalike color plotter output.

BASIC Choices

Compilers for the world's favorite programming language offer speed and the ability to create stand-alone applications





by Jim Heid

BASIC isn't basic anymore. Today's BASICs would be as foreign to a programmer who used *Dartmouth BASIC* in 1964 as today's English would be to Chaucer. And that's good. Languages die if they don't adapt to the age in which they're used, and BASIC has evolved along with the computers it runs on.

That's especially true of BASIC on the Macintosh. The first BASICs were interpreters, translating the programming statements you wrote into machine code each time you ran the program. A variation on this approach, used by products like *True BASIC* (see *Reviews, Macworld*, November 1986) and Softworks Limited's *Business BASIC*, translates your original program statements only once into an intermediate code. The intermediate code can then be executed with a run-time system to create applications that don't require the programming application itself. True compilers, however, translate the programs you write directly into the 68000's machine code. The new breed of BASIC compilers—Microsoft's *BASIC Compiler*, Zedcor's *ZBASIC*, and Pterodactyl Software's *PCMac-BASIC*—let you create fast stand-alone applications that run directly from the Finder.

Although BASIC will never be a leading language for Mac software development, the debut of BASIC compilers is great news for programmers who prefer BASIC's versatility to the rigid confines of Pascal and C.

A single article can't explore the intricacies of one BASIC dialect, let alone three, so what follows is an

overview that will help you identify the products that deserve a closer look. "Compiler Test Track" shows the results of my performance tests, and "BASIC Comparisons" spotlights each product's key features.

Basic Considerations

When evaluating a BASIC compiler, first examine its operating style. One reason interpreters are popular is that they let you alter a program and see the results immediately. A compiler shouldn't rule out such on-the-fly convenience. Switching between a compiler application and a text editor slows you down during debugging. One time-saver is a Transfer command that starts a different application, bypassing the Finder.

Access to the routines in the Mac's Toolbox is essential for writing Mac applications. All compilers let you create menus and dialog boxes, but beyond that, Toolbox support varies. Many products support the routines on a low-level, use-at-your-own-risk basis, which means keeping *Inside Macintosh* handy and often reaching for the reset switch. Unfortunately, no existing BASIC compiler can create desk accessories, although Zedcor is developing a special *ZBASIC* that will.

If you plan to write large applications, look for a compiler that supports the Mac's Resource Manager. You can then use Apple's *ResEdit* to create dialog boxes without fussing with screen coordinates, then

BASIC Comparisons

	Microsoft BASIC Compiler 1.0	ZBASIC 3.03	PCMac- BASIC 1.94
Specifications			
Variable types ¹	I, S, D, T	I, S, D, T	I, S, D, T
Variable name length (significant characters)	40	15	40
Maximum numeric precision (digits)	15	240 ²	17
Maximum string length	32,767	255	255
Type-declaration statements	Y	Y	Y
Static or dynamic arrays	Both	Both ³	Dynamic
Program Structuring			
Line numbers required	N	Y	Y ⁴
Labels	Y	Y	N
Multiline IF ... THEN ... ELSE	Y	Y	N
SELECT CASE construct	Y	N	N
WHILE ... WEND construct	Y	Y	Y
DO UNTIL construct	N	Y	N
Subprograms	Y	Y	N
CHAIN statement	Y	Y	Y
User-defined functions	Y	N	Y
Machine-language subroutines	Y	Y	Y
Toolbox Support⁵			
Menus, windows, dialogs	H	H	H
Event trapping	H	H	H
⌘-Key menu equivalents	H	H	H
Fonts, sizes, and styles	L	H	H
128K ROM zoom box	N	H	L
Bundle bit, Finder info	N	H	L
Regions	H	L	L
QuickDraw drawing routines	H	L	L
Scroll bars	H	H	L
Mouse pointers	H	H	L
Resource manager	H	L	H
Standard file package (file dialog boxes)	H	H	H
Clipboard	H	L	L
AppleTalk manager	N	H	L
Macintosh access	N	H	L
Print dialog boxes	H ⁶	H	L
Low-level access to other routines	N	Y	Y
Disk Files			
Sequential-access files	Y	Y	Y
Random-access files	Y	Y	Y
Accesses resource fork with OPEN statement	N	Y	Y
Indexed file statements	N	N	N
Programming Features			
Built-in text editor	N	Y	N
MDS editor included	Y	Y	Y
Runs programs within compiler	N	Y	N
Transfer command	Y	Y	N
Memory monitor desk accessory	N	Y	N

retrieve them with a few statements. You can store dialog boxes in a resource file or in your application's resource fork, along with pictures, icons, alert boxes, and text.

Performance is important if you're writing programs that perform complex calculations or use graphics or animation. You can rate a compiler's performance on three levels: the speed with which it compiles your original source code (important as your programs grow), the speed of the compiled program, and the size of the resulting application.

Finally, while clear and thorough manuals are an asset to any program, they're vital to a programming language. Good manuals use lots of examples to illustrate the language's syntax.

Microsoft BASIC Compiler

Microsoft BASIC Compiler is among the fastest BASIC compilers, and not surprisingly, it's the most compatible with Microsoft's interpreter. *BASIC Compiler's* Toolbox support is good and its manual is thorough, although flipping between it and 12 pages of update notes is distracting.

Unfortunately, *BASIC Compiler* precludes on-the-fly programming. You create source code with a text editor (Apple's *Edit* is included), then transfer to the compiler to create applications. If you have Microsoft's interpreter, you can use it to program and debug, then compile your program's text-only file.

BASIC Compiler provides the same keywords as Microsoft's interpreter for creating menus, windows, and dialog boxes. Also included is a set of Clear Lake Research (CLR) machine language libraries that let you

¹Variable types: I, integer; S, single precision; D, double precision; T, text (string); L, long integer (range of -2,147,483,648 to +2,147,483,647).

²You can configure ZBASIC to provide 8 to 240 digits of precision. Floating-point math slows as precision increases.

³ZBASIC provides dynamic arrays for string arrays only. Numeric arrays are static.

⁴PCMacBASIC requires line numbers only on lines that are referenced by a control statement. A future version will allow labels.

⁵Toolbox support: H means the language provides high-level statements for accessing the feature discussed. L means the language provides low-level access to the feature through a CALL statement. Low-level access is generally more difficult to use, since you must pass parameters through an array, and is more error-prone, because the compiler does not extensively check the validity of the parameters.

⁶Microsoft BASIC's OPEN "LPT:PROMPT" statement causes the Page Setup and Print dialog boxes to appear consecutively, which is awkward, since Page Setup isn't always needed. ZBASIC lets you access each separately.

open the Toolbox and use resource files, scroll bars, QuickDraw polygons and regions, menu ⌘ keys, and more (see *Reviews, Macworld*, December 1986).

The Toolbox library is a valuable addition to *BASIC Compiler*, although LIBRARY statements aren't as convenient as built-in keywords. To access the routines, you use a LIBRARY statement that names its own disk and folder (see Listing 1). For HFS users, that can

ZBASIC lets you edit and run programs with the same start-and-stop ease an interpreter provides.

mean lengthy LIBRARY statements. Moreover, creating an application containing the code in the LIBRARY statements involves copying the library's CODE resources to the resource fork of the compiled program—a chore that involves several steps and requires a resource mover such as *ResEdit*. A more convenient method would be one that compiled the routines along with the rest of the program. Worse, if the name of the application is changed, a run-time error occurs—the program can't open the resource fork, since it's referred to by the application's original name. Fixing this quirk would involve adding a statement or compiler option that would let the application automatically look in its resource fork, without requiring the user to specify a file name.

Microsoft tweaked its interpreter to improve its compatibility with the compiler. Version 3.0, whose performance matches that of the previous version (2.1), also adds multiline IF...THEN statements, better HFS support, the CLR Toolbox library, and a run-time interpreter that lets you run programs without the full interpreter. A \$25 upgrade is available to registered users.

Zedcor's ZBASIC

ZBASIC isn't as well known as Microsoft's *BASIC Compiler*; but it deserves to be. ZBASIC provides excellent Toolbox access, has a better head for figures, and is the only BASIC compiler that lets you edit and run programs with the same start-and-stop ease an interpreter provides.

You can write ZBASIC programs with *Edit* (which is included) or via ZBASIC's editing window or line editor. The latter favors typed commands over the mouse and is a throwback to ZBASIC's versions for other computers. The editing window is the easiest way to program, though it lacks niceties such as search and replace commands and keyword boldfacing.

```
LIBRARY"BASIC:Microsoft:BASIC Toolbox:ToolLib"
OPTION BASE 1
DIM R%(4),m%(2)
in%=0:dis%=0
setrect R%(1),30,30,50,60 'rectangle to be dragged
setrect p%(1),30,30,200,200 'area that dragged rectangle is pinned
setrect s%(1),5,5,250,250 'area where outline can appear
FRAMERECT VARPTR(R%(1))

loop:
WHILE MOUSE(0)=0:WEND
SetPt m%(1),MOUSE(1),MOUSE(2)
PtInRect m%(1),R%(1),in% 'test if mouse is inside rectangle
IF in% THEN
  DragGrayRect R%(1),m%(1),p%(1),s%(1),0,dis%(1)
  IF dis%(1) <> -32768! THEN
    ERASERECT VARPTR(R%(1))
    offsetrect R%(1),dis%(2),dis%(1)
    FRAMERECT VARPTR(R%(1))
  ELSE
    BEEP
  END IF
END IF
WHILE MOUSE(0)<>0:WEND
```

Listing 1

*This program uses the Microsoft BASIC Compiler's Toolbox library to construct a rectangle that can be dragged. Notice that Toolbox routines (**SetRect**, **DragGrayRect**, **OffsetRect**) don't appear in boldface as do built-in keywords.*

ZBASIC version 4.0, which should be available as you read this, will add editing features and also do away with ZBASIC's biggest flaw: required line numbers. Fortunately, using those relics from BASIC's infancy isn't as inconvenient as it seems. ZBASIC also lets you label blocks of code as does Microsoft's *BASIC Compiler*, and ZBASIC's Renummer command works in a wink.

ZBASIC's Toolbox support includes *BASIC Compiler*-like statements for creating menus, windows, and dialog boxes. ZBASIC goes beyond Microsoft's *BASIC Compiler*, however, by adding keywords useful for writing complex applications. The **DEFPAGE** and **DEFLPRINT** statements summon standard Page Setup and Print dialog boxes. **EDIT MENU** produces a standard Edit menu with an Undo command, while several **HELP** statements add on-line help. Other keywords let you access AppleTalk, produce speech through the *Macintosh* System file, and set bundle bits and file signatures, useful for applications that create documents.

BASIC Benchmarks

I ran several programs to test the performance of the BASIC compilers. The first measured arithmetic and array-handling performance using the ever-popular Sieve of Eratosthenes algorithm. The compilers perform this routine too quickly to get a meaningful result from one run-through; therefore, the program repeated it ten times. I also ran this program with both integer and floating-point arrays, and in the case of Microsoft's *BASIC Compiler*, with both static and dynamic arrays. (You can redimension and erase dynamic arrays; static arrays are fixed in memory, but run faster.) I also ran a string-handling program that concatenates and slices text values as well as a disk access program that writes and reads 10,000 strings to and from a disk file. My test bed was a 512K En-

hanced Mac with a MicahDrive 20MB internal hard disk.

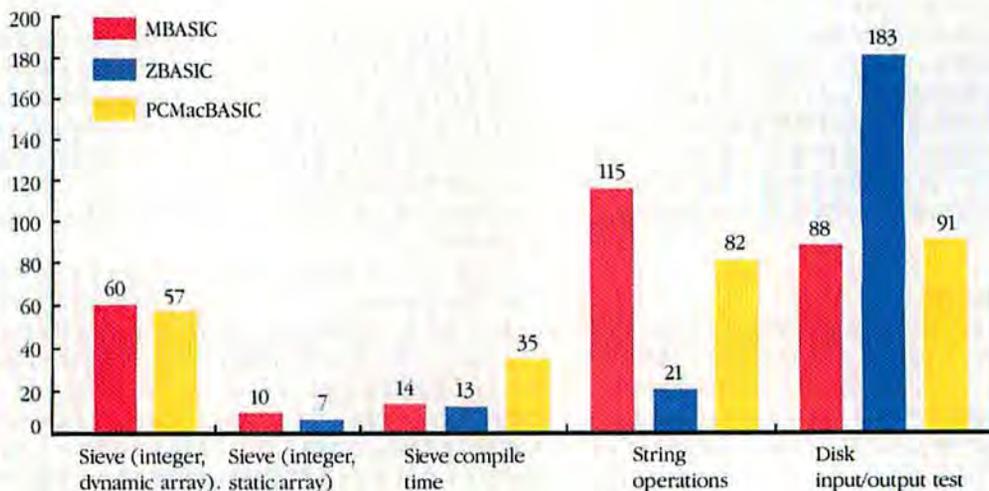
The results appear in "Compiler Test Track." The overall winner? Microsoft's *BASIC Compiler*. *ZBASIC* edged out *BASIC Compiler* in integer arithmetic, but the overhead required by its superior math package caused it to fall behind at floating-point math. (To appreciate the speed of the compilers, consider that Microsoft's *BASIC Interpreter* 3.0 takes over 12 minutes to run the Sieve benchmark.)

ZBASIC also beat the *BASIC Compiler* in the string-handling event, but *ZBASIC* strings are limited to 255 characters, while the *BASIC Compiler* allows strings of up to 32,767 characters. Oddly, *ZBASIC* slowed to a crawl on the disk-access test, specifically when reading the file. Zedcor is ex-

amining its *INPUT#* statement to see where the inefficiency lies.

Because a compiled application contains the compiler's *run-time* software, another way to assess a compiler's performance is to examine the size of the applications it creates. With the Sieve program, whose listing comprised 28 lines, *ZBASIC* created a 36K application; the *BASIC Compiler's* application was 39K; and *PCMacBASIC's* was 43.5K.

Benchmarks are great ice-breakers at hackers' parties, but they shouldn't be the deciding factor in your choice of a language. The real test is how well a language lets you develop the kinds of programs you write. After all, if unbridled speed is all that counts, you should be programming in assembly language, not BASIC.



Compiler Test Track

Comparison of three BASIC compilers running the Sieve of Eratosthenes, a string benchmark, and a disk input/output test. All times are in seconds. Note that *ZBASIC* does not provide dynamic arrays for numbers, and *PCMacBASIC* doesn't offer static arrays.

ZBASIC has many strengths, but its manual isn't one of them. Zedcor uses the same manual for all versions of ZBASIC, and an appendix documents features unique to each version. That means skipping over sections that don't apply to you and flipping between the main reference section and the Mac appendix. Zedcor is preparing a Mac-specific manual, slated for release with version 4.0, that will also cover all the Toolbox routines.

Pterodactyl's PCMacBASIC

Pterodactyl Software may not be a major force in software, but its PCMacBASIC is one of the more interesting BASIC compilers available. At \$39.95, it's also the best programming value around.

PCMacBASIC compiles programs written for BASICA, the advanced BASIC that runs on IBM PCs and many compatibles. The compiler cleverly translates KEY statements (which produce function-key prompts at the bottom of a PC screen) into Macintosh menu items. The multiple screens supported by some PC graphics cards are translated into Macintosh windows. Most other statements operate unchanged.

PCMacBASIC's approach to program development is akin to that of commercial Mac development systems. The compiler uses resource files instead of keywords to create menus, dialog boxes, and windows. To create these items, you edit the definitions in a generic resource file that comes with the compiler (or create your own resource file from scratch), then call the resources from your program. When you specify the name of the source listing and its resource file, PCMacBASIC combines them to create an application. PCMacBASIC also creates source files for Apple's Macintosh Development System or Signature Software's McAssembly; a future version will produce segments for Apple's Macintosh Programmer's Workshop.

PCMacBASIC has some faults. In the current version, you must place a line number before any line referenced by a control statement (GOTO, GOSUB, and so on), and the manual, while clearly written, simply presents every keyword alphabetically. But it's hard to gripe, given PCMacBASIC's bargain price. PCMacBASIC is a good compiler; for \$39.95, it's remarkable.

Compiling Conclusions

In the BASIC compiler derby, Microsoft's BASIC Compiler and Zedcor's ZBASIC finish first. BASIC Compiler lacks ZBASIC's interactive programming convenience, but this isn't a drawback if you don't mind programming with a slow interpreter. For developing complex applications, ZBASIC is the better compiler, thanks to its superior arithmetic accuracy and Toolbox support.

Get PCMacBASIC if you have BASICA programs that you want to run on the Mac. Even if you plan to use Microsoft's BASIC Compiler or ZBASIC, you may

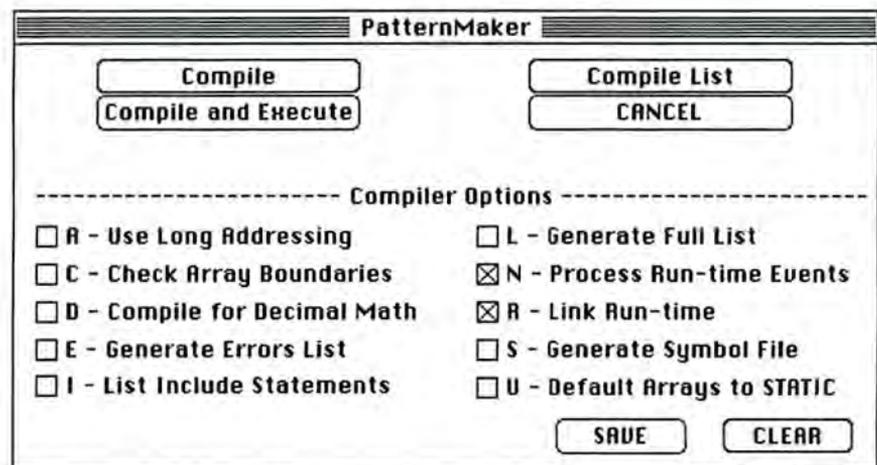
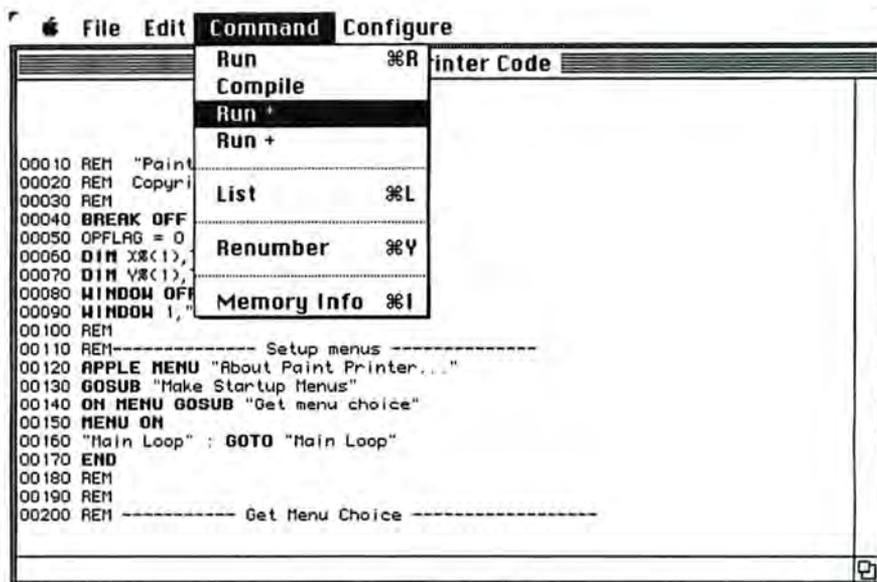


Figure 1

ZBASIC (top) lets you program with all the spontaneity of an interpreter. To create an application you choose the strangely named Run* command. Microsoft's BASIC Compiler (bottom) simply compiles source files you create with a separate text editor or with Microsoft's interpreter. If you find an error in the resulting application, you must change the original file and recompile it—a more time-consuming approach.

want to buy PCMacBASIC just to experiment with the resource-oriented approach.

But remember that every programmer has individual needs and preferences in a language, and some products are better for writing certain types of programs. Invest some time in research. That's the best way to find a dialect you feel comfortable speaking. □

Rounding the Bezier Curve

Cricket Draw, a new PostScript drawing program, points the way to the future of Macintosh graphics applications.

by Adrian Mello

Cricket Draw is the first sophisticated object-oriented drawing program to depart from *MacDraw*'s CAD orientation in favor of a design aimed at graphic artists. *Cricket Draw*'s ability to directly address the PostScript page-description language makes it a better drawing tool for the illustrative applications previously dominated by *MacDraw*. These include single-page layouts that are highly graphic in nature, such as advertisements and fliers, as well as structured illustrations that might in turn be incorporated into a page layout or a slide presentation.

Cricket Draw actually has two ways of describing a single document: a QuickDraw description and a PostScript description. The PostScript description lets the program produce a number of special effects such as gradual shades and blends of gray and rotated text. These effects are always more clearly defined when printed than when viewed on screen. Nevertheless, a screen representation is provided to make the drawing easier to work with.

Cricket Draw works with the ImageWriter, but to get the benefit of its Post-

Script effects you'll need a compatible printer like the LaserWriter. The program requires the ROM in the Mac Plus or a 512KE Macintosh; you cannot paste Clipboard selections larger than 32K into a 512K Mac, which has only the older 64K ROM.

Cricket Draw reads files saved in both *MacDraw* and PICT formats, as well as its own internal file format. You can also paste in bit-mapped images produced with paint programs or a digitizer. Once in *Cricket Draw*, you can crop, scale, and set the color of bit maps. Files can also be saved in PICT format, text, and EPSF (Encapsulated PostScript Format), so that you can export graphics to page-layout programs. Early versions of *Cricket Draw*, however, have difficulty transferring PICT files to and from other programs. Like most complex programs, *Cricket Draw* has a few bugs, but Cricket Software has an excellent record of updating its products.

Cricket Draw prints more slowly than *MacDraw* because, to improve printing accuracy, it avoids QuickDraw's LineTo command. *Cricket Draw* is slowed dramatically by complex images and effects, which are, of course, unavailable to less ambitious programs. Otherwise the program is comparatively fast.

Diamonds, Starbursts, and Grates

When you first open *Cricket Draw*, you'll notice two palettes, one vertical and one horizontal. The vertical palette contains several drawing tools, including line, oval, arc, polygon, freehand line, and round- and square-cornered rectangles, whose general function will be familiar to users of *MacDraw* or *MacDraft*. Less familiar tools include diamond-shaped objects, grates (parallel lines or concentric circles), starbursts (radial lines), and bezier curves.

Grates are useful for making linear or circular divisions in objects and layouts (including perspective effects when the log function is used). Grates can also be used as a design element; for example, you could add a series of gradually expanding parallel lines to a rule or letterhead.

A starburst is a series of lines radiating out from the center of an oval shape. Since density and other line characteristics of both starbursts and grates can be edited, these tools can be used to achieve interesting masking effects for display type and graphic objects.

The bezier curve tool lets you create free-flowing curves whose shapes are not restricted (in the way an arc's shape is) to a constant radius. This allows you to produce asymmetrical curves such as those found in the slope of an automobile's fender.



Since most curves are more complex than an arc, bezier curves open a world of complex shapes to graphic artists.

Cricket Draw's most powerful drawing feature lets you edit each vertex of a smoothed polygon as a bezier curve. This provides remarkably flexible yet simple control over irregularly curved shapes.

Shady Shapes

Taking advantage of PostScript's unique powers, *Cricket Draw* allows you to create special effects, like gradually shaded objects and drawings. To begin with, an object's fill or border can be printed in up to 100 shades of gray or in

any of 8 colors, with 100 variations of intensity. For shading purposes, setting grayscale intensity in *Cricket Draw* is infinitely preferable to using *MacDraw's* patterns. However, the patterns would still be useful for symbolic fill representations, such as those used by architects and engineers to indicate material types. Although current PostScript printers print only in black and white, it's virtually certain that compatible color printers will one day be available. Until then, simple color printing can be done on the ImageWriter II.

Objects can also be filled with a *fountain*, a shading scheme that fills an object with a gradual blend from one gray intensity to another. The variation can add interest and texture to objects.

Shadows give objects the appearance of a third dimension. You determine a shadow's depth and direction by dragging a ghost image from behind a selected object.

Editing in Depth

Cricket Draw has powerful editing capabilities. For a start, objects can be selected, reshaped, and moved in much the same fashion as in *MacDraw*. The style and shape of an object can be further modified by double-clicking on it or selecting the object and pressing **⌘-E**. These operations call up dialog boxes for style and reshaping, respectively, with options tailored to the selected object.

Unlike other programs with a propensity for dialog boxes, *Cricket Draw* uses them consistently, thereby minimizing confusion while keeping menus uncluttered. The consolidation of available options into a single dialog box makes the program easier to learn and lets you easily apply multiple commands to a single object.

Future versions of *Cricket Draw* could benefit from the ability to set global style "macros" for objects. In this way you could set multiple style attributes for object fills, borders, and lines, and apply those attributes to different objects. Cricket Software is no stranger to this approach, having implemented graphic macros in *Cricket Graph*.

Artistic Acrobatics

Rotate, flip, zoom, tilt—*Cricket Draw* is an acrobat among drawing programs. You can rotate and tilt objects in 1-degree

increments. Reflect commands let you flip an object on its *x* or *y* axis. You can specify the number of duplicates and the vertical and horizontal offsets of each duplicate in a dialog box—a feature sure to be appreciated by managers who create organizational charts.

The program has a number of features for viewing objects on screen. You can have multiple (as many as your Mac has available memory for) documents open simultaneously. You can zoom in and out, progressively enlarging or reducing the viewing scale by a factor of two. You can zoom in to eight times the original size or zoom out to one-eighth size. In addition to the scroll bars, all objects cause the screen to scroll automatically as they cross the screen border. You cannot turn off the autoscrolling, which is sometimes an annoyance.

Cricket Draw lets you group objects so that they can be moved and resized as a unit. One limitation you'll find in working with grouped objects (which applies to other drawing programs as well) is that you can't define them as a single region; consequently, you can't fill them in the same way you would a single closed object.

Drawing or Drafting?

While *Cricket Draw*'s features make it a more powerful shape-editing program than its predecessors, it is not a superset of other programs' features. For example, you cannot draw shapes from the center, as you can with *MacDraft* and *SuperPaint*. *Cricket Draw* lacks a number of the drafting features generally associated with CAD programs. This might seem reasonable, since the program is not intended for use in CAD. However, as evidenced by *MacDraw*, it's difficult to determine where CAD features end and graphic arts features

begin. A strict separation of these applications may not always be desirable, considering that architects and engineers are often as concerned with the presentation value of drawings as with their value for specifying a design.

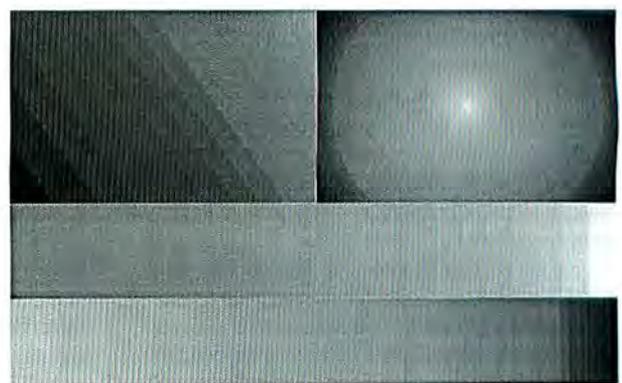
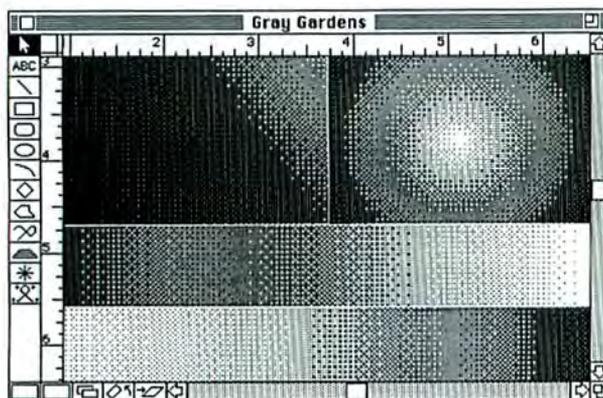
Cricket Draw actually does include several precision-oriented features useful in both CAD and graphic arts applications. The program includes adjustable rulers in several measurement scales, including picas, plus adjustable grids and guides. You can align objects by left or right sides, by centers, by tops, or by bottoms. By choosing Show Specs from the Layout menu, you can show an object's current dimensions or angle of rotation as it is being drawn. You can't, however, create permanent dimension lines that automatically adjust to scale and size changes, as you can with *MacDraft*.

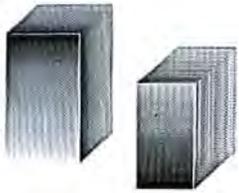
Cricket Draw's most serious limitation is that you can't use it to create multipage layouts. While you can zoom out to show more than a one-page area, you're ultimately restricted to a maximum drawing area of about 8½ by 11 inches. Although most printers are themselves restricted to printing single pages of this size, many people who create large presentations and layouts like to work within a single document. The limited page size means you can't take full advantage of landscape monitors such as the MegaScreen and The Big Picture; nor can you load multipage documents from *MacDraw* or *MacDraft* (in PICT format) and use *Cricket Draw*'s graphic arts talents to embellish their appearance.

Since *Cricket Draw* is at least partly designed for desktop publishing applications, it would be nice if the program provided a tabloid format or the ability to work with opposing pages on screen.

Fountains

These four rectangles demonstrate different fountains, both as they appear on screen (left) and as printed on a laser printer (right). Specific examples include: an angled log fountain (upper left), a radial fountain (upper right), a linear fountain (center), and a log fountain (bottom).





Water water everywhere but not a drop to drink. Waterwater everywhere but not a drop

This is standard text. The size and the style of the text are determined within a dialogue box.

This is an example of a text rotation. The text size and style were determined within a dialogue box.

This is an example of a text rotation. The text size and style were determined in a dialogue box.

This is an example of a text rotation. The text size and style were determined in a dialogue box.

On the Curve

Cricket Draw produces a variety of interesting effects. Shadows (top) can be created for text and objects, in this case polygons. Text can be bound to a path (center), but you must be careful not to make curves too tight or the flow of text becomes choppy. Text can also be rotated and can appear in a variety of styles (bottom).

The Text Angle

Cricket Draw has the most powerful text-handling capabilities of any graphics program currently offered for the Macintosh—on a par with dedicated word processors like *MacWrite*. For instance, once you create a rectangular shape with the text tool, type wraps to the rectangle's shape. Text rectangles can be moved and re-shaped, with the text wrapping to fit the re-shaped rectangle. Once text is entered, you can edit it freely, mixing fonts, styles, and sizes in the same block. You can also change the intensity, color, spacing, and alignment of a text block. Because of the number of options available, *Cricket Draw* requires more steps for creating and editing text than does *MacDraw*. Editing a previously created text block is a little cumbersome, often requiring two or three operations before actual changes can be implemented.

Most spectacular of all are *Cricket Draw's* special text effects. You can rotate a text block in 1-degree increments. Rotated text can be viewed on screen; however, the Mac's inadequate screen resolution makes for a rather crude image. You can speed up screen performance with an option that replaces text with a pattern on screen.

You can also create unusual text effects by binding text to the path of an open-ended object. For example, to bind text to a gradual curve you draw the curve, type a text block, shift-click the two, and

choose the Bind Text command from the Special menu. There's no screen emulation for bound text other than a curving pattern, but PostScript permits the printed text to curve gradually along the invisible path.

Window on PostScript

Although *Cricket Draw* provides many useful features of PostScript, you may want to create your own PostScript programs to further embellish drawings. To this end, *Cricket Draw* lets you generate a PostScript program that you can edit in a separate window. The window serves as a PostScript editor, providing standard cut-and-paste editing commands as well as good search-and-replace features. You can save and recall procedures from within the editing window using library commands. You can also print all or part of the program listing, and there is even an on-line help facility that describes each command and its parameters. Once you've finished editing your program, you can save the PostScript text file with or without the *Cricket Draw* program procedures or in EPSF. To print, you download files to a PostScript-compatible printer.

Cricket Draw's PostScript editor is a thoughtful and compact addition to the program. It creates clean files and works well with different application programs, PostScript printers, and drivers. PostScript text files can be no bigger than 32K—more than enough for most drawings but possi-

bly limiting for a job such as writing binary PostScript for digitized pictures. One of the most intriguing aspects of the built-in editor is that it makes *Cricket Draw* an excellent learning tool for students of PostScript. Objects and effects produced in the *Cricket Draw* drawing window can be studied and modified in the PostScript window.

