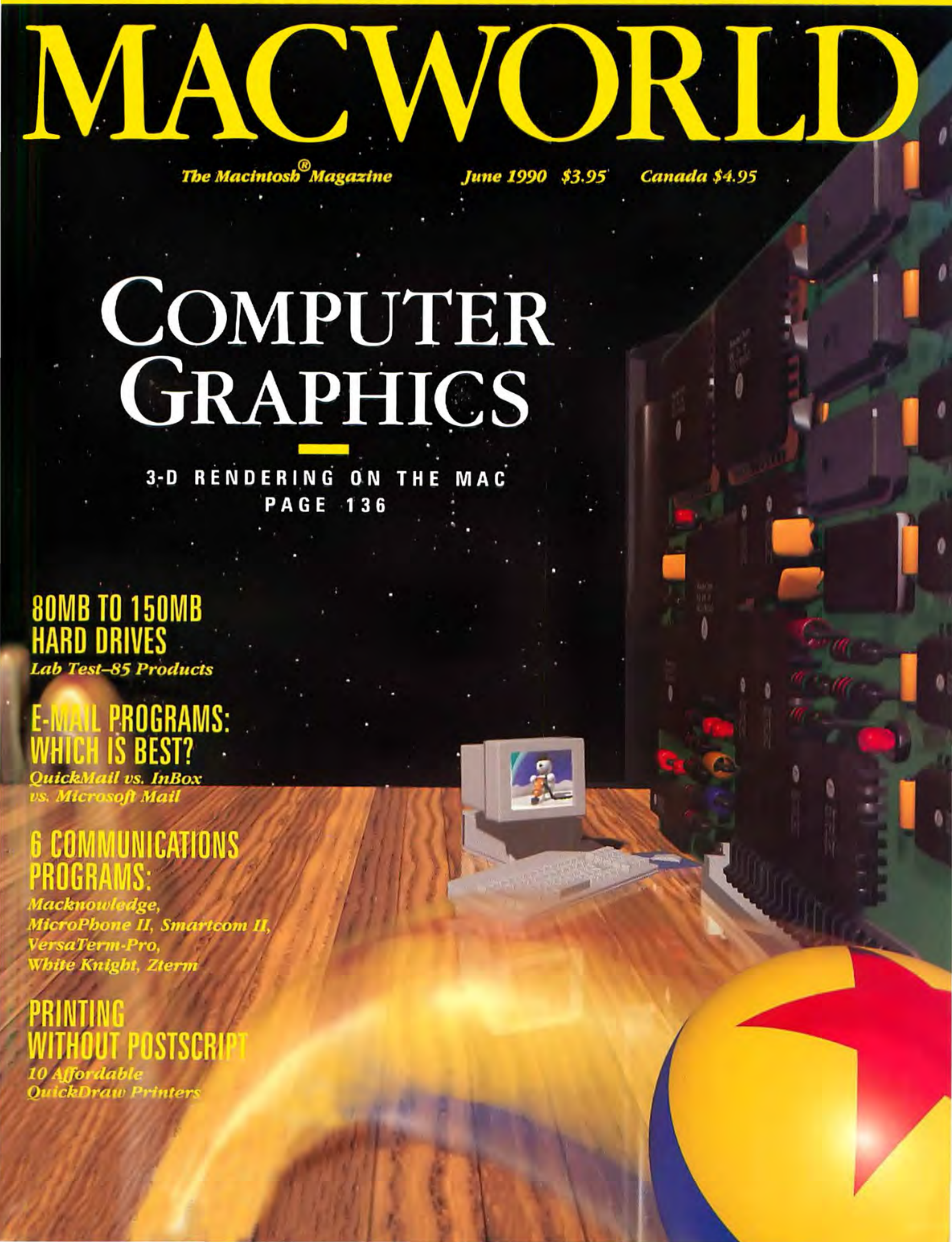
79 NEW PRODUCTS: PAGE 243 • 25 PRODUCT REVIEWS: PAGE 186

MACWORLD

The Macintosh® Magazine *June 1990 $3.95* *Canada $4.95*



COMPUTER GRAPHICS

3-D RENDERING ON THE MAC
PAGE 136

80MB TO 150MB HARD DRIVES

Lab Test–85 Products

E-MAIL PROGRAMS: WHICH IS BEST?

QuickMail vs. InBox vs. Microsoft Mail

6 COMMUNICATIONS PROGRAMS:

MacKnowledge,
MicroPhone II, Smartcom II,
VersaTerm-Pro,
White Knight, Zterm

PRINTING WITHOUT POSTSCRIPT

10 Affordable QuickDraw Printers

Preferred by nine o
and manipu

Consistently, people who work with numbers have some noticeable traits.

They're intelligent, organized and thorough—buttoned up, if you will.

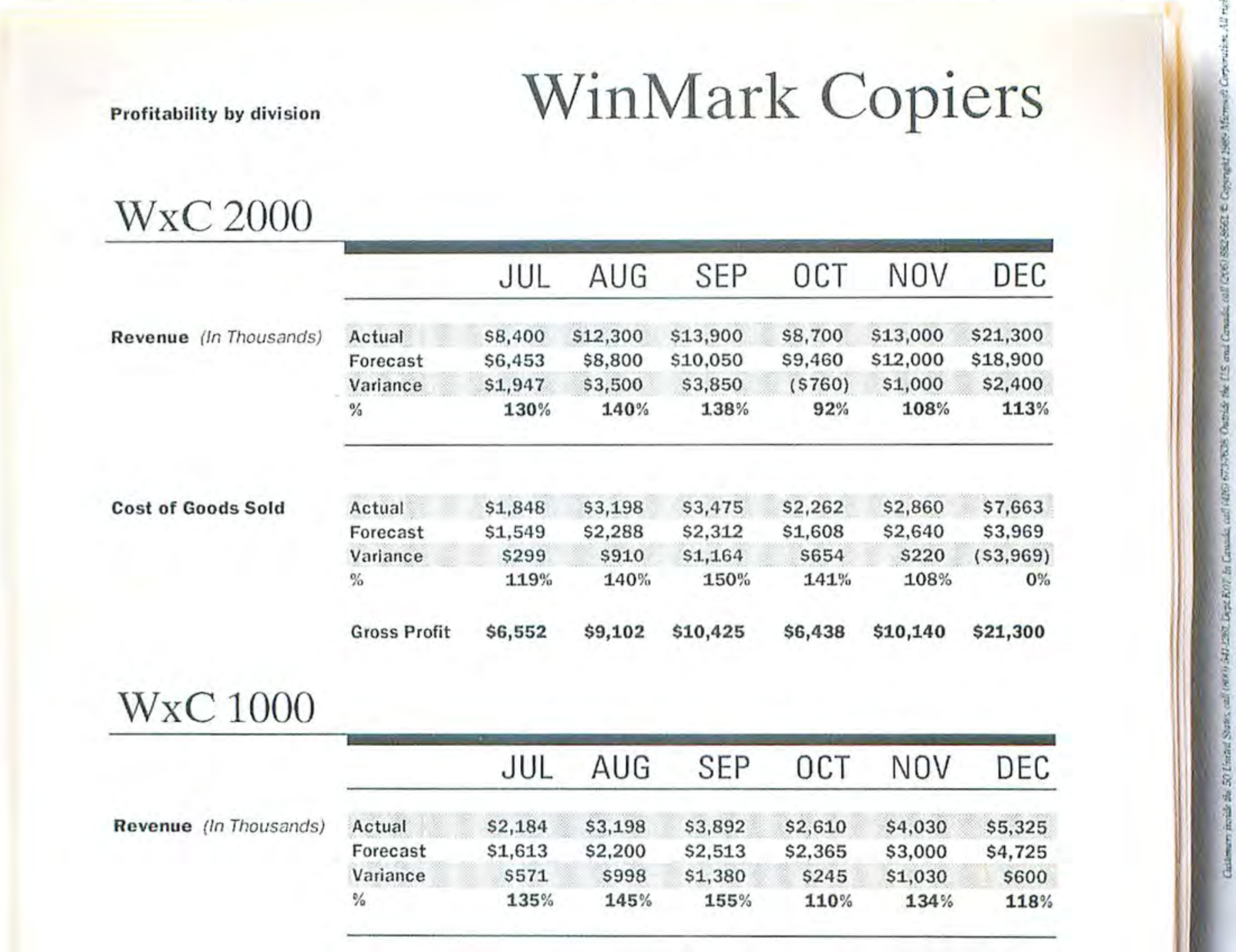
Which explains why Microsoft® Excel has been the spreadsheet standard for Macintosh® ever since it was introduced in 1985. Today, 90% of Macintosh spreadsheet users do their calculating, manipulating, analyzing and presenting with it.

And while Microsoft Excel has always been easy to learn and use, it can now perform all the complex functions you perform, but with labor-saving benefits.

You can easily build complex models, and conveniently link multiple sheets with a simple point and click.

So the left hand knows what the right is doing, we've added a feature that will tie your data into Microsoft Word documents. Then update that same data automatically, when

With Microsoft Excel you can create impressive documents, choosing from 256 fonts and colors, variable row height and shading.



Profitability by division

WinMark Copiers

WxC 2000

		JUL	AUG	SEP	OCT	NOV	DEC
Revenue *(In Thousands)*	Actual	$8,400	$12,300	$13,900	$8,700	$13,000	$21,300
	Forecast	$6,453	$8,800	$10,050	$9,460	$12,000	$18,900
	Variance	$1,947	$3,500	$3,850	($760)	$1,000	$2,400
	%	**130%**	**140%**	**138%**	**92%**	**108%**	**113%**
Cost of Goods Sold	Actual	$1,848	$3,198	$3,475	$2,262	$2,860	$7,663
	Forecast	$1,549	$2,288	$2,312	$1,608	$2,640	$3,969
	Variance	$299	$910	$1,164	$654	$220	($3,969)
	%	119%	140%	150%	141%	108%	0%
	Gross Profit	**$6,552**	**$9,102**	**$10,425**	**$6,438**	**$10,140**	**$21,300**

WxC 1000

		JUL	AUG	SEP	OCT	NOV	DEC
Revenue *(In Thousands)*	Actual	$2,184	$3,198	$3,892	$2,610	$4,030	$5,325
	Forecast	$1,613	$2,200	$2,513	$2,365	$3,000	$4,725
	Variance	$571	$998	$1,380	$245	$1,030	$600
	%	**135%**	**145%**	**155%**	**110%**	**134%**	**118%**

ut of ten calculating lative people.

it's been changed in Microsoft Excel.

To insure data integrity, we've even built in alerts that will warn you of such grievous errors as circular references. In fact, Microsoft Excel is so bright, it will actually review your worksheet and flag any formulas that don't fit an established pattern.

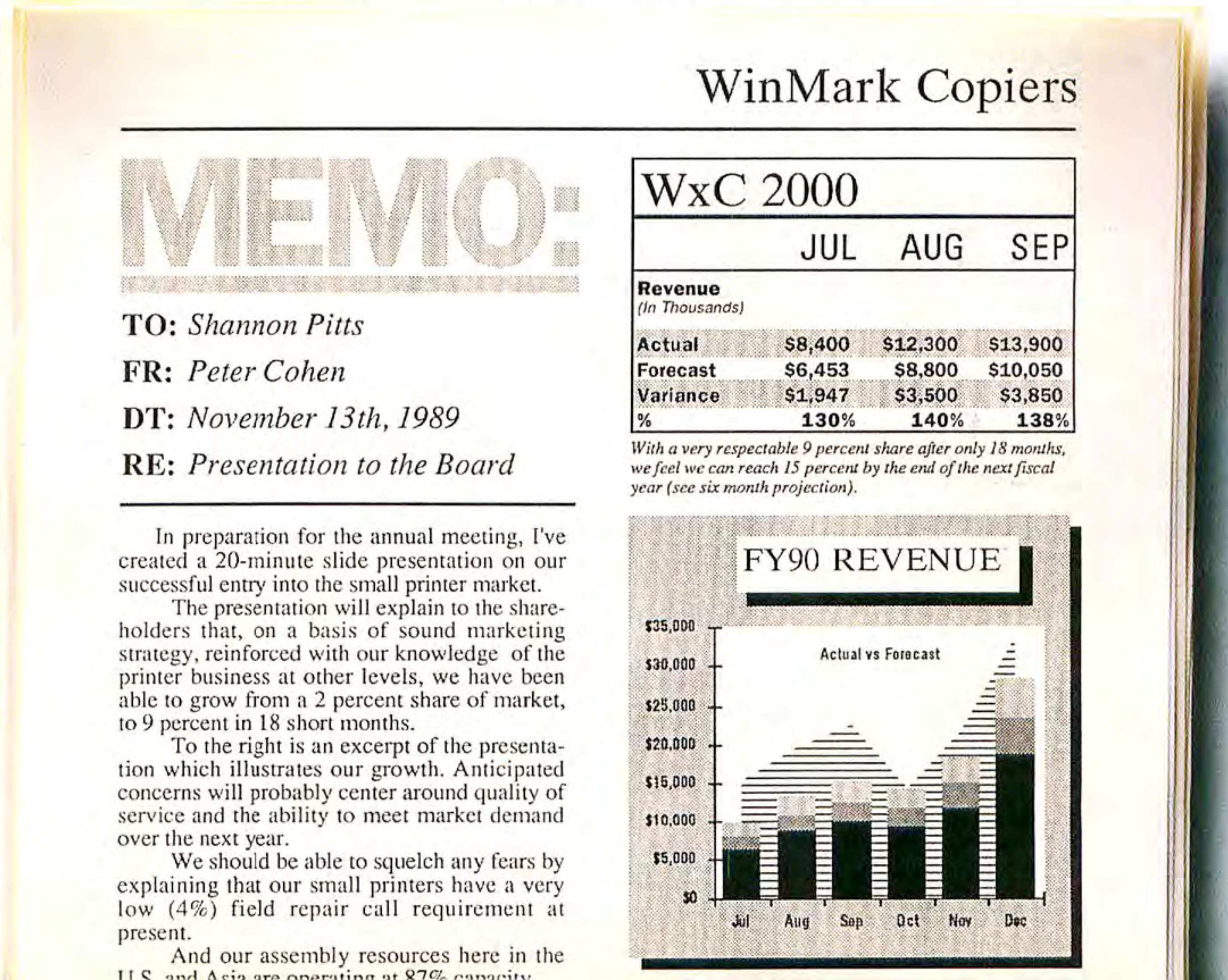
Furthermore, the search and replace function can make corrections on a global scale. And customized number formatting lets you bend the rules, allowing you to create everything from a 3-digit account code to a 17-digit part number.

Now, we've left a lot out in this short discourse, but Microsoft Excel hasn't. So be sure to ask your dealer for a complete explanation of its capabilities. And you'll see how Microsoft Excel will make your job easier and better.

Or, if you look at it a different way, you'll become a more effective manipulator. And a more efficient calculator.

Microsoft
Making it all make sense

Then you can Paste Link those worksheets and charts into your Microsoft Word documents and update them automatically.



WinMark Copiers

MEMO:

TO: *Shannon Pitts*

FR: *Peter Cohen*

DT: *November 13th, 1989*

RE: *Presentation to the Board*

In preparation for the annual meeting, I've created a 20-minute slide presentation on our successful entry into the small printer market.

The presentation will explain to the shareholders that, on a basis of sound marketing strategy, reinforced with our knowledge of the printer business at other levels, we have been able to grow from a 2 percent share of market, to 9 percent in 18 short months.

To the right is an excerpt of the presentation which illustrates our growth. Anticipated concerns will probably center around quality of service and the ability to meet market demand over the next year.

We should be able to squelch any fears by explaining that our small printers have a very low (4%) field repair call requirement at present.

And our assembly resources here in the U.S. and Asia are operating at 87% capacity

WxC 2000

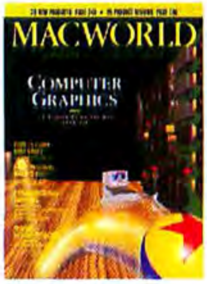
	JUL	AUG	SEP
Revenue *(In Thousands)*			
Actual	$8,400	$12,300	$13,900
Forecast	$6,453	$8,800	$10,050
Variance	$1,947	$3,500	$3,850
%	130%	140%	138%

With a very respectable 9 percent share after only 18 months, we feel we can reach 15 percent by the end of the next fiscal year (see six month projection).

FY90 REVENUE

CONTENTS

DEPARTMENTS


Our cover illustration, by Drew Huffman of Paracomp and Eliot Smyrl of Pixar, proves the Mac can produce state-of-the-art computer graphics (see Art Beat, *page 53*). Our rendering feature begins on page 136.

You may get your next E-mail over a radio network (see News, *page 107*).

FEATURES

What's new in the midrange hard disk market? Lower prices and higher quality (see page 146).

A call for entries: win great prizes, get famous in our Art Contest (page 185) and SuperStacks Contest (page 145).

REVIEWS

MACWORLD

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■

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June 1990, Volume 7, Number 6
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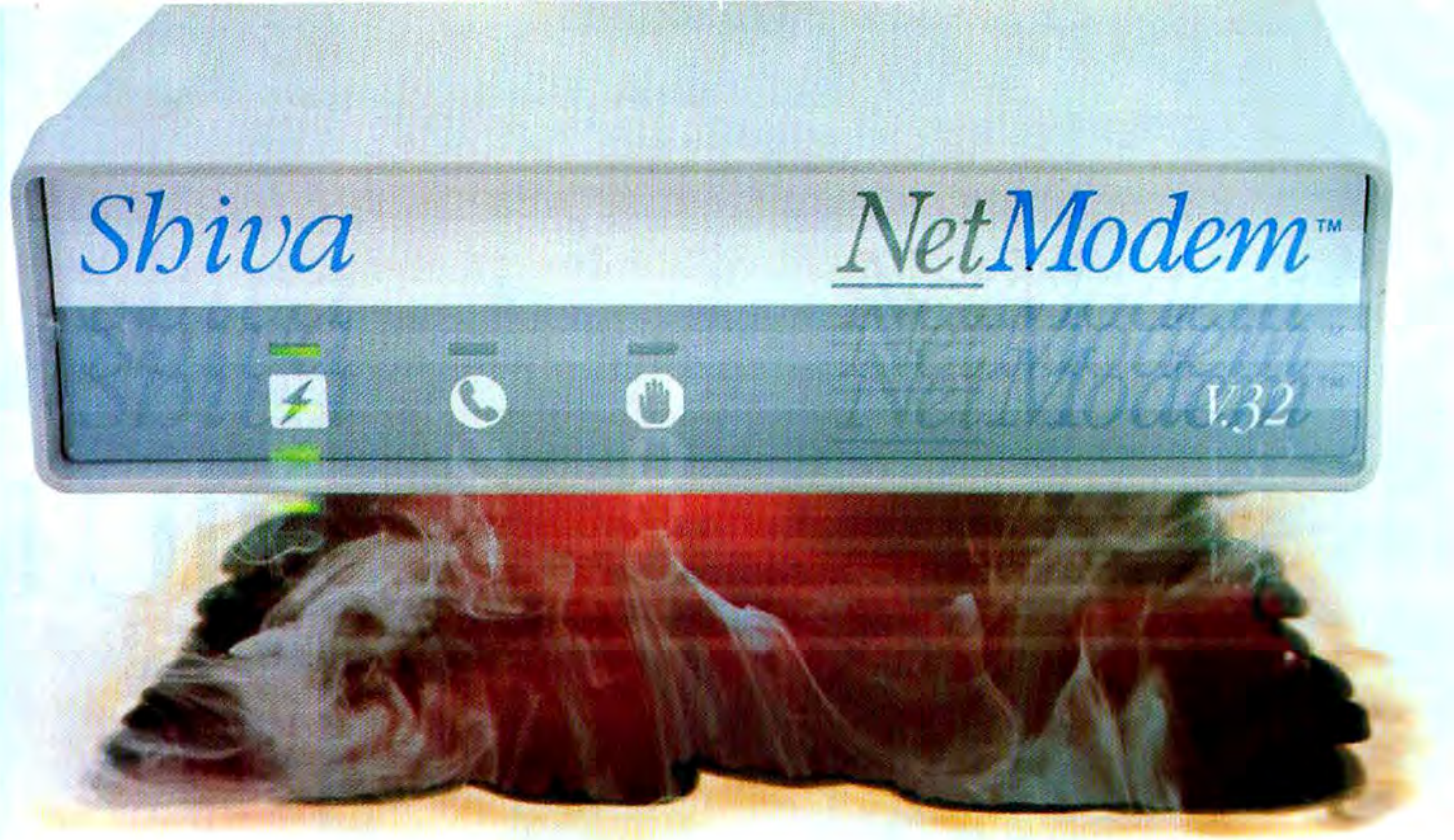
Shiva
NetModem™
V.32

Getting ready for th
Challenge, the single
race around the worl
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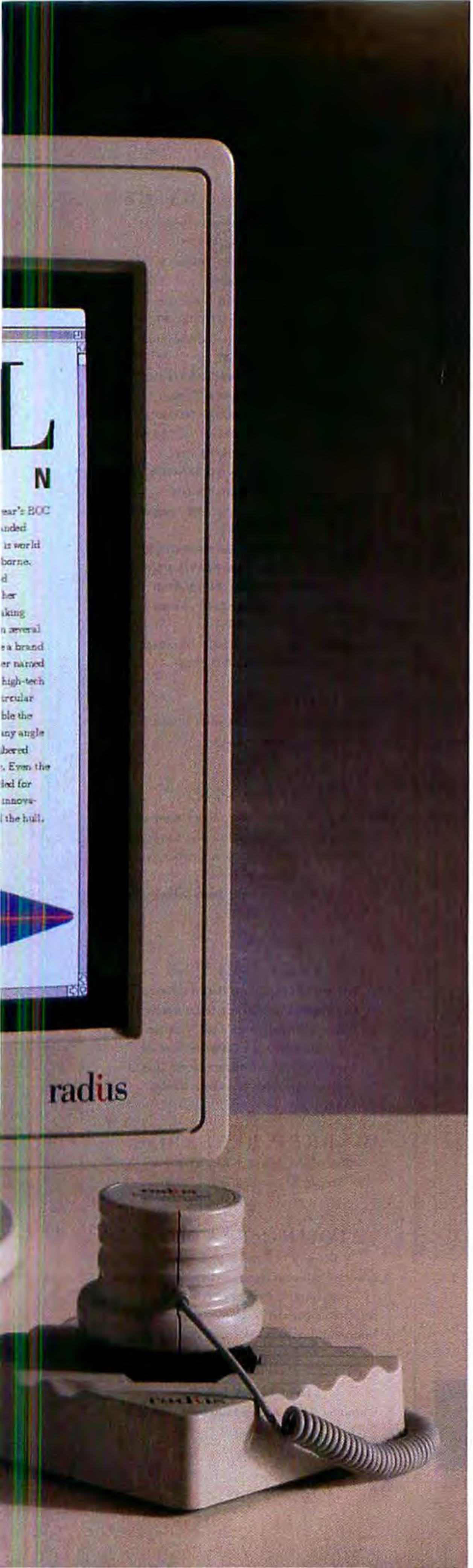
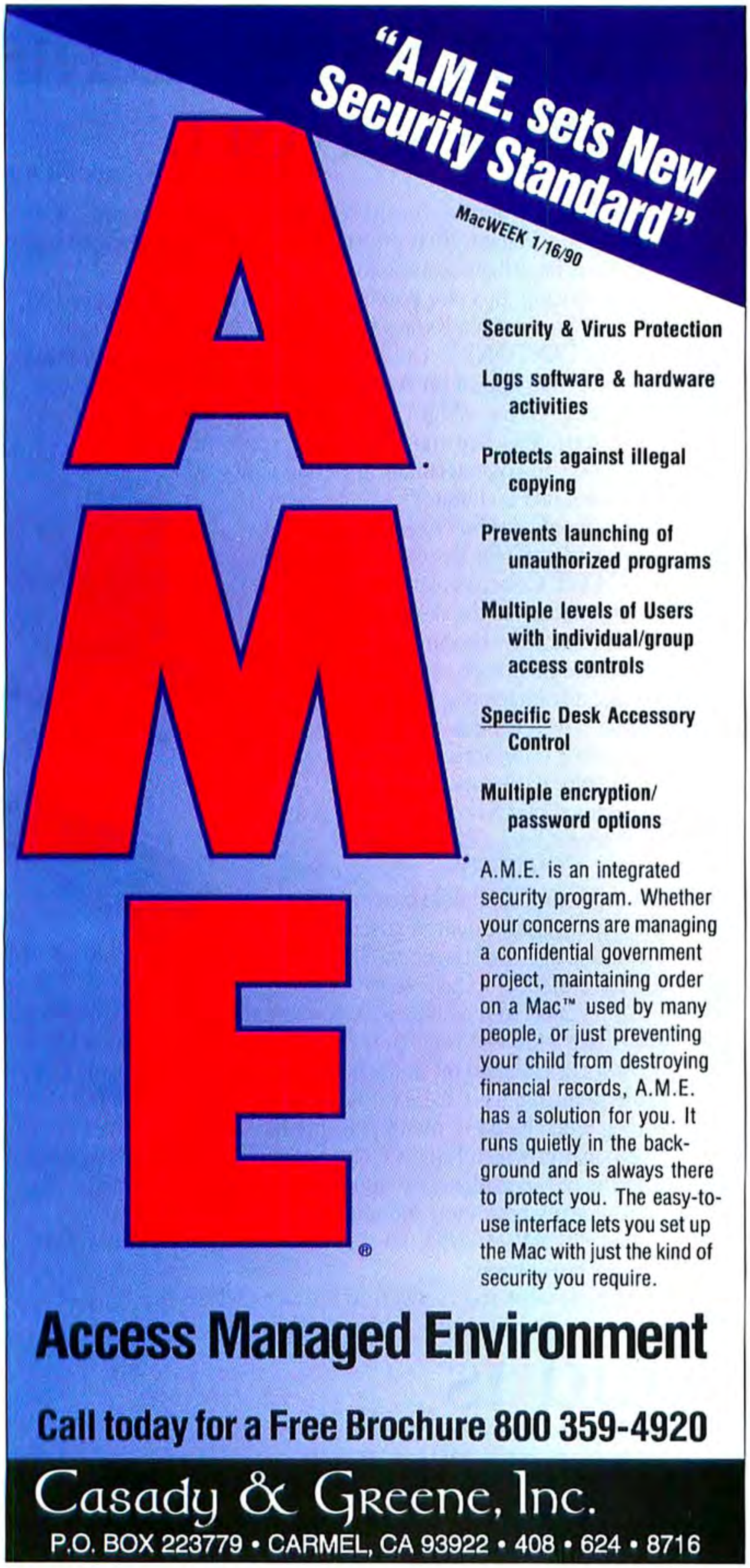


Radius PrecisionColor Calibrator

Radius QuickColor Graphics Engine
6 MIPS RISC Processor



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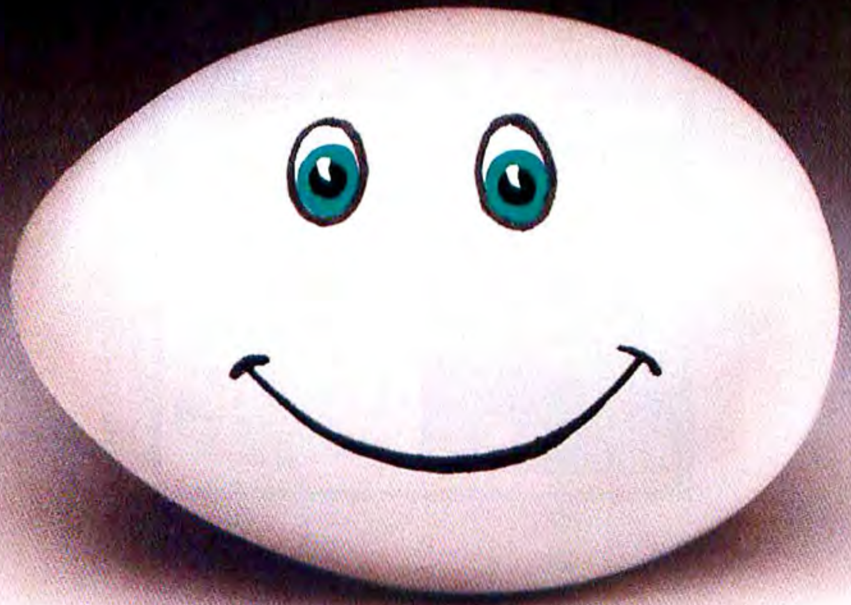
In a field of unfriendly communication interfaces,



enter a new face.

Modems, wake up. Macintosh users take heart. MicroPhone II 3.0 is about to brighten your day.

Using Color Icons, Superior Text Editing and Custom Dialogs, MicroPhone II 3.0 lets you design your own custom front ends. Suddenly, hostile remotes are on speaking terms. And clumsy chains of commands are reduced to effortless clicks and keystrokes. You communicate more easily than ever before.

Whether for mail, teleconferencing, on-line research or bulletin boards, MicroPhone II 3.0 is helping everyone put on a happy face.

SOFTWARE
VENTURES

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MicroPhone is a trademark of Software Ventures Corporation. Copyright © 1990 Software Ventures Corporation. Includes Dialoger for MicroPhone II.
Available at your local Businessland, Egghead, ComputerCraft, Computer Factory and Software Spectrum.

Circle 48 on reader service card

Look.

Only SuperMac™ can dramatically enhance the look and feel of your Macintosh.® We do just that with the newest, most impressive member of our family—our 21-inch Color Two Page Display.™

We redefine the concept of a two page display with the first 1152 × 870 color display that's Apple® standard WYSIWYG.

And we apply our vast color graphics expertise to our gray scale and monochrome displays, too. With our Platinum Two Page Display™ and our 19″ Platinum Display,™ we perfectly mirror the subtle details of the actual printed page: Paper whites. Crisp grays. And razor sharp focus, even at the edges.

SuperMac's display system family includes the new Color Two Page Display and Platinum Two Page Display; the 19- and 16-inch Color Trinitrons; and the 19-inch Color, and 19″ Platinum Displays.

SuperMac's Two Page Displays are the latest members of an influential family of sophisticated graphics systems. Each complete with a high-contrast antiglare panel and a fast 75Hz flicker free refresh rate. Each perfect for any size system or budget. From our 19- and 16-inch color Trinitrons™ to our high performance 19″ Color and Platinum Displays.

Feel.

But looks aren't the half of it. SuperMac also enhances the feel of your Macintosh with the most versatile 8- and 24-bit color graphics cards and superior QuickDraw™ acceleration.

SuperMac's 24- and 8-bit graphics family includes the new accelerated Spectrum/8 PDQ and Spectrum/24 PDQ for large screens; the economical ColorCard/24 and Graphics Accelerator.™ Other family members include the Spectrum/8 Series III, accelerated Spectrum/24 Series III, ColorCard/8,™ Monochrome Card,™ and other specialty cards.

Our new large screen color cards integrate QuickDraw acceleration on a single card, and optimize Macintosh performance within *every* QuickDraw application, not just a few. Best of all, they mix and match with more displays than any other card—including Apple and a host of other industry standard displays.

Choose from our Spectrum/8™ PDQ for fast 8-bit performance, or our Spectrum/24™ PDQ for a blazing 16.7 million colors—as many as your eye can distinguish. Or select any one of our extensive family of high performance, 24- and 8-bit graphics systems: displays, boards, and software. Including our ColorCard/24™ with optional acceleration for 13″ displays.

So insist on the superior quality you've come to expect from SuperMac. The best look. The best feel. The best performance. And the best value. Ask your dealer for a SuperMac graphics system.

SUPER**MAC**
TECHNOLOGY

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MACWORLD

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Questions and Quick Tips Direct questions or tips on how to use Mac computers, peripherals, or software (by mail or electronically) to: Quick Tips, Lon Poole.

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BPA IDG

Introducing Color That Out-Neons Neon.

Amazing, isn't it? The monitor image actually out-shines the real thing. Introducing two of the brightest Macintosh-compatible color monitors ever made: the Seiko Instruments 14″ CM-1445, and 20″ CM-2050.

Our new Trinitron® monitors brighten your ideas with a blazing 100 NITs* of color. That's a full 30 NITs brighter than an Apple® MAC II® RGB monitor's maximum of 70 NITs. Which means with us, your colors can be 43% brighter.

Your fire engine reds can be 43% hotter, glacier blues 43% icier, and sunshine yellows can almost give you a tan. In fact, with color brighter than neon in 16 million possible shades, anything you can imagine, you can see. And every eye-popping pixel will be razor sharp because of our high resolution Trinitron tubes.

So if you're looking for color, just use your eyes. You'll see that Seiko Instruments is the brightest choice you can make.

Call **1-800-888-0817 Ext. 104M** for information and an Authorized Dealer.

SII Seiko Instruments Inc

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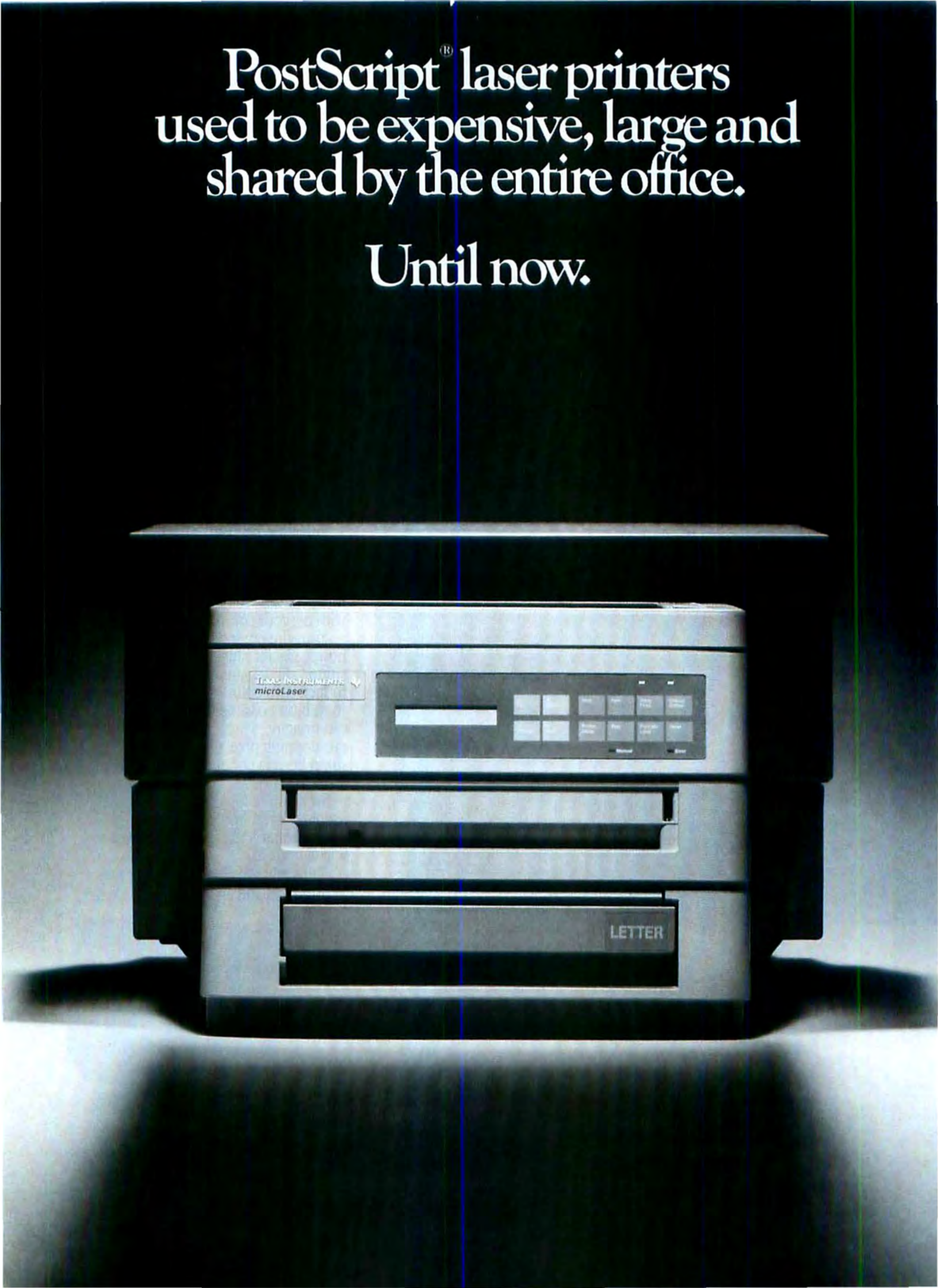
PostScript® laser printers used to be expensive, large and shared by the entire office.
Until now.
Texas Instruments
microLaser
LETTER

microLaser™ from Texas Instruments: the affordable PostScript printer you can call your own.

Finally, for less than $3,150*, you can have a true Adobe® PostScript laser printer right at your own desk. TI introduces its new microLaser – the perfect partner for your Macintosh®.

Small size. Lots of value.

When you place this printer next to your Mac, you'll be impressed by its small size and compact design. At only 13.4 inches wide and 14.2 inches deep, microLaser may be the small kid on the block, but it packs plenty of punch. This six-page-per-minute printer takes full advantage of virtually all of the software that runs on your Macintosh. That's because it uses the Adobe PostScript language, offers 35 PostScript typefaces, 1.5 Mb of memory and an AppleTalk® interface.

If you also use MS-DOS® Computers, you can switch between the PostScript language and standard HP LaserJet® Series II emulation easily without turning off the printer.

True Adobe PostScript.

Because microLaser features the PostScript language, you can print fonts in a variety of typestyles, sizes, and orientations by scaling and rotating them to meet your exact specifications.

The PostScript language also gives you more graphics power so you can print precise lines and smooth curves. Integrating text and graphics is easy, and the microLaser can print even your most sophisticated page layouts and illustrations.

What's more, the PostScript language is the industry standard for higher resolution output devices. So you can proof your documents on the microLaser, then print on any typesetter with PostScript capability without recreating the document.

Capabilities that grow as your needs grow.

One of the best things about microLaser is that you only buy what you need. Memory is upgradeable in 1 Mb increments up to a total of 4.5 Mb, and you can upgrade it yourself, without tools or technicians. All you have to do to get additional fonts is download through software or plug optional microCartridges into two credit-card size slots.

Superior paper handling.

Part of what makes microLaser a truly personal, desktop laser printer that takes up so little room is its paper drawer, which slides inside. Because microLaser holds 250 sheets standard (it holds 500 when you add an optional paper drawer), you spend less time refilling paper and more time creating superb-looking documents.

This printer also handles a variety of paper sizes and types – from letter, legal, and executive to transparencies, labels and envelopes. For those times when you're facing a large mail merge task, just plug in an optional envelope feeder to alternate between letters and envelopes.

Your own PostScript printer is a call away.

To find out more about how you can have affordable PostScript printing for your Macintosh, call TI today.
1-800-527-3500.

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*TI suggested retail price of microLaser PS with an AppleTalk interface.

TEXAS
INSTRUMENTS

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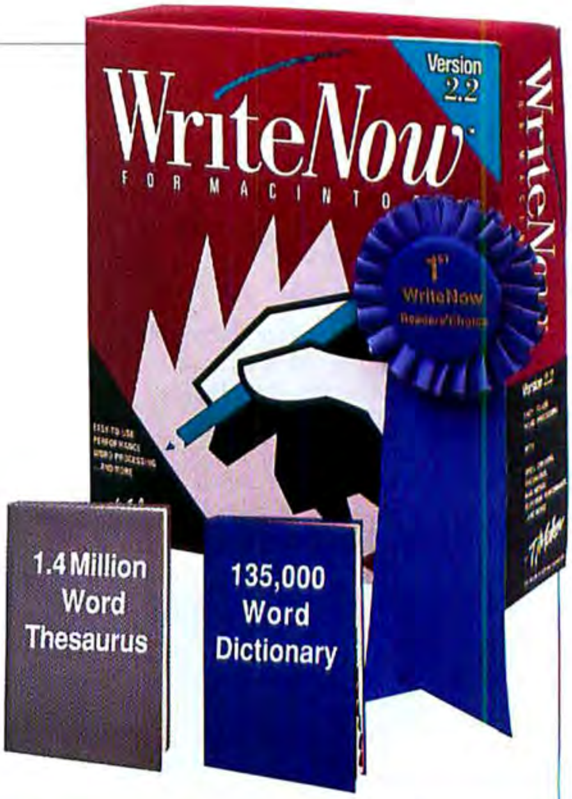
The New WriteNow Version 2.2.

Still Easy. Still Fast.
And Still the Right Choice...



...But Now For *Even More* Reasons!

1.4 Million-Word Thesaurus How about **1.4 million** new reasons? WriteNow now includes the Proximity WordMaster™ Thesaurus, containing 1.4 million synonyms, antonyms, compared, contrasted, and related word responses at your fingertips—it's the biggest in the Macintosh world!

135,000-Word Spelling Checker How about another **135,000** great new reasons? We've increased the size of our spelling checker to 135,000 words, making it the largest of any Macintosh word processor as well.

Direct Word 3.0 and Word 4.0 Compatibility Maybe you just need **3.0** or **4.0** good reasons? WriteNow is directly compatible with Microsoft Word 3.0 *and* Microsoft Word 4.0 documents.

Over a Dozen New Features & Usability Enhancements Or how about over a dozen new features and usability enhancements, like menu fonts, ruler guides, automatic window tiling & stacking, date formatting, powerful new format accelerators, direct input of font size, pre-designed mailing label templates for popular label sizes, and more.

The Word Processor of Choice in the Macintosh World Or how about just **one** really important reason: When you ask industry critics which word processor they use day-to-day, the answer is always the same: WriteNow. Still the word processor of choice in the Macintosh world.

Reviews

> “*WriteNow is the definitive Macintosh word processor. It's **easy to use, powerful, and comfortable**... Highly recommended.*
> —**John Dvorak, Industry Columnist**
>
> *[WriteNow] might be The **Best Program** I'd Ever Used. On any computer—it's **the fastest** Macintosh word processor I've ever seen.*
> —**Jim Seymour, MacUser Magazine**
>
> *Even if WriteNow is your first Mac application, you'll be up and running in no time. We rate ease of learning **excellent**.*”
> —**InfoWorld Magazine**

Awards

1989 Editors' Choice Award,
'Best New Word Processor'—**MacUser**

1989 Readers' Choice Award,
'Best Word Processor'—**MACazine**

***#1 Rated** Word Processor in Macintosh*
'PC Week Poll of Corporate Satisfaction.'
—**PC Week Magazine**

Comparison of Leading Word Processors

	WriteNow 2.2	MacWrite II	Word	Works
Actual disk space needed:	**(2) 800K**	Hard disk	Hard disk	Hard disk
Thesaurus:	**1.4 million**	220,000	220,000	No
Spell Checker:	**135,000**	100,000	130,000	60,000
Mail Merge:	**Yes**	Yes	Yes	Yes
Format Accelerators:	**Yes**	No	Yes	No
Multiple Header/Footers:	**Yes**	No	Yes	No
Extensive Undo:	**Yes**	No	No	No
Retail Price:	**$195**	$249.95	$395	$295

For more information...

Registered users will receive WriteNow 2.2 upgrade information in the mail. Nonregistered users should call or write for details.

T/Maker Company
1390 Villa Street
Mountain View, CA 94041

Tel: (415) 962-0195 Fax: (415) 962-0201

T/Maker.

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MACBULLETIN

Time for Tempo

Affinity is designing some extensions for its macro builder, Tempo II, and will probably call the completed package Tempo+ Tools. The additions include Tempo+ Menu, an INIT that creates a special menu for local and universal Tempo macros, and Tempo+ Viewer, an application that lists all the steps of a macro to simplify debugging macros and setting up branches (an editor will be released eventually). The new package also has improved support for externals, and it comes with 22 externals that perform such functions as reading the name of a window and using it to branch to another macro, or triggering an action based on a bitmap such as an icon. The new package lists for $29.95 and is available to registered Tempo owners only. For more information, contact Affinity at 303/442-4840.

Programmers' Triptych

Paracomp and Aladdin Systems have both recently announced programming utilities, and Symantec has a new version of Think Pascal. Paracomp's $495 C Math Solvers is a collection of Think C 3.0–compatible math routines adapted from FORTRAN libraries on other computers. An MPW C version is also under development. Aladdin's $99.95 Programmer's Assistants is a collection of six desk accessories that perform specific tasks, such as calculating 68000 instruction cycles and displaying the values of windows and system variables. Think Pascal version 3.0 is a fully object-oriented implementation of Pascal, with a special class-browser and tools to simplify the transition from procedural programming to object-oriented programming. Think Pascal 3.0 lists for $249. For more information, contact Paracomp at 415/543-3848; Aladdin Systems at 408/685-9175; and Symantec at 408/253-9600.

Lotus, Novell Announce Merger

In a surprise announcement, Lotus Development Corporation of Cambridge, Massachusetts, has agreed to acquire Provo, Utah–based Novell. Under the terms of the agreement, Novell—the developer of Netware—will become a wholly owned subsidiary of Lotus. The two companies will combine their boards of directors. Jim Manzi will continue as chairman, president, and CEO of Lotus; Ray Noorda will become vice chairman of Lotus and continue as Novell's CEO. The deal, expected to become final in July, will make Lotus the world's largest personal-computer software vendor, surpassing Microsoft.

Reams on ROMs

The latest addition to the CD ROM market is Grolier's 1990 version of the New Grolier Electronic Encyclopedia. The new version contains the entire 1990 edition of *Grolier's Academic American Encyclopedia* with color images. Also on compact disc is Highlighted Data's CD ROM edition of *Webster's Ninth New Collegiate Dictionary*. The dictionary includes illustrations and digitized pronunciations of each word. The list price for the New Grolier Electronic Encyclopedia is $395. For more information, contact Grolier at 800/356-5590. The list price for the CD ROM version of *Webster's Ninth New Collegiate Dictionary* is $199.95. For more information, contact Highlighted Data at 703/533-1939.

Rodime Ships 330MB and 650MB Hard Disks

Rodime Systems has begun shipping two new high-capacity hard drives: the Cobra 330e and Cobra 650e. The Cobra 330e lists for $3999 and has an average access time of 14.5ms. The Cobra 650e lists for $5899 and has an average access time of 16.6ms. For more information, call Rodime at 407/994-5585.

Farallon Opens More Windows

Timbuktu, a utility that lets users reach across a network and observe or control another Macintosh, is adding the ability to observe or control more than one other Mac at a time. In version 3.1, each remote machine's desktop appears to the guest in a separate, resizable, movable window. Farallon says the new version transfers files seven times faster than version 3.0. Farallon is also shipping its Remote/WakeUp cable, which will allow a user to call in via modem and boot any ADB Mac. For more information, call 415/596-9100.

Casady & Greene on the Scene

Casady & Greene is preparing a truckload of new products, including a general utilities package. QuickTools is a collection of five utilities including Sunset, a screen saver; Dialog Power, similar to CE Software's Dialog Keys; a screen grabber called Snipper; PowerStrip, for launching files and applications; and Functionality, which makes the function keys on the Apple Extended Keyboard function. QuickDex is

(continues)

getting scroll bars and multiple-keyword search capability, and its companion PrintDex is getting a major overhaul including sorting, text parsing, three-level-deep selecting, simplified importing, and greatly improved print formatting. Also coming: two new games (one by Patrick Buckland, the author of Crystal Quest) and lots of new fonts, including two music fonts and a few Cyrillic fonts. Fonts will come with both Type 1 and Type 3 in the box. For more information, call Casady & Greene at 408/624-8716.

Fastback Is Back

Fastback II 2.1 sports a typical backup rate that is up to three times faster than version 2.0, according to its maker, Fifth Generation Systems. The new version also uses half as many disks for a backup. Users can select files to back up by their size, date, and even the color of their icons. In addition, Fifth Generation is entering the hardware business with the FB120, an MCD II–format cartridge tape backup system that the company says can store over 200MB at a data-transfer rate of more than 3MB per minute. Fastback II 2.1 lists for $189. For more information, contact Fifth Generation Systems at 800/873-4384.

Compute While You Sleep

Simple Software has introduced NightLife 1.2, an application that can launch and operate other programs while the user is away from the computer. NightLife, available in the latest version for $79.95, can open an application at a preset time and initiate macros made by applications or macro generators including MacroMaker, QuicKeys, or Tempo II. For more information, contact Simple Software at 415/381-2650.

Apple, KPMG Peat Marwick Form Strategic Alliance

Apple and KPMG Peat Marwick have formed a strategic alliance to assist companies implementing executive information systems and decision support systems (EIS/DSS) on Macs. Called Exis (Executive Integration Services), the venture will provide consulting and systems integration services, including project management, systems planning and analysis, system configuration, traning, and support. Exis will operate as a business unit of KPMG, Peat Marwick's Management Consulting Practice. For more information, contact KPMG Peat Marwick/Exis at 415/354-1412.

The Expandable SAM

Version 2.0 of Symantec Anti-Virus for Macintosh (SAM) can be modified by end users to add protection against new viruses. Symantec will maintain an automated telephone hot line to provide codes that users can simply type into a dialog box, much like adding words to a spelling checker. Security features have also been expanded so that network administrators can disable the Learn button and lock SAM's configuration. SAM 2.0 can keep a list of all alerts and can scan Syquest platters at insertion. List price remains $99.95. For more information, contact Symantec at 408/253-9600.

Claris Upgrades CAD

The new Claris CAD pushes mind-machine symbiosis several brainwaves into the future with Graphic Guide, a system that makes intelligent guesses about a user's next action, based on mouse speed, direction, and position. Version 2.0 of the 2-D package has about 100 new features, including enhanced dimensioning capability, selection filters, and object-attribute exporting for project management and cost estimates, and will list for $899. For more information, call Claris at 408/987-7000.

The Talking Mailbox

Microsoft Mail is sporting a new talking envelope. Using a $149 version of the MacRecorder that Farallon stripped down for digitizing speech, MS Mail users can affix messages with spoken comments. The interface lets users play back and change messages before sending them, and reply to or forward voice messages like text messages. Microsoft is at 206/882-8080.

Strata Takes Flight

Strata has released StrataFlight, a $189 add-on utility for Strata's 3-D rendering program, StrataVision. StrataFlight can animate 32-bit color images composed in StrataVision. Key images created with StrataVision's 3-D camera can be animated using StrataFlight's tweening function to fill in the intervening frames. The animations can then be exported into MacroMind Director. For more information, contact Strata at 801/628-5218.

Scitex Visionary Expanded

Scitex's Mac software used for preparing QuarkXPress files for Scitex photo editing and color correction has been upgraded to match the features of version 3.0 of QuarkXPress, adding support for text rotation, bleeds, and the use of multiple templates in a document, as well as support for Quark's new library feature. Visionary 3.0 also adds such Scitex features as degrade creation, black trapping and mask substitution, and scanning instructions. For more information, contact Scitex at 617/275-5150.

Apple Files against Mac Clone

In the latest skirmish of its anticlone wars, Apple says it has filed a complaint against five Akkord Technology employees. Akkord makes a Macintosh clone. The criminal complaint, which has resulted in police raids on the Taiwanese premises of Akkord and Flive Computer Corporation, alleges that the five employees illegally copied the code contained in Apple ROM chips. At press time, the Taiwanese police were considering indictments, according to Apple. ▣

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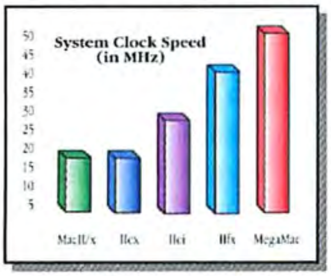

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The secret to MegaMac's incredible performance is its proprietary design. A 68030 50MHz microprocessor coupled with 64K of 12 nanosecond, write-through™ caching and on-board, high speed dynamic RAM (up to 64 megabytes) provides blistering fast program execution. The bottom line? In a word, p-r-o-d-u-c-t-i-v-i-t-y. . .gains greater than you ever imagined.

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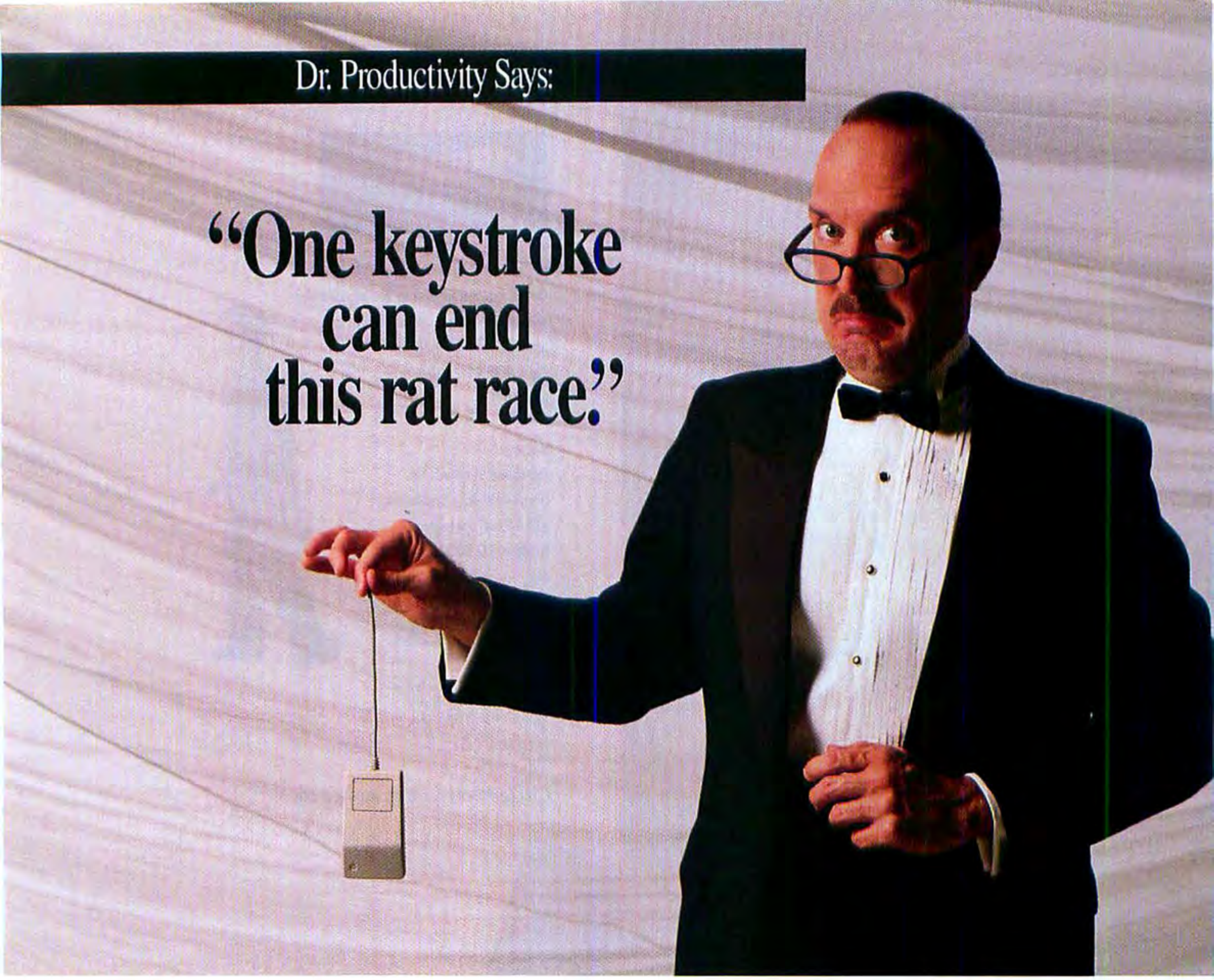

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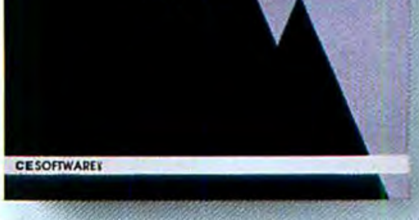

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My Turn

AN OBSERVER ATTEMPTS TO SHED LIGHT ON RECENT EVENTS AT APPLE

BY JERRY BORRELL

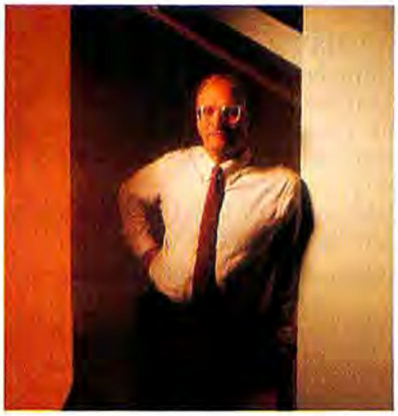
It all started with sporadic reports in the newspapers about an expected decline in earnings at Apple. Then John Sculley missed a round of meetings with financial analysts. Rumors began to circulate that a low-cost Macintosh was nowhere on the horizon. News followed about massive layoffs at the company's headquarters. Next came a spate of front-page stories about Allan Loren, who was leaving Apple. At the same time Michael Spindler (formerly president of Apple Europe) was promoted to chief operating officer. The *Wall Street Journal* followed up with a report that Jean-Louis Gassée had resigned from Apple. It was widely discussed that John Sculley intended to head up the group formerly directed by Gassée. Sculley began to receive some of the worst press in Apple's history. This is but the latest chapter in the ongoing saga of the all-too-public growth pains of a small company that is getting big.