Drawing a Conclusion

For creating structured illustrations and layouts on the Macintosh, *Cricket Draw* is unsurpassed. It does not replace the flexibility of a paint program, nor does it offer the scaling and design features of a CAD program—but then it's not intended to. Although Adobe has introduced another impressive PostScript graphics program, called *Illustrator* (see *Macworld News, Macworld*, January 1987), it is chiefly designed as a tracing tool for creating high-resolution technical illustrations. In fact, most graphics programs offer complementary capabilities for demanding graphics applications.

Drawing programs with a graphic arts emphasis will continue to proliferate, as interest in desktop publishing and presentations grows. In the meantime, *Cricket Draw* opens up new possibilities to Mac graphics enthusiasts. □

See *Where to Buy* for product details.

Reviews

A High-Wire Act

Trapeze 1.0

Integrated text-graphics spreadsheet. **Pros:** Very powerful spreadsheet features with desktop publishing aspects; built-in report generation capabilities. **Cons:** Manual needs improvement; no macros; flexible spreadsheet requires initial setup decisions before data is entered. **List price:** \$279. **Requires:** 512K. **Copy Protection:** None.

 *Trapeze* from Data Tailor fills some of the gaps left by power spreadsheets such as *Microsoft Excel*. If you didn't know there were any gaps left to fill in *Excel*, you will after you try *Trapeze*. It not only frees you from the usual row and column constraints of a spreadsheet, but also allows you to input text and graphics. The program lets you position data, numerical results, graphs, and text in separate blocks with the ease and flexibility of a desktop publishing program. *Trapeze* is most useful for scientists, business people, and engineers who want to create, print, and store text and graphics with their spreadsheets.

Trapeze does not skimp on raw spreadsheet power either. Besides the usual functions, the program includes database capabilities, matrix operations, amortization, and other functions. The program supports the 68881 math coprocessor and added memory, but the current release does not have macros. *Trapeze* lets you solve problems that would require complex worksheets and macros in *Excel*. For example, you can perform five different matrix inversions with one function in *Trapeze*, or use multiple linear regression for trend analysis. If you add another factor for data analysis, the program simply expands and adjusts the data. In *Excel* you would have to redo your macro. Updating old reports is also greatly simplified, since the data, graphics, and text components do not require separate files.

The Workings of Trapeze

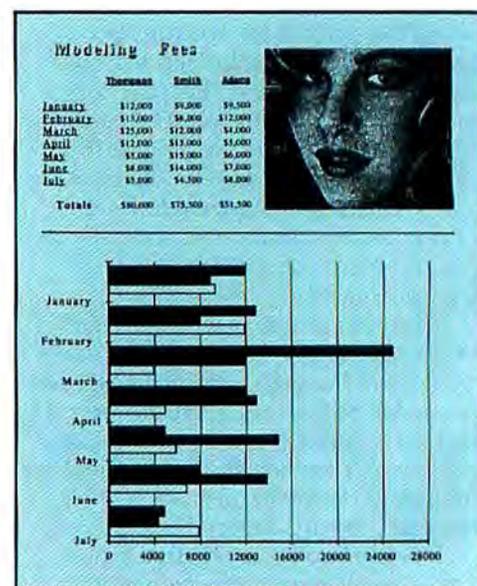
With the block design concept of *Trapeze*, static rows and columns are replaced with named blocks (windows) of data, which can be sized and positioned anywhere on the screen. The autosize capability allows the spreadsheet to grow or shrink depending on the amount of data it contains. Autosize goes beyond the Fill capabilities of *Excel*; *Trapeze* automatically expands associated data and formula blocks. This feature lets you easily revise a budget initially prepared for a single month to include any number of months.

You can open up to 31 windows at a time (memory permitting), and linking spreadsheets is easier than in *Excel*. Each block of *Trapeze* can contain more than 32,000 by 32,000 cells, and theoretically you can have 32,000 blocks in a file. However, a file can have only 11 pages, so the spreadsheet capacity is limited by this number and by memory constraints.

In *Trapeze*, formulas refer to a block by name and not by cell location as in traditional spreadsheets, which means the program does not use relative references. If you add or move data, you do not have to redefine the range or reference. It is faster to organize and analyze a block of data in *Trapeze*, but calculations of single values take longer to set up than they would in *Excel*, since each cell has to be defined as an individual block. If you were buying a house and knew the exact interest rate, and were simply trying to determine the mort-

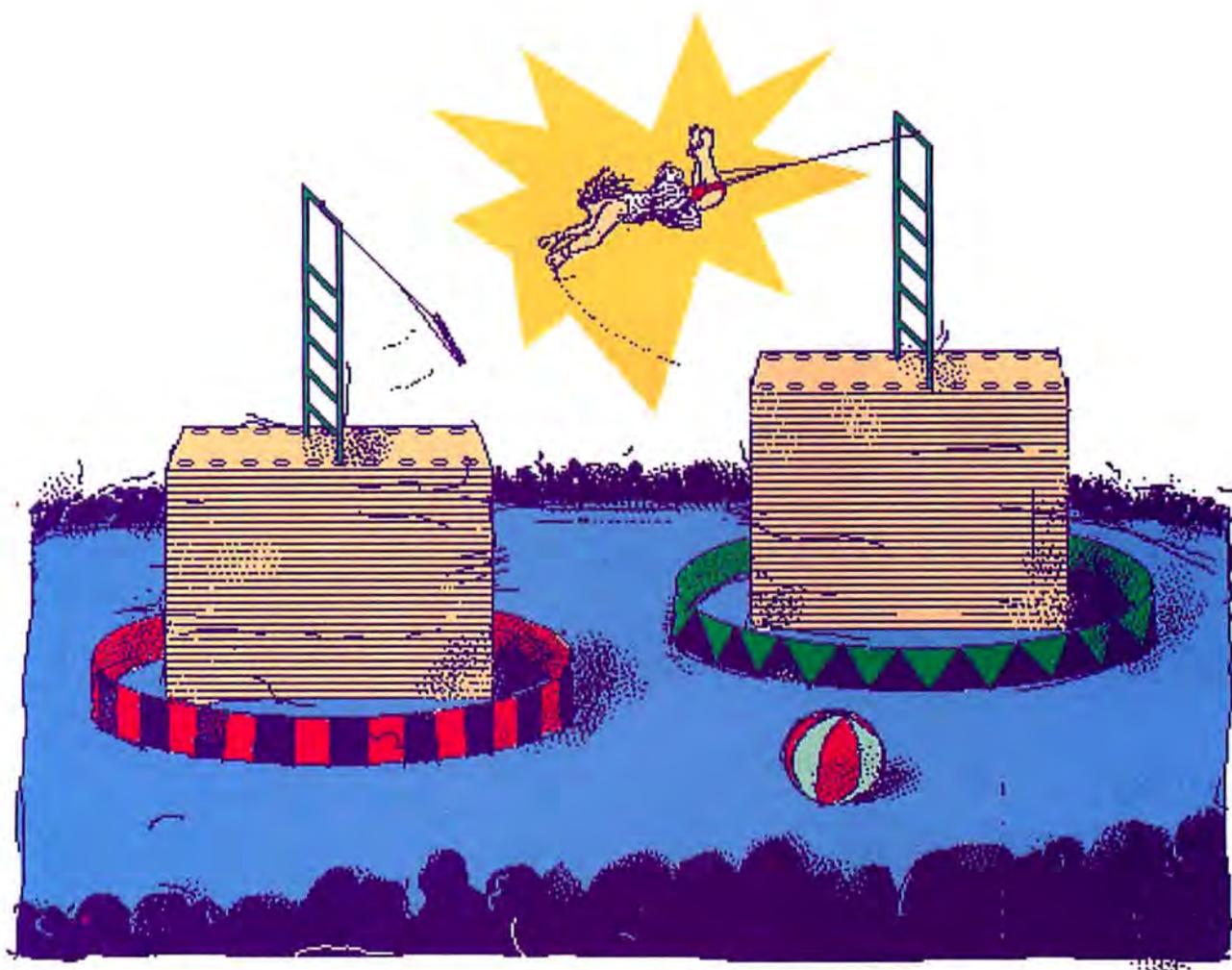
gage payment (the single value), *Excel* would accomplish this task quickly. If, however, you were looking at several houses and analyzing different interest rates to generate a series of mortgage payments, *Trapeze* would be faster, since you wouldn't have to set up a data table.

You can mix text blocks, graphic blocks, and data blocks on the screen and in printouts, and what you see is what you get. "Modeling Fees" shows a database block (months and fees), a formula block (totals), a chart block (bar chart), and a graphics block (digitized photo). The location of any of these blocks on the page is flexible. Printing is page oriented. Unlike *Excel*, *Trapeze* won't let you select and print a block or portion of a page, but after you have finished laying out the contents of



Modeling Fees

Powerful desktop publishing features of *Trapeze* allow you to create reports in only a few minutes.



each page, printing a final report is far simpler than in *Excel*.

Trapeze represents a breakthrough in report archiving. Anyone who has tried to modify the data in an old report (composed of separate files for text, spreadsheet calculations, and linked charts) will welcome a functional spreadsheet that has all these items in one file. *Trapeze's* data-to-graphics linkage, which is similar to the Hot View feature in *Jazz*, is particularly impressive in scientific and engineering applications. You can set up a single screen with a data table, a line plot of the data, and a block showing calculated statistics about the data (including regression coefficients). As you change entries in the data table, the plot and statistics will change automatically. For quick analysis of experimental results, this is nearly ideal.

The comprehensive math-function set in *Trapeze* includes solutions to systems of linear equations, which gives you powerful graphing and calculating capabilities. You can link a plot showing input variables for

an industrial process to a plot displaying process outputs, a combined graphing and calculating function that gives you rapid trial-and-error optimization of input mix. (A flexible iterate function can be used to churn through the possibilities.) When you import data from an existing spreadsheet, *Trapeze's* autosize feature adjusts the plots to fit the imported data blocks. With a little practice you can swap data blocks in a matter of seconds using the available keyboard shortcuts.

Learning Trapeze

Trapeze may be more difficult to learn than other spreadsheets, and because each block must be named, the initial setup requires some planning. But once you set up and organize your data, it is much easier to work with *Trapeze* than *Excel*, and it is useful to have all the information about a project in a single file. Data Tailor provides several examples on the disk, and the program supplies on-line help. The manual includes an easy-to-follow tutorial but offers little help on advanced features. The reference section gives detailed information on functions but the information is hard to

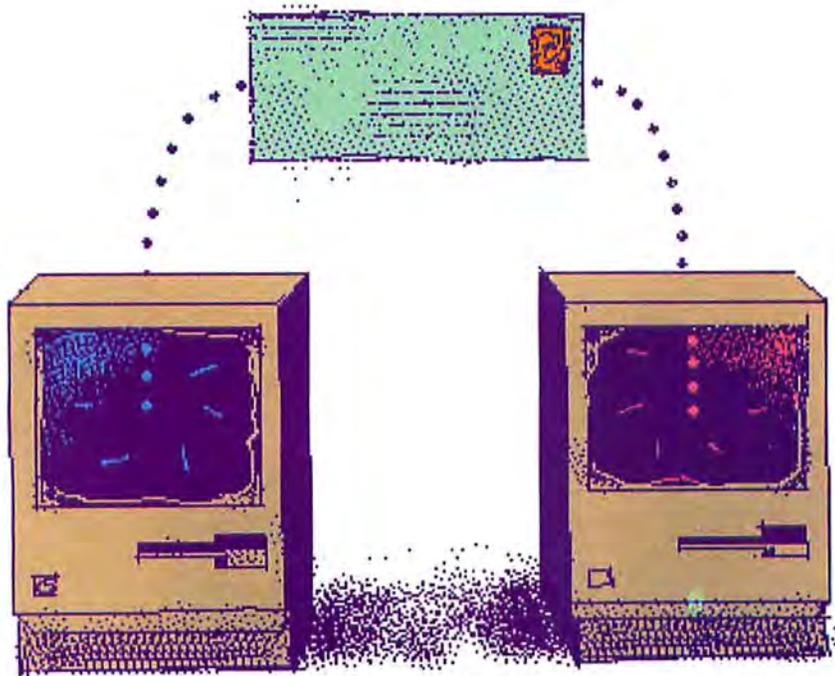
find and not thoroughly explained. The company plans to include new features such as macros to improve performance and to provide a clearer manual with more advanced tutorials in its next release.

Swinging

Trapeze is fast and flexible and it works well on a 512K Mac. The program has a definite place in desktop publishing as well as in the spreadsheet world. Its ability to incorporate and manipulate text, graphics, and data on a single spreadsheet is so useful that other companies may be forced to follow Data Tailor's lead.

Although macros are needed to improve performance and the Undo feature has not been adequately implemented in version 1.0, we highly recommend *Trapeze* to anyone who needs to integrate text and graphics into spreadsheet output. It is also an excellent program for scientists and engineers who need a full set of mathematics functions in a spreadsheet.—Prasad Kaipa and Edwin Haskell

See *Where to Buy* for product details.



A Gateway to Communications

InterMail 1.0

Desktop communications system. Pros: Nondedicated asynchronous background operation; open-ended, with on-line help screens; IBM and mainframe compatibility. **Cons:** You can't bold messages while composing them unless you send them to yourself; several basic modules are optional; no pricing available for combination packages. **List price:** 1-4 users \$299.95; 5-10 users \$499.95; 11-20 users \$749.95; 21+ users \$949.95. **Requires:** 512KE, preferably with a hard disk for data file. **Copy protection:** None.



Andy Hertzfeld has suggested that the "open Mac" won't be truly open until you don't have to be a hacker to program it to your needs. Well, the guys at Internet would seem to agree with him. *InterMail*, their Macintosh desktop communications system, is an easy-to-use E-mail network that's open-ended and user-sensitive; you can add features as you need them, and make—or order—your own customized modules. Additionally, *InterMail* doesn't need a dedicated Mac, can be site-licensed, and isn't copy protected—making it even more competitive with Think Technologies' *InBox*.

Installing InterMail

Before installing *InterMail* on an AppleTalk network, make sure that all users are running System 3.2 and Finder 5.3 (or later versions). You need to use a Mac 512K Enhanced (or preferably a Plus) to host the software server, and without a hard drive you'll probably run out of storage space quickly. The disk you receive from Internet is configured for the number of users you've specified, and you get a manual for the network manager (its contents are paralleled in the on-line help screens). Setup is easy. You install the *InterMail* server resource in the server System Folder and the *InterMail* desk accessory in the System file. After restarting the Mac, you enter the names of all network users (and passwords if desired) in the server list. Users then install the *InterMail* desk accessory in their System files, copy the User icon into their own System Folders, and enter their names in the Chooser. At this point, if the manager hasn't already entered a password, users may enter their own. Without a password, *InterMail* automatically signs them in when they boot.

InterMail Interface

When you choose the *InterMail* desk accessory from the Apple menu, the Message Center lists the messages you've received and displays the icons you'll use to send messages or modify your mailbox (see "Messages for Michael Miley"). Dou-

ble-click on a message from the list, and it appears in easy-to-read 12-point Chicago (*InBox* uses 9-point Geneva). To send a message, double-click a message icon to open a window containing a memo area and a scrollable list of mailboxes (see "Send Message").

The Message Center shows up to six icons at a time. (Custom message formats can be ordered through Internet and installed in this window, and 20 additional types should be available by summer.) In the version we reviewed, the following options were available.

The Standard Message allows you to send communiqués, of up to 32K each, to any user or group in any zone (any logical grouping, such as a department) and to append files to the message. The Telephone Message lets you send phone messages on the *InterMail* phone pad.

One excellent feature, the Network Assistance Request, allows you to report problems in detail to the network manager. It also has a programmable interface with other programs. To encourage the use of this feature, Internet has started a registered developer program for companies that would like to hook their applications into the Network Assistance Request. This would allow *InterMail* to automatically identify, record, and report the System and Finder versions and all the system and application errors that occur on the network. The function could be used effectively to manage not only the AppleTalk network, but all the Macs on it.

A Tutorial icon provides access to 25 pages of help screens that can be accessed on a user's Macintosh when requested. A Graphic Message option allows you to send both PICT and bit-mapped images. There's also an optional Network Reminder that pops up on the recipient's desktop at a specified date and time. Other features let you alter user names and passwords, create groups, print user lists, and access the Preferences window to customize the operation of the user's Message Center. You can also mark messages for return receipts, or print, delete, or forward them. But unlike *InBox*, *InterMail* cannot hold messages before routing them. To hold a message to work on later, you must send it to yourself or paste it into a desk accessory word processor—a bit of a hassle. Once a message is routed, however, it is automatically saved for the recipient and can also be backed up in ASCII format.

InBox or InterMail?

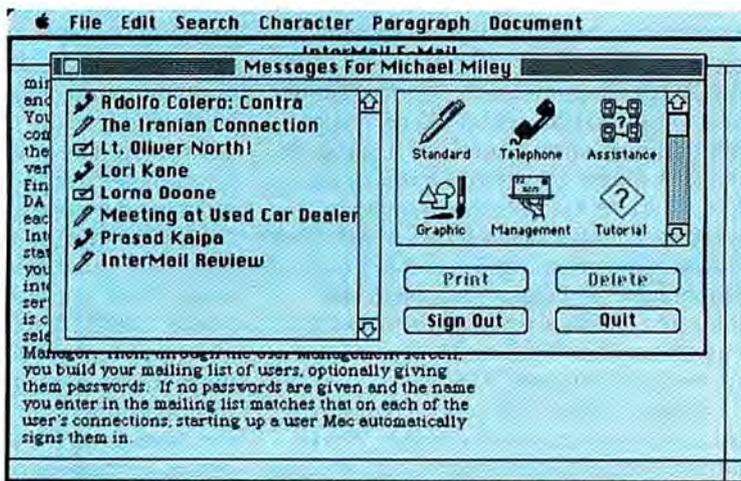
Since *InBox* and *InterMail* are both excellent products, which should you buy? There's no simple answer at this point. Although *InterMail* is easier to set up and initially less expensive, if you buy some of the options that are standard with *InBox*, *InterMail's* price advantage disappears. And while *InterMail* does not require a dedicated Mac, you can't route messages when the server is turned off. Even so, it has true background-serving capability, and it can coexist with software servers like *AppleShare*, *TOPS*, *MacServe*, and *HyperNet*. By contrast, the *InBox* version we tested has heavy copy-protection schemes (which some companies may like for security reasons); requires that you dedicate a Mac (a nondedicated version of the program has been announced); and is not compatible with *MacServe* and *AppleShare*, though it will be shortly.

(Keep in mind that if you run the *AppleShare* file server, which itself requires a dedicated Mac, you could install *InterMail* or the *AppleShare*-compatible version of *InBox* on the server. On a large network, where performance is crucial, the need to dedicate a Mac as a host file- and mail-server is not an insurmountable drawback and, in fact, could speed up performance. For a smaller network, running a background program like *InterMail* on a user's Mac makes more sense.)

Like *InBox*, *InterMail* version 1.5 will have a network bulletin board. Unlike *InBox*, *InterMail* does not have a data-compression option to recover unused disk space: *InterMail* claims enough contiguous tracks to cover its highest usage and then reserves that space for its exclusive use.

Messages for Michael Miley

In this view of a user's Message Center, incoming messages (on the left) include checked Receipts indicating that outgoing messages were read. The icons on the right represent various modules. Not shown is the optional Network Reminder.



Send Message

This is the Standard Message form. The checked names will receive the message once the Send button is clicked. The File... button permits the sender to append file enclosures to the message.

And a separate consideration is that 512K users who work with memory-intensive applications like *Excel* or *PageMaker* find that the amount of memory a desk accessory occupies becomes important. At any time, *InterMail* occupies no more than 30K, while *InBox* requires about 90K.

Both programs write messages to disk immediately upon sending (you can back them up as text files), and both allow for graphic messages (only as appended files in *InBox*, but both as appended files and within memos in *InterMail*). As of this writing, neither product lets you append multiple files to your messages or route messages to other message centers; nor do these products give you remote dial-up access via modem—although both companies claim such options are on the agenda.

Some significant new features planned for versions 1.5 and 2.0 of *InterMail* include server-to-server automatic communications with background modem serving capabilities and multiuser telex capability.

A future version, which may be available by the time you read this, is supposed to allow optional personal-server software to hold your mail until the main network server is available.

Additions like these would make *InterMail* a full-featured desktop communications package. Assuming that Internet keeps all its promises (and they are considerable), *InterMail* could be a gateway to a world of communications encompassing much more than just E-mail. Even now, however, it looks to us like *InterMail* is the winner. But you can be sure the competition will intensify.—Prasad Kaipa and Michael Miley

See *Where to Buy* for product details.

Taking Control

LabVIEW 1.0

Laboratory instrument control. Pros: Works with IEEE-488 and RS-232 equipment; powerful and flexible programming; data analysis, database, and report features. **Cons:** Manual needs improvement; no site licensing. **List price:** \$1995; hardware connection for IEEE-488 \$695. **Requires:** Mac Plus or 512K Mac with two 800K drives. **Copy protection:** None.



Scientists and engineers are becoming increasingly aware of the power of the Macintosh and of its potential as a laboratory control instrument. But until now few have possessed the time or programming skills to tap the Mac's graphics power for custom applications. National Instruments' *LabVIEW*, a sophisticated yet easy-to-use programming environment, is changing that.

Before *LabVIEW*, the only instrument control option that took advantage of the Mac's unique capabilities was the Reed College *Bencbtop Instrument*. This instrument must be programmed with Rascal, a Pascal and C hybrid optimized for the Macintosh. Another alternative to *LabVIEW* is *MacAdios*, which also requires traditional programming for operation. *LabVIEW's* unique G (Graphic) language enables researchers to

use icons and menus to create on-screen, virtual instruments. These virtual instruments can be used to control real instruments or to perform sophisticated data analysis.

You can name any *LabVIEW* instrument you create, assign an icon to it, and save it in a library for later use. These instruments can then be used separately, or as subelements in more complex instruments. Since *LabVIEW* makes it easy to change a module or add new pieces of equipment, you no longer need to spend extensive programming time developing a system that serves only one purpose. To further simplify things, *LabVIEW* includes a collection of "canned" virtual instruments for many common pieces of IEEE-488 equipment (see "Virtual Instrument Library").

LabVIEW can control almost any IEEE-488- or RS-232-based equipment, which you connect to the Macintosh either directly or through optional hardware. A companion product, MacBus, even allows you to add peripheral cards designed for IBM computers.

Down in the Lab

The first step in creating a *LabVIEW* virtual instrument is to design the visual interface, or front panel. You start by selecting the type of input or output subelements you need—string, numeric, binary, or graph—from the control menu. Through a series of pop-up menus, you then define the parameters that control each subelement. As you define the input and output controls, the front panel display changes to reflect your choices; knobs, buttons, switches, and various types of digital and analog readouts appear, all with the correct calibrations and formats.

The logic underlying the front panel controls is displayed in *LabVIEW*'s block-diagram window. When you add a switch or meter to the front panel, an icon representation also appears on the block-diagram panel. Programming involves wiring these inputs and outputs to the built-in logical, mathematical, and scientific functions of *LabVIEW* on the block diagram. The program's different wiring styles indicate the type of data being passed between subelements. For example, a thick solid line indicates an array of numbers; a thin dotted line, a Boolean value. If you make an error in wiring, the newly formed wire blinks and a Get Info menu item suggests a possible solution.

Virtual Instrument Library

Instrument	Description
Wavetek 75	arbitrary waveform generator
Fluke 5101B	calibrator
Tek PS5010	DC triple power supply
Fluke 8502A	digital multimeter
Fluke 8520A	digital multimeter
Fluke 8840A	digital multimeter
Fluke 8842A	digital multimeter
HP 3457A	digital multimeter
HP 3478A	digital multimeter
Prema 5000	digital multimeter
Tek DM5010	digital multimeter
HP 54100A	1-GHz digitizing oscilloscope
Tek 2430	150-MHz digitizing oscilloscope
Tek AA5001	distortion analyzer
Tek FG5010	20-MHz function generator
HP 3314A	function/waveform generator
Tek SI5010	multichannel scanner
PF 6201	precision filters
Tek SG5010	programmable oscillator
HP 8116A	pulse/function generator
HP 8566B	spectrum analyzer
HP 3456A	systems digital voltmeter
HP 6624A	system power supply
EG&G 5208	two-phase lock-in analyzer
HP 5316A	universal counter
Tek DC5009	universal counter/timer
Keithley 228	voltage/current source
Keithley 230	voltage source
Tek 7612D	waveform digitizer
Tek 7D20	waveform digitizer

Heating Up

A simple application for *LabVIEW* would be controlling the heating rate of a laboratory furnace. Suppose you want the temperature of the furnace to rise at a constant rate and then stop at a set temperature. A *LabVIEW* program could determine what temperature the furnace should be at any given time and could record and output the signal to control the heating elements. A simple algorithm for this operation would be: 1) Input maximum temperature. 2) Input heating rate. 3) Set clock to zero. 4) Start timing. 5) Calculate correct temperature. 6) Display calculated temperature. 7) Check whether the maximum temperature has been reached; if no, go to step 5; if yes, continue. 8) Stop.

Figure 1 shows the control panel for a simulated temperature controller. Two inputs are located on the right: a digital input for heating rate and a digital input with an analog dial for setting the maximum tem-

perature. The on-screen strip-chart recorder at left shows output in real time.

Figure 2 shows the layout board of one portion of the simulated temperature controller. The instruments required to implement the algorithm include the inputs, two built-in clocks, a scaling factor, the output strip-chart recorder, and an iterative loop (shaded border). The clocks provide the value of the Macintosh system clock (in 60ths of a second), so to start counting from zero, the initial value of the clock located outside of the iterative loop is subtracted from the value of the clock inside the loop. Each iteration of the loop updates the clock inside the loop but not the clock outside the loop. The resulting value is multiplied by a scaling factor (Rate), which is normalized to seconds by dividing by 60. A "less-than-or-equal-to" comparison is then made with "Max Temp," the maximum set value, and iteration continues until this maximum is reached. If this virtual instrument were to control a real temperature controller via the IEEE-488 bus, a write statement to the bus would be added to the output in parallel with the recorder.

We tested *LabVIEW*'s interface capabilities by connecting a Mac to a National Instruments GPIB-MAC interface, which was in turn connected to a Tektronix MI5010 Programmable Multifunction Interface, equipped with the M41A3 Thermocouple Amplifier Module. Reading and writing commands to and from the module was straightforward, and we were able to customize commands for receiving the temperature data.

Final Views

LabVIEW's capabilities are truly impressive. The package smoothly implements the parallel processing and multitasking concepts inherent in block diagrams. *LabVIEW* does not require programming experience, but it does assume a knowledge of the laboratory task to be performed. The environment includes a full complement of programming tools for reducing development time, including facilities for single-step execution, free-run execution, error detection and handling, range checking, and execution breakpoints. *LabVIEW* lets you open multiple instruments and panels and enables you to move freely among them. You can debug your instruments in real time by adjusting the controls on the front panel while the virtual instrument operates. And *LabVIEW*

is one of the few Macintosh programs that allows you to integrate software written in other languages into its own language in a manner similar to subroutine incorporation in a conventional language.

The manual for *LabVIEW* includes a tutorial volume and a volume for functions. Both sections are helpful, although the functions section could explain the use of some of the functions more thoroughly. If you want more training, National Instruments offers one- and two-day seminars on the inner workings of the program.

In addition to being a superb program for equipment control in university and engineering environments, *LabVIEW*'s ability to function without being attached to real pieces of equipment makes it well-suited for service as a classroom aid. Built-in functions for vector and matrix manipulation, FFT, and spectral analysis make *LabVIEW* an ideal teaching aid for physics, math, and engineering classes. For instance, a teacher could use the program's

built-in function generators and signal-processing capabilities to teach a lesson on Fourier analysis of complex waveforms.

LabVIEW excels at providing a powerful, user-friendly environment for controlling laboratory instruments, and it does so in a way that takes full advantage of the flexibility and graphics power of the Macintosh user interface. *LabVIEW* pushes the Macintosh squarely into the field of instrument control—a field which has been dominated by other computer manufacturers. National Instruments is developing a variety of plug-in boards for the Macintosh II (see "Filling the Slots," April 1987), and with the new machine's 68020 and 68881 processing speed, *LabVIEW* will be a formidable contender in any laboratory. It is a pleasure to recommend such a powerful, easy-to-use, and innovative application.

—Edwin Haskell and Prasad Kaipa

See *Where to Buy* for product details.

A Very Important Program

V.I.P.

A visual interactive programming language. **Pros:** Develops good, structured programming habits; includes strong graphics and user-interface development facilities; run-time module and V.I.P.-to-C code translator available. **Cons:** No literature available except manual. **List price:** Version 2.0 \$125; language-translation modules \$89 each. **Requires:** 512K. **Copy protection:** None.



So you've fooled around with BASIC a fair amount, and perhaps have written a few one-page Pascal programs. You have some interesting ideas that might make good programs, for your own use or (who knows?) even for sale. But you don't really know how to bring your programming skills up to a professional level, and you're not optimistic about your ability to write a decent Mac interface.

Consider getting a copy of *V.I.P.*, a visual programming language from Mainstay. This package allows you to develop a program as a series of choices from a menu that represents the available actions by icons. This convention takes some getting used to, but it has several advantages—such as preventing bugs caused by typos. Also, *V.I.P.* helps you develop good habits; for example, it forces you to declare and type in all variables. And the package contains routines that make it easy to draw and move graphic objects within a program. It also includes a good graphics tutorial.

Programming Tools

Despite its exotic-looking icon interface, *V.I.P.* is a conventional, modern, structured language. Its ultimate output is an editable text file in a language that looks much like C.

The palettes at the left of the screen (see "Icon Programming") show the program elements available with *V.I.P.* The objects in the top box are byte, integer, real, point, rectangle, and constant; these objects can be manipulated by procedures. The next box contains icons for logic forms: routine call, "structure view," if-then-else, switch, while-do, and for-next.

Figure 1
This simple example of a LabVIEW front panel enables you to set the maximum temperature and heating rate for a furnace. This virtual device works equally well as a simulation or as an actual furnace controller.

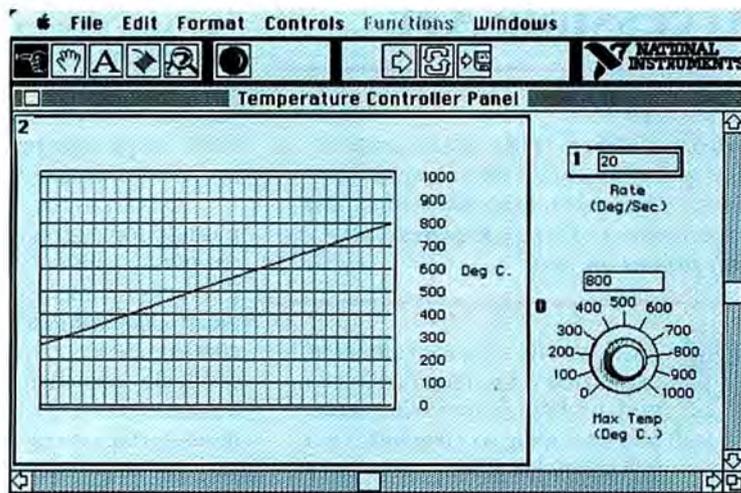
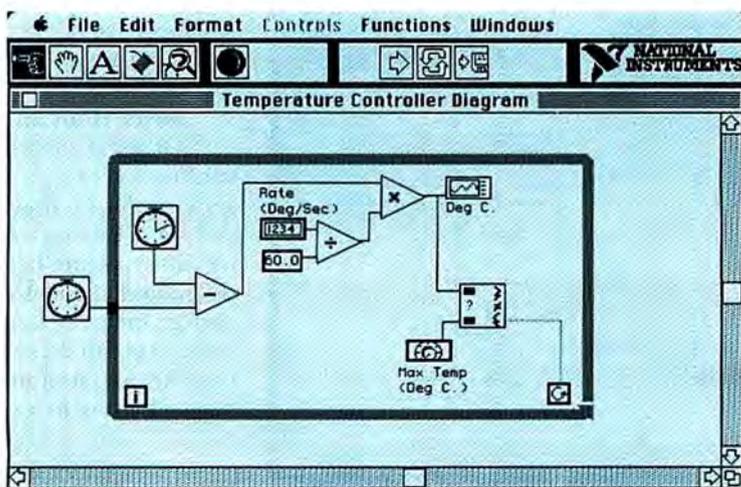


Figure 2
While block diagramming is an important part of any programming project, with LabVIEW the diagram is the program. This screen shows the furnace controller pictured in Figure 1.



The icons in the bottom box call up menus that offer 170 predefined procedures. This large collection of procedures is *V.I.P.*'s real strength.

The diagram in the main window of "Icon Programming" gives you an idea of how *V.I.P.* differs from a standard text language. To produce this for-next structure, you simply select the for-next icon from the logic forms palette. The expanded structure appears in the main window and prompts you for variables such as the start value, the end value, the increment, and the loop action. If you've never programmed at all, you'll be lost; if you know a little bit, however, you'll find this system convenient and error-proof.

What makes *V.I.P.* valuable is that it can take programmers from the print-your-name-20-times BASIC programming level straight to creating programs with pull-down menus, moving graphics, and a slick, professional feel. Menu development; music; windowing and screen design; and in-program manipulation of text styles, graphics, and printing are all part of the procedures toolbox.

Who's a V.I.P.?

So this program is good for intermediate beginners, but is it suitable for professional developers? Despite the relative inconvenience of assembling a long program by the icon-choice method, the answer is yes, for several reasons: First, although *V.I.P.* is an interpreted language and runs programs about half as fast as the best compilers, *V.I.P.* programs for which speed is critical can be automatically translated and recompiled in *LightspeedC*. Second, Mainstay includes a run-time module, so *V.I.P.* programs can be sold directly in interpreted form with no royalty charge from

Mainstay. The third factor is the built-in error avoidance implicit in icon choice—you can't leave out delimiters or make endless loops or other egregious blunders. This idiot-proofing significantly cuts the time it takes to develop a ready-to-ship program.

By allowing easy access to Mac Toolbox features, *V.I.P.* frees the programmer from mastering *Inside Macintosh* and worrying about low-level system chores.

Mainstay itself plans to use *V.I.P.* for commercial software development—an endorsement that's admittedly biased but does come from people who have ample basis for comparing programming systems.

While hard-core Mac assembly programmers who can recite patches of the 128K ROM in hex are unlikely to switch languages overnight, *V.I.P.* just might be the long-awaited programming system for the rest of us.—*Charles Seiter*

See *Where to Buy* for product details.

Accessible Art

Graphidex 1.0

Graphics indexer. *Pros:* Automatically indexes labeled documents; allows users to edit graphics. *Cons:* Poorly organized manual. **List price:** Version 1.1 \$124.95. **Requires:** 512K. **Copy protection:** None.



If you haven't yet gotten around to organizing your clip-art collection, perhaps Brainpower's *Graphidex* will spur you into doing so. *Graphidex* is a unique application that allows you to organize and retrieve graphics created with *Mac-*

Paint or *MacDraw*. The main program enables you to categorize your graphics and create an index of documents and the individual pictures they contain. A *Graphidex* desk accessory lets you view the index from within an application and copy selected illustrations into a document or into the Scrapbook. If you wish, you can use a number of tools to edit a picture before pasting it into the document.

Graphidex creates an organizational hierarchy: an index denotes a major category; in the index are a number of documents; the documents in turn contain numerous pictures. In theory, an index contains 500 documents, each of which contains 500 pictures. For instance, the index Animals might contain, among others, the document Insects, which holds the pictures Butterfly, Grasshopper, and so on. With the *Graphidex* desk accessory, you select an index, choose a document within the index, and view a list of the pictures in the document. If you can't immediately find the picture you're looking for in the currently displayed list, the program's Find function can locate a specific name.

Unlike Symmetry's *PictureBase*, another graphics organizer, *Graphidex* doesn't store the pictures themselves. Instead, the program stores pointers to pictures' locations; the pictures must be available on disk in order for *Graphidex* to open them.

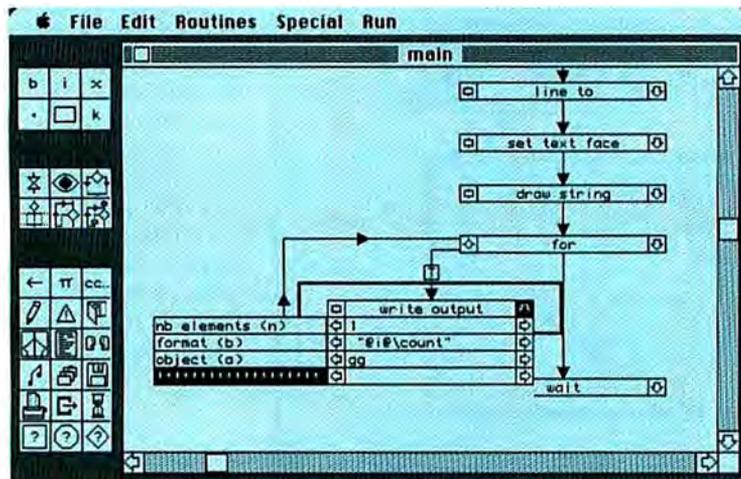
As with any organizational task, you must do some groundwork. In the case of *Graphidex*, this entails labeling each picture in every document to be indexed. For example, if a *MacPaint* document entitled Borders contains 20 decorative borders, you might individually label them Floral, Deco, Pumpkins, and so on. (You can also cross-reference items, giving one picture several names in case you can't remember the original label when looking for it several months later.) Names must be typed in 9-point Monaco; *Graphidex* employs a bit-map matching scheme to "read" the names on each document until a selected name is found.

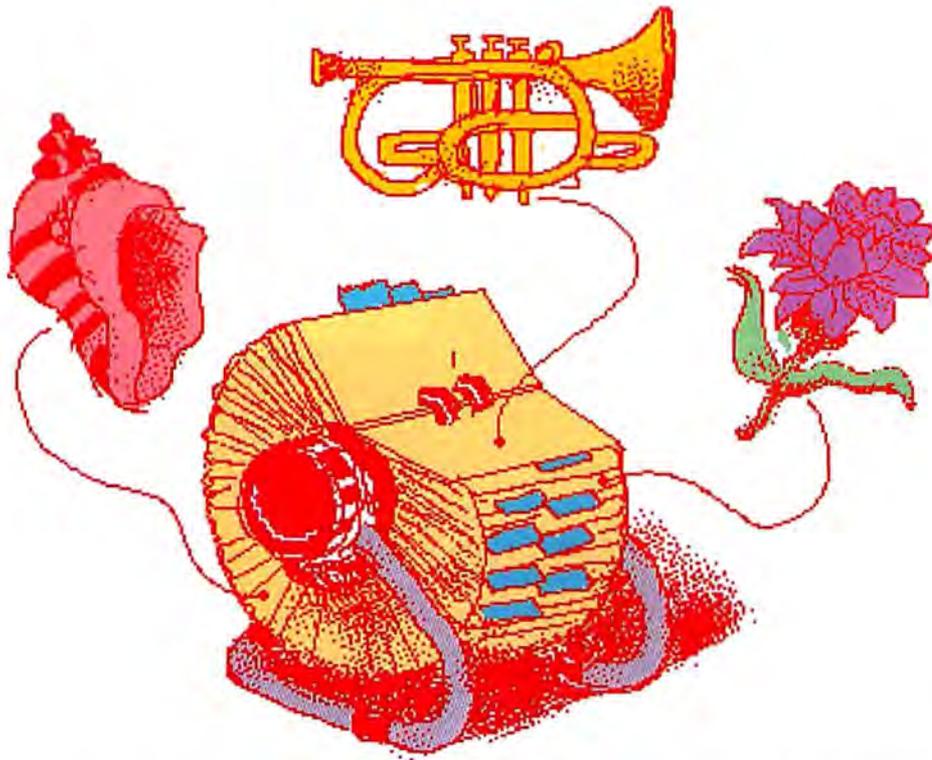
More than an Indexer

Other Macintosh art-accessing tools confine you to copying and pasting graphics. *Graphidex*, however, provides a limited set of editing tools that allows you to modify a picture before pasting it into a document. If you want to personalize a clip-art image before pasting it into a newsletter, you can do so from within your page-layout program. A Preview option displays a picture in a small window. Various

Icon Programming

V.I.P.'s programming icons "open up" to prompt you for variable names and information.





tools and menu options let you resize a drawing, rotate it by degrees, flip it horizontally or vertically, invert black and white, add a border, or edit the drawing pixel-by-pixel (see "Graphic Detail"). Changes made from within *Graphidex* don't affect the original drawing, only the copy you're working on.

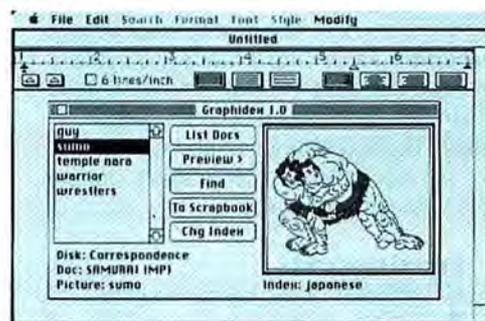
Graphidex provides an additional technique for quickly accessing graphics. You place pictures in a font and then produce a picture by typing a key. This feature could come in handy for those who use various special symbols, from mathematical characters to company logos. For indexing purposes, you assign a name to each picture in the font. The program then associates the picture with the key that corresponds to the first letter of the picture's name: *L* for Logo, for instance. Font pictures can be up to 127 pixels high by 254 pixels wide (127 points). Although some programs' font menus support such large sizes, an entire set of 127-point graphics would use quite a bit of memory. In addition, fonts larger than 48 points may cause system errors in Macs with the older, 64K ROM.

C Is for Conclusions

On the whole, *Graphidex* is an excellent tool for organizing a collection of Macintosh artwork, particularly for an individual or business with dozens of

commercial clip-art disks. Although the program works on a 512K Mac with an external drive, indexes that span dozens of documents require a hard disk. The desk accessory itself is a hefty 47K, and to use the program the index files and graphics must be available.

As mentioned earlier, you have to do a fair amount of preparation before the program can index a series of documents. You must label individual pictures and often must move them around on the page. In



Graphic Detail

Graphidex, a desk accessory that displays an alphabetical listing of graphics files, allows you to edit pictures before pasting them into an application.

MacPaint, if you don't separate the pictures with a "free space" of a given number of pixels, the program will read two or more neighboring pictures as one. Although you can set the amount of free space required, some picture shuffling will probably be necessary. In *MacDraw*, you must group separate objects in a picture before *Graphidex* can read them as a single picture.

These are minor complaints. In my opinion, the program's greatest flaw is its documentation. For example, the manual erroneously instructs you to press the Shift key to select nonadjacent items in a list; instead, the \mathbb{N} key should be used. The manual could have been better organized as well. Although a step-by-step tutorial explains how to open and paste a picture using the desk accessory, other procedures such as creating a picture font are covered less thoroughly. A six-page addendum adds to the disarray.

Despite these slight inconveniences, I think many artists, writers, and desktop publishers will find *Graphidex* a welcome addition to their software libraries. The ability to edit illustrations before pasting them and to create pictorial fonts makes *Graphidex* an excellent indexing system for graphics. —*Erfert Nielson*

See *Where to Buy* for product details.

A Case for a Perspective Base

Gridmaker 1.0

Perspective grid construction set. **Pros:** Performs well within program constraints; creates perspective grids quickly and easily. **Cons:** Limited usefulness; dependent on two other programs for effective use. **List price:** \$49. **Requires:** 128K. **Copy protection:** None.



Folkstone Design's *Gridmaker* is a modest program that does exactly what its name suggests. It makes grids. Specifically, three-dimensional perspective grids from user-defined viewpoints. With *Gridmaker*, professional designers can produce perspective drawings either in *MacDraw* or on paper, using a printed grid as a base for the finished drawing.

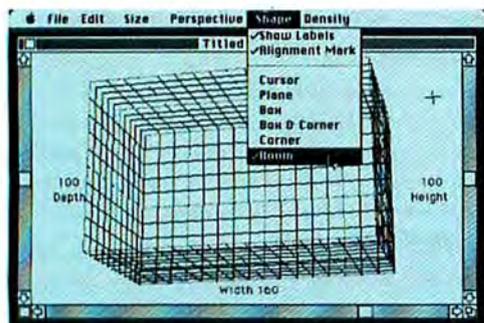
Creating Grids

Constructing a grid is easy. You simply select a shape and then manipulate the grid until you achieve the desired perspective. *Gridmaker's* basic shapes represent various combinations of orthogonal planes (planes that are always at right angles to each other). You can select the grid as a square box, an inside corner (the floor and two back walls of a room), a six-sided transparent cube, or five sides of a box with the front face missing, representing an interior view of a room (see "A View with a Room").

The program also lets you select a two-dimensional plane, but this is of little use in creating perspective views. In an attempt to help you quickly try out different sizes and rotations, a 3-D cursor can display the three axes of a chosen grid. This feature is superfluous, however, since the grids themselves can be manipulated quickly and easily enough.

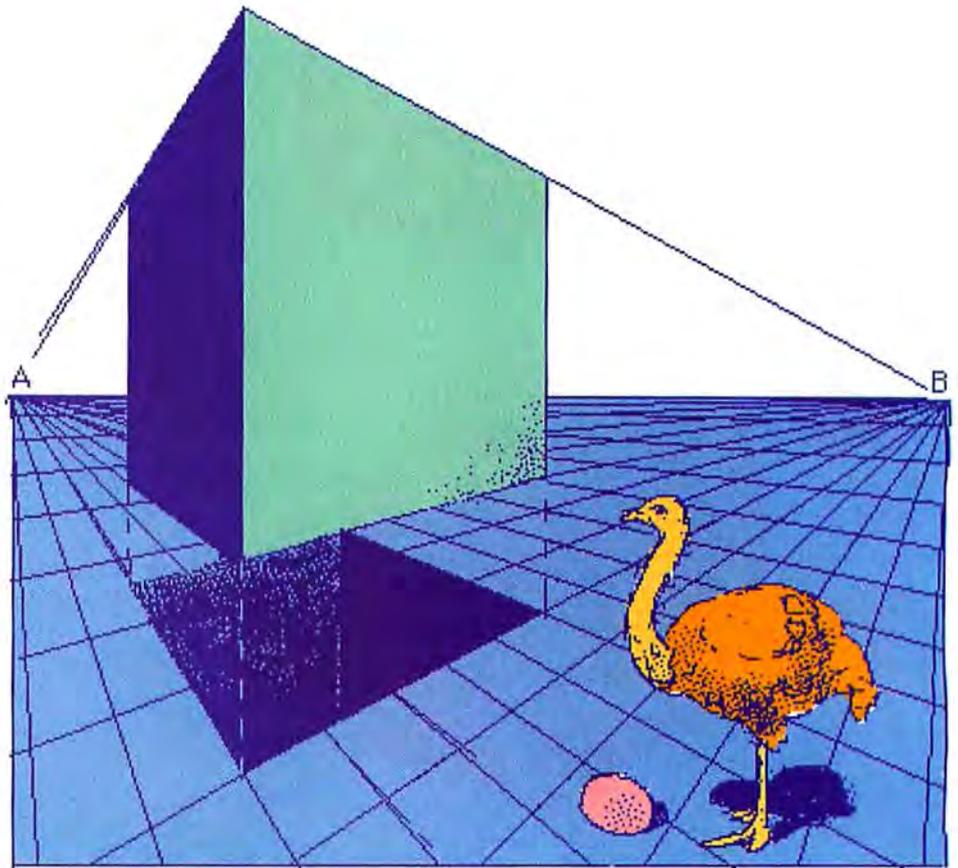
Gridmaker lets you enlarge, rotate, stretch, and shift shapes relative to your own viewpoint. You can distort the grid using telephoto and wide-angle viewpoints for special effects, and specify the density of the lines on the grid from coarse to fine.

All tools used to manipulate the grid are controlled by one of three scroll bars. Width, for example, is controlled by the scroll bar along the bottom of the screen. As the elevator is moved to the right, the grid stretches and increases in width. The default value for the height, width, and depth of any shape is 100, and the scroll bar permits a range of 0 to 200. The disad-



A View with a Room

After selecting the grid from one of the basic shapes offered, you can customize it using the other menus.



vantage of the scroll bar system is that all manipulations of the grid are relative to its own abstract default settings on the screen, rather than real dimensions in feet and inches. It is not possible to specify a particular size, scale, or viewpoint. These settings must be achieved on a trial-and-error basis, by scrolling until the grid looks right.

To use *Gridmaker* effectively, you need both *MacDraw* and *Switcher*. *Gridmaker* does not include a zoom command, so to view a whole document that exceeds *Gridmaker's* working window, you must move the document to *MacDraw*. *Switcher* will simplify and speed up document transfer, but it is tedious to go back and forth between the two programs to make the necessary adjustments.

Printing Grids

Gridmaker does not have a print option. To further manipulate, embellish, or print grid documents, you must paste them, via the Clipboard, into *MacDraw*. The largest grid you can paste into *MacDraw*, however, is 28 by 28 inches, which spans 12 sheets of 8½-by-11-inch paper. If the grid exceeds 28 by 28 inches, it will be cut off when it's pasted into *MacDraw*. Such a grid can be enlarged from within *MacDraw*. But when you stretch the grid,

you can easily lose its original proportions. *Gridmaker* would be better if Folkstone Design had restricted the grid size so that the entire grid would be transferred.

Overextending Itself

The *Gridmaker* manual includes a section on how to transfer grids into *MacDraw* to use them as templates for creating perspective drawings as *MacDraw* documents—a laborious process that doesn't lend itself to the creation of complicated perspective drawings. Given the current proliferation of 3-D drafting packages for the Macintosh, it's difficult to understand why anyone would want to combine *Gridmaker* and *MacDraw* for such a purpose.

Rather, the value of *Gridmaker* is in its simplicity and the relative ease with which perspective grids can be customized, printed, and used as a base for a perspective sketch, or incorporated as grids into other types of graphic material.

—Dennis Dornan

See *Where to Buy* for product details.

ance sheet will be incorrect. In fact, *Accountant, Inc.* may close a month with an unbalanced balance sheet—a gross accounting error. To complicate matters, the documentation doesn't clearly explain the proper period-end closing procedures.

Finally, the documentation is poorly organized. The incomplete reference section is about 70 pages long, but the tutorial that shows how to set up three types of companies takes about 400 pages. Much of that material is redundant and belongs in the reference section. The documentation also suffers from some questionable and obscure advice, both about accounting and about using the program.

The Bottom Line

I still like *Accountant, Inc.*'s concept—reasonably priced, fully integrated accounting with four key modules. But until SoftSync improves the program's error handling, simplifies operating procedures, and reorganizes and clarifies the documentation, I can't really recommend this product. —*Steve Mann*

See *Where to Buy* for product details.

It's Only Logical

LogicWorks 1.02

Digital logic design and timing program.

Pros: Easy to use and fully interactive. **Cons:** Slow response time for large designs (over 100-200 symbols). Not appropriate in a production/engineering setting due to limited number of devices, symbols, and options. **List price:** \$159.95; symbols library \$29.95; utility package \$29.95. **Requires:** 512K; HFS (two disk drives recommended). **Copy protection:** None.



If you design digital logic circuits or want to learn about digital logic, *LogicWorks*, by Capilano Computing Systems, can save you a lot of time, effort, and frustration. The program provides a software toolbox for designing digital logic circuits and for tinkering interactively with the symbols and connections to see what happens as you make changes.

LogicWorks is most appropriate as a training program, but it could also be used in a small engineering company for checking handwritten paperwork on PROMs and PLA (or PAL) devices. The program lets you watch the timing pattern at a half-dozen or more test points while you're changing logic

symbols and signal connections. In addition, the optional symbols library works for simple schematic entry, and the utilities package lets you create netlists in a variety of text formats and enables you to print out a bill of materials for your design.

The Works

LogicWorks provides a variety of common logic devices, including NOT, AND, OR, NAND, NOR, and XOR gates; D and JK flip-flops; counter; shift register; open collector; three-state devices; multiplexer; decoder; adder; and clock generator; as well as several input/output devices. You position symbols by dragging and clicking with the mouse. Although the program lacks some of the more exotic symbols, the toolbox has everything a beginner needs to learn about laying out a circuit.

To create connections between signal lines and logical pins, click on the first signal line or pin and drag the new signal line to the connecting position. Signal lines can be crossed, and the program inserts connecting dots automatically if you start or stop a new line on an existing signal. A special Zap function deletes signal lines or any device on the screen. The *LogicWorks* circuit is always hot. You can tinker with gates or signal lines without worrying about power spikes—and see the results.

A software logic probe displays the following conditions: high impedance, don't know, conflict, and high or low logic levels. A software switch is also available that toggles from 1 to 0. To change the setting, position the pointer over the switch and click. One advantage of the software logic probe is that you can connect dozens of probes to the circuit and monitor them simultaneously. This is much less expensive than spending \$50 to \$100 for each hardware probe.

The Name command in the Edit menu lets you identify signals. The program displays any named signal (except 0 or 1) in the timing diagram. All devices with inputs and outputs have a default delay of 1 unit. The minimum delay is 1 and the maximum is 127. To change delays, click one of the two buttons on the dialog box; the program displays the results in the timing diagram at the bottom of the screen.

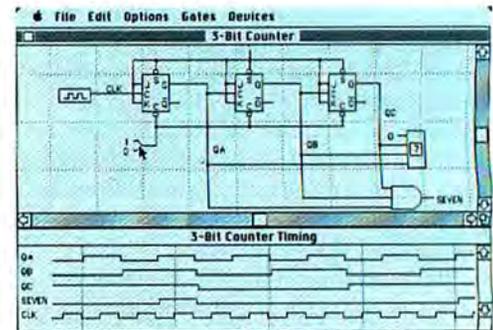
The New PROM or PLA item on the Options menu lets you define the internal logic for programmable logic devices using either a PROM (truth-table) or PLA (product-term) format. The advantages of a soft-

ware approach are twofold: you don't need to design a network of gates on paper to produce the desired outputs, and you can verify data before programming the PROM or PLA chips. A separate chapter of the User's Guide covers programmable logic in detail and includes several examples.

The Device Librarian is a separate application with which you create new device types, including macros that you build up from combinations of simple gates and existing devices. You create new symbols in *MacPaint*, with the special *LogicWorks* five-dot grid file. This application is somewhat cumbersome, but it ensures that the pins align correctly.

Logical Conclusions

The *LogicWorks* User's Guide is adequate for the software. It describes each of the symbols on the Devices menu with a combination of line drawings, truth tables,



The 3-Bit Counter

The upper part of the screen shows the test circuit; the lower screen shows timing at various named signal lines. The arrow points to a software switch that resets the counters.

and timing diagrams. There are several examples in the PROM and PLA chapter, but the general logic chapters would benefit from more examples and a couple of exercises for beginners. To balance the shortage of exercises, the program provides a number of demonstration circuits, and it could easily be argued that a working circuit on the screen is worth more than a picture in the manual.

If you need a program for learning the principles of digital logic or a toolbox that's easier to use than a pencil and paper for design testing, *LogicWorks* is a worthwhile investment. The program is fully interactive, and you see the results of changes as quickly as you make them. —*Ken D. Schmeupe*

See *Where to Buy* for product details.

Grand Prix Racing

Ferrari Grand Prix

Race simulation game. *Pros:* Exciting, realistic racing; excellent manual. *Cons:* Hours of practice necessary to become competitive. **List price:** \$59.95. **Requires:** 512K. **Copy protection:** Not copyable.



You peer out from the cockpit of your Ferrari. The engine is purring. You shift into first gear and ease onto the course. *Ferrari Grand Prix* by Bullseye Software puts you at the wheel of a grand prix racer in a simulation of Formula One racing.

The car reaches speeds of over 200 miles per hour, but you'll want to get the feel of your Ferrari by driving conservatively in the Practice Mode before attempting competitive racing. The Ferrari comes equipped with a five-speed gear box that corresponds to the numbers 1 through 5 on the keyboard. As you shift, the Ferrari accelerates with a sound that creates an undeniable illusion of thrust.

Once under way, you realize that fixing your eyes on the steering wheel or the front tires drastically inhibits your vision, and you invariably go off the road. The correct method for driving is not unlike real life—your eyes should focus on the farthest point ahead. A cursor bar positioned on the horizon just above the road shows where you should steer.

By staying in a low gear you can comfortably acquaint yourself not only with the mechanics of driving—steering and shifting with the mouse, braking with the space bar—but also with gauges, such as the tachometer, that you must take in at a glance once you race in earnest. Proficiency in negotiating curves, passing, and getting in and out of pit stops are skills developed through patience in the face of repeated and unavoidable traumas.

Your Worthy Opponents

For competition you're matched against two other drivers. They're good. But to create a more competitive race, you can program your opponents' capabilities. For instance, by restricting their cars to a low gear, you limit their speed. Likewise, you can prevent them from blazing too far ahead by programming the drivers to

downshift to first gear when you go off the track. Lap times, your competitors' speeds, and best elapsed time are constantly monitored and displayed on the screen.

A variety of tracks challenges your driving skills with sharp curves and tricky chicanes, and there is one course designed specifically for high speeds. Additionally, *Ferrari Grand Prix* provides a system for designing your own courses. Piece by piece you assemble curves of various degrees and straight pieces of track and see the course take shape before your eyes.

Factored into *Ferrari Grand Prix* are the essential elements of Formula One racing—a sense of ultra-high speed, challenging courses, and fierce competition. A well-designed manual provides clear, detailed instruction for the program's use. Learning to manage the power of the Ferrari comes only with experience. Maneuvering at high speeds requires a master's touch with the mouse, and the peculiarities of a given course must be committed to memory. The novice inevitably finds the landscape tumbling before his eyes as he goes into a high-speed roll. However, after a few hours of practice you can begin to harness the Ferrari's power and race competitively on the grand prix circuit. —Richard Miller

See *Where to Buy* for product details.

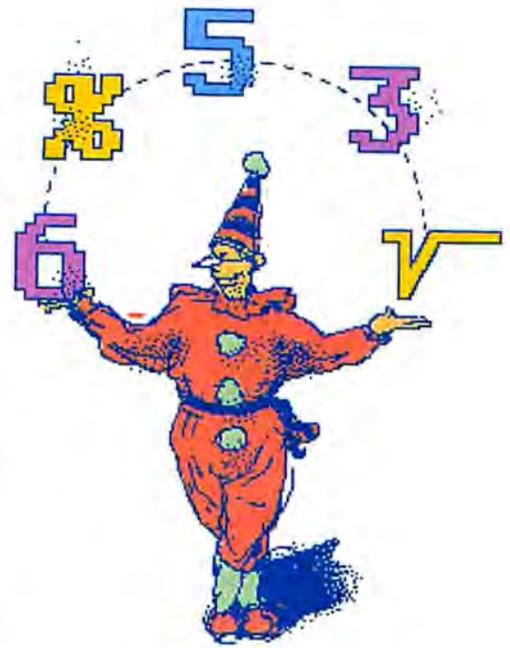
Symbolic Scratchpad

PowerMath 2.0

Symbolic mathematical manipulation program. *Pros:* Turns tedious computation into a straightforward and educational process. *Cons:* All but the simplest calculus functions must be user-defined; extremely slow function plotting. **List price:** \$100. **Requires:** 512K. **Copy protection:** None.



If you're looking for something more sophisticated than a simple number-crunching calculator, a mathematical manipulation program may be the answer. *PowerMath* from Industrial Computations is the first symbolic scratchpad for the Mac. It performs symbolic and numeric operations from simple algebra and mathematics to matrix operations and some calculus, using rational operations precise to as many as 600 digits.



Show Your Work!

PowerMath does make excellent use of the Mac's interface and bit-mapped graphics to present complex symbolic operations interactively and in a graphically appealing fashion. The program also allows you to display intermediate results.

PowerMath allows you to manipulate extremely large numeric values and symbolic equations. This is made possible by the program's ability to transform numbers from base 10 to base 10,000, storing them as open-ended strings of characters representing the digits instead of actual numbers. Given the 600-digit limit, you will run out of RAM before surpassing the program's ability to accept and process data.

PowerMath's capabilities include algebraic multiplication and division, miscellaneous functions, roots and powers, linear and nonlinear equations, differentiation of polynomials, indefinite integrals, general calculus (such as integral limits and Taylor series), user-defined calculus functions (such as chain rule and trigonometric functions), matrix algebra, and function plotting.

But in spite of its muscle, *PowerMath* lacks the extensive calculus functions and built-in programming languages of its mainframe cousin *MACSYMA* or the IBM PC's *muMath*. It can neither manipulate imaginary numbers nor automatically per-

form calculus operations more complex than polynomial expressions. You can customize the program to handle more complex calculus (all the principal trigonometric and substitution rules are present), but you must define the functions *PowerMath* cannot recognize. In the time it takes to lay down all the ground rules for a custom trigonometric function, you would probably be able to solve the equation manually.

With its well-integrated use of five windows, *PowerMath* helps you maintain order amid symbolic chaos. The Data Slate is used for defining and saving data sets, including matrices. You can type in data or import it through the Clipboard from another application. The Problem Slate is used to express and save problem statements; the Answer Slate displays the results of the program's manipulations (see "PowerMath at Work"); and the Example Functions window allows you to define custom functions. The Plot Slate, a subset of the Answer Slate, creates a two-dimensional plot of any specified function. All windows can be open simultaneously, and all window data can be saved or exported through the Clipboard or Scrapbook for use by other applications.

Another drawback is *PowerMath's* extremely slow function plotting. A moderately difficult operation with 150 factorials took about thirty seconds to solve but almost five minutes to plot. The manual suggests boosting *PowerMath's* speed by not displaying intermediate results or by relying on symbolic constants for as long as possible. (Symbolic constants, such as π for 3.14159..., can be used with any equation.)

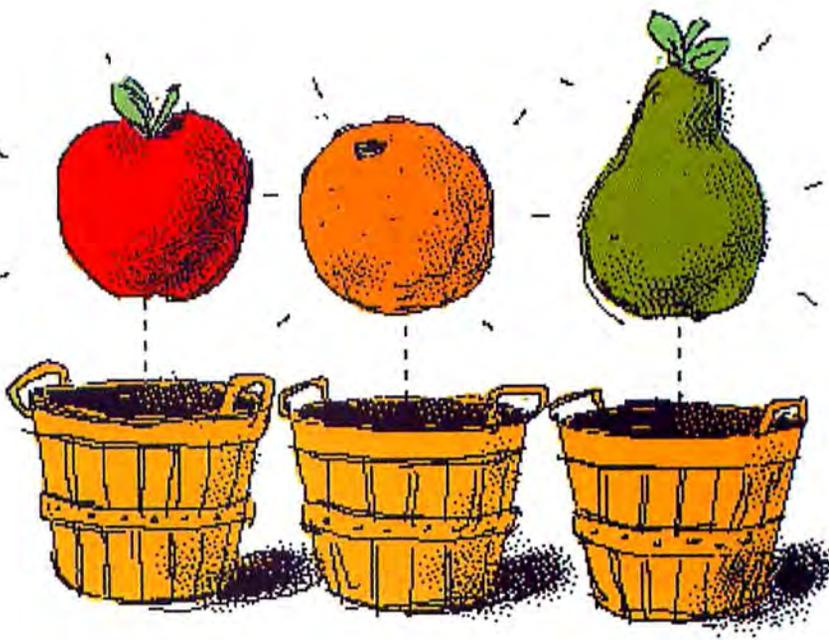
You'll find sample problems on disk that illustrate the range of *PowerMath's* ca-

capabilities. The documentation contains an interesting discussion of the program's operations and its implementation of artificial intelligence techniques.

A useful tool for anyone performing simple to moderately complicated symbolic operations, *PowerMath* helps you avoid transcription mistakes that could bring a mathematical operation to a standstill. The program's proofs and examples give students a better understanding of symbolic functions. *PowerMath* falls short for mathematicians, who can probably perform most of the functions in their sleep, but it brings symbolic computation to the Mac in a lively and educational manner.

—Terry A. Ward

See *Where to Buy* for product details.



Voila! Another Instant Outline

Voila 1.0

Outliner desk accessory. **Pros:** Export and import capability; converts documents to outline format. **Cons:** Uses up 90K; numbers sorted in computer fashion; headlines limited to 80 characters. **List price:** \$99.95. **Requires:** 512K. **Copy protection:** None.

Voila!