What Started All of This?

Good question, since Apple is selling more Macintosh computers than it ever has. Part of the problem is that someone estimated, and someone else accepted the estimates, that Apple was going to sell about 40 percent more computers in the fall and winter of 1989 than it actually sold. And based upon those estimates, money was spent and projects were initiated. Estimates that flew in the face of facts, such as the real limits on the number of Macs that could be made in the company's manufacturing plants.

Part of the problem was that the number of employees at Apple had crept up to nearly 15,000. Part of the problem was Allan Loren's inability to wrest control of, and give direction to, Apple's marketing and sales groups. Part of the problem was caused by those plans that Loren *was* able to implement. Test-drive a Mac, a campaign Apple advertised beginning in November of 1989, produced results as lackluster this time as it had the first time it was tried a couple of years ago. Worse, Apple heavily promoted a campaign of rebates that provided consumers with cash for machines they probably would have bought without any inducement.

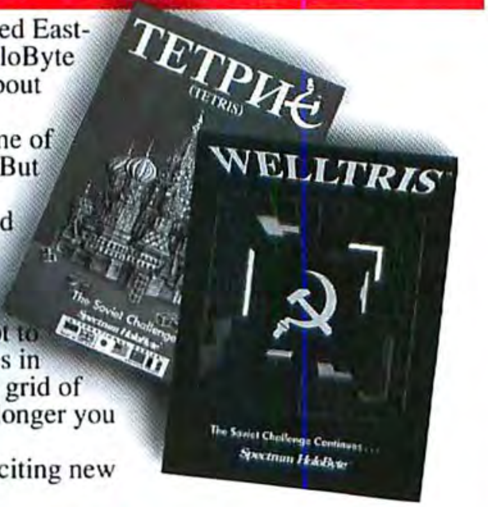
Part of the problem was caused by John Sculley's personnel choices—like his choice of Loren (not to mention the crowd of executives that preceded him), a career insurance executive, to head up a computer company's product marketing. Part of the problem was caused by Sculley's reported inability to allow his executives to run their own departments—a notorious tendency to reduce his direct reports to supernumerary status by going around them to get their staffs to make decisions that he liked. Part of the problem was that John Sculley preannounced the low-cost Macintosh by at least a year and a half. For the first time in his tenure Sculley had seriously miscalculated his actions, which caused many to repeat a popular saying at Apple, "Apple leaks from the top." And a large part of the problem was caused by the fact that the press loves a goat, and so it heaped negative attention on Sculley for sins not all of his own making.



Missing: The Low-Cost Mac

The surprising truth is that there are several versions of low-cost Macs on the drawing boards or in prototype stages at Apple. The not-so-surprising truth is that Apple, during the process of designing both color and monochrome versions of low-cost machines, is learning a lot about what can and cannot be done.

At the same time, technology is changing—faster microprocessors are always just over the horizon—waiting on a successful yield rate from a silicon manufacturer. Disk drive technology is fluid. You have self-appointed critics (like me) out there in the press asking Apple to pull off technical miracles, such as adding small erasable optical drives to their machines. Apple's increasing level of sophistication in integrated circuit and subsystem design (the chips that are stuffed onto a printed circuit board) dictates *(continues)*



that the company think out its designs rather than slapping integrated circuits onto a card to get another machine out the door.

Then there is the shifting nature of system software—which has its own impact on the functional requirements for new CPUs the company will produce. Finally, the company's design mandate requires it to produce aesthetically pleasing machines. To do that, Apple runs sophisticated models on its Cray computer, mills molds out of solid steel, and does tests of how materials will look when they are produced by the mold. In short, as one company executive reported in an obvious jab at Sculley, "We're not producing soda pop here."

Add to this the pressure for Sculley to deliver on his promise of a low-cost machine. In fact, being in the position of having to announce the most expensive machine Apple has ever produced, the Mac IIfx, Sculley must have felt as if the company's leaders on the technology side were letting him down.

French Psyche, Meet New York Push

All of which set up an increasing friction between John Sculley and Jean-Louis Gassée. Proud, egocentric, charismatic Frenchman (who had cultivated many friends in the press) meets high-strung, brilliant, cold marketing wizard (whose press coverage is strewn with photos of multimillion-dollar mansions and Malcolm Forbes junkets). Use pressure, confine in tight space, mix thoroughly, and have the ghost of Steve Jobs wandering the halls at night.

So Gassée is gone and John Sculley is going to (by many accounts) head up product development in his place. Great! Take a legendary marketeer and give him the visionary role, in charge of that section of Apple Computer that has exhibited remarkable stability over the last four years. Now take Michael Spindler—the best-qualified executive (years of experience at Siemens, DEC, Intel, and Apple) Apple has ever had at that level of the company—make him COO, load him up with too much responsibility (Ich bin overworked), mix vigorously, and serve hot.

Stay tuned. ■

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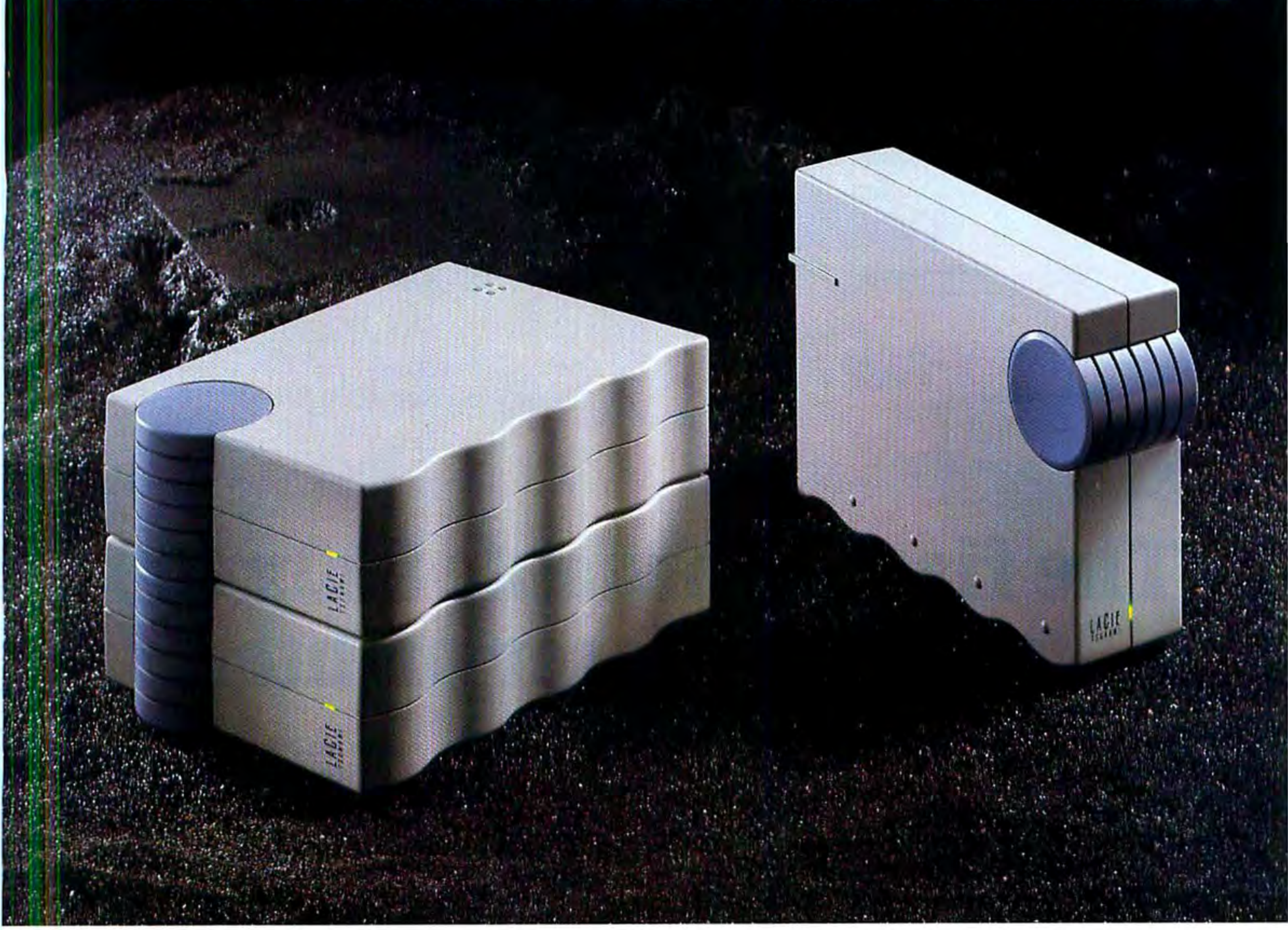

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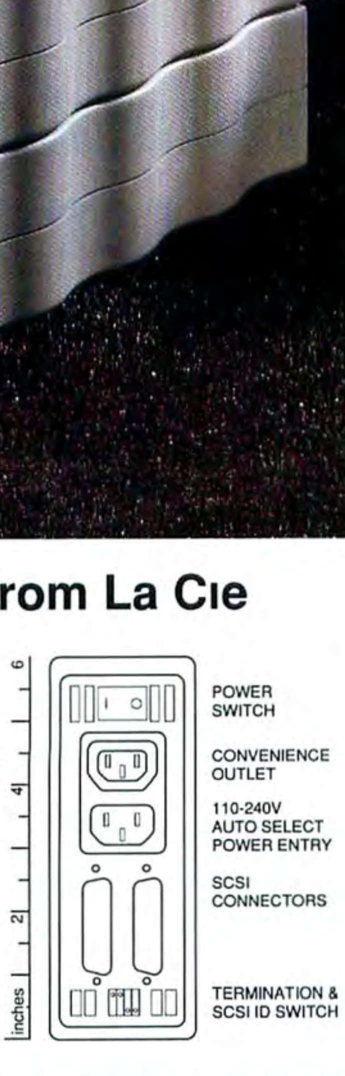
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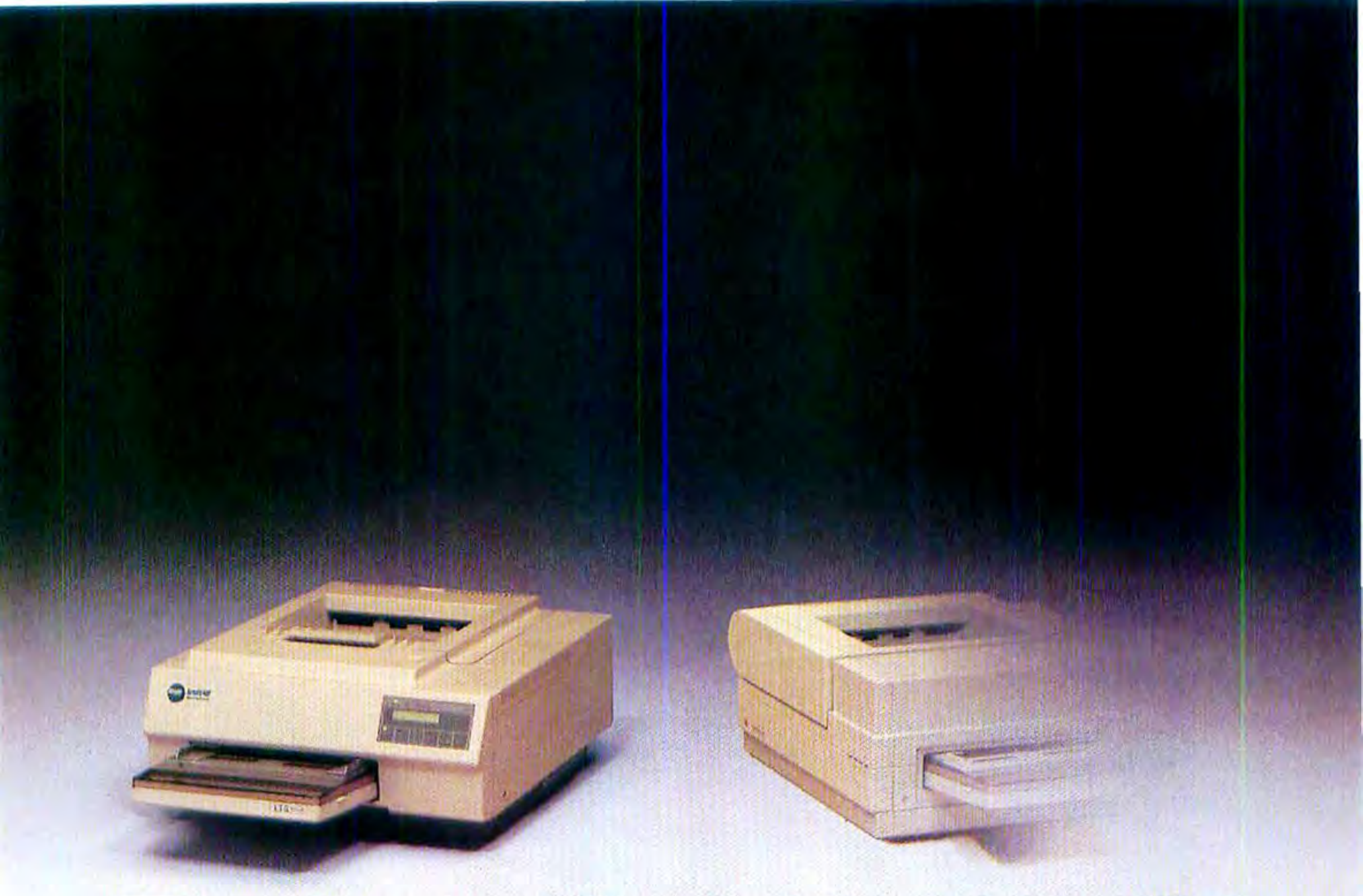

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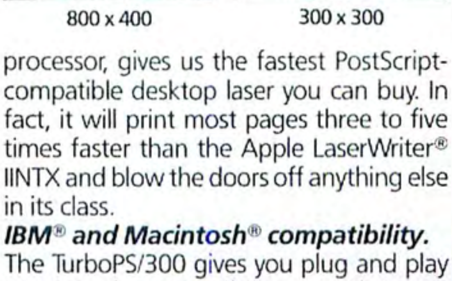

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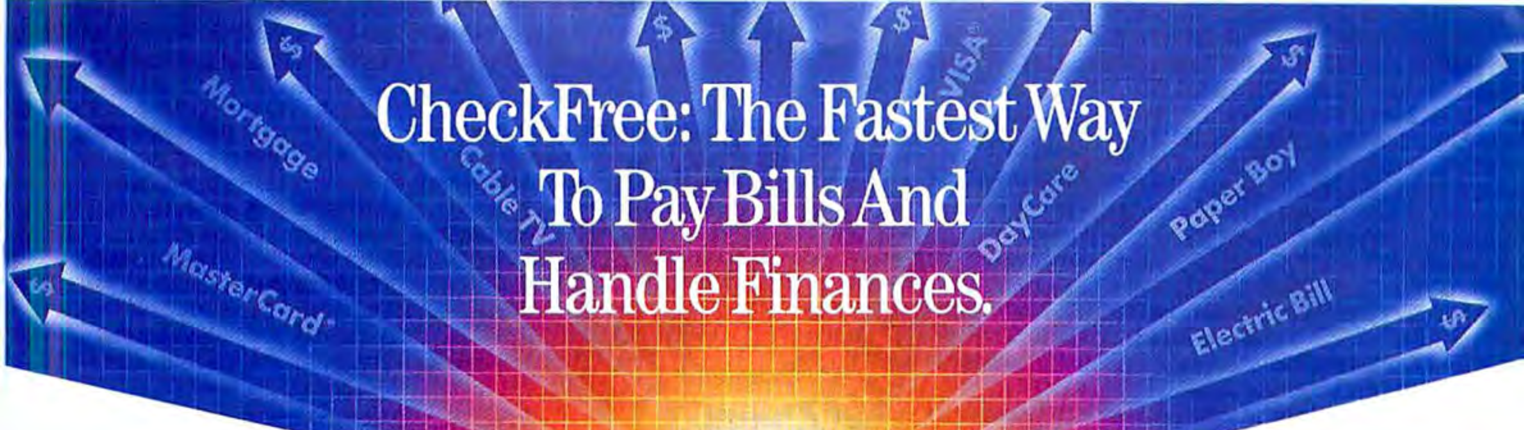

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PC Magazine, Best of 1989 Awards
January 16, 1990 issue

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PC Magazine

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LETTERS

WARD SCHUMAKER

Batteries Get You Everywhere

I must take Steven Levy to task over his obvious disdain for things battery-powered [*The Iconoclast*, March 1990].

Somewhere out there beyond our sheltered shores, yeah, even beyond the great Mojave Desert, is something called The Rest Of The World, where things do not operate at 110V AC. They don't even have standardized wall sockets, for goodness' sake. And you can forget about those handy-dandy converters. If they can blow a hair drier, I shudder to think what they might do to an unsuspecting computer.

Those of us who must travel and write at the same time have waited patiently for a Macintosh product to fit the bill. Yes, it needs to be lighter, and definitely more affordable. But, as Levy points out, Mac devotees really don't have much choice at the moment.

So please, keep the batteries (but you can make them lighter).

Christina Macias
San Juan Capistrano, California

Post-Portable Depression

Steven Levy's column about the Mac Portable is the only real review I have seen. I couldn't agree with his judgments more. I'm an escaped physicist who studies buildings, so I do a fair amount of field research. All I've ever wanted in a laptop is something that was easy to pack and carry and would run a word processor, a spreadsheet, a drawing program, and a scientific graphics program. I began saving my money so that when Apple did come out with a lightweight I could buy one.

I eventually bought Toshibas to tide me over, nice little machines that cost less than $2000. But Levy is right. I hate MS-DOS. When the Dynamac and the Colby started shipping I kicked the tires, but they were large and heavy and I could buy a couple of Toshibas for the same price. When the Mac Portable came out, I was delighted it could run the software but depressed to find that it weighed nearly the same as my SE, was the size of a large typewriter, and was the price of three Toshibas. My depression lasted until I saw Tandy's new little laptop, the Tandy 1100. I bought one of these machines for just over $1000. It's just small enough to take with me and easy enough for me to use all the time. So if you are as disappointed as I was with Apple's portable, go have a look at this cheap and simple laptop. I had enough money left over in my Mac Portable savings account to pay cash for a new car. I'm not depressed anymore, and I owe it all to Apple.

Terry Brennan
Oriskany, New York

Stereotype City

It's sad that Steven Levy lacks the foresight to see the technological breakthrough that is the Macintosh Portable. But it is far worse that his indefensible anti-Semitic comment de-

(continues)

Corrections

The following information should have appeared in the table "SIMM Sellers" on page 134 ("Is Your Mac Obsolete?" February 1990): The MacZone (800/248-0800) sells 256K and 1MB SIMMs.

*GeneSystems makes the scientific graphics program Plasmid Artist (*New Products, *February 1990).*

Genigraphics Corporation should have been credited for its help in the design and production of visuals for "Here's the Pitch" (March 1990).

C-Cube Microsystems (408/944-6300), maker of color compression hardware and software, was incorrectly referred to as C^3 in State of the Mac *(April 1990).*

*The caption for the photo on page 95 (*Macworld News *April 1990) should have read "Mark Tuttle (left) and David Sherertz of Lexical Technology."*

The phone numbers for Brøderbund, maker of The Playroom (New Products, *April 1990) are 800/521-6263 and 415/492-3200. The product retails for $49.95.*

Howtek's Pixelmaster printer does not support color transparencies ("Hot Wax & Cold Ink," February 1990). Although the Pixelmaster can print on transparent material, the opaque quality of the ink results in black-and-white output.

tracts from otherwise valid criticism.

Levy states that the Macintosh Portable, in giving the user critical feedback, "worries like a Jewish mother." Levy can aim his venom at whatever computer he desires, but he cannot be allowed to libel a religion or its followers. *Macworld* 's Jewish readers deserve a prompt and public apology and retraction for this irresponsible breach of journalistic ethics.
Ross Scott Rubin
Flushing, New York

My Jewish mother forgives me—can you?—Steven Levy.

Fonts of Wisdom

The professional typesetters at our shop get sick and tired of seeing newcomers to typesetting and desktop publishing make the same mistakes over and over. A typesetting faux pas that makes us see red is the improper use of bitmapped fonts. If you're going to make the effort to typeset something, why not make it look good?

We hope that you will help us spread the word on bitmapped fonts: they're ugly and, as a law-abiding American citizen, you don't have to use them (if it's not an amendment, well, by God, it should be).
Carol White
Andrew Dallons
Melinda Parker
Tehachapi, California

Type-Righter

I learned to type in high school over 30 years ago, and that means I put two spaces after a period at the end of a sentence. I will continue to do it, come hell or high water, because it accomplishes what I want: it distinguishes the end of a sentence from the word space that follows an abbreviation. All word processors ever made (at least all that I know of) can handle that and don't do stupid things like leaving a ragged edge if the line breaks there. I have set type on machines with no more RAM than is now found in the average wristwatch, and they didn't have any trouble with it (and they did better hyphenation too). Now we have to contend with programs like ReadySetGo and QuarkXPress that display the attitude "we don't do it that way in typesetting." Baloney.

It used to be that typing was for business and typesetting was for books, and the two had very little in common. For decades even the keyboard layouts were different. It's not that way anymore. Acronyms and abbreviations are everywhere you look, in any kind of copy. There is no excuse for perpetuating this snooty myth any longer. These people should be ashamed of putting their customers through needless gyrations to get the glitches out of their finished work, glitches that the programs put there intentionally.
Eric Bear Albrecht
Taos, New Mexico

Features Don't Follow Function

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(continues)

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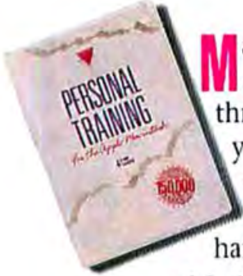

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functionality. In the beginning, there was this wonderful concept that users would purchase software that did one thing very well. Because of the Macintosh interface, all programs would share information. What wonderful functionality. Unfortunately, your reviewers favor the all-in-one mediocre software.

A case in point is your review of desktop presentation packages ["Here's the Pitch," March 1990]. David Pogue makes the statement "PowerPoint, the granddaddy of them all, somehow continues to do well in the marketplace, despite the fact that it's nowhere near as capable as its rivals." Define capable. I'm sure Pogue defines it as features. The majority of users, based upon their purchase of PowerPoint, define it as functional. PowerPoint is by far the most functional of those reviewed. I've tried them all.

Steven Doctor
Rochester, New York

Heap o' Help for Crashes

I used to experience annoying "Unexpectedly quit" messages even after installing 8MB of RAM [see *State of the Mac,* February 1990]. The problem seemed to occur particularly when I was using PageMaker, with or without MultiFinder.

Then I discovered a little utility called HeapFixer from CE Software included with the QuicKeys program. The accompanying Read Me file is very informative and suggests that the user look at the amount of RAM the System file is occupying. If there is less than about 20 percent free space, look out for a crash. After some experimentation, I used HeapFixer to set the system heap at 1200K larger than normal (about 1600K).

Anyone with plenty of RAM who is experiencing system crashes or unexpected quits should look at About Finder to see how much of the system heap is in use. If the "thermometer" is nearly all black, consider HeapFixer. I haven't had a crash or an unexpected quit in two months, in spite of the fact that I work with MultiFinder open at all times.

Matt Cole
Lakewood, Colorado

MYMmania II

After reading Andrew Tobias's letter [*Letters,* March 1990], I'd like to reassure him that Levy's column [*The Iconoclast,* January 1990] is not the last word on MECA's Managing Your Money (MYM). I have a few of my own to add.

Reading Levy's column actually encouraged me to purchase MYM. I'm one of those sick people who wants a program that really nails down every last penny and then gives me the powerful tools included in Tobias's program. I am also the kind of computer enthusiast who doesn't mind a program with a few non-Mac foibles and idiosyncrasies as long as it does what I want.

But MYM was so frustrating to work with that I finally gave up on it completely. I can't count the number of times I reached for the Undo function, never to find it active. Changing a category under which an account is

(continues)

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MIGHTY MAC
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WE FIND MARVIN EAGERLY ANTICIPATING THE MASTERY OF HIS NEW MAC...
...HE SAID I'D BE AN EXPERT IN JUST 10 MINUTES
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COMPUTER SHOPPING CENTER
WE CARE! (SORTA)
INITIALIZE MY WHAT?!
CORPORATELAND INSTRUCTIONS
• INSTALL CARDS
• MOUNT SYSTEM
• INITIALIZE
• FORMAT
TWEEK
TRY AGAIN
READ MANUAL
BREATHE DEEP
TRY AGAIN
LATER...
...WRONG CABLE?.. WE CAN BACKORDER THE RIGHT ONE FOR YOU.
...STILL LATER...
THERES GOT TO BE AN EASIER WAY
INSTRU
MAC WHO?
CORPORATELAND
AARRGGG
IN HIS MOMENT OF NEED MARVIN IS SAVED BY OUR HERO... AND A CALL TO Mac FRIENDS!
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MacFRIENDS
ZOT!
Mac Friends
OVER-NIGHT SERVICE
THE VERY NEXT DAY!
AND TO THINK ...IT EVEN COST ME LESS!
MacFRIENDS INSTRUCTIONS
1. UNPACK
2. PLUG IN
3. TURN ON
4. DO IT!
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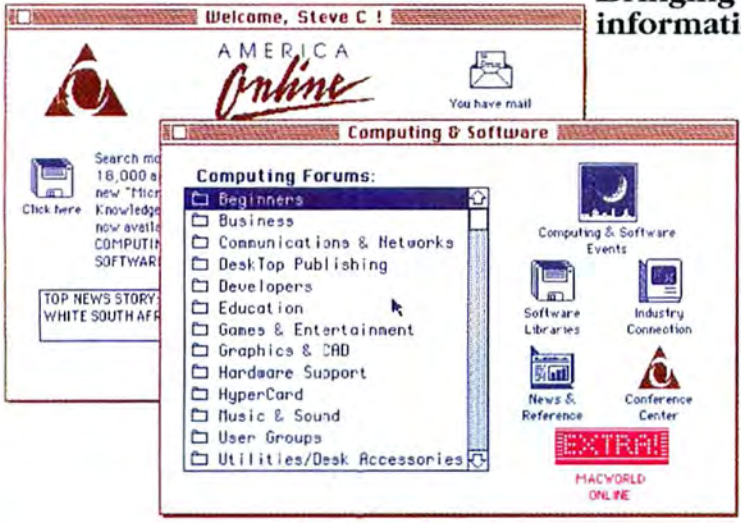

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listed is impossible once you have recorded a transaction for it. And changing many things in the program entailed a trip through multiple screens (you couldn't call them windows because most of them are dialog boxes) that look confusingly similar.

It was especially infuriating to have to give up because using MYM for a moderately complex financial situation means a considerable investment in time to get everything set up. If this program was written by "Mac true-believers" as Tobias says, I would suggest they don't give up their day jobs.

Dan Kuchta
Brockport, New York

FileMaker Graphics

Your article "Forming Opinions" [February 1990] is correct when it states that FileMaker II has crude graphics capabilities. However, you overlooked the fact that PICT graphics can be imported into FileMaker and then printed with high resolution. I use the wide array of drawing tools in Canvas 2.1 to draft forms from scratch, or redraw images scanned with a Hewlett-Packard ScanJet Plus. The finished graphic is then copied into the Clipboard and pasted directly into FileMaker. Graphics, such as the company logo, can be imported and arranged separately. Once the parts of the form are positioned, fields are overlayed. Using an additional layout allows fields to be rearranged so they are visible on the small screen of a Mac Plus or SE (handy for data entry). Additional fields or layouts can be used for tracking copies of the form (records) after they are issued. The combination of a high-resolution background and fields with database capabilities can be achieved easily with FileMaker.

Ian McGregor
Saskatoon, Saskatchewan, Canada

SEeing Static

The static field of my SE used to create a heap of problems for me [see "Warning: Computing Can Be Hazardous to Your Health," January 1990] including allergic eye sores caused by dust clinging to my face, asthma, and unfamiliar fatigue. In addition, after some hours on my Mac, my hair was literally standing on end. Antiglare filters, such as those manufactured by Polaroid, seemed to add to these troubles. With Polaroid filters I could actually feel the star particles spraying my face.

NoRad's antistatic radiation filter has done away with all of these problems, which is why I strongly recommend it. However, it has one serious flaw: the grounding cable can't be securely fastened to the screws in the back; it has to be tucked loosely into the gap between screw and chassis.

Alexander Schaumburg-Lippe
Schloss, West Germany

You can ground the NoRad screen to the chassis provided you have a Torx T15 or 1/8-inch flathead screwdriver. Unscrew one of the case screws part way, slip the U-shaped lug around it, then retighten the screw. The contact between the chassis and the screw grounds the *(continues)*

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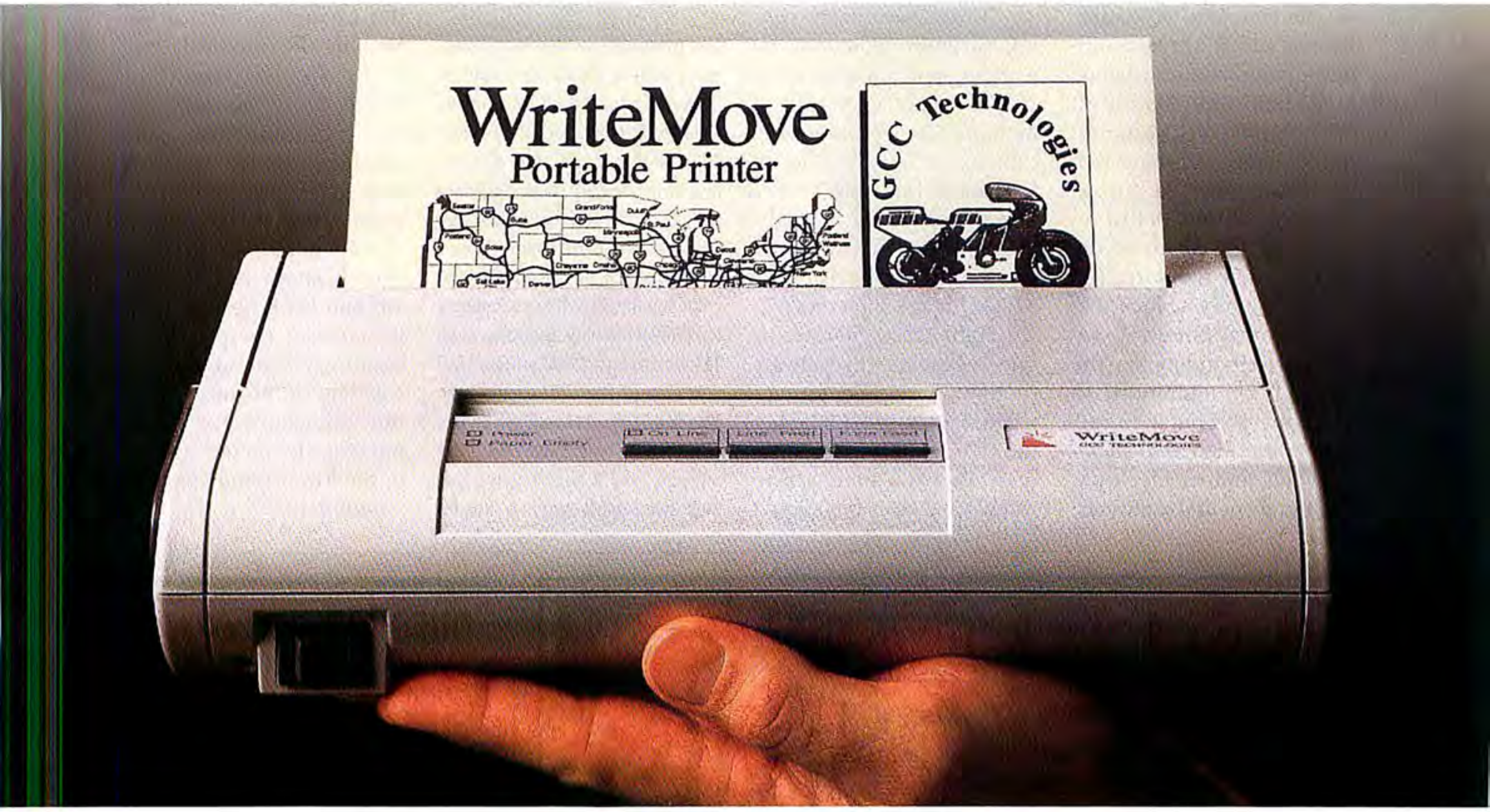

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Circle 305 on reader service card

AD# 020065

screen. In fairness, several manufacturers provide grounding cords that plug directly into a three-pronged outlet. They have only the ground lead, so there is no danger of electrocution.—Ed.

Simple SIMM-On

Your article on upgrades ["Is Your Mac Obsolete?" February 1990] contains misinformation about installing SIMM chips into Macintosh SEs. "Memory Configurations" (page 129) states that a resistor must be cut on the main logic board in order for the SE to recognize the new memory. The SE has a jumper block that can be switched or removed (depending on the memory configuration) to allow the computer to recognize the increased memory. This jumper block has been present in the SE since at least November 1988.

Rebecca R. Van Dalsem
Portola Valley, California

An MB is an MB

I'm still trying to figure out one paragraph from "Is Your Mac Obsolete?" February 1990, page 130:

"If you have been reading carefully, you may be wondering why it takes eight 256K SIMMs to get 1MB of memory. One 256Kbit chip can store 256,000 bits of information, but only 1 bit is accessible at a time. . . . Eight 256Kbit chips on one SIMM provide only half of that 16—8 bits (1 byte) of memory."

Eight 256K SIMMs for one megabyte? I've always thought that it takes four: (4 × 256 = 1024). Also, whether the CPU takes its data 8, 16, or 32 bits at a time, a byte will always be 8 bits, and a megabyte will always be 1024 bytes. This implies that 1MB on a Mac II–family machine is less than 1MB on a Plus or SE, since the 68020 and 68030 CPUs get their data 32 bits at a time.

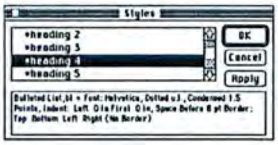
Jeff Morrow
Ann Arbor, Michigan

The paragraph (which was incorrectly edited) should have read as follows. Each 256K SIMM contains eight 256Kbit chips, and it takes four 256K SIMMs to get 1MB of memory. One 256Kbit chip can store 256,000 bits of information, but only 1 bit is accessible at a time. Since a byte equals 8 bits, eight 256Kbit chips (on the SIMM) are necessary for 256K of memory. Similarly, eight 1Mbit chips on a SIMM provide 1MB of memory. The CPU in the Mac Plus and SE needs to access 16 bits (2 bytes) at a time. Since one SIMM provides only 8 bits (1 byte), you must buy SIMMs two at a time for a Plus or SE. The CPU in a Mac SE/30, II, IIx, or IIcx, on the other hand, accesses 32 bits (4 bytes) at a time. As a result, you must buy SIMMs four at a time for those Macs.—Ed.

Skeletal Screw-Up

I read with great interest Dr. Tessler's article about the expanding role of the Mac in the medical field ["The Medical Desktop," March 1990]. Not only was the text informative, the graphics included were well chosen and illustrated key points. However, I thought I should point out that the cervical spine film on pages 139 and 142 is upside down. Of course, I suppose we could say the subject was standing on his head when the radiograph was taken, but considering the arthritis in the lower segments, that

(continues)



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Circle 463 on reader service card

would be a dubious explanation at best.
Keith H. Sherry, M.D.
Mishawaka, Indiana

Thanks for pointing out the mix-up. We published the image just as we received it, inverted, and we regret not catching the error. —Ed.

How Many Minitels?

As an active member of the Paris Macintosh community, I get a lot out of reading *Macworld* each month. In your February column [*Commentary*], I was surprised to read about the supposedly 20 million Minitels that have been distributed here. The number is actually verging on 5 million, and a significant number of these aren't really used, even for as simple a function as the Electronic Phone Directory. Nevertheless, only a public service could afford to invest so much (nearly $2 billion initially) with no guaranteed return, enabling France to pass rapidly from a country with an underdeveloped phone system to one with over 12,000 online services used at the rate of 6 million hours per month.
Lionel Lumbrosco
Paris, France

Ethernet + LocalTalk = ?

I really enjoyed the article on ISDN. I wanted to clarify one item, however. In the second paragraph you stated that EtherTalk was "Ethernet implemented over LocalTalk." This is not true. It is a confusing issue, but generally both Ethernet and LocalTalk are used to describe hardware standards (the physical medium), while AppleTalk and EtherTalk define protocol standards. EtherTalk is simply AppleTalk protocols running over Ethernet cabling. By definition, however, you cannot run Ethernet over LocalTalk, since they're both hardware standards.
Mark S. Burnham
Walnut Creek, California

It Can Print Envelopes

Reviewer Ron Risley should be happy to know that his one real reservation about the Fujitsu RX7100PS PostScript page printer [*Reviews*, April 1990]—its inability to print envelopes—has been more than resolved. Actually, printing envelopes is one of the printer's greatest selling points.

The RX7100PS and the PS+ are now bundled with two software enhancements that make envelope printing and letter writing a breeze: Working Software's desk accessory QuickLetter and Fujitsu's proprietary Select-A-Bin menu-driven utility for automatic switching of dual paper bins. Both printers also come with screen fonts on disk.
Sallie Siegal
Fujitsu America
San Jose, California

……

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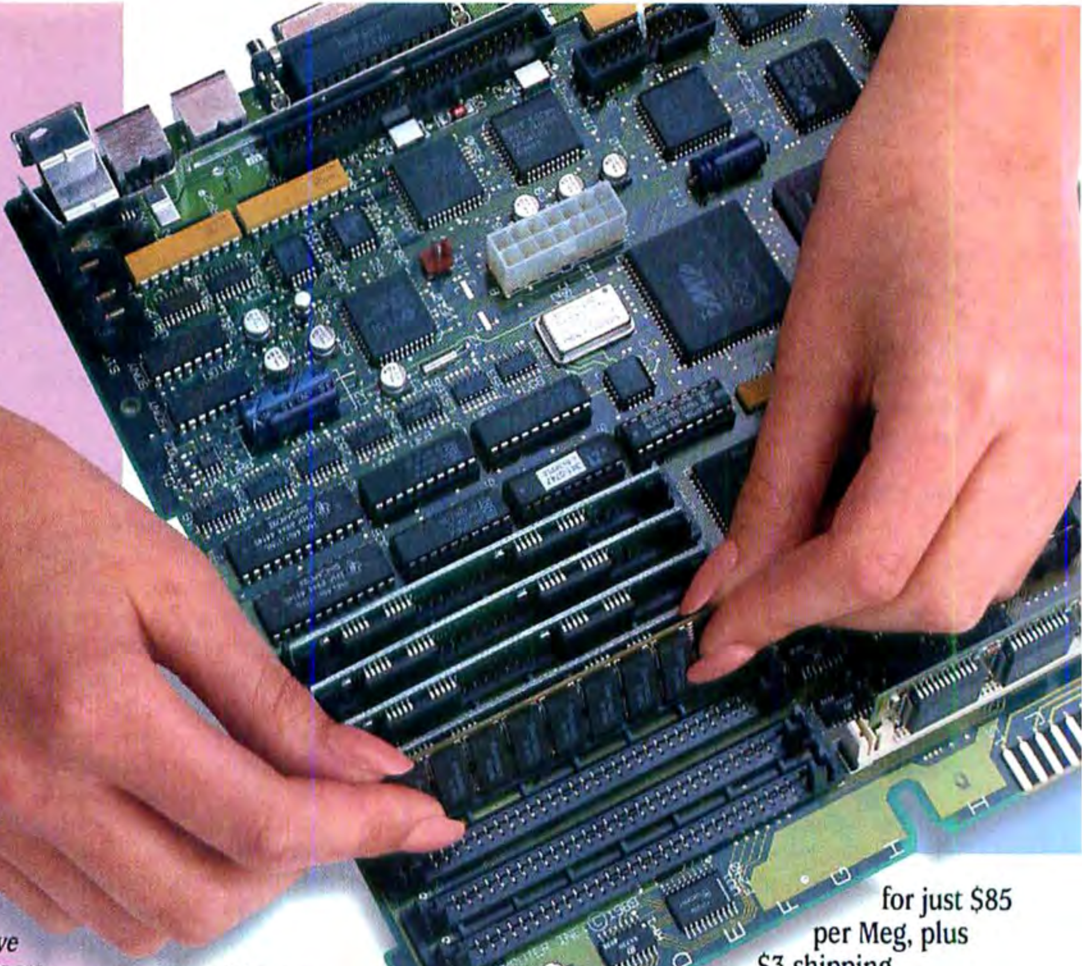

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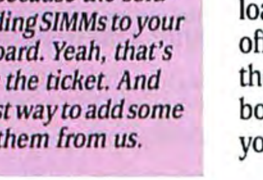

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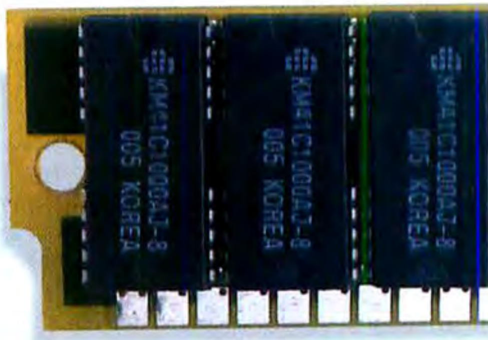

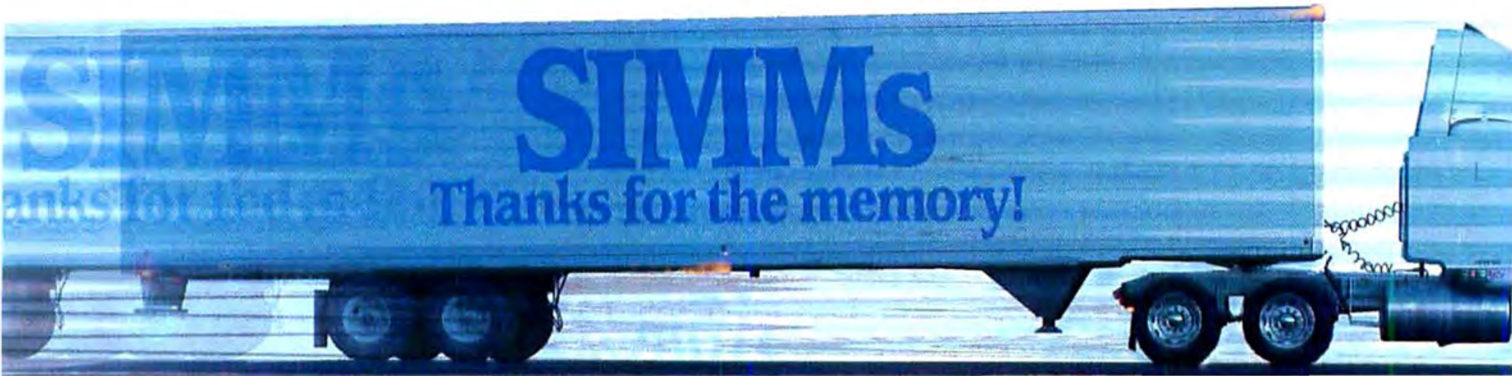

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5174	QuickMail 2.2 *(5 user Pak)*	215.
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1676	CompuServe Information Service	23.
1673	CompuServe Navigator 2.1	39.
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5834	Connect 1.5 for the Macintosh	63.
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4842	MacLink Plus/Translators 4.12	99.
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5391	FastNet LAN 1	949.
5390	FastNet LAN 2 *(1 Meg)*	1349.
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5387	FastNet LAN 5 *(4 Meg)*	1439.
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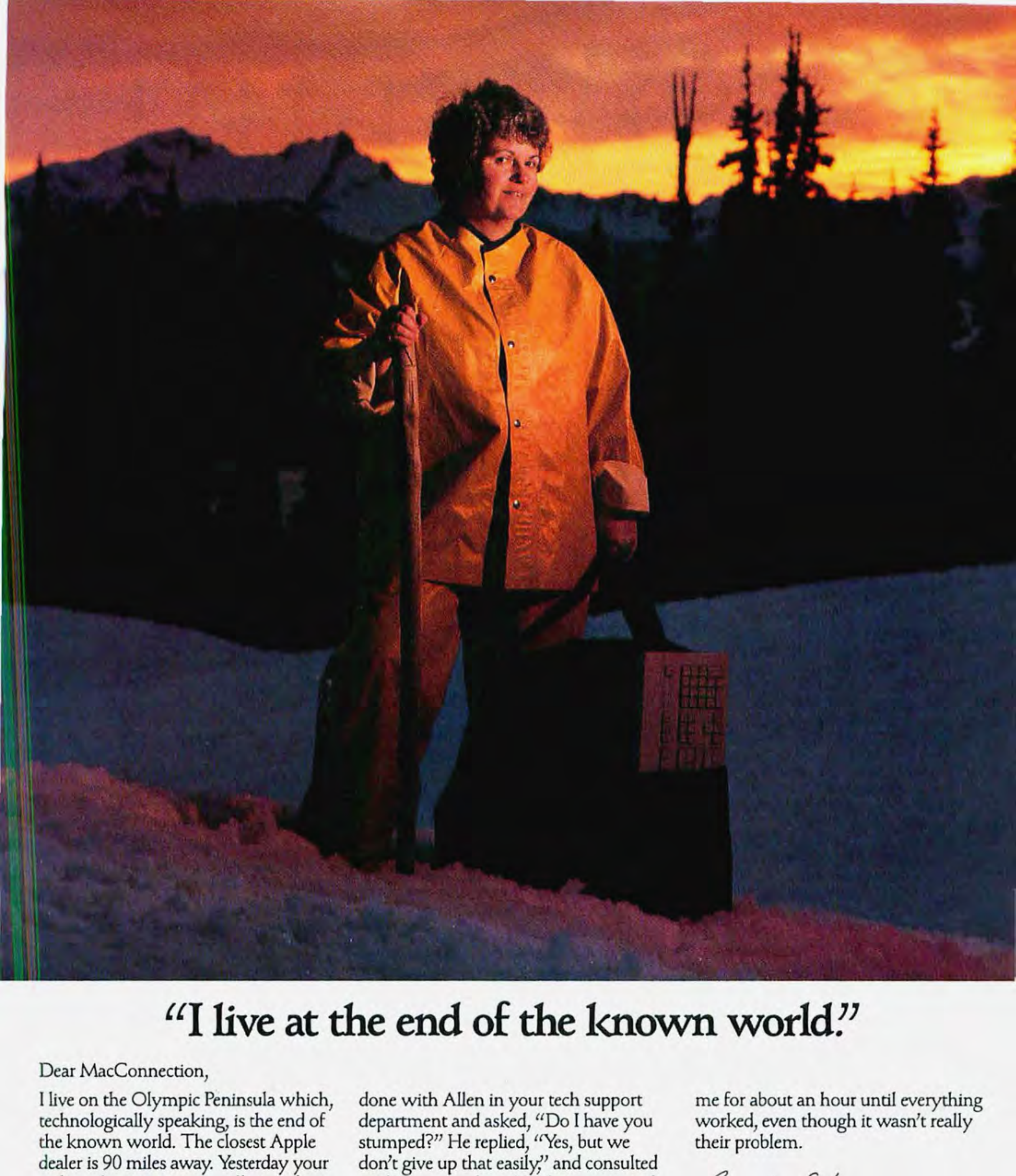

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4018	LaserWriter II Series Cover *(navy)*	17.
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2593	MacVision 2.1	219.
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6730	DICONIX M150 Plus Printer	489.
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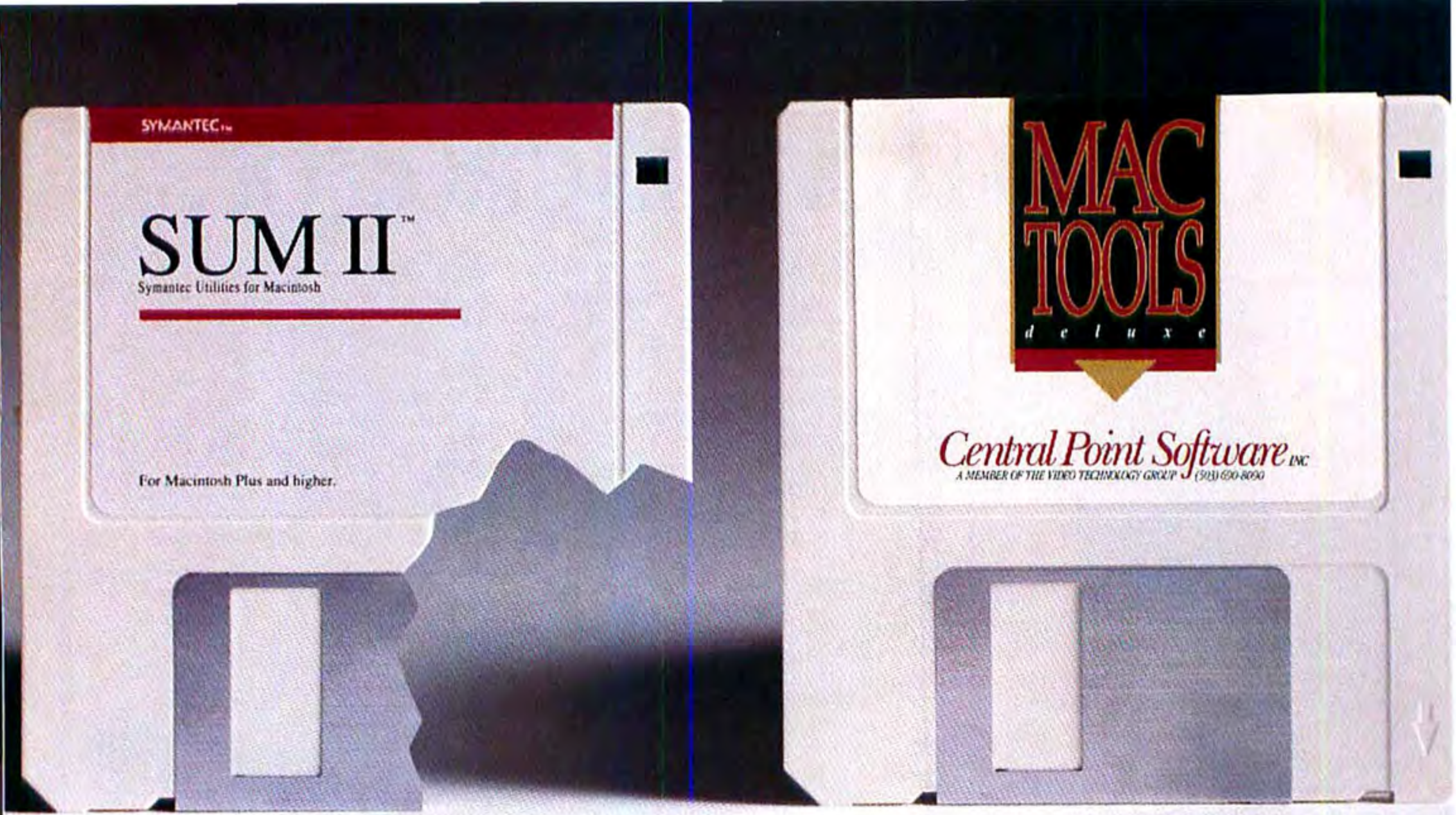
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ART BEAT

**by Cathy E. Abes
and Jerry Borrell**

The tools and the talent behind Macworld's graphics and the techniques that make them possible

Artists: For this month's cover illustration, Drew Huffman of Paracomp created a model from *Macworld* art director Joanne Hoffman's sketch; Huffman and Eliot Smyrl of Pixar then rendered the image.
Tools: Sun 3150 workstation; Mac IIcx with 40MB hard drive; RasterOps 24-bit board; 13-inch Apple color monitor; Paracomp's Swivel 3D; and Pixar's PhotoRealistic RenderMan.
How It Was Done: To get the most sophisticated image possible, we had to provide Pixar the underlying geometry for the image in a format acceptable to Pixar's RIB (RenderMan Interface Bitstream) software.

Huffman used an unreleased version of Swivel 3D (2.0) to create first wireframe, and then shaded, models of a Macintosh, a 24-bit graphics board, and two additional surfaces that Pixar rendered as the floor and the star field in the final output. Using Swivel 3D Huffman built objects (such as the components on the circuit board) and set the camera position (viewing angle). He pulled the Mac from a file of Paracomp's to-be-released 3-D clip art.

Generating a reasonable facsimile of a RasterOps 24-bit board took Huffman about five hours. Tweaking the model, varying the geometry, resizing, and changing the viewing angle and perspective took about eight hours. He worked on a Mac IIcx with a RasterOps 264 board set for 8-bit operation.

The original DXF file was a whopping 4.5 megabytes, containing over 100,000 polygons—too large to be practical for ren-

(continues)

dering. Huffman and Smyrl reduced the size of the file to 2.7MB by rebuilding the pins (metallic leads) on the integrated circuits as united files. Then Huffman and Smyrl broke the image into smaller objects (computer, circuit board, and so forth) in order to simplify the rendering process. Software routines called shaders were used to calculate each object's surface properties and produce specular highlights and wood flooring. Smyrl even wrote a shader that applied the bands of color on the resistors.

Smyrl spent about 75 hours over a three-week period on the project. The wooden floor and ball are borrowed from the Pixar film *Luxo Jr.* The snowman on the Mac is from Pixar's film *KnickKnack.* Smyrl worked on a Sun 3150 workstation that has a Pixar-designed graphics-accelerator board connected on the Sun bus. The star field in the background is from Pixar's proprietary star-field generator, a program that makes astronomically correct star backgrounds. You may be able to detect the constellation Orion in the background.

The entire project could have been done on a Mac, but time constraints made it necessary to use the Sun system, which cut the rendering time in half. The motion blur, for example, presented special problems. Smyrl had to use a digital composition technique to give individual motion-blur streaks the appearance of a ball bouncing across the floor.

To maintain the resolution of the data file, Pixar submitted the entire file on magnetic tape to Walker Graphics in San Francisco. Walker produced both match print and CMYK separations from the tape, and performed some color corrections on the highlighting of the ball.

State of the art is possible, but rather painful on the Macs of today. The Mac IIfx release came too late to help, but we look forward to improvements in Mac computer graphics that the IIfx will provide. Our thanks to Ed Catmull, founder and chairman of the board of Pixar; to Bill Woodward, president of Paracomp; and to all the folks at both companies who spent weeks working on the cover.—**J.B.**

Artists: For our rendering feature on page 136, *Macworld* asked five vendors to put their software to the test by rendering a complex model of a Chinese mask. Here's how Jay Roth, president of Electric Image, and Koji Sonoda of SystemSoft created their images.

Tools: Roth used a Mac IIcx with his company's Electric-Image software, AutoCAD, Studio/8, and Adobe Photoshop. On a distributed network of several Macs, Sonoda used PixelPaint and SystemSoft's modeler and renderer, code-named Shade, which is not yet released in the United States.

(continues)

This wire-frame image shows how the data looked before it was rendered.

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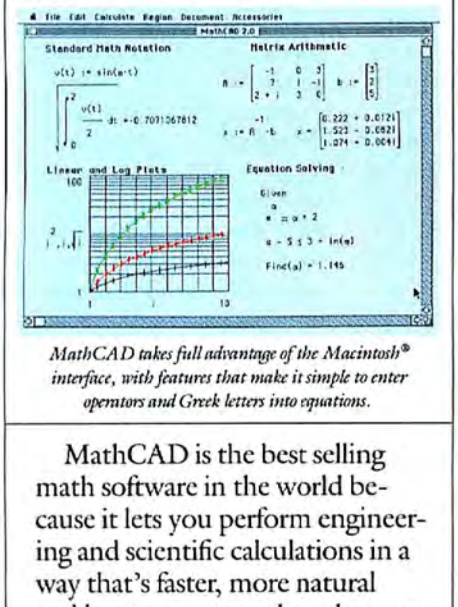

MathCAD takes full advantage of the Macintosh® interface, with features that make it simple to enter operators and Greek letters into equations.

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MathCAD's live document interface™ lets you enter equations anywhere on the screen, add text, and graph the results. Then print your analysis as a presentation quality document.

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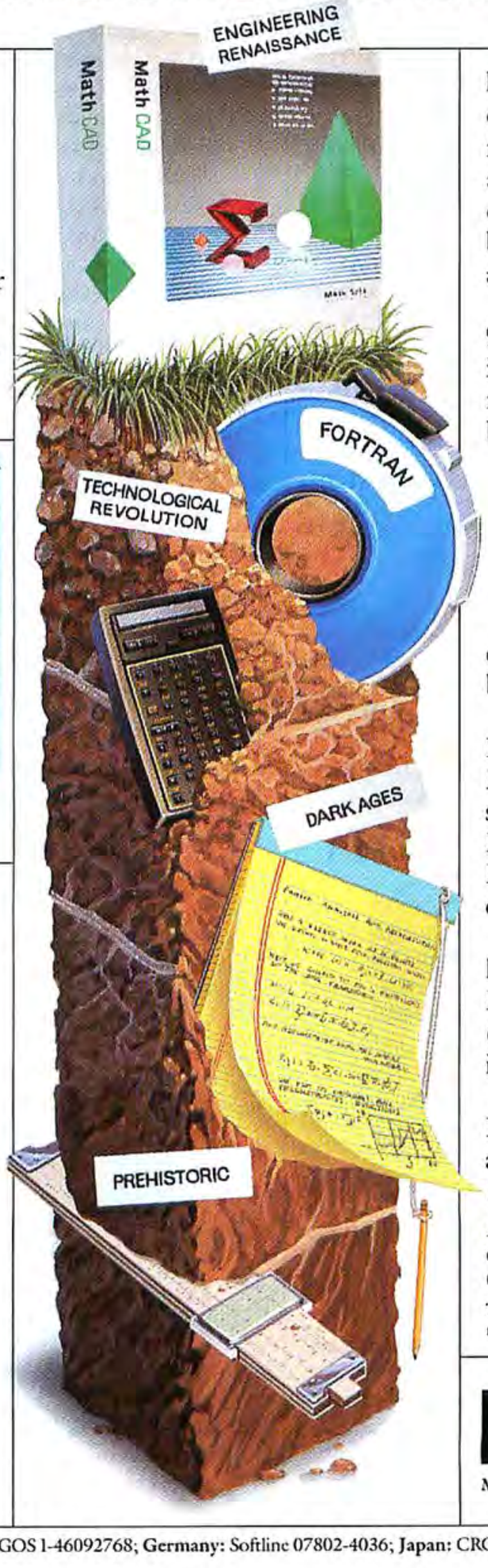

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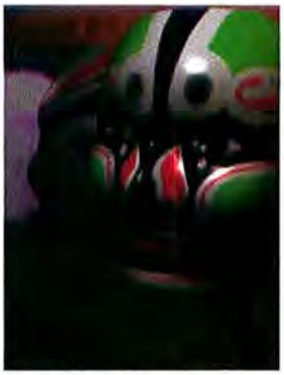
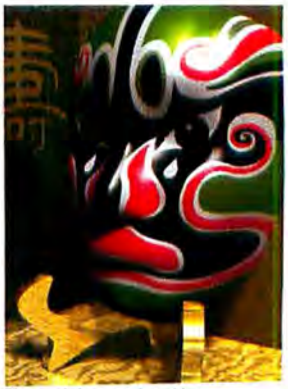
How It Was Done: The original image was scanned by Cyberware Laboratories of Monterey, California, with a Rapid 3-D Digitizer. The Cyberware works by throwing a laser grid composed of more than 200,000 data points over an object, so a lot of extraneous data had to be deleted from the model before rendering. Production designer Jon Farhat did some of the cleanup work in AutoCAD before the image was sent to the vendors.

ElectricImage: Roth cleaned up and fleshed out the model in AutoCAD, then added the shelf, wall, and mirror. He imported wood-grain-texture images (in PICT format) from Studio/8 and applied them to the shelf and stand. To create a template on which to paint the mask pattern, Roth rendered the mask in a straight-on view using a 100mm simulated lens to flatten it out. He imported the resulting image into Photoshop, where he painted the pattern on top of the mask. Roth then brought the pattern back into ElectricImage as a texture map, which he applied to the model. After positioning all the objects, he lit the scene with one spotlight and lit the reflection with two spotlights and a fill light. The entire project took about six hours, much of it devoted to cleaning up the model. The rendering (of six or seven thousand polygons) took about ten minutes on a IIcx.



The model as rendered by ElectricImage.



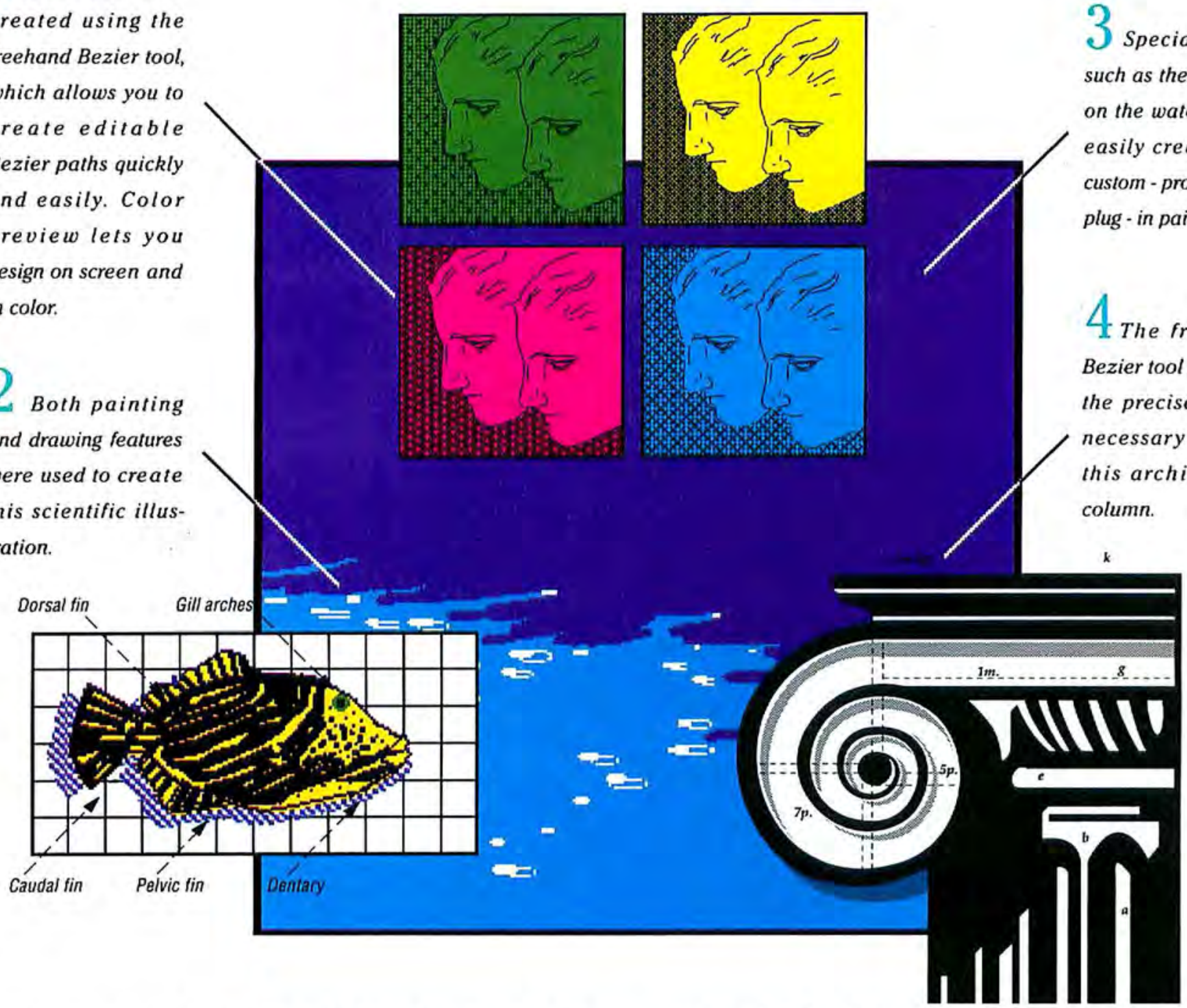
The model as rendered by SystemSoft.

SystemSoft: Because of the poor quality of the model, Sonoda re-created the mask geometry. First he created a template by using Capture to convert a wire-frame image of the DXF file into a PICT file. He imported the PICT file into Shade and used the program's modeler to reconstruct the mask on top of his template. Sonoda applied randomly generated patterns from Shade to the wall and to the shelf. He scanned in a Chinese character and used PixelPaint to fine-tune the image. The mask pattern was also created in PixelPaint, saved as a PICT file, and imported into Shade.

According to Toshiya Tokieda, author of Shade, ray tracing the soft shadow and soft reflection on the shelf and wall required considerable computational time. As a result, the rendering process—distributed over a network of Macs—took about 24 hours. Rendering time could be cut drastically by leaving out the soft shadow and soft reflection features, Tokieda said.—**C.E.A.**

SuperPaint 2.0

Setting the Standard. Again.



1 *These faces were created using the freehand Bezier tool, which allows you to create editable Bezier paths quickly and easily. Color preview lets you design on screen and in color.*

2 *Both painting and drawing features were used to create this scientific illustration.*

3 *Special effects, such as these bubbles on the water, can be easily created with custom-programmed, plug-in paint tools.*

4 *The freehand Bezier tool provided the precise control necessary to draw this architectural column.*

SuperPaint, the best-selling graphics program for the Macintosh®, has always set the standard against which other software is compared. And we just raised that standard.

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Then, with a mouse click, you can further refine your graphic with the most flexible and sophisticated painting tools available on the Mac, including a slick new airbrush that works just like the real thing. Plug-in paint tools can be custom-programmed and will show up in the tool palette.

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System requirements:
Macintosh Plus, SE or Macintosh II;
System 6.0 or later

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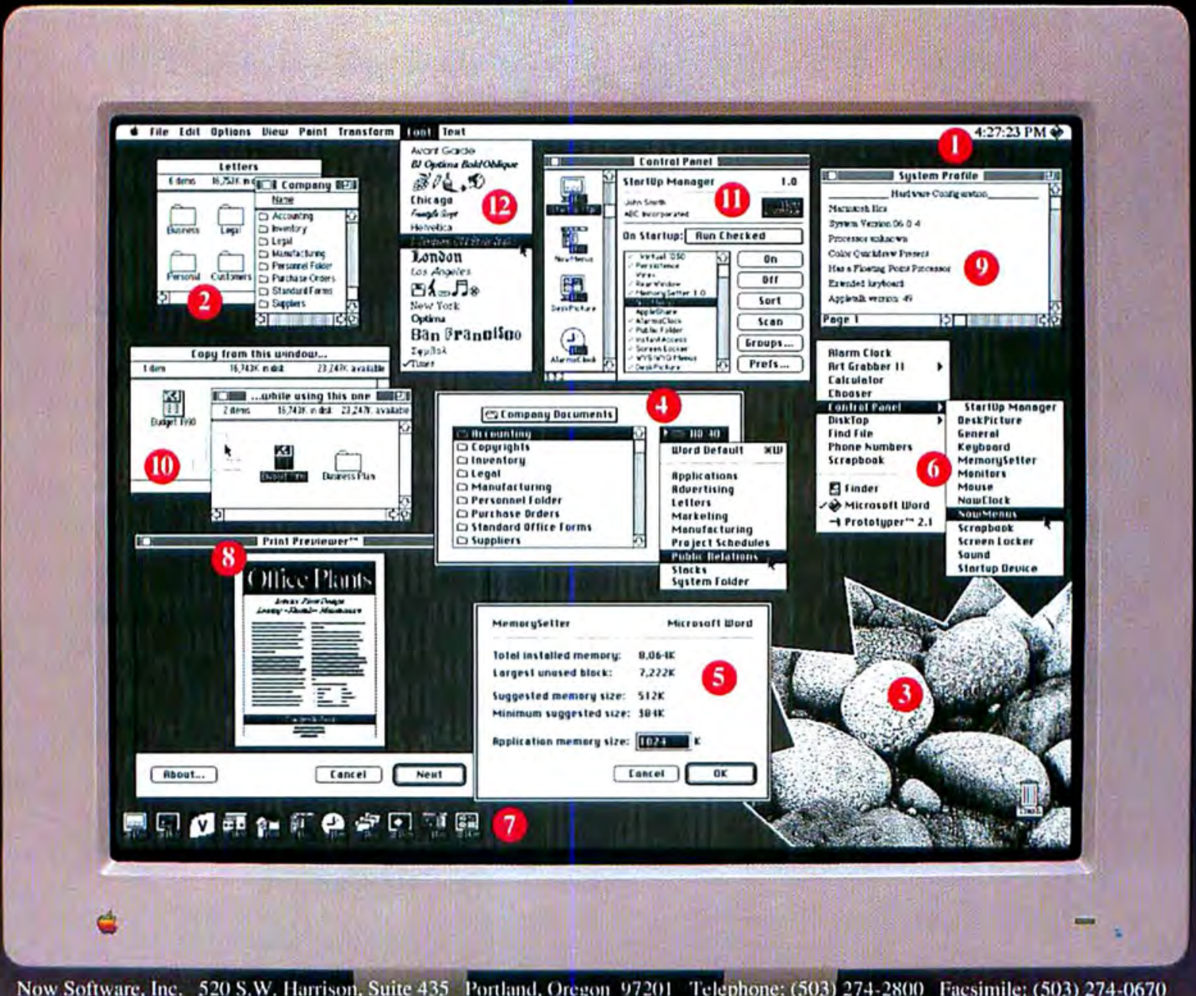

MemorySetter Microsoft Word

Total installed memory: 8,064K

Largest unused block: 7,222K

Suggested memory size: 512K

Minimum suggested size: 384K

Application memory size: 1024 K

Now Software, Inc. 520 S.W. Harrison, Suite 435 Portland, Oregon 97201 Telephone: (503) 274-2800 Facsimile: (503) 274-0670

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The End of Literature

MULTIMEDIA IS TELEVISION'S INSIDIOUS OFFSPRING

BY STEVEN LEVY

Multimedia has become a certified buzzword in computerdom, so much so that the only people whose heads don't drop to the table when that word is intoned are those who have something to sell. At the heart of the instant boredom concerning this presumably exciting concept is overhype. The promise of multimedia is just a little too far ahead of what Macintoshes (and other PCs, including those of IBM, a company also touting multimedia as the platform of the future) can presently deliver. And besides, in the mantralike repetition of the word, its definition has fuzzed to the point of near-meaninglessness. What is multimedia, anyway? Should we care?

We should care very much. Because despite its vague beginnings, multimedia is just as potent as its myriad promoters say it is. The forces of history almost dictate that it will succeed, and in the not-distant future, multimedia will be so easy to produce that it will be pandemic as a means of communication.

But no one, at least to my knowledge, has anticipated the potentially disastrous effects of multimedia's success. So please say you read it here first: multimedia will hasten the end of literacy. Despite the fact that its promoters are almost universally well intentioned, multimedia's lasting legacy will be the debasement of the remaining forms of communication in this country that have not already been debased by the perpetually widening gyre of television.

Tale of the Tube

First of all, let's consider the nature of multimedia. Once you strip it bare of its considerable pretensions, multimedia is essentially one thing: computer applications that aspire to being television. Once you add video-quality images, high-resolution animation, and high-fidelity sound to computer files, you've got your MTV. That's why some folks are calling this Desktop MTV. (Wimps call it Desktop Media—same difference.) Presumably, these multimedia capabilities aid the user in communicating and learning.

But this is a different form of communication we're talking about, something that, according to *Business Week* magazine, "could change the way people work, learn, and play." How is multimedia different? With colors and pictures and noises and motion, it's oriented not to the mind, but to the senses and the gut—like television. Multimedia disregards the previous communications paradigm: the person as reporter, blending logic, language, and perhaps illustrative charts in order to inform or compel. The new paradigm sees the user as a television director, most often one who works in the advertising business.

The result is a debasement of content, because the language of television, as convincingly argued by New York University professor Neil Postman in his book *Amusing Ourselves to Death* (Penguin, 1985), is inherently incapable of promoting complex dis-

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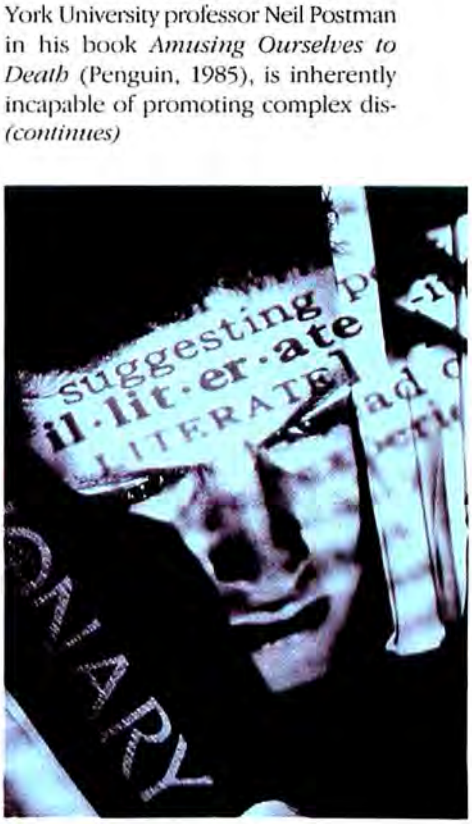
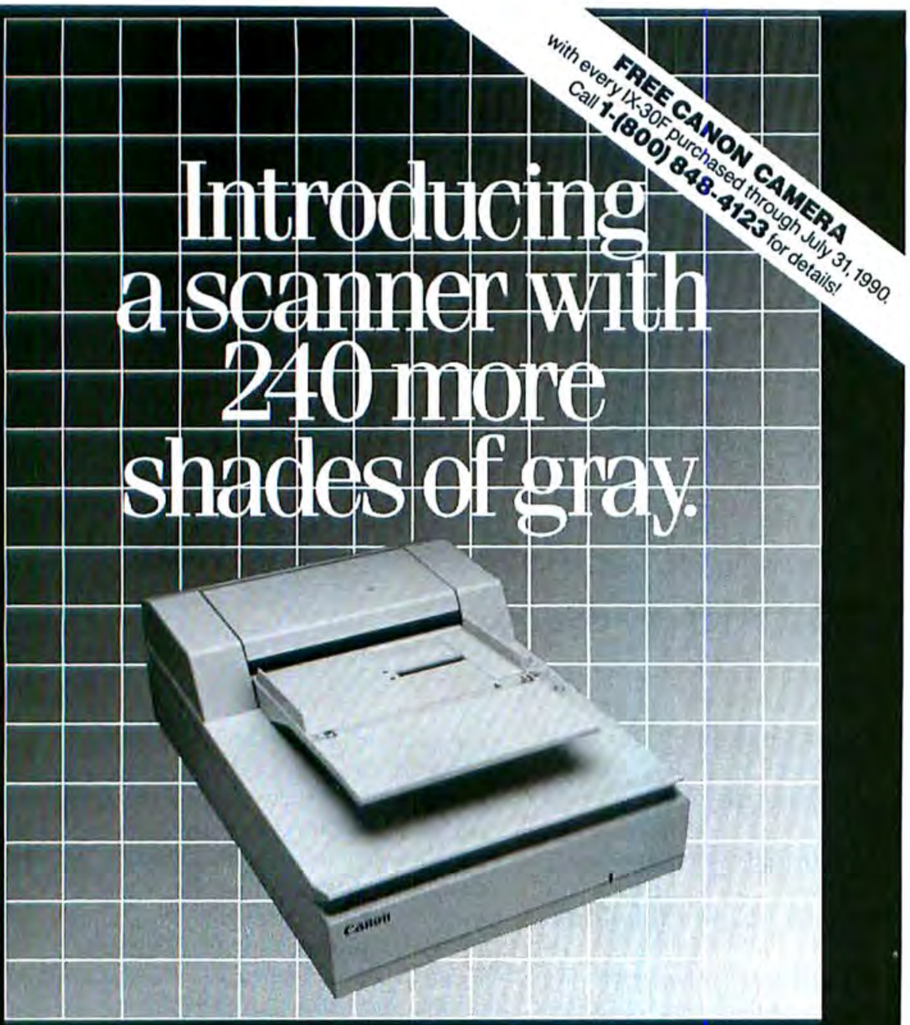


JEFFERY NEWBURY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course—style *always* overwhelms substance. Postman writes, "Television's conversations promote incoherence and triviality . . . the phrase 'serious television' is a contradiction in terms . . . and television speaks in only one persistent voice—the voice of entertainment."

Entertainment, of course, is the bottom line of multimedia. Just listen to its promoters. (Most of them are marketing men like John Sculley.) Invariably they describe these innovative modes of expression as "exciting" or—the most common description of all—"sexy." These adjectives are applied regardless of the content of the concepts or facts to be processed through the multimedia mill. Multimedia deals solely with the style in which information is conveyed. Thoughts are permitted, but they can't *look* like thoughts—you have to dress them up like show girls. Sooner or later you realize that you communicate more effectively in this medium if you ditch complex thoughts altogether.

The ethos of multimedia was unwittingly expressed recently in a *New York Times* op-ed piece written by Robert W. Pittman, the television executive who created MTV. He argues, in essence, that the postwar generation of so-called TV babies have grown accustomed to, indeed are entitled to, the short-term, emotion-geared, nonintellectually engaging forms of discourse exemplified by television news and music video clips. Pittman suggested that politicians and educators should use even more of this form of communication. He wasn't speaking of computers, but multimedia fits right into his vision: it stretches the ability of computers to cater to the short attention spans and nonlinear thinking processes of nonliterate TV babies. Thus we face a future where our business reports and school papers aspire to the communicative standards of a Def Leppard clip in MTV heavy rotation.

Will It Fly?

We see a good example of this TV-baby communication in the justifiably excoriated Apple advertising campaign in which some would-be geniuses in some corporation hatch the idea of a

(continues)

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Prevents both known and new viruses from infecting your Mac

Removes existing viruses, and repairs infected files

NEW! Includes a 24-hour Virus Newsline for new information and instant updates (A SAM Exclusive)

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NEW! Checks any folder combination you choose at any time

NEW! Scans and ejects virus-infected floppies instantly

NEW! Inoculates and "locks" applications & INITs to increase protection against viruses

NEW! Expanded password protection to secure your configuration (A SAM Exclusive)

Eliminates false-alarms by "learning" the normal activity in your system that merely looks like a virus (A SAM Exclusive)

Introducing Symantec AntiVirus for Macintosh (SAM™), Version 2.0.

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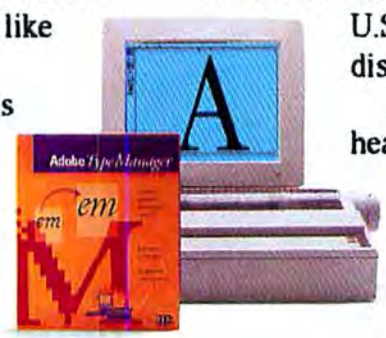
A
Adobe Type Manager
em
em

"helocar," and proceed to convince their bosses to give the project a thumbs-up. What bothers me about the ads is that by using multimedia to illustrate the concept—making a kinetic report chock-full of exploding charts and flying vehicles—the main effort is spent not in doing the hard work of figuring out whether or not the thing will literally fly, but in creating the sexy images that will get their bosses all heated up about the concept. What makes the workers successful is not the idea, but the flashy presentation. Who cares whether the helocar makes financial sense? Look at it fly!

Essentially, the ad campaign views workers, even engineers, as marketers whose job it is to sell ideas to their superiors. That may be a valid interpretation of part of an engineer's job, but placing the heavy artillery of Madison Avenue in the hands of an engineer will likely do much more harm to the process than good. Those tools are effective precisely because of their ability to bypass logic and access emotion. The victory goes to the engineer who can make the best commercial—not the best vehicle.

This process almost guarantees that choices will be made on irrelevant criteria. To quote Neil Postman again, "The commercial disdains exposition, for that takes time and invites argument. It is a very bad commercial indeed that engages the viewer in wondering about the validity of the point being made. . . . Moreover, commercials have the advantage of vivid visual symbols through which we may easily learn the lessons being taught. Among those lessons are that short and simple messages are preferable to long and complex ones; that drama is to be preferred over exposition; that being sold solutions is better than being confronted with questions about problems."

This is what we want to introduce as the standard means of communicating? Obviously, yes. Catherine Nunes, in charge of multimedia in Apple's publishing, presentation, and audiovisual markets, told me that it was "very likely" that the writing tools of the future would be able to process sound and video images as well as words.

Lowering Higher Ed

If multimedia in business isn't bad enough, consider the potential effects of multimedia in education. Here again, this platform is being touted as a beneficial revolution. No one has bothered to ask, "What are we revolting against?" The answer, of course, is reading and writing. Implicit in all the hype about multimedia is the premise that language alone just doesn't cut it. Those still nourished by this antiquarian activity may argue that the ability to express oneself in words, and to understand the words of others, is essential to the process of thinking. But multimedia laughs at that objection—because multimedia, like its progenitor, television, is designed to entertain, at the cost of thinking.

Let's look at a multimedia project geared to the education market: the ABC-TV products that utilize television news footage of important events, such as presidential elections or the Middle East crisis. Presumably the products' purpose is to amplify the failings of the written word. As Doug Doyle, Apple's manager of multimedia solutions for higher education, puts it, "Traditionally, we thought that information resides in the library—in books. But that's not true anymore." Multimedia is a way to capture that information and, as Doyle says, "add value" to it by including it in the learning process.

That seems to make some sense, but is the gain sufficient to overcome the danger that the images will overwhelm everything else? Take the ABC product dealing with the Middle East. Presumably, by interacting with a multilinked set of video clips loaded with key images and sound bites from the Holy Land, the student gets a deeper understanding of the situation. Actually, since the language of television is the main form of communication here, and the student is encouraged to browse the material by accessing a subject here and a subject there, a lack of context is almost guaranteed. Some of the clips are quite dramatic but lack a full explanation of the circumstances under which they were taped.

In order to get full use of the system, each student needs to spend unhurried time with a Macintosh, a

(continues)

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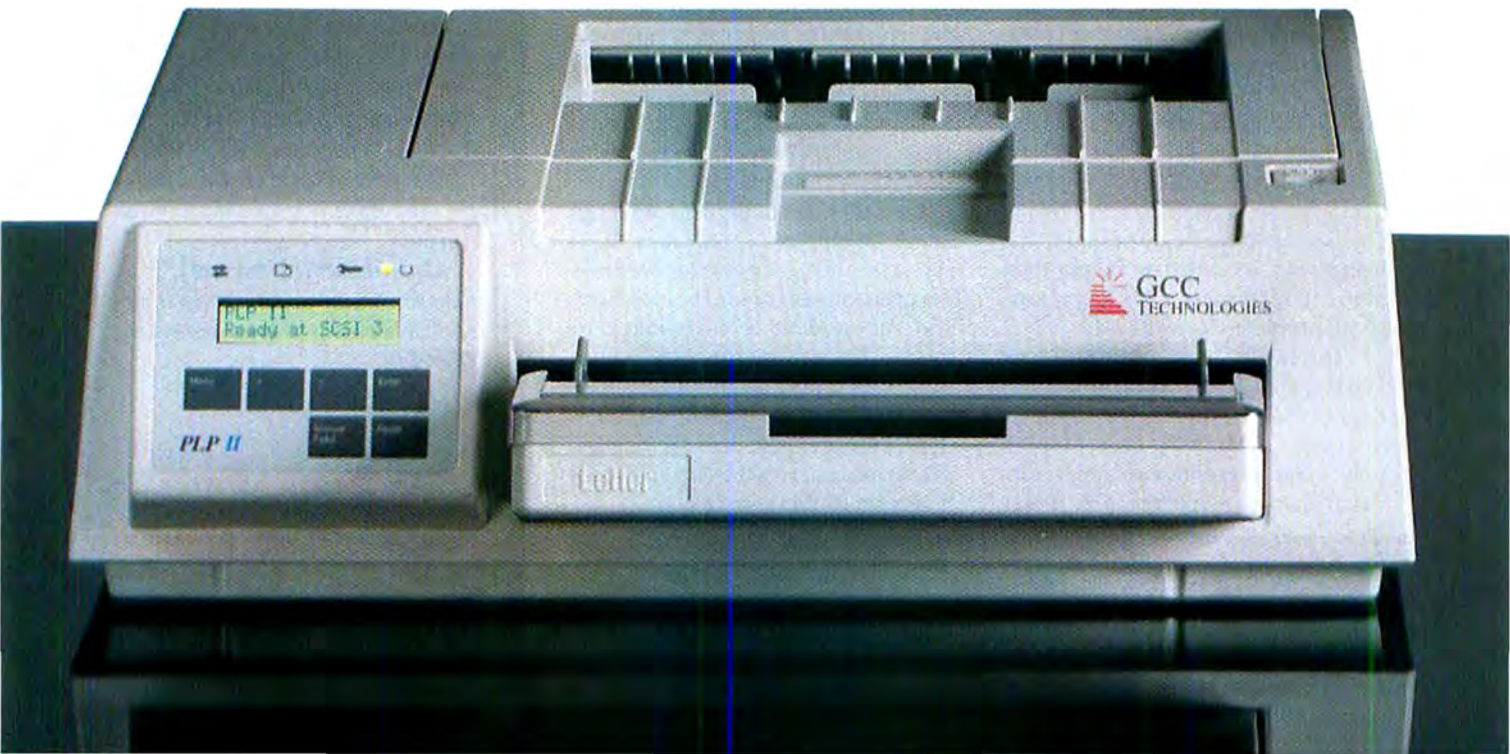

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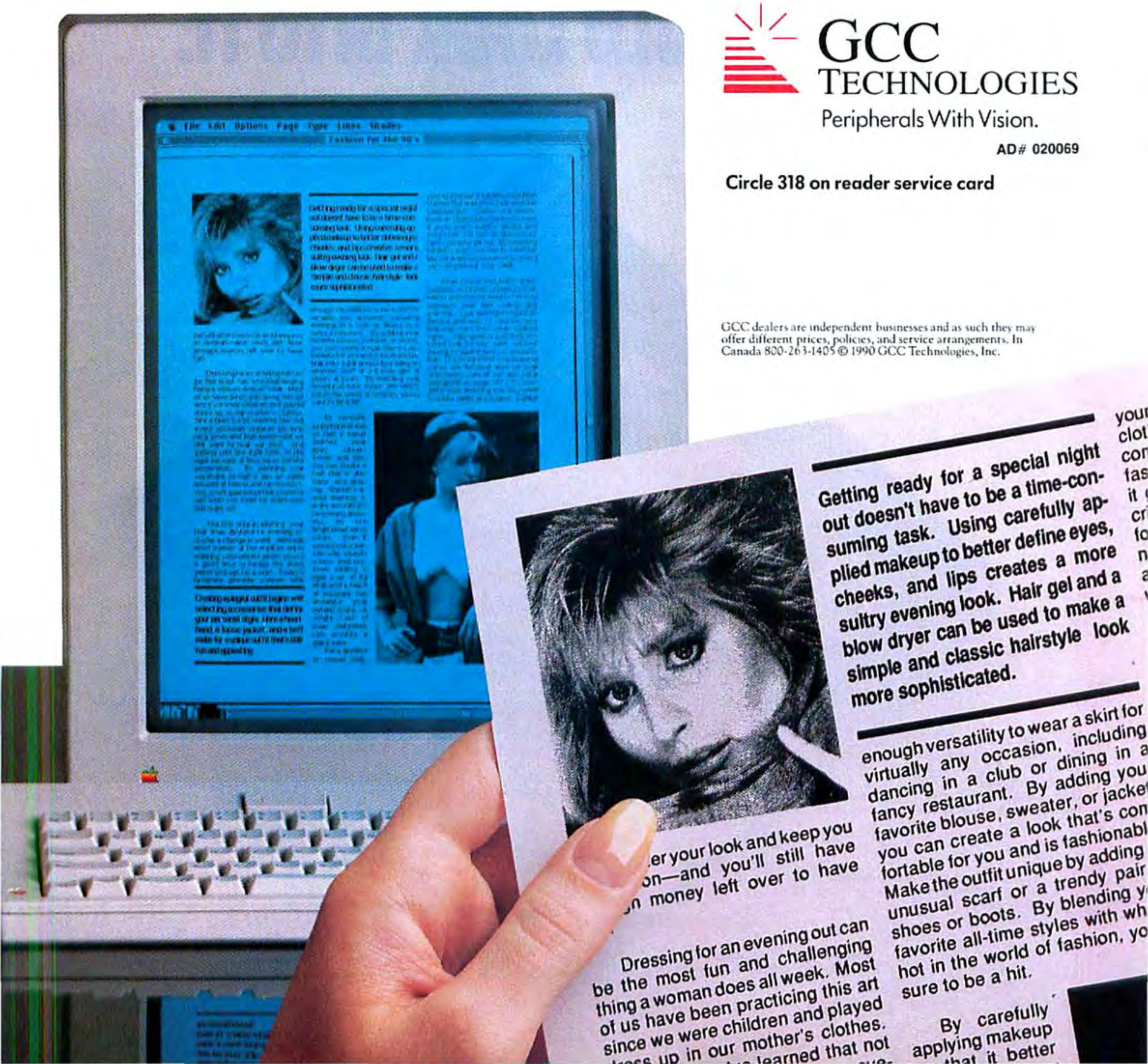

Getting ready for a special night out doesn't have to be a time-consuming task. Using carefully applied makeup to better define eyes, cheeks, and lips creates a more sultry evening look. Hair gel and a blow dryer can be used to make a simple and classic hairstyle look more sophisticated.

er your look and keep you
on—and you'll still have
n money left over to have

Dressing for an evening out can be the most fun and challenging thing a woman does all week. Most of us have been practicing this art since we were children and played dress up in our mother's clothes.
learned that not

enough versatility to wear a skirt for
virtually any occasion, including
dancing in a club or dining in a
fancy restaurant. By adding you
favorite blouse, sweater, or jacke
you can create a look that's con
fortable for you and is fashionabl
Make the outfit unique by adding
unusual scarf or a trendy pair
shoes or boots. By blending y
favorite all-time styles with wh
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sure to be a hit.

By carefully
applying makeup
that it better

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UltraDrive S

If you like what you've seen so far, let us introduce UltraDrive S. It's the only hard

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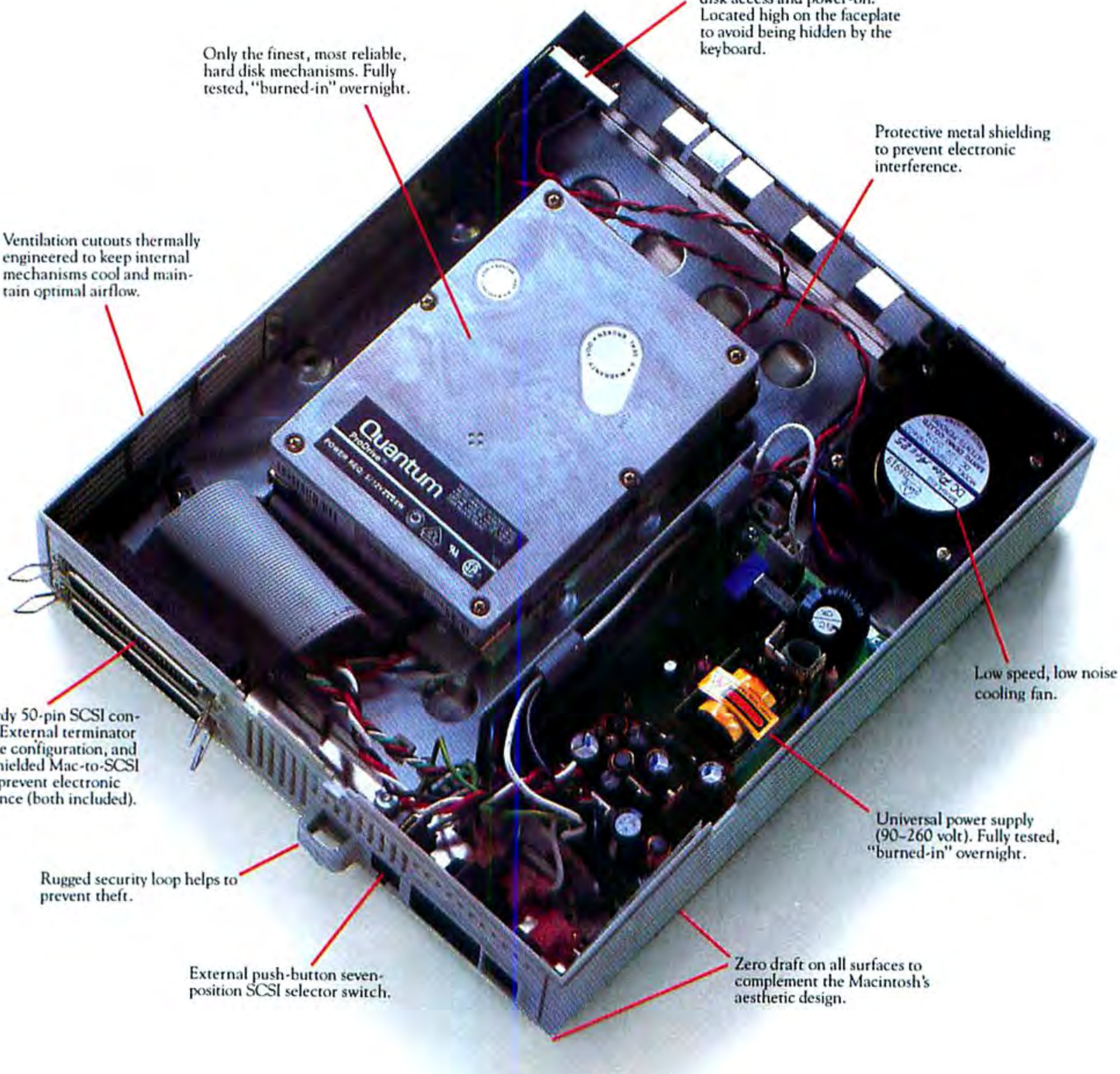

Two bright LEDs indicate disk access and power-on. Located high on the faceplate to avoid being hidden by the keyboard.

Only the finest, most reliable, hard disk mechanisms. Fully tested, "burned-in" overnight.

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Low speed, low noise cooling fan.

Two sturdy 50-pin SCSI connectors. External terminator for simple configuration, and double shielded Mac-to-SCSI cable to prevent electronic interference (both included).

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disk nominated as MacUser's Best Storage System of 1989. And UltraDrive S includes all of the same high-quality components, detailed engineering features, and sophisticated software that you'll receive with UltraDrive.

But what sets UltraDrive S apart from the competition is its incredibly fast average access times, its use of on-board disk caching, and a 1:1 interleave on all Macintosh CPUs. Which means that your hard disk will always operate at maximum speed.

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GCC DriveManager enables the creation of Macintosh, A/UX, and ProDOS partitions. Provides password protection, and sets the interleave value. Also tests, initializes, and formats the hard disk.

QuickSpool II is a second generation spooler for serial printers like the ImageWriter II. Reduce your waiting time during printing by as much as 75%. A $59 value.

GCC Partitions DA allows partitions to be mounted, unmounted, locked. Also provides password protection from within any application.

GCC dealers are independent businesses and as such they may offer different prices, policies, and service arrangements. In Canada 800-263-1405

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video monitor, and a laser disc player. (Apparently one advantage of multimedia over book learning is that the former generates significantly higher revenues.) Once installed before a machine, students are encouraged to create their own reports on the system. Drawing on the culture of TV babies, these reports are not driven by language or reasoning, but by the accumulation of vivid images. The students are literally asked to perform the function of a television news producer, splicing clips together for maximum impact. And clever students will soon learn, as clever television producers understand all too well, the facts of dealing in a visual medium: one dramatic image, even if misleading, communicates more effectively than an interesting idea without a compelling picture accompanying it. It's history by sound bite. Doug Doyle of Apple insists that responsible teachers will prevent this from happening, but in light of our national experience with television—which has trivialized literature to sitcoms and transformed our politicians into pitchmen—this seems rather optimistic.

If Books Could Talk

Recently I spent a session with Marc Canter and John Scull, the two key executives of MacroMind. They guided me through an impressive tour of their newest version of Director, a program designed to enliven information, multimedia style. Canter was frank in admitting that, given the present state of computer power, the only way Director and other powerful multimedia tools can be implemented is in expensive machines with relatively hard-to-use applications. Even so, those who do this type of work anyway—art directors and advertising people and television graphics folks—will currently find a Macintosh to be a cost-effective tool. I see no problem at all with lowering the cost of tools to people already involved in this form of show business, and MacroMind is doing honorable work in this regard. Likewise, I think that multimedia capabilities have real value when used in areas such as scientific visualization.

But Canter and Scull were both gushing about the not-too-distant day when our Macintoshes will be more powerful, and their software will be as simple to use as a Nintendo machine. At that time, they guess reasonably, multimedia will be as accessible to ordinary users as, say, word processing is to people today. That will be the day when multimedia will be utilized in many instances where previously, logical communication sufficed quite nicely—except for the fact that one had to be literate to participate. Marc Canter believes that ultimately, multimedia will make significant inroads in replacing the beleaguered holdouts of communication, those dinosaurs that refuse to yield to pictures and sound . . . you know, books.

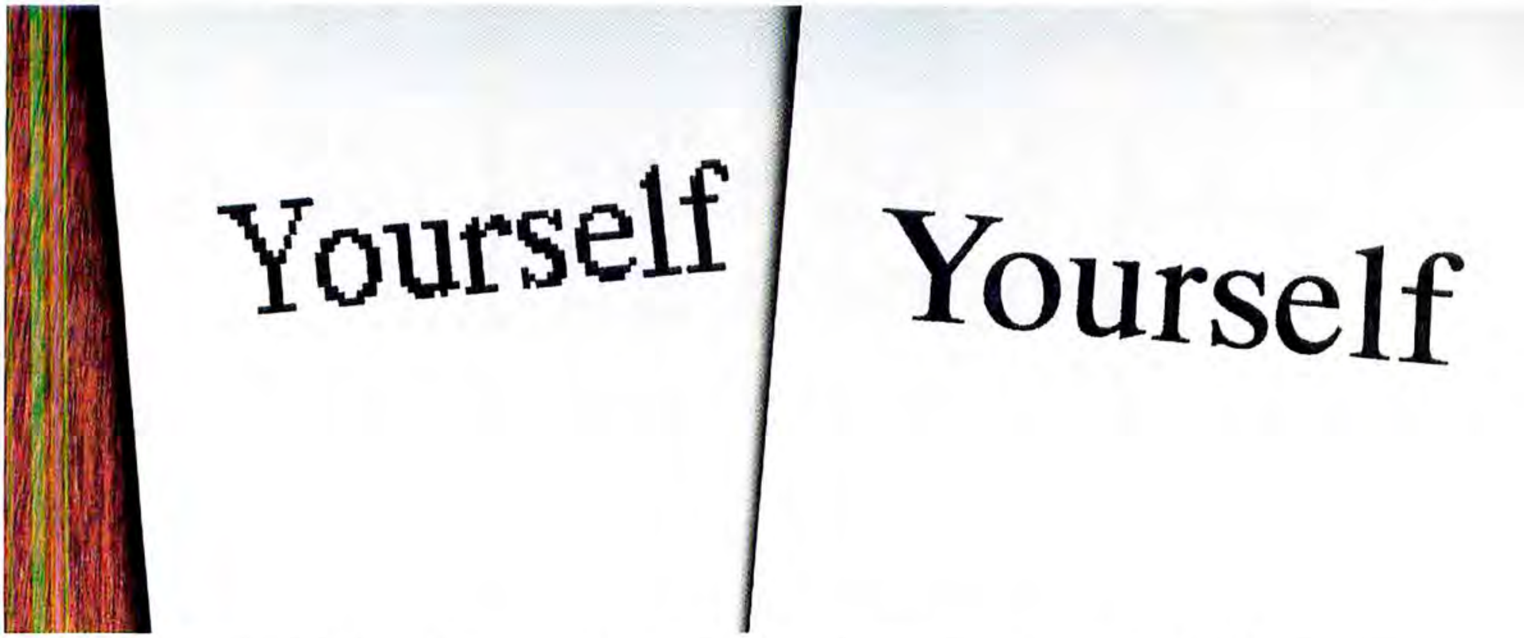
Earlier, Canter and I had been talking about my current book project. As with the previous ones, I proceed with my research on the assumption that any images I collect in addition to the reams of written and spoken material I gather will be conveyed only by my language. The finished project will be a bound stack of pages consisting of words, accessed a page at a time, in order. Canter is convinced this process will be improved upon. "Steve," he said, bursting with enthusiasm, "I really believe that ten years from now you won't be writing a book in that way. In ten years, books won't be written only in text—they'll be done with sound and video and images, and people will access it by links, not start to finish."

Multimedia fulfilled: a world where sensory input is king. Where writing is replaced by "authoring." Where the techniques of sneaker ads "add value" to charts and spreadsheets, and a thousand words die with every picture. Words we could have used. Words that bind a writer and a reader, words that bear rereading, words that when carefully unraveled detonate fireworks inside the mind and change lives.

Canter couldn't have meant this, could he? Yet, he said it—within a decade, books are going multimedia.

"What you don't understand, Marc," I said to him, "is that you're describing my nightmare." ▣

Steven Levy is a Macworld *columnist and the author of* The Unicorn's Secret: Murder in the Age of Aquarius *(NAL, 1989).*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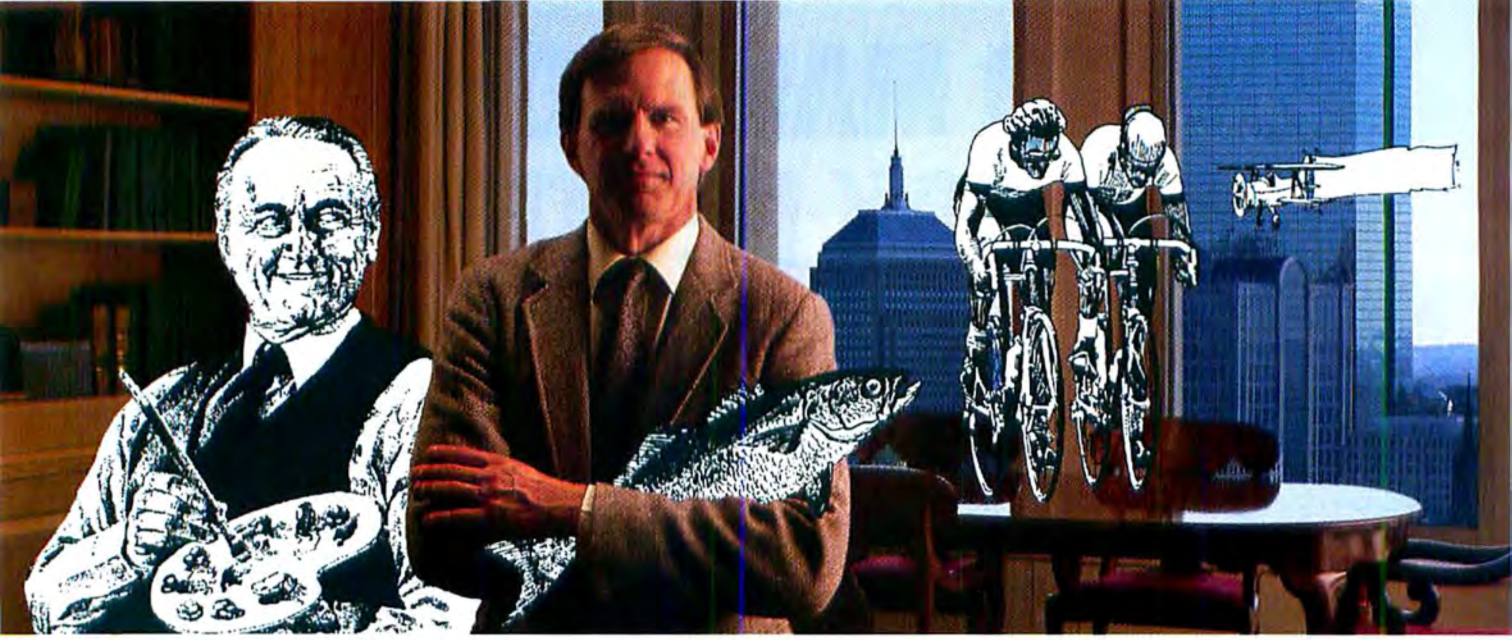

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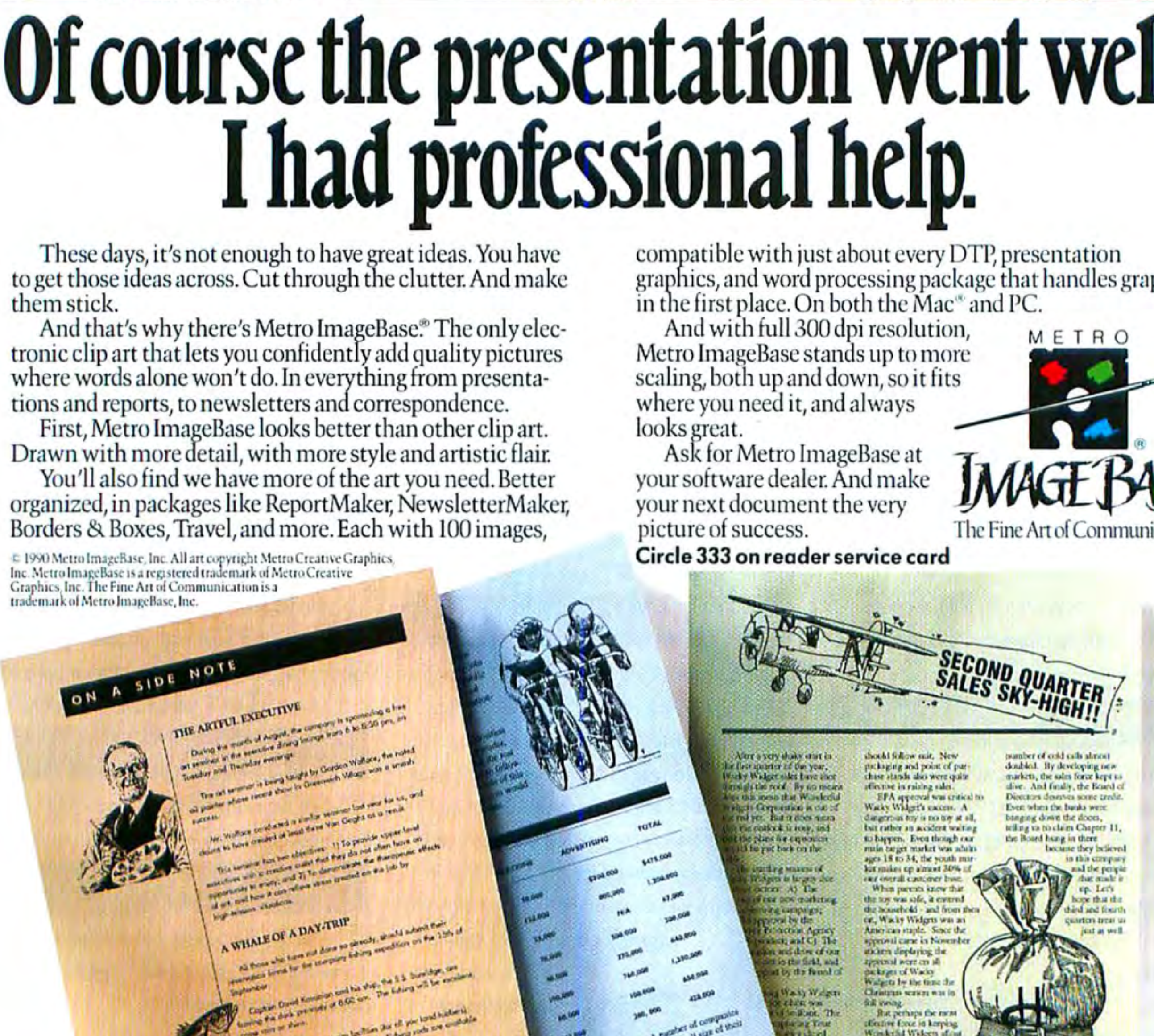

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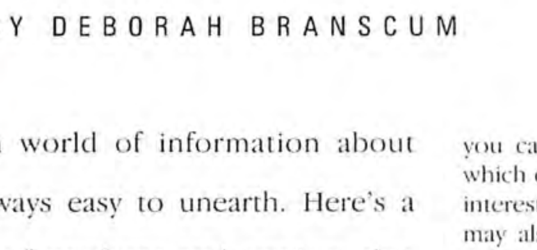
Information, Please

HELPFUL TOOLS AND RESOURCES FOR MAC USERS

BY DEBORAH BRANSCUM

There's a world of information about the Macintosh, but it's not always easy to unearth. Here's a brief and opinionated survey of products and services that can simplify your search.