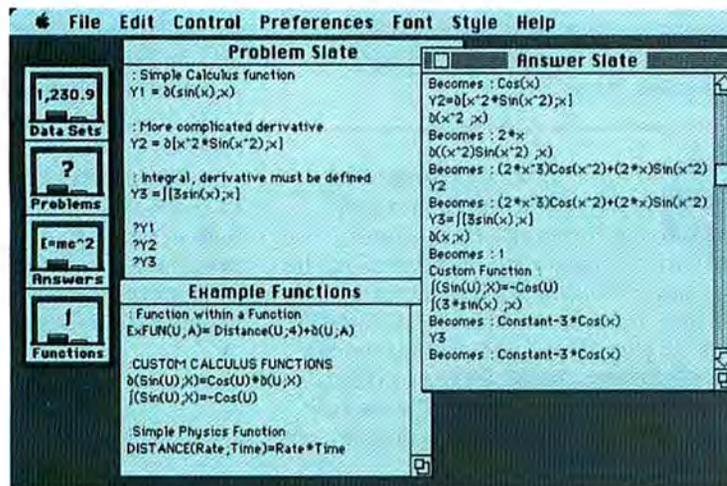
Chart makers, simple spreadsheets, mini word processors, and no-frills desk accessories have been around since the birth of the Mac. But with the arrival of the Mac Plus, increased memory, and low-cost hard disks, desk accessories gained more room to grow. Among the first of this more powerful breed was *Acta*, an outliner that weighed in at 52K. Now Target Software has released its challenger, *Voila*, an outliner that takes up 90K of disk space. But is bigger really better?

Expansive Thoughts

Once installed, *Voila* loads from the Apple menu, placing its menu on your current menu bar until you quit *Voila* or the

PowerMath at Work

The Problem Slate window contains a set of calculus problems involving trigonometric functions. The Example Functions window shows the custom calculus functions used in solving this problem. Finally, the Answer Slate shows the solution to the problem.



application. *Voila's* commands are listed in its menu, but unlike *Acta's*, they also appear as a row of icons across the top of the outline window. Below that row is a movable headline rectangle. When you open a window, the editing tool is automatically selected and you're ready to type or edit your headline.

Headlines are limited to 80 characters, horizontally scrollable in the headline rectangle. *Acta's* headlines can be up to 32K, but they wrap automatically, which gives you an optional first-line view. *Voila* uses Expander windows, and each headline can have one Expander, which holds up to 32K. Although you can't put graphics in the main outline, as you can with *Acta*, you can put them in Expanders (without text). Expanders have their own rulers; they accommodate centered and left- or right-justified text but don't allow indents or tabs. Finally, you can change type font, style, and size in Expanders, but only in one at a time—a tedious process if you have several Expanders.

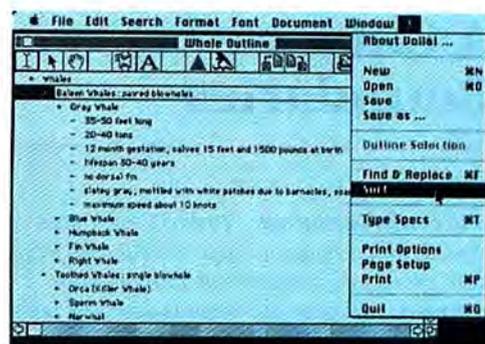
You create a new *Voila* headline simply by pressing Return, and except for the first one, it aligns at the same level as its predecessor. Mnemonic \mathbb{N} keys (as well as arrow combinations on the Plus) allow you to change headlines and subordinate them up, down, left, or right. Equivalent *Acta* commands are confined to movement right or left, and the Plus's arrow keys are limited to editing. You can drag headlines in both programs, but precise positioning is a bit more difficult in *Voila*. As in *ThinkTank*, *Voila* headlines mark the presence or absence of subordinates with plus or minus signs. A sign in outlined type indi-

cates a text Expander, and shadow type indicates a graphics one; however, it's difficult to distinguish the two.

Outlines with Style

In both *Voila* and *Acta*, you can alphabetically sort headlines nested one level below a selected headline, in ascending or descending order. Unlike *Acta*, though, *Voila* sorts by the first digit, so that sorted numbers must have the same number of digits. Both programs include search functions, but *Voila* lets you turn case sensitivity on or off and includes replace functions. The programs' formatting options are comparable. In both programs all text within a single headline must be the same font and style, but in *Voila* the font size must be the same for the whole outline. Unfortunately, new and moved headlines do not always follow previous formatting commands in either program, and a global font change often voids other style or size settings.

One of *Voila's* major advantages is its Print Options, which allow more than a dozen formats. You can designate margin sizes, page headers, numbers, and line spacing; whether or not to print Expanders and in what format; whether or not to create a table of contents; how many outline levels to print; which of four formats to use; and so on. But this advantage has a trade-off. While *Acta* offers fewer print options, its output is often easier to read than *Voila's*. Both outliners save files in their own formats or as text; *Acta* also saves them as *MacWrite* files. However, only *Voila* can convert a *MacWrite* or *Word* document into an outline: titles, section heads,



Instant Reorganization

Voila's Sort command alphabetizes the headlines immediately subordinate to the selected headline. Here, for example, all the baleen whales are about to be reorganized.

and the first sentences (or parts of them) are put into outline format, while the rest of the text is stored in Expanders.

And the Winner Is...

It's a close finish. Although *Voila* and *Acta* do not have the features of *MaxThink*, or *ThinkTank's* Slideshow option, both have enough power for most outlining needs, are easier to use than *MaxThink*, and have better format control than *ThinkTank*. More important, they're desk accessories, which means you can easily add an outline function to any application, especially a word processor.

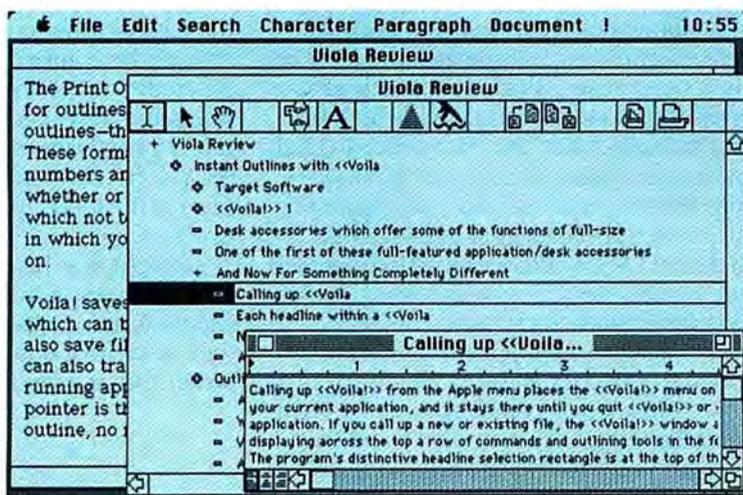
So which should you get? Aside from memory and disk considerations—*Voila* is 87 percent larger than *Acta*—you must consider their different outlining styles, and my personal preference is *Acta's*. There's also the bottom line: *Acta* costs \$59.95 and *Voila*, \$99.95. Finally, you may want to consider the aesthetics of the matter: how much glamour do you really want in a desk-accessory outliner?—Robert C. Eckhardt

See *Where to Buy* for product details.

For an overview of available outliners, including stand-alone products, see the *Annual Index* references to *Outline Processors* published in the January 1986 and 1987 issues of *Macworld*.

Outlining with Icons

At the top of the *Voila* window is a row of icons representing various commands and tools. The two at the far right call up the print options and print dialog boxes, and the two just to the left open and save *Voila* documents. The window at the bottom right is the Expander associated with the highlighted headline.



A Choice of Boundaries

MapMaker 1.1

Map construction set. **Pros:** Creates maps of any size and geographic area; accepts data from word processors, spreadsheets, and database programs; automatically displays data overlays; prints in color on ImageWriter II. **Cons:** Does not take advantage of LaserWriter's high resolution; slow screen updating; map patterns and symbols cannot be edited; poor manual. **List price:** Version 2.0 \$295. **Requires:** Version 1.1 512K; version 2.0 1MB. **Copy protection:** None.

MacAtlas 1.1

Clip-art style maps. **Pros:** Maps in both paint and draw format; special "filled" maps eliminate unsightly pattern/border interactions; helpful manual. **Cons:** Limited number of map sizes. **List price:** USA and World \$79 each; USA counties \$119; complete set \$199. **Requires:** 128K, paint or draw program. **Copy protection:** None.

EarthPlot 2.0

Draws the earth as viewed from space. **Pros:** Creates unique, 3-D globe, with or without latitude and longitude lines. **Cons:** Close-up views are of poor quality; maps can only be saved by means of screen snapshots; the program is not entirely bug-free. **List price:** Free (public domain). **Requires:** 512K. **Copy protection:** None.



Until recently, accurate disk-based maps were no easier to draw with the Macintosh than with pen and paper. But *MapMaker*, *MacAtlas*, and *EarthPlot* have changed all that. Each, however, offers quite a different solution, and the one you acquire will depend upon your cartographic needs and the size of your budget.

MapMaker: The BMW of Map Programs

Select Micro Systems' *MapMaker* is powerful enough to satisfy all but the most demanding requirements. You can create maps in *MapMaker*, or use maps designed



in other applications and imported as paint files. *MapMaker* displays demographic and other data, imported from another program or input directly, and creates a map legend automatically. Patterns (for areas) and symbols (for cities) used to differentiate data divisions are assigned by the program but can be changed to any of 35 patterns and eight colors. Map boundaries can also be printed in color.

Using *MapMaker* entails making the map itself and then entering and working with the data to be displayed on the map. It's easiest to have the program make the map for you, which it does with the help of boundary files. You can use boundary files singly or in combination (e.g., North and South America), or you can select subsets of the boundaries included in one or more files (e.g., the southern states from the file containing the 48 contiguous states). The basic *MapMaker* package includes files for the United States, divided by state boundaries; the 50 individual states, divided by county boundaries; and the world, divided by country (with the countries grouped into ten geographical areas); as well as 90 major metropolitan areas in the United States and 169 world capitals. Also included are data files for U.S. state income, population, and retail sales statistics; and U.S. county and world population statistics. Additional boundary and data files are available from another company, Strategic Locations Planning, including the United States by zip code, by telephone area code, by television marketing and metropolitan sta-

tistical areas, and by the 500 largest cities.

After you decide on size and page position, *MapMaker* will construct a map from boundary files. Maps of large geographic areas usually have more than adequate detail; close-ups of small geographic areas, however, tend to look like amateurish cardboard cutouts. A newly created map gets labels and a legend automatically, all of which can be moved and altered. Maps can be moved on the page or resized at any stage. But since the resizing process does not recalculate the map from the original boundary files, you get better results if you start over again with a larger map size before calculation begins.

With *MapMaker*, you can save a map as a paint file for use in another program or import paint files containing maps. Using the various Assign commands, you can inform *MapMaker* of the names of all fully enclosed, geographically important areas on an imported map, combine regions comprised of several enclosed areas, and indicate the locations and names of cities. Once the assigning process is complete, *MapMaker* treats an imported map in exactly the same way it does a map created from boundary files.

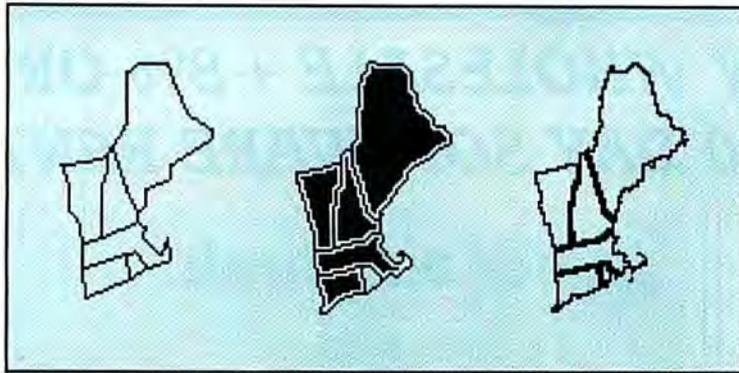
Similar to charting programs, *MapMaker* lets you display data relevant to defined areas by entering data into the program's data sets or by importing data from text files created with a word processor, spreadsheet, or database program. Although only one set may be displayed at a time, you can switch between as many as 30 sets, all of which can be retained with a single map document.

The program automatically divides each set's data into five equal divisions and assigns them a distinctive pattern. Once the data is displayed, however, you can change the number of divisions (from 1 to 35), redefine the data set's maximum and minimum, reset each division's range, and select a new pattern from a standard set of 35. You can also alter the legend and add text (in the font of your choice) anywhere on the map itself.

MapMaker has two major shortcomings: it cannot produce maps in PICT (draw) format or use PostScript fonts (either resident or downloaded) on the LaserWriter. Other irritating problems include

Three Maps Compared

The two maps on the left are taken from two 5- by 7-inch MacAtlas maps of the United States. The first is from a MacDraw file, while the second is from a filled MacPaint file. The map on the right was drawn by MapMaker.



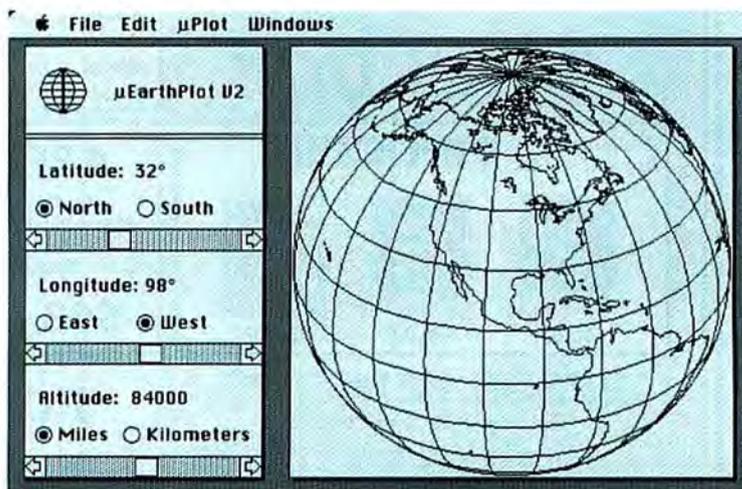
the slow speed with which the program redraws the screen and the Show Page image, the awkward way in which maps are repositioned on the page, and the fact that you cannot change the font or style of text within legends. The program is incapable of selecting more than one boundary file at a time or of editing map patterns (limited to a few gradations of gray and some wallpaper patterns) or symbols. The manual is poorly written and lacks an index. A new version designed to correct these problems should be available by the time this review is published.

MacAtlas: Manual, not Automatic

If *MapMaker* is a BMW, then *MacAtlas* is a Yugo. It's a clip-art-style, multivolume collection of maps, each containing paint- and draw-format documents that cover everything from counties to the countries of the world. Some collections include maps of different sizes and internal divisions, while others offer only one or two maps (per format) of each region.

The World According to EarthPlot

EarthPlot can draw a view of the earth from almost any point in space. The program will draw latitude and longitude lines on the globe if you wish, but the additional work slows down the drawing process considerably.



EarthPlot: A Free Ride

EarthPlot, a public-domain program by Michael Peirce and Marsh Gosnell, is widely available from user groups and electronic bulletin board software libraries, such as CompuServe and BCS-Mac (Boston Computer Society). The program can draw a view of the earth at any latitude and longitude from 700 to 160,000 miles above the earth (see "The World According to EarthPlot"). *EarthPlot* draws the major landforms in outline only, but it can superimpose a latitude and longitude grid over the globe if you ask for it.

As long as your viewpoint is relatively distant from the earth, *EarthPlot*'s maps are remarkably realistic. However, coastlines are crude approximations and perspectives grossly inaccurate in close-up views. Since creations cannot be saved as documents, you must take a screen shot and cut away the extraneous parts surrounding the map in order to save it. But despite a few bugs, *EarthPlot* can produce dramatic maps, including some that would be difficult or impossible to find elsewhere.

Which Way to Go

Determining which map program is best for you depends on your budget, the kinds of maps you need, and how much of the creative work you are willing to do yourself. *EarthPlot* produces excellent outline globes at a terrific price (free), but it ignores political boundaries and is not very successful with close-up views. *MacAtlas* makes sense for those who need maps only occasionally, don't need to resize them, and are willing to plot data by hand. *MacAtlas* maps also make good sense economically, if you can get away with buying only one or two volumes. If you need maps for the regions in all three *MacAtlas* volumes and use maps with some frequency, then you might as well spend the extra money for *MapMaker*. For the price, you get maps of the size (up to a full page) and geographic area of your choice, plus a program that automatically displays data on the maps. But no matter which way you go, BMW, Yugo, or public transportation, you'll always have a map to help you along the road.—Robert C. Eckhardt

See *Where to Buy* for product details.

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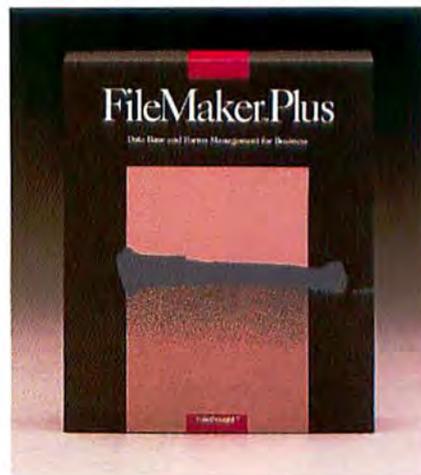
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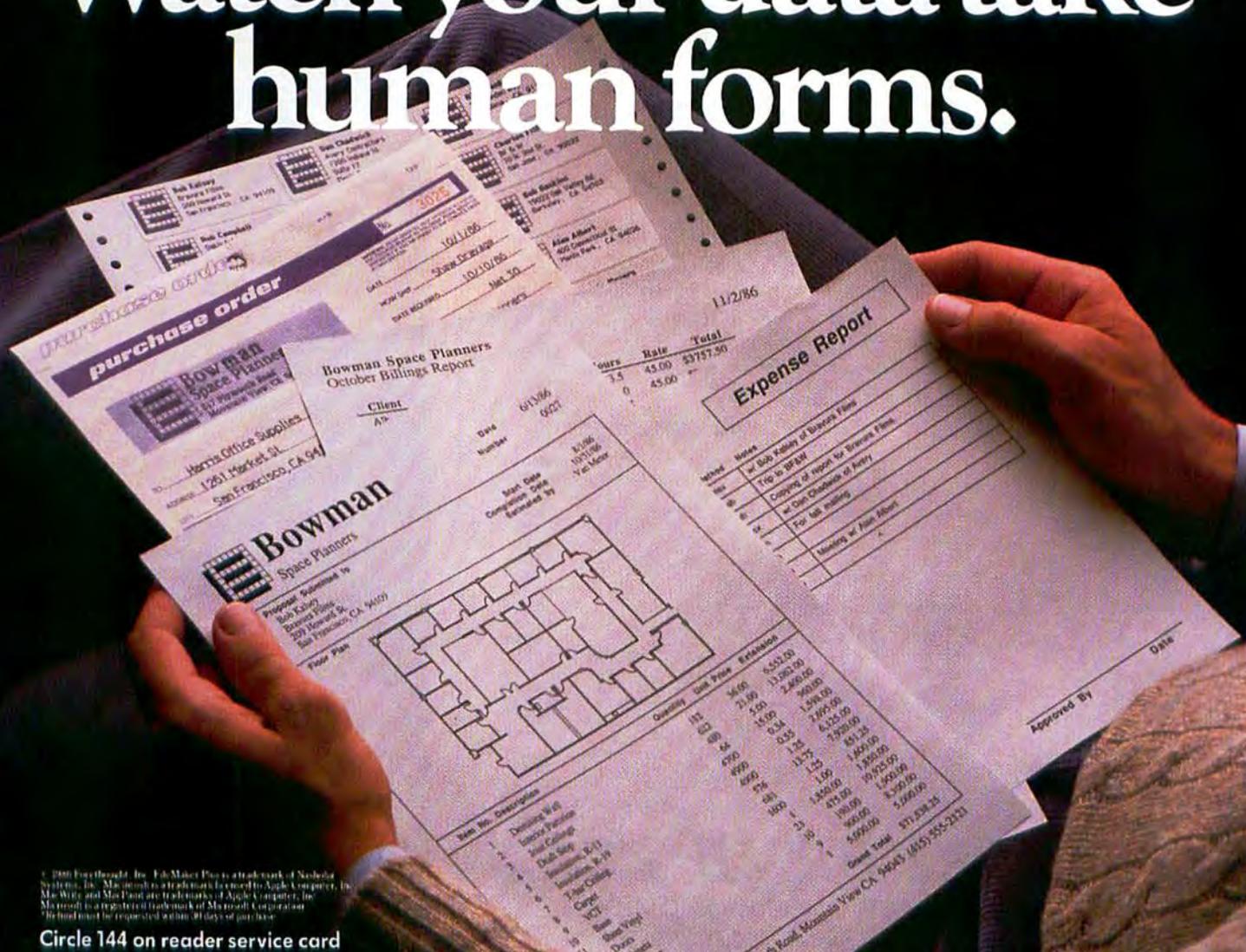
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Quick Tips

Answers to your questions

by Lon Poole

Can you make 800K MFS disks on an un-enhanced Mac 512K with an 800K external drive? I said no in January, but Bangs L. Tapscott, editor of the University of Utah user group's excellent newsletter, *MacFUG News*, says yes, if you use the right drive. Tapscott's DataSpace 800K external drive correctly formats 800K disks under HFS (Hierarchical File System) or MFS (Macintosh File System), reads and writes 400K or 800K disks, and works as the start-up drive. The only thing it won't do is format a single-sided (400K) disk, which he considers a minor drawback, since the internal drive does that. (For a comparative review of seven 800K external drives, see "Both Sides Now," *Macworld*, November 1986.)

Straightening Out MacDraw Text

December *Quick Tips* mentioned a known problem in *MacDraw* 1.7 and 1.9: objects sometimes drift out of alignment. Tom Parrish, of Chevy Chase, Maryland, observes that text is especially likely to drift if you move it along with other objects. The problem occurs when you use *MacDraw's* grid with a centimeter ruler or a custom ruler with 5, 10, 16, or 32 minor divisions. None of those ruler configurations mesh evenly with the 72-dots-per-inch Mac screen. Don't use those rulers with the grid turned on if you want to prevent sliding text.

Right-to-Left Typing

Since the subject of Hebrew word processing came up in November, a number of people have mentioned desk accessories that let you type right-to-left. *MacInHebrew* works with *MacWrite*, *MacPaint*, and *MacDraw*, and with other applications, according to Phillip Avruch, of Silver Spring, Maryland. He says there are a few bugs in *MacInHebrew*, particularly when English and Hebrew text are on the same line, but nothing can beat it at the price (\$25 shareware, available from user

groups, on-line information services, and clearinghouses such as Educomp, 2429 Oxford St., Cardiff-by-the-Sea, CA 92007).

Excel Picture Copy

I do market analysis and planning at Cray Research. This year we are doing a major project on the Mac with *Microsoft Word* and *Excel*. I fondly wish that we could somehow copy *Excel* worksheets into *Word* with the font, style, formatting, and grid lines intact but without the row and column designators. Can you help?

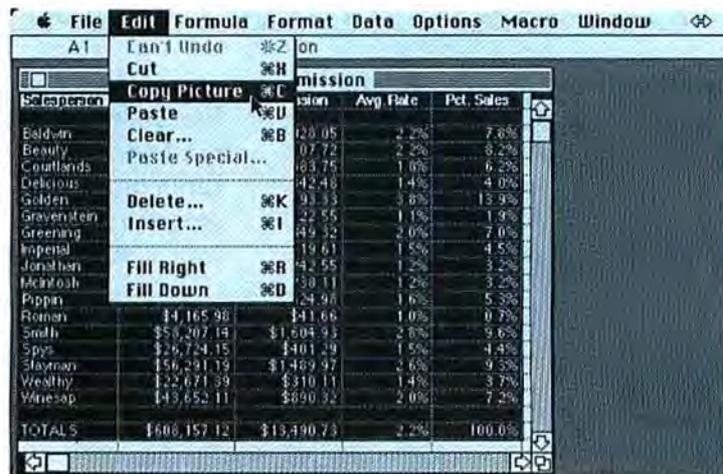
Anne Hazelroth McNeill
Minneapolis, Minnesota

I know of two solutions to the problem you describe. One does exactly what you want, and the other gives you control of column spacing and text attributes after pasting, at the expense of grid lines and some of the formatting.

Solution 1: When you're using a work-

sheet in *Excel*, pressing the Shift key changes the Copy command to a Copy Picture command (see "Excel's Copy Picture" command). The Copy Picture command copies selected cells to the Clipboard along with all current display options, such as grid lines, row and column headings, and text font and style. Use the Display and Font commands from *Excel's* Options menu to select the options you want. Then press Shift and choose Copy Picture from the Edit menu, or as a shortcut press **⌘-Shift-C**. You can check the results without quitting *Excel* by choosing Show Clipboard from the Window menu. When the Clipboard shows the results you want, quit *Excel*, start *Word*, and paste the picture in the appropriate place in your document.

After pasting the spreadsheet picture into your *Word* document, you can successfully *resize* it because it is copied in *MacDraw* format, not *MacPaint* format. To *resize*, just click once on the picture to select it, and then drag one of the small black boxes, called *handles*, that appear at the



Excel's Copy Picture

Press the Shift key to change Excel's Copy command to a Copy Picture command, which puts selected cells on the Clipboard as a MacDraw-type picture, with all display options intact.

(continues)

edge of the picture. In *Word* 3.0, you must press Shift while you drag. For measured size control in *Word* 1.05, select the picture and press **⌘-Shift-Y**, and then type a number from 1 to 9. Typing 9 reduces the picture to 90 percent of its original size, 8 reduces it to 80 percent, and so on. Return the picture to its original size by pressing **⌘-Shift-P**. *Word* 3.0 doesn't support keyboard resizing, but it will resize a picture proportionally if you press the Shift key while dragging the handle at the lower-right corner of the selected picture; the new version of *Word* reports the percentage reduction or enlargement at the lower-left corner of the document window. In *Word* 3.0, double-clicking on the picture returns it to its original size.

Solution 2: In *Excel*, select the cells you want to copy to *Word*, and choose Copy from the Edit menu. This puts a copy of the selected cell values on the Clipboard. Quit *Excel* and start *Word*. Open the *Word* document in which you want the worksheet, and choose Paste from the Edit menu. This puts a copy of the cell values from the *Excel* worksheet into your document as text, not as a picture. The values don't show up in columns, but they are separated by invisible tab characters. You

can align them in columns by setting tabs at appropriate places. To do that, select all the rows you just pasted and use *Word* 1.05's Tab command or *Word* 3.0's formatting ruler or Paragraph command. Generally, you will use a left tab to align text and a decimal tab to align numbers. You may also change the font, size, and style of any part of the text.

Q Fan Mail

Retail folks tell me I don't need a fan to keep my enhanced 512K Mac cool, and yet in magazines like *Macworld*, I see fans advertised. Tell me true, do I really need a fan?

*Rob L. Hewell
Mulvane, Kansas*

A Most Macs manage to stay pretty cool. How? All the fans at their keyboards. (Har har.) Seriously, your standard Mac 512K or Mac Plus won't need a fan unless you do. Keep its vents clear, and convection will cool it enough—provided the

air temperature stays below about 100 degrees. Don't bake it in the sun, don't stash the newspaper on it, don't let your cat use it as a hot water bottle, and don't use it as a bookend.

You should strap a blower on your Mac if you install an internal hard disk drive, clip on an accelerator card, or add a memory expansion card. All those internal modifications generate heat and block the normal convective airflow. Recognizing this, most add-on manufacturers include fans with their products. Internal modifications that don't add heat or block the airflow—for example, swapping SIMMs (Single In-line Memory Modules)—don't require fans.

If I were installing a fan, I'd pick one that boosts airflow through the machine, as opposed to one that just blows the same hot air around inside the cabinet.

Q Opening Recovered Files

One of my data disks, which holds the only copies of about 19 documents, was somehow damaged. Fortunately, with *MacTools* I was able to restore the Desktop file

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(the most likely file to have taken the plunge). Unfortunately, I can no longer open any of the files on that disk. The files all now have names like RecoveredFile 1 and RecoveredFile 2, and they have generic icons. Are these files permanently lost, or is there a way to reclaim them?

Dan Sievenpiper
Novato, California

A The generic icons mean your files have lost their distinguishing Creator or Type attributes. The Creator attribute determines which application program created the file, and the Type attribute designates whether the file contains plain text, formatted text, spreadsheet information, *MacPaint*-style graphics, *MacDraw*-style graphics, or some other type of information. (For a complete discussion of how file Creator attributes relate to icons, see *Get Info* in the July 1985 issue of *Macworld*.)

You can inspect and change the normally invisible Creator and Type attributes using a utility program such as *ResEdit* (available through user groups or from the Apple Programmer's and Developer's Asso-

ciation, 290 S.W. 43rd St., Renton, WA 98055, 206/251-6548) or *Fedit Plus* (from MacMaster Systems, 939 E. El Camino Real #122, Sunnyvale, CA 94087), or a desk accessory such as *DiskInfo* or *SetFile* (both available from user groups and on-line information services).

Use one of those utilities to make the Creator and Type attributes of the recovered files match the attributes of a similar file that can be opened. If you're not sure what kind of file a recovered file is, try various valid attributes until you find the combination that lets you successfully open the file. Such experimentation may be time consuming and may never succeed if you don't strike the proper combination or if the file itself has become garbled.

For future reference, you can rebuild the invisible Desktop file from the Finder. Hold down the Option and ⌘ keys as you insert the disk, and the Finder asks whether you wish to rebuild. Rebuilding from the Finder loses Get Info comments.

So tell me, what do you think of backups now?

Q Disk Directory Full

Lately, when trying to save a document in *MacDraw* or *Microsoft Word*, I've been encountering the message, "Destination directory is full. . . ." The destination disks do contain many short documents, but usually less than half of the actual disk space is filled. I understand what the Mac is telling me, but I can't believe there isn't some simple maneuver to make more complete use of a disk's capacity. Combining several small documents into one, thus using one slot in the directory, seems much too laborious. I'd rather start a fresh disk.

Ted Linnert
Golden, Colorado

A The flat file system normally used on single-sided (400K) disks limits the number of files on a disk according to the length of the file names. As the names get longer, fewer files are able to fit in the disk's directory, as shown in "File Limits."

Apple's Hierarchical File System (HFS)

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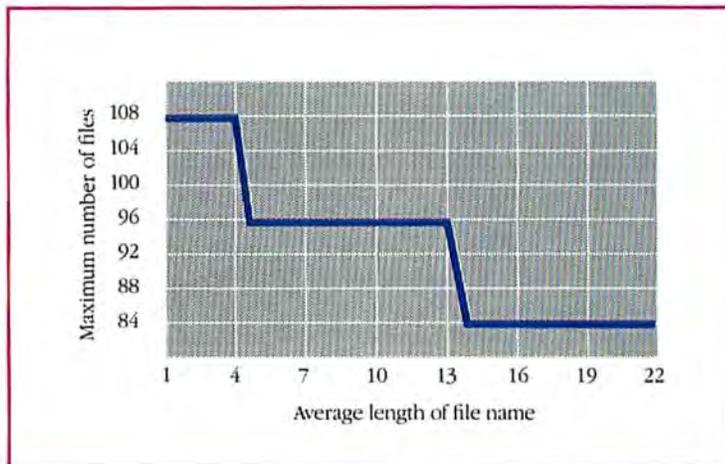
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How To/Quick Tips



File Limits

The flat Macintosh File System, normally used with single-sided floppy disks, limits the number of file names in a disk directory, depending on the number of characters in the names. A disk with many short files may reach the name limit and still have lots of space available.

alleviates the problem because it does not limit the number of file names on a disk. The Mac automatically uses HFS on hard disks and double-sided floppy disks, but not on single-sided floppies. You can, however, initialize a single-sided disk to use HFS. The method differs for new and old disks.

To force HFS on a new single-sided disk, insert the disk and click One-Sided in the dialog box that appears. At the end of the initialization process, when you finish typing the disk name, hold down the Option key as you press Return or click OK.

Disks already in use must be erased to convert them to HFS. Before erasing a disk, make a backup copy. Then choose Erase from the Finder's Special menu, and hold down the Option key as you click One-Sided in the dialog box that appears. For best results, hold down the Option key until the dialog box disappears. When you restore the disk's former contents, drag file and folder icons from the backup disk. If you drag the backup disk's icon over the reinitialized disk's icon, the reinitialized disk loses its HFS format during the disk-copy operation.

HFS is built into the Mac SE, Mac II, Mac Plus, Mac 512K Enhanced, and upgraded equivalents. If you have an earlier model, you must place a special file named Hard Disk 20 in your System file in order to use HFS. You don't need a hard disk to use the Hard Disk 20 file (get it from a friendly dealer or from a user group such as Boston Computer Society, One Center Plaza, Boston, MA 02108, 617/367-8080; to find the user group closest to you, call 800/538-9696 ext. 500).

Q Too Quick to Double-Click

I am a relatively new Mac Plus user, and I am confused. When I double-click the System, Finder, Laser Prep, and other files in the System Folder and then choose Get Info from the Finder's File menu, I get the message "An application can't be found for this document." What does this mean? How else do I find out version numbers?