MARK ULRICH

Indexes Our annual index (usually in the January issue) is fine for many readers, but you may prefer to have an index on a disk. No problem—two small companies offer floppy-disk guides to *Macworld* and two other Mac magazines.

Niles & Associates of Berkeley, California, began indexing *Macworld*, *MacUser*, and *MacWeek* in February 1989. The company also publishes EndNote, a reference database and bibliography maker. For $120, subscribers to MacInfo receive the initial disk (covering February 1989 to date), 12 monthly updates, and a run-time version of EndNote. I like MacInfo a lot, despite its shortcomings (see "Indexing Plus"). (Developers, students and educators, and user groups can purchase the product for $99.) Niles can be reached at 415/655-6666.

MacKay Associates of Lincoln, Nebraska, began indexing Macintosh publications in 1986. The Journal Index comes as a bare-bones, laconic HyperCard stack (see "Bare Basics") and a text file that can be loaded into a database template; check with the company to see if your particular database is supported by a template. The Journal Index for 1990 covers the three largest Macintosh magazines. A six-issue (12-month) subscription costs $65. The 1989 edition includes additional publications and is priced at $35. The 1984–1988 edition is also $35. Contact the company at 402/486-3550 or 800/829-6753.

Databases Through CompuServe you can access the Dialog service, which offers at least five databases of interest to computer users. (Dialog may also be available through your public library.) The databases include the Microcomputer Index and the Microcomputer Software & Hardware Guide and are intended for the well-heeled: these babies will cost you $60 an hour and more to access. For more details, talk to Dialog at 415/858-3810 or 800/334-2564.

Books For one-stop shopping, it's hard to beat MacBooks, a mail-order bookstore in Palo Alto, California, that says it keeps track of the more than 360 Macintosh books currently in print. Because customers can't browse, MacBooks publishes a $2 HyperCard catalog with a complete list of the books and brief reviews. Regular new-book bulletins also keep clients informed. "We do try to take a stand on books, since we are mail order and people can't browse," says president David Angell.

You can access the book bulletins and catalog from the MacBooks forum on Connect, or call the company directly at 415/494-2154.

Angell warns that no one book can answer all your questions, but he's happy to suggest some recent titles. For beginners he recommends *The Big Mac Book* ($27.95, Que, 1989), "because it's hands on and geared toward

(continues)

new users." One meaty, more-technical read is *Inside the Apple Macintosh* ($24.95, Brady, 1989) by *Macworld* contributing editor Jim Heid and Peter Norton. *Encyclopedia Macintosh* ($24.95, Sybex, 1990) is a general resource book "geared toward the software end of the Mac world" that packs a lot of information in its pages. It includes ten tips and quick references for many popular programs and is also available as a $50 HyperCard stack from Heizer Software (415/943-7667 or 800/888-7667).

Organizations There are a slew of useful organizations for Macintosh users, but I only have room to mention three of them. APDA offers technical tomes and other products to the programmers and would-be programmers among us. The Berkeley Macintosh User Group and Boston Computer Society are excellent general sources of information. For example, twice a year BMUG produces hernia-inducing "newsletters" of 300-plus pages. And the group pays Macintosh experts to staff a telephone help line for members. BCS publishes regular

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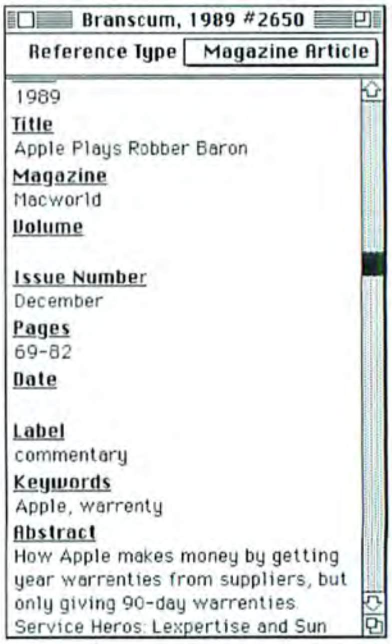

Branscum, 1989 #2650

Reference Type: Magazine Article

1989

Title
Apple Plays Robber Baron

Magazine
Macworld

Volume

Issue Number
December

Pages
69-82

Date

Label
commentary

Keywords
Apple, warrenty

Abstract
How Apple makes money by getting year warrenties from suppliers, but only giving 90-day warrenties.
Service Heros: Lexpertise and Sun

Indexing Plus

You must use MacInfo with EndNote, but in return you get information about the author, pages it appears on, title, and type of article, plus room for your own notes. The occasional misspelled keyword, such as *warranty*, can make it tough to find the article you want.

IT'S ALL HERE IN BLACK AND WHITE

Up to now Macintosh users had only one choice for hard disk solutions. One choice for warranty. One choice for service. One choice for hard drive mechanisms. And one choice for cases.

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Since 1985 La Cie has offered you more. It's your choice.

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	80	25	699	759	999	1
	100	25	799	859	1099	1
	200	15	1199	1259	1599	1
Quantum	40	15	529	579	799	5
	50	15	599	659	899	5
	80	15	799	859	1099	5
	105	15	899	959	1199	5
	120	15	999	1059	1299	5
	170	15	1199	1259	1599	5
	210	15	1399	1459	1799	5
HP	660	15	3099			5

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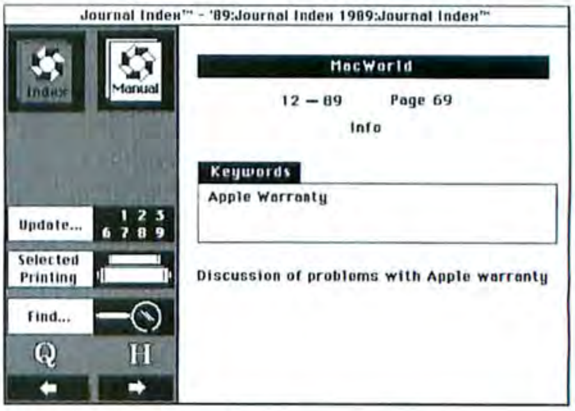
Macworld Online Devoted readers now have an opportunity to hobnob with *Macworld* editors and access selected articles through the Macworld Online service provided in conjunction with America Online. For free software and details, call Quantum Computer Services at 703/448-8700 or 800/227-6364.

Under the Hood Grease monkeys in the audience will appreciate a new diagnosis-and-repair HyperCard stack from MicroMat Computer Systems of Novato, California. The first module, priced at $100, covers the Mac SE and was released in February.

Founder Jeff Baudin has "been tearing things apart since I could crawl" and has several years of component-level repairs under his belt. In collaboration with another repair specialist, Mike McCord of MicroDoc, Baudin created a stack with hundreds of component illustrations and schematics. These are linked with expert-based diagnostics to help guide you through troubleshooting sessions (see "Display Disabilities"). MicroMat is still in the repair business and offers replacement parts to do-it-yourselfers. The company can be reached at 415/898-6227 and 800/829-6227.

Of course, if your only Mac gets sick, you may not be able to check a stack for information. Don't worry, *Macintosh Repair & Upgrade Secrets* (Hayden Books, 1990) covers the Mac 128K through the SE. Written by user-group stalwart Larry Piña (a developer and tech writer), the book seems clear and helpful.

Did I leave anything out? You bet. I haven't discussed many swell sources of fact and fancy. Mapping the entire Macintosh universe would be impossible; consider this a nudge toward your own Mount Everest.



MacWorld

12 — 89 Page 69

Info

Keywords

Apple Warranty

Discussion of problems with Apple warranty

Bare Basics

The Journal Index is too basic for me—no authors or titles hog space here. But it does offer flexibility for people who want to use its text files with a database program, such as FileMaker.

Cranky about Crate

Last October I received a letter from Steven Payne of Washington, D.C., who was in the midst of an odyssey that would tax the patience of a saint. So perhaps it's appropriate that he's a Roman Catholic priest and editor of *Spiritual Life* magazine. Father Payne bought a 60MB external Crate Technology hard disk drive from a dealer in September 1988 to use with his Mac SE for desktop publishing.

Problems with the disk prompted Father Payne to call the dealer and Crate for advice. When telephone troubleshooting didn't work, he returned the disk drive on August 15, 1989, to the dealer at Crate's suggestion. He, in turn, sent it to Hamilton Avnet, the large disk drive distributor from which the dealer had purchased the drive originally. Hamilton Avnet sent the drive to Seagate for actual repair. And there the drive sat. And sat. And sat.

Father Payne called his dealer. He called the manufacturer, Crate Technology. He called Hamilton Avnet. He called me. Eventually Hamilton Avnet returned the drive—broken. Another round ensued, and in late February Father Payne wrote to tell me that a working replacement unit had finally arrived. A mere six months later, a new drive replaced the old.

But a mystery remains. Why didn't Crate help Father Payne get his drive repaired? The drive came with two warranty statements. One statement

(continues)

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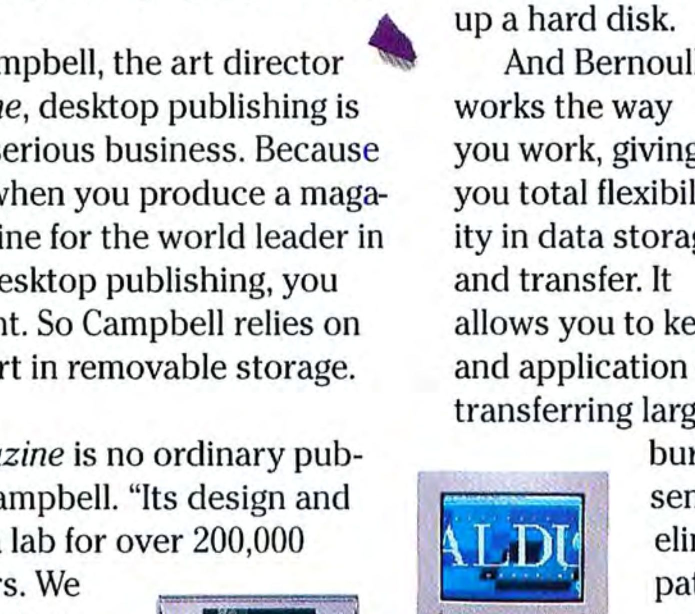

Bernoulli is a complete primary storage solution for desktop publishing. Its removable 44MB disks provide endless storage capacity, without the worry of filling up a hard disk.

And Bernoulli works the way you work, giving you total flexibility in data storage and transfer. It allows you to keep both your files and application on one 44MB disk. So transferring large projects to service bureaus is as simple as sending the disk over, eliminating software compatibility problems and saving the time of using a modem. And since Bernoulli disks can withstand 1000Gs of shock, they're rugged enough to mail anywhere.

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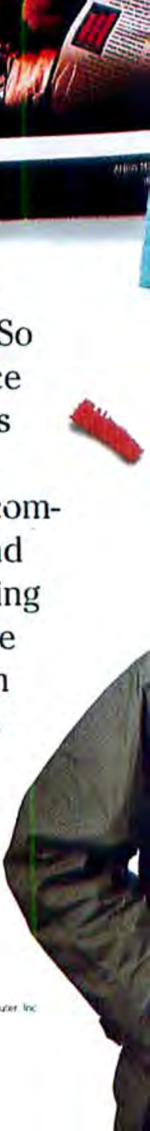

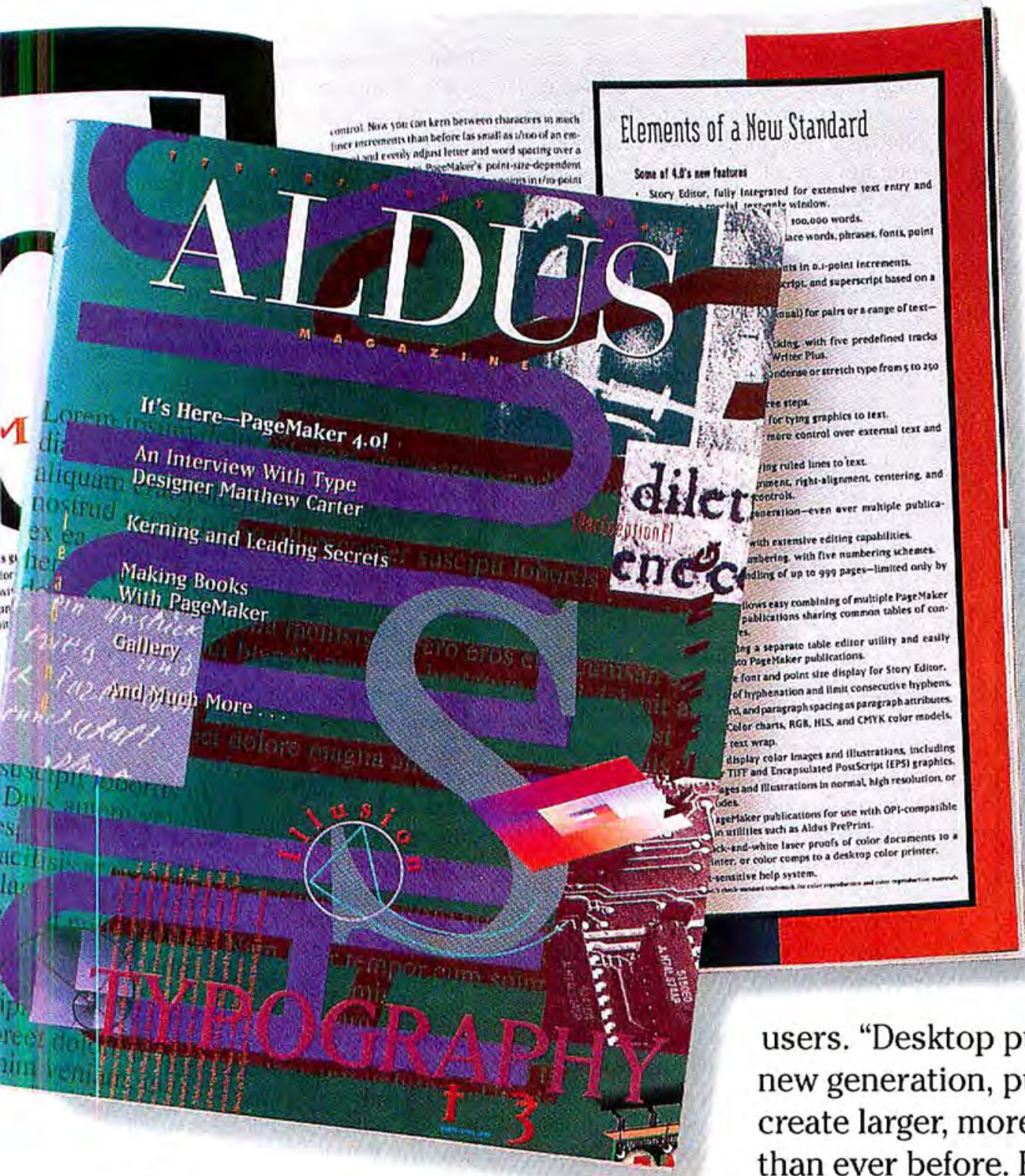

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Scott Campbell, Art Director,
Aldus Magazine, Aldus Corporation

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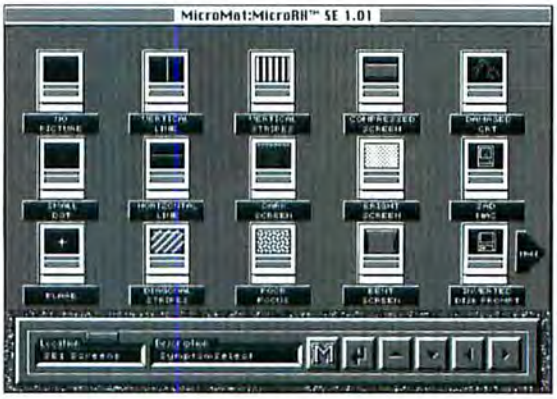
said "AppleCrate [as the company was then known] will repair or replace, at its option, any AppleCrate disk drive that becomes inoperative or fails to perform to published specifications for a period of two years from the date first shipped." The other statement said "Warranty of any disk drive installed in the AppleCrate is specified by the warranty of the manufacturer of the specific drive used." Crate president Chris Lemoine argued that it was the dealer's responsibility to get the drive fixed, not Crate's. The warranty's words, apparently, were meaningless.

I talked to Lemoine recently to get his side of the story. I wanted to understand Crate's perspective, particularly in light of other complaints I've received about poor service from Crate.

Lemoine said Crate sells housing and software to Hamilton Avnet and not drive mechanisms, which caused the misunderstanding. Crate now offers a two-year limited warranty on the case and a one-year warranty on the drive when Crate adds the drive mechanism.

Lemoine blamed the problem on the dealer, who reportedly had given up his small company and moved by the time Father Payne's drive needed repair. "Typically, if a person buys a product from a retailer, the retailer has inventory that can buffer a person from the process. In this particular case, the consumer had no buffer," said Lemoine. "The retailer made his $300 and then walked away from it."



Display Disabilities

MicroRX is a HyperCard-based expert system for Macintosh SE repairs. In the section on displays, clicking on the icon that represents your Mac's problem (above) brings up a description of the ailment and suggested action.

A warranty should be more than a piece of paper. In my opinion, Crate should have stepped in and repaired or replaced Father Payne's drive *because that's what the first warranty said Crate would do.* Father Payne shouldn't be held responsible for Crate's inconsistent warranty policies. But I have some sympathy for the situation of companies like Crate. "How does a manufacturer protect himself from products sold by incompetent people?" asked Lemoine. One answer is authorized dealers, and Crate is looking at that possibility.

Father Payne did finally get a new drive, but only after many months and many letters to three different companies. Did Crate learn anything from its customer? Probably not. "Maybe Crate should have solved the problem, but I thought giving the man [Father Payne] a drive would only condone his behavior," said Lemoine.

What about Father Payne? "I guess I've learned not to deal with Crate and Hamilton Avnet in the future, at least not unless I get everything spelled out in writing from the start," he writes. "They seem to view consumers as if we were adversaries out to bilk them. I'll also avoid any similar arrangements where I'm dealing with a manufacturer through both a dealer and distributor. I often felt like the victim of an elaborate shell game, trying to guess which party was going to admit responsibility for the warranty. But finally, I've learned that persistence pays off. . . . Almost every positive development over these past six months was at my prodding."

Jasmine Update

Jasmine is accepting and shipping new product orders (with Fujitsu mechanisms), and using half the income for back orders and repairs, according to Jasmine president William Bayer. When Jasmine filed for Chapter 11 in mid-March, there were 1500 to 1600 product back orders. Bayer said the company's goal is to

(continues)

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The chart explains exactly what you need to achieve the desired level of performance.

To upgrade a 4-socket Mac Plus or SE to this amount of memory	Do this: (Install in multiples of two only)
2 MB	Remove all four existing 256K SIMMs, install two 1M SIMMs, leave two sockets for future expansion.
2½ MB	Remove only two 256K SIMMs, install two 1M SIMMs.
4 MB	Replace all four 256K SIMMs with four 1M SIMMs.
To upgrade an 8-socket Mac II, IIx, IIcx, or SE30 to this amount of memory	**Do this: (Install in multiples of four only)**
4 MB	Remove all four existing 256K SIMMs, install four 1M SIMMs, leave remaining sockets for future expansion.
5 MB	Keep existing 256K SIMMs, install four 1M SIMMs in remaining sockets.
8 MB	Remove all four 256K SIMMs install eight 1M SIMMs.

To open your Mac Plus or SE, you'll need a specially designed tool — it's available from us as part of a handy tool kit for just $15.

WHAT YOU NEED TO KNOW

Memory chips come factory-installed on plug-in cards, called SIMMS (Single Inline Memory Modules). Each one megabyte SIMM card holds eight top quality memory chips. We carry chips by all the major manufacturers like Texas Instruments, Intel and Samsung. We also carry the full line of Dove memory products.

*Prices can vary a lot, based on quality, speed and demand. At press time our price for 1MB, 120 ns Memory kits is $89 Please call for the very latest prices and availability. Our sales staff will tell you what you need and help make your choice an easy one.

SPEED

Do you need 80, 100 or 120 Nanosecond (ns) chips? Nanoseconds are billionths of a second, so an 80 ns chip responds faster than a 100 ns chip. The original Mac used relatively slow 150 ns memory chips. The 68020 processor needs 120 ns (or faster) chip, and the 68030 Macs like the speedier model.

OVERNIGHT DELIVERY

Place your order by 12:00a.m.(E), weekdays and we'll deliver overnight for just $3.00. There's never been a better time to consider a memory upgrade. Call our toll-free number now and tomorrow morning your Mac will be off to a brand new start.

MacWAREHOUSE™

1-800-255-6227

Call toll-free
Twenty-four hours a day,
seven days a week.
Inquiries 1-201-367-0440
Fax 1-201-905-9279

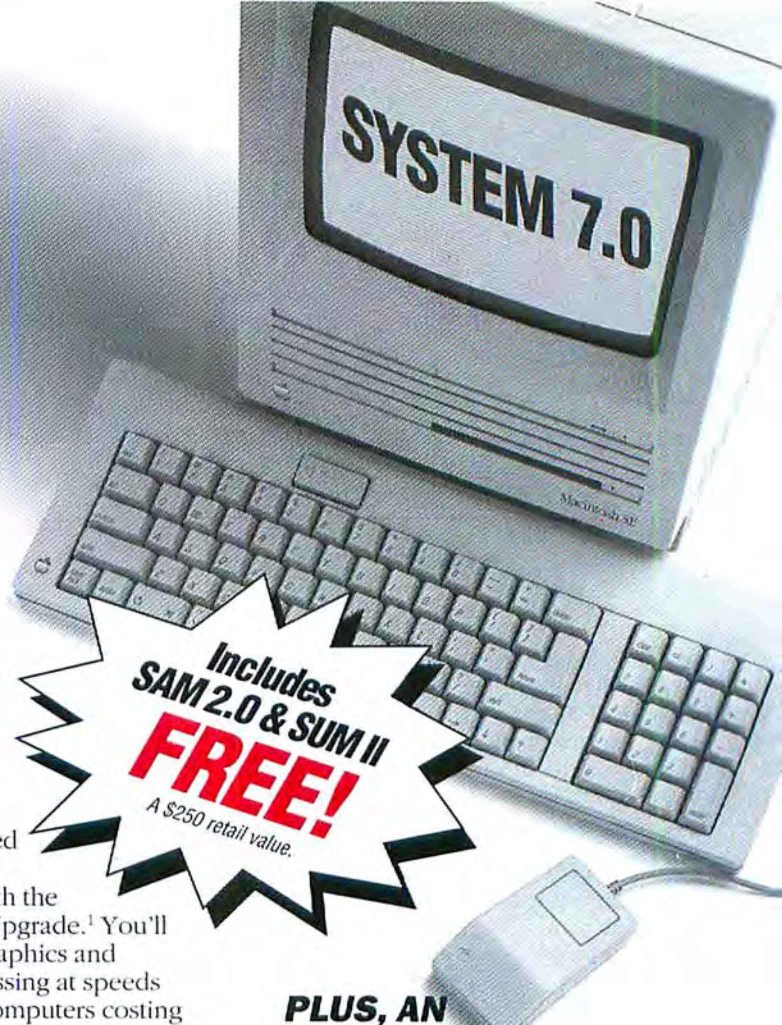
MACWAREHOUSE 30 DAY MONEY BACK GUARANTEE

If, for any reason, you are dissatisfied with your MacWarehouse Memory Kit, you may return it for a full refund within thirty days of purchase. All you have to do is call us for a return authorization number and return the product, postage paid, in its original condition, with the original packaging and documentation.

ONE YEAR WARRANTY. MacWarehouse also guarantees its Memory Kits against manufacturer defects for one year from the date of purchase. We will repair the item or replace it at our discretion.

MWF0P

Turn your Mac into a System 7 *Powerhouse* for only $449!



Includes SAM 2.0 & SUM II FREE!

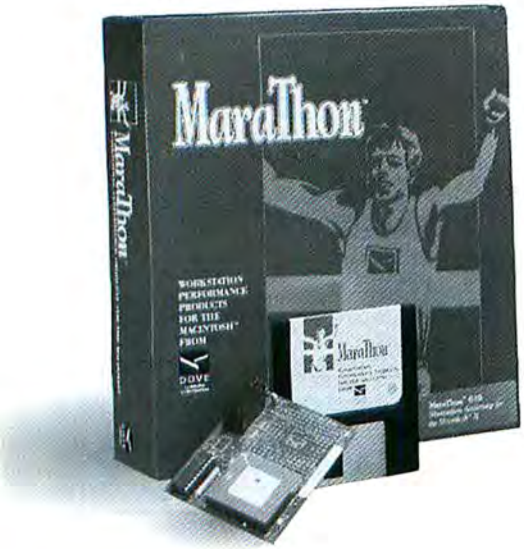
A $250 retail value.

In a matter of weeks, Apple will release SYSTEM 7 and make it available to all existing Mac users! And there's a large pool of SYSTEM 7 software ready to run RIGHT NOW! Soon, the multi-tasking capabilities of SYSTEM 7 will allow your Mac to run new and much more powerful applications.

But this new intelligent software will make the Mac more "power-hungry" than ever. And to fully utilize SYSTEM 7 you'll need a 68030 processor which gives access to virtual memory — allowing the computer to use your hard disk as extended RAM.

PRICE BREAKTHROUGH!

Thanks to some ingenious new technology, we're able to offer the Dove Marathon 030 upgrade, including the necessary 68030 processor for the astonishing price of $449.



You'll be amazed at the increase in speed of your present applications with the Marathon 030 Upgrade.[1] You'll race through graphics and database processing at speeds equivalent to computers costing thousands more. And as soon as SYSTEM 7 is available — you'll be ready to run the new applications.

WHAT DO I NEED?

The upgrade is easy to install in not much more than half an hour and comes with complete step-by-step instructions. You may need a simple tool kit to open your Mac — price $15.

To run SYSTEM 7 you must have at least 2 megabytes of RAM, and an enhanced (128K bytes) ROM. The Mac Plus, SE, SE/30 and the Mac II series all have the enhanced ROM, so the only other expense is an extra megabyte of RAM if your computer only has 1MB. Since you have to install 1MB memory chips in pairs, this could cost about $200.

30 DAY MBG

MACWAREHOUSE 30 DAY MONEY BACK GUARANTEE

If, for any reason, you are dissatisfied with your purchase of any of these items, you may return it for a full refund within thirty days of purchase All you have to do is call us for a return authorization number and return the product, postage paid, in its original condition, with the original packaging and documentation.

MACWAREHOUSE 120 DAY GUARANTEE

In addition, every item we sell comes with the MacWAREHOUSE 120 Day Guarantee. If your selection is defective in any way, all you have to do is call for a return authorization number. Defective software will be replaced immediately. Defective hardware will be replaced or repaired at our discretion.

MWF0F

PLUS, AN INCREDIBLE $250 VALUE!

To keep your newly upgraded system on track, we've bundled two state-of-the-art maintenance utilities with this offer. SAM 2.0 - Symantec Antivirus for Macintosh operates to identify and eradicate viral infections. SUM II - Symantec Utilities for Macintosh is used for more urgent disaster relief such as crashed disk and deleted file recovery, back-up and security.

CALL NOW!

Don't miss the chance to supercharge your Mac to SYSTEM 7 capability now. Our helpful staff of Mac fanatics is standing by to take your call. We'll help you select just what you need and get you off and running on the new system!

MacWAREHOUSE

1-800-255-6227

24 hours a day, 7 days a week.
Inquiries: 1-201-367-0440
Fax: 1-201-905-9279

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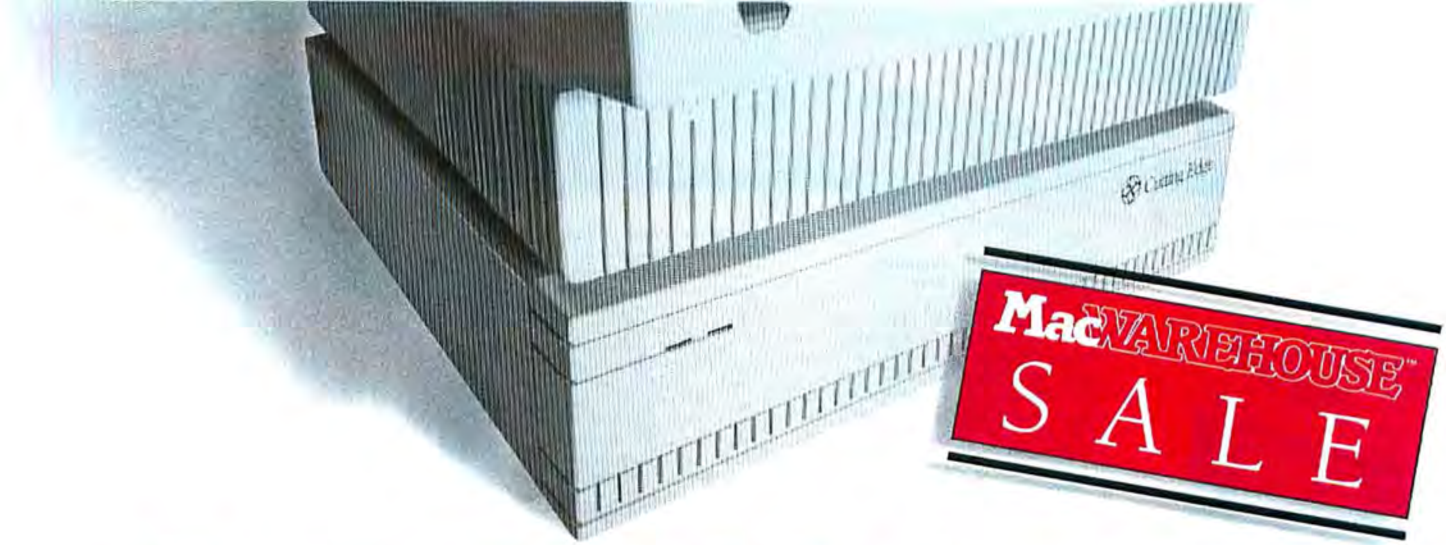
[1] MaraThon 030 will not work with Mac 128/512.



Buy a Hard Drive Now And Save Up To $350

"The best deal in hard drives just got better!"

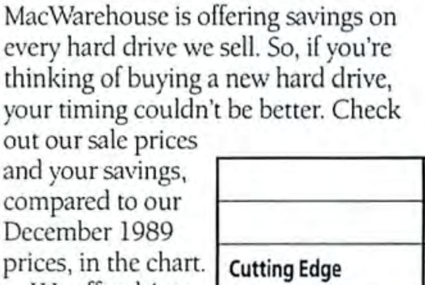
Between now and May 31st MacWarehouse is offering savings on every hard drive we sell. So, if you're thinking of buying a new hard drive, your timing couldn't be better. Check out our sale prices and your savings, compared to our December 1989 prices, in the chart.

We offer drives by leading manufacturers like Cutting Edge, C.M.S., Quantum, Dolphin, PLI Infinity Turbo and others — all at unheard of low prices.

	20+ MB		30+ MB		40+ MB		60+ MB		80+ MB		***40+ Removable	
	SALE PRICE	YOU SAVE	SALE PRICE	YOU SAVE	SALE PRICE	YOU SAVE	SALE PRICE	YOU SAVE	SALE PRICE	YOU SAVE	SALE PRICE	YOU SAVE
Cutting Edge	339	$100	389	$110	449	$100	489	$140	549	$190	729	$170
CMS, MacStack	429	$100	499	$46	589	$36	649	$50	769	$30	839	$36
Dolphin, Integra	389	$110	439	$156	499	$220	589	$189	645	$350	799	$340
PLI, Infinity Turbo	–	–	569	$20	619	** $26	–	–	–	–	999	$120
***Quantum Internal**	–	–	–	–	399	$126	–	–	649	$220	–	–

Savings are calculated from MacWarehouse December 1989 published prices. *Quantum drives are for internal installation and require a 3.5 Internal Drive Kit for $75 **PLI is a 50meg turbo drive. ***40 + meg Removable Cartridge Drives come with 1 cartridge. Additional cartridges available.

Let our helpful sales staff take the hassle out of buying a drive. They'll tell you which drive mechanism each manufacturer uses. They'll also tell you about access speed, reliability, software and the manufacturer's warranty.



MONEY BACK GUARANTEE

They'll tell you which drives come with the MacWarehouse 30-day money back guarantee. Try one at home. And if, for any reason, you're not 100% satisfied, just return it to us within thirty days and we'll refund your money.

Then there's the MacWarehouse Loaner Drive Program. Buy from MacWarehouse and if you ever have a problem, you won't be without a drive for more than a few hours.

READY TO USE

A hard drive from MacWarehouse couldn't be easier to use. We'll tell you which ones come pre-formatted — ready to use right out of the box. You just plug in, turn on your Mac and go!

If you do need any help, the MacWarehouse Technical Support staff is standing by our toll-free lines to assist you.

LIMITED TIME OFFER

MacWarehouse sale prices, based on capacity, are shown in the chart. Also shown are the savings from pre-holiday prices. (This is a limited time offer, valid through May 31, 1990.) Overnight delivery is just $3, anywhere in the Continental United States.

So call us now and tomorrow morning you'll be up and running with the best hard drive deal in the business!

MacWAREHOUSE™
1-800-255-6227
Call toll-free
Twenty-four hours a day,
seven days a week.
Inquiries 1-201-367-0440
Fax 1-201-905-9279
© Micro Warehouse Inc.

MacWarehouse 30-Day Money Back Guarantee

Many of our drives come with the MacWarehouse 30-Day Money Back Guarantee. If, for any reason, you're not completely satisfied, call us within thirty days of receipt for a return authorization number and full refund of the purchase price.

MWF0D

GUARANTEE

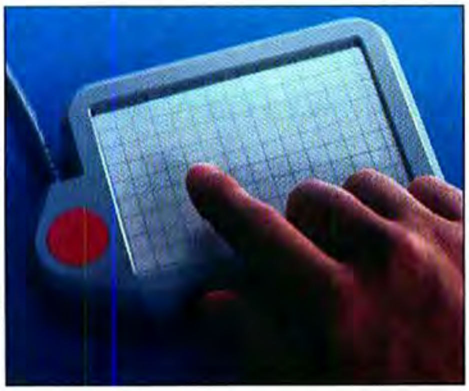
Many of our products come with a thirty day money back guarantee, if you are not completely satisfied. Ask for details when you place your order.

White Knight 11.0 (Freesoft)
White Knight is Scott Watson's successor to the legendary Red Ryder telecommunications program. It's more than just a new version - the added new features list alone is more than 20 pages long! The 270+ pg. manual has plenty of step by step tips to help beginners communicate like the pros in no time. White Knight comes bundled with Okyto, a revolutionary Mac-to-Mac file transfer program. A free subscription to the GEnie network is also provided. (communications) **$85.**

ACCESSORIES

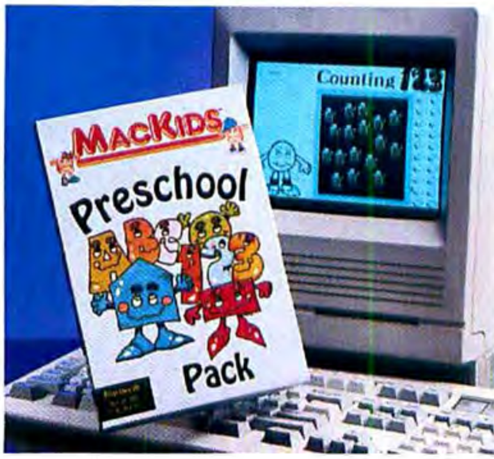
American Power Conversion	
110 SE UPS	269.
Apple	
Toner Cartridges LaserWriter	111.
Avery Labels (full line available)	
Laser 3.5 Diskettes	29.
Laser File Folders	6.
Laser Transparencies	22.
Basic Needs, Inc.	
HardTop Keyboard Covers	15.
HardTop ImageWriter Covers	17.
Keyboard Flip	6.
Dust Covers - Grey Nylon Ripstop	
ImageWriter or LaserWriter	12.
Mac Plus and keyboard	11.
Mac SE & extd. or reg. keyboard	11.
Mac II and extd. keyboard	12.
Universal Laser Printer Stand	28.
Utility Pac	11.
Curtis	
Computer Tool Kit (52 pc.)	49.
Curtis Clip	6.
Disk Holder (holds 40)	9.
Ergotron	
MacTilt-SE	68.
MacTilt II-RGB	75.
Goldstein & Blair	
The Macintosh Bible	20.
ICD	
Graflex	84.
I/O Designs	
Imageware II Carrying Case	49.
Macinware IIcx Carrying Case	85.
Macinware Mac II Carrying Case	99.
Macinware Plus Carrying Case	64.
Macinware SE Carrying Case	75.
Monitorware Apple RGB Case	79.
The Ultimate SE Carrying Case	79.
Kensington	
Anti-Glare Filter	33.
Apple Security System	34.
LaserWriter II Security System	32.
Mac II Stand w/Cable Kit	64.
MasterPiece Mac II	105.
PowerBacker 360 UPS Line	269.
PowerBacker 800 UPS Line	749.
PowerBacker 1200 UPS Line	949.
System Saver	63.
Mobius Products	
Fanny Mac QT	55.
SE Silencer	39.
Polaroid	
Circular Polarizing Filter	35.
Targus, Ltd.	
Deluxe Plus/SE-XKB Case (black)	69.
ImageWriter II Case (black)	45.
Mac Plus/SE Case (black)	55.
IIcx /IIci Case	75.

UnMouse (MicroTouch)
The UnMouse does everything a mouse can - only faster, easier, and in less space. To move the cursor, simply slide your finger over the glass surface. To make a selection, merely press down. The UnMouse also serves as an extended keyboard. Tap the large red button and you have a Power Keypad with 16 keys instantly available to execute macros (60 in advanced mode). With its one million touch points the UnMouse also performs as a small graphics tablet. Requires a Mac with ADB port. (input) **$189.**



Macintosh SE/Plus w/Extended Keyboard Carrying Case (Targus)
Pamper your Mac with a Targus carrying case made of Zilicone treated nylon to give you waterproof durability and an impact absorbing high-density foam layer with a soft protective lining for complete protection. Cushioned shoulder pad and handles provide extra comfort and convenience. Plus there's room for everything from your Mac, a hard disk drive, and the extended keyboard to pockets for your mouse, floppies, cables, and pens. Full Macintosh line available in black. Some styles available in blue, burgundy, and platinum. (accessories) **$69.**

MacKids Preschool Pack (Nordic Software)
Color animation, graphics and voice technology to teach learning *FUN*damentals. Includes six different lessons. AlphaWorks teaches letter recognition and keyboard layout. BarMath uses blocks to teach basic number concepts. Concentration develops short term memory skills. Connect the Dots teaches number and letter sequence. Counting 1,2,3 develops counting skills through matching numbers with objects. ShapeWorks teaches shape recognition by matching shapes based on patterns, size comparison, color, etc. (education) **$35.**



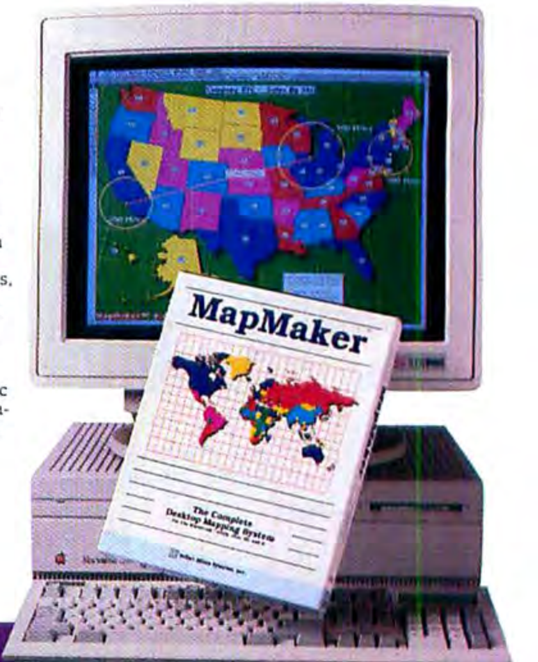
ACCOUNTING & PERSONAL FINANCES

Aatrix	
Checkwriter II	37.
Payroll 3.5	109.
Payroll PLUS	175.
TimeMinder	175.
DAC	
Dac-Easy Light	42.
Intuit	
Quicken 1.5	36.
Layered, Inc.	
at Once!	285.
MECA	
Managing Your Money	124.
Monogram	
Business Sense	269.
Dollars and Sense	81.
Nolo Press	
For The Record	29.
WillMaker	32.
ShopKeeper Software	
Bill-It 2.0	99.
Softview	
MacInTax Federal '89 - 1040	65.
State supplements	ea. 56.
MacInTax/Quicken 1.5 bundle	95.
Taxview 1040	355.
Survivor	
MacMoney 3.5	59.

BLANK MEDIA

B.A.S.F. made in U.S.A	
DS/DD (box of 10)	14.
DS/High Density (1.44 Meg)	24.
Sony	
DS/DD (box of 10)	13.
DS/HD (1.44 mb)	24.

MapMaker 4.0 (Strategic Mapping, Inc.)
Now includes dozens of powerful new features such as built-in drawing tools, on-screen distance measurements, graphics tablet support, and much more. Creates publication quality color maps of the U.S. by states and counties, and the world by country. Enter or import your own data, or use the included U.S. census statistics. Quickly displays hidden relationships in geographic data with striking presentation graphics. Mac 512K, Plus, SE and II. (graphics) **$295.**



WIN A TRIP TO LONDON ON THE CONCORDE

Imagine yourself on the flight deck of the British Airways Supersonic Concorde — en route to the MacUser U.K. show in London. New York to London in just over three hours! Superb comfort at twice the speed of sound. At 60,000 feet the sky is dark blue and you can see the curvature of the earth. The ultimate flying experience.

You can win a fabulous four day, all expense paid trip by Concorde to the MacUser U.K. Show, November 7-10, 1990, in the MacWarehouse Concorde to London Contest. You'll meet some of the staff of MacWarehouse U.K. and find out how the Mac is making out in Europe!

Your name is automatically entered into the drawing when you order from MacWarehouse. (Or just mail the entry coupon.)

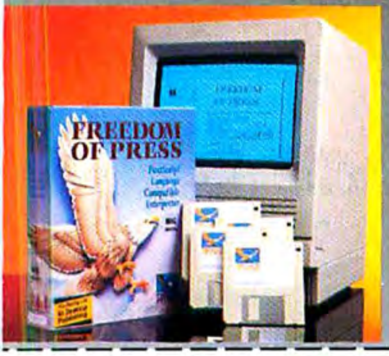
And don't forget, nobody beats MacWarehouse for great prices, free technical support and our Midnight Express Service. Order until twelve midnight for overnight delivery. The price is still just $3. Nobody does it faster than MacWarehouse — nobody!

MacWAREHOUSE
WIN A TRIP TO LONDON ON THE CONCORDE
MIDNIGHT EXPRESS SERVICE!

FREE CATALOG!

We carry more than 1200 Macintosh products, including all the latest releases and new versions. We pride ourselves on getting new products first. If you can't find what you need, call us for a free copy of our latest catalog.

Dreams (Innovative Data Design)
IDD, creator of MacDraft, offers a powerful precision drawing tool for professional scaled drawings, illustrations, presentations and general purpose graphics. Dreams offers zoom, rotation, layers, dimensioning, symbol libraries and a vast array of drawing tools, as well as many advanced illustration features. You can merge shapes together, cut edges of objects using other objects as templates...even glue lines and curves together to form unique shapes to be filled with colors or patterns. (graphics) **$325.**



Freedom of Press 2.1a (Custom Applications,Inc.)
Print PostScript language files using more than 50 different printers and film recorders. In combination with your favorite desktop publishing, graphics, drawing, painting and word processing software, Freedom of Press allows you to print PostScript language files, including support for 24 bit continuous tone color images. Complete with 35 scalable and rotatable outline fonts and drivers for all supported printers. Requires Macintosh SE30, II, IIcx, IIx or IIci. (utility) **$259.**

StuffIt Deluxe (Aladdin Systems, Inc.)
StuffIt Deluxe is the newest generation of the industry-standard compression, encryption, and archiving application. An easy-to-use interface and one-step QuickStuff/QuickUnStuff features allow beginners to benefit immediately. With over 75 new features, it employs many new state-of-the-art compression (including file-specific optimizers) and new security methods. Multiple archives can be opened and manipulated in a Finder-like fashion (with sorting, copying, renaming, or deleting). ViewIt brand viewers, a complete HyperTalk-like scripting language, and IBM-PC support (with dearc and unzip) are included. (utility) **$63.**

OFFICIAL ENTRY COUPON MWF0

Concorde to London Contest
1690 Oak Street, P.O. Box 1579, Lakewood, NJ 08701

When you order by phone or mail, you are automatically entered in the drawing. You can also mail this coupon or call our contest entry line. 1-800-367-0787. (In CT., call 1-203-852-8968)

Name ______________________________

Address ______________________ Apt. ________

City ______________ State ________ Zip ________

I'm Kerry, call me at:

MacWAREHOUSE™

1-800-255-6227
(1-800-ALL-MACS)

Inquiries: 201-367-0440
FAX: 201-905-9279

Call anytime — day or night 24 hours a day, seven days a week

*Midnight Express service available weekdays.

FROM MacWAREHOUSE™

Different Drummer
March to the tune of a MIDI drummer. Compose patterns, songs and jams. Sound output via Mac or MIDI, exports MIDI files for use with sequencers. Enter notes in real time, or drag notes into place with the mouse. Very easy to use! (music) **$ 59.**

Relational Objex
Relational Objex takes ordinary object-oriented drawing programs a step further. It adds the ability to link objects to other objects. Whenever you move or re-size an object, all the other linked objects will change accordingly. Use it to create animated illustrations, Gantt charts that update automatically, floor plans that change with new specifications, etc. (graphics) **$150.**

Easy Color Paint
Power Packed Palette! Jammed with features, Easy Color Paint delivers thrills and excitement to any would-be Piccaso within mouse-reach of your Mac. Includes 17 tools, 256 colors, user defined patterns, multiple color palettes, coloring modes and much more. (graphics). **$45.**

Publish It!
Complete self-contained desktop publishing program. Allows both professional & non-professional business communicators to write, design, and produce dynamic, sophisticated documents. From simple in-house newsletters & business forms to full-length magazines and distinctive annual reports; do it faster and easier than before! (desktop publishing) **$225.**

DATABASE SOFTWARE

Acius	
4th Dimension 2.0	515.
AEC Management Systems	
AEC Information Manager	409.
Blyth	
Omnis 5	375.
Claris	
FileMaker II	219.
Fox Software	
FoxBASE+/Mac	295.
Odesta	
Double Helix III	339.
GeoQuery	198.
ProVUE	
Panorama	257.

DESK ACCESSORIES

Casady & Greene	
QuickDEX	31.
JAM Software	
Smart Alarms & Appt. Diary	49.
Smart Alarms (1 - 4 users)	99.
Smart Alarms (5 - 8 users)	149.
Smart Alarms (9 - 15 users)	199.
Smart Alarms (16-25 users)	299.
Preferred Publishers	
DAtabase 1.5	69.
Vantage 1.5	52.
Solutions	
SmartScrap & The Clipper 2.0	45.
Vision Software	
Form Layout	35.

110 SE UPS (American Power Conversion)
It fits neatly under your Mac and provides up to 20 minutes of clean power. A built-in rechargeable battery prevents data loss and equipment damage. During normal operation, it protects against surges, spikes and power line noise. (accessory) **$269.**

Power Chute
Upon power failure Power Chute alerts all network users and initiates a graceful shutdown of the AppleShare Network. It communicates with a signalling American Power Conversion UPS (such as the 110SE or 307ci). (utility) **$74.**

DISK DRIVES/BOARDS

CMS	
MacStack 20 Meg	429.
MacStack 30 Meg	499.
MacStack 45 Meg	589.
MacStack 60 Meg	649.
MacStack 80 Meg	769.
MacStack 44 Meg Removable	839.
Cutting Edge	
800K External Floppy Drive	149.
SyQuest Removable 45 Meg	799.
Under the Mac 20 Meg	339.
Under the Mac 30+ Meg	389.
Under the Mac 45+ Meg	449.
Under the Mac 60+ Meg	489.
Under the Mac 80+ Meg	549.
Dayna Communications	
Dayna File Single 360K (5 1/4")	525.
Dayna File Dual 360K & 1.44M	749.
Dolphin Systems Tech	
Integra 20 Meg	389.
Integra 30 Meg	439.
Integra 40 Meg	499.
Integra 60 Meg	589.
Integra 80 Meg	645.
Flipper 44 Meg	829.
Fujitsu	
800K Disk Drive	159.
Kennect Technology	
Drive 2.4	329.
Rapport	199.
Peripheral Land, Inc.	
Infinity Dual Turbo	1875.
Infinity Turbo 40 Meg	999.
Turbo Floppy 1.4	359.
Quantum	
Quantum 40 MB Raw Drive	465.
Quantum 80 MB Raw Drive	735.
RasterOps	
RasterOps Colorboard 264	755.

Personal Press (Silicon Beach)
Personal Press creates professional layouts for you. Forget the long, steep learning curve, because Personal Press has AutoCreate to assemble stories and graphics into templates. It includes a full-featured word processor with spelling checker and thesaurus, controls for scanned images, spot color separations, posted notes, link navigator, extensive page previewing, and on-line help. (desktop publishing) **$199**

DESKTOP PUBLISHING

Aapps	
MicroTV	275.
Aldus	
PageMaker 4.0 or PrePrint	Call.
Broderbund	
DTP Advisor	47.
Data Translation	
PhotoMac	609.
Emerald City Software	
Smart Art I, II, or III	ea. 84.
Letraset	
ColorStudio or FontStudio	Call.
ImageStudio	275.
Ready,Set,Go!	275.
Olduvai	
Read-It! 2.1 (OCR)	245.
Read-It! Personal 2.0	125.
Read-It! TS (ThunderScan)	79.
Quark	
QuarkStyle	169.
Xpress	479.
Silicon Beach	
Personal Press	199.
Spinnaker/Springboard	
PLUS	115.
Springboard Publisher II	109.
TimeWorks	
Publish-It!	225.

EDUCATIONAL/ PERSONAL

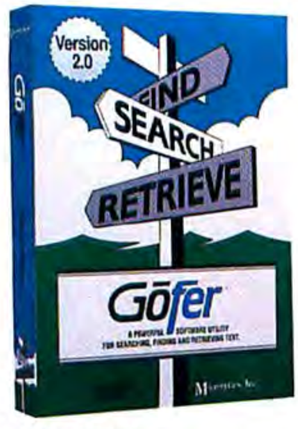
Beacon Technology	
GEMS of the Word	25.
BrightStar	
Alphabet Blocks	30.
Talking Tiles	27.
Davidson	
Math Blaster Mystery	26.
Speed Reader II	26.
Fair Tide Technologies	
Navigate! mono.	199.
First Byte	
The Dinosaur Discovery Kit	27.
The Puzzle Storybook	27.
The Rhyming Notebook	27.

The "ULTIMATE" SE Carrying Case (I/O Design, Inc.)
The "ULTIMATE" SE Carrying Case is designed with the same high quality standards as other MacLuggage products. This case offers internal, padded compartments for ANY Macintosh keyboard, mouse, external hard disk and cables. It also features 2 additional exterior pockets for everything from disks to umbrellas. Combine these features with sturdy Dupont Cordura nylon and 1/2 inch high density foam padding and you'll see why this is the "Ultimate" carrying case for your Mac. (accessories) **$79.**

MORE FOR YOUR MONEY...

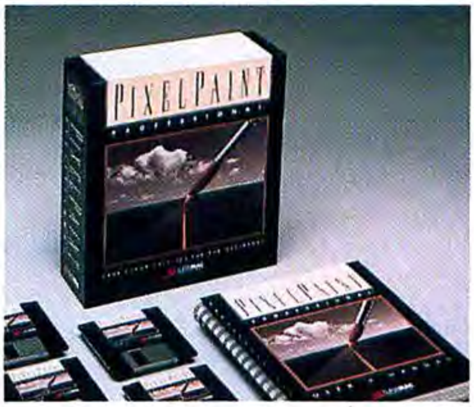
BUSINESS & PRESENTATION

A Lasting Impression	
ResumExpert (word vers.)	39.
Cover Letters or Students	ea. 39.
Managers or Sales & Marketing	ea. 39.
Healthcare or Finance & Banking	ea. 39.
Education or Glamour Profs.	ea. 39.
Comp. Sciences & Engineering	39.
Adobe Systems, Inc.	
TrueForm SetUp	225.
AEC Management Systems	
FastTrack Schedule	115.
Aldus	
Persuasion 2.0	329.
Antic Software	
FlexForm Bus.Temp Vol 1 or 2	ea. 45.
Claris	
MacProject II	369.
SmartForm Designer w/Assistant	295.
Cognition Technology	
MacSMARTS PRO	249.
Cricket (Computer Associates)	
Cricket Graph 1.3	115.
Cricket Presents	285.
Imagine That!	
Extend	339.
Informix	
WingZ 1.1	249.
Kaetron	
Top Down	199.


Version 2.0
FIND
SEARCH
RETRIEVE
Gōfer
A POWERFUL SOFTWARE UTILITY FOR SEARCHING, FINDING AND RETRIEVING TEXT
Microlytics Inc.

GOfer (Microlytics)
The ultimate text finder. A powerful software utility that searches, finds and retrieves text. Searches through countless files on your hard disk drive or floppy disks to find the text you need. A phrase, a fact, a note, a date. If you need it, GOfer finds it in seconds. You can automatically import the section of text into the document you're currently working in. You save hours searching through files. GOfer operates as a Macintosh desk accessory. (utility) **$45.**

Microsoft	
Excel 2.2 or PowerPoint 2.1	ea.249.
The Microsoft Office	529.
Works 2.0	185.
Portfolio Systems	
Dynodex-w binder & paper	95.
Paper	14.
Power Up	
Address Book Plus	53.
Address Book Plus w/Binder	99.
Calendar Creator	38.
FastForms!	89.
Letter Writer Plus	53.
Preferred Publishers	
Direct Mail	54.
ProPlus	
Wall Street Investor	449.
Satori	
Bulk Mailer 3.2.3	77.
Softstream International	
Endeavour Planner	95.
Symantec	
More II 2.01	269.
Symmetry	
KeyPlan	245.



PixelPaint Professional (SuperMac Technology)
PixelPaint Professional's photo-realistic paint capabilities let your imagination tinker with reality. Don't settle for manipulating images...*create* them with PixelPaint Professional! Offers an array of advanced paint tools for dazzling special effects. Choose from full transparency control, dynamic masking, image merging and a sophisticated airbrush tool. Use 8-to-32 bit color while selecting from a spectrum of custom palettes and color pickers including 4-color process, RGB, and PANTONE. (graphics) **$389.**

SYNEX	
MacEnvelope 5.0	79.
MacEnvelope Plus	219.
MacPhonebook	51.
Vertical Solutions	
FastLabel 2.0	89.

CAD/CAE

Claris	
ClarisCAD	595.
Graphsoft	
MiniCad+2.0	519.
Innovative Data Design	
MacDraft	175.
I.S.I.	
Precision	155.
Strata	
StrataVision 3D	375.

COMMUNICATIONS & NETWORKING

CE Software	
In/Out (1 to 5 Users)	128.
QuickMail 2.2 (1-10 Users)	319.
CompuServe	
CompuServe Navigator 3.0	39.
CompuServe Subscription Kit	24.
DataVIZ	
MacLink Plus w/Cable 4.1	119.
MacLink Plus/Translators 4.1	99.
Dove	
FastNet SCSI	749.
FastNet III	375.
FastNet SE or SE/30	ea. 375.
Dow Jones	
News/Retrieval Membership	24.
Farallon	
Timbuktu 3.0	95.
Timbuktu Remote 1.0.1	125.
TrafficWatch	125.
PhoneNET PLUS	33.
PhoneNET Repeater	315.
PhoneNET Star Controller	825.
FreeSoft	
White Knight 11.0	85.
Infosphere	
Liaison	175.
InSignia Solutions	
Soft PC (Mac II)	245.
Microcom Software	
Carbon Copy Mac	119.
Prodigy	
Mac Starter Kit	27.
Prometheus	
Acknowledge	289.
MAcKNOWLEDGE	149.
Software Ventures	
Microphone II v.3.0	215.
TOPS	
NetPrint	119.
FlashBox or Repeater	119.
FlashCard	155.
Teleconnectors	29.
TOPS 3.0 Network Bundle	189.
TOPS DOS Network Bundle	165.
Traveling Software	
Lap Link	81.
Lap-Link III Connectivity Pac	119.
Lap-Link III Network Pac	189.

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- **Sales Tax:** CT residents add 8%, NJ residents add 6%. Ohio residents add appropriate tax.

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- C.O.D. orders ship via UPS (Blue Label if you are more than 2 days from us via UPS Ground). Charge is $6 including shipping.
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*Defective software replaced immediately. Hardware replaced or repaired at our discretion.

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Manages your names and addresses faster than anything on the Mac: dial, find, change, sort, select, import, export, merge, and more. Includes "no fuss" forms to print 300 double-sided pages to Filofax and other personal organizers. (business) **$95.**

MicroPhone II 3.0
MicroPhone II scripting language makes using electronic mail services an automatic operation. Other types of file transfers are equally effortless. MicroPhone II now supports the hot new ZMODEM, transfer protocol (in addition to XMODEM, YMODEM, KERMIT, and MacTerminal 1.1), and can operate modems at any speed from 50 to 57,600 baud. (communications) **$215.**

CanOpener 1.1
Information retrieval utility for the Mac. Search anywhere, and lets you retrieve just about anything; including text, pictures and sounds. Locates text inside pictures, and gives you the whole picture! Anything you retrieve with CanOpener can be stored in its library, so the next time you need it, it's just a click away. (utility) **$64.**

GUARANTEE

Many of our products come with a thirty day money back guarantee, if you are not completely satisfied. Ask for details when you place your order.

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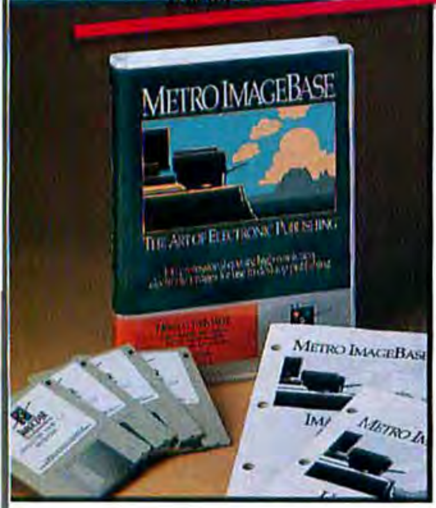


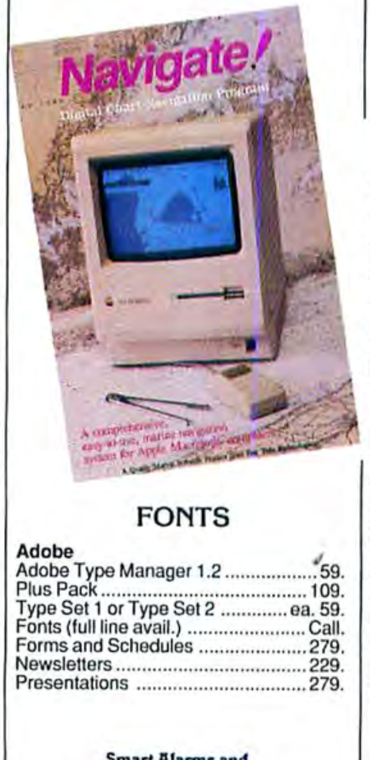
Help Software, Inc.	
Desktop Help for Excel	50.
Learning Company	
Math Rabbit or Reader Rabbit	ea. 31.
Nordic Software (full line available)	
MacKids Turbo Math Facts	28.
MacKids Preschool Pack	35.
MacKids Word Quest	30.
Penton Overseas	
VocabuLearn French, Spanish, German, Italian	ea. 29.
VocabuLearn Japanese	35.
Voice & Video Instruction Videos	
HyperCard or Pagemaker 3.0	ea. 35.
Word 4.0 Video Tape	35.

ENTERTAINMENT

Access Software, Inc.	
World Class Leader Board	26.
Artworx	
Bridge 6.0	24.
Daily Double Horse Racing	19.
GrailQuest	19.
Broderbund	
Ancient Art of War At Sea	27.
Shufflepuck Cafe	24.
Where in the World is Carmen	27.
Bull City Software	
Moriarity's Revenge	32.
Bullseye	
Ferrari Grand Prix or P51	ea 32.
Fokker Tri-plane	24.
Centron Software, Inc.	
BlackJack or CrapsMaster	ea 27.
CasinoMaster (5 pack)	49.
Electronic Arts	
Chuck Yeager Adv. Flight Trainer	32.
Miles Computing	
Fool's Errand	32.
Puzzle Gallery	27.
Mindscape	
Balance of Power, or Deja Vu	ea. 29.
Hostage or Colony	ea. 29.

Metro ImageBase Electronic Art (Metro ImageBase)
High quality 300 dpi electronic art from one of the world's leading publishers of ready to use art. Enhance brochures, menus, reports, newsletters and presentations. One large image per file - 100 per package. Packages available: Newsletter Maker, Business Graphics, Computers & Technology, ReportMaker, Borders & Boxes and 9 others. (graphics) **$76. each**

Nemesis	
Go Master	49.
Joseki Tutor	30.
Softstream	
22nd Street or MacRummy	32.
The Software Toolworks	
Cribbage & Gin King	39.
Life & Death or ChessMaster	32.
The Hunt for Red October	32.
Strategic Simulations	
Pool of Radiance	32.
Three Sixty	
Sands of Fire	32.
Visionary Software	
Synchonicity	39.
XOR/PCAI	
Lunar Rescue or MacGolf 2.0	34.
MacGolf Classic	53.
Road Racer	39.
NFL Challenge	54.
TaskMaker	29.



FONTS

Adobe	
Adobe Type Manager 1.2	59.
Plus Pack	109.
Type Set 1 or Type Set 2	ea. 59.
Fonts (full line avail.)	Call.
Forms and Schedules	279.
Newsletters	229.
Presentations	279.
Altsys	
Fontastic Plus 2.02	52.
Fontographer 3.05	249.
Metamorphosis	149.
The Art Importer 2.0	89.
Emerald City Software	
TypeAlign	60.
Letraset	
LetraStudio	275.
LetraFonts (various)	ea. 69.
Tactic Software	
ArtFonts Vol.1, 2 or 3	ea. 55.

GRAPHICS & DESIGN

3G Graphics	
Images w/Impact	
Graphics & Symbols 1	51.
Business 1 or Accents & Brdrs 1	ea.65.
Adobe	
Illustrator 88 1.9.3	279.
Photoshop	529.
Streamline	229.
Aldus	
Freehand 2.0	329.
Aperture Technology	
Aperture Visual Information Mgr.	729.
Broderbund	
Drawing Table	79.
TypeStyler	119.
Claris	
MacDraw II	295.
MacPaint 2.0	95.
Creative Software	
Easy Color Paint	45.
Deneba	
Canvas 2.1	189.
Ultra Paint	125.
Digital Vision	
Computer Eyes B&W	199.
Computer Eyes Pro Color	349.

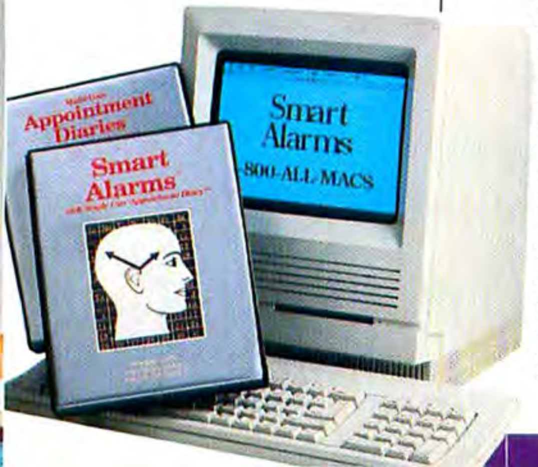
Navigate! (Fair Tide Technologies)
Enter the world of Digital Chart Navigation. Navigate! allows you to display the precise position of your yacht on a detailed chart. Displays land mass, shoal lines, buoys and many other navigation aids. Has full course planning and tracking features. Includes interface for a position sensor (LORAN, SATNAV, GPS) and one chart. Available in color or mono. (education) **Navigate! mono $199.**

Dream Maker	
Cliptures, Business Images	69.
MacGallery	27.
Electronic Arts	
Studio/1	96.
Studio/8	296.
Graphsoft	
Blueprint	339.
Innovative Data Design	
Dreams	325.
MacroMind	
MacroMind Director	445.

2400MFAX
"Just the Fax Ma'am...Just the Fax" Not anymore when you combine high-end fax capabilities with the power of your Mac! Part of the new Promodem Data/Fax Series, the 2400MFAX adds Group III, originate-only and 4800bps fax capabilities to the enclosed 2400bps data modem. Includes MAc-KNOWLEDGE and a customized version of BackFAX. (modem/fax) **$209.**

Listen
Play it by ear! Beginners and pros alike can hone their ear training skills when they *Listen*. You'll love using this exciting software package to master varying degrees of note, chord and interval recognition via an on screen piano & guitar or your external MIDI keyboard. (music) **$62.**

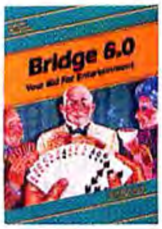
Address Book Plus
The most complete, ready-to-use solution for managing names, addresses, phone numbers, and other vital information. The program makes it easy to print top quality address book pages, phone lists, mailing labels, rotary-file cards, and envelopes. Also includes a separate Desk Accessory for searching and dialing. (business) **$53.** With leather binder **$99.**



Smart Alarms and Appointment Diaries (JAM)
The ultimate reminder system. Smart Alarms desk accessory creates reminders which interrupt you at an appointed time. Features snooze up to to 1 hour, printing, choice of beeps, & text editing reminders. Appointment Diary desk accessory calendar for appointments. Features: Auto-layout, Day Layout, set reminders directly into Smart Alarms, Week at a view, Month at a glance, printing. Multi-User requires AppleShare or TOPS. (desk accessories) **single user $49, 1-4 users $99, 5-8 users $149, 9-15 users $199, 16-25 users $299**

TaskMaker (XOR)
The world has plunged into depression and devastation...the once mighty kingdom is no longer. Your mission: to restore order and prosperity to the kingdom, but you have no experience. Explore lands, caves and castles. Discover precious riches, decipher cryptic messages and fight hellish beasties such as skeletons, zombies and giant caterpillars. To gain help, find the TaskMaker. With his guidance and your courage, the kingdom might be saved! (entertainment) **$29.**

Sands of Fire
Venture into the white-hot sands and sweltering intensity of WWII North Africa. Thoroughly documented with accurate historical data, Sands of Fire recreates actual battle scenarios of tank warfare in WWII. You can influence the outcome of up to 48 different battle engagements from Tobruk to the Kasserine Pass and more. (entertainment) **$32.**



Bridge 6.0
Bridge 6.0 is a comprehensive contract or duplicate bridge-playing program which allows you and your computer partner to bid against two computer opponents and play out the hand. Ideal way for the novice to improve his or her game, and advanced player to get into a game without having to round up three additional players. (entertainment) **$24.**

Pool of Radiance
The fabled city of Phlan has been overrun by monsters led by a mysterious leader. Your quest: discover the identity of this evil force and rid Phlan of its scourge. The Adventurer's Journal will help guide your party on many different missions with history, maps, clues and rumors. (entertainment). **$32.**

Metro ImageBase (Full Line Available)	
Art Deco or ReportMaker	ea. 76.
Newsletter Maker or Business	ea. 76.
Mindscape	
ZING	125.
Multi Ad Services	
Multi-Ad Creator	865.
ProArt: Bus., Sports or Holidays	ea.95.
Paracomp	
Swivel 3D 1.1	319.
Silicon Beach	
Digital Darkroom	249.
Super 3D 2.0	315.
SuperPaint 2.0	125.
SoftStream	
Relational Objex	150.
Strata	
StrataVISION 3d	375.
Strategic Mapping, Inc. (Select Micro)	
Map Maker 4.0	295.
Studiotronics	
Colorset 1.5	229.
SuperMac	
PixelPaint 2.0	225.
PixelPaint Professional	389.
Tactic Software	
Art Clips Vol. 1	51.
Art Clips Vol. 2	65.

HARDWARE & PERIPHERALS

Cutting Edge	
Two Page 19" Monochrome Monitor	959.
General Computing Company	
WriteMove Ink Jet Printer	575.
Magnavox	
Color Monitor 14"	535.
Microtek	
Microtek MSF-300GS Scanner	1589.
Mobius	
Multiscreen Video Card w/ Princeton 15" monitor	529.
Qume	
Crystal Print Publisher	2900.
Seikosha America	
Seikosha Printer (dot-matrix)	235.
Sharp	
The Wizard	229.
ThunderWare	
LightningScan	369.
ThunderScan 5.0	187.

NEW! The DataDesk Switchboard (DataDesk International) The new Switchboard is the first user-configurable keyboard. The unique, modular design allows the user to arrange the Alpha, Cursor, and Numeric keypads into many different positions that best suit their individual computing needs and comfort. Additional input devices, such as a trackball, vertical function keys, digitizer tablet, and programmable-macro keys can either replace existing keypads or otherwise be added to the keyboard. This flexibility allows the Switchboard to evolve with the needs of the user and at the same time preserving desktop space due to the integration of all the Switchboard's modules into a single unit. Additionally, the Switchboard is the first keyboard that is engineered to work on both IBM and Apple computers. (input/output) **$175.**

HYPERWARE

Bantam	
Complete HyperCard Handbook	22.
Beacon Technologies	
HyperBible International Version	175.
HyperBible King James Version	145.
Bright Star Technology	
HyperAnimator 1.5.1	98.
interFACE	229.
DataDesk International	
HyperDialer	29.
ICOM Simulations	
HyperTMON	59.
MicroMaps	
HyperAtlas	59.
Power Up	
HyperTutor	29.
Silicon Beach	
SuperCard 1.5	189.
Softstream International	
HyperHit	125.

MacEnvelope 5.0 (SYNEX)
MacEnvelope 5.0 delivers the look you want for personalized mail. Import self-styled graphics and text to create unique envelope and label layouts. And save money on bulk mailing and speed delivery using MacEnvelope's Postal Bar Coding ability. Stores up to 1600 addresses per file, sorted alphabetically or by ZIP code. (business) **$79.**
MacEnvelope Plus 2.0 Maintains up to 100,000 names per file. Provides list management features including comments, flags and multilevel sorts. (business) **$219.**

Springboard	
Family Matters	28.
Symmetry	
HyperDA 1.2	49.
TimeWorks	
HyperWorks Organizer	57.

INPUT/OUTPUT

Altra	
Felix	127.

Felix (Altra)
Finally, a stationary mouse alternative that's quicker and easier to use. Felix uses just six inches of desk space to provide full speed cursor control. It utilizes Altra's "Optical Pointing Technology" and an onboard microprocessor to achieve very high resolution combined with simple use. Felix is more than a mouse, it's a productivity tool! No maintenance required. For all Mac SEs and IIs. (input) **$127.**

HyperDialer (DataDesk International)
Now you can connect your Macintosh to your existing business or home telephone for automatic dialing with Apple's HyperCard. DataDesk's HyperDialer is designed specifically for HyperCard's touch-tone dialing capabilities and works with line business phones without requiring a modem or dedicated phone line for automatic dialing. Automatically dials HyperCard, SideKick, Focal Point, C.A.T., SuperCard and QuickDex phone numbers. It connects to the speaker port - not a precious serial port. (hyperware) **$29.**

Asher Engineering	
QuadLYNX Trackball	59.
Cutting Edge	
CE-105 ADB Keyboard	125.
DataDesk Intl.	
DataDesk Switchboard	175.
Mac 101 Keyboards	139.
International versions	Call.
Kensington	
New Turbo Mouse	109.
Kraft	
ADB Joystick Premium III (SE&II)	49.
QuickStick	39.
Trackball	79.
Kurta	
IS/ADB Tablet 8 1/2 x 11	255.
Micro Touch	
The UnMouse	189.
Mobius	
Cordless Mouse	95.
Mouse Systems	
A+ Mouse (SE/II)	79.
Practical Solutions	
The Cordless Mouse	95.
Mouse Master	57.
Summagraphics	
Bit Pad Plus	319.

LANGUAGES

Digitalk, Inc.	
Smalltalk/V MAC	125.
Microsoft.	
QuickBasic	65.

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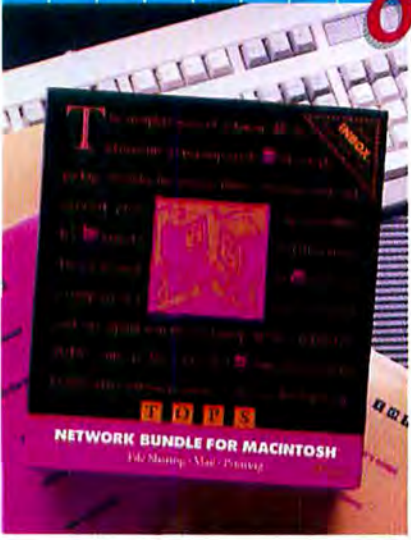

Shana Corporation	
Inside Out	369.
SmethersBarnes	
Prototyper	189.
Symantec	
THINK'S C 4.0	168.
THINK'S Lightspeed Pascal	168.
Zedcor	
ZBasic 5.0	89.

MEMORY UPGRADES/ ACCELERATORS

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Low Profile, 120ns High Quality Single In-Line Memory Modules for MacPlus, SE, II, IIx.
2 yr. Warranty. **ONLY $89.**

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MaraThon 030 Accelerator	449.
MaraThon 030X	449.
MacSnap 2S	209.
MacSnap 4S	415.
MacSnap 8S	829.
MacSnap 524E	185.
MacSnap 524S	239.
MacSnap 548S	499.

MODEMS/FAX

Abaton	
InterFax12/48	265.
InterFax 24/96	419.
Best Data Products	
SmartOne 2400/1200	145.
Dove	
DoveFax desktop	279.
DoveFax Networkable desktop	375.
DoveFax Nubus	449.
Networkable Nubus	749.
Hayes	
Smartmodem 2400	349.
Smartmodem 9600 (V series)	759.

TOPS 3.0 Network Bundle for the Mac (TOPS)
TOPS 3.0 provides a completer network/E-Mail solution for any combination of Macs, IBM PC's and Sun workstations. With TOPS, every computer is a server and each user decides which files are public or private. TOPS follows AppleTalk File Protocol, so AFP-compatible multi-user applications will run properly. Includes TOPS Spool for background printing on the network, and a 20-user package of InBox 3.0 (networking) **$189.**

Prometheus	
2400MFAX	209.
ProModem 2400 SE Int.	209.
ProModem 2400M	199.
Travel Modem	205.
Supra	
Supra Modem 2400	129.
US Robotics	
Courier 9600 Modem	689.

MUSIC AND SOUND

Altech	
MIDI Interface	59.
ARS Nova	
Practica Musica 2.2	69.
Bogas Productions	
Super Studio Session 2.0	65.

Coda	
Finale	569.
MacDrums	31.
Perceive	49.
Electronic Arts	
Deluxe Music Construction 2.5	85.
Deluxe Recorder	99.
Esthetic Engineering	
Music Mouse	49.
Farallon Computing	
MacRecorder (records sound)	159.
Screen Recorder	125.
First Byte	
SmoothTalker	32.
HIP Software	
Harmony Grid	59.
Passport Designs	
NoteWriter	325.
Passport MIDI Interface	89.
Primera Software	
Different Drummer	59.
Repertoire	
Music Publisher	359.

FastLabel 2.0 (Vertical Solutions)
Stick it to the chore of simple label printing! FastLabel offers a handy easy-to-use solution to creative label printing without the need to haul out cumbersome desktop publishing software. Import addresses, lists and graphics from other Mac applications then use Fastlabel's eighteen preformatted designs (or create your own) to produce everything from disk, V.C.R and cassette labels to personalized envelopes, name badges, signs and more. (business) **$89.**

MacTilt (Ergotron)
See eye to eye with your Mac and watch productivity soar! Raise your Mac to eye level using MacTilt's 4 inch pedestal. Then tilt it up to 30 degrees and rotate it a full 360 degrees to make glare, eye, neck and back strain disappear like magic. (accessories) **$68.**

Resonate	
Listen 2.0	62.
Tactic Software	
Sound Clips Vol. 1 or 2	ea. 49.

SECURITY & VIRUS PROTECTION

ASD Software, Inc.	
FileGuard Extend (office 5-pak)	309.
Fifth Generation	
Disk Lock	107
HJC/Microcom	
Virex 2.3	52.
Kent Marsh	
MacSafe II	107.
NightWatch	86.
QuickLock	56.
Mainstay	
AntiToxin	59.
Symantec Corporation	
S. A. M.	68.

SmartOne 2400 Modem (Best Data Products)
For beginners and experienced modem users. If you need a 2400 baud modem, the Smart One 2400 Modem provides an economical alternative. For less than the cost of some 1200 bps units, you get a Hayes compatible modem with auto answer/originate, 300, 1200 and 2400 baud operation, pass-through phone jack, speaker with programmable volume, and a manufacturer's two-year warranty. All user options are stored in non-volatile memory. Includes software and cable. (modems) **$145.**

SPELLING/DICTIONARY THESAURUS CHECKERS

Deneba Software	
BigThesaurus	64.
Spelling Coach Pro 3.1	125.
Electronic Arts	
Thunder II	49.
Lexpertise	
MacProof 3.2.1	115.
Microlytics	
Electronic Word Finder	59.
Word Finder 2.0	34.

Casino Master (Centron)
Let it Ride! You can bet on having hours of fun with Casino Master's five exciting casino games. Includes **Blackjack Ace**, **Crapsmaster**, **Roulette Master**, **Pokermaster** and **Baccarat Master**. Exact table simulation, mouse controlled betting, selectable bankroll, stored win/lose statistics and complete manual included. Mac II version available in full color! An odds-on favorite with professional gamblers. (entertainment) Individual games **$27. ea.** / 5 game Casino Master Package **$49.** /
Deluxe Mac II version
$55.

Sensible Software	
BookEnds	53.
Sensible Grammar	53.

STATISTICAL ANALYSIS

Abacus Concepts	
StatView II	279.
StatView SE+Graphics	179.
D2 Software	
MacSpin 2.0	189.
Wolfram Research	
Mathematica (SE)	450.

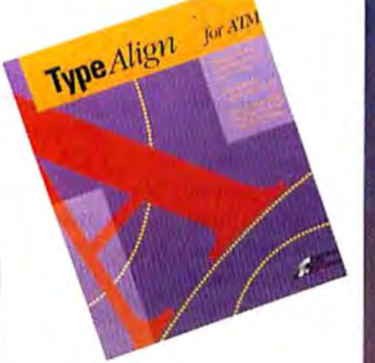
UTILITIES

Abbott Systems	
CanOpener 1.1	64.
Affinity	
Tempo II	99.
Aladdin Systems Inc.	
Programmer's Assistants	75.
Shortcut	46.
StuffIt Deluxe	63.
ALSoft	
DiskExpress II	57.
MultiDisk	49.
Master Juggler	64.
American Power Conversion	
Power Chute	74.
CE Software	
DiskTop 4.0 or QuicKeys 1.2	ea. 64.
Caere	
OmniPage	549.

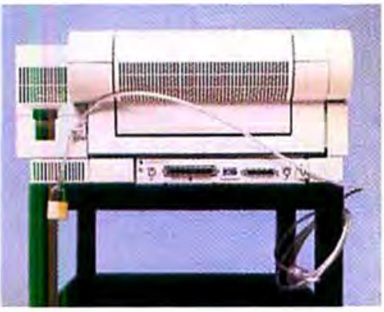
CompuServe®

You can now contact MacWAREHOUSE or place orders with us in the **Electronic Mall** on CompuServe. The **MacWAREHOUSE GO code is GO MW**. As always, you'll get fast, dependable overnight service and you can leave messages for Kerry or any of our support staff.

TypeAlign (Emerald City Software)
Exclusively for ATM owners; give your type a change of face with TypeAlign. Rotate, wrap, skew, and kern type, then add special effects like outlines and see it all on screen, instantly. Print on any ATM-supported printer, including ImageWriters, DeskWriters, and LaserWriters. Works with major word processing, desktop publishing and presentation programs and Adobe PostScript fonts. Also supports over 16 million colors. (fonts) **$60.**



Central Point Software	
Copy II Mac	23.
Mac Tools Deluxe	75.
Custom Applications	
Freedom of Press 2.1a	259.
Dantz Development	
Retrospect	149.
Dayna Communications	
DOS Mounter	55.
Emerald City Software	
Lasertalk 1.0	149.
Fifth Generation	
FastBack II	107.
PowerStation 2.5	34.
Pyro	22.
Suitcase II	44.
ICOM Simulations	
On Cue	35.



Insight Development	
MacPrint	95.
Magic Software	
AutoSave II	29.
BackMatic	50.
POWERicons or POWERmenus	ea. 39.
Mainstay	
Capture 2.0	49.
Microlytics	
GOfer	45.
Olduvai	
ClipShare	139.
MultiClip	50.
ON Technology	
On Location	75.
Preferred Publishers	
Exposure	52.
Software Innovations	
HandOff	32.

Carbon Copy Mac (Microm)
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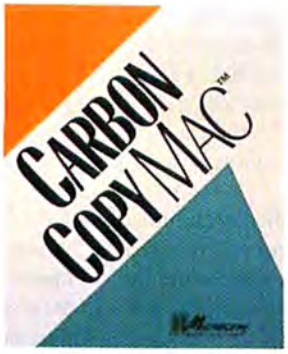

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Attention Uptime Subscribers

Viking Technologies, which published the subscription-based software service Uptime, filed for bankruptcy last year and in January sold its assets to Softdisk Publishing of Shreveport, Louisiana.

The company has taken over the Uptime subscriptions, sending up to six monthly disks to Uptime customers, depending on the number of disks left in their subscriptions. The disks contain original applications and magazine-like columns and departments. Any questions? You can reach Softdisk Publishing and Diskworld at 318/221-5134 or 800/831-2694.

Hacker Heaven

The Fifth Annual Macintosh Technical Conference, or MacHack '90, is scheduled for June 13 through 16 in Ann Arbor, Michigan. *Macworld* editor, conference chair, and technogeek Brita Meng urges programmers to use this sterling opportunity to meet other programmers. Don't miss the popular Apple-led Bash Apple session and the infamous Best Hack competition. Call Aimee Moran or Carol Lynn for more details at 313/882-1824.

Hard-Won Warranty

Many thanks to Apple for recently changing its outmoded warranty policy and for offering owners of old Apple products the opportunity (through May 31) to buy six months of AppleCare and get six months free. And special thanks to the nearly 1500 readers who fought for a better warranty by writing letters and sending coupons to *Macworld* and Apple. Your voices made a difference. ■

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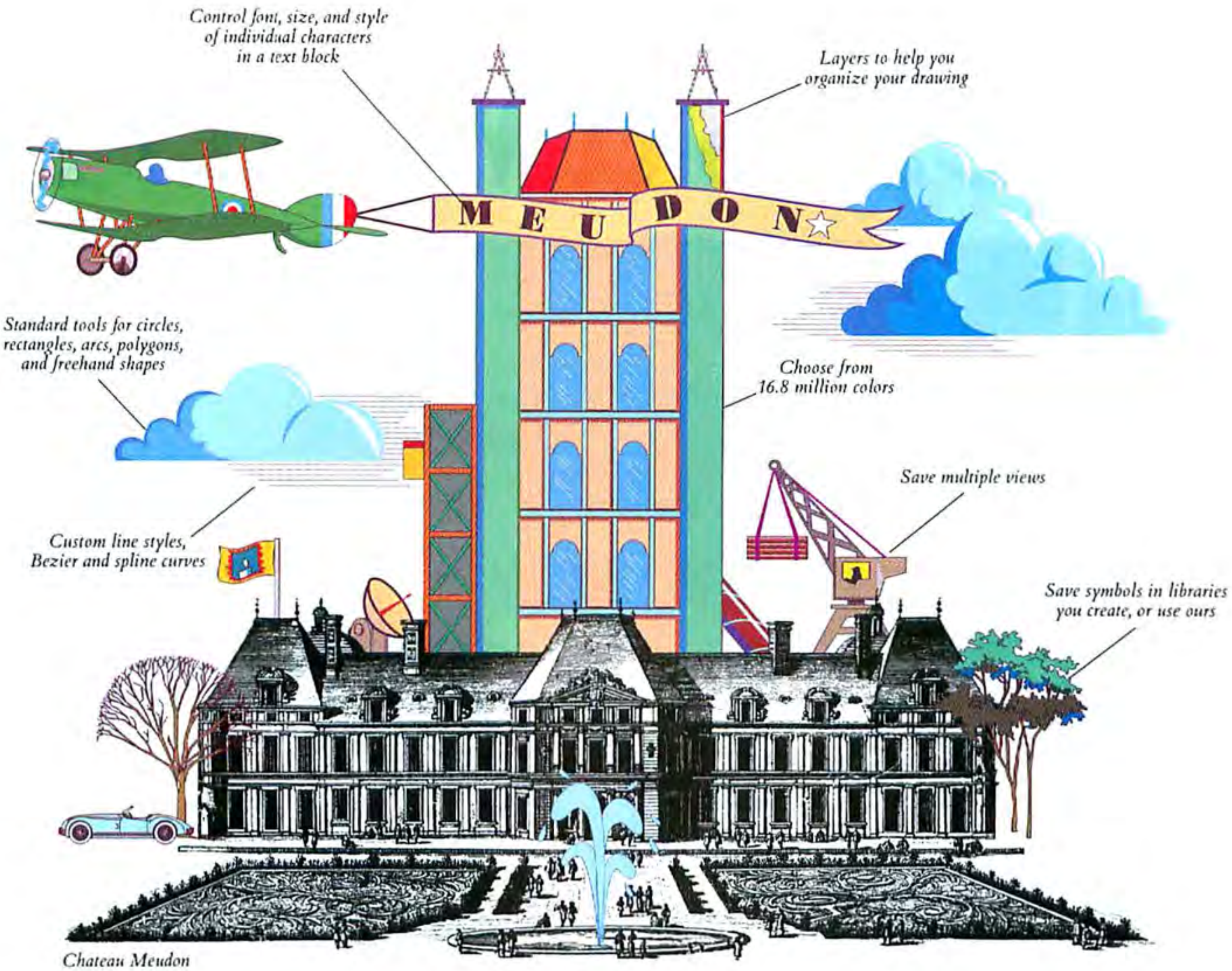

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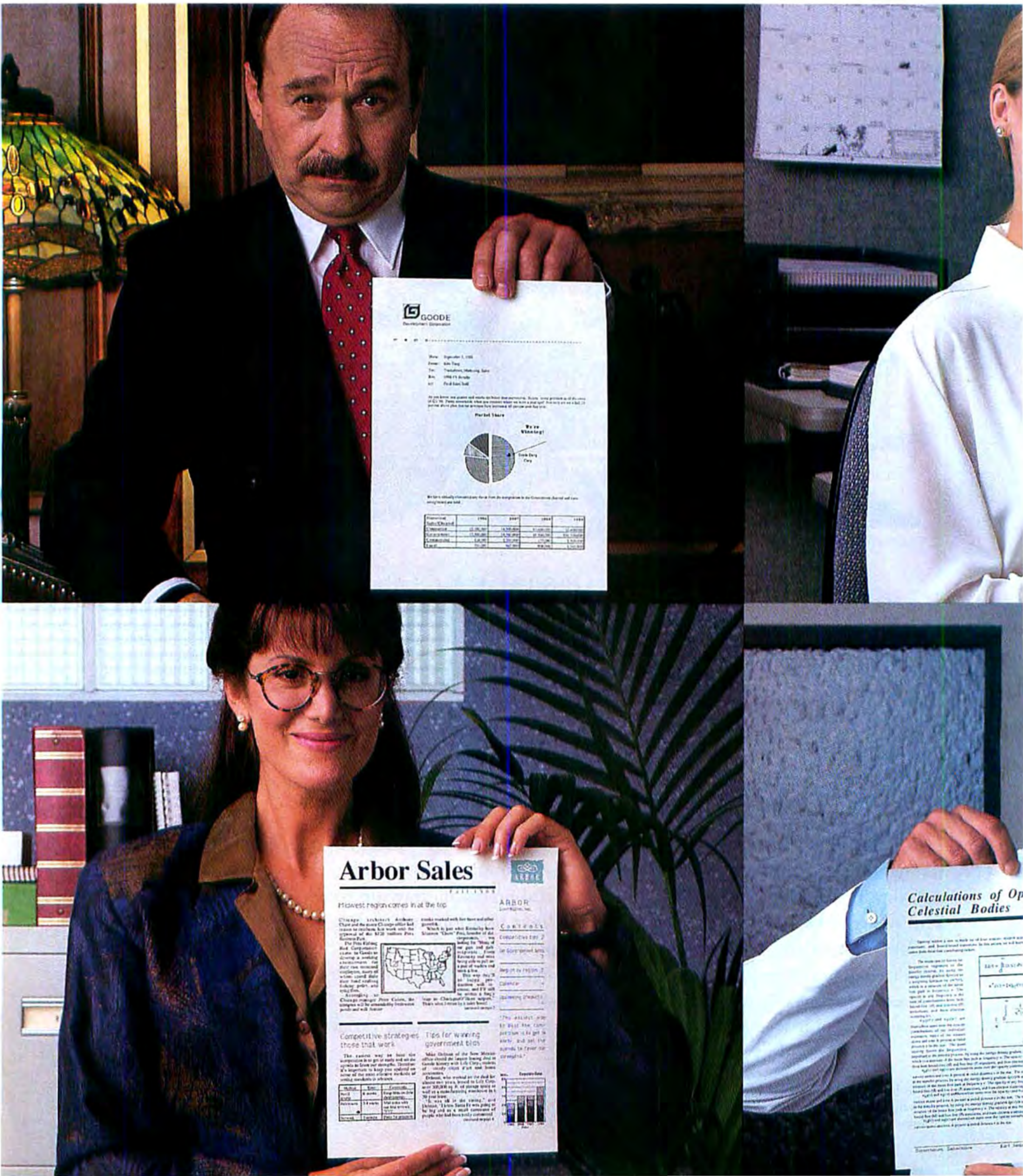

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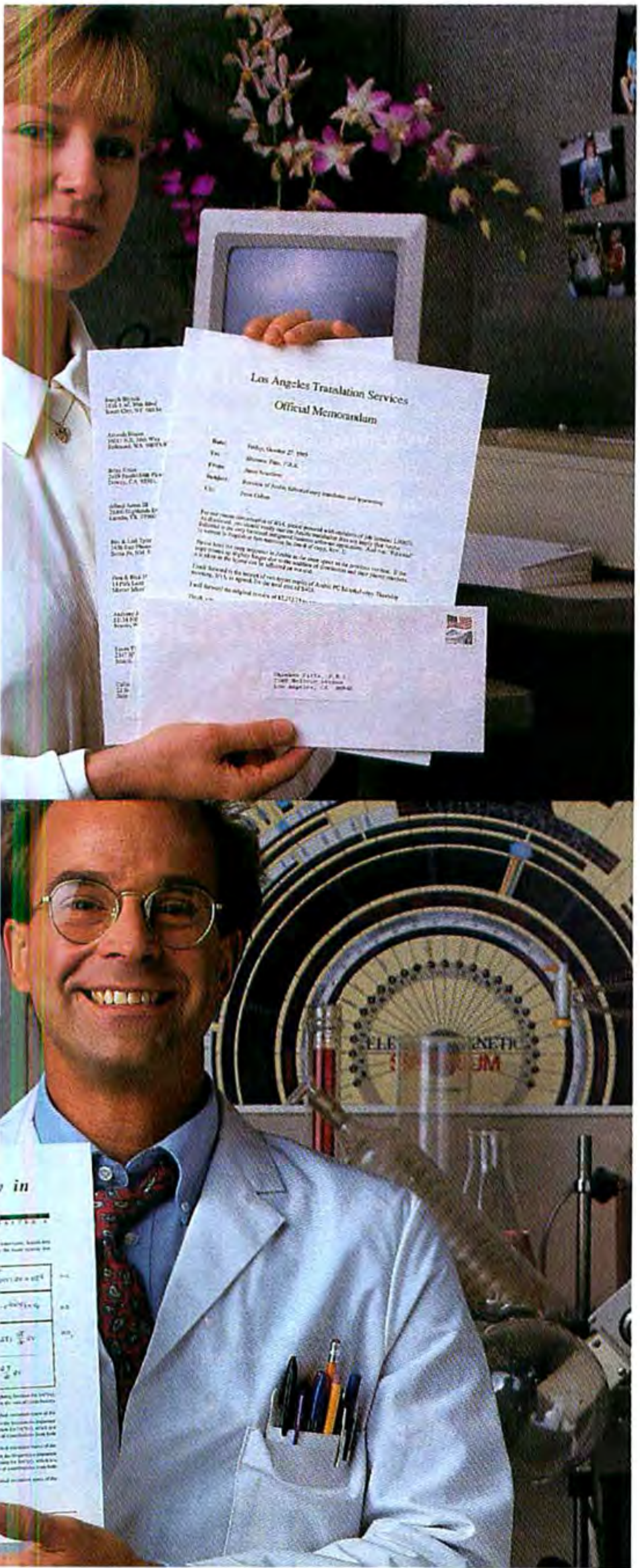

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Programming for the Rest of Us

CAN SOFTWARE DEVELOPMENT ON THE MAC EVER BECOME MAINSTREAM?

BY BRUCE F. WEBSTER

It is ironic that the Macintosh—perhaps the easiest personal computer to use—is one of the toughest personal computers to program. It is also no surprise: the difficulty in programming is a direct consequence of the complexity of the software supporting the Mac's user interface. But it does present a real barrier to Macintosh users who would like to create custom applications, develop commercial products, or write programs just for the fun of it.

Suppose you have lots of experience using the Mac, but you have done little (if any) Mac programming. Are there any tools to help you get through the initial learning curve? Is HyperCard (or, at least, HyperTalk) the best solution? Does graphical programming really exist on the Macintosh? And will object-oriented programming solve all your problems? Let's take a look at these questions and more.

Can You Say C?

Let's start off by considering traditional, non–object-oriented programming languages: Pascal, C, BASIC, FORTRAN, Forth, Ada, and others. There are many such languages available for the Macintosh, but few are good choices for someone who's never programmed on the Mac before. That's because of the inherent difficulties—more than 500 toolbox routines, five volumes of *Inside Macintosh* to learn, and the significant amount of code needed just to fully implement the user interface. On top of that, if the language isn't Pascal, you have the challenge of hooking up with the Mac's Pascal-oriented toolbox interface.

Despite the burden that traditional languages place on Mac programmers, you should consider, or at least be aware of, some products that use traditional languages. Macintosh Programmer's Workshop (MPW), from Apple, is a large, professional development environment. It comes with thick manuals, lots of disks, and (ironically) an interface geared toward command-line interaction; it's not for the casual user. MPW's greatest strength is its modular approach: you buy the basic MPW development system, then add the tools you want. These include languages such as C, Pascal, C++, 680x0 assembler, Modula-2, Ada, FORTRAN, and more. (Some are available from Apple, others from third-party vendors.) While this all may sound great, MPW doesn't lend itself to introductory Mac programming. It's big, complex, slow at times, and obscure in places. That's not to say that you might not want to try it someday, but learn how to program the Mac first.

There are some traditional languages that provide solutions better suited for the masses. One example—two, really—is a pair of languages from Symantec: Think C and Think Pascal.

The two implementations offer similar features: fast compilation and linking; project management and source-level debugging, all in a highly integrated, Mac-style environment. These features alone have made both products widely accepted in the Mac community. But their most recent enhancements—object-oriented extensions, a Mac class library, and (for Think Pascal) a class browser and support of MacApp—make these products all the more useful to programmers new to the Mac environment. I'll talk more about why later on.

If you do choose MPW or one of the Think languages, you might want to buy a programming aid. Several companies market source-code libraries or linkable modules that implement aspects of the Mac user interface or provide functionality that you might need. Examples of the former include MacInterface, from Holder, Egan & Company, and Professional Programmer's Extender, from Invention Software. These packages give you the source code required to build a basic Macintosh application; you can then focus on adding functionality. A different approach is taken by FaceWare, which markets a set of code modules called FaceWare Pack that provide key functionality (user interface, text editing, graphic windows, and so on) and

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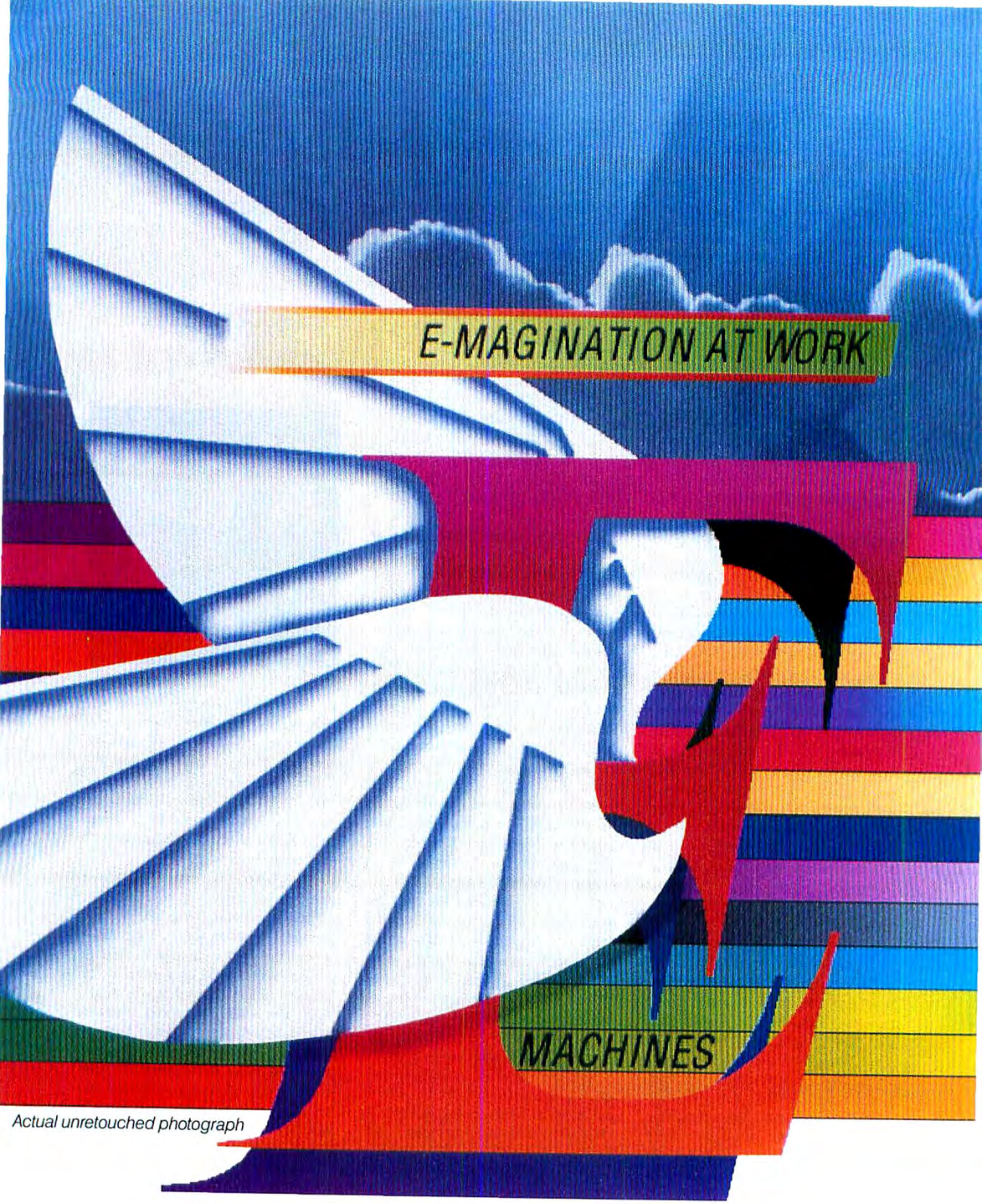

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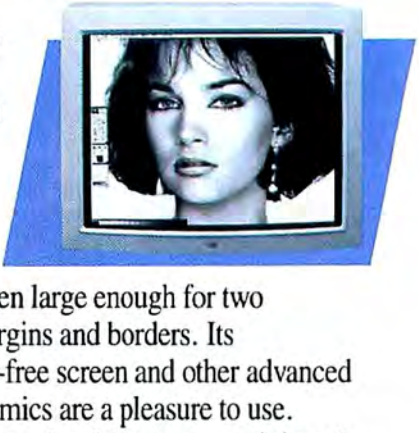

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can be used with several different C, Pascal, and FORTRAN compilers for the Mac. In both cases, the idea is the same: to cut down on the difficulty of Mac development by letting someone else do all the initial hard work.

Even with help, traditional languages are still the most difficult way to go in Mac development. You'll almost certainly need to purchase Apple's development bible, *Inside Macintosh* (Addison-Wesley 1985–1988), and there are other books you may want to get as well.

Building Bridges

Since designing and creating the user interface is one of the most time-consuming tasks in Macintosh programming, new utilities such as AppMaker and Prototyper that substantially streamline the process are a boon for novices. Not only do they free up a programmer's time, but they also allow nonprogrammers to tackle what ordinarily would be a formidable task.

AppMaker and Prototyper both use the same approach. First, you lay out the user interface—windows, dialog boxes, menus, buttons, text fields, controls, and so on—using an interactive environment, so that you can see just how everything will look. Once you're satisfied, you can generate C or Pascal source code, which you then use within the program you're writing. (These tools presume that you're using an existing compiler, such as MPW or one of the Think languages.)

Hyping HyperCard

HyperCard was Apple's first real attempt to bring Macintosh programming to the rest of us. A simple yet deep programming environment that is given away with every System, HyperCard has led to hundreds of public domain and shareware programs, or stacks, some of which are impressive in their functionality and complexity. A number of add-on and utility programs for HyperCard (libraries and editors, for example) have come to market, and HyperCard has even inspired the more powerful SuperCard from Silicon Beach Software.

However, HyperCard has not led to a revolution in Mac software development for the masses. The HyperCard interface is so different from the standard Mac interface that many would-be programmers and users have a hard time treating stacks as serious or normal applications. And there are other limitations—such as lack of color support—yet to be addressed by Apple. If more aggressive support and development doesn't materialize, then HyperCard will probably start a long, slow decline as a useful tool for end-user development.

Programming with Pictures

Several development environments have appeared that allow you to build programs graphically. One of the first was V.I.P. (Visually Interactive Programming) from Mainstay. Put simply, V.I.P. lets you lay out a program's flow. You create boxes that define values, make tests, carry out functions, then

connect them to indicate the path(s) of execution. The biggest problem with V.I.P. is bandwidth: there's a real limit to how much of a program you can see on the screen at one time. This is true for any programming environment, graphical or not, but V.I.P.'s flowchartlike format is especially "verbose" in a visual sense.

More effective is Serius89, from Serius, which bills itself (in a fit of hyperbole) as "the world's first desktop programming tool." Serius89 is designed to let nonprogrammers build complete applications. To do this, you build a list of objects—menus, windows, buttons, pictures, numbers, text—and define their attributes and relationships. Then you can select from a large number of functions (organized according to object type), define when and how those functions are used, and determine what objects they will act upon. Having set everything up, you can then have Serius89 "compile" your program design into a separate, stand-alone application. Although it sounds complicated, the interface is quite easy to learn and use. After working through the tutorial, I went back and built a very simple text editor in a matter of minutes—without programming.

For the nonprogrammer, the Serius89 environment is limited by the objects and functions that are already defined. (Serius does make a developer's version of Serius89 that allows programmers to create new objects and functions, and Serius hopes to make these objects and functions available to its user base.) But unless you have a source for such objects and functions, you may find Serius89 too limiting.

Objective Opinions

Now we get to the current panacea: object-oriented programming (OOP). OOP has been touted heavily for the last year or two in the microcomputer marketplace, and the phrase *object-oriented* is being heavily abused (much like oat bran in the food marketplace). This is not to say that the benefits of OOP are not real, but it does mean that calling something object-oriented doesn't guarantee those benefits, any more than sticking oat bran into a candy bar ensures that the candy bar will be good for you.

Briefly and all too simply put, object-oriented programming involves treating a program you build as a collection of *objects,* individual entities that hold information and send messages to one another. These objects have a taxonomy, that is, they are *instances* (actual copies) of a particular *class* (type) of object. Thus, you might have a general Window class that knows how to draw a window; how to resize it, move it, or close it; how and when to redraw its contents; and so on. When your program runs, it may create several instances of the Window class—actual windows—which then already know how to behave. If you need a custom type of window, then you create a *subclass* of

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the Window class and modify its behavior appropriately.

Why might an object-oriented approach to programming the Mac make things easier? Because you typically have a *class library,* that is, a hierarchy of classes of objects that implement the Mac user interface. Thus, you already have classes defined for event loops, windows, dialog boxes, menus, buttons, scroll bars, text, and so on. You can then create instances of these objects in your program and use them without having to know how to correctly implement their behavior. Note that this approach is very similar in purpose to some of the products discussed earlier (MacInterface, Professional Programmer's Extender, and FaceWare Pack).

This doesn't mean that an OOP language is inherently easier to learn than traditional programming. Consider Smalltalk/V Mac from Digitalk. This is a pure, classical object-oriented language in a rich development environment available on several platforms. It comes with excellent documentation, including a well-written tutorial. Some people take very quickly to Smalltalk; there are cases cited of children programming merrily in Smalltalk after only a few days of instruction. Of course, there are also children who play the violin at age four. Other people find themselves going in circles, trying to grasp mutually dependent concepts and being unable to gain a grip anywhere.

A more conventional approach involves using an object-oriented version of an existing language. The MPW Pascal compiler has had object-oriented extensions for some time, and an MPW C++ compiler is now available. And as I mentioned earlier, Symantec has added object-oriented extensions to Think C and Think Pascal. All these efforts provide object-oriented programming in the context of an existing procedural language.

But the object-oriented extensions aren't enough to make the task easier; you need a good class library. Apple has had one for years—MacApp. However, upper-level management at Apple did little to support its development or promote its use until about a year and a half ago. Not surprisingly, that coincided with the announcement of the Next system, with its much ballyhooed (and rightly so) object-oriented development system. Once that happened, high-level Apple execs got religion about OOP, finally catching on to what others within Apple had been saying for years.

Of course, since MacApp is designed to be used within MPW, there are other barriers to overcome. As one developer of programming tools for the Mac put it, Apple has managed to replace one tough learning curve with another. Luckily, Symantec provides its own class library—the Think Class Library—for use with the latest versions of Think C and Think Pascal; the latter also supports MacApp directly.

A Hybrid Future?

Over the past two years, we've seen a new wave of Macintosh development tools that make it easier to create a development system to fit individual needs, tastes, and backgrounds. For example, a user with experience programming on non-Mac systems might put together AppMaker or Prototyper, Think C, and maybe some of the FaceWare modules. Someone with no programming experience at all might be better off staying with HyperCard or looking at something like Serius89.

The ultimate solution is not here yet. And I'm not sure what it will be. It might be a cross between HyperCard, Serius89, Prototyper, and FaceWare—a development environment in which you build a Mac interface, establish connections between the elements, use a simple yet powerful scripting language to define behavior, and drop in prefabricated software modules to add functionality. All the individual components exist, and they do seem to be roughly headed in the same direction, but that degree of system integration can only come from Apple.

Programming the Mac may never be as easy as using one, but we can hope. We can always hope. ■

See *Where to Buy* for contact information.

Contributing editor Bruce F. Webster is project manager at San Diego–based LaserGo. He can be reached via BIX (bwebster) and via MCI Mail (Bruce Webster).

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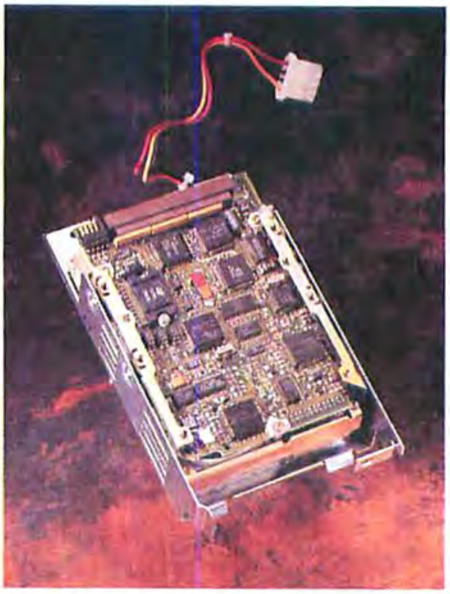

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MACWORLD NEWS

by Dan Littman and Tom Moran

Macs Go Live with Radio Net

Does sending Mac electronic mail by radio sound far-fetched? If Apple's Apple Complex Systems (ACS) group has its way, you'll be able to do just that. Written by two members of ACS, Ken Landau and Ricardo Batista, MacKDT is an E-mail and telecommunications program that sends and receives messages over the ARDIS (Advanced Radio Data Information Service) radio network. Developed at ARDIS's request and demonstrated initially at ARDIS's introduction, the program runs in the background under MultiFinder and works much like AppleLink. The only difference is that it uses radio waves instead of telephone wires to transmit and receive data.