*Dianne N. Emnis
Norcross, Georgia*

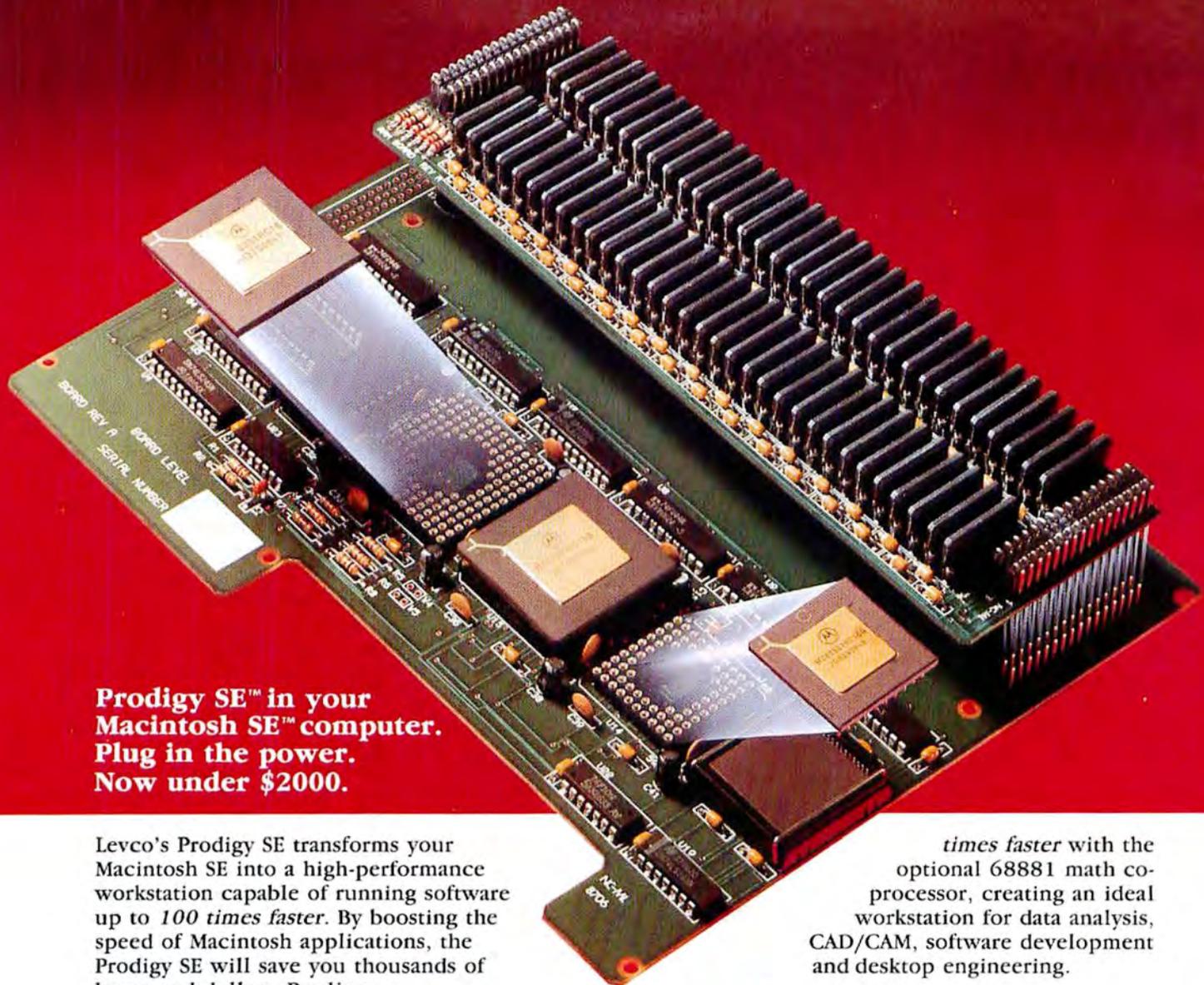
A You see them from time to time, those hapless double-clickers. They double-click by reflex, perhaps thinking it makes the Mac work faster. Even long-time Mac users suffer from this tick; you've got to control that index finger.

Only click an icon once before choosing Get Info. Double-clicking an icon in the Finder is a shortcut for starting an application. The Finder can't figure out which application to start for the System, Finder, or Laser Prep icons, so it presents the message you cite. For more ways to investigate version numbers, see *Quick Tips* in the January 1987 *Macworld*.

Know Disk Space Available with Any View

Tip: I like to use my disk and folder windows in Name view but I found that I was continually switching to Icon view to see how much space was available on the disk. I eliminated the switching between views by creating a new folder and naming it Available. I leave this empty folder open in Icon view and position its window so the title bar is still visible after I open the

(continues)



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How To/Quick Tips

disk window. The folder takes up little room and always shows the amount of available disk space.

Ken London
Glen Oaks, New Jersey

If you incorporate the disk name in the name of the empty folder, you'll always know on which disk the space is available.

Easy ImageWriter Command Codes

Tip: The best method I've found for using the ImageWriter's command codes is David Dunham's desk accessory text processor, *miniWriter*. It directly inserts ImageWriter style commands in its text documents. For example, typing **⌘-B** inserts *Escape-I* to produce boldface text.

Better yet, *miniWriter* comes with a screen font, *imageWriter*, that displays Escape characters on screen. Visible Escape characters are easy to edit, so you can create any printer command by typing, for example, **⌘-B** and then editing to get the desired command, such as *Escape-L002* (to make the left margin 2 characters wide).

The *miniWriter* Print command lets you select any of several native ImageWriter fonts in draft or near-letter quality on an ImageWriter II. The *imageWriter* font duplicates the ImageWriter's native Pica proportional font, so the printout matches the screen.

To insert primitive command codes, such as line-feed characters, use the *StuffClip* desk accessory along with *miniWriter*. It puts onto the Clipboard any character whose ASCII code is between 0 and 31, so that you can paste it into a document.

Bill Layman
La Crescenta, California

Your methods sound better than those I described in December and February. The *miniWriter* and *StuffClip* desk accessories are shareware; each is available from user groups and on-line information services such as *CompuServe* and *Genie*.

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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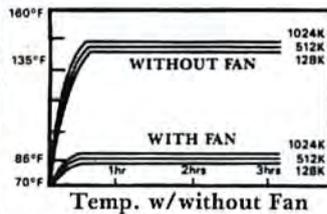
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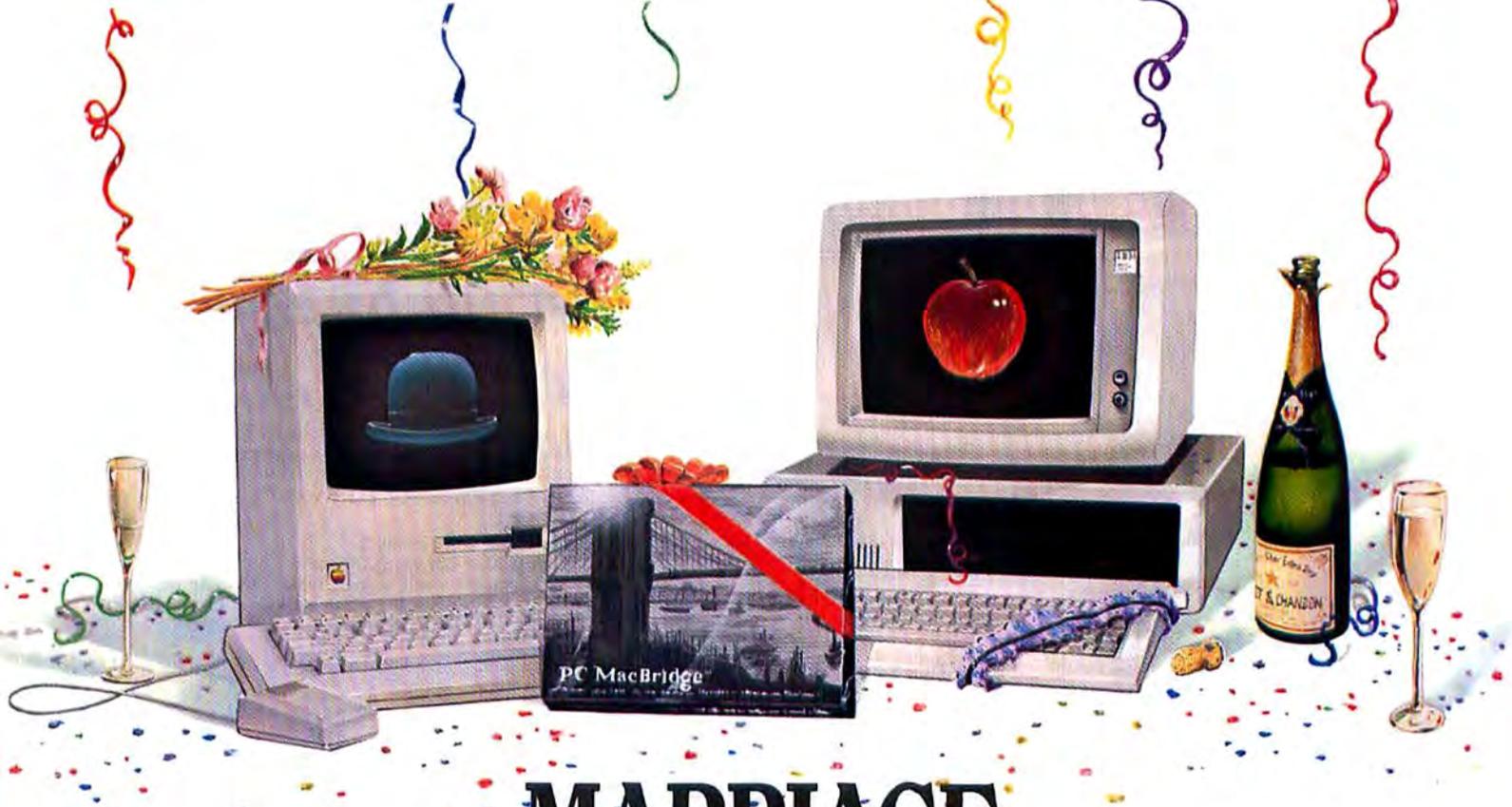
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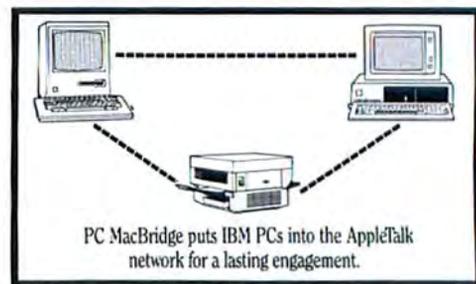
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Getting Started with Communications Gear

Choosing a modem and communications software while coming to terms with baud rates, file transfers, and protocols.

by Jim Heid

A curious kid is interested in almost everything, but few things hold more allure than the telephone. Though it may not thrill a parent, it's an exciting moment for a child when he or she learns that dialing seven numbers can summon friends, information, help, and a little mischief.

While its mischief potential isn't as great, telecommunications can be just as intriguing for the ex-child with a Mac. As last month's *Getting Started* showed, a subscription to an electronic information service lets you shop, get stock quotes, correspond, plan a trip, and more—if you're willing to forgo your mouse and type your way through a labyrinth of menus. And even if you plan to use one of the new mouse-oriented services or hobbyist bulletin boards that are just around the corner, you must still learn the basics of telecommunications and understand how to choose and operate the computer's telephone, the modem.

Modems Demystified

A modem (rhymes with "mow-them") converts, or *modulates*, data coming from the Mac into audio tones that phone lines can carry, and *demodulates* incoming tones into data the Mac can comprehend. *Direct connect* modems attach between the Mac's modem or printer port and a phone jack. *Acoustic* modems contain cups into which you snug a telephone handset. Although they're nearly extinct, due to their susceptibility to background noise, acoustic modems are handy in such places as hotels, where phones are often wired directly into the wall.



MEL LINDSTROM

When modem hunting, look for two things: speed and Hayes compatibility. The former lets you exchange data faster—a big plus when you're paying by-the-minute online charges—and the latter ensures that your modem will work with all popular communications programs.

The speed at which modems exchange data is measured in *baud rate*, also called *bit rate*. You may recall from last January's column that any character on the keyboard can be represented by a combination of eight bits, or a *byte*. Internally, the Mac shuttles these bits between memory, microprocessor, and disk drive in *parallel mode*. The eight bits travel alongside one another, each in its own wire, like marchers in a parade striding eight abreast.

When conversing with a modem or printer, however, the Mac sends bits *serially*—one bit after another, in single file, like commuters threading through a subway turnstyle.

To show the computer on the other end of the line where one byte ends and the next begins, a communications program adds two extra bits to each byte—a start bit and a stop bit. This means that it takes roughly ten bits to send one character. For all practical purposes, one baud equals one bit per second, or one *bps*, so

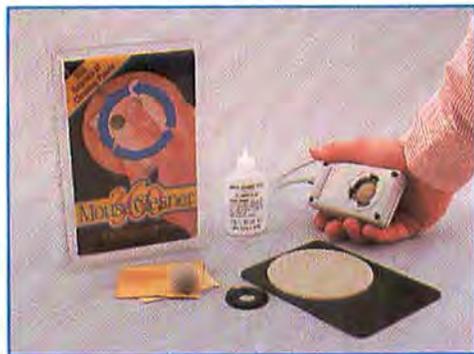
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How To/Getting Started

you can roughly calculate how many characters a modem sends per second by dividing the bit rate by ten. Many people prefer the acronym *bps* because *baud* is old-fashioned and less precise.

Fast or Twice as Fast?

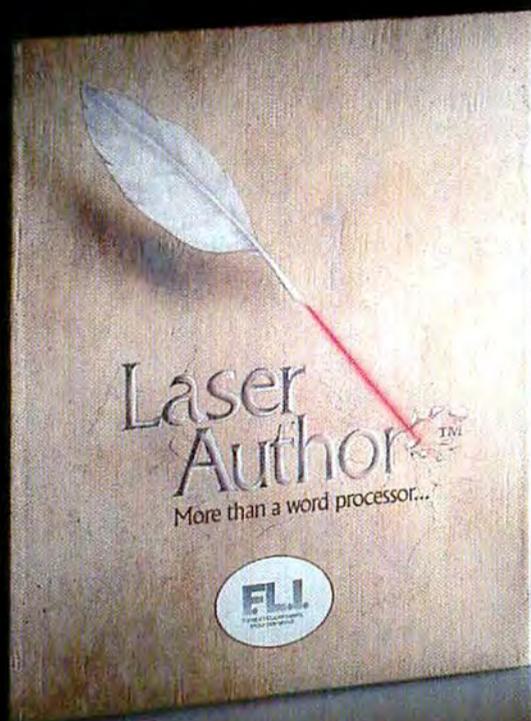
300-bps modems, which usher in text so slowly that you can read it without feeling rushed, were once the standard. Today they're as common as cars with tail fins. 1200-bps modems, four times faster than their ancestors, are the new standard, and now they're feeling the heat from 2400-bps units. All information services support 2400-bps access, though that isn't the case with all switching networks (those local-number gateways you dial to access an information service). Late last year, CompuServe dropped its surcharge for 2400-bps access, so you can now exchange the same amount of information for half the cost of 1200-bps use.

When you consider that data moves within the Mac at millions of bits per second, 1200- and even 2400-bps communications seem a tad sluggish. But remember, we're discussing phone lines here, those same circuits that can make a distant voice sound like Darth Vader's. Static and dropouts during a conversation are annoying; during data transmission, they can be devastating, changing spreadsheet figures, garbling electronic mail, and rendering downloaded programs useless. New error-checking schemes are making 4800- and 9600-bps modems possible, but they cost more than \$1000, and few switching networks support bit rates above 2400.

Whether you need a 1200- or 2400-bps modem depends on your on-line plans. If you intend to trade programs or lengthy electronic letters frequently—tasks that involve issuing a command, then waiting while a wad of data is sent or received—consider a 2400-bps modem (but first contact your information service's customer service department to find out whether your local access network supports communications in the fast lane). But if you plan to summon, and then muse over, tidbits like stock quotes and flight schedules, a 1200-bps modem will do. And if you're buying a modem solely to communicate directly with another computer user, don't buy one that's faster than his or hers; modem speeds must match during a communications session.

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Telecom Terms

Bell 103/Bell 212A Two standards that specify the tones modems use. A 300-baud modem should be Bell 103 compatible, a 1200-baud modem should be Bell 212A compatible. 2400-baud modems use a standard called V.22 bis.

Local echo A setting that tells a communications program to display characters you type. When communicating with information services or bulletin boards, you turn local echo off because the other computer transmits your typing back to your program. When communicating directly with another computer user, how-

ever, you usually turn local echo on.

Null modem cable A cable that connects two computers directly, without a modem, usually used for transferring files between two computers that are next to each other. You can use an ImageWriter cable as a null modem cable for communicating with IBM PCs and many portable computers, including Radio Shack's Model 100.

Parity bit A bit added to the data bits and start and stop bits that uses a formula to determine whether a character was received accurately. This bit is

generally not used in micro-computer communications.

SYSOP Short for system operator, the person who maintains a bulletin board or special interest group. You can often get help by leaving a message for the SYSOP.

Xon/Xoff Also called *flow control* or *handshaking*, these control codes are start and stop signals that communicating computers (or a computer and a printer) use to ensure that each is ready to send or receive. With most communications programs, you can enable or disable flow control using a Settings command.

Modem Intelligence

Modems used to be dumb. To establish a connection you dialed the number yourself, listened for the high-pitched *carrier tone* of the other computer's modem, then flicked a switch on yours to the "connect" position. If you didn't flick fast enough, the other computer hung up and you had to repeat the process.

Hayes Microcomputer Products eliminated this manual labor with its Smartmodem, which houses a microprocessor and other circuitry for responding to commands from, and sending status reports to, a communications program. These "smarts" enable the modem to dial numbers, detect whether the line is busy, know when a connection has been made, and, when in *auto-answer mode*, answer your phone and send a modem mating call.

Other firms began making microprocessor-equipped modems. Some companies developed their own *command sets*, but most, seeing that the Smartmodem was becoming an industry standard, designed modems that mimicked it. Hayes's attorneys didn't like that, especially when people started using the phrase "smart modem" to describe any modem with auto-dial, auto-answer features.

Should you buy a Smartmodem or a modem that acts like one? Smartmodems are the Cuisinarts, the Sonys, the Leicas of the modem world—built better than the competition and priced accordingly. But unless you get a good deal or anticipate being cruel to your modem, you'll be just as happy with one of the Hayes-compatible modems from Apple, Microcom, Racal-Vadic, Prometheus Products, or any of the half-dozen other firms making them.

One more hint: look for a modem that has front-panel status lights. They aren't essential, but they can help you troubleshoot a sticky file-transfer session by showing when a connection exists and when data is being exchanged. Like a car without gauges, a modem without status lights doesn't tell you much when problems arise.

Internal modems, commonplace in the IBM PC world, will be making an appearance now that there's a place for them on the new Mac II. They're out of the way and are easy to transport along with the Mac, but they lack status lights and use up a slot.

The Software Half

Smart or not, a modem without communications software is a mere box of mute chips. A communications program's

job is to send what you type to the modem and to display what comes in. But all programs go beyond that by adding commands that dial numbers (by sending commands to a smart modem), send and receive files, print incoming text, and *capture* it on disk. Most programs also offer a scroll bar for viewing text that's scrolled off the screen, and let you select and copy text to the Clipboard and Scrapbook.

The best programs—Hayes's *Smartcom II*, FreeSoft's *Red Ryder*, Palantir's *In-Talk*, and my favorite, Software Venture's *MicroPhone*—let you automate part or all of your communications sessions and decrease the typing needed to navigate an information service. Called an *autopilot* or *script* language, it's the best thing to happen to communications since modems got smart.

Each program's autopilot vocabulary is different, but the concept is the same. You create a script containing statements that tell the program to wait until it receives a prompt before sending a response. One common autopilot application is a sign-on script that dials a service and supplies your user ID and password for you (see "Autopilot Sign-On").

(continues)

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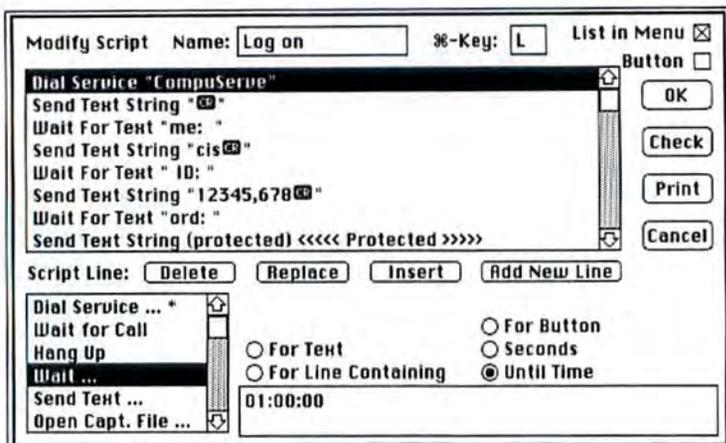
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Autopilot Sign-On

This autopilot sequence from MicroPhone automatically dials CompuServe and signs on. Like Smartcom II, it lets you include your password in a sequence, then "protect" lines in which it appears. Here, an added line delays sign-on until 1 a.m.



Most autopilot languages also let you access the communications program's other commands, as well as specify that the program must wait until a specific time before switching into autopilot. You can write scripts that wait until 1 a.m. (when phone and access rates are low), then sign on, ferret out a stock quote and save it on disk, download and print the latest wire service news, check your electronic mailbox, then sign off.

Writing a script for unattended operation is an ambitious and bug-prone undertaking. You might, for example, mistype a

certain prompt in a "wait for" statement, causing the script to wait for text that will never appear. Fortunately, that kind of blunder won't keep the on-line meter running forever; all information services automatically hang up after a given amount of inactivity.

Two communications programs, *MicroPhone* and *Red Ryder*, give you a head start in avoiding program pests by providing "learn" modes that monitor a communications session and create scripts according to your actions. You may have to

edit some resulting scripts slightly, adding "wait until" times, for example, but that still beats creating them from scratch.

Following Protocol

I mentioned earlier that communications programs provide one command that captures text on disk and another that receives a file. Those two tasks sound identical, but they aren't. A capture command squirrels away incoming text and any text you type until you say otherwise. You might use it to save a set of stock quotes for insertion into a spreadsheet, or to store an electronic letter, a list of programs available for downloading, or some wire service news that you'll format and print with a word processor. You can conveniently switch capturing on and off as desired. But there is a catch: if noise on the line caused some "garbage" characters to appear, they're captured, too, forcing you to expunge them later.

A file-receiving command, by contrast, accepts a single file that the other computer is sending according to a *transfer protocol*—a set of rules that ensures error-free transfers of applications or docu-

(continues)

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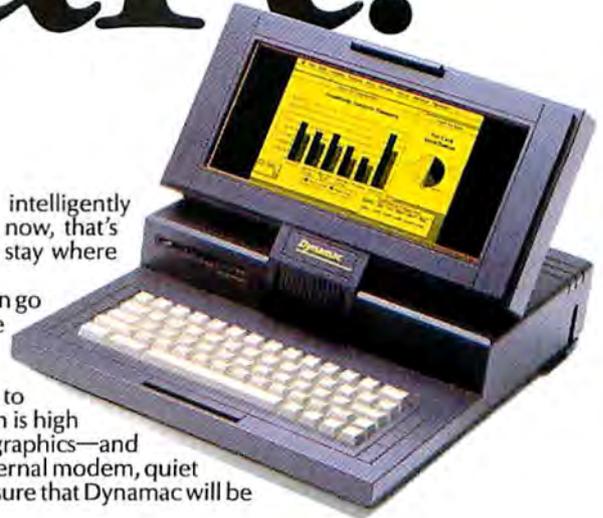
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How To/Getting Started

ments. A few transfer protocols exist, but *Xmodem* predominates. When sending a file under Xmodem, the other computer transmits it in blocks, with each block containing error-checking information. If your program reports an error after receiving a block, the other computer sends it again. Because of its data proofreading, Xmodem is used when exchanging applications or important documents with an information service or another computer user.

While you always use an error-checking protocol when receiving a file, you may opt to forgo accuracy when sending a letter or any other text-only document. (Indeed, you'll have to in the unlikely event that the other computer's communications program doesn't support the same protocols as yours.) Just remember that you risk garbled text. For Mac-to-Mac exchange of applications or any documents that aren't text-only, you must use a transfer protocol.

In the Macintosh world, file transfers are a bit complicated because application files and some types of documents have two components—a *resource fork* and a

data fork. A program's resource fork holds names of menus and their commands, icons, and other elements of the program, while the data fork holds the program code itself. An information service's mainframe computers can't store files in this special format, so pioneering Mac communicators developed a transfer scheme called *MacBinary* that encodes the two forks (along with a file's creation date, original name, and icon) so a mainframe can store them. And you don't have to know how it works. When you're exchanging files with an information service, you simply activate MacBinary, usually by checking a box or button in a Settings dialog box.

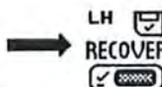
Signing Off

Even though every third word in the past two columns has been italicized, I still haven't presented all the terms and concepts that you may encounter. Several more are defined in "Telecom Terms." For a more detailed treatment of telecommunications and its lingo, I recommend *The Complete Handbook of Personal Computer Communications* by Alfred Glossbrenner (St. Martin's Press, New York City). It wasn't written with the Mac in mind, but it's an ex-

cellent guide to the whys and hows of communications. There's also a new book on Macintosh communications, *MacAccess*, by Dean Gengle and Steven Smith (Hayden Books, Hasbrouck, New Jersey); it covers file transfers, telephone hookups, cables, and lots of other details, but there are no tips for using on-line services.

After setting up your modem, learn how to set up your communications program to conform to your service's requirements (most programs come with documents specifying settings for the major services). Next, learn how to sign on and type commands for your information service. Experiment with capturing text, then attempt a file transfer. When you've mastered these basics, try your hand at autopilot script writing. With its technical hurdles and arcane commands, telecommunications is still a primitive world. But the technicalities won't keep you from the rewards—and from racking up a fat phone bill—if you tackle them one at a time. □

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Due to overwhelming response, the special trade-up offer to both PageMaker and MacPublisher owners has been extended through April 30, 1987.

Insights on OverVue

Beyond the learning curve and onto the proficiency path: helpful hints from data entry to macros.

by Rick LePage

ProVue Development Corporation's *OverVue* offers a unique blend of database concepts with spreadsheet functionality. *OverVue* has been around almost as long as the Macintosh, and although much has been made of the relational programs—Borland's *Reflex* (formerly *Interlace*), Ashton-Tate's *dBase Mac*, Blyth's *Omnis 3*—*OverVue* continues to sell, filling a niche the other packages have left vacant. *OverVue* offers speed, advanced calculation facilities, good data entry features, and a host of other pluses that make it an excellent product for managing lists, performing basic statistical analysis, and other tasks that do not require the heavy-handed, relational approach. ProVue also offers excellent technical and user support, with frequent (and inexpensive) updates. The recently released version 2.1, for example, fixes a few bugs and offers tab-delimited text export and several other new features.

The Basics: Data Entry

Oh yes, data entry—that tedious but essential wicket we must squeeze through before a computer can give us a hand with data management. Fortunately *OverVue* offers some timesaving methods that cut down on the tedium.

■ **Input Patterns** When you want to format a specific field's contents, use the input pattern to set up the field, such as with dates or other specialized numbers. For dates in the MM/DD/YY format, set the input pattern as " / / ." For phone numbers using the (000)000-0000 format, set the input pattern to "() - ." You can then enter the numbers directly and let *OverVue* do the formatting. If you paste into a field from the Clipboard, however, the input pattern is not invoked. This feature can be helpful if you have odd data you don't want formatted by the input pattern (such

as international phone numbers, which often do not follow the digit pattern used in the United States).

■ **Using the Value Bar** The value bar can also speed up data entry, especially when a limited number of values are associated with a field. When using the value bar, you type the first letter of an associated option, and *OverVue* selects that option for the field. Overriding options is also easy. When you press Return, the blank data window appears at the top of the screen, allowing you to enter another option.

A limitation of the value bar is that the total text of all the entry options must fit in 64 characters of space, which can be a problem if the options are long. But if you abbreviate the values, you can fit up to 16 choices in a value bar (with one-letter abbreviations). To spell out the abbreviations

automatically later, create a simple macro that replaces the abbreviations with the complete values in each instance. For example, if a value bar for the field MailType is set up with the values Fed, UPS, Pur, and Exp, the following macro spells out the correct values:

```
Do "Spell Out MailType/1" Home *moves
  cursor to first record
Column "MailType" *moves cursor to field
  MailType
Hide *turns off the display
GlobalReplace "Fed" "Federal Express"
GlobalReplace "Pur" "Purolator"
GlobalReplace "UPS" "United Parcel
  Service"
```

(continues)



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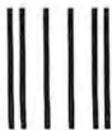
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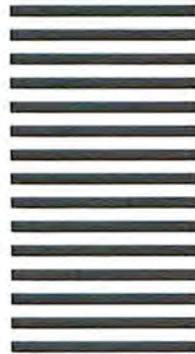
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GlobalReplace "Exp" "Express Mail"
Show *turns the display back on

If you wish to include a variable that contains a space character (like Federal Express) in a value bar, use the underscore (_) character between the words. When *OverVue* places that value in a cell, the underscore converts to a space.

■ **Clairvoyance** The Clairvoyance option is another way to save time when entering data. Try it when the number of values in a field is limited, but the value bar is inappropriate. This feature also works when retrieving data via the Select option. When entering the selection criteria in a field that uses Clairvoyance, *OverVue* attempts to anticipate your selection by filling in a value before you finish typing the criteria. If you are able to type the entire criterion without *OverVue* filling it in for you, then the value is probably not present in that field.

OverVue version 2.1 refines the way Clairvoyance works. If you are typing in a column that uses Clairvoyance, the new version does not attempt to find a match until you pause or stop typing. This is a big improvement over the old method, which attempted a match after each letter was typed—an awkward process if you're a quick typist using a large data sheet.

■ **Turbo Tabs** Selecting the Space Bar Tab option on the Attributes menu substitutes the space bar for the tab in the field you've designated. Unless your left pinky is exceptionally agile, the space bar moves you to the next field in a record more quickly than the Tab key. But what if you want to enter text containing spaces in a field that has the Space Bar Tab option turned on? You can still use the space bar stand-in; just type the underscore character (_) in place of spaces in the text. Then go back and replace any underscores with spaces via a global replace macro.

Macro Madness

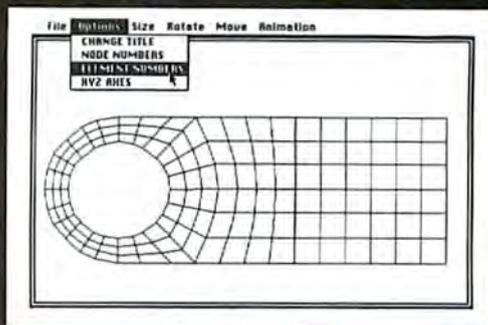
Macros let you add your own ⌘-key shortcuts to *OverVue*. Here are a few especially helpful macros, along with some hints for using them.

■ **Add Date or Time** The following macro pastes the current date or time into the selected cell.

- Do "Paste Current Date/2"
- Scrapcalc "date(1:today())"
- Paste Right *moves to the next cell
- Do "Paste Current Time/3"
- Scrapcalc "ampm(now())"
- Paste Right *moves to the next cell

(continues)

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■ **Easy Selection Macro** To select all records that meet criteria based on the current cell, implement the following macro: Do "Select Equal to this Cell/4" Copy Equal *sets the selection criteria to equality Select "[.]"

This performs a selection on all records that meet the minimum criteria set up in the macro, as well as any records that begin with the words you selected. To perform a one-to-one (exact) selection, do not use the two periods in the Select "[.]" line.

■ **Using ⌘-Key Equivalents** If you use a ⌘-key equivalent in a macro (by placing a slash and the key you wish to use after the macro name), make sure that the key you choose is not already used by *OverVue*, or that it's a command you do not plan to use often. Nothing catastrophic happens if you designate a key already taken by an *OverVue* command, but your choice overrides any preset ⌘ keys.

Reports and Records

Here are a few techniques for smoothly manipulating data for reports.

■ **Floating Fields in Reports** With the floating length and floating position features, you can create reports without the padded spaces and empty lines that other databases leave when reporting on empty fields or fields with variable length values. To format a report correctly, however, use the following method to ensure that data isn't inadvertently omitted. 1) Set up the first field on a line with a floating length option. 2) Set up the last field on a line with a floating position option. 3) Turn off floating position and floating length options for all but the first and last fields on a line.

■ **Selecting Records** While *OverVue* is not entirely Mac-like when dealing with the Clipboard, you can select an entire record and copy it to the Clipboard. Click in the first column while holding down the Shift key to highlight the entire record; you can then Cut, Copy, or Paste. (In any column, if you hold down the Shift key while selecting, you select the contents of the cell in that column and every cell to the right margin of the data sheet.)

■ **Swapping or Inserting Columns** If you swap columns or insert them in the middle of a group of columns (as opposed

to the end of the record setup), all of your report templates are rendered obsolete, and you must remanipulate your templates before you can print them correctly. If you add a column at the end of a row, the only way to use that new field in an existing report is to choose Hide Frames and then Show Frames from the report generator's Template menu.

■ **Searching for Empty Fields** To select records that do not contain any data in a certain field, choose Select from the Find menu and use the = (complete equality) criterion, but do not type anything in the Dialog window at the top of the screen.

The Import-Export Trade

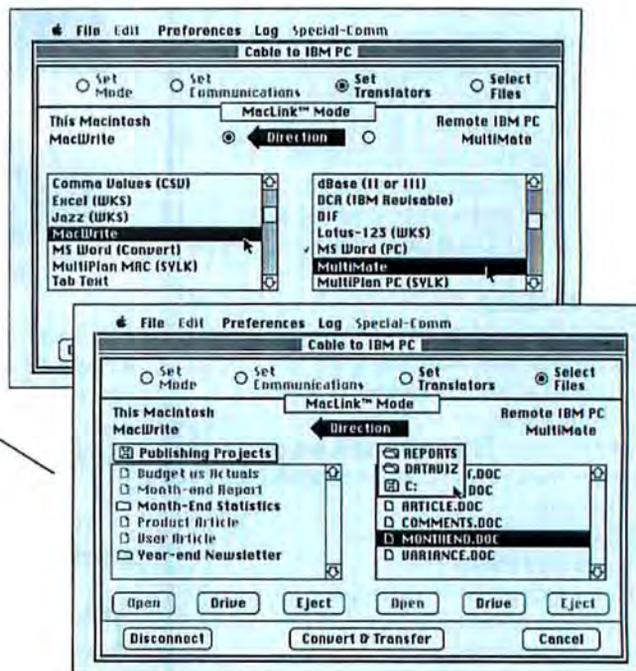
If you don't mind your p's and q's, moving data around from program to program can cause a great deal of frustration. Here are some specifics to make the process easier.

■ **Importing Excel Files** To import a *Microsoft Excel* database, save the *Excel* file as text. This will place tabs at the end of

(continues)

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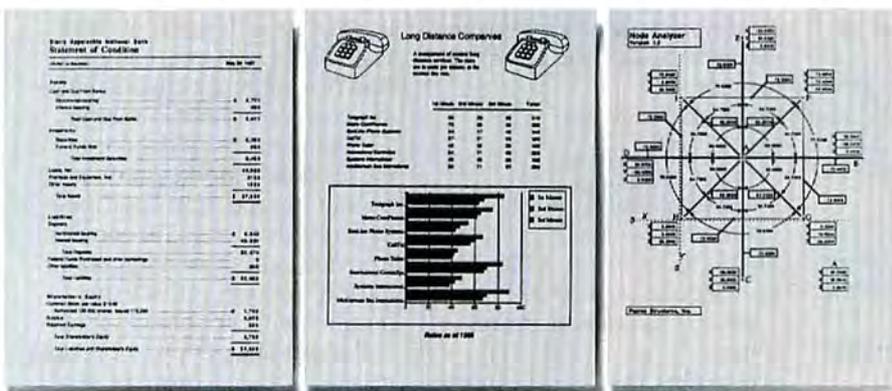
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Hidden Resources

ProVue added a number of features to *OverVue* that did not make the final manual, most of which add macro functionality. To receive ProVue's documentation on these features, write and ask for the Undocumented Features in *OverVue* 2.0 release notes.

Loops in Macros

OverVue's most powerful new feature is its ability to perform loops in macros. Loops can create value bars, fill certain records, manipulate scrap (Clipboard) contents, and do many other tasks that need to be performed repetitively.

Loop statements start with the Loop command, and take the form:

Loop *initializes the loop (actions) ... *actions you wish to have performed

Until_condition *until a condition is performed

Here is a list of loop statements and their conditions:

- **UNTILEOF** (*Until End of File*) continues actions contained in the loop until the cursor bar reaches the end (last visible record) of the data sheet.

- **UNTILBOF** (*Until Beginning of File*) performs the loop until the cursor bar reaches the beginning (first visible record) of the data sheet.

- **UNTILRIGHT** (*Until Right Edge of Data Sheet*) stops the loop when the cursor bar reaches the right edge of the data sheet.

- **UNTILLEFT** (*Until Left Edge of Data Sheet*) stops the loop when the cursor bar reaches the left edge of the data sheet.

- **UNTIL "number"** (*Until Number of Times*) loops for a specified number of times. For example, UNTIL "3" performs the loop three times.

- **UNTILSUM** (*Until Summary Record*) causes the loop to be performed until the cursor bar reaches a summary record.

- **UNTILEMPTY** (*Until Empty Cell*) stops the loop upon reaching an empty cell.

- **WHILEEMPTY** (*While Empty Cell*) loops until a cell that contains data is found.

A Valuable Macro

Macros put looping to good use by creating a value bar automatically. The following macro performs this action by sorting a data sheet based on a certain column; creating a summary record for each separate variable in the data sheet; selecting the summary records; looping through the data sheet, copying each variable and adding it to the scrap; creating a value bar by pasting the contents of the scrap; and returning your data sheet to its earlier condition by deleting the summaries and selecting all of the records.

Do "Make Value Bar"

Sort *sorts

Group *groups

SelectSummaries *selects summaries

Home *goes to top of file
InsertRecord; Cut; Delete-

Record *initializes scrap

Loop

ScrapCalc '()\$ + " " + []' *copies and adds previous scrap contents together

Down *moves down one cell

UntilEof

ValueBar "[]" *creates value bar

SelectAll *cleans up

DeleteSummaries

Another Macro Command

The Col? command copies the name of the current column into the scrap. This feature can be helpful for placing information in summary records.

Save-Get Buffers

OverVue also offers a dual scrap buffer that allows you to save the contents of two cells in different memory locations, regardless of the contents of the scrap. SSAV1 and SGET1 save and retrieve information from buffer 1, respectively. SSAV2 and SGET2 perform the same functions for buffer 2. Buffer 1 has a limit of 80 characters when used alone, or 40 characters when information is also stored in buffer 2. Buffer 2 has a maximum limit of 40 characters. These buffers can be helpful when you want to manipulate two separate pieces of information but do not want to combine or work on the contents together.

Copying Columns

There are also undocumented features that can be used with the Equation function of *OverVue*. One, Copy(*nm*), copies data from another column into the currently selected column. The number inside the parentheses stands for the number of columns to the right or left of the current column. To copy from a column to the left of the current column, preface the number with a minus (-) sign.

For example, Copy(-2) copies all of the data from the second column to the left of the current column, and Copy(2) copies data from the second column to the right of the current column.

each cell in a row. Open *OverVue* and store the Untitled document that appears automatically. Choose Import from the File menu and select the file to be imported, choosing the Text and Tabs Between Fields options.

To strip out extra spaces and the quote marks that *Excel* sometimes adds within a field, move to each column that contains quotes or extra spaces, select Equation from the Math menu, and type the equation $\{ \{ \&A-Z\&a-z\&0-9\&-\&A-Z\&a-z\&0-9 \}$ in the box (see "An Import Duty").

■ **Exporting Data** One of the main reasons for printing reports to disk is to use certain data in another program, such as *Excel*, *Microsoft Word*, or a statistical analysis program. To ensure that you are saving only data, set Page Length, Top Margin, and Bottom Margin all at zero on the report generator's Layout menu.

If you are exporting data to be used as a mail merge file, set the Page Length equal to 15,000. This allows you to create a header at the beginning of the file that contains the merge fields. (A page length of 0 indicates no header or footer.)

If you are delineating your fields with commas in a mail merge file, remember to place quotation marks around any fields that might contain commas within them. This ensures that your data's integrity is preserved when you import it into another program.

■ **Exporting Long Records** The most likely form of data destined for a spreadsheet or mail merge file is the entire contents of a record in one paragraph, separated by tabs or commas. Unfortunately, *OverVue*'s report generator places a carriage return at the end of each line in a report template, truncating any line longer than 150 characters. With an extra step, you can circumvent this obstacle.

Place as many fields as you can on a line, separated with tabs—using the tilde symbol (~)—or with commas, making sure that the line does not contain more than 150 characters. Place the remaining fields on as many subsequent lines as needed to export all of your data. At the end of each line except the last one, type a string of characters that do not appear anywhere in your database, such as three @

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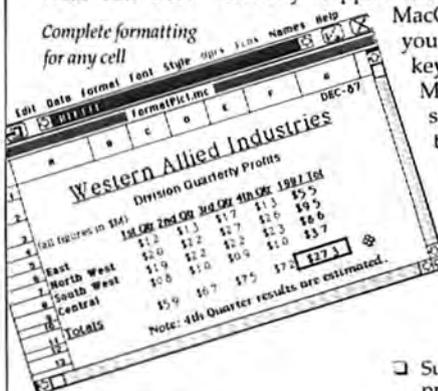
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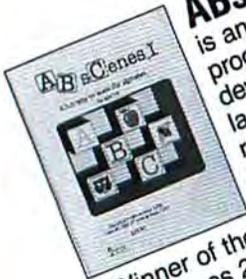
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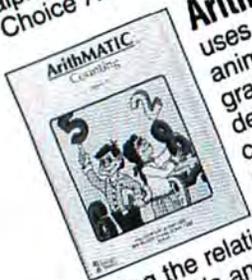
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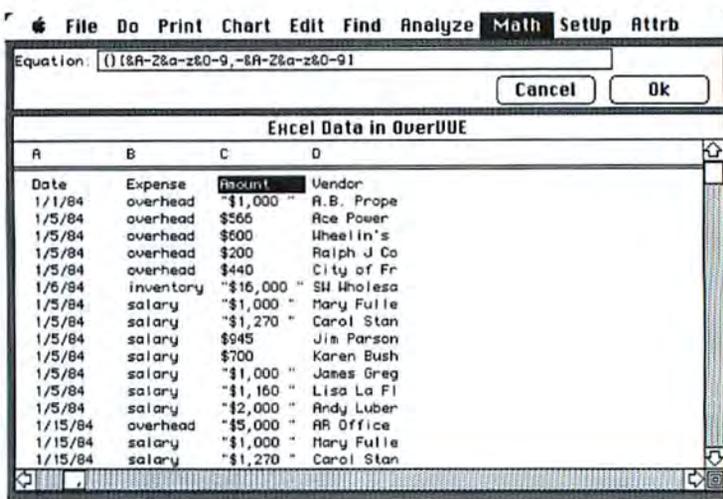
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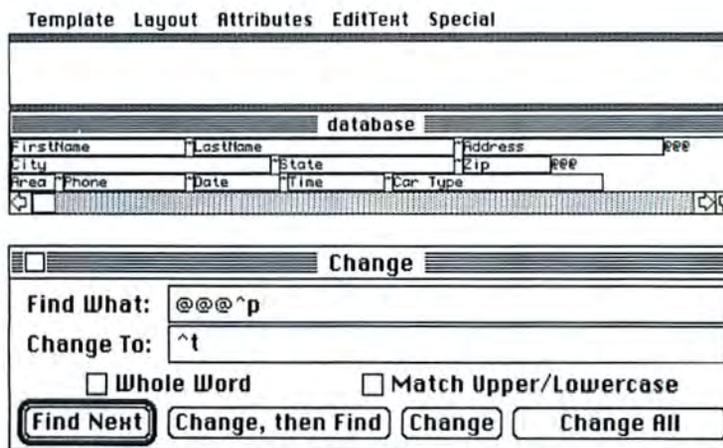
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How To/Insights



An Import Duty

Use the OverVue equation shown in the box to delete the quote marks brought into the database with imported Excel data.



Export Limits

To break through OverVue's 150-character-per-line limit when exporting data, link the lines together in the report generator window with a unique symbol, here, @ symbols. Once text has been exported, you search for the symbols and replace them with tabs.

signs. Resize the window so that only the lines containing data you wish to export are visible (see "Export Limits").

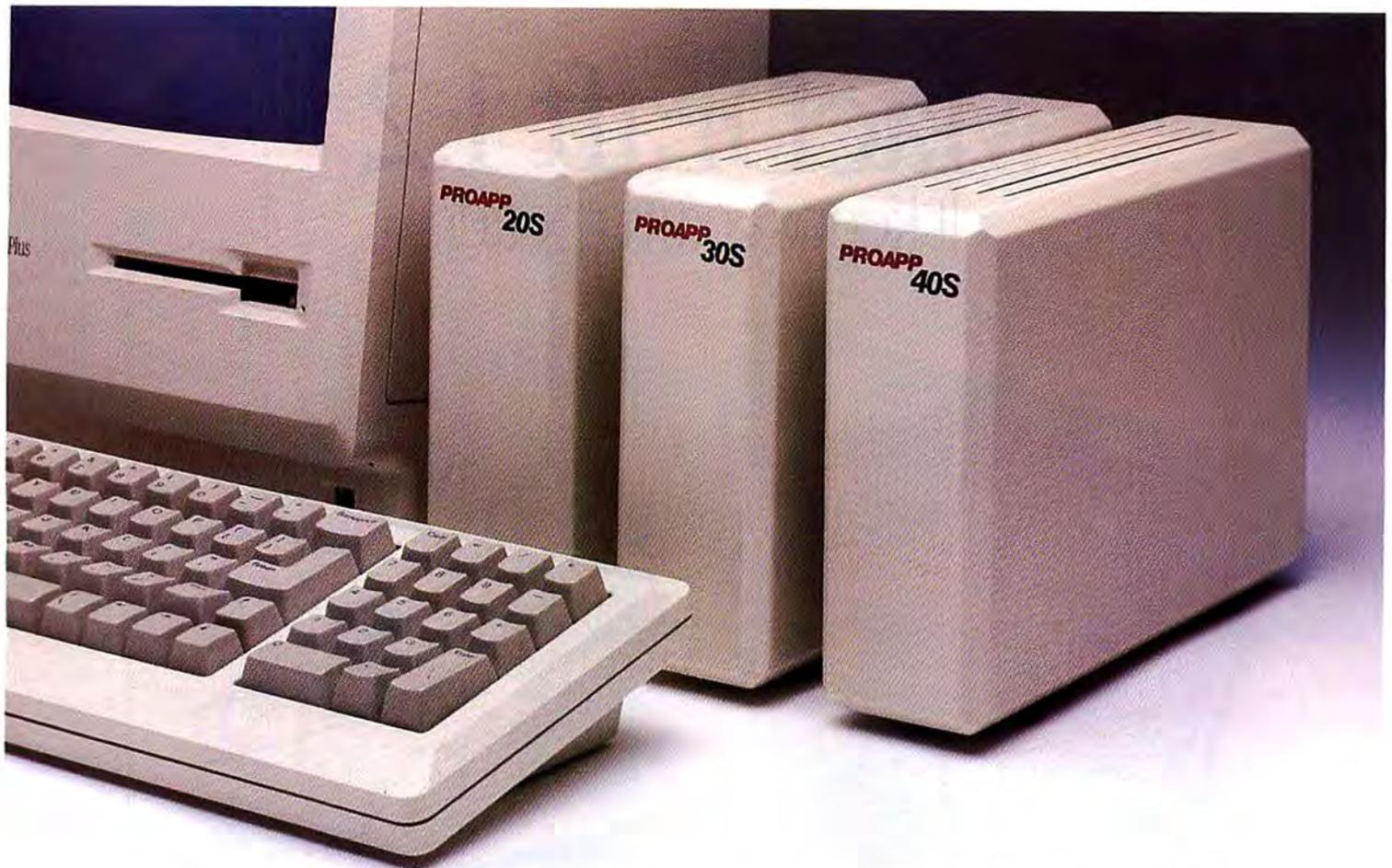
Set other report options, such as page length and header information, and quit the report generator. Choose Print Report On Disk from the Print menu. After the report is finished, quit *OverVue* and load either *Microsoft Word* or another word processor or text editor (like Apple's *Edit* or the shareware *MEdit*) that allows you to search for Tab and Paragraph format characters. Open the report.

If using *Word*, select Change from the Search menu. In the Find What box, type in the string you chose to end each line in your report, followed immediately by a ^p. In the Change To box, type in ^t if each field is to be separated by tabs, or type in a comma if that is the separating character. Select Change All to consolidate each rec-

ord in your file into a single paragraph. If you are going to use the file in another program, make sure you save it in text-only format.

■ **Exporting Selected Records** Why is it taking 3½ hours to save your five selected records as text? Because *OverVue* is exporting the other 3000 records, too. The current version of *OverVue* (2.1) allows you to save a data sheet in text-only format, with each field delimited by tab characters. Saving a sheet in this manner, however, gives you *every* field and record in the sheet. To export particular records, choose them using the Select command on the Find menu; specify which fields with the report generators, as in the previous tip. □

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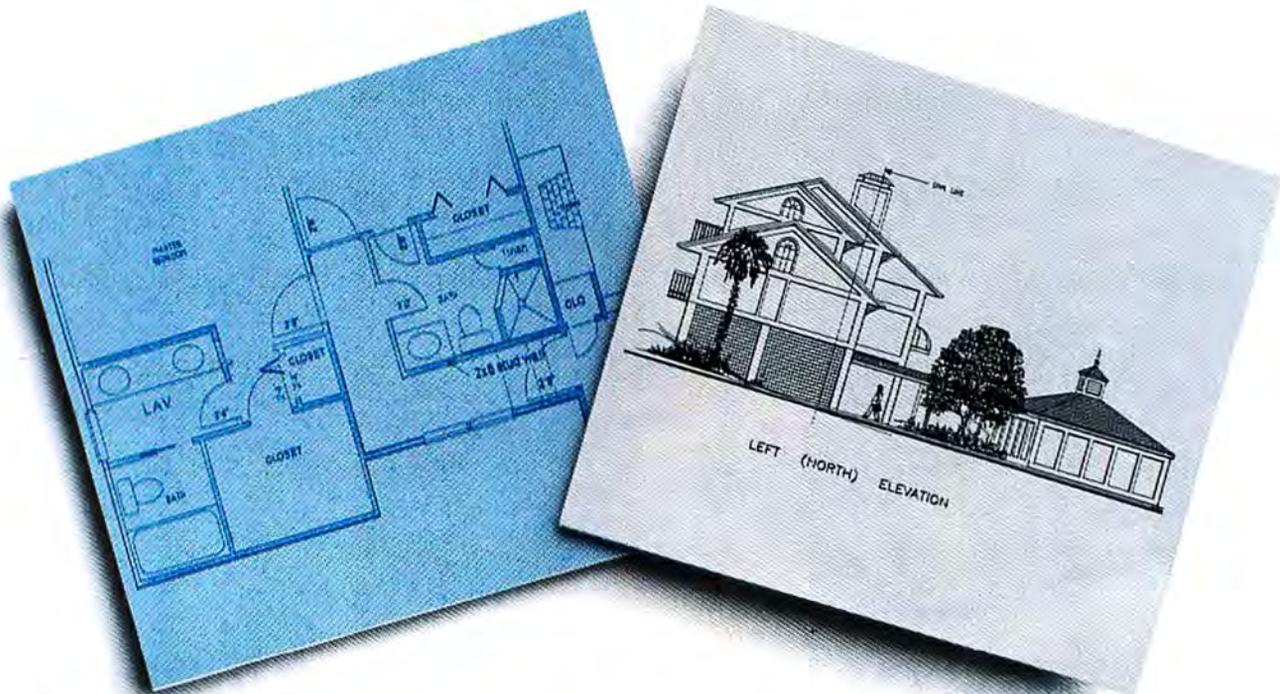
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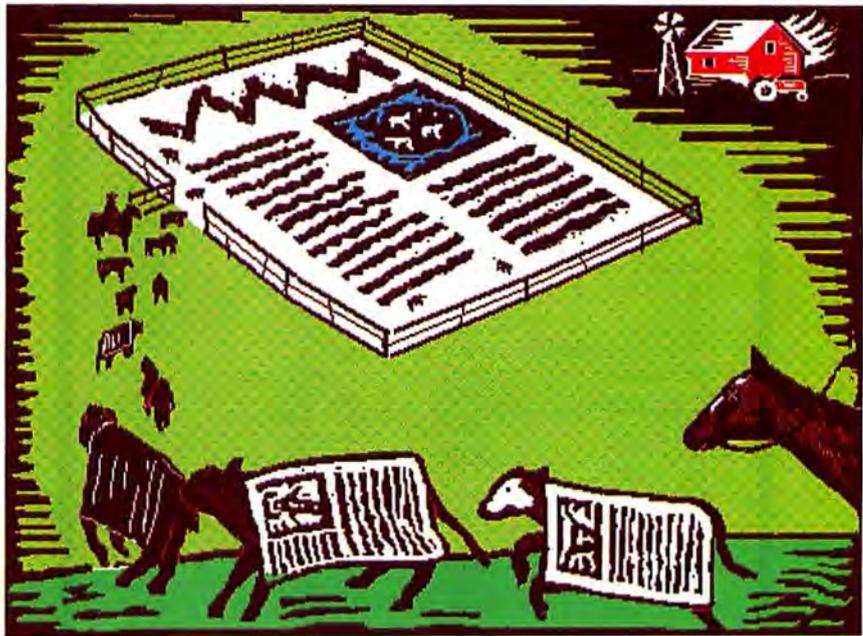
Not that page-makeup software isn't great. If you're putting out a line of program documentation or plan to self-publish your first novel, your investment in a program like *LetraPage*, *PageMaker*, or *ReadySetGo* will be well repaid.

But if you produce only the occasional newsletter, flier, or ad for your business, you may be surprised by what you can do with *MacDraw*, *MacPaint*, and *MacWrite*. This tried-and-true triad—in combination with *Switcher*—can duplicate many of the features of dedicated publishing programs. In fact, it can give you some amenities power publishers might envy, such as the ability to stretch and shrink text at will or to conform text to an irregularly shaped polygon.

To take advantage of the following tips, you'll need a Mac with two disk drives and at least 512K. If you have truly glacial patience, you won't need *Switcher*; most of us, however, will find these multiapplication tasks too slow without that handy utility. Other tools that can speed things along are *Art Grabber* and *PictureBase*, though their use will not be directly addressed here.

General Procedures

Because of its measuring, aligning, and text-formatting capabilities, and because it prints with laser fonts instead of bit maps, *MacDraw* will serve as your main pasteup window. By switching between it and other applications, you'll build up a finished document.



To begin a project, establish the number of pages for the document by selecting Drawing Size from the Layout menu. Then choose Reduce to Fit and use the rectangle tool to block out where you want various items to go. Reserve space for graphics with gray rectangles and for text with white rectangles.

Flowing Columns

One of the most impressive features of page-layout software is its ability to flow columns of text interactively between pages. Such programs enable you to make additions or deletions to one page of a multipage document without having to revise subsequent pages. Surprisingly, you can duplicate this capability in *MacDraw*. The only limitations are that the document must fit on five pages and the columns must be vertically aligned.

For most pasteup work, it's best to import text from a word processor into *MacDraw*. If you're using *MacDraw* only, or

have some other reason for composing in *MacDraw*, you must contend with the fact that *MacDraw* does not automatically scroll the page as the text you're entering drops through the bottom of the screen. You can minimize this inconvenience by creating a screenwide text-entry rectangle and using a small font. In this way you can work with a large quantity of text before you need to manually scroll the window to watch what you're entering.

When you've finished entering text, select its final font and style and resize the text block to the width of the final column. Because of word wrap, narrowing a column of text has a disproportionate effect on the column's length, so be careful not to unwittingly squeeze text through the bottom of the document.

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How To/Mac Tools

When you're checking to see if your column fits, don't trust the relative appearance of text in a Reduce to Fit view. This view displays most text blocks as occupying less space on the page than they actually use. Always examine the page borders in Normal Size after altering the width of a text block.

To create the environment for the long column:

- Choose Drawing Size from the Layout menu and select up to five vertical pages.

- Draw a rectangle the width of the intended column. Only the width is important; the height can be an inch. Extra text will simply spill past the bottom of the rectangle.

- Select the rectangle and paste in your text. A hidden requirement of *MacDraw* is that before pasting text you must type at least one character and then backspace over it. If you omit this step, *MacDraw* will paste your text in one continuous horizontal line.

The typed or pasted text will conform to the column width you have set and will flow into page after page. Any text that doesn't fit into the five vertical pages will disappear past the bottom of the last page. If you leave it in that state, you'll never see it. Make the column wider—the text will readjust itself, and the missing section will reappear.

To open gaps for headers and footers or for an illustration—without breaking up your text into separate blocks—insert spaces and carriage returns into the column. Do this from the top down and monitor the last page for overflow.

Mixing It Up

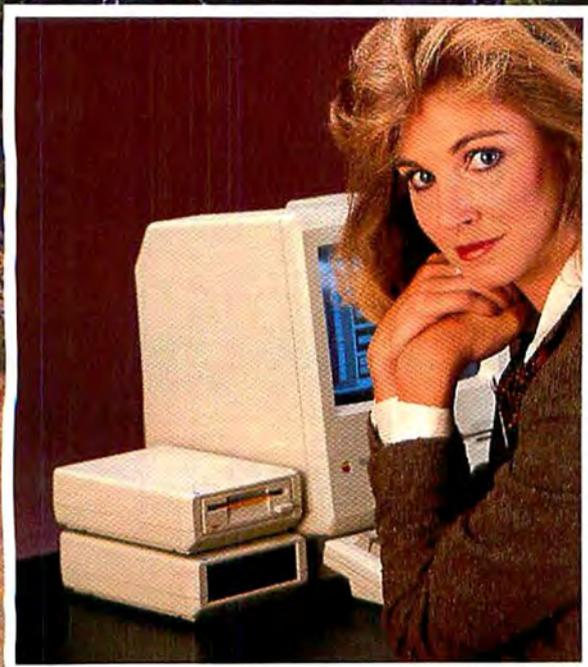
So there you are in *MacDraw* with your articles all in place. As a finishing touch, you decide to boldface the first sentence of your lead story. You select the text and then Bold from the Style menu and—zzzip! The entire story is boldfaced.

You have just encountered one of *MacDraw*'s serious limitations for desktop publishers: its inability to mix fonts and styles within one text block. That means no italics for titles of works, no bold for subheads, no superscript for footnotes. Getting around this restriction is a simple, if somewhat inelegant, process:

- When you've laid out your text the way you want it to appear, highlight the text you want to modify and choose Cut

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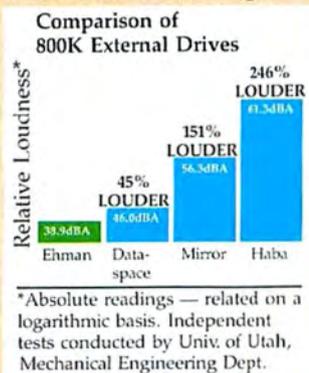
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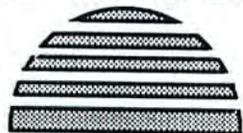
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Back to the MacDrawing Board

One of the most impressive features of page-layout software is its ability to flow columns of text interactively between pages. Such programs enable you to make additions or deletions to one page of a multi-page document without having to revise subsequent pages.

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you're entering. When you've finished entering text, select its final font and style and resize the text block to the width of the final column. Because of word wrap, narrowing a column of text has a disproportionate effect on the column's length, so be careful not to unwittingly squeeze text through the bottom of the document.

Special Effects with Text

You don't need special text-manipulation programs like *Text Effects* to produce striking display type for your

layouts. The graphics tools built into *MacPaint* and *MacDraw* give you capabilities to alter and enhance text far beyond anything in page-layout programs. For example, it's a simple matter to use *MacPaint*'s Invert function to create black-on-white text for dramatic initial capitals, callouts, or other display elements. You can only invert as much text in *MacPaint* as will fit into one window. If you need to invert a lot of text, do it one section at a time and later group the blocks into one unit. By keeping a rectangle the size of a *MacPaint* window in a *MacDraw* document, you can easily see when you should cut off each block of *MacDraw* text. Remember that any text that you transport into *MacPaint* for manipulation becomes a bit map and loses its laser font characteristics. As a general rule, if you don't like the appearance of such bit-mapped elements on the screen, don't bother to print them, since they will look the same on paper. You can now compose your text with full editing

continues

from the Edit menu. Type some carriage returns or spaces to open a gap for the enhanced text that will soon be placed there.

- Draw a rectangle that's as wide as the column you're working on. Don't worry about the column's depth. While the rectangle is still selected, type a space and immediately backspace over it (do not overlook this step!).

- Choose Paste from the Edit menu. The text excerpt will appear inside the new rectangle.

- With the newly pasted text selected, choose the desired font, size, or style from the appropriate menus. Your fancy text will readjust itself to fit the column width.

- Drag the fancy text block next to the spot where you plan to insert it, and use it as a visual guide for tailoring the gap you made in the original text block.

- Drag the fancy text into the gap and align it appropriately, then group the plain and fancy blocks together. If you need to re-edit the text, ungroup it first.

Of course, if you're only modifying a word at a time, you won't need to worry

about putting it in a rectangle to adjust the margins. Simply type the word off to one side, adjust the gap for it, and put it in place.

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(continues)

The Proof's on the Page

This newsletter mock-up was created without benefit of a page-make-up program, using only MacDraw, MacPaint, MacWrite, and the techniques described in this article.

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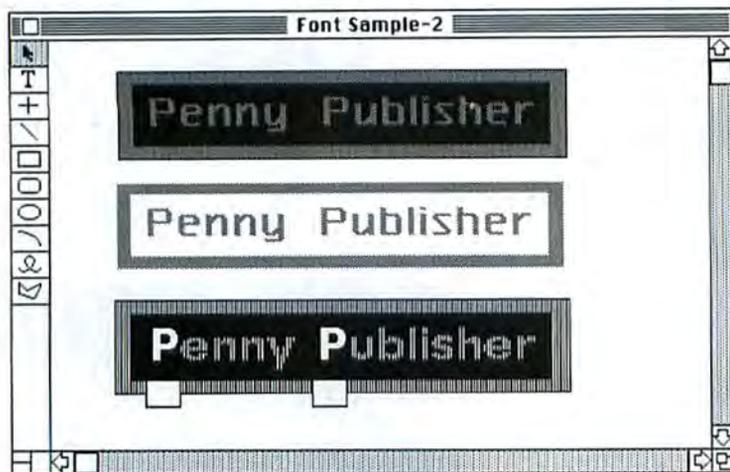
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Special Effects

Some examples of patterned text. By leaving the pattern panel for your text showing (bottom sample), you can experiment with different fill patterns. Once you're satisfied, simply resize the panel to hide it.



size of a *MacPaint* window in a *MacDraw* document, you can easily see when you should cut off each block of *MacDraw* text.

Remember that any text you transport into *MacPaint* for manipulation becomes a bit map and loses its laser font characteristics. As a general rule, if you don't like the appearance of such bit-mapped elements on the screen, don't bother to print them, since they will look the same on paper.

- Draw or paste an appropriately sized rectangle into your *MacDraw* document and, while it is still selected, choose a font, size, style, and alignment. You can now compose text with full editing freedom.

- To get a preview of the inversion, select the text tool and highlight the text by dragging the cursor. When you like what you see, reselect the text with the arrow pointer. Doing so will preserve its current font, size, and style when you copy it to *MacPaint*.

- Select Invert from the Edit menu.
- Copy and paste the text back into *MacDraw*. The inverted text block will appear as a graphic object, which you can no longer edit as text.

For a variation on inverted text, try "dropped out" (white) letters over a graphic. This technique can make for interesting captions—it saves page space and helps liven up a boring picture. Be sure, however, to try it only with relatively uncluttered graphics.

- Start in *MacPaint* with a *MacPaint* or *MacDraw* graphic no larger than the *MacPaint* window. Select Invert, and then paste the graphic into *MacDraw*.

- Type and arrange your caption off to one side of the graphic and choose None as a background fill for the caption. Position the text over the inverted graphic. Select both the graphic and the text, and copy and paste them into *MacPaint*.

- Invert the the whole assemblage.