MacKDT is named after Motorola's hand-held wireless terminal, the KDT-840, which includes the RF (radio frequency) modem necessary to access the ARDIS network. A joint venture between IBM and Motorola, the network allows data terminals or computers with special RF modems to access remote host computers via wireless radio links. IBM has been using its own nationwide private radio system to support its 18,000 field service technicians for six years. Motorola, meanwhile, offered a radio-based commercial data communications network in Chicago, Los Angeles, and New York.

When the ARDIS network goes online in early April, it will contain more than 1100 radio base stations and will provide service to more than 8000 cities and towns in 50 states. Initially, the ARDIS network will operate at 4.8 kilobits per second; future plans call for data rates to reach 19.2 kbps as the network expands.

MICHAEL LLEWELLYN

Ricardo Batista (left) and Ken Landau of Apple developed MacKDT, an electronic-mail solution that sends data over the ARDIS radio network created by IBM and Motorola.

According to ARDIS, the radio network will offer traveling workers a way to access corporate databases, perform data entry, and exchange E-mail that's better than modems using cellular phone technology. Perhaps most importantly, ARDIS uses 800- or 900-MHz radio bands that work indoors as well as outdoors.

MacKDT is a prototype application at present, but Apple is currently working on ways to incorporate the Motorola RF modem into Macs, most notably the Macintosh Portable. Landau believes the Mac Portable, MacKDT, and radio modem will prove to be a winning combination not only for Apple, but also for large businesses that need Mac-based wireless communications capabilities.

For example, MacKDT could be offered to corporate customers through Apple's Complex Support Group as one part of the answer to the customer support, installation, and

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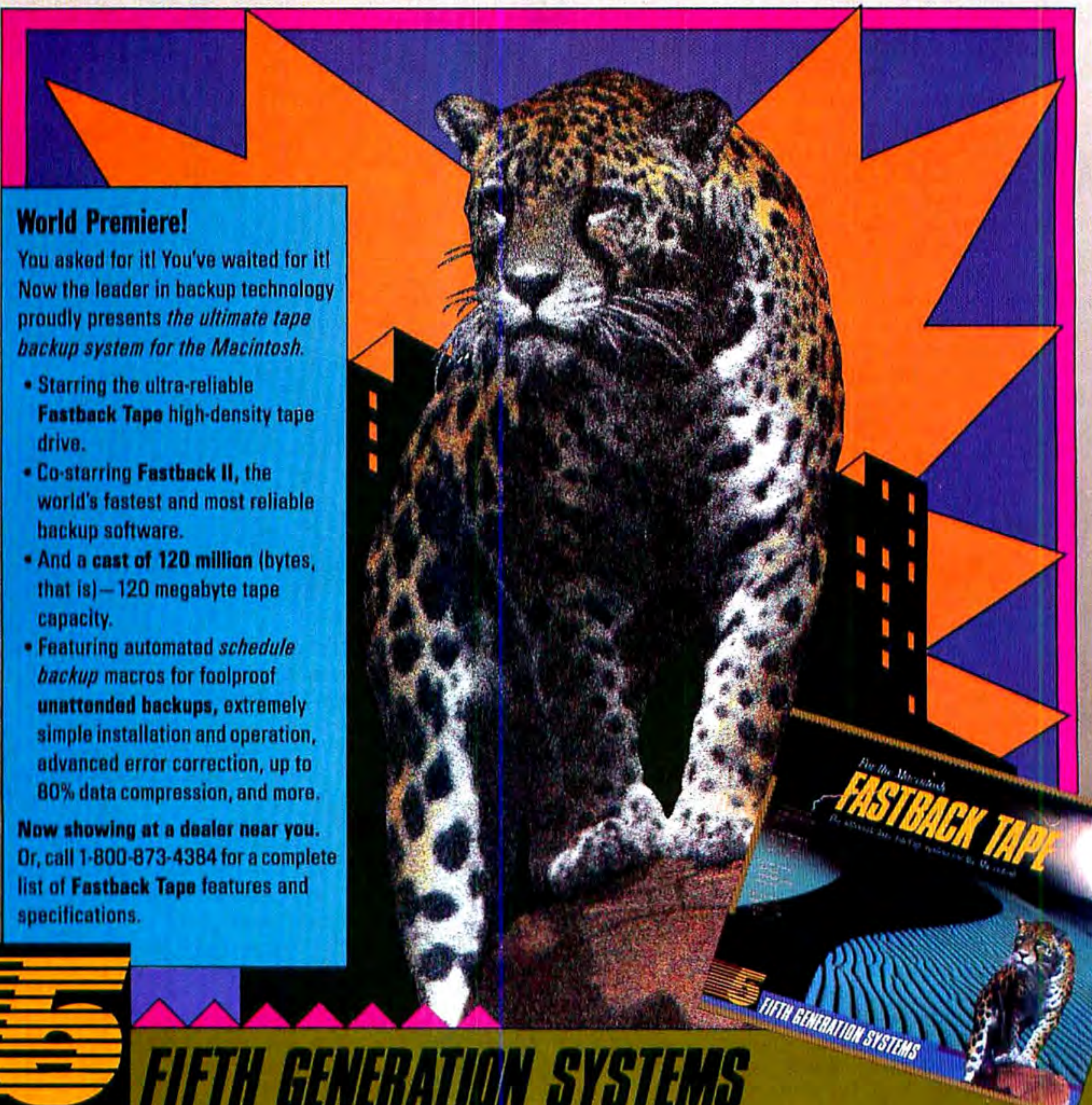

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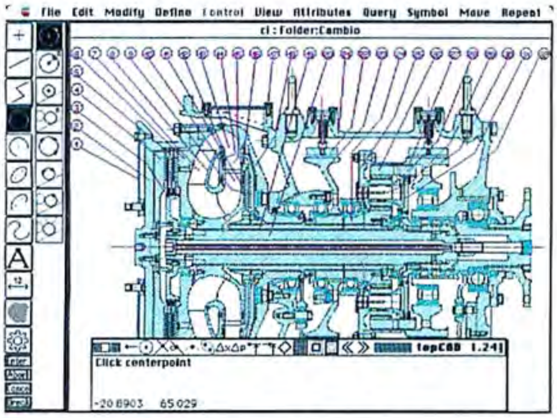
service puzzle. Police and fire departments could also benefit by constantly receiving information from remote locations. For more information, contact ARDIS at 708/913-1215 and Apple at 408/996-1010.—**Brita Meng**

Under topCAD, a Language

The Hungarian company Graphisoft is known in this country for ArchiCAD, but in Europe it is also known for the high-end 2-D mechanical-design package topCAD, and Graphisoft plans to market topCAD aggressively here beginning next year. topCAD, which was originally developed for VAXs and IBM mainframes, features a C-like programming environment with watch-me capability. Engineers can design mechanical objects such as cylinders, pistons, and valves while topCAD records them as macros in an editable command language. The objects can then be reused in a complex design such as an engine. You can create menus and assign macros to them as menu items, and a floating Prompt Window, besides suggesting the next appropriate action, has a miniature icon bar (similar to Icon-It) for attaching macros to icons. (A pixel-editor window is available for drawing icons.)



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topCAD's Prompt Window suggests the next action. Each icon in the row across the top represents a command.

In a programmer's hands, topCAD can double as a CAD-application generator. The language has about 500 commands, and programmers who bump up against its limits when designing new tools (or making Toolbox calls) can use routines written in FORTRAN, C, or Pascal. For example, an end user might call an object such as a gear from the macro library and a topCAD application could use the Prompt Window, a dialog box, or a pop-up menu to request parameters, such as how many teeth to give the gears.

topCAD's 110 tools are context-sensitive. For example, when you select the circle tool, a second level of tools appears for drawing a circle through three points, around a center point, tangential to three points, and so on. topCAD imports and exports a wide range of formats (including a spreadsheet format, helpful for generating materials lists); provides 20 levels of undo; adjusts dimensioning when you change an object; and lets you select objects by characteristics, for example, all polygons and all splines on layers 127 through 155.

topCAD is already available in this country, but Graphisoft has focused its energy on ArchiCAD and will not have a United States sales-and-support framework for topCAD until 1991. The U.S. list price is equivalent to European pricing at $4800. Copy-protection is common in Europe, and Graphisoft is selling topCAD in this country with European-style hard-key copy protection, which requires a device on the SCSI bus. For more information contact Graphisoft USA in South San Francisco, California, at 415/266-8720, 800/344-3468. **—D.L.**

Liveware Is Born

Fellow carbon-based life forms, take heed! Silicon-based life is on its way. You needn't take cover yet, however. So far, computer-based life is only a gleam in the eyes of those who attended the second Artificial Life Conference last February. At the week-long conference in Santa Fe, New Mexico, participants demonstrated an impressive array of digital ecosystems, from cellular automata to simulated ants.

Harold Thimbleby of Stirling University introduced the concept of liveware.

A number of artificial life (AL) projects were created on the Macintosh. James Kalin demonstrated Maxis Software's SimCity, a combination game and educational tool in which a city populated by Sims (simulated citizens) must be kept running smoothly as it evolves. Kalin says he'll use some of the information he garnered at the conference to enhance future versions of SimCity, making the Sims more lifelike and offering them different ecosystems. Michael Travers, a graduate student at MIT's Media Lab, showed a simulated world where artificial ants leave trails for other ants to follow to artificial food. John Holland created Echo, a miniature world populated by organisms that move about their environment, eat resources (and each other), and reproduce, perpetuating the chromosomes of the survivors. Apple fellow Alan Kay described the Vivarium Project, in which elementary-school students can create their own creature-filled environments on the Macintosh.

So, has anyone come close to creating artificial life yet? Unfortunately, the artificial organism that meets most of the criteria for being "alive" is—you guessed it—the computer virus. These critters are, to tick off some requirements, complex, self-replicating, and tolerant of changes in their environment. They carry information, absorb information from their surroundings, and exhibit purposeful behavior. Horrifyingly enough, two Mac viruses—nVIR-A and nVIR-B, can "mate"—one virus overwriting a portion of the other's code to produce a new strain unlike either of the parents.

On the brighter side, one confer-

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ence participant has harnessed the power of purposeful, self-replicating programs for good instead of evil. Harold Thimbleby of Stirling University, Scotland, introduced the concept of *liveware,* software that automatically updates a database that's passed from one user to another. Thimbleby got the idea for his autonomous database when he needed to collect information on some 50 colleagues who shared his interest in human-computer interaction. Toward this end, he created a HyperCard stack. Rather than send out 50 disks, get them back, and compile the information for each person, he decided to make the software do the work. His liveware application automatically adds information from one stack to another, allowing a community of users to keep a database up to date. An autotrigger option causes the stack to perform a merge whenever it encounters another liveware database; if this autonomy is too virus-like for a user's taste, a manual merge button returns a degree of control to the stack's owner. Thimbleby's stack not only incorporates new cards, but time-stamps each entry to allow users to update existing cards. The database also includes a bulletin board where users can post messages.

Liveware, like any form of shared information, raises the issue of security. To prevent a stack from being corrupted, the originator of a database can specify a password, requiring authorized users to log in. If a database does become damaged, chances are good that another user in the group will have an undamaged version.

Liveware has other potential uses. If you use one Mac at home and another at the office, for example, you could use a liveware application to keep the files on both machines current. Liveware could also be used by a system administrator to update software on a group of Macs when a new version of a program is released. Another potential application is automatic file backup.

Although viruses have made Mac owners squeamish about the idea of data crawling around on its own, perhaps liveware will revitalize communal computing. In the hands of responsible people, a little digital autonomy could be a good thing.—**Erfert Fenton**

Crashing Works' Party

TML Systems, known to Macintosh developers for its TML Pascal, is writing a seven-module integrated package to challenge Microsoft where the giant has no competition. TML says the new product, code-named Zebra, will have much greater capabilities than Microsoft Works 2.0 but will list for the same price. Zebra's seven parts include a word processor, a database, a spreadsheet, telecommunications, draw and paint modules, and a charting and graphing module.

KELLY LADUKE

TML Systems' Leonard brothers: Randy, Bob, and Tom. Tiny TML hopes Zebra gets the last laugh on Microsoft Works.

TML is giving the modules some unusual integration. Tools from every module are available in every other module where appropriate—for example, text tools are available everywhere (except in telecommunications)—giving you access to the Microlytics spelling checker and the word processor's MacWrite-like style sheets in spreadsheets, databases, and charts. It also has live links so, for example, you can move spreadsheet data into the charting module, make a chart and paste it into your word processor and, when you change the original spreadsheet, Zebra will update the finished chart inside the word processor.

Zebra's word processor presents a dialog box to choose database fields for mail merges. It can display text in columns, has on-screen headers and footers, and can wrap text around graphics. Live text from the word processor can also be linked to the draw module, which has linked text blocks to give Zebra some layout capability.

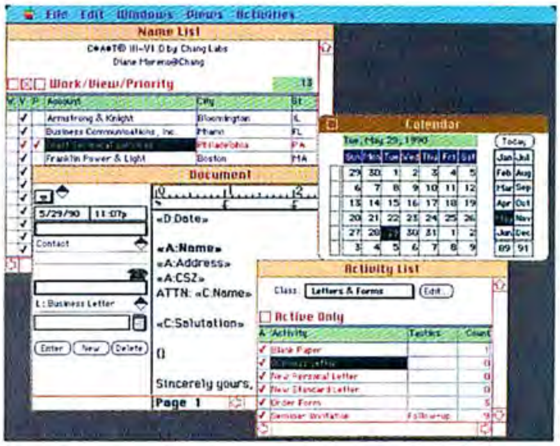
The database has a forms-oriented interface that warns you when you set a field outside the print area. It duplicates FileMaker's query-by-example method and search syntax, and adds one feature FileMaker lacks: a scrolling memo field. Zebra implements XTND, Claris's open file translation technology, and, being the hackers that they are, the people at TML Systems have cracked the Excel and Works file formats, so Zebra can import and export spreadsheets from both. Its spreadsheet duplicates Excel's function set, though Zebra lacks a macro command language.

Zebra will list for $295. For more information, call TML in Jacksonville, Florida, at 904/636-8592.—**D.L.**

The CAT's Third Hat

Chang Labs' CAT (Contacts, Activities, and Time) is back as CAT III, older, wiser, and—Chang Labs hopes—less mysterious. In previous incarnations the informa-

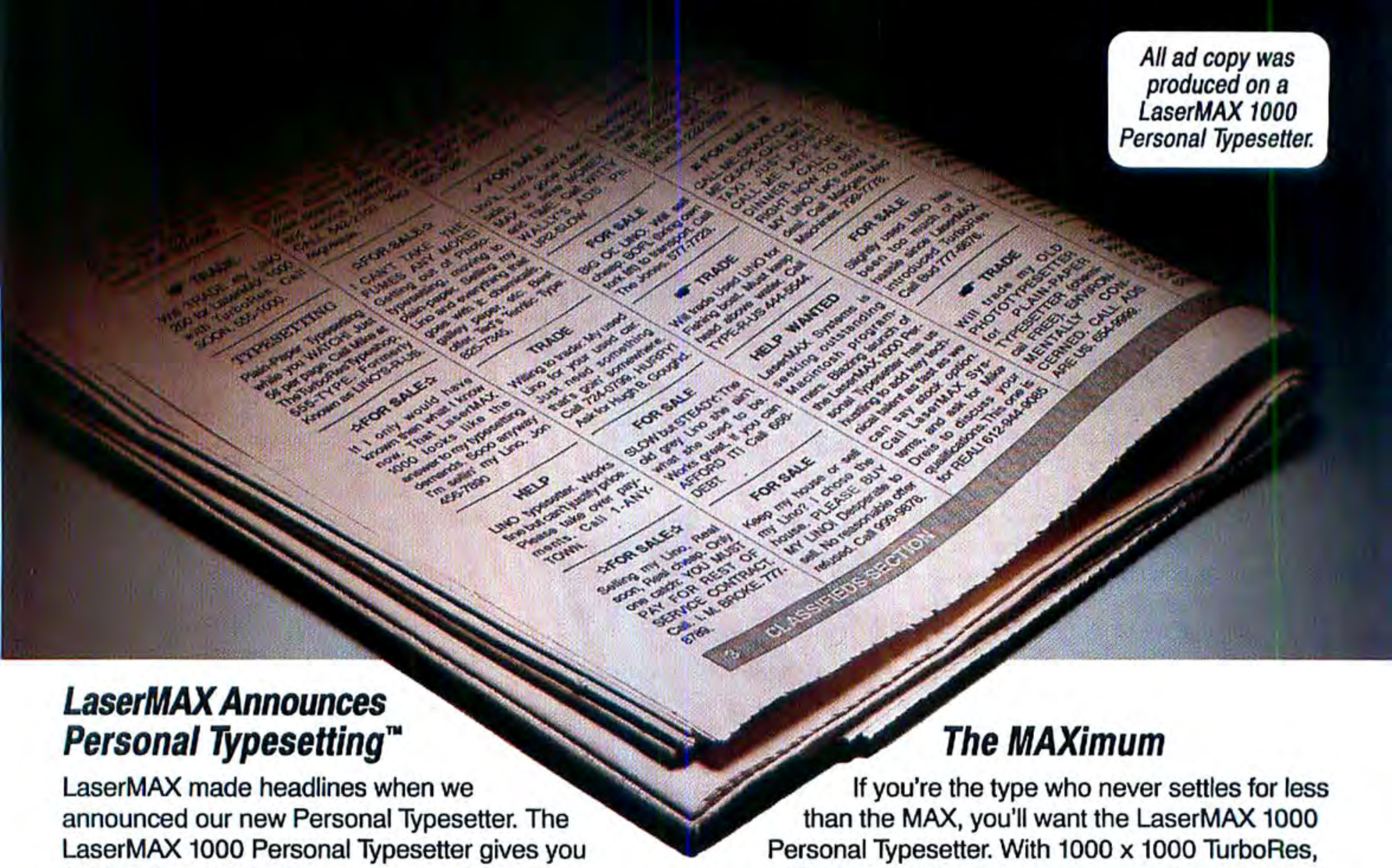
(continues)



CAT III's new template-design window; behind it, the Name List consolidates tiny windows from version 2.0.

When LaserMAX Made Headlines Lino Also Made the Paper.

All ad copy was produced on a LaserMAX 1000 Personal Typesetter.



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Circle 342 on reader service card

tion manager drew praise for integrating people-tracking, correspondence, and conversations. But CAT was also criticized for having a complex interface and a rigid structure that resisted tailoring to individual needs. CAT III addresses these two problems and adds many new capabilities, including forms design and a system for users to share data files.

The miniature Account, Contact, Contact List, and Codes windows of old have been incorporated in a single Name card, and the Push, Pop, and Exchange commands have been replaced by a simple Enter button, simplifying navigation and data entry. The ambiguous Events category is now called Documents, which, given CAT's mail-generating orientation, is a more appropriate name.

The forms-design environment provides basic drawing tools, a Claris SmartForm–like list field, and a library for storing company logos, digitized signatures, and so on. You can set up calculations using standard arithmetic operators and functions that create check boxes, running totals, and serial numbers; compute sums, maximums, and counts; and even generate standard deviations. Fields can use other fields in calculations or extract information from raw text in the Notes field—if you bracket data as you write in the Notes field, CAT III effectively creates a new field for the bracketed information. As you begin to systematize data entry, your notes become accessible to all of CAT's features. For example, if you bracket your contacts' birthdays, you can generate a batch of happy birthday letters every week. CAT can now perform mail merges without creating a document for each letter, so you won't be packing your hard disk full of birthday notes.

Finally, CAT III implements a publish-and-subscribe metaphor for sharing files on a network. If you travel, it exports records you create on the road and loads them into your workgroup's database when you get back to the office. And for getting started with CAT, which in earlier versions was a challenge, there are new controls for managing messy data when importing text files.

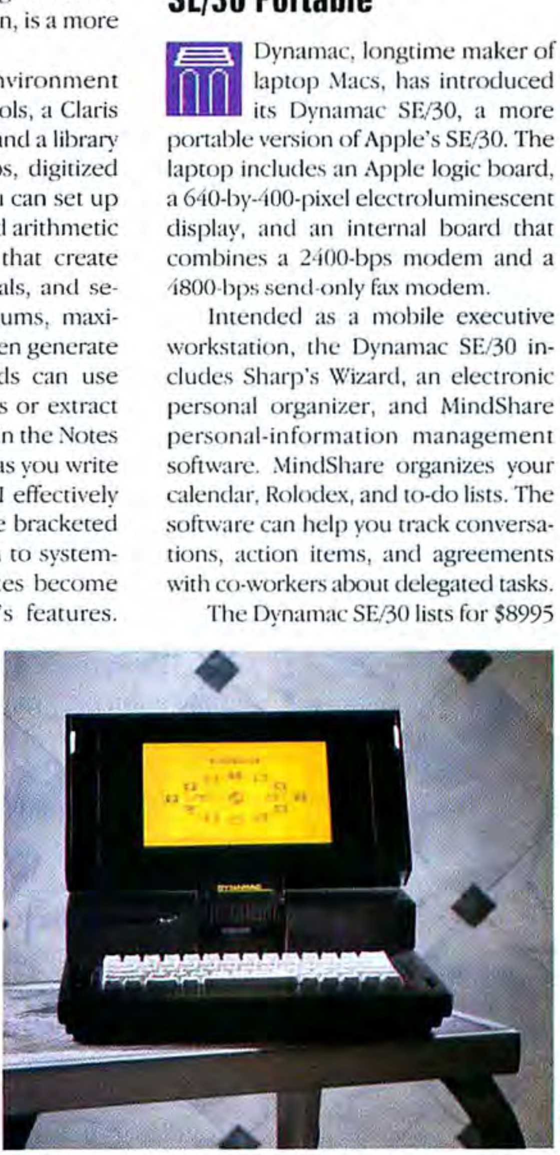
CAT III still lacks a few tools that users may want, in particular, time-billing features and a really good daily planner- and calendar-management capability. The new version will list for $495. For more information, contact Chang Labs in Santa Clara, California, at 408/727-8096.—**D.L.**

Dynamac Introduces SE/30 Portable

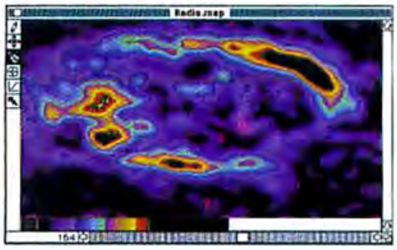
Dynamac, longtime maker of laptop Macs, has introduced its Dynamac SE/30, a more portable version of Apple's SE/30. The laptop includes an Apple logic board, a 640-by-400-pixel electroluminescent display, and an internal board that combines a 2400-bps modem and a 4800-bps send-only fax modem.

Intended as a mobile executive workstation, the Dynamac SE/30 includes Sharp's Wizard, an electronic personal organizer, and MindShare personal-information management software. MindShare organizes your calendar, Rolodex, and to-do lists. The software can help you track conversations, action items, and agreements with co-workers about delegated tasks.

The Dynamac SE/30 lists for $8995 inluding 2MB of RAM, a 40MB hard disk, and a cable for connecting to the Sharp Wizard. It supports a variety of Apple monitors, including the 13-inch RGB display. Options include up to 8MB of RAM and a choice of internal hard drive ranging up to 200MB in capacity. For more information, contact Dynamac in Denver, Colorado, at 303/296-0606 or 800/234-2349.—**T.M.**


LUIS DELGADO

The Dynamac SE/30 comes with an Apple SE/30 logic board and an internal fax modem installed.


Data from a neutron-star simulation. Colors were remapped with Spyglass to highlight features.

Colorizing Data

Like many physical scientists, Colleen Barton has to isolate a few meaningful numbers buried in vast arrays of numerical data. Barton is a postdoctoral student at Stanford's Center for Borehole Geophysics, studying holes drilled by oil companies in search of petroleum. The instruments that scan the borehole walls return data sets that can run as large as 600 by 2000 cells—so many that Barton could never pick out where oil-bearing sandstone meets impermeable granite, for example, or the bore-hole plunges through a fracture in the earth.

Instead of looking at raw numbers, Barton converts them to color images. In conjunction with a cylindrical-geometry application she wrote herself, Barton uses an image-manipulation package that grew out of work at the National Center for Supercomputing Applications (NCSA) and is now for sale as a product called Spyglass. "I primarily use [Spyglass] for palette manipulation, extracting features that I wouldn't otherwise be able to see," Barton says. Compressing the palette around one region in an array is analogous to zooming in on a real image. By assigning more colors to a narrower range of numbers—increasing the

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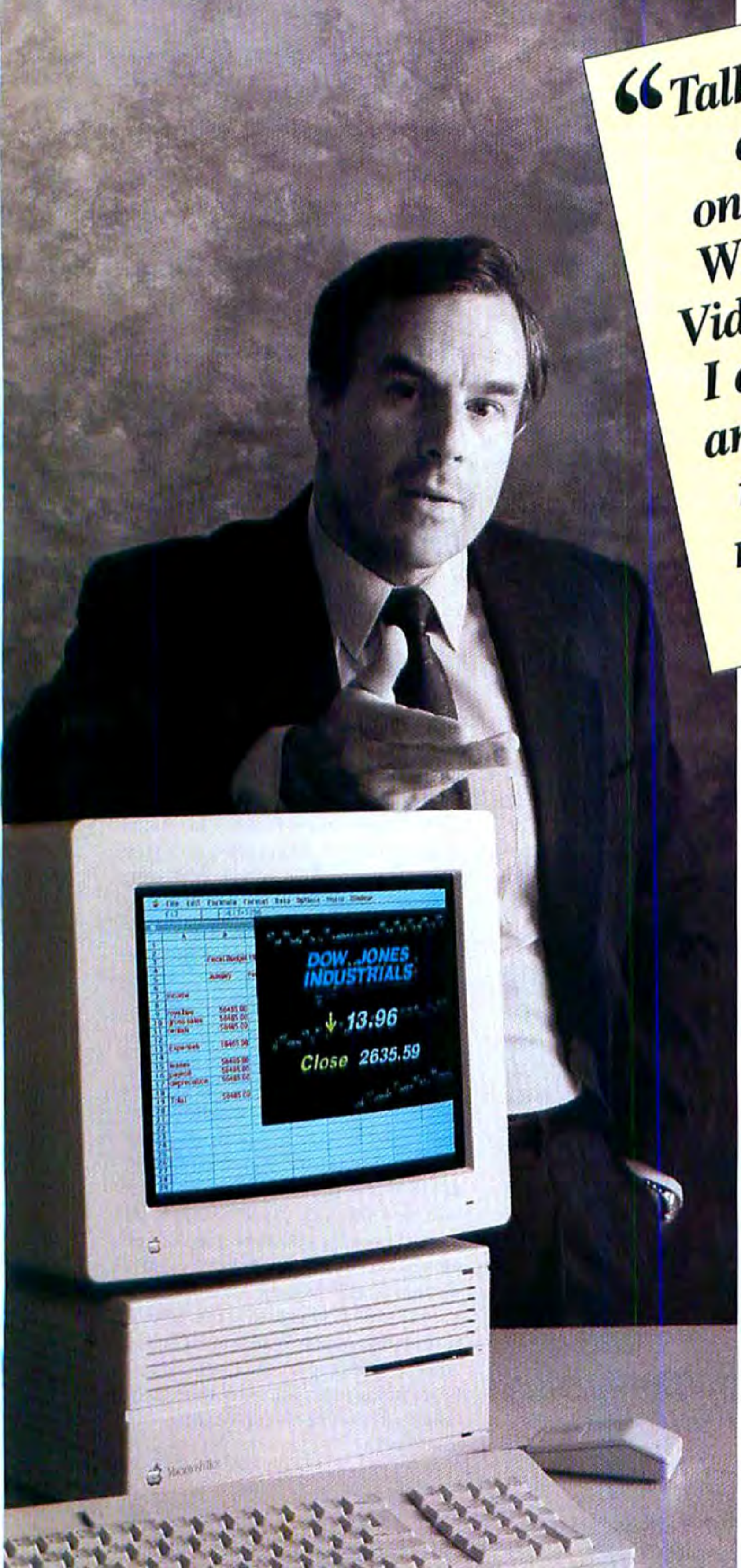
The Power O

“Talk about gaining an advantage on the competition. With the RasterOps Video ColorBoard 364, I can produce a stock analysis and check out the latest Wall Street report simultaneously on my Macintosh.”



The promise of multimedia just arrived. And it's from RasterOps.

Introducing the Video Colorboard 364, a single NuBus board that brings the world of full-motion video to your Macintosh.

In short, the Video Colorboard 364 is both a frame grabber and a display board, meaning you can selectively watch live TV or video from any NTSC or S-Video source on a Macintosh screen and capture any image.

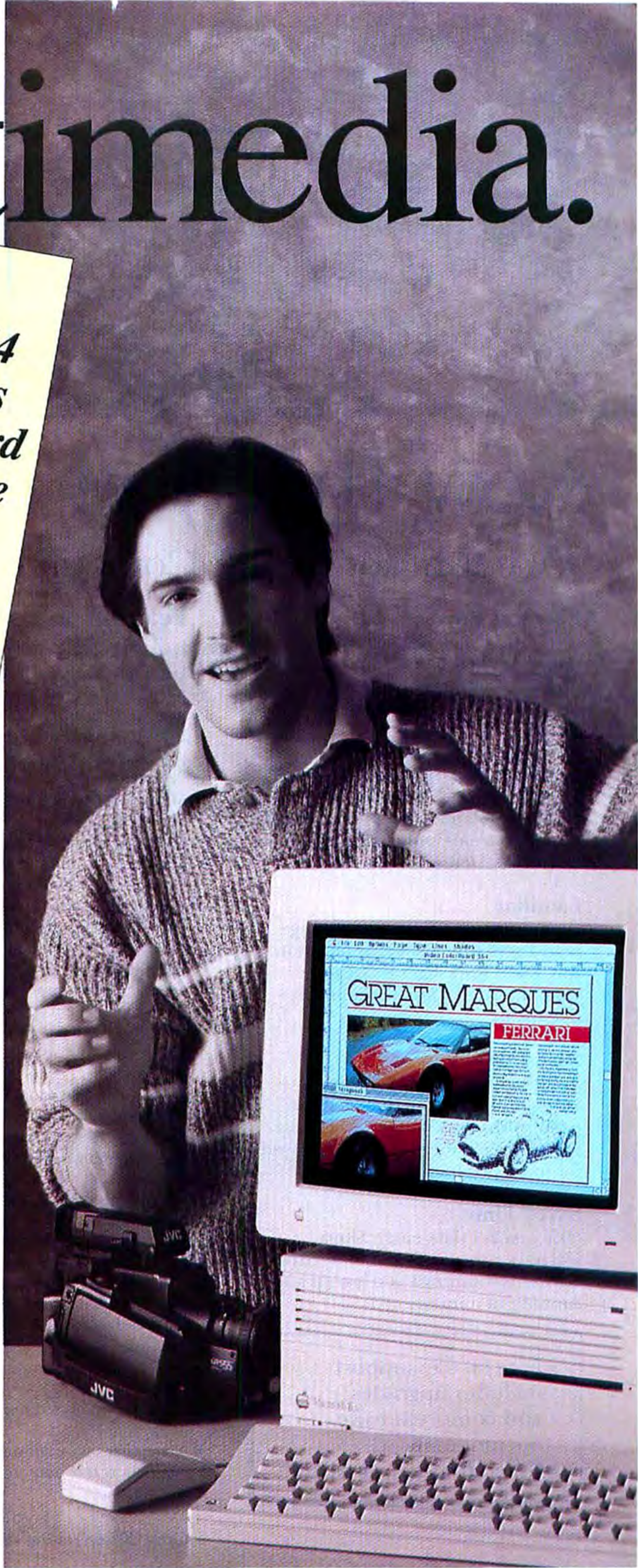
Even more amazing, you can run an application program and show video on your Macintosh at the same time . . . without depending on MultiFinder.

If this sounds like a technological breakthrough, you're right. In fact, RasterOps has a patent pending on the circuitry that makes it possible.

Once the video appears on the screen, you can change the channel, brightness, contrast, or sound directly from your Macintosh, thanks to the RasterOps Video Tuner. This companion product also provides a speaker and headphone jack. And a second companion product, the RasterOps Video Expander, enables you to output Macintosh-resident graphics to a video recorder in true 24-bit color.

f Multimedia.

> “The RasterOps Video ColorBoard 364 is a graphic designer’s dream. This single board in my Macintosh lets me capture a 24-bit color image from a video source, then transfer the image into a desktop publishing package.”



For applications that require recording on a video tape, the Video ColorBoard and Video Expander is the perfect solution.

The Video ColorBoard 364 also represents a multimedia building block. RasterOps developed the XCMD software for the Video ColorBoard 364 to interact with applications such as SuperCard, HyperCard, and MacroMind Director. You can create training aids, presentations, and other tools that take advantage of its multimedia capabilities. Regardless of your application, one of the best parts about the Video ColorBoard 364 is its introductory price. At $1,995, the Video ColorBoard 364 provides an incredible range of features at half the cost of competitive products.

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Circle 203 on reader service card

image resolution—you can see where numbers make sudden changes in value.

Spyglass is four applications: Spyglass Transform, which reads and writes floating-point data in HDF files and provides tools for manipulating data and recording the results; Spyglass View, with precise controls over color palettes (including a fiddle icon tool—for fiddling with colors) and the ability to animate a series of arrays; Spyglass Format, for turning a series of color images into an annotated presentation; and Spyglass Dicer (which is not derived from NCSA work), for boring holes and cutting chunks out of 3-D data sets to see what they look like inside.

Version 1.1 upgrades will add support for sparse data sets such as weather data; improved contour and surface plots that, the company says, will be as good as mainframe-generated contour and surface plots; better numerical control over color-mapping; and more import formats including TIFF, which will be useful for analyzing satellite photos.

Spyglass Transform and Spyglass View list for $395 each, Spyglass Format for $195, and Spyglass Dicer for $495. Bundled sets are available at a discount. For more information, contact Spyglass Software in Champaign, Illinois, at 217/355-1665.—**D.L**

Breaking Those Mind Chains

David Zeeck is facing a series of problems. As executive editor of the *Kansas City Star*, he is, step-by-step, merging his paper's editorial staff with the editorial staff of the *Star*'s former competitor, the *Kansas City Times*. Although the two papers' business operations have already merged, their editorial cultures have remained distinct. For example, Zeeck says, to do investigative reporting, "On the *Star* [we] always had a special-projects team. The *Times* always did it without a special team—their philosophy was that the whole paper should be involved."

To patch together answers to problems like that, Zeeck has been turning to MindLink, a HyperCard-based brainstorming tool. MindLink incorporates ideas developed by Synectics, a management consulting firm that spun off from Arthur D. Little in the early 1960s. (The name derives from *syn*, meaning bringing together, and *ectics*, meaning diverse elements.) Synectics consultants go into large corporations and, at rates typically running $10,000 or more, guide groups of managers in thinking creatively about their company's problems. (Before beta testing MindLink, Zeeck was familiar with Synectics through New Directions for News, a professional association of newspaper editors.)

DENNIS POTOKAR

Using MindLink won't make you see colors, but it may blast the cobwebs from your mind with a dose of inspiration.

MindLink leads you through developing wish lists and free-associating ideas, suggesting images and ideas to help your thoughts branch out. For example, on one card you might pose a problem; if you click on the Wishing Well button, you jump to another card where you can speculate about the problem or ask for triggers—key words, images, or even stories. MindLink may even prompt you to get up and go for a stroll outside. Meanwhile, MindLink gathers your ideas and stores them until you are ready for the key task: turning wild ideas back into practical solutions.

What did Zeeck decide about investigative reporting? "I believe in a projects desk, but the *Times*' way has benefits too. So we'll . . . do it in a way where the investigative reporters are using other reporters from all over the building. "[MindLink] can't invent an answer you don't have inside you already," he adds. "But it might bring you to that answer more quickly. [And] it's much faster on the computer than in a group."

MindLink's price is $499. For additional information, contact MindLink in North Pomfret, Vermont, at 802/457-2025.—**D.L**

Image Compression: The Wve of the Ftre?

Twenty-four-bit color images, color animations, and digitized video look great, but they present a growing problem because they demand vast amounts of processing power, data storage space, and network capacity. However, an image-compression processor recently introduced by C-Cube MicroSystems promises to reduce the problem by compressing digital images by as much as 200 to 1, with an average gain of 20 to 1. The result could be much faster market acceptance of performance hogs such as color DTP and multimedia applications.

Called the CL550, the processor can compress or decompress full-motion video at the standard 30 frames per second. It takes less than a second to process the average color photograph, according to C-Cube. Just as important, the CL550 uses a method of compression proposed as a stan-

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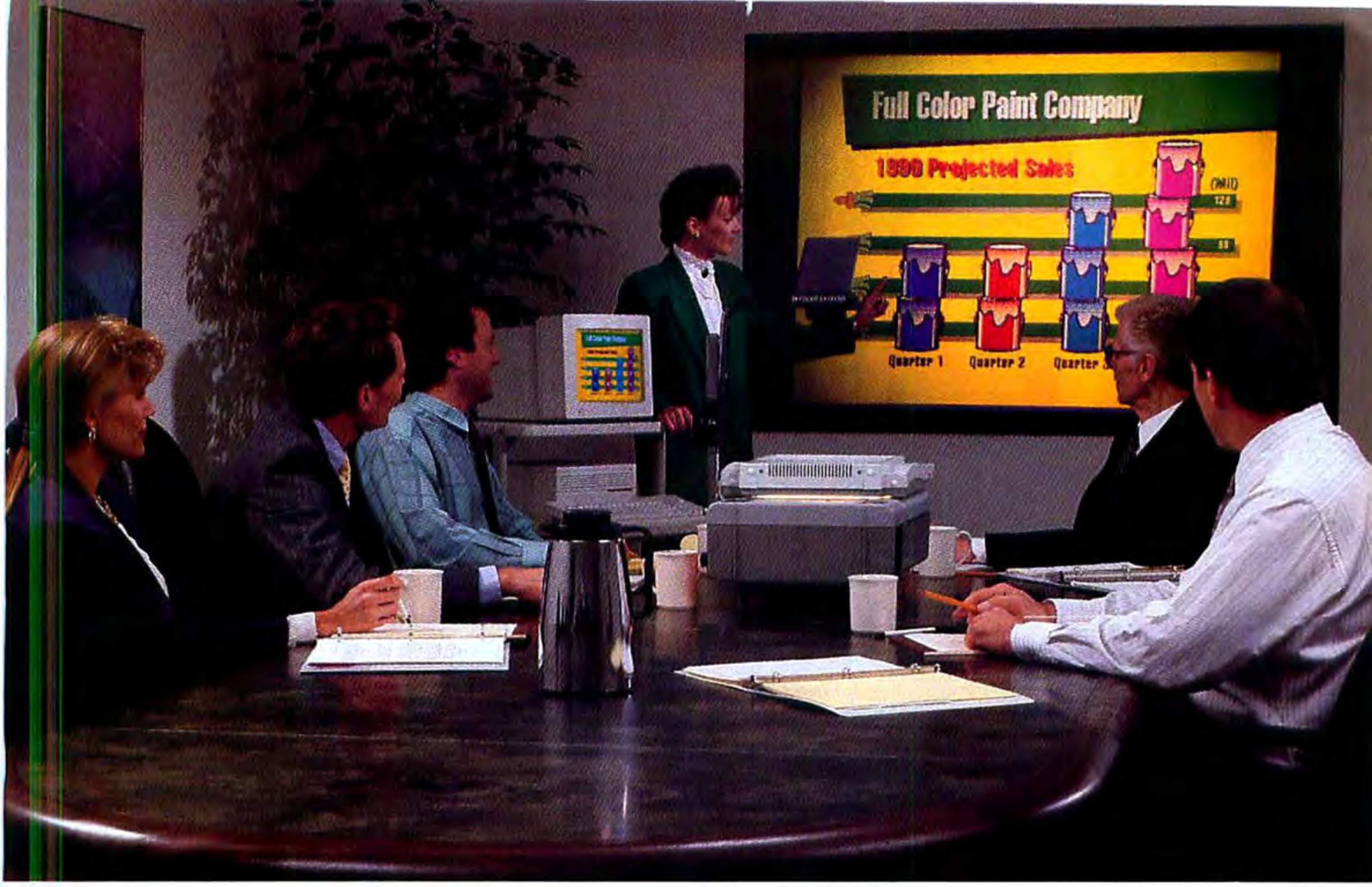
DRAKE SOREY

C-Cube cofounders Alain Rossmann (left) and Edward Sun show off the company's image-compression techniques.

Full Color Paint Company
DONUTS



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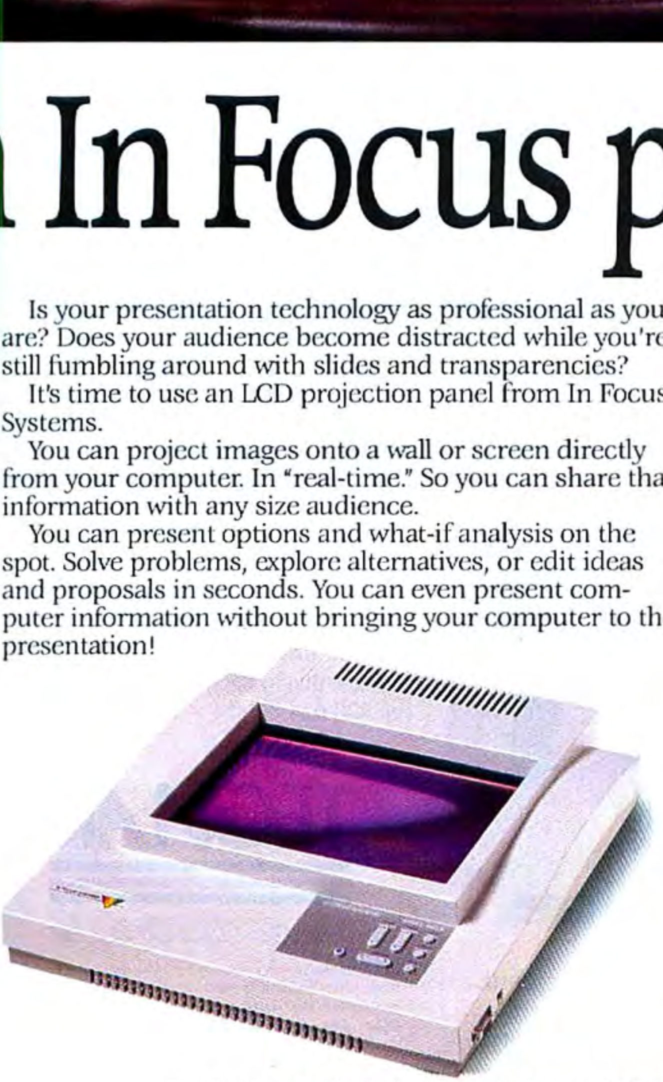

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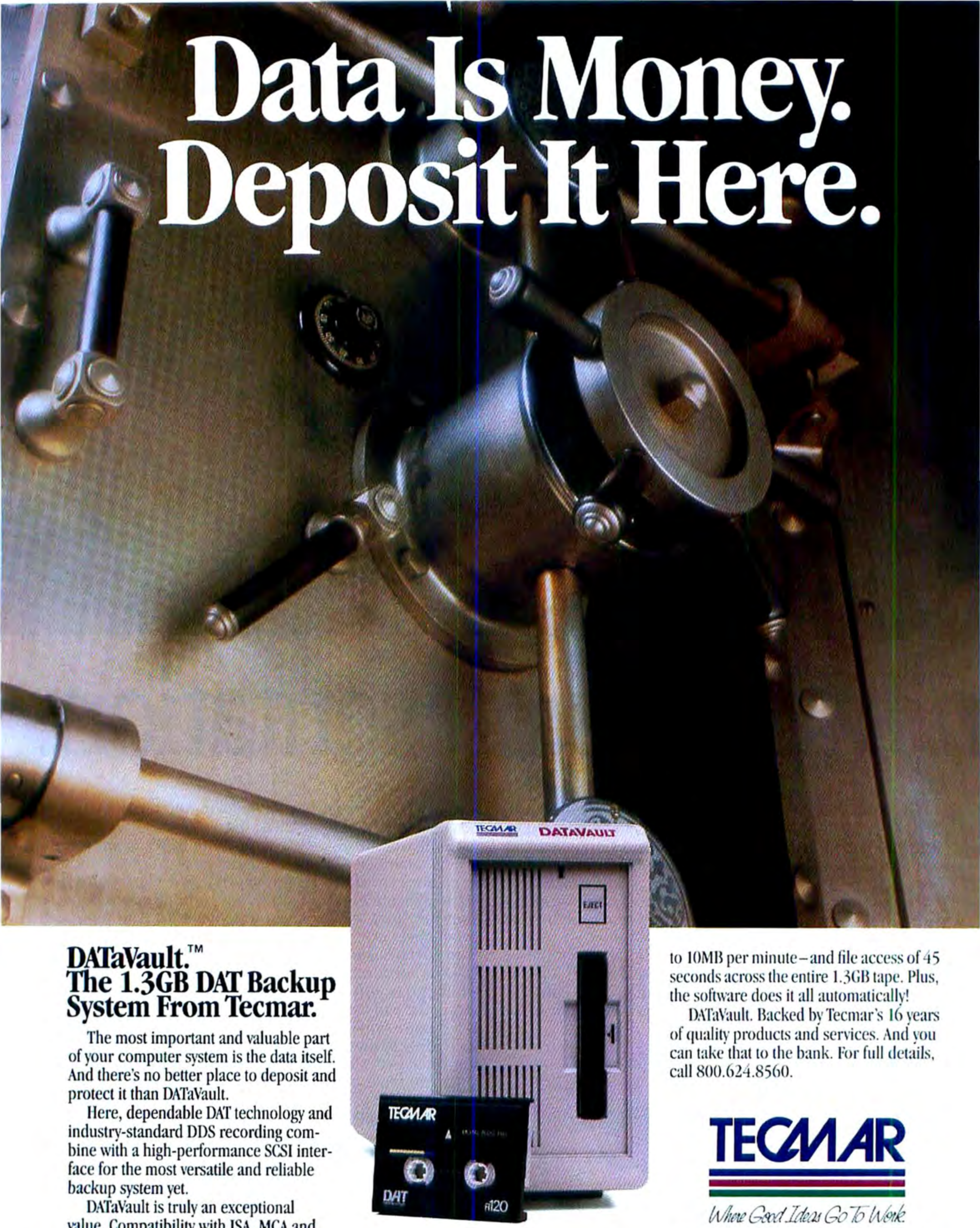

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dard by the Joint Photographic Experts Group (JPEG) of the international standards group CCITT/ISO. If the proposed standard is adopted by the industry there is the potential for the chip and others like it to reside in computer systems communicating across diverse network architectures.

C-Cube says it is providing application developers with the C-Cube Compression Workshop, software that will let them adapt their applications to the image-compression processor. The Compression Workshop currently runs only on the Mac II family, but versions for both DOS and OS/2 machines are under development. The software costs $500. For more information, contact C-Cube in San Jose, California, at 408/944-6300. **—T.M.**

Datacopy Gray-Scale Scanner for Macs, PC ATs, PS/2s

Xerox Imaging Systems recently introduced the Datacopy GS Plus, an 8-bit gray-scale scanner that works with Macs, PC ATs, and PS/2 systems. The scanner offers resolutions from 75 to 300 dpi, variable in increments of 1 dpi.

The Datacopy GS Plus scans an 8 ½-by-11-inch document in two shades in about 21 seconds at 300-dpi resolution. It also supports up to 256 shades of gray and can accept standard- (8½ by 11 inches) and legal-size (8½ by 14 inches) documents. You can attach an optional automatic document feeder to the flatbed scanner after removing the lid from the GS Plus. The document feeder has a list price of $595.

Available now, the Datacopy GS Plus has a suggested retail price of $2195. The scanner uses the SCSI interface. For more information, call Xerox Imaging Systems in Sunnyvale, California, at 800/248-6500.**—T.M.**

LUIS DELGADO

The Datacopy GS Plus is an 8-bit scanner that offers resolutions from 75 to 300 dpi.

Multimedia Art Education

Part of modern experience is looking at modern art and wondering what to think and feel, and whether you're really supposed to do either. Aware of this dilemma, educators from seven major museums undertook a research and development program to see how technology—specifically, their Macs—could make art less arcane. The project is near completion, and the results are two interactive multimedia prototypes. The subject of both is Impressionism—the work of Monet, Cézanne, Cassatt, and Seurat—and both include a videodisc of imagery drawn from collections around the world.

Would you like to see Monet's *Water Lilies?* Choose it from a menu of the artist's works. Would you like a close-up of one lily so you can study the brush work? Place the cursor, click, and close in. If you like, select an audio explanation of what you see. Now, would you like to see the artist's studio, to learn how he worked and what else he painted? From there you might like to consider examples of his preoccupation with light. Go to the menu, choose Rouen Cathedral, then select video stills and motion video, and watch the light change at different times of day and in different weather conditions. Then compare these video images, side by side, with Monet's light studies and his final painting of the cathedral.

The prototype includes a videodisc player and disc, a Mac II, an Electrohome 19-inch long-persistence, monitor, a Truevision NuVista 4M capture board, a NuVista VidI/O Box, and custom software, written in C.

DAVID BARRY

Frankie Mann (left) and Kathy Wilson helped create an interactive multimedia project on Impressionism.

What's new about the technology here? First off, you see everything on one screen. The capture board and VidI/O Box convert the videodisc player's analog signal to digital, so that graphics and menus stored on the hard disk are combined with imagery from the videodisc. (The standard Mac multimedia configuration has been a Mac running HyperCard to control images from a videodisc displayed on an NTSC monitor, making users watch two screens at once.) The custom software also goes several steps beyond HyperCard, offering graphic overlays and picture icons in 24-bit color, plus a lot more speed.

Museum educators prefer high resolution for the scanned images, but have learned that it takes big chunks of memory and display time. Is it better to have a high-resolution image, even if it leaves the user waiting for it to appear? How much memory do you want to buy for the sake of high resolution? The results of two years of such trade-offs are now being tested at the Museum of Modern Art in New York City. The project has thus far been funded by the Getty Trust and the Pew Charitable Trust, but the museums will soon seek new funding.

The Museum Education Consortium is currently headed by Danielle *(continues)*

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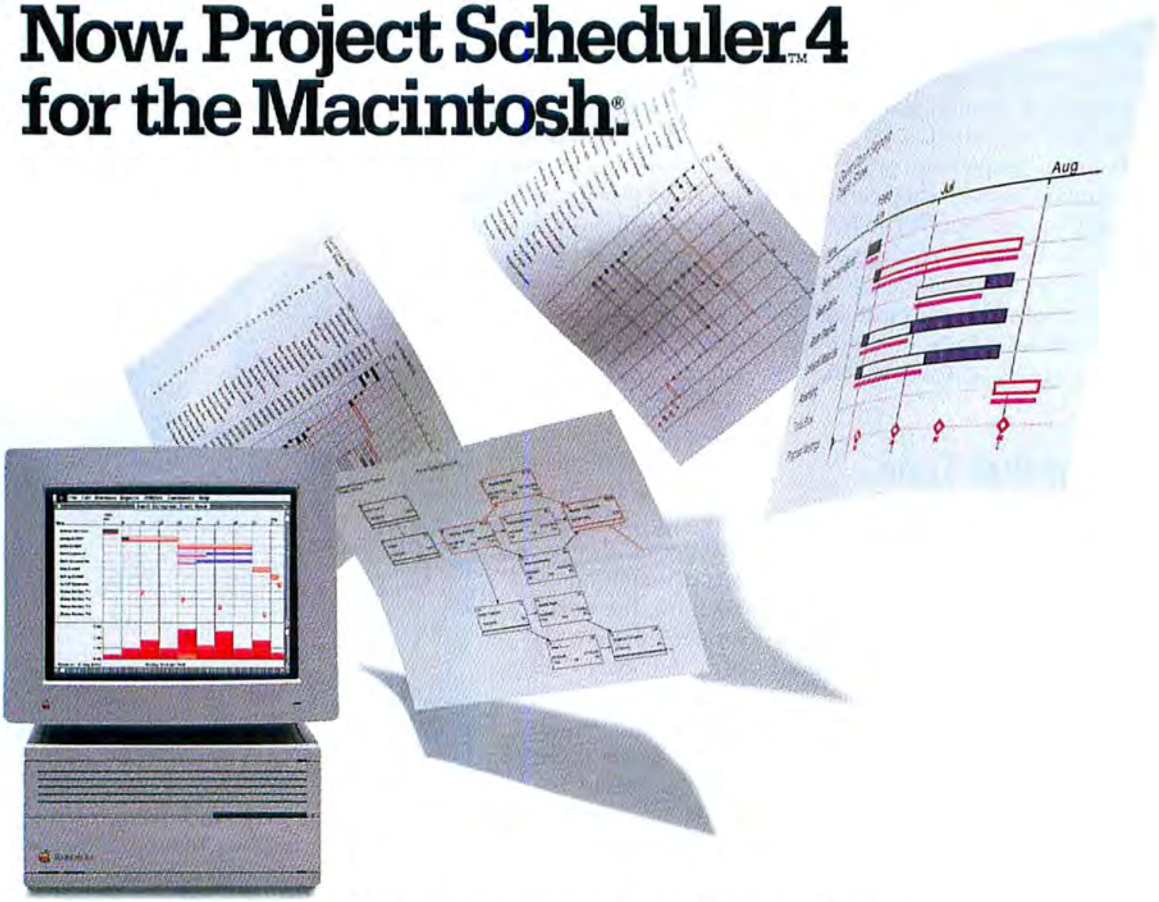

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Rice of the Philadelphia Museum of Contemporary Art. Other members represent the Museum of Modern Art, New York City; the Metropolitan Museum of Art, New York City; the Brooklyn Museum; the National Gallery of Art, Washington, D.C.; the Art Institute of Chicago; and the Museum of Fine Arts, Boston. The prototypes were designed by Kathy Wilson and programmed by Frankie Mann, with the help of a team of 15 art historians, museum educators, image-acquisition experts, and illustrators. For further information, call Susan Stedman at the Museum of Modern Art in New York City, at 212/708-9797.—**Ann Garrison**

Mac to Welcome Open Plan

Welcom Software Technology is developing Open Plan/Mac, a version of its high-end project-management application Open Plan, which runs under dBase on DOS machines and under Recital on the VAX, for FoxBase+/Mac. The three versions share an identical interface, have identical feature sets (except that the VAX can manage ten times as many activities), and can share data files in a multiuser environment. Open Plan's key feature is the origin of its name: because a big chunk of it is written in uncompiled dBase (its computation engine is written in compiled FORTRAN), users can modify and customize Open Plan almost beyond recognition, adding new capabilities—for example, drawing and specification indexes or procurement registers—adding new fields, and reworking menus to accommodate added functionality.