If you want to reposition the caption or do other fine-tuning, simply return to *MacDraw*, where a copy of the negative image is still waiting. Outline and shadow styles work particularly well with this technique.



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Pattern Printing

Other techniques for creating custom display type make use of *MacDraw* and *MacPaint*'s fill patterns. Use the following tips to produce anything from splashy novelty type to tasteful heads in various shades of gray (see "Special Effects").

For basic patterned text:

■ Start in *MacPaint* and produce the text you want in outline style. Select a nice meaty font. If the font isn't substantial enough, use its bold version.

■ Pick a fill pattern—a tight pattern works best. Select the paint bucket and fill each letter, making sure that the hollow letters retain their white centers. Some letters in certain font and pattern combinations will require FatBits editing.

Use pattern-filled text by itself or combine it with identical unfilled text to produce a patterned shadow. The next two patterned variations—inverted and outline-free patterned text—begin with a block of inverted text, as described previously.

For inverted patterned text:

■ Paste an inverted text block into a *MacDraw* document. Create a large, pattern-filled rectangle over the text block

and send it to the back. The white text will assume the pattern of the background rectangle.

■ While the background rectangle is still selected, try different fill patterns.

You can vary the size of the rectangle so that it's hidden by the text block, or make it extend beyond the text block border to serve as a frame.

If you want, you can give the first letter of your patterned text a special look.

■ In *MacDraw*, create a small rectangle over the letter or letters you want to highlight, and select a fill pattern.

■ Select the text block and bring it to the front. The small rectangle's pattern will now fill the desired text.

To experiment with various fill patterns for your special letter(s), make the patterning rectangle long enough so that a portion of it protrudes below the text block (see "Special Effects"). This allows you to select the rectangle and change its pattern even after you've brought the text block to the front. When you're satisfied, reduce the length of the rectangle so that it's hidden.

To produce outline-free patterned text:

■ Copy your inverted patterned text as described previously and paste it back into

MacPaint. Now invert it; the black background block will disappear. Most patterns invert beautifully.

Crafty Cropping

It's time to add leaves to the tree. Few publishing jobs are complete without a few pictures. A basic feature of most page-makeup programs is the ability to crop graphics once you've imported them to the layout window. While *MacDraw* can resize imported images, it has no built-in tool for selecting portions of a picture.

Of course, you could crop your images in *MacPaint* prior to importing them to *MacDraw*. This procedure, however, is irreversible. Should you decide that you really want to show more of the cropped picture, you'll have to go back to the original graphic, recrop it, and paste it back into *MacDraw*.

The following method describes the construction and use of a flexible cropping tool (see "Down to Size"). Start with *MacDraw* active, an open document, and a bit map pasted into the layout from *MacPaint*.

(continues)

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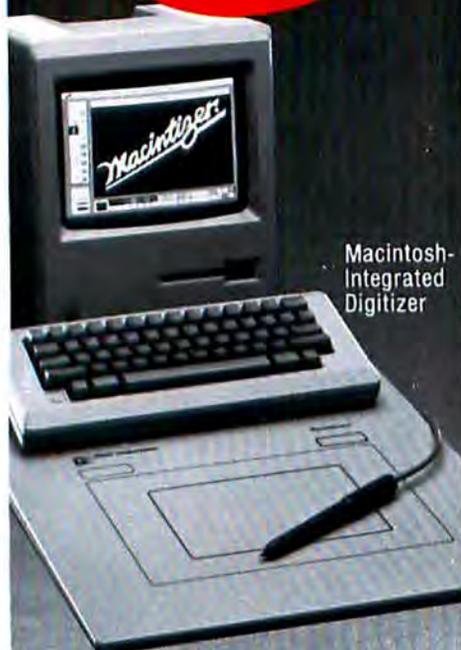
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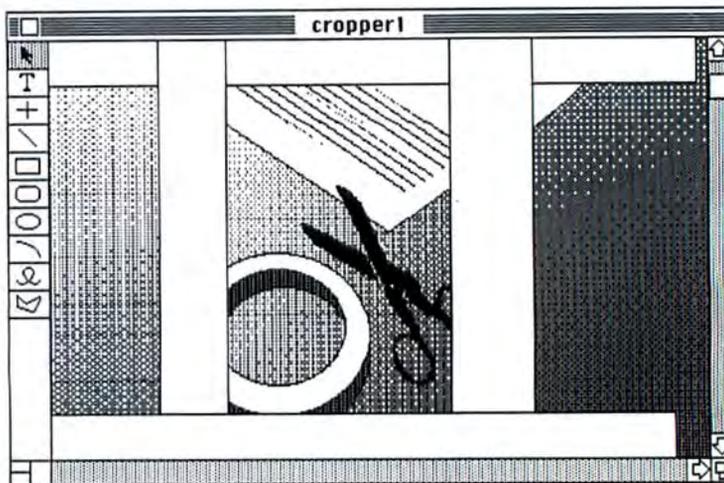
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How To/Mac Tools



Down to Size

This MacDraw cropper is more than just a visualization tool. Used correctly, it allows you to change the cropping after you've added an image to your document.

- Create four white rectangles: two horizontal and two vertical.

- Spread the rectangles into a picture-frame arrangement with a rectangular hole in the middle. This is your mask.

- Select the four rectangles by drawing a large marquee around them all or by shift-clicking each of them, and drag them on top of the bit map to be cropped. The graphic will now be roughly masked by the white rectangular frame.

- Fine-tune the masking effect by moving the mask rectangles around as separate elements.

- When you are satisfied with the masking job, resize the outer edges of the white rectangles so that any protruding sections of the bit map are completely covered.

- Select all the mask rectangles and group them. Then select both the mask and the painting and group them. Now the masked bit map is fit for traveling around your layout document in one piece.

- While you have the cropped bit map selected, choose None from the Pen menu. The white rectangles will become borderless, and their outer edges will blend with the white background.

- Position the cropped picture in your layout and send it to the back.

- If you are using a background pattern other than white and you want the masking rectangles to be invisible, their Fill pattern should be the same as the pattern used for the background on which the cropped picture will appear.

One final graphics tip: learn to exploit the differences between *MacDraw* and *MacPaint*. The transparency of *MacPaint* bit maps in *MacDraw* opens a world of possibilities for the imaginative designer. For example, graphic artists frequently add interest to a picture by applying a gradient

screen to it (as was done for the illustration in the figures). You can easily reproduce this technique using *MacPaint* and *MacDraw*.

- Paste a bit map from *MacPaint* into *MacDraw*. Using the freehand tool, construct a white mask to cover all areas of the bit-mapped picture you don't want to shade with the gradient. Send the mask to the back of the picture and group the two objects.

- Bring a previously created gradient into the work area and position it behind the picture; it will show through all the unmasked areas. Slide the picture on the gradient until you achieve the desired effect. Group the gradient with the previously created picture group.

- Use the cropping tool described earlier to hide the ends of the gradient.

Using this method rather than simply adding the background screen in *MacPaint* gives you the freedom to readjust the gradient screen or rearrange picture elements at any time by ungrouping the gradient and picture and adjusting their relative positions.

Obviously, this isn't an exhaustive account of *MacDraw* and *MacPaint* pasteup possibilities. Expand on the ideas here to create your own effects. After trying *MacDraw*-based pasteup for a while, you may opt for the convenience and features of a dedicated page-makeup program. Even if you move beyond *MacDraw*, you'll have some experience and know what features you do and don't need. But for desktop publishers on a budget, *MacDraw* is a versatile tool and a ready solution. □

See *Where to Buy* for product details.

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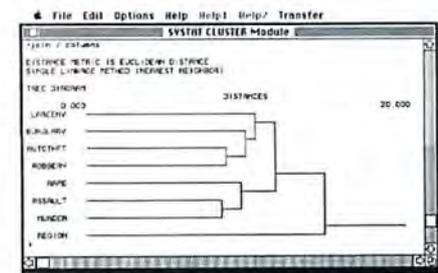
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CASE#	FIBRE	NETWORK	CLUST	MISCELL	OTHER
11	38 000	42 000	1 000	1 000	2 000
21	52 000	44 000	2 000	2 000	2 000
31	72 000	25 000	2 000	2 000	2 000
41	42 000	15 000	2 000	2 000	1 000
51	32 000	26 000	2 000	1 000	1 000
61	50 000	51 000	2 000	2 000	2 000
71	26 000	51 000	1 000	2 000	1 000
81	51 000	51 000	2 000	1 000	2 000
91	70 000	64 000	1 000	1 000	2 000
101	80 000	57 000	2 000	1 000	2 000
111	56 000	44 000	1 000	1 000	2 000
121	56 000	65 000	1 000	2 000	1 000
131	56 000	66 000	2 000	2 000	2 000
141	45 000	25 000	1 000	2 000	2 000
151	84 000	26 000	1 000	2 000	2 000

Command	Value	Label
OF	1	PROB
MODUL	1	845
USE	1	259
SUBMIT	1	1 000
OUTPUT	1	1 000
NOTE		
PRGE		
FORMAT		45 851
PRINT		22604
HELP		22617
BY		46 863
SELECT		22625
WEIGHT		22605
QUIT		22614

Command	Value	Label
Use SYSTAT file	KS	Module
Save SYSTAT file as...		
Edit SYSTAT file	KE	
Edit new		
Get ASCII file	KG	
Put ASCII file	KP	
Put ASCII file as...		
Submit file of SYSTAT commands		
Quit	KQ	



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"Linotype and Macintosh™ gave us the edge in text and graphics."

Bert Monroy

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"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 imagesetter, 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."

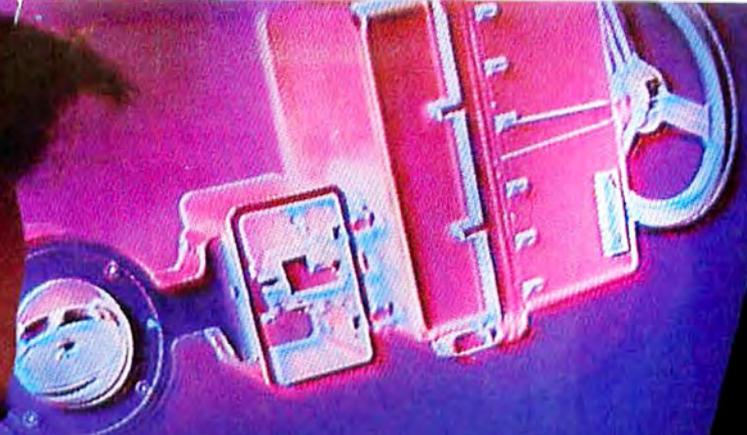
If you'd like to know more about the Linotronic 300, 100 or the Linotronic 500 wide-line (108-pica) laser imagesetter, contact: Linotype Company, 425 Oser Avenue, Hauppauge, NY 11788. Or call (516) 434-2016. In Canada, (416) 890-1809. And let our quality speak for itself.

This ad was composed on a Macintosh computer and output on a Linotronic 300 laser imagesetter.

Linotype



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EPR 5
EPR 4
EPR 3
EPR 2



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Updates

This list brings you the highlights of software updates recently received but not yet tested. The first price is the upgrade cost for registered owners; the second is the current list price.

Calliope Plus allows multiple fonts and style, type-size, and line-spacing changes. Innovision, P.O. Box 1317, Los Altos, CA 94023-1317, 415/964-2885. Free; \$99 new.

Copy II Mac version 6.3 includes a fully HFS-compatible *MacTools*. Central Point Software, 9700 S.W. Capitol Hwy. #100, Portland, OR 97219, 503/244-5782. \$18; \$39.95 new.

Design version 1.02 corrects bugs; has option for applying object changes to substructures; adds four text searches, a merge function, and complete object layering. Meta Software Corp., 55 Wheeler St., Cambridge, MA 02138, 617/576-6920. Free; \$200 new.

MacTEX version 2.0 is completely revised and includes an improved editor, automatic type coding of *MacWrite* or *Word 3.0* files with the option to make manual changes, flexible previewing capabilities, on-line help to describe Plain TEX commands, an automatic macro generator, and a translator for Adobe fonts. FTL Systems, 234 Eglinton Ave. E #205, Toronto, Canada M4P 1K5, 416/487-2142. Free; no more than \$750 new.

More version 1.1 has an undo command, selective text styling, multi-level bullet charting, keyboard control, and a disk-based National

Directory of Addresses and Telephone Numbers. Living Videotext, 2432 Charleston Rd., Mountain View, CA 94043, 415/964-6300. Free; \$295 new.

OverVue version 2.1. For more information see "Insights on OverVue."

PictureBase version 1.2 enhances use with HFS. It saves automatically and lets you view information in the Retriever, move graphics directly to a selected application, convert Scrapbook files to libraries, and merge libraries. Symmetry Corp., 761 E. University Dr., Mesa, AZ 85203, 602/844-2199. Free when original disk is returned, without disk \$10; \$69.95 new.

Rags to Riches version III increases flexibility with two new invoice formats, multiple fonts, sizes, styles, and full keyboard operation. Chang Labs, 5300 Stevens Creek Blvd., San Jose, CA 95129-1088, 408/246-8020. \$49.95 per module and 50 percent discount for extended-support customers; \$199.95-\$399.95 per module.

Spellswell version 1.3 saves option settings; supports *Microsoft Works*, *More*, and *Jazz*; and has an enlarged, 93,000-word dictionary. This version contains expanded proofreading capabilities and improved speed. Working Software, 15 Via Chualar, Monterey, CA 93940. \$17.50 for purchases before Oct. 1, 1986, \$2.50 for purchases after that date; \$74.95 new. □

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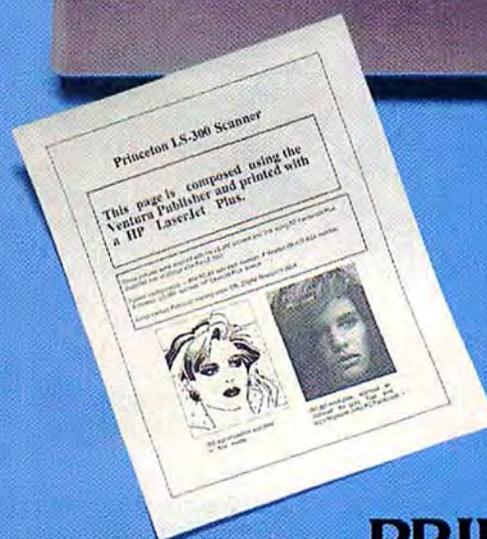
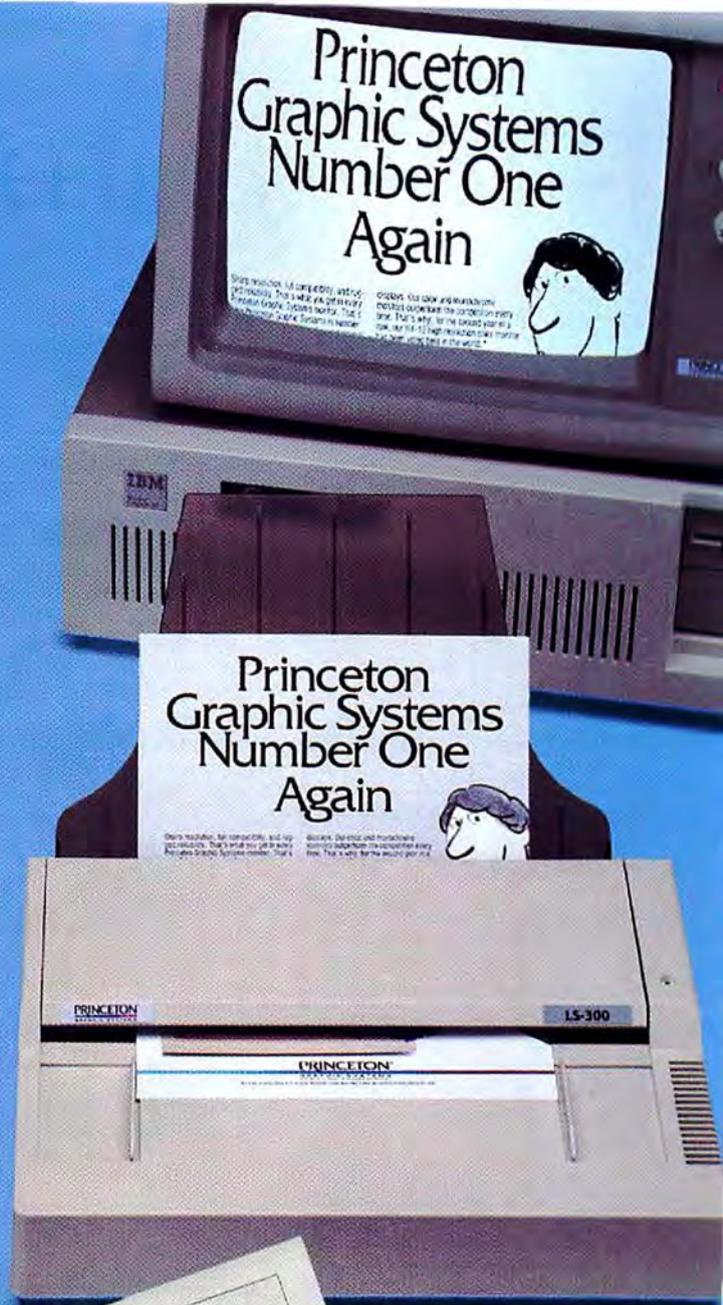
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■ Services

○ Data Conversion

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CompuData Translators, Inc., 6565 Sunset Blvd. #301, Hollywood, CA 90028, 213/462-6222

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Conversion services for your Macintosh, to or from over 800 computer systems:

- Mag tapes
- Microcomputers
- Word Processors
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Our conversion capabilities include to or from 3½-inch, 5¼-inch, and 8-inch disks & mag tapes.

Pivar Computing Services, Inc., 165 Arlington Heights Rd., Dept MC, Buffalo Grove, IL 60089, 312/459-6010

○ Desktop Publishing

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Mac/PC typesetting. Disk or modem. 300-dot LaserWriter™ output: 635-, 1270-, or 2540-line Linotype™ L300P output. Composition, page makeup, printing/bindery services. Hardware/software sales, services, and support; beginning and advanced training and seminars for Macintosh, PC, and Linotype 100/300 users. MacTypeNet™, P.O. Box 52188, Livonia, MI 48152-0188, 313/477-2733

Laser Printing Services

LaserWriter (300-dpi)/Linotype L100 (1270-dpi) output of your Mac/IBM files. Disk or modem. 24 hr. service. Linotype \$5 per page (\$3.50 volume discount). LaserWriter \$50 per pg. Desktop publishing specialists in consulting & design services. Hardware/software sales. Xerox Ventura Publisher for sale at low price. Full offset printing & bindery services avail.

Laser Printing Services, 26058 W. 12-Mile Rd., Southfield, MI 48034, 313/356-1004 (MI), 800/722-3475 (nat'l) Modem: 313/356-3186

○ Graphics/Printing

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Waldman Graphics, 9100 Pennsauken Hwy., Pennsauken, NJ 08110, 212/925-2420, 215/627-7200, 201/552-8778, 609/662-9111

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Printed Circuit Photoplotting Service for Vamp/McCAD and Bishop. Graphics Quick Circuits users. Next-day turnaround is standard. Able to drive photoplotter with Macintosh floppy. Modem available. Quick Circuits Gerber Translator. Pricing by film size. CAD design service and fabrication also avail.

Design Express, Inc., 80 S. Lake Ave. #820, Pasadena, CA 91101, 213/681-0304

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Alphabet Soup Inc., 900 North Point St., San Francisco, CA 94109, 415/885-3156. Alphabet Soup is an Authorized Apple VAR

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Personal Computer Peripherals Corp., 6204 Benjamin Rd., Tampa, FL 33634, 813/884-3092,
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Communications

Mac2624: HP CRT Emulator

Lets your Mac emulate the HP2624, HP2392, and HP2394, reliably running all HP3000 software. Implements HP modes, parameters, keyboard features, and display characteristics within the Mac's mouse/menu/⌘-key environment.

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Pacer Software, Inc., 7911 Herschel Ave. #402, La Jolla, CA 92037,
619/454-0565

MAC3000: HP Emulation

MAC3000 provides full terminal emulation of the Hewlett Packard 2624, HP2392, as well as DEC VT-100, IBM3278, & TTY Terminals.

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- Radco & Associates/Fit to Print, 17746 W. Sierra Hwy., Canyon Country, CA 91351, 805/298-7251

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○ Engineering

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 - Package including 7400, analog libraries, and net list utility \$199.95
- Capitano Computing, 300-1120 Hamilton St., Vancouver, B.C., Canada, V6B 2S2 604/669-6343

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File Conversion

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Phillips Software, 1633 Commonwealth Ave., West Newton, MA 02165, 617/332-1373

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○ Medical

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Western Software Associates, 110 El Dorado Rd., Walnut Creek, CA 94595, 415/935-3673

○ Printer Drivers

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Advertiser Index

Reader Service Number

463 AST Research, Inc., 8-9
678 Adobe Systems, Inc., 44-45
306 Aldus Corp., 64-65
691 Allied Linotype, 214
227 Altsys Corp., 172-173
21 BASF, 215
490 Bede Tech, 178-179
627 Bering Industries, Inc., 86
373 Best Computer Supplies, 92
588 Blyth Software, 35
381 Borland Int'l., IFC-1
38 Bravo Technologies, Inc., 197
— CasadyWare, 54
669 Casey's Page Mill, 52
607 Central Point Software, 46
524 Centram, 68-69
697 Circo Business Solutions, 36-37
650 Clearview Software, 70
636 Compu-Teach, 198
496 CompuCover, 52
330 CompuServe, 177
271 Computer Friends, 38
611 Coral Software, 186
684 Cricket Software, 79
685 Cricket Software, 81
615 DEST, 10-11
637 Datacube, 98
354 DataSpace, Corp., 102
662 Data Tailor, Inc., 195
281 DataViz, Inc., 194
687 Davka Corp., 46
606 Design Science, 208
562 Diskette Connection, 234
645 Dynamac, 187
600 E-Machines, Inc., 96
193 Echo Data Services, 225
602 Elman Engineering, 205
674 Enchanted Software, 201
677 Ergotron, 182
676 Ergotron, 52
683 Firebird Licenses, Inc., 183
144 Forethought, Inc., 170
289 Forethought, Inc., 24-25
— GE Information Services, 207
323 GTCO Corp., 212
143 General Computer, 56-57
682 Greene, Inc., 54
530 I/O Design, Inc., 82
272 Icon Review, 48-51
668 Infinity Computer Products, 193
249 Infosphere, IBC
308 Innovative Data Design, Inc., 200
589 Internet, 100
570 Jasmine Technologies, Inc., 76-77
599 Kameron Labs, 23
11 Kensington, 18, BC
664 LaserWare, Inc., 226
238 Layered, 72-73
652 Letraset, 190
493 Levco, 175
238 Lionheart, 216
— Living Videotext, 12, 16-17
654 Logic Array, 199
395 Mac Doctor Electronics, 210
— MacConnection, 108-111
673 MacLine, 58
1 MacMemory, 30-31
16 MacStore, 230
593 MacNeal-Schwendler Corp., The, 193
368 MacRentals, 59
653 Macropac Int'l., 104
689 Megasoft, 174
675 Meta Software, 60
219 Micro Analyst, Inc., 188
235 Micrographic Images, 211
— Microsoft, 20-21, 78
585 Microtek, 34

Reader Service Number

694 Migent, 40-41
40 Mirror Technologies, 39
633 Nantucket Corp., 231
688 Nordic Software, 174
695 On-Line Store, The, 216
547 Owl Int'l., 26
— PC Connection, 108-111
45 PC Network, 168-169
509 Peripheral Land, 185
223 Personal Computer Peripherals Corp., 189
560 Personal Training Systems, 80
211 Practical Computer Applications, Inc., 74
656 Princeton Graphic Systems, 217
77 ProVUE Development Corp., 6
194 Programs Plus, 83-85
334 Public Domain Exchange, The, 230
577 Radius, Inc., 15
630 SBT Corp., 229
635 STSC, Inc., 90
693 Safeware, 232
— Satori Software, 106
649 Searchlink, 233
266 Silicon Beach Software, 87, 89, 91
690 SoftStyle, 53
435 Software Discoveries, Inc., 88
655 Solutions, Int'l., 66
582 Solutions, Int'l., 66
225 StatSoft, 182
— Subroutines, 209
618 Sun Remarketing, 206
— SuperMac Technology, 61, 63
491 Systat, Inc., 213
686 Systat, Inc., 213
332 T/Maker Co., 75
461 Tangent Technologies, 180
478 Target Software, 42
659 Target Software, 62
643 Think Technologies, Inc., 7
167 Thunderware, Inc., 94
483 Tussey Computer Products, 33
134 USA-Flex, 176
537 Uptime, 5
672 Vertical Business Software, 202
459 Vision Technologies, 204
439 Warp Nine Engineering, Inc., 28-29
374 Williams & Macias, 71
681 Working Software, Inc., 47

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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
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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
781	782	783	784	785	786	787	788	789	790	791	792
793	794	795	796	797	798	799	800	999			

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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

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Product Index

Reader
Service
Number

■ Software

Business

- 678 Adobe Systems, Inc., 44-45
- 306 Aldus Corp., 64-65
- 381 Borland Int'l., IFC-1
- 38 Bravo Technologies, Inc., 197
- 697 Circo Business Solutions, 36-37
- 611 Coral Software, 186
- 684 Cricket Software, 79
- 685 Cricket Software, 81
- 662 Data Tailor, Inc., 195
- 674 Enchanted Software, 201
- 683 Firebird Licenses, Inc., 183
- 144 Forethought, Inc., 170
- 289 Forethought, Inc., 24-25
- 249 Infosphere, IBC
- 589 Internet, 100
- 238 Layered, Inc., 72-73
- 652 Letraset, 190
- 238 Lionheart, 216
- Living Videotext, 12, 16-17
- 653 Macropac Int'l., 104
- 675 Meta Software, 60
- Microsoft, 20-21
- 633 Nantucket Corp., 231
- 547 Owl Int'l., 26
- 560 Personal Training Systems, 80
- 630 SBT Corp., 229
- Satori Software, 106
- 690 SoftStyle, Inc., 53
- 435 Software Discoveries, Inc., 88
- 582 Solutions, Inc., 66
- 655 Solutions, Inc., 66
- 686 Systat, Inc., 213
- 491 Systat, Inc., 213
- 643 Think Technologies, 7
- 672 Vertical Business Software, 202

Vertical

- 593 MacNeal-Schwendler Corp., The, 193
- Satori Software, 106

Data Management

- 588 Blyth Software, 35
- 381 Borland Int'l., IFC-1
- 662 Data Tailor, Inc., 195
- 144 Forethought, Inc., 170
- 653 Macropac Int'l., 104
- 77 ProVUE Development Corp., 6

Word Processing

- 606 Design Science, 208
- Microsoft, 78
- 332 T/Maker Co., 75
- 478 Target Software, 42
- 681 Working Software, Inc., 47

Communications

- 524 Centram, 68-69
- 281 DataViz, Inc., 194
- 249 Infosphere, IBC
- 589 Internet, 100
- 334 Public Domain Exchange, The, 230
- 461 Tangent Technologies, 180
- 643 Think Technologies, 7

Educational

- 636 Compu-Teach, 198
- 560 Personal Training Systems, 80
- 688 Nordic Software, 174
- 225 StatSoft, 182

Graphics/Desktop Publishing

- 678 Adobe Systems, Inc., 44-45
- 306 Aldus Corp., 64-65

Reader
Service
Number

- 227 Altsys Corp., 172-173
- CasadyWare, 54
- 669 Caseys' Page Mill, 52
- 650 Clearview Software, 40
- 684 Cricket Software, 79
- 685 Cricket Software, 81
- 606 Design Science, 208
- 289 Forethought, Inc., 24-25
- 308 Innovative Data Design, Inc., 200
- 664 LaserWare, Inc., 226
- 652 Letraset, 190
- Living Videotext, 12, 16-17
- 675 Meta Software, 60
- 547 Owl Int'l., 26
- 334 Public Domain Exchange, The, 230
- 266 Silicon Beach Software, 87, 89, 91
- 690 SoftStyle, Inc., 53
- 374 Williams & Macias, 71

Desktop Engineering

- 606 Design Science, 208

Personal Business/Home

- 547 Owl Int'l., 26
- 374 Williams & Macias, 71

Entertainment

- 211 Practical Computer Applications, Inc., 74

Language/Development Systems

- 381 Borland Int'l., IFC-1
- 611 Coral Software, 186
- 687 Davka Corp., 46
- 635 STSC, Inc., 90

Utilities

- 607 Central Point Software, 46
- 682 Greene, Inc., 54
- 653 Macropac Int'l., 104
- 219 Micro Analyst, Inc., 188
- 690 SoftStyle, Inc., 53
- 659 Target Software, 62

Miscellaneous

- 306 Aldus Corp., 64-65
- 330 CompuServe, 177
- GE Information Services, 207
- 589 Internet, 100
- 560 Personal Training Systems, 80
- 334 Public Domain Exchange, The, 230
- Satori Software, 106
- 537 Uptime, 5
- 374 Williams & Macias, 71

■ Hardware

Computer Systems

- 645 Dynamac, 187

Boards

- 1 MacMemory, 30-31
- Digitizers/Scanners
- 615 DEST, 10-11
- 637 Datacopy, 98
- 585 Microtek, 34
- 656 Princeton Graphic Systems, 217
- 167 Thunderware, Inc., 94

Reader
Service
Number

Display

- 600 E-Machines, Inc., 96
- 235 Micrographic Images, 211
- 577 Radius, Inc., 15

Modems

- 694 Migent, 40-41

Hard Disks/Storage

- 463 AST Research, Inc., 8-9
- 627 Bering Industries, Inc., 86
- 602 Ehman Engineering, 205
- 143 General Computer, 56-57
- 570 Jasmine Computer Systems, 76-77
- 599 Kameron Labs, 23
- 493 Levco, 175
- 654 Logic Array, 199
- 40 Mirror Technologies, 39
- 695 On-Line Store, The, 216
- 509 Peripheral Land, 185
- 223 Personal Computer Peripherals Corp., 189
- SuperMac Technology, 61, 63
- 439 Warp Nine Engineering, Inc., 28-29

Miscellaneous

- 691 Allied Linotype, 214
- 271 Computer Friends, 38
- 354 DataSpace Corp., 102
- 323 GTCO Corp., 212
- 11 Kensington, 18, BC
- 395 Mac Doctor Electronics, 210
- 1 MacMemory, 30-31
- 618 Sun Remarketing, 206

Reader
Service
Number

■ Accessories

Floppy Disks/holders

- 21 BASF, 215
- 562 Diskette Connection, 234
- 193 Echo Data Services, 225
- 668 Infinity Computer Products, 193
- 368 MacRentals, 59
- 689 Megasoftware, 174

Miscellaneous

- 490 Bede Tech, 178-179
- 373 Best Computer Supplies, 92
- 496 CompuCover, 52
- 676 Ergotron, 52
- 677 Ergotron, 182
- 530 I/O Design, Inc., 82
- 11 Kensington, 18, BC
- 693 Safeware, 232

■ Mail Order

- 373 Best Computer Supplies, 92
- 272 Icon Review, 48-51
- MacConnection, 108-111
- 673 MacLine, 58
- 16 MacStore, 230
- PC Connection, 108-111
- 45 PC Network, 168-169
- 194 Programs Plus, 83-85
- 483 Tussey Computer Products, 33
- 134 USA-Flex, 176
- 459 Vision Technologies, 204

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Accountant, Inc.

Version 1.0. SoftSync, Inc., 162 Madison Ave., New York, NY 10016, 212/685-2080. 512K minimum memory; requires an external drive; Mac Plus with hard disk recommended. \$299.95.*

Achbar

Version 2.03. Davka Corp., 845 N. Michigan Ave. #843, Chicago, IL 60611, 312/944-4070, 800/621-8227. Key-disk copy protection. 512K minimum memory; external drive recommended. \$249.95; \$25 extra for two Hebrew fonts that work with vowels; \$99 extra for four Hebrew laser fonts.

Acta

Version 1.2. Symmetry Corp., 761 E. University Dr., Mesa, AZ 85203, 602/844-2199, 800/624-2485. 128K minimum memory; 512K recommended. \$59.95.

Alkaatib

Version 1.2. Eastern Language Systems, Inc., 240 E. Center St., Provo, UT 84601, 801/377-4558. Key-disk copy protection; installs on hard disks. 128K minimum memory. \$199; \$199 for *Alkaatib* laser fonts.