Besides Open Plan's vast project capacity—10,000 activities, 250 resource types per activity, and unlimited resources per project—its feature set is impressive. It supports 256 calendars and generates reports using any or all of them. It also has a merge and copy system that makes it possible to duplicate parts of a project (for example, reusing floor 2 of a 20-floor hotel for floors 3 through 19); industry-standard Work Breakdown Structure and Organization Breakdown Structure; and sophisticated resource leveling with activity stretching, splitting, and reprofiling to manage groups of workers with differing start and quit dates and multiple subprojects with different priority levels.

TOM EBENHOH

Korte Construction's Sharon Varel is beta-testing Open Plan for the Mac.

Open Plan uses the 250-command WRL (Welcom Report Language) for creating reports. For programming-shy project managers, Open Plan/Mac will ship with 60 standard time-phased and nonphased reports. WRL can coax very precise reports from Open Plan—for example, color coding noncritical task paths by how much float they have.

Supplemental modules are available for Open Plan on the other platforms, and Welcom is porting some of them to FoxBase+/Mac. OPERA (Open Plan Extension for Risk Analysis), a risk- and certainty-analysis module, should be available about three months after Open Plan/Mac ships; COBRA (Cost Breakdown Application), a performance-measurement and cost-reporting system that meets the United States Department of Defense's Cost Schedule Control System Criteria, should ship about three months after OPERA.

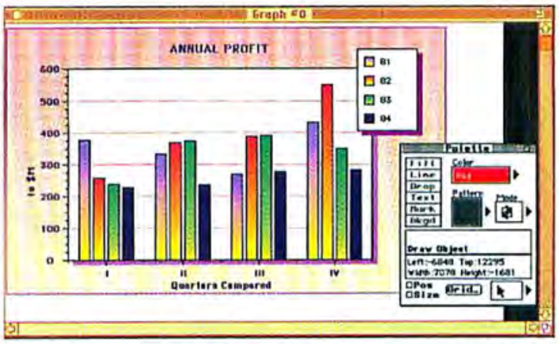
For users who prefer a Mac interface to the dBase- or VAX-like interface, Open Plan's extensibility should make it possible to write a front end in HyperCard or a similar application generator, though its massive feature set would make that quite a project. Open Plan/Mac costs $4200 for a single user; site licenses are less expensive per user. A demo version with full documentation is available for $100. OPERA will list for $2200 and COBRA for $5000. For more information, contact Welcom in Houston, Texas, at 713/558-0514.—**D.L**

New Graphing Tools from Bravo

Bravo Technologies was known in the Mac's early days for publishing the fast and clean spreadsheet MacCalc. Now Bravo is back with a new product tentatively named MacGraph, a sophisticated business and scientific graphing package to compete against DeltaGraph and the long-awaited FoxGraph. MacGraph creates pie, bar, stacked bar, and area charts, line graphs, and scatter plots—with many variations on each—and it has features for customizing tables of data.

Key among MacGraph's features is its open architecture. Scientists or financial analysts who exhaust its list of functions can write their own in a standard programming language, or use the many public domain routines already available. Drop a function in the appropriate folder and it appears under the Equations menu. MacGraph also provides logical, arithmetic, and comparison operators for manipulating data. Other tools for changing file types and cleaning up data facilitate importing data from instruments or other computers, including mainframes, and a dialog box provides a point-and-click method of creating new numeric formats.

MacGraph has some unusual but intuitive Mac interface extensions. It creates its own desktop (as Odesta's Data Desk and Double Helix do), with icons arranged down the left side of the screen. Two shades of gray indicate columns of independent and subindependent variables, and special *(continues)*



MacGraph provides a wide range of formatting capabilities with a powerful set of data-manipulation tools.

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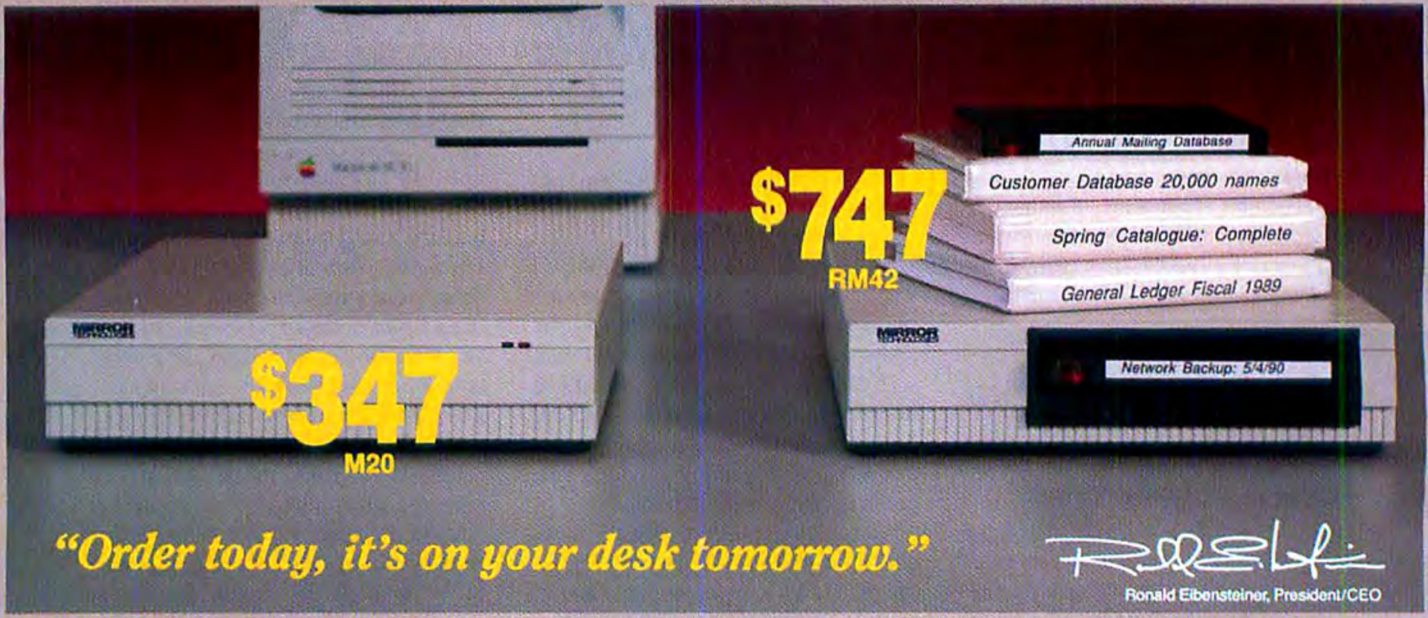
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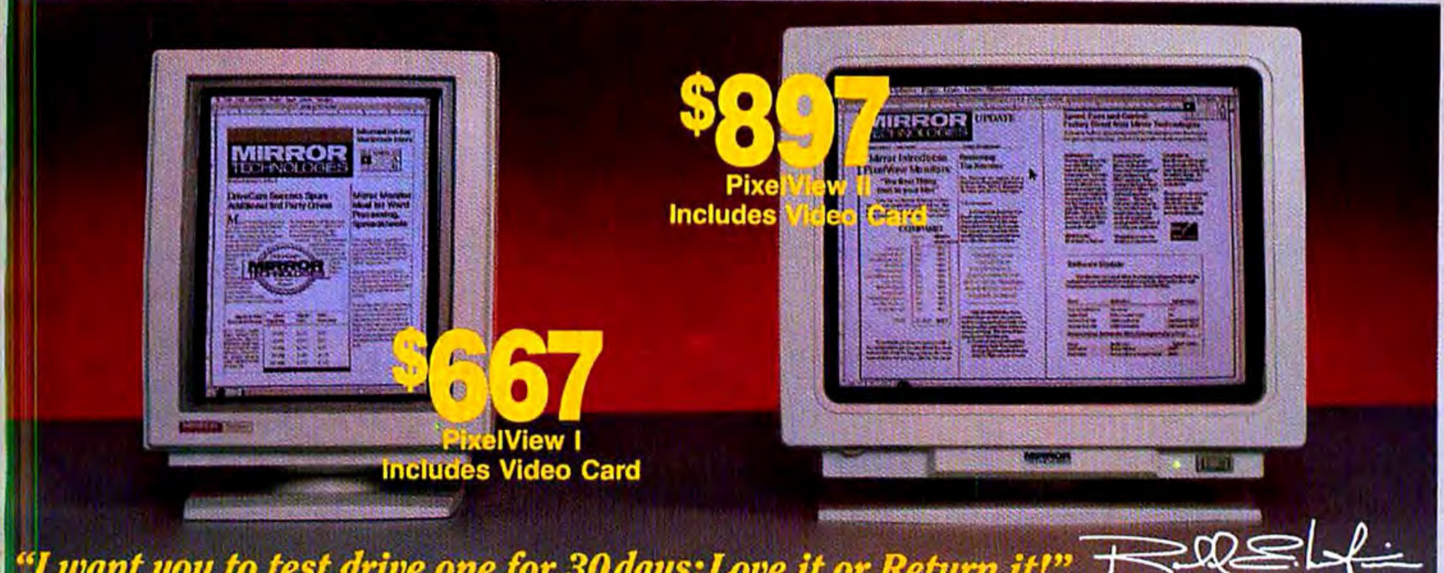

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cursors appear when you sort and select data that simplify the graphing of discontiguous or hierarchical subsets of data.

Unlike the venerable CA-Cricket Graph, with MacGraph all graphs generated from a data set stay together as one file using one background page, called a Letterhead, throughout. You can place graphics, headers, and footers on the Letterhead, making them appear on every graph's page, or you can add text and graphics page by page. MacGraph generates attractive finished graphs and provides a standard Mac drawing palette and 32-bit color support. You can modify almost every part of a graph, including text, frames, fills, line widths, how far tick marks are offset from axes, and so on. To overlay a line graph on top of a bar chart, you select the second set of data for the line graph and—what else?—hold down the Shift key as you issue the line graph command.

MacGraph does not create true 3-D graphs, though it does make $2^1/_2$-D–like shadows. Bravo Technology president Richard Ross says 3-D graphs must be skewed or distorted to be seen on a flat surface—a computer screen or paper—so they give inaccurate impressions.

MacGraph's list price was undecided at press time but should be less than $200. For more information, contact Bravo Technologies in Berkeley, California, at 415/841-8552.—**D.L**

Erasable Optical Drive Works with Macs and PCs

Tecmar has introduced an erasable optical drive that can work with Macintoshes and IBM PCs, holding up to 650MB of Mac, DOS, and OS/2 files on a single removable disc. Called the LaserVault 650, the device is based on a Sony erasable optical drive and requires an additional connection kit for each of the three types of systems supported: Macs, PC ATs and compatibles, and PS/2s and compatibles.

JACK VAN ANTWERP

Tecmar's LaserVault 650 erasable optical drive stores 650MB and can work with Mac, PC AT, and PS/2 systems.

The LaserVault comes with software that you use to separate each removable, erasable optical disc into separate volumes, depending on the type of system you have. Other included software provides automatic setup and archiving features. The LaserVault uses the SCSI interface.

The LaserVault and connection kits for the Mac and PC AT were all scheduled to be available now. The LaserVault with PS/2 kit should begin shipping in July. The LaserVault drive lists for $5495 without a connection kit. For more information, contact Tecmar in Solon, Ohio, at 216/349-0600.—**T. M.**

Survey: System, System, Who's Got the System?

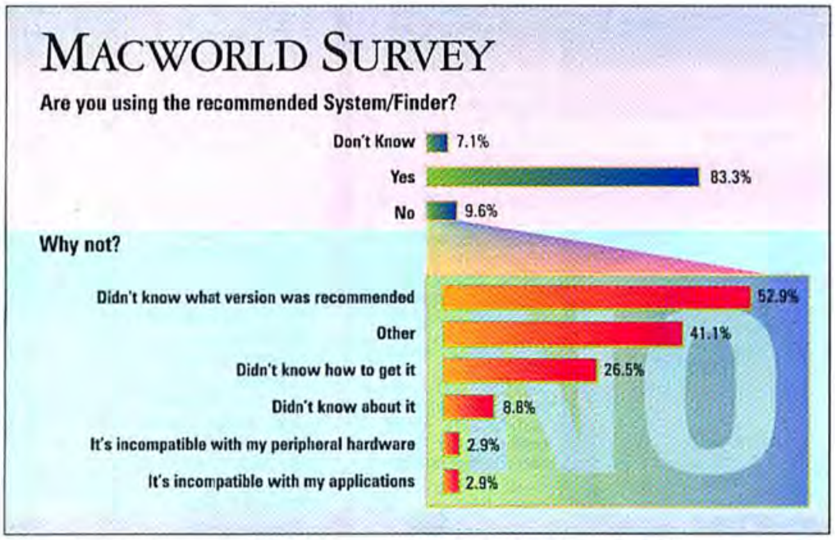
This month's survey, which was mailed to 1000 subscribers, examines *Macworld* readers' use of and opinions about Systems and Finders. Readers were given a list of Apple-recommended Systems and Finders and asked if they were using the correct ones for their machines. A reassuring 83.3 percent of respondents answered yes, 9.6 percent answered no, and 7.1 percent said they did not know.

Readers who answered that they use a System and Finder not recommended by Apple were asked to state all reasons why. Of those readers, 52.9 percent pleaded ignorance and 26.5 percent said they didn't know how to get the upgrade.

Readers were also asked how often they used MultiFinder. 59.5 percent of all responding readers said they seldom or never use MultiFinder, 13.1 percent said they sometimes use it, 6.8 percent said they use it often, and 20.5 percent said they always use it.

When asked how likely they were to update to System 7.0, 48.6 percent of all respondents said they were extremely or very likely to make the update, 30.7 percent said they were somewhat likely, 15.9 percent said they were not very likely, and 4.8 percent said that they were not at all likely to update.

Of those readers who said they were extremely or very likely to make the update, 40.9 percent said that the most important feature of System 7.0 will be outline fonts, 16.4 percent picked virtual memory, 15.7 percent said Finder 7.0, and 13.2 percent cited interapplication communication. —**Jonathan Cassell**



9.6 percent of readers responding to our survey said they do not use the System/Finder recommended for their CPU. Of these, 5.8 percent cited incompatabilities as the reason.

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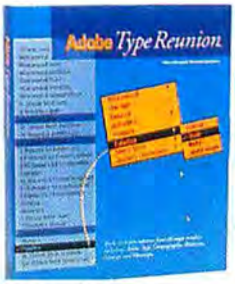

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OEM Mechanism	Seagate ST125N-1	Seagate ST157N	Quantum ProDrive 40S	Connor 3040	Seagate ST157N-1	Seagate ST1096N-1	Quantum ProDrive 80S
Formated Capacity	20.1 MB	47 MB	40 MB	40 MB	48 MB	20.1 MB	78.8 MB
Access Time (ms)	28 ms	32 ms	19 ms	25 ms	28 ms	28 ms	19 ms
ID Selection	Rotary	Rotary	Rotary	Rotary	Rotary	Rotary	Rotary
Termination	Internal	Internal	Internal	Internal	Internal	Internal	Internal
Cable (length, type)	4 ft. - 50/25 Pin	4 ft. - 50/25 Pin	4 ft. - 50/25 Pin	4 ft. - 50/25 Pin	3 ft. - 50/25 Pin	4 ft. - 50/25 Pin	4 ft. - 50/25 Pin
Warranty	1 Year	1 Year	2 Year	2 Year	1 Year	1 Year	2 Year
Software Bundled	Dolphin Install, 7 MB Public Domain & Shareware	Dolphin Install, 7 MB Public Domain & Shareware	Dolphin Install, 7 MB Public Domain & Shareware	Dolphin Install, 7 MB Public Domain & Shareware, Battery Saver	Turbo Cache, Turbo Spool, Turbo Backup, Turbo Optimizer	Dolphin Install, 7 MB Public Domain & Shareware	Dolphin Install, 7 MB Public Domain & Shareware

	PLI 100 Turbo	Porta 100	Integra 105Q	Integra 170	PLI 250 Turbo	Integra 300	PLI 300 Turbo
Zone Price	$998	$998	$998	$1488	$1948	$2398	$2398
Zone Code	3273	3264	2742	3271	3269	3272	3270
Category	External Drive	External Drive	External Drive	External Drive	External Drive	External Drive	External Drive
Manufacturer	Peripheral Land, Inc.	Dolphin Systems	Dolphin Systems	Dolphin Systems	Peripheral Land, Inc.	Dolphin Systems	Peripheral Land, Inc.
OEM Mechanism	Connor 100	Connor 30100	Quantum ProDrive 105S	Imprimis 170	Hitachi 250	Imprimis 300	Imprimis 300
Formated Capacity	105 MB	102 MB	102 MB	173 MB	251 MB	330 MB	327 MB
Access Time (ms)	20 ms	25 ms	19 ms	18 ms	16 ms	14 ms	16.5 ms
ID Selection	Rotary	Rotary	Rotary	Rotary	Rotary	Rotary	Rotary
Termination	Internal	Internal	Internal	Internal	Internal	Internal	Internal
Cable (length, type)	3 ft. - 50/25 Pin	4 ft. - 50/25 Pin	4 ft. - 50/25 Pin	4 ft. - 50/25 Pin	3 ft. - 50/25 Pin	4 ft. - 50/25 Pin	3 ft. - 50/25 Pin
Warranty	1 Year	2 Year	2 Year	1 Year	1 Year	1 Year	1 Year
Software Bundled	Turbo Cache, Turbo Spool, Turbo Backup, Turbo Optimizer	Dolphin Install, 7 MB Public Domain & Shareware, Battery Saver	Dolphin Install, 7 MB Public Domain & Shareware	Dolphin Install, 7 MB Public Domain & Shareware	Turbo Cache, Turbo Spool, Turbo Backup, Turbo Optimizer	Dolphin Install, 7 MB Public Domain & Shareware	Turbo Cache, Turbo Spool, Turbo Backup, Turbo Optimizer

	Quantum 40	Quantum 80	Quantum 105	Flipper 44	Infinity 40	Infinity 40/40	Infinity Optical
Zone Price	$449	$687	$797	$848	$1097	$1936	$4248
Zone Code	3245/3246/3265	3247/3248/3266	3249/3250/3267	2416	2181	2182	2854
Category	Internal Drive	Internal Drive	Internal Drive	Removable Media	Removable Media	Removable Media	Optical Media
Manufacturer	Dolphin Systems	Dolphin Systems	Dolphin Systems	Dolphin Systems	Peripheral Land, Inc.	Peripheral Land, Inc.	Peripheral Land, Inc.
OEM Mechanism	Quantum ProDrive 40S	Quantum ProDrive 80S	Quantum ProDrive 105S	Syquest SQ555	Syquest SQ555	Syquest SQ555	Sony
Formated Capacity	39.4 MB	78.8 MB	103 MB	43 MB	42.5 MB	42.5 MB/42.45 MB	573 MB
Access Time (ms)	19 ms	19 ms	12 ms	20 ms	19 ms	19 ms	60 ms
ID Selection	---	---	---	Rotary	Rotary	Rotary	Rotary
Termination	---	---	---	Internal	External	External	External
Cable (length, type)	---	---	---	4 ft. - 50/25 Pin	3 ft. - 50/25 Pin	3 ft. - 50/25 Pin	3 ft. - 50/25 Pin
Warranty	2 Year	2 Year	2 Year	2 Year	1 Year	1 Year	1 Year
Software Bundled	Dolphin Install, Includes Bracket & Cables	Dolphin Install, Includes Bracket & Cables	Dolphin Install, Includes Bracket & Cables	Dolphin Install, 7 MB Public Domain & Shareware	Turbo Cache, Turbo Spool, Turbo Backup, Turbo Optimizer	Turbo Cache, Turbo Spool, Turbo Backup, Turbo Optimizer	Turbo Cache, Turbo Spool, Turbo Backup, Turbo Optimizer

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After Dark	22.
Stepping Out 2.01	49.
Bitstream	
Baskerville	88.
Bitstream Charter	88.
Futura Medium	88.
Galliard	88.
Garamond	88.
Headlines 1 & 2 .... each	88.
Souvenir	88.
Blyth Software	
Omnis 5 Incrementer	74.
Omnis 5 Single User	374.

Micro League Baseball II** .. **$39.
Micro League Sports
Hall of Famers and All-Stars alike take the field on your own baseball diamond, and you're the manager.

Bootware Software	
ResuméWriter - Pro	57.
ResuméWriter - Student	17.
Borland International	
SideKick 2.0	67
Turbo Pascal 1.1	66.
Turbo Pascal Tutor 1.0	49.
Bright Star Technology	
Hyper Animator 1.5	97.
Interface	228.
Brøderbund	
Print Shop	35.
TypeStyler	118.
Caere	
OmniPage	544.
Casady & Greene	
QuickDEX	30.
CE Software	
CalendarMaker 3.0	30.
DiskTop 4.0 w/GOfer	62.
In/Out (1-10 User)	188.
In/Out (1-5 User)	127.
MockPackage Plus	30.
QuicKeys 1.2	61.
QuickMail 2.2	
1-5 Users	218.
1-10 Users	315.
1-50 Users	CALL
Administrator Pack	CALL
Single User Pack	CALL
Central Point Software	
Copy II Mac 7.2	22.
Mac Tools Deluxe	CALL
PC Tools Deluxe	42.
Chang Labs	
C.A.T.	224.
Check Mark Software	
Cash Ledger	114.
MultiLedger 1.3	234.
Payroll	174.
Claris	
Claris Cad	594.
FileMaker II	218.
MacDraw II	294.
MacPaint 2.0	94.
MacProject II 2.0	368.
MacWrite II	158.
...w/FileMaker II Bundle	294.
...w/MacDraw II Bundle	368.
SmartForm Designer	294.

Computer Associates	
Simply Accounting 1.1	224.
Connect	
Connect Business Info 2.0	94.
Connectix	
Virtual - Mac II	124.
Virtual - Mac II w/PMMU	187.
Virtual - SE/30, IIx, IIcx	114.
Craig Management Systems	
ScheduleMaker	299.
Cricket Software	
Cricket Color Paint	178.
Cricket Graph 1.31	115.
Cricket Paint	64.
Cricket Presents 2.0	284.
Pict-O-Graph	103.
Custom Applications Inc	
Freedom of Press	258.
Dantz Development	
Retrospect	148.
DataViz	
MacLink Plus PC 4.0	118.
MacLink Translators	98.
Dayna Communications	
DOS Mounter	54.
Deneba Software	
BigThesaurus	63.
Canvas 2.1	188.
Coach Professional	124.
Comment 2.0	63.
UltraPaint	124.
Digital, etc.	
Business Sense 1.2	268.
Digital Vision	
Computer Eyes	348.
Digitalk	
SmallTalk/VMAC	124.
Dubl-Click Software	
Calculator Const. Set	44.
Dubl-Click, WetPaint	
1 & 2 Classic Clip Art	39.
3 & 4 For Publishing	39.
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Electronic Arts	
Disk Tools Plus	31.
Studio/1	94.
Studio/8	294.
Thunder II	48.
Emerald City Software	
Smart Art 1, 2 & 3 each	83.
Type Align	57.
Farallon	
PhoneNet Check Net	63.
Screen Recorder	124.
Traffic Watch	124.
Timbuktu 3.0	
Single User	94.
30 User Pack	1,284.
Timbuktu Remote	122.
...w/9600 V.32 Modem	848.
Fifth Generation	
Disk Lock	105.
Fast Back II	105.
PowerStation 2.5	33.
Pyro! 4.0	22.
Suitcase II	42.

Foundation Publishing	
Comic Strip Factory	37.
#1 Office Days	20.
#2 Kid Stuff	20.
Fox Software	
FoxBASE+ 2.0	291.
FoxBASE+ Multi User	385.
FoxBASE+ Runtime	175.
FreeSoft	
Second Sight	99.
White Knight 11	84.
Generic Software	
Generic CADD Level 1	83.
Hayes	
Smartcom II 3.1	84.
Help Software	
Desktop Help for Excel	49.
High Performance Systems	
STELLA 2.1	384.
STELLA Stack1.0	275.
HJC Software	
Virex 2.2	50.
ICOM Simulations	
HyperTMON	58.
On Cue 1.3	34.
TMON 2.8.2	86.
Individual Software	
101 Macros for Excel	36.
101 Scripts & Buttons	36.
Informix	
Wingz 1.1	244.
Infosphere	
Liaison	174.
Innovative Data Design	
Dreams	318.
MacDraft 1.2b	168.
Insight Development	
MacPrint 1.2	94.

Insignia Solutions	
Soft PC	244.
Soft PC Portable	244.

Synchronicity** .... **$38.
Visionary Software
A mood altering experience. "Best new software, Mac...works as a game, a tool and a stressbuster" - Seattle Times.

Intuit	
Quicken 1.5	35.
Jam Software - Smart Alarms	
Single User Version	48.
1-4 Users	98.
5-8 Users	148.
9-15 Users	198.
16-25 Users	295.
Kent Marsh	
MacSafe II	106.
Night Watch	84.
QuickLock	55.
Kiwi Software	
KiwiEnvelopes!	34.

Layered	
At Once!	284.
Insight Expert Series	
Accounts Payable	394.
Accounts Receivable	394.
General Ledger	394.
General Payroll	394.
General Time Billing	394.
Inventory	394.
Letraset	
ColorStudio	1,588.
DesignStudio	618.
FontStudio	458.
ImageStudio	273.
LetraStudio	273.
ReadySetGo! 4.5	273.
Lexpertise U.S.A. Inc.	
Mac Proof 3.2.1	114.
Loop Software	
Picture Book	39.
Lundeen & Associates	
Works Plus Command	84.
Works Plus Spell	56.
Mac Master	
FEdit +	28.
MacroMind	
MacroMind Accelerator	124.
MacroMind CD ROM	149.
MacroMind Director	438.
VideoWorks II	188.
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BACKMATIC	CALL
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The Mac Zone

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Our phone lines are open for orders:

Mon - Fri:	**8am to 1am Eastern Time** **5am to 10pm Pacific Time**
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We accept VISA, MASTERCARD, DISCOVER CARD, AMERICAN EXPRESS & OPTIMA Card ***No surcharge added.***

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- If we must ship a partial order, we never charge freight on the shipments that complete the order (U.S. only).
- Your credit card will not be charged until products ship.
- All U.S. shipments insured at no extra charge.
- Most personal and company checks clear immediately on receipt to insure shipment. Allow one week for checks over $1,000.
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- No sales tax (except WA residents add 8.1% to total incl. shipping).
- **All prices subject to change without notice.**
- All items subject to availability.

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- All orders add $3.00 per order. We ship all items Airborne Express overnight service. (Areas not serviced by Airborne will be sent U.S. Postal service or UPS.)
- **Orders placed by 7:30pm Eastern Time, 4:30pm Pacific Time (weekdays) for "in stock" items ship same day (barring system failure, etc.) for overnight delivery.**
- APO/FPO/PO Box orders shipped 1st class mail, charged by weight.
- Alaska, Hawaii orders ship UPS 2nd day air.

International Orders (Tel. 206.883.3088)

- We accept VISA, MASTERCARD, AMERICAN EXPRESS & Bank checks in U.S. funds.
- We ship anywhere in the free world, using the quickest & least expensive methods possible.
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- If payment is made by check, please include adequate shipping charges, we will refund you the difference.
- **Items in stock ship immediately. Items not in stock back ordered unless otherwise notified.**
- Some product restrictions apply.
- When ordering by mail or FAX please include phone# & FAX#.
- All credit card orders must include shipping address & address to which your credit card bills come.

Electronic Orders

- E-Mail your orders or questions to us via Compuserve (73667,3636), GEnie (MACZONE) or Connect (MACZONE).
- MacZone uses CE Software's QuickMail to check our mail hourly.

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- Defective software replaced immediately. Hardware replaced or repaired at our discretion.
- Mac Zone has a 30 day money-back guarantee on hardware (USA Only).
- Software and hardware is subject to manufacturer's warranty. Defective items will be replaced immediately with like item(s).
- All hard drives come with a Zoner Loaner guarantee. Loan drives subject to availability (USA Only).
- All returns must have an authorization number. Call 800-248-0800.

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The Mac Zone

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The "power" page design tool for the creative professional, built with the designer in mind. Created specifically for graphic arts professionals. From concept to mechanicals, DesignStudio gives you the comfort of your own environment with all the power of electronic typesetting and design.

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Schedule development software, now in color! Helps you create clear, graphic schedules... fast! Schedules that took hours to draw now take only a few minutes.

Draw flowcharts up to ten times faster than with drawing programs or pen and pencil. Graphically organize even complex programs, projects and structures, fast!

MacSchedule $149. MacFlow $125.

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30-60 day money back guarantees on many items. Ask!

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Capture 2.0	48.
MacFlow 3.0	125.
MacSchedule 2.0	149.
Think N Time	55.
V.I.P.	87.
MECA Ventures Inc.	
Managing Your Money	122.
Mediagenic	
Focal Point II	116.
Reports 1.2	68.
Microcom Software	
Carbon Copy Mac	119.
Micro Planning Software	
Micro Planner Plus 6.1e	359.
Microlytics	
GOfer 2.0	44.
WordFinder	34.
Microseeds	
INIT Picker	25.
Redux	49.
Screen Gems	39.
WristMac Standard	144.
WristMac Pocket	178.
WristMac Executive	188.
Microsoft	
CD-ROM	599.
Excel 2.2	245.
File 2.0	125.
Office	525.
PowerPoint 2.01	249.
Quick BASIC 1.0	65.
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Works 2.0b	184.
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Microsoft Mail 2.0	
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1 Workstation	83.
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Plus 1.1	114.
Read-It! 2.1	244.
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Paracomp	
Milo	157.
Model Shop	374.
Swivel 3D 1.1	298.
Paragon Courseware	
Nisus 2.02	236.
QUED-M	104.
Personal Bibliographic	
ProCite	198.
PLI Software	
Turbo Back	54.
Turbo Cache	68.
Turbo Optimizer	38.
Turbo Spool	68.
Turbo Bundle (all above)	120.
Portfolio Systems	
Dynodex Instant Address Book	88.
Power Up!	
Address Book	55.
...w/Leather Notebook	83.
Fast Forms	88.
Letter Writer Plus	52.

Preferred Publishers	
DAtabase	67.
Exposure	51.
Vantage	51.
Prescience	
Expressionist 2.03	78.
Theorist	229.
Pro Plus Software	
Wall Street Investor	447.
Prometheus	
Macknowledge	147.
ProVUE	
Panorama 1.5	247.
Quark	
QuarkExtras	55.
QuarkStyle	164.
XPress 2.12	469.

Microphone II .... $215.

Software Ventures

Eddy Award honorable mention. Top of the line personal computer communications software.

Reference Software	
Grammatik IV	51.
Sabastian Software	
Image Grabber 2.0	31.
Satori	
Bulk Mailer Plus	178.
Select Micro Systems	
Exstatix 1.2	217.
MapMaker 4.0	239.
Silicon Beach Software	
Digital Darkroom	248.
Super 3D	313.
Super Card	CALL
SuperPaint 2.0	124.
SmethersBarnes	
ProtoTyper 2.1	182.
Software Innovations	
HandOff	31.
Software Ventures	
Microphone II 3.0	215.
Solutions	
backFax	139.
Curator	71.
SmartScrap & Clipper	45.
Super Glue II	61.
Somak	
Script Edit	48.
SuperMac Software	
Disk Fit 1.5	57.
Network Disk Fit	224.
PixelPaint 2.0	222.
PixelPaint Pro	388.
Sentinel 2.0	86.
SuperSpool 5.0	58.
SuperLaserSpool 2.0	
Single User	86.
Multi User (1 to 5)	285.
Survivor Software	
Invoice It	49.
MacMoney 3.5	58.
Symantec	
Just Enough Pascal	49.
Think Pascal 3.0	99.
More II	268.
S.A.M. 1.5	67.
S.U.M. II	94.
Think C 4.0	165.

Symmetry	
Acta Advantage	64.
HyperDA 1.2	48.
Key Plan	245.
Picture Base 1.2	54.
Synergy Software	
KaleidaGraph 2.0	145.
Versa Term 4.0	88.
Versa Term Pro 3.0	174.
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Sound Clips 1 & 2	ea. 48.
TGS Systems	
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TimeSlips Corporation	
TimeSlips III	168.
Timeworks	
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Mac Administrator	215.
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TOPS Network Bundle (Mac Version)	188.
TOPS NetPrint 2.0	117.
Traveling Software	
Lap-Link Mac Release III Connectivity Pack	113.
Lap-Link Mac Release III Network Pack	CALL
Trendware	
XCAL	77.
True BASIC, Inc.	
True BASIC Language 2.02	56.
True BASIC Toolkits	
3-D Graphics	46.
Business Graphics	46.
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Developer's	46.
Mathematician's	46.
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U.S. Micro Labs	
FontSizer II	78.
VersaCad	
VersaCad Drafter	424.
Visionary Software	
Synchronicity	38.
Williams & Macias	
myDiskLabeler	
...for ImageWriter	28.
...for LaserWriter	33.
Labels, 216 (ImageWriter)	15.
Labels, 216 (LaserWriter)	18.
Sticky Business	88.
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WordPerfect 1.0.3	228.
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Eddy Award winning best software product of the year. The software solution to desktop publishing's most common problem. Turns many printers and imaging devices into PostScript language compatable printers to give you the professional quality text and graphics output you deserve.

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Print any Mac application on many different printers. Chooser level program, completely transparent in operation. Select the printer only once on a simple setup page. Everything else is automatic. Print text and graphics at your printer's maximum resolution. Supports HP LaserJet II & IID.

MacPrint 1.2 .... $94.

Macintosh Memory Upgrades

Does your computer just nibble at it's work? Put some teeth in your mother board. One megabyte SIMMs (for Mac Plus, SE, SE/30, II, IIx, IIcx & IIci) are easy to install, especially since we include complete installations instructions. It's time to give your Mac the RAM it needs to take a bigger byte.

SIMM Chips .... CALL

The MacZone

A truly professional looking notebook for protecting and keeping track of your valuable information on 3.5" floppy disks. Plenty of space for twenty disks. A secure velcro fastener keeps it closed and your disks in place. About the same size as a notebook and just as easy to take with you.

Leatherette Disk Notebook .... $12.

Digital Vision

Finally - an inexpensive way to capture real-world full-color images on your Macintosh color display for use in presentations, desktop publishing, image databases, slide shows, etc. Connects the Mac II to any standard video source and acquires high-quality images under simple software control.

Computer Eyes .... CALL

Xerox (Datacopy)	
AccuText	545.
Zedcor Inc	
DeskPaint/DeskDraw	64.
ZBasic 5.0	88.

HARDWARE

Scanners

Complete PC	
Half Page Scanner/400	314.
Page Scanner	758.
Logitech	
Scan Man	318.
Thunderware	
Lightning Scan	368.
ThunderScan 5.0	184.

Modems

Everex	
EMAC MD2400	224.
MacTech - SmartLink Modem	
2400m (MNP 5)	245.
2400s	139.
Prometheus	
9600m Plus V.32	768.
Shiva Corporation	
NetModem V2400	434.
Supra Corp.	
Supra Modem 2400	128.
U.S. Robotics	
9600 HST Baud	685.

Monitors & Cards

Micron Color Cards	
for SE/30, II, IIx, IIcx, & IIci	
Xceed (8 Bit - 13")	385.
Xceed (8 Bit - 19")	598.
RasterOps	
Trinitron 19" Monitor	3,398.
ColorBoards	
108+ (II, IIx, IIcx, IIci)	899.
108+ (SE/30)	1,045.
224 (32 Bit - 19")	3,151.
264 (II series - 13")	CALL
264 (SE/30 - 13")	CALL
Sony - Color Multiscan	
14" 1304 HG Color	795.

Accelerators & Upgrades

Dove	
MacSnap Upgrades	
524 (512k to 1 Mb)	192.
524e (512kE to 1 Mb)	185.
524s (524e w/SCSI)	238.
548 (512k to 2 Mb)	432.
548e (512kE to 2 Mb)	418.
548s (548e w/SCSI)	478.
SCSI Port Adapter	109.
Marathon 020 SE Accelerators	
MSE1 (Board Only)	428.
MSE2 (...w/1 Mb)	698.
MSE3 (...w/68881)	588.
MSE4 (...w/68881 & 1Mb)	898.
Marathon 030 Accelerators	
Mac II series or SE/30	ea. 965.
Marathon Racer	148.
Marathon 030 Upgrade	
Mac Plus, SE, & II	CALL
Macintosh Memory Upgrades	
available in 70ns - 120ns	
256k SIMMs	
1 Mb SIMMs	Call for prices
Motorola	
Math Co-Processors	
68882 - 16MHz	289.
68882 - 25MHz	399.
68882 - 33MHz	695.
68882 - 40MHz	748.

SmartLink 2400S .... $139.

SmartLink 2400M ... $245.

MacTech

2400 baud modem, Bitcom communications software, and Mac to modem cable in one complete package.

Orchid Technology	
Mac Sprint II	249.
Total Systems	
Gemini 020\030 Accelerators	
68020 SE - 16MHz	697.
68020 SE - 25MHz	1,118.
68030 SE - 16MHz	976.
68030 SE - 20MHz	1,118.
68030 SE - 25MHz	1,285.
GemKit (allows user to put Gemini 020/030 Accelerators in Mac+, 512kE, 512k, & 128k. Includes internal fan, SCSI port, and space for extra RAM memory)	149.

Backups & HD Drives

Everex - EMAC Drives	
60/60dtl Deluxe	1,495.
60t (Tape Backup)	658.
Impact Tape (150 Mb)	985.
PLI (Peripheral Land, Inc.)	
TurboFloppy 1.4	358.

Networking Hardware

Cayman Systems	
Gator Box	2,159.
Gator Mail Gateway	698.
Gator Mail to Unix	698.
Gator Share Software	1,398.
Gator Card (Mac SE, II, IIx, IIcx, IIci, or SE/30)	ea. 460.
Dove	
FastNet Equipment	
Fastnet AE	1,249.
FastNet SE or SE/30	374.
FastNet III	374.
FI-1 Ethernet LAN/68020 Accelerator SE	995.
SCSI CheaperNet	748.
SCSI Thickwire Ethernet	849.
Farallon - PhoneNet	
DB-9	31.
DIN-8	31.
DIN-8 (10 Pack)	198.
Star Connector	17.
Star Connector (10 Pack)	198.
Star Controller	824.
Star Controller EN	CALL
Repeater	312.
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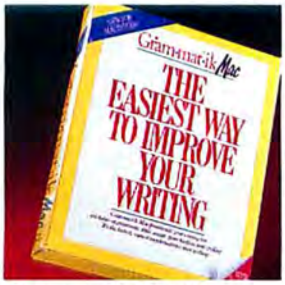

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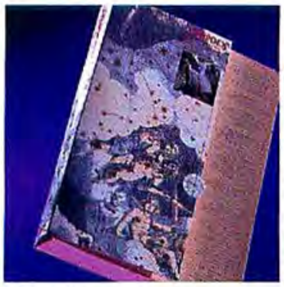

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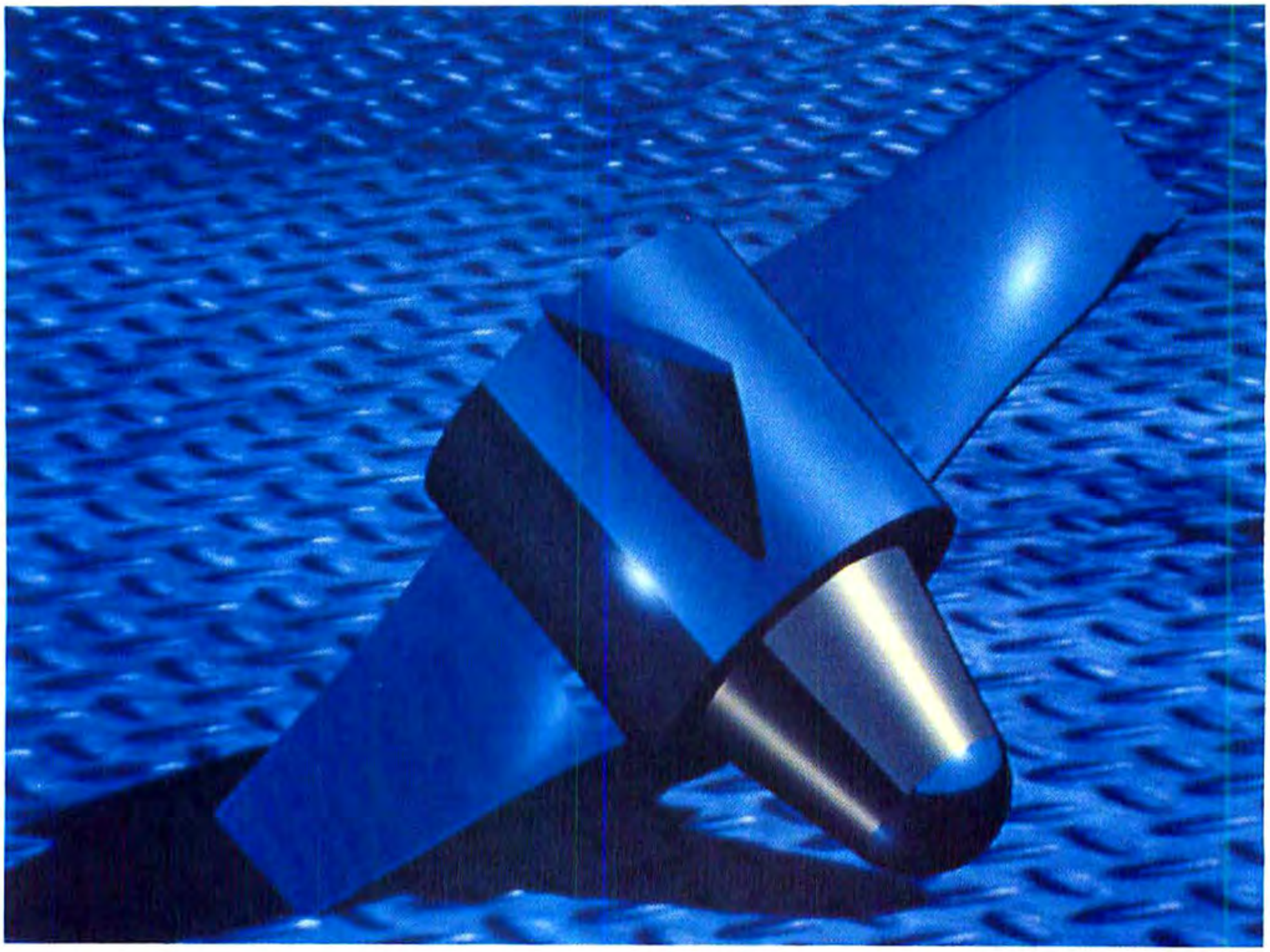


Above: Artist, Ray Davis; software, CADKey Render, which uses RenderMan (on an IBM PC). Right: Artist, Koji Sonoda; software, SystemSoft. For more details, see "Rendering Face-off." Facing page: Artist, Tony Tomsu; software, Sculpt 3D.

Get Realistic

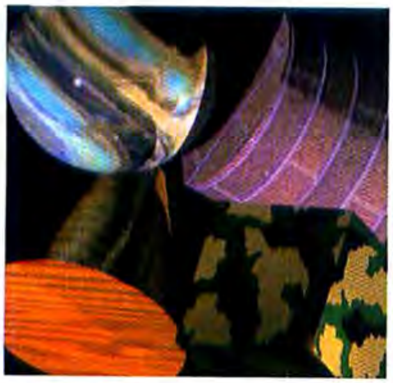
AN INTRODUCTION TO RENDERING SOFTWARE—PROGRAMS THAT TURN 3-D GEOMETRY INTO PHOTOREALISTIC DISPLAYS

Seeing, they say, is believing, and in most businesses it's necessary for people to believe with all their hearts before they'll invest money and time in a project. But how do you see something that doesn't yet exist? Or, in a different type of business, how do you create a believable illusion of something that never will or could exist? Answer: render.

On the computer, rendering is the process of adding color, texture, the illusion of transparency or reflectivity, and other visual effects to 3-D models. Some people prefer to use computer rendering instead of traditional methods because they want a high-tech look. Others use it because of the efficiencies they can realize. For example, computer rendering has a lot to offer animators, who create many views of the same subject, or product designers, who must create many treatments of the same view.

Three-dimensional modeling software with shading capabilities of various types has been around on the Mac for some time, but falling memory prices, faster Macs, and the advent of 32-bit color have only recently created an environment where true 3-D rendering is practical. In response, a number of companies have joined Visual Information—longtime maker of RayTrace Dimensions, until recently the only Mac rendering program—in this field. Now images produced by Mac software from Strata, MacroMind, Electric Image, Byte by Byte, and Pixar are beginning to show up everywhere from Disney Studios to the offices of Ford, ABC, and BBD&O.

by Stuart Cudlitz



Selections from the Library

These objects were ray traced in StrataVision and then mapped with textures from some of Strata's attribute libraries. Rainbow onyx comes from the Decorative Stone collection, while the oak texture comes from Wood Grain; the other two are from unreleased collections. Strata "attributes" are more than just PICT files; each includes gloss information and a bump map.

Private Eye

Robyn Miller modeled and rendered this scene in StrataVision using the program's mapping and ray-tracing abilities. He produced the louvered lighting effect by applying a louver-shaped map to his main light source.

All rendering software shares the goal of being able to add realistic visual effects to 3-D models, but different programs approach this pursuit in very different ways. To understand the distinctions among Macintosh rendering packages, you will find it helpful first to get a grasp of the basics of 3-D imaging.

The Model

The illusions created by rendering software are, for the most part, only skin-deep; the skeleton—the structure—is provided by the 3-D model. Computer modeling is the process of defining a graphic object in three-dimensional space (*x*, *y*, and *z* coordinates). When choosing a modeling program or method, it's important to select one that is appropriate to the type of object you'll be creating and to the rendering technique you intend to use.

There are three basic types of surface modelers. The simplest modeler creates wire-frame objects (not to be confused with wire-frame representation—any type of object can be *viewed* as a wire frame). Wire-frame models are the type produced by many CAD programs. They look like neon sculptures and are composed solely of intersecting lines. Each line is a separate object; they do not form surfaces that can be colored or shaded. Some programs, such as Dimensions Presenter, can translate wire-frame data into surface data appropriate for rendering. This is not, however, a trivial problem, and the results are unreliable. The translation process can be very time-consuming, and complex models may not translate accurately.

A more complex type of model is made of flat polygons—small two-dimensional surfaces made of three or more straight lines, or edges. You can stretch and distort objects built out of these surfaces by moving control points, much like sculpting with a wire net. The facets of a polygonal model can be interpolated in rendering for a smooth appearance. Polygonal models describe curves better that wire frames and lend themselves to a wide range of surface and lighting treatments. This is the type of object most Macintosh 3-D programs produce.

The most sophisticated modelers are known as parametric, or simply curved-surface, modelers. In these, the polygonal net becomes a mesh, known as a patch, with even more control points—four or more connected lines for each surface. The lines that form the edges of a patch are controlled by splines, which means that the surface of each patch can be curved.

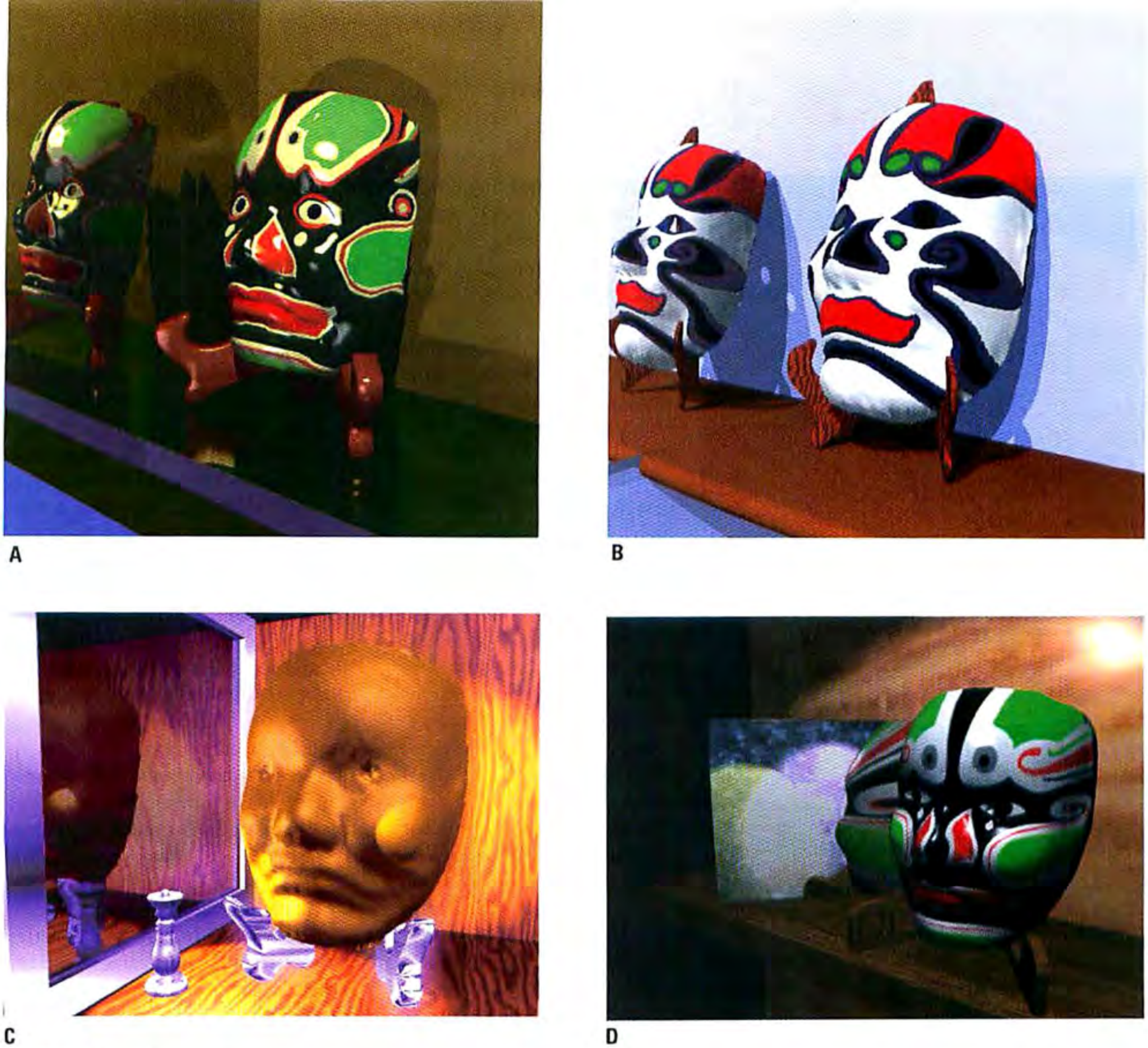
It follows that curved-surface modelers are the best at defining objects with complex curves. They can do this more efficiently than polygonal modelers, since it might take a polygonal modeler 50 or even 100 facets to reproduce the contours of one patch. On the other hand, curved-surface models are more computationally intensive, and the software used to create them is generally more complex to work with. Only a few Macintosh programs—such as Design Dimensions, Microstation Mac, and MacBravo Modeler—can produce parametric models. In general, this type of model is used only when extremely high quality or absolute accuracy is required, as in high-priced advertising or simulation.

Remember that all of these modeling techniques produce only shells, not solid objects. If you were to cut any surface model in half, the software would not know how to treat the new edge or the interior space. Solid modelers are a separate type of 3-D software (see "Beneath the Surface: The World of Solid Modeling," *Macworld*, March 1990). Of the renderers in this article, only Pixar's as-yet-unreleased RenderMan engine is designed to handle solid models.

Scene Description

Once you've defined the 3-D objects that will be rendered, the next step is to organize them to describe a scene. This involves placing lights to illuminate the objects' surfaces and determining the view by choosing a camera position and lens type.

The camera in rendering is designed to mimic a real-world camera, with a lens through which light rays converge at a focal point and focus onto an image plane. The rendering programs let you change the field of view by either imitating different cine lenses (as in ElectricImage Animation System) or changing the view by degrees (as in Dimensions Presenter).



Rendering Face-off

To compare rendering software, *Macworld* sent copies of the same DXF model to five companies. The model was based on an actual Chinese mask, which we sent to Cyberware Laboratories of Monterey, California, where it was scanned using a Cyberware Rapid 3-D Digitizer. The mask stand was also scanned, and saved as a 3-D file.

Along with the two DXF files, participating artists received a rough pencil drawing showing the mask's traditional colors and pattern, and a sketch showing how we wanted the scene framed and the desired placement—on a shelf in front of a mirror. The artists were given the option of re-creating the mask pattern or coming up with a surface treatment of their own.

The first image appears at the beginning of this article. (Page 136, bottom). *Software:* SystemSoft's soon-to-be-released modeler and renderer (see "Coming Attraction"). *Techniques:* Koji Sonoda used a random-pattern generator to produce the wall texture and marble; he then ray traced the scene on a distributed network that ranged between five and nine Macs. The mask pattern is a wrapped PixelPaint file. (A) *Software:* Sculpt 3D. *Techniques:* Steve Speer ray traced the entire image after using Sculpt 3D's modeler to encode the mask pattern directly onto the DXF model. (B) *Software:* Dimensions Presenter. *Techniques:* Karl Mochel used computed patterns for the shelf and stand. He painted the mask pattern in Studio/8 and then wrapped the pattern onto the model. The scene was then ray traced. (C) *Software:* MacroMind Three-D. *Techniques:* Roy Santiago rendered the basic highlights and shadows using Phong shading. A reflection map combined with specular highlights produced the metallic effect. The wood is a scanned texture map. (D) *Software:* ElectricImage. *Techniques:* Jay Roth used texture mapping to produce all the effects. The wood in the shelf and holder are stock files from Studio/8. Roth painted the mask pattern in Photoshop. For a closer look at two of these images, see *Art Beat*, in this issue.

By and large you can position the camera anywhere in the scene.

The light sources in 3-D and rendering packages also mimic actual lighting possibilities. The three most common lighting types are ambient, directional, and radial. Ambient light is nondirectional, distributing light uniformly like sunlight on an overcast day. Directional light sources mimic the effect of spotlights, with their cone-shaped spread, or direct sunlight, which has a distinct, parallel look. Radial lights illuminate from one spot but not in a specific direction, like a light bulb.

The color of objects is often determined not by painting but by assigning combinations of colored lights. Most programs offer the option to set multiple colored lights that can be positioned relative to your objects.

Rendering

Scene description sets the stage for the next step, which is rendering. Unlike traditional drawing, where all steps along the path toward producing a realistic representation are referred to collectively as rendering, in computer graphics rendering is the process of converting the numeric description of a scene into the individual color values of the display surface.

The Mountains of Mars

Using ElectricImage Animation System, Jay Roth mapped Viking satellite photography onto a model built from actual Mars surface-altitude data to produce this realistic rendering of the Panovis Mons volcano.

Broadly speaking, there are three main rendering techniques: ray tracing, shading, and texture mapping (see "Marching toward Realism"). Computer artists and designers often use these methods in combination to create a desired look in the most economical way.

Ray Tracing Ray tracing is an exhaustive, automatic process for capturing shadows, highlights, and reflections. For every pixel on the screen, a single imaginary ray of light is projected from the center of the camera into the scene and back. The software calculates the effects of all light sources as they interact with surfaces. These calculations take into account user-determined settings for reflectivity, refraction, and transparency.