Apple Personal Modem

Apple Computer, Inc., 20525 Mariani Ave., Cupertino, CA 95014, 408/996-1010. 128K minimum memory. \$399 for 300/1200-baud modem.

Appleline

Apple Computer, Inc., 20525 Mariani Ave., Cupertino, CA, 95014, 408/996-1010. Requires software such as *MacTerminal*, *LisaTerminal*, or *Access 3270*. \$1295.

Arabic and Persian Fonts and Word Processors

(See *Alkaatib*, *MacArabic*, and *Foreign Fonts Edition*)

Armenian Font

(See *Foreign Language Fonts*.)

Bengali Font

(See *Foreign Language Fonts*.)

BrushWriter

Kaihin Technology Pte. Ltd., 35 Tannery Block #03-01, Ruby Industrial Complex, Singapore 1334; no phone number listed.

Burmese Font

(See *Foreign Language Fonts*.)

Chinese Word Processors

(See *BrushWriter* and *FeiMa*.)

Cricket Draw

Version 1.01. Cricket Software, Inc., 3508 Market St. #206, Philadelphia, PA 19104, 215/387-7955, 800/345-8112, 800/662-2444 in California. 512K minimum memory; LaserWriter recommended. \$295.

Cyrillic Font

(See *Foreign Language Fonts*, *MacCyrillic*.)

DCF II/5251, DCF II/3270

Wall Data, 17769 N.E. 78th Pl., Redmond, WA 98052, 206/883-4777, 800/433-3388. 128K minimum memory. \$3995 for 6 ports, \$4995 for 10 ports, \$5995 for 18 ports.

Devanagari and Tamil Fonts

George Hart, Dept. of South and Southeast Asian Studies, 1203 Dwinelle Hall, UC Berkeley, Berkeley, CA, 94720, 415/642-4564. 128K minimum memory. \$10; \$20 for Tamil laser fonts.

Digital Link

Version 1.2. Digital Creations, Inc., 1333 Howe Ave. #208, Sacramento, CA 95825, 916/344-4825. 128K minimum memory. \$69.95.

Dimensions

Version 1.15. Visual Information, Inc., 16309 Double Grove, La Puente, CA 91744, 818/918-8834. Limits number of floppies; will copy to hard disks. 512K minimum memory; requires 800K storage; Mac Plus with a hard disk recommended. Design Dimensions: black-and-white \$750; color \$1395. Solid Dimensions: black-and-white \$395; color \$1295. Full Design Dimensions with color \$2495.

EarthPlot

Version 2.0. Public domain software. 512K minimum memory. Free.*

Easy3D

Version 1.01. Enabling Technologies, 600 S. Dearborn St. #1304, Chicago, IL 60605, 312/427-0408. 512K minimum memory; ImageWriter or ImageWriter II recommended. \$149.

Edit

Version 1.01. APDA, 290 S.W. 43rd St., Renton, WA 98055. 128K minimum memory. \$25 for members only; bundled with *Mac Development Utilities*.

EgBridge

Version 2.0. Qualitas Trading Co., 323 Monte Vista Ave. #307, Oakland, CA 94611, 415/547-1520. Key-disk copy protection. 512K minimum memory; MPS-compatible only. \$249.

EgWord

Version 2.2. Qualitas Trading Co., 323 Monte Vista Ave. #307, Oakland, CA 94611, 415/547-1520. Key-disk copy protection. 512K minimum memory. \$399.

European Language Fonts

(See *SuperFrench German Spanish UltraFonts*, *Fluent Fonts*, *Fluent Laser Fonts*, *Foreign Fonts Edition*, and *Mac the Linguist*.)

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.

FeiMa

Version 3.1. Unisource Software Corp., 23 East St., Cambridge, MA 02141, 617/577-8888. Key-disk copy protection. 512K minimum memory. *FeiMa* \$395, *FeiMa-S* (student version) \$195, *FeiMa II* \$545 (includes additional character set and a converter for transforming traditional into simplified characters).

Ferrari Grand Prix

Bullseye Software, P.O. Box 7900, Incline Village, NV 89450, 702/831-2523. Not copyable. 512K minimum memory. \$59.95.*

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Fluent Fonts

Version 1.1. CasadyWare, Inc., Box 223779, Carmel, CA 93922, 408/646-4660, 800/331-4321 (orders only), 800/851-1986 in California (orders only). 128K minimum memory; 512K recommended. \$49.95.

Fluent Laser Fonts

Version 1.0 for volumes 1-6; version 2.0 for volumes 7-15. CasadyWare, Inc., Box 223779, Carmel, CA 93922, 408/646-4660, 800/331-4321 (orders only), 800/851-1986 in California (orders only). 512K minimum memory. \$69.95 per volume.

Fontastic

Version 2.7. Altsys Corp., 720 Ave. F #108, Plano, TX 75074, 214/424-4888. 128K minimum memory; 512K or Mac Plus recommended. \$49.95.

Foreign Fonts Edition

Version 1.0. Devonian International Software, P.O. Box 2351, Montclair, CA 91763, 714/621-0973. 512K minimum memory. \$49.50 plus \$3.00 shipping and handling; includes collection of 22 foreign language fonts.

Foreign Language Fonts

Version 3.2. Ecological Linguistics, P.O. Box 15156, Washington, DC 20003-0156, 202/546-5862. 128K minimum memory. \$30 per alphabet; over 30 different alphabet systems available.

General Accounting

Version 1.00. BPI Systems, Inc., 3001 Bee Cave Rd., Austin, TX 78746, 512/328-5400, 800/531-5252. 512K minimum memory; external drive recommended. \$249.

Georgian Font

(See *Foreign Language Fonts*.)

Grafterm

Version 2.4. Shareware, also available from Infrastructure Software, 5826 Highland Terrace #1, Middleton, WI 53562, 608/831-0066. 128K minimum memory.

Graphidex

Version 1.1. Brainpower, Inc., 24009 Ventura Blvd., Calabasas, CA 91302, 818/884-6911. 512K minimum memory. \$124.95.*

Greek Fonts

(See *SuperGreek* and *SMK GreekKeys*)

GridMaker

Version 1.0. Folkstone Design, Inc., P.O. Box 86982, North Vancouver, B.C., Canada V7L 4P6, 604/986-8060. 128K minimum memory. \$49.*

Griffin Terminal 100

Version 86.06.01. Metaresearch, Inc., 1211 S.W. Fifth #2860, Portland, OR 97204, 503/228-5806. 128K minimum memory. \$99.

Gujarati Font

(See *Foreign Language Fonts*.)

Hakotev

Version 1.0. Eastern Language Systems, Inc., 240 E. Center St., Provo, UT 84601, 801/377-4558. Key-disk copy protection; installs on hard disks. 128K minimum memory. \$99; \$99 for *Hakotev* laser fonts.

Hayes Modems

Hayes Microcomputer Products, Inc., P.O. Box 105203, Atlanta, GA 30348, 404/441-1617. 128K minimum memory. Smartmodem 1200 approximately \$599, Smartmodem 2400 approximately \$899.

Hebrew Fonts and Word

Processors

(See *Achbar*, *Hakotev*, *SuperHebrew*, and *Foreign Fonts Edition*.)

InBox

Version 2.0. Think Technologies, Inc., 420 Bedford St. #350, Lexington, MA 02173, 617/863-5590. 512K minimum memory. \$295.

Indian and Southeast Asian

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(See Sanskrit, Bengali, Gujarati, Kannada, Telugu, Malayalam, Thai, Khmer, Lao, Burmese, and Devanagari and Tamil.)

Inside Macintosh

Apple Computer, Inc., 20525 Mariani Ave., Cupertino, CA 95014, 408/996-1010. \$24.95 for volumes 1, 2, and 4, \$19.95 for volume 3.

inTalk

Version 2.11. Palantir Software, 12777 Jones Rd. #100, Houston, TX 77070, 713/955-8880, 800/368-3797, 800/831-3119 in Texas. 512K minimum memory; requires modem. \$195.

InterMail

Version 1.0. Internet, 20 Amy Circle, Waban, MA 02168, 617/965-5239. 512K minimum memory; requires AppleTalk; hard disk recommended. \$299.95 for 1-4 users, \$499.95 for 5-10 users, \$749.95 for 11-20 users, \$949.95 for 21 or more users. Product is site licensed.*

Japanese Fonts and Word

Processors

(See *EgWord* and *MacKana & Basic Japanese Kanji*.)

Jazz

Version 1A. Lotus Development Corp., 55 Cambridge Pkwy., Cambridge, MA 02142, 617/577-8500. Key-disk copy protection; installs on hard disks. 512K minimum memory; requires external drive. \$395.

Kannada Font

(See *Foreign Language Fonts*.)

Khmer Font

(See *Foreign Language Fonts*.)

Korean Fonts

(See *MacKorean*.)

LabVIEW

Version 1.0. National Instruments, 12109 Technology Blvd., Austin, TX 78727, 512/250-9119, 800/531-4742, 800/433-3488 in Texas. 1MB minimum memory; Mac Plus with hard disk recommended. \$1995.*

Lao Font

(See *Foreign Language Fonts*.)

Lao Font

David Wyatt, Dept. of History, Cornell University, McGraw Hall, Ithaca, NY 14853; no phone number listed.

LogicWorks

Version 1.02. Capilano Computing Systems Ltd., P.O. Box 86971, North Vancouver, B.C., Canada V7L 4P6, 604/669-6343. 512K minimum memory; HFS (two disk drives recommended). \$159.95, with symbols library and utility package \$199.95.

MacAdios

GW Instruments, P.O. Box 2145, Cambridge, MA 02141, 617/625-4096. 512K minimum memory; external drive recommended. \$2500.

MacArabic Font

James Slater, 6207 Olentangy River Rd., Worthington, OH 43085, 614/846-7279.

MacAtlas

MicroMaps, P.O. Box 757, Lambertville, NJ 08530, 609/397-1611. 128K minimum memory; 512K with external drive recommended. \$199.*

MacCyrillic

Version 1.0. Linguists' Software, 106R Highland St., South Hamilton, MA 01982, 617/468-3037. 128K minimum memory. \$49.95; *LaserCyrillic* \$149.95.

MacDraft

Version 1.2A. Innovative Data Design, Inc., 2280 Bates Ave., Concord, CA 94520, 415/680-6818. 512K minimum memory; external drive or hard disk recommended. \$269.

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Version 1.9. Apple Computer, Inc., 20525 Mariani Ave., Cupertino, CA 95014, 408/996-1010. 128K minimum memory; 512K and external drive recommended. \$195.

Mac/5251

Perle GSD Ltd., 600 S. Dearborn St. #507, Chicago, IL 60605, 312/461-0453. 128K minimum memory. \$1595

Macintosh 68000 Development System

Version 2.0. Apple Computer, Inc., 20525 Mariani Ave., Cupertino, CA 95014, 408/996-1010. 128K minimum memory. \$195.

MacKana & Basic Japanese Kanji

Version 1.3. Linguists' Software, 106R Highland St., South Hamilton, MA 01982, 617/468-3037. 128K minimum memory. \$79.95.

MacKermit

Version 0.8(34). Columbia University Center for Computing Activities, 612 W. 115th St., New York, NY 10025, 212/280-3703. 128K minimum memory. \$10 per disk, \$5 for user's guide.

MacKeymeleon

Version 1.3G. Avenue Software, Inc., 1173 Charest West, Quebec City, Quebec, Canada G1M 2C9, 418/682-3088. 128K minimum memory. \$49.95.

MacKorean

Version 3.7. Linguists' Software, 106R Highland St., South Hamilton, MA 01982, 617/468-3037. 128K minimum memory. \$79.95.

MacLine

Version 2.0. TouchStone Software, 909 Electric Ave., Seal Beach, CA 90740, 213/598-7746, 800/531-0450. Key-disk copy protection. 512K minimum memory. \$145.

MacMainFrame

Version 2.0. Avatar Technologies, 99 South St., Hopkington, MA 01748, 617/435-6872. 512K minimum memory; requires MacTerminal or Jazz. \$1295; Host File Transfer software for mainframe \$500; CICS, CMS, or TSO versions available.

MacPaint

Version 1.5. Apple Computer, Inc., 20525 Mariani Ave., Cupertino, CA 95014, 408/996-1010. 128K minimum memory; 512K and external drive recommended. \$125.

MacPerspective

Version 3.0. B. K.ack Drafting, 313 Marlin Pl., Melbourne Beach, FL 32951, 305/727-8071. 512K minimum memory. \$149.

MacSpace Pro

Version 1.5. Abvent, 9903 Santa Monica Blvd. #268, Beverly Hills, CA 90212, 213/659-5157. Key-disk copy protection. \$625.

MacTerminal

Version 2.1. Apple Computer, Inc., 20525 Mariani Ave., Cupertino, CA 95014, 408/996-1010. 128K minimum memory; requires Apple- or Hayes-compatible modem. \$125.

Mac the Linguist

Version 2.0. Megatherium Enterprises, P.O. Box 7000-417, Redondo Beach, CA 90277, 213/545-5913. 128K minimum memory. \$40.

Mac3D

Version 2.0. Challenger Software Corp., 18350 Kedzie Ave., Homewood, IL 60430, 312/957-3475, 800/858-9565. 512K minimum memory; requires external drive or hard disk. \$249

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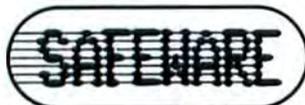
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MacTransliterator

Version 2.0. Linguists' Software, 106R Highland St., South Hamilton, MA 01982, 617/468-3037. 128K minimum memory. Bundled with *MacPhonetics*, which includes International Phonetic Alphabet and Summer Institute of Linguistics' Character Set \$79.95; for *LaserTransliterator* \$99.95.

Mac240

Version 1.3. White Pine Software, 75 Rt. 101A, P.O. Box 1108, Amherst, NH 03031, 603/673-8151. 128K minimum memory; numeric keypad recommended. \$199.

MacWrite

Version 4.5. Apple Computer, Inc., 20525 Mariani Ave., Cupertino, CA 95014, 408/996-1010. 128K minimum memory; 512K and external drive recommended. \$125.

Malayalam Font

(See *Foreign Language Fonts*.)

MapMaker

Version 2.0. Select Micro Systems, 2717 Crescent Dr., Yorktown Heights, NY 10598, 914/245-4670. 1MB minimum memory. \$295. Boundary and data files available from Strategic Locations Planning, 4030 Moorpark Ave. #123, San Jose, CA 95117, 408/985-7400.*

MaxThink

Version 2.3. MaxThink, 230 Crocker Ave., Piedmont, CA 94610, 415/428-0104, 800/227-1590, 800/642-2406 in California. 512K minimum memory. \$89.

McAssembly

Version 6.3. Signature Software, 2151 Brown Ave., Bensalem, PA 19020, 215/639-8764. 128K minimum memory; 512K recommended. \$40.

MGMStation

Version 2.5. Micro CAD/CAM, 3230 Overland Ave. #105, Los Angeles, CA 90034, 818/376-6860. Key-disk copy protection. 512K minimum memory; requires 800K external drive. \$799.

Microcom Modems

Microcom, Inc., 1400 Providence Hwy., Norwood, MA 02062, 617/762-9310, 800/322-3722. 128K minimum memory. AX/2400 \$749, AX/2400C \$895.

MicroPhone

Version 1.1. Software Ventures Corp., 2907 Claremont Ave. #220, Berkeley, CA 94705, 415/644-3232, 800/336-6477, 800/336-6478 in California. 128K minimum memory; requires Hayes-compatible modem; 512K or Mac Plus recommended. \$74.95.

Microsoft BASIC Compiler

Version 1.0. Microsoft Corp., 16011 N.E. 36th Way, Box 97017, Redmond, WA 98073-9717, 206/882-8080, 800/426-9400. 128K minimum memory; 512K or Mac Plus recommended. \$195.

Microsoft BASIC Interpreter

Version 3.0. Microsoft Corp. (See *Microsoft BASIC Compiler* for address and phone number.) 128K minimum memory. \$99.

Microsoft Excel

Version 1.03. Microsoft Corp. (See *Microsoft BASIC Compiler* for address and phone number.) 512K minimum memory; external drive recommended. \$395.

Mongolian Font

(See *Foreign Language Fonts*.)

Mouse Exchange Terminal

Version 2.0. Dreams of the Phoenix, Inc., P.O. Box 10273, Jacksonville, FL 32247, 904/396-6952. 512K minimum memory. \$49.95.

(continues)

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Where to Buy

Netway 1000/MacWindows 3270
 Version 3.0/2.0. Tri-Data, 505 E. Middlefield Rd., Mountain View, CA 94043, 415/969-3700, 800/874-3282. 512K minimum memory; requires AppleTalk. \$3195/\$1495. Software is network licensed.

Newsletter for Asian and Middle Eastern Languages
 Bear River Systems, P.O. Box 1021, Berkeley, CA 94701, 415/644-9400. \$12 per year, \$18 for organizations.

OverVue
 Version 2.1. ProVue Development, 222 22nd St., Huntington Beach, CA 92648, 714/969-2431. 128K minimum memory; external drive recommended. \$295.

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 a printer that supports PostScript. \$495.

pcLink
 Version 3.0. Pacer Software, 7911 Herschel Ave., La Jolla, CA 92037, 619/454-0565. 512K minimum memory; requires 800K drive. \$2000 for five users, \$20,000 for unlimited users. License is for the host system.

PCMacBASIC
 Version 1.92. Pterodactyl Software, 905 W. California St., Mill Valley, CA 94941, 415/388-4827. 512K minimum memory; requires 800K or more disk space. \$39.95.

Persian Fonts
 (See *Alkaatib*, *MacArabic*, and *Foreign Fonts Edition*.)

Phoenix 3D Level One
 Version 1.1. Dreams of the Phoenix, Inc., P.O. Box 10273, Jacksonville, FL 32247, 904/396-6952. 512K minimum memory; external drive recommended. \$39.95.

PowerMath
 Version 2.00. Industrial Computations Inc., 40 Washington St., Wellesley, MA 02181, 617/235-5080. 128K minimum memory. \$100.*

Project Billing
 Version 1.25. Satori Software, 2815 Second Ave. #590, Seattle, WA 98121, 206/443-0765. Key-disk copy protection. 512K minimum memory; 800K storage recommended. \$695.

Prometheus Modems
 Prometheus Products, Inc., 4545 Cushing Pkwy., Fremont, CA 94538, 415/490-2370. 128K minimum memory; 512K minimum memory for ProModem Gs. ProModem 1200 \$349, ProModem 1200G \$249, ProModem 2400 \$499, ProModem 2400G \$399.

Pro3D
 Version 1.0. Enabling Technologies, Inc., 600 S. Dearborn St. #1304, Chicago, IL 60605, 312/427-0408. 512K minimum memory. \$349.

Racal-Vadic Modems
 Racal-Vadic, 1525 McCarthy Blvd., Milpitas, CA 95035, 408/946-2227, 800/482-3427. 128K minimum memory; 1200VP requires serial cables and Hayes-compatible software. 1200VP \$295, 1200PA \$495, 2400VP \$595, 2400PA \$795, 9600VP \$1495.

R BASIC
 Version 2.1. Indexed Software, Inc., 40960 E. Florida Ave., Hemet, CA 92344, 714/929-2749. 512K minimum memory; hard disk recommended. \$149.

(continues)

Where to Buy

Red Ryder

Version 9.4. Shareware also available from Freesoft Co., 10828 Blacklink, St. Louis, MO 63114, 314/423-2190. 512K minimum memory; requires Hayes-compatible modem. \$40.

Reed College BenchTop Instrument

Metaresearch, Inc., PacWest Center #2860, 1211 S.W. Fifth Ave., Portland, OR 97204, 503/228-5806. 128K minimum memory; 512K recommended. \$650.

ResEdit

Version 1.01. APDA, 390 S.W. 43rd St., Renton, WA 98055, 206/251-6548. 128K minimum memory. \$25 to members only; bundled with *Macintosh Development Utilities*.

Russian Fonts

(See Cyrillic, *MacCyrillic*, Armenian, Georgian, *Foreign Fonts Edition*.)

Sanskrit Font

(See *Foreign Language Fonts*.)

Schema

Version 10/31. Harvard Graduate School of Design, Lab for Computer Graphics, 48 Quincy St., Cambridge, MA 02138, 617/495-2526. 512K minimum memory. \$20.

Smartcom II

Version 2.2. Hayes Microcomputer Products, Inc., P.O. Box 105203, Atlanta, GA 30348, 404/441-1617. 128K minimum memory; requires modem. \$149.

SMK GreekKeys

Version 2.3+. SMK, 5760 S. Blackstone Ave., Chicago, IL 60637, 312/947-9157. 128K minimum memory. \$25.

Softworks BASIC

Version 2.0. Shareware also available from Softworks, Ltd., 2944 N. Broadway, Chicago, IL 60657, 312/975-4030. 512K minimum memory; 512K with external drive recommended. Business version \$295, personal version \$99, introductory version \$29.

S/3X Link

Version 1.0. KMW Systems Corp., 100 Shepherd Mountain Plaza, Austin, TX 78730-5014, 512/338-3000, 800/531-5167. 512K minimum memory. \$1195 bundled with Series III Twinax.

Straight Talk

Version 2.07. Dow Jones & Co., Inc., P.O. Box 300, Princeton, NJ 08543, 609/452-1511, 800/257-5114. 128K minimum memory; requires Hayes-compatible modem. \$95.

SuperFrench German Spanish

Version 2.0. Linguists' Software, 106R Highland St., South Hamilton, MA 01982, 617/468-3037. \$79.95; laser version 1.1 \$99.95.

SuperGreek

Version 2.3. Linguists' Software, 106R Highland St., South Hamilton, MA 01982, 617/468-3037. 128K minimum memory. \$79.95; *LaserGreek* \$99.95.

SuperHebrew

Version 1.5. Linguists' Software. (See *SuperGreek* for address and phone number.) 128K minimum memory. \$79.95; *LaserHebrew* \$99.95.

Switcher

Version 5.0. Apple Computer, Inc., 20525 Mariani Ave., Cupertino, CA 95014, 408/996-1010. 128K minimum memory; Mac Plus, external drive, and Hard Disk 20 recommended. \$19.95.

Tekalike

Version 2.05. Mesa Graphics, P.O. Box 600, Los Alamos, NM 87544, 505/672-1998. 128K minimum memory. \$250.

Telescope

Version 1.0. Mainstay, 5311-B Derry Ave., Agoura Hills, CA 91301, 818/991-6540, 800/628-2828 ext. 765 for orders only. 128K minimum memory. \$125.

Telugu Font

(See *Foreign Language Fonts*.)

Thai Font

(See *Foreign Language Fonts*.)

ThinkTank 512

Version 1.3. Living Videotext, Inc., 2432 Charleston Rd., Mountain View, CA 94043, 415/964-6300. 512K minimum memory; external drive recommended. \$195.

Tibetan Font

Version 1.0. John Rockwell, Jr., 350 Arapahoe Ave. #12, Boulder, CO 80302, 303/449-6190. 128K minimum memory. \$10.

Tibetan Font

Pierre Robillard, 200 Balsam Ave., Toronto, Ontario, Canada M4E 3C3; no phone number listed.

Tibetan Font

(See *Foreign Language Fonts*.)

Trapeze

Version 1.0. Data Tailor, Inc., 1300 S. University Dr. #409, Fort Worth, TX 76107, 817/332-8625, 800/443-1022. 512K minimum memory; external drive recommended. \$279.*

True BASIC

Version 1.2. True BASIC, Inc., 39 S. Main St., Hanover, NH 03755, 603/643-3882, 800/872-2742. 128K minimum memory; 512K recommended. \$149.90.

UltraFonts

Version 2.0. Century Software, 2306 Cartner Ave., Los Angeles, CA 90064, 213/829-4436. 128K minimum memory. \$29.95.

UltraFonts Technical and Business Set

Version 2.0. Century Software, 2306 Cartner Ave., Los Angeles, California 90064, 213/829-4436. 128K minimum memory. \$29.95.

VersaTerm

Version 2.3. Peripherals, Computers & Supplies, Inc., 2457 Perkiomen Ave., Mount Penn, PA 19606, 215/779-0522. 128K minimum memory. \$295.

VersaTerm-Pro

Version 1.2. Peripherals, Computers & Supplies, Inc. (See *VersaTerm* for address and phone number.) 512K minimum memory. \$295.

V.I.P. (Visual Interactive Programming)

Version 2.0. Mainstay Software, 5311-B Derry Ave., Agoura Hills, CA 91301, 818/991-6540, 800/628-2828 ext. 765 for orders only. 512K minimum memory. \$124.95.*

Visions-Plus

Version 1.0. Solaco, P.O. Box 396, Fremont, CA 94537-0936, 415/487-1911. 512K minimum memory. \$79.

Voila

Version 1.0. Tangent Software, Inc., 14206 S.W. 136th St., Miami, FL 33186, 305/252-0892, 800/622-5483. 512K minimum memory. \$99.95.*

Wheels for the Mind (Directory)

Apple Computer, Inc., 20525 Mariani Ave., Cupertino, CA 95014, 408/996-1010. Single issue \$4, one-year subscription for four issues \$12.

ZBasic

Version 3.03. Zedcor, Inc., 4500 E. Speedway #22, Tucson, AZ 85712, 602/795-3996, 800/482-4567. 512K minimum memory; 512K recommended. \$89.95.

Z 3D

Version 2.0. Computer Graphics Center, Inc., 444 High St. #100, Palo Alto, CA 94301, 415/325-3111. 512K minimum memory; two drives recommended. \$99. □

Macworld Best-Sellers

Months on chart	Last month	This month	
23	2	1	Microsoft Word <i>Microsoft</i>
3	1	2	Microsoft Works <i>Microsoft</i>
15	3	3	Microsoft Excel <i>Microsoft</i>
11	4	4	PageMaker <i>Aldus</i>
7*	6	5	MacWrite <i>Apple Computer</i>
20	7	6	MacDraw <i>Apple Computer</i>
6	5	7	FullPaint <i>Ann Arbor Softworks</i>
7*	8	8	MacPaint <i>Apple Computer</i>
2	9	9	SuperPaint <i>Silicon Beach Software</i>
1	-	10	MacInTax <i>SoftView</i>

Education Software

7	2	1	Math Blaster <i>Davidson and Associates</i>
7	1	2	Kids' Time <i>Great Wave Software</i>
7	5	3	Typing Tutor III <i>Simon and Schuster Computer Software</i>
6	4	4	MacEdge II <i>Think Educational Software</i>
1	-	5	Early Games <i>Springboard Software</i>

Entertainment Software

7	1	1	Flight Simulator <i>Microsoft</i>
7	2	2	MacGolf <i>Practical Computer Applications</i>
3	5	3	Dark Castle <i>Silicon Beach</i>
1	-	4	Déjà Vu <i>Mindscape</i>
3	4	5	The Ancient Art of War <i>Broderbund Software</i>

Networking/Data Communications

7	1	1	AppleTalk <i>Apple Computer</i>
7	2	2	MacServe <i>Infosphere</i>
3	4	3	TOPS <i>Sun Microsystems</i>
14	5	4	MacTerminal <i>Apple Computer</i>
7	3	5	Apple Personal Modem <i>Apple Computer</i>

Months on chart	Last month	This month	
3	2	1	Apple HD-20SC <i>Apple Computer</i>
6	1	2	Apple Hard Disk 20 <i>Apple Computer</i>
7	3	3	DataFrame 20 <i>SuperMac Technology</i>
4	5	4	FX-20 <i>General Computer</i>
6	-	5	HyperDrive 20 <i>General Computer</i>

Books

7	1	1	Excel in Business <i>Douglas Cobb, Microsoft Press</i>
6	2	2	The Apple Macintosh Book <i>Cary Lu, Microsoft Press</i>
6	3	3	Inside Macintosh <i>Addison-Wesley</i>
7	4	4	The Printed Word <i>David A. Kater and Richard L. Kater, Microsoft Press</i>
6	-	5	Microsoft Macinations <i>Mitchell Waite, Robert Lafore, and Ira Lansing, Microsoft Press</i>

Product Watch

Editors' choice:

Other recent products of particular interest:

Desktop Express *Apple Computer*
electronic mail software

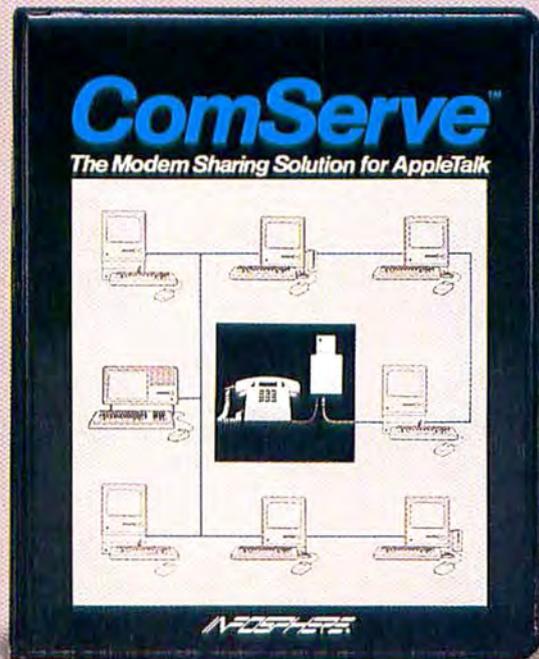
LaserPaint *LaserWare* PostScript
graphics

PS-800 Plus *QMS* laser printer

Source: Exclusive InfoCorp survey of more than one hundred Macintosh retailers and selected mail-order suppliers. Covers sales during January 1987.

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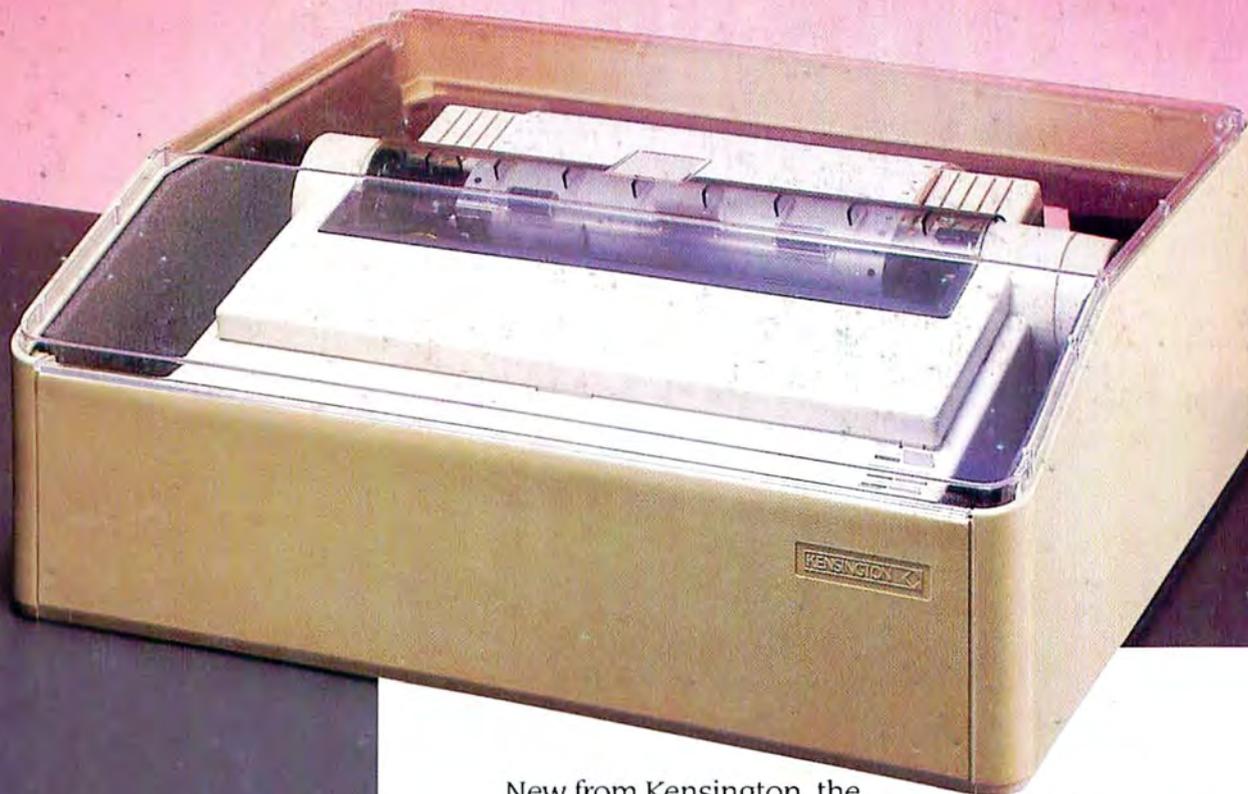
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