Shading Flat shading, Gouraud shading, and Phong shading are familiar terms in 3-D graphic production. All rendering programs and many CAD and modeling programs offer these techniques. Like ray tracing, these shading methods are all *illumination models;* unlike ray tracing, they describe only the relationship between the surface shape of an object and the color and direction of its lighting. Thus, for example, objects rendered using these techniques have shading, but cast no shadows. Nor do shading techniques take surface characteristics into account.

Different shading methods will produce different effects. With flat shading, each facet of an object has the same color at all points. Abrupt changes in color often occur at the edge between one surface and another.

Phong shading interpolates the flat polygons so that edges are smoothed and shades progress from light to dark without shifts. When an object's surface has no abrupt shifts in contour, like a ball, Phong shading produces good results. But if the structure changes radically at an edge, a Phong shader may smooth the transition inappropriately.

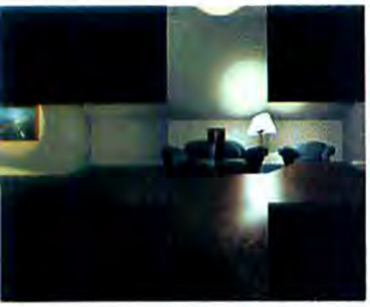
Gouraud shading produces an effect that combines characteristics of flat and Phong shading. The edges of facets remain distinct, but the facets themselves are shaded smoothly from edge to edge.

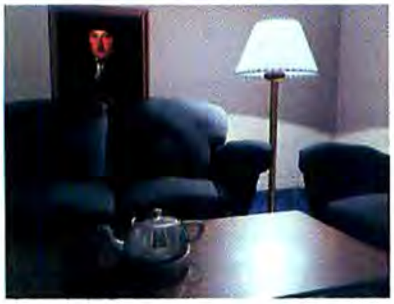
Mapping Along with ray tracing and/or shading, all the rendering programs covered in this article provide some option for texture mapping. In mapping, a 2-D PICT or other graphics file representing a desired texture, pattern, material, or other attribute is mathematically applied to an object. Programs that map generally offer three basic options (though the terminology may vary). Flat mapping is like putting a decal on a surface; this technique is used only for objects with relatively little curvature. The second type, often simply called wrapping, is like covering the object in saran wrap. No attempt is made to correct for distortion. In the third type, the program controls distortion by wrapping to a predefined geometric model. Typically, the designer must tell the program that the object in question is most like a sphere, cylinder, or other basic shape (see "Selections from the Library").

By using different types of mapping, you can simulate most of the visual attributes of a ray-traced image. For example, reflection maps—as the name suggests—can create the illusion of reflectivity. To make a reflection map, you begin by taking a snapshot, as it were, of the scene surrounding the object to which you want to add a reflection. You then map the snapshot onto the reflective object. By setting the transparency of the reflection map, you can determine the degree of reflectivity for the object. Cubic, or environmental, mapping is a more convincing method of reflection mapping in which the program makes six separate views of the scene surrounding a reflective object. This unfolded cube view is then automatically mapped over the object's surface (see "From the Inside Looking Out").

Even though creating an environmental map requires some effort, it's still less time-consuming than ray tracing a scene, because you have the creative control of placing reflections only where you want them, adding only those needed to produce the desired level of realism.

Artists use another common type of texture map—bump maps—to create the illusion of relief. A bump map





From the Inside Looking Out

Ray tracing isn't the only way to create realistic reflections. In environmental, or cubic, mapping, six views are taken from the point of view of the reflective object—in this case the teapot—and then wrapped around that object. Levels of reflectivity are established by setting a map's level of transparency.

is simply a PICT or other 2-D graphic file in which the highlights and shadows have been offset to give a 3-D, textural effect. Most surface-treatment type-rendering programs include facilities for creating bump maps. Mapping programs also have facilities that enable you to produce the illusions of shadows and glows, among other effects.

The non-ray-traced techniques just described all come under the rubric of surface simulation or surface treatments. A final form of surface simulation is exclusive to the RenderMan format, developed by Pixar.

Dream Castle

Mike Peraza used Sculpt 3D to model and render this scene, which was used to test camera angles for Disney's *The Little Mermaid*. Copyright © 1990, Walt Disney Company

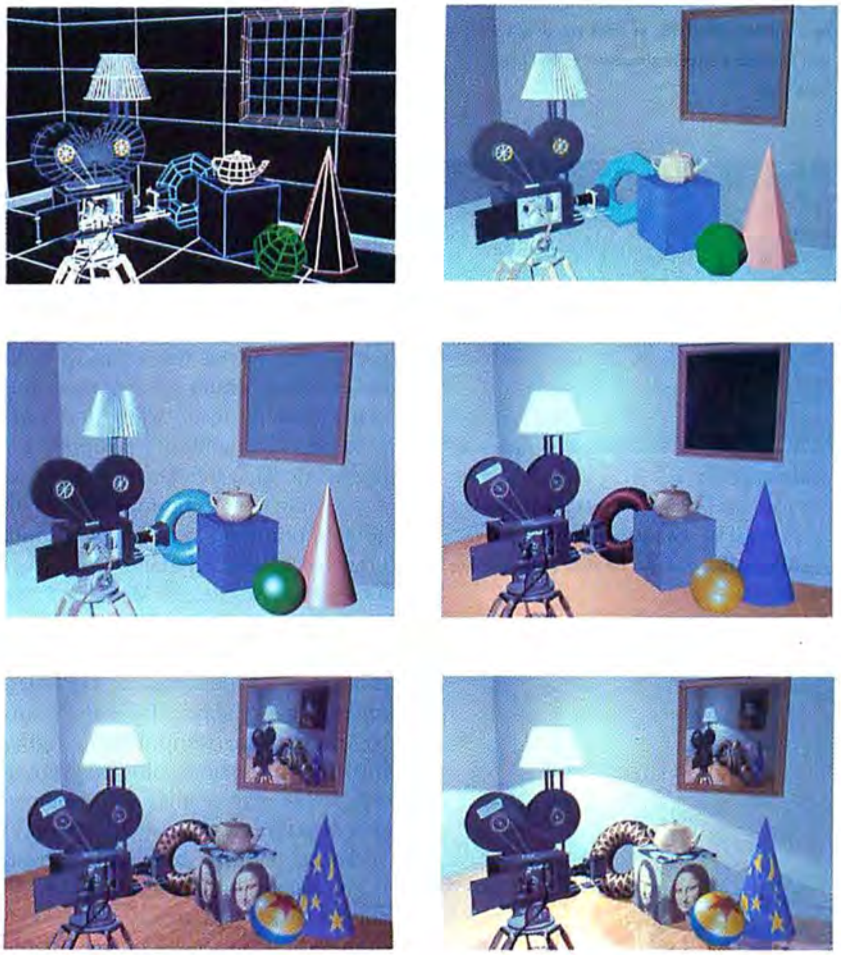
RenderMan

One problem producers of 3-D graphics have had to contend with until now is that while formats exist for transporting 3-D geometry, there has been no common file format for scene description. Each modeling or rendering package has had its own way to specify lighting, camera position, and materials. This bars you, for example, from using a package on a PC to describe a scene and then porting it to a workstation for rendering.

By the time this article is published, however, many modeling and rendering packages will offer support for a standard created by Pixar, the former computer arm of Lucasfilm, now partly owned by Steve Jobs. The RenderMan standard uses the surface-treatment techniques just described as well as some unique methods to provide for very high quality, photorealistic rendering.

The Pixar system works like this: You create a model and describe the scene using a RenderMan-compatible package, setting calls as you go along for different types of lighting and materials with different textures or degrees of reflectivity. You then save the scene as a RIB (RenderMan Interface Bytestream) file, and export it either to a RenderMan application running on your Mac or to a device, such as a film printer, with a RenderMan interpreter built into it. The RenderMan interpreter processes the calls in the RIB file and renders the scene either to your screen or to output media.

All surface treatments and lighting effects require the presence of something Pixar calls shaders. In essence,



Marching toward Realism

This series in part re-creates the stages of computer graphics' march toward realistic rendering. Reading from left to right these pictures show wire-frame representation with hidden lines removed; flat shading; Phong shading; simple RenderMan shaders with a light source; more complex (procedural) shaders with texture maps; the addition of shadows, environmental maps, and displacement shaders (which affect surface geometry—note the texture on the torus).

Images courtesy of Pixar and Addison-Wesley, excerpted from Foley, van Dam, Feiner, and Hughes's *Computer Graphics: Principles and Practice, 2nd Edition,* (Addison-Wesley, 1990).

Roy's Room

Roy Santiago modeled this scene in Swivel 3D and rendered it in MacroMind Three-D. The room includes Phong shading; texture maps of the floor, marble, and painting; and ambient and spot lighting. 3D Works enables you to specify that spotlights create shadows, as has been done here.

Design: Mary Bellis
Software: Sculpt 3D

Something Fishy

This room was modeled and ray traced in Byte by Byte's Sculpt 3D. Two algorithms were used to produce the fishbowl: one for solid glass, another for surface glass.

shaders are programs that describe the appearance of surfaces. Often the code for a shader actually contains information about the visual qualities of a given material. A redwood shader, for example, does not have a PICT file of redwood in it. Instead, it includes information about the textural, reflective, and tonal qualities of redwood. In RenderMan, just about any effect you may want is handled by a shader. In addition to simulating various materials, shaders might create atmospheric effects, environment maps, or even, in a somewhat twisted example, a wire-frame representation. Shaders also have the unique ability to actually displace geometry, moving polygons on the surface of an object to represent a desired texture, such as a screw thread.

RenderMan handles all models including wire-frame, polygonal, and parametric. At this writing most makers of Mac rendering software and many makers of modeling and CAD programs have announced support for the RenderMan standard. As yet, however, there is no commercially available RenderMan rendering engine. Pixar has anounced that it will market a renderer, MacRenderMan, for $795. This bare-bones rendering engine, which offers no scene-description or modeling abilities, had a scheduled release date of May 1. Pixar also plans to market the RenderMan engine through third-party software companies, who may or may not enhance the interface with scene-description and other features. According to Pixar, the initial releases of the engine will ship with 9 to 12 shaders; the exact number and mix will depend on the provider. Pixar envisions that soon shaders will be like fonts, with users buying additional visual effects either from Pixar or third parties and plugging them into their systems.

Whichever rendering approach you take, you should try to previsualize the steps, thinking of what you want your final display to look like.

Software

So much for theory—what about products? By the time this article comes out, there should be five full-featured, general-purpose rendering programs on the market. They range in price from $495 to $7495, and their capabilities are just as variegated.

ElectricImage Animation System At the top of the price range is ElectricImage. I looked at a beta version for this article, but the company promised release before the end of spring. ElectricImage does not create models. Instead the program imports the greatest number of formats of all the programs under review. Object files are easily transported and converted to ElectricImage's FACT file format. The package is optimized for four-sided polygons and can translate simpler objects or surface-patch data into the FACT format (parametric surfaces are converted to polygonal objects without loss of complexity).

Designed with film and video applications in mind, ElectricImage can emulate any lens in the American Cinematographers Manual—including VistaVision, a format usually used for feature special-effects productions. The programs come with registration overlays to facilitate use with video and film.

ElectricImage does not do ray tracing, instead relying on reflection maps, standard shading, and manipulations of texture maps and other surface treatments. You can use interrelated sliders to control all color channels in addition to hue, saturation, and brightness. This, plus the ability to control opacity, transparency, and luminance in the Alpha channel and full 32-bit depth, allow for extensive control over the appearance of objects and the composition of scenes.

Although ElectricImage is expensive, it will be worth the investment for those of us who want to go out to videotape with film effects templates and video-compatible graphics.

Dimensions Presenter and RayTrace Dimensions VIDI packages its rendering capabilities in two packages. RayTrace Dimensions does just what it sounds like. Dimensions Presenter is for scene description, texture mapping, and animation. A planned upgrade of Presenter, 3-D

RENDERING ROUNDUP

	Byte by Byte Corporation	Electric Image	MacroMind	Strata	Visual Information Development
Product	Sculpt 3D 1.0	ElectricImage Animation System 1.0*	MacroMind Three-D 1.0*	StrataVision 3d 1.4	Dimensions Presenter 1.2
Price	$1500**	$7495	$1495	$495	$595
Creates Objects					
Wire frame	yes	no	yes	yes	no
Polygonal	yes	no	no	yes	yes (basic primitives)
Parametric	on command	no	no	no	no
Maps					
Texture	no	yes	yes	yes	yes
Reflection	no	yes	yes	yes	yes
Bump	no	yes	yes	yes	yes
Ray tracing	yes	no	no	yes	with RayTrace ($995)
RenderMan	yes	yes	yes	no	no
Imports	Object PICT	Cubicomp	DXF	DXF	Design Dimensions
	PRIM	Cyberware	IGES	EPS	DXF
	SA4D	Echo	PICS	IGES	IGES
		DXF	PICT	MiniCad+	PostSCript
		E&S MPS	Swivel 3D	PICT	Super3D
		FACT	Super 3D	Super 3D	3DPICT
		Filmrole	3DGF		PICT
		Mac3D			
		PICS			
		PICT			
		Pro3D			
		Super 3D			
		Swivel 3D			
		3DGF			
		Wavefront			
Exports	PICT	DXF	PICS	DXF	DXF
	PRIM	E&S MPS	PICT	RIB	PICS
	SA4D	FACT	RIB		PICT
		IFS	3DGF		
		PICS			
		PICT			
		PixelPaint			
		Super 3D			
		3DGF			
		Targa			
		Wavefront			

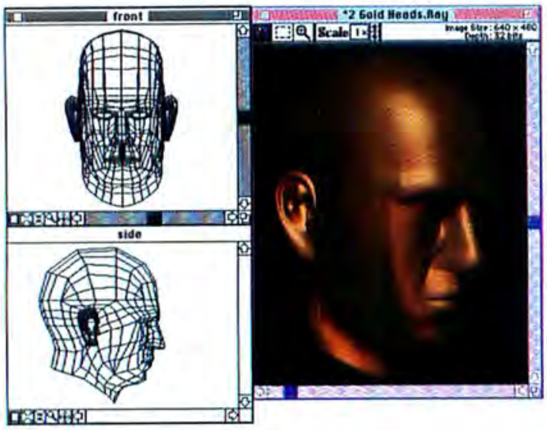
*Prerelease; specifications subject to change. **$1995 with Kandu Software's CAD Mover file-conversion utility.

Producer, includes smooth shading and the ability to save files in the RIB format as well as stronger animation features. Presenter reads a variety of 2-D and 3-D data files and allows you to convert some 2-D PICT files, such as those from MacDraft, into 3-D by embedding programming statements with the files. You can also create objects using the included MacDraft-like drawing program and lathing or extruding polygonal objects.

By offering separate smooth shading and ray-trace modules, VIDI is competing with Strata in the market for product design and engineering graphics.

StrataVision 3d StrataVision 3d is a mixed ray-tracing and surface-treatment renderer that also includes reasonably competent modeling capabilities. Version 2.0, slated for release sometime this spring, will have even better modeling abilities. Because everything is in one module, StrataVision makes it easy to mix standard techniques as called for. Its main strength is as a 3-D visualization tool that enables you to compose using elements from different origins. One nice feature is the ability to import text or PICT files and autotrace them as a first step toward converting them to 3-D objects.

To complement its renderer, Strata sells attribute libraries of PICT



Chrome Dome

Michael Gold modeled this head in Design Dimensions using parametric bicubic patches. He used RayTrace Dimensions and Dimensions Presenter to ray trace, smooth shade, and antialias the scene.

Coming Attraction

SystemSoft of Los Altos, California, is marketing its powerful modeling and rendering program in Japan but, as this goes to press, has yet to find an American distributor. The package includes high-end features such as the ability to perform depth-of-field calculations and to render on a distributed network. Toshiya Tokieda modeled this ray-traced Lamborghini using the package's parametric modeling features and then ray traced his model.

graphics for texture mapping. The first two libraries, Wood Grain and Decorative Stone, are shipping at this writing ($139 each). The company plans to release a building-materials library soon.

Sculpt 3D Byte by Byte's Sculpt 3D was designed as an artist's tool, enabling you to move from sculpting images to rendering and animating them. It provides ray tracing as well as Phong and Gouraud shading. By the time you read this, Sculpt 3D/Textures will be available. This upgrade promises features for creating sophisticated hybrid renderings, in which a single texture map might be combined with ray tracing, smooth shading, and transparency. The upgrade will cost $1000.

For now, Sculpt 3D offers a good modeling environment. You can manipulate polygonal objects by moving control points on the vertices. The animation features are also good, offering precise control of objects' motion. You manipulate the motion path of animation by moving the control points of the objects' vertices (adjusted by splines that subdivide along selected paths).

Although Sculpt 3D is efficient as a stand-alone Mac tool, the program outputs files in various workstation formats as well, which could enable users to employ the Mac as a design and preview station and handle rendering on an AT&T or Intel workstation, for example.

MacroMind Three-D MacroMind, best known for its animation compositing and display program, MacroMind Director, has now completed a 3-D and rendering package, scheduled for release this June. The total package comprises three separate applications—3DWorks, RenderWorks, and ImageWorks—that are linked under MultiFinder and work seamlessly together, one launching the next.

The 3DWorks application imports a number of 3-D formats and offers limited modeling abilities of its own. The program is not a ray tracer; instead it enables you to perform various surface treatments as well as scene description. Through spline controls, you can manipulate the motion paths of objects, the camera, light sources, and color transitions in animations. The program imports Swivel 3-D models, and maintains their hierarchically linked structures. These can also be manipulated using spline controls.

The native format of 3DWorks is 3-DGF, which MacroMind developed and has made available to developers. According to MacroMind, 3-DGF has many advantages over DXF, the current most popular geometry standard. Once you've described your scene in 3DWorks, you simply use the Render command, and the program launches RenderWorks, which carries out your instructions.

When rendering is complete, ImageWorks is launched automatically. This program has some of the abilities of MacroMind Director, enabling you to create limited transitions between files (dissolves) and compositing (positioning objects over backgrounds). You can also combine rendered animations by creating a hierarchy of windows. A pop-up videotape recorder control panel enables you to output animations to tape, if you have the appropriate controller boards.

Rendering Judgment

It's been part of the promise of the Macintosh as a graphics workstation that it would make high-end rendered 3-D scenes affordable for presentations or Mac-based multimedia. With the products just discussed, it looks like this capability has arrived, more or less.

Still, Macintosh users shouldn't expect to create the sort of 3-D rendered animations being done at places like Pacific Data Images or Pixar. The Mac 3-D modeling and rendering software does not have the powerful automatic animation functions applied in the entertainment industry, nor does the hardware have the power of specialized workstations.

If you do decide to buy into Macintosh rendering, go for as much hardware power as you can afford. You should definitely be working on at least a Mac II with an 80-megabyte hard disk minimum and 4 to 8 megabytes of RAM. And although an 8-bit video board is acceptable for working on and viewing rendered images, a 32-bit board (with 16 million colors) makes more sense. After all, since these programs are expensive and the process is time-consuming, you may as well have the best Mac display available to enjoy the amazing images you'll be able to produce. ■

See *Where to Buy* for contact information.

. . . .

***Stuart Cudlitz** is an artist and filmmaker who has designed computer graphics and special visual effects for feature films, broadcast television, and interdisciplinary fine arts.*

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Midrange Hard Disks

MACWORLD LABS TESTS 46 HARD DISKS IN THE 80MB-TO-150MB RANGE TO MAKE SURE YOU GET THE BEST-QUALITY BYTES FOR YOUR BUCKS

BY CHERYL E. SPENCER

Since we last reviewed hard disks under 300MB in capacity ("Turning 40," September 1989), drive makers have brought out several new products and revamped some older ones. One new class of hard disks has emerged—pocket-size portables that take their power directly from the Mac. Still, the buying criteria haven't changed: look for price, performance, service options, case design, and software.

Because drive technology and the recipe for producing a winning unit have remained so constant, vendors have had a chance to correct many deficiencies criticized in earlier products. GCC and Rodime, for instance, have completely reworked their older lines. In September, both of these companies sold hard disks that were slow performers with uninspiring cases, manuals, and software. Now GCC's UltraDrive and Rodime's Cobra are among the fastest performers: they sport new, sleek cases; and they include solid software and improved manuals.

Not every vendor has been so responsive. Drives from MacProducts and Relax still can't duplicate folders reliably, and their case design has yet to be given a more modern, streamlined appearance. CMS has kept up the appearance of its Platinum line, but the company still doesn't include any software—not even a copy of Apple's marginally useful HD Backup.

Although the midrange market is crowded—Macworld Labs tested over two score hard disks for this article—in the end we were able to divide the offerings into three simple categories: those we like best, those that are good (but not especially so), and those we don't recommend. The ones we like best contain a well-rounded set of features or are outstanding in a certain area (say, speed or support). The runners-up are products we would have no qualms about purchasing; if found at a bargain price or with good dealer support, they could be top picks. As for those we don't recommend—a group that includes the portable units—well, let's just say we found no reason to purchase them over the other choices.

The Winners

Deltaic, FWB, GCC, La Cie, Maxcess, MicroNet, Microtech, Rodime, Ruby, Storage Dimensions, SuperMac.

The drives we like best include most of the fastest performers (see "Hard Disk Speed Tests"). But speed isn't everything. For instance, hard disks from Maxcess, MicroNet, and SuperMac were average performers, but still made it into our top-picks list due to good software and good customer reports on service and reliability.

Based on an informal poll (letters *Macworld* has received and conversations on various Mac bulletin boards), hard disks from MicroNet and Storage Dimensions get high marks for reliability. Similarly, these companies offer good service (see "Hard Disks Compared"). Other service stars include La

PHOTOGRAPHS BY MARK JOHANN

Pictured are the Rodime Cobra, Microtech Nova, GCC UltraDrive, Maxcess E-Series, and La Cie Cirrus.

Cie and Microtech, with their five-year warranties, toll-free support, and guaranteed turnaround times for repairs, 72 and 48 hours, respectively.

All of our favorite hard disks include good formatting and diagnostic software, but a few products include even more. Any backup software other than Apple's HD Backup is a plus—Rodime's Cobra comes with Fastback, Microtech's Nova has DS Backup, and SuperMac's DataFrame includes DiskFit. Maxcess's hard disks include no backup software, but they do include CE Software's QuicKeys Lite (a macro program that, unlike the standard version of QuicKeys, limits you to 14 keystrokes), DiskTop (a useful file-management program), and MockPackage (a group of utilities such as a text editor and background printer). These excellent products are worth buying on their own. La Cie's Cirrus drives include hard disk–management software and SilverServer, an application that lets you share hard disks and modems over an AppleTalk network.

SuperMac's DataFrame, MicroNet's Micro/Stack, and Deltaic's Server 100H

Case design also played a part in our decision. GCC's UltraDrive is sleek with rounded edges and classy lines, and it fits perfectly under a Macintosh SE. FWB's PocketHammer, La Cie's Cirrus, and Maxcess's V-Series are small, lightweight units that are easy to carry. You can purchase a carrying case for the PocketHammer; the Cirrus and V-Series come with one. You can also buy the La Cie and Maxcess hard disks in a case that fits underneath a Macintosh SE. Storage Dimensions' MacinStor and MicroNet's Micro/Stack have cases that are a bit larger and bulkier than the others.

It is hard to pick a price-for-performance leader since retail prices don't always reflect what you actually pay for a hard disk. If the vendor sells direct, then the price listed is what you will pay, barring a special promotion or a group discount. You may pay much less than the listed price if the vendor sells through a dealer only.

Although we can't objectively name a best buy we do have favorites. We found GCC's UltraDrive, La Cie's Cirrus, Maxcess's E-Series and V-Series, Microtech's Nova, and Rodime's Cobra to be the most appealing. The UltraDrive is the most slickly packaged and includes the best manual. La Cie and Microtech come out on top in service and support; La Cie and Maxcess offer the best software. Rodime's Cobra was a clear winner thanks to good speed, on-screen LEDs, and a nice case that includes two extra power outlets. But be forewarned that this unit makes a whirring sound when in use—several of us at *Macworld* liked to hear the drive working, but some users may prefer a quieter unit such as the Cirrus or Liberty 100 (see "A Little Quieter Please").

The Best of the Rest

Apple, Dolphin, EMAC, Hard Drives International, iDS, Liberty, Mirror, PCPC, PLI, ProCom.

Products in this category had nothing particularly wrong with them nor were they particularly impressive. Notice that Apple's Hard Disk 80SC is in this category. This disk provides reasonable speed, good manuals, and—if you opt for the external version—a perfect aesthetic match with a Macintosh SE. What you won't get is a cut-rate price.

PLI's PL100 Turbo isn't very fast, and the installation manuals are worthless, but it offers a nice set of custom software—a spooler, a disk optimizer, and a disk-cache utility which, with enough tweaking, can speed up the unit some 5 percent. Hard disks from Dolphin, iDS, and Mirror are faster but they don't offer much in the way of software (Dolphin's Integra includes partitioning software, and the iDS Prologue includes a varied assortment of shareware, but these are slim pickings compared to, say, the CE Software programs bundled with the Maxcess drives). Likewise, Hard Drives International's Power Drive doesn't have much to distinguish it from the crowd, except for an extremely low price. Still, the drive is solidly constructed and worked well during our tests.

The two hardest calls in this category were EMAC's Impact and the Liberty drive. Both are fast, small, and lightweight. You can even purchase a carrying case for the Liberty for an extra $29. Unfortunately, neither product has anything special to recommend it over La Cie's Cirrus,

HARD DISK SPEED TESTS (IICX)

Actual result

35.8 **Fastest in test**
80.5 **Slowest in test**

Color groupings are based on indexed speed comparison

Faster
↕
Slower

Macworld Labs tested hard disk speed on several everyday operations such as loading applications and saving documents. In addition, we used SCSI Evaluator to test the drives' ability to read and write data without any application overhead (in these tests, larger numbers are better since SCSI Evaluator times the number of kilobits the drive can transfer in a second). We ran the tests on drives attached to a Macintosh IIcx and on drives attached to a Macintosh SE. Some drives performed better in comparison to their peers on one machine or another.

Drives are listed in order of overall fastest to overall slowest drive, based on their cumulative speed scores. Note that drives that use the Quantum mechanism generally fared best, although the top three drives—the Deltaic Server 100H, the Microtech Nova 150, and the Rodime Cobra 100e—used CDC, Micropolis, and Rodime mechanisms respectively. The color coding provides an easy way to see which drives perform fastest (red) or slowest (gray) in any given test.

(continued on page 151)

	(Seconds)					(Kilobits per second)	
Overall fastest	**Duplicate 10MB folder**	**Open PageMaker document**	**Search 4th Dimension record**	**Load Excel**	**Save PageMaker document**	**SCSI evaluator read**	**SCSI evaluator write**
Deltaic Server 100H (CDC)	66.2	8.6	47.1	12.6	7.4	10107	9319
Microtech Nova 150 (M)	71.8	8.7	46.2	12.4	7.5	7678	6912
Rodime Cobra 100e (R)	75.2	9.3	54.5	13.3	8.8	7150	6428
GCC UltraDrive S 80 (Q)	67.9	10.2	45.8	13.2	11.6	6563	6528
Apple Hard Disk 80SC (Q)	67.6	10.0	51.0	13.0	11.3	5635	5932
La Cie Cirrus 80 (Q)	86.0	9.7	45.5	12.9	10.7	6067	6172
SuperMac DataFrame XP 100 (Q)	84.4	9.6	50.1	12.9	10.0	5866	6005
Ruby Systems Dwarf 80 (Q)[1]	84.4	10.2	45.0	12.7	11.0	5929	5944
Dolphin Integra 80 (Q)	83.8	10.1	45.6	12.9	11.0	6195	6193
Storage Dimensions MacinStor ZFP 80 (Q)	82.7	10.0	45.9	12.9	11.2	6673	6705
FWB PocketHammer 80 (Q)	81.4	10.0	45.1	13.2	11.4	6601	6623
Advanced Gravis HardPac 105 (Q)	79.9	9.8	50.5	13.0	10.6	6582	6620
Ruby Systems StarDrive 80 (Q)	84.8	9.9	50.4	12.9	10.0	6220	6211
iDS Prologue 80 (Q)	83.0	10.2	45.5	13.1	11.2	6634	6652
Hard Drives Int'l PowerDrive 105 (Q)	78.5	9.9	51.0	12.9	11.0	5806	5861
Liberty 105Q (Q)	87.1	9.9	45.6	13.1	11.3	6051	6127
Tallgrass TravelPac 80 (Q)	82.3	9.9	50.4	13.2	11.0	6205	6167
Jasmine DirectDrive 105 (Q)	83.0	10.6	46.6	13.3	11.5	6642	6662
EMAC Impact 80 (Q)	83.1	9.8	50.5	13.0	11.9	6191	6185
Microtech Nova 105 (Q)	83.7	9.9	51.5	13.3	11.3	6100	6095
MacProducts Magic 105 (Q)	81.9	10.1	52.8	13.2	11.2	6610	6651
Dolphin Porta 100 (C)[2]	93.5	10.3	54.2	12.7	9.9	5820	5785
Ehman Hard Drive 105 (Q)	88.9	9.9	51.0	13.1	11.5	5920	4159
Mirror MP 80 (Q)	87.3	10.5	50.8	13.0	11.2	6149	6136
Maxcess E-Series 105 (Q)	85.8	10.4	51.0	13.3	11.4	6068	6080
Relax Hard Plus 100 (C)	91.1	10.5	56.0	12.7	10.2	6150	6094
MacProducts Magic 100 126 (CDC)[3]	109.0	9.7	51.4	12.8	10.7	3704	3452
MicroNet Micro/Portable 100 (C)[4]	93.6	10.1	54.8	12.9	10.7	5726	4792
PCPC MacBottom 84 (Q)	87.4	10.3	50.7	13.1	12.4	6140	6193
CMS Platinum 100 (C)	93.4	10.5	55.1	13.0	10.4	6092	5981
MacProducts Magic 80 (Q)	117.7	10.1	46.6	13.1	10.9	6570	6556
iDS Prologue 105 (C)	92.1	10.6	55.4	13.0	10.5	6086	6053
PLI PL100 Turbo (C)	92.3	10.3	60.2	12.7	10.3	5820	5755
Ehman Hard Drive 135 (F)	103.6	11.1	54.5	13.2	11.8	4951	3922
Jasmine DirectDrive 130 (F)	91.7	12.0	60.1	13.4	11.9	4965	4740
Procom MD 100 (C)	115.9	11.0	61.5	13.0	11.9	3457	4161
MicroNet Micro/Stack 105 (CDC)	76.1	11.6	70.9	15.1	14.6	9161	9178
Relax Hard Plus 150 (CDC)	84.0	11.4	65.3	15.1	15.3	7796	7801
CMS Platinum 150 (CDC)	86.7	11.8	63.4	15.2	15.3	7147	7153
Toshiba America MacKit 140 (T)	84.5	11.7	69.6	15.2	15.7	7821	7829
Procom MD 150 (M)	102.2	11.9	64.0	15.3	16.3	5096	4203
Heart Data 80 (Q)	97.0	12.5	72.0	15.2	16.5	6069	6098
Relax Hard Plus 80 (S)	105.4	12.7	74.4	15.4	17.1	6690	6684
Crate MacCrate 105 (T)	117.4	12.7	63.7	15.6	18.6	4416	2985
BSM MacCider 105 (T)	117.0	12.6	69.0	15.3	18.0	4395	2975
Jasmine DirectDrive 80 (Y)	115.0	12.9	67.4	15.5	18.2	4226	4230
Procom MD 80 (Y)	129.1	12.9	67.6	15.7	18.4	3305	3327
Ehman Hard Drive 80 (S)	130.1	13.9	78.0	16.0	19.5	3467	3453

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[1] Dwarf 80 is the name of the portable version of the StarDrive.
[2] Micro/Portable 100 is the name of the portable version of the Micro/Stack.
[3] Porta 100 is the name of the portable version of the Integra.
[4] Magic 100 126 is the name of the portable version of the Magic.

CUSTOMER SUPPORT

The service a company provides can be a make-or-break factor for users who are deciding which drive to buy. Even Apple has made concessions to customer support by upping its warranties to one year. If your drive goes bad, some companies guarantee that you will receive a replacement drive within a certain amount of time. Others offer a guaranteed turnaround time only to their dealers, who in turn can pass the guarantee on to the customer. Some companies will even try to save the data on a crashed hard disk if you ask—dealers can't do this easily since many data rescue attempts require that the disk be disassembled in a sterile room. One company, Mirror Technologies, offers a hard disk repair and data recovery service for a wide variety of hard disks. Prices for the service vary according to the size and type of disk.

Company	Warranty	Extended Warranty	Toll-free Telephone Support	Guaranteed Turnaround Time	Data Recovery on Request
Apple Computer	1 year			[1]	
Advanced Gravis	1 year			[1]	•
BSM	1 year			[1]	
CMS Enhancements	1 year	•		[1]	
Crate Technology	2 years			[1]	•
Deltaic Systems	1 year	•			•
Dolphin Systems	2 years	•		[1]	•
Ehman	1–2 years[2]		•	•[3]	•
Everex Systems	1 year			[1]	
FWB	1 year	•		[1]	•
GCC Technologies	2 years	•	•	[1]	•[4]
Hard Drives Int'l	1 year				
Heart Data Corp.	2 years		•	[1]	•
iDS Systems	3–5 years[2]		•	[1]	•
Jasmine Technologies[5]	2 years				
La Cie	5 years		•	72 hours	•
Liberty Systems	1–2 years[2]			48 hours	•
MacProducts USA	1–2 years[2]	•		[1]	•
Maxcess	2 years		•	48 hours	•
MicroNet Technology	1 year	•		[1]	
Microtech International	5 years		•	48 hours	•
Mirror Technologies	2 years	•		•[3]	•[4]
PCPC	2 years	•		•[3]	•[4]
PLI	1 year		•	[1]	•
ProCom Technology	1 year			48 hours	•
Relax Technology	1 year		•	[1]	•[4]
Rodime	1 year			72 hours	
Ruby Systems	1 year	•	•	[2]	•
Storage Dimensions	1 year	•		48 hours	•
SuperMac Technology	1 year			[1]	
Tallgrass Technologies	2 years	•	•	[1]	•
Toshiba America	1 year			30 days	
Westcom	2 years	•	•	[1]	•

[1] Up to the dealer.

[2] Depends on which mechanism you buy.

[3] Overnight replacement service for a small charge per year.

[4] For a fee.

[5] At press time, Jasmine had filed for Chapter 11 bankruptcy and was not shipping drives.

FWB's PocketHammer, or Maxcess's V-Series.

Not only are ProCom's MD drives nicely packaged, with good manuals, but their switchable termination is a handy innovation especially in situations where a hard disk will be moved between Macs. In a chain of peripherals, where you place a hard disk determines whether or not it needs to be terminated. Switchable termination combines the seamlessness of internally terminated units with the flexibility of externally terminated ones. We had hoped to recommend Procom's MD drives highly. Alas, the MDs were some of the slowest of the pack. Buy these drives only if your need to switch termination outweighs your need for performance.

Finally, there are the MacBottom drives from PCPC. I still have a soft spot in my heart for these longtime survivors. They are reasonably fast, inexpensive, and include decent backup and partitioning software. They also come with a custom desk accessory for finding files, and a file-copying utility that lets you split a large file among several floppy disks. But lately, *Macworld* has received an above-average number of complaints about PCPC's customer service. The company claims, however, that it has added support staff to solve the problems.

The Losers

BSM, CMS, Crate, Ehman, Heart, Jasmine, MacProducts, Relax, Toshiba, Westcom.

Ehman's drives are one of the lowest priced, and I've used a 40MB unit for about three months with no trouble. Yet, one of the review units that Macworld Labs received had a SCSI connector that didn't fit properly with the cable and jammed when we plugged it in (I gave up disconnecting them). In addition, one of the three review units was missing the MacTree Plus software.

Ehman's formatting software is also poorly designed and gave us no end of trouble. Any hard disk attached to a Macintosh II should be set at a 1:1 interleave ratio to ensure maximum performance. The Ehman 80MB drive, however, performed extraordinarily slowly on write operations (such as saving or duplicating a file) when run on a Macintosh II at a 1:1 ratio. For instance, it took the 80MB drive 36 seconds to save a PageMaker file at a 1:1 ratio and 4.5 minutes to duplicate a 10MB folder. By reformatting the drive to a 2:1 ratio (the standard for a Macintosh SE) we were able to improve the write times—the same PageMaker save took 19 seconds and the folder-duplication time was cut in half. Still, the Ehman 80 was one of the slowest performers.

The other two drives that Ehman sent us—a 100MB Quantum-based drive and a 130MB Fujitsu-based drive—were not obnoxiously slow on write operations at a 1:1 interleave on a Macintosh II,

HARD DISK SPEED TESTS (SE)

Actual result

35.8 **Fastest in test**

80.5 **Slowest in test**

Color groupings are based on indexed speed comparison

🟥 **Faster**
🟥
🟥
🟥
🟫 **Slower**

The color-coded groupings were determined by first indexing the actual results and then dividing the indexed numbers into five groups. The first four groups include drives that decrease in speed by 10 percent—the fifth group includes drives that are 50 percent or more slower than the drives in the first group. The absolute fastest drive in each test is indicated with a yellow rectangle while the absolute slowest is indicated with a black rectangle.

C = Connor
CDC = CDC
CI = C. Itoh
F = Fujitsu
M = Micropolis
Q = Quantum
R = Rodime
S = Seagate
SI = Seagate (formerly Imprimis)
T = Toshiba
Y = YE-Data

	(Seconds)					(Kilobits per second)	
Overall fastest	Duplicate 10MB folder	Open PageMaker document	Search for 4th Dimension record	Load Excel	Save PageMaker document	SCSI evaluator read	SCSI evaluator write
Deltaic Server 100H (CDC)	113.5	18.6	180.4	45.5	12.9	5300	4258
Hard Drives Int'l PowerDrive 105 (Q)	116.6	19.4	174.8	45.3	13.4	5005	4257
GCC UltraDrive S 105 (Q)	106.8	19.9	158.3	46.0	16.8	3667	3722
Ruby Systems Dwarf 105 (Q)[1]	116.7	20.2	158.2	45.8	14.8	4659	4168
Storage Dimensions MacinStor ZFP 105 (Q)	122.0	19.5	158.0	45.9	14.8	4437	4383
EMAC Impact 80 (Q)	122.1	19.7	159.0	45.8	15.1	4366	4185
Maxcess E-Series 105 (Q)	133.5	16.4	159.4	46.0	15.9	3674	3609
La Cie Cirrus 105 (Q)	125.1	20.1	159.5	45.9	15.0	4339	4182
Jasmine DirectDrive 105 (Q)	124.4	20.3	161.0	45.9	15.0	4452	4390
Microtech Nova 150 (M)	127.5	18.6	179.7	45.4	13.9	4020	3406
Apple Hard Disk 80SC (Q)	110.2	20.0	178.7	46.0	15.7	3784	3300
Ruby Systems StarDrive 80 (Q)	121.9	19.6	177.5	45.8	14.4	4223	4181
Tallgrass TravelPac 80 (Q)	124.4	19.5	178.0	45.8	14.3	4356	4189
Dolphin Integra 80 (Q)	122.3	19.5	177.7	45.8	14.7	4374	4189
SuperMac DataFrame XP 100 (Q)	123.5	19.6	175.7	45.6	14.7	4957	4197
Mirror MP 80 (Q)	123.4	19.6	177.9	45.8	14.7	4339	4187
Liberty 105Q (Q)	124.1	19.6	178.4	45.8	14.6	4364	4176
PCPC MacBottom 84 (Q)	122.9	19.7	178.0	45.9	14.8	4355	4178
Advanced Gravis HardPac 105 (Q)	123.3	19.6	177.7	45.8	14.9	4461	4392
FWB PocketHammer 80 (Q)	131.2	20.3	159.0	46.2	15.8	3775	3815
MacProducts Magic 80 (Q)	118.3	20.0	183.5	45.8	15.4	5316	4400
Microtech Nova 80 (Q)	124.0	19.6	179.5	46.0	15.2	4320	4172
iDS Prologue 80 (Q)	123.6	19.9	179.5	45.9	15.2	4451	4388
MicroNet Micro/Portable100 (C)[2]	130.6	20.0	177.4	45.6	14.8	4129	3924
Dolphin Porta 100 (C)[3]	129.8	19.9	186.7	45.7	14.4	4113	3991
Rodime Cobra 100e (R)	121.5	20.1	180.3	46.1	15.6	4767	3964
MacProducts Magic 100 126 (CDC)[4]	134.7	20.9	167.9	45.6	15.1	4205	3464
CMS Platinum 80 (C)	130.8	20.0	187.8	45.7	14.5	4220	4078
PLI PL100 Turbo (C)	130.5	20.0	187.1	45.8	14.7	4038	3968
iDS Prologue 105 (C)	131.5	20.2	188.9	45.9	15.2	4366	4191
Jasmine DirectDrive 130 (F)	127.2	20.7	186.9	46.1	15.8	4749	4150
Relax Hard Plus 100 (C)	131.9	20.6	193.0	45.8	15.6	4372	4201
MicroNet Micro/Stack 105 (CDC)	120.2	21.4	196.1	46.8	17.3	5181	4260
Toshiba America MacKit 140 (T)	127.8	20.9	195.2	47.4	17.9	4287	4209
Heart Data 80 (Q)	129.3	21.2	198.3	47.4	18.1	4253	4220
CMS Platinum 150 (CDC)	133.7	20.8	196.1	47.3	18.2	3694	3684
Relax Hard Plus 150 (CDC)	134.4	21.8	201.5	47.4	19.0	4027	4032
Ehman Hard Drive 105 (Q)	170.0	19.5	178.1	45.9	19.9	4334	1258
Ehman Hard Drive 135 (F)	174.2	20.7	181.0	46.0	20.4	4682	1342
Jasmine DirectDrive 80 (Y)	140.6	22.5	200.7	47.8	20.5	4177	3701
BSM MacCider 105 (T)	171.2	22.5	175.3	47.7	22.5	2561	2540
Relax Hard Plus 80 (S)	154.9	23.0	205.4	47.9	21.0	3590	3523
Crate MacCrate 105 (T)	172.1	22.5	195.1	47.5	22.7	2562	2541
Procom MD 100 (C)	235.8	23.4	192.4	47.4	19.8	1184	3369
Procom MD 150 (M)	244.0	24.5	202.2	49.1	23.8	1194	2563
Procom MD 80 (Y)	255.4	25.5	204.5	49.2	26.3	1183	2130
Ehman Hard Drive 80 (S)	324.6	23.0	205.2	48.3	40.8	3450	425

[1] Dwarf 80 is the name of the portable version of the StarDrive.
[2] Micro/Portable 100 is the name of the portable version of the Micro/Stack.
[3] Porta 100 is the name of the portable version of the Integra.
[4] Magic 100 126 is the name of the portable version of the Magic.

HARD DISKS COMPARED

Company	Product	Capacity/ Mechanism[1]/ Price	Internal Version	Sold Direct or through Dealers	Portable Version Available	Dimensions (h. x w. x d., in Inches)
Apple Computer	Apple Hard Disk 80SC	80MB/Q/$1799	yes	dealers	no	3.1 x 9.7 x 10.5
Advanced Gravis	HardPac	80MB/Q/$1595; 105MB/Q/$1795	no	dealers	yes[2]	2 x 4 x 7.2
BSM	MacCider	80MB/S/$893; 105MB/T/$1281	yes	dealers	no	3.1 x 9.9 x 11
CMS	Platinum series	80MB/C/$1479; 100MB/C/$1995	yes	dealers	no	2 x 10 x 10.25
		150MB/CDC/$2179				
Crate	MacCrate	80MB/S/$949; 105MB/T/$1049	yes	dealers[3]	yes	2.75 x 9.75 x 10.75
Deltaic	DS100Q/Server 100H	105MB/Q/$1199; 105MB/CDC/$1299	no	direct	no	2.3 x 9.7 x 9.75
Dolphin	Integra	80MB/Q/$1302; 105MB/Q/$1346	yes	dealers	yes	2.4 x 13 x 14.5
		150MB/M/$1895				
Ehman	Ehman Hard Drives	80MB/S/$599; 105MB/Q/$799	yes	direct	no	2.5 x 9 x 9
		135MB/F/$999				
EMAC	EMAC Impact	80MB/Q/$1299	yes	dealers	no	2.5 x 6 x 10.5
FWB	PocketHammer	80MB/Q/$1495; 105MB/Q/$1595	yes	dealers	no	6.5 x 3 x 9
GCC	UltraDrive S	80MB/Q/$1099;105MB/Q/$1299	yes	both	no	2.75 x 9.5 x 10.75
Hard Drives International	PowerDrive	80MB/S/$499; 80MB/Q/$649	yes	both	no	2.5 x 9.75 x 9.75
		105MB/C/$629; 105MB/Q/$699				
Heart Data	Heart Data	80MB/Q/$1119; 105MB/Q/$1203	yes	both[3]	no	3.1 x 9.9 x 11
iDS	iDS Prologue	80MB/Q/$1345; 105MB/C/$1695	yes	dealers	yes	3 x 10 x 11
		130MB/F/$1895				
Jasmine	DirectDrive	80MB/Q, CI, Y/$849; 105MB/T or Q/$1099	yes	direct	no	2.5 x 9.5 x 10.5
		130MB/F/$1199				
La Cie	Cirrus	80MB/Q/$859; 80MB/C/$759	yes	direct	no	3 x 6 x 9
		105MB/Q/$959; 100MB/C/$859				
La Cie	Cirrus (zero footprint)	80MB/Q/$799; 80MB/C/$699	yes	direct	no	3 x 10 x 10
		105MB/Q/$899; 105MB/C/$799				
Liberty	Liberty 100C/105Q	100MB/C/$999; 105MB/Q/$1099	no	direct	yes	2 x 5 x 7
MacProducts	Magic	80MB/Q/$775; 105MB/Q/$869	yes	both	no	2.5 x 10 x 10.75
		100MB/SI/$950				
Maxcess	E-Series	80MB/Q/$1395; 105MB/Q/$1495	yes	both	no	2.4 x 9.5 x 9.75
Maxcess	V-Series	80MB/Q/$1395; 105MB/Q/$1495	yes	both	no	6.5 x 3 x 8
MicroNet	Micro/Stack	80MB/S/$1245; 105MB/C/$1395	yes	dealers	yes	3 x 10 x 10.5
		105MB/CDC, SI/$1795				
Microtech	Nova	80MB/Q/$1019; 105MB/Q/$1099	yes	dealers[3]	no	2.5 x 9.7 x 10.5
		150MB/M/$1469				
Mirror Technologies	Mirror MP	80MB/Q/$887; 105MB/Q/$947	yes	direct	no	2.5 x 10 x 10.75
PCPC	MacBottom	84MB/Q/$789; 105MB/Q/$1029	yes	both	no	2 x 9.5 x 9.7
PLI	PL100 Turbo	100MB/C/$1099; 100MB/T/$1099	yes	dealers	no	2.37 x 9.75 x 9.75
Procom	MD series	80MB/Y/$1195; 100MB/C/$1350	yes	dealers	no	2.25 x 9.7 x 10.25
		150MB/M/$1895				
Relax	Hard Plus Series	80MB/S/$879; 100MB/C/$1149	yes	dealers	yes	3.5 x 10.5 x 10.5
		150MB/CDC/$1749				
Rodime	Cobra 100e	100MB/R/$1949; 100MB plus/R/$1799	yes	dealers	no	2.4 x 9.7 x 10.4
Ruby Systems	StarDrive	80MB/Q/$1385; 90MB/SI/$1569	yes	dealers[3]	yes	2.25 x 10 x 10.5
		105MB/Q/$1599; 130MB/SI/$1999				
Storage Dimensions	MacinStor ZFP	80MB/Q/$1799; 105MB/Q/$1899	yes	dealers	no	3 x 9.7 x 10
SuperMac	DataFrame XP	105MB/Q/$1599; 150MB/M/$2099	yes	dealers	no	8 x 3 x 9.5
Tallgrass	TravelPac 80	80MB/Q/$1895	no	dealers	yes[2]	2 x 4.5 x 7
Toshiba America	MacKit 140	140MB/T/$1595	yes	dealers[3]	no	3.75 x 10.25 x 10
Westcom	WE	80MB/Q/$690; 105MB/Q/$754	yes	both	no	3 x 10 x 10.5
		80MB/S/$620				

[1] *C = Connor, CDC = CDC, CI = C. Itoh, F = Fujitsu, M = Micropolis, Q = Quantum, R = Rodime, S = Seagate, SI = Seagate (formerly Imprimis), T = Toshiba, Y = YE-Data.*

[2] *Portable version only.*

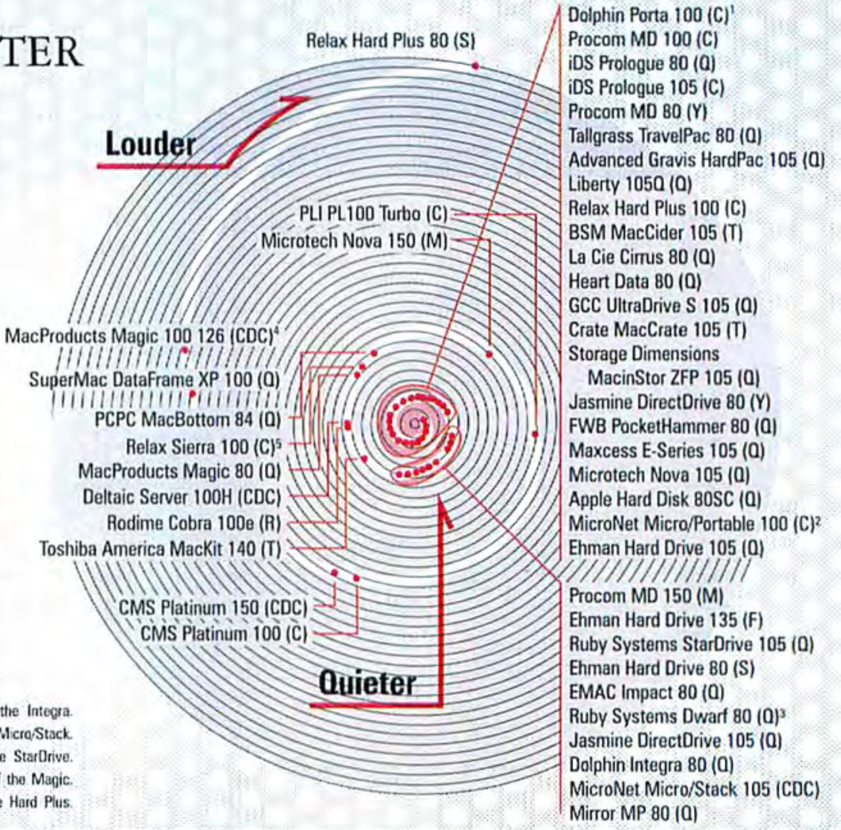
[3] *Sold direct to corporations, schools, government, or in areas where there are no dealers.*

[4] *Drive(s) not received in time for testing.*

Case Material	Type of Termination	Partitioning Software	Backup Software	Password-Protection Software	Other Software	Best Seek Time on Mac IIcx (in Milliseconds)
plastic	external	no	HD Backup	no	no	22
plastic	internal	no	no	yes	Advanced Security	21
metal	internal	yes	HD Backup	no	no	27
metal	internal	no	no	no	no	18
metal	internal	yes	no	no	no	26
metal	external	yes	no	yes	no	19
metal	internal	yes	HD Backup	no	shareware	22
metal	internal	yes	DS Backup	no	MacTree Plus	22
plastic	external	yes	HD Backup	no	no	22
metal	internal	yes	HD Backup	yes	Hard Disk DeadBolt	22
plastic	external	yes	SUM II	yes	SUM II, shareware, spooler	22
metal	internal	yes	no	no	no	23
metal	either	yes	HD Backup	no	no	22
plastic	internal	no	HD Backup	yes	shareware	21
plastic	internal	yes	SUM II	yes	SUM II, BMUG shareware, Platinum Flower	23
plastic	internal	yes	DS Backup	yes	Silverlining, SilverServer, shareware	22
plastic	internal	yes	DS Backup	yes	Silverlining, SilverServer, shareware	not tested[4]
metal	internal	yes	HD Backup	yes	no	23
metal	either	no	HD Backup	no	shareware	18
metal	internal	yes	no	yes	QuicKeys Lite, DiskTop, MockPackage	23
metal	internal	yes	no	yes	QuicKeys Lite, DiskTop, MockPackage	not tested[4]
plastic	internal	yes	HD Backup	yes	no	19
plastic	internal	yes	DS Backup	no	shareware/MacTree Plus	15
metal	internal	no	HD Backup	no	shareware	22
plastic	internal	no	HFS Backup	no	SCSI Floppy, Floppy Copy, Eureka DA	22
metal	internal	yes	Turbo Back	no	Turbo Optimizer, Turbo Cache, Turbo Spool	23
plastic	switchable	no	HD Backup	no	no	15
metal	external	no	HD Backup	no	no	18
plastic	internal	yes	FastBack	yes	no	19
metal	internal	yes	HD Backup	yes	no	21
metal	external	yes	PC Tools for Mac	yes	PC Tools for Mac	22
metal	internal	yes	DiskFit	yes	SuperSpool, SuperLaserSpool, encryption	22
plastic	internal	no	no	no	DiskTools Plus	22
metal	internal	yes	no	no	no	not tested[4]
metal	internal	yes	HD Backup	yes	shareware	22

A LITTLE QUIETER PLEASE

This spiral graph represents the way loudness is measured. That is, for every 3-decibel increase, loudness doubles. Drives represented by dots closest to the center of the spiral are quietest (about the level of bedroom noise) while those on the outer edges are much noisier (about the level of conversational speech). Not surprisingly, the portable drives (which don't include a fan) were generally the quietest. Some drives that were tested for speed arrived too late to be tested for noise level.



[1] Porta 100 is the name of the portable version of the Integra.
[2] Micro/Portable is the name of the portable version of the Micro/Stack.
[3] Dwarf 80 is the name of the portable version of the StarDrive.
[4] Magic 100 126 is the name of the portable version of the Magic.
[5] Sierra 100 is the name of the portable version of the Hard Plus.

although they still came in near the bottom of our speed tests. As an experiment, I retested the drives at a 2:1 ratio on the Macintosh II, again using the PageMaker save and folder-duplication benchmarks. Surprisingly, the drives performed at exactly the same speed as they had when run at a 1:1 interleave ratio. I then performed the same tests using an updated driver (version 2.2.6) that Ehman claimed would increase the drive's write speed 3.5 times. No matter what interleave I set, the drives still ran the tests at the exact same speed. Hold off on buying the Ehman drives—any bargain price you find won't be worth the frustration you'll have in getting these drives up and running.

We can't recommend Jasmine's DirectDrive, in spite of its nice array of software, excellent manuals, and sleek case. For the last several months, we've heard complaints from numerous customers about Jasmine's inability to service its hard disks and its problems in fulfilling new orders. Support lines are always busy and calls aren't being returned. Then, just as this article went to press, Jasmine filed for protection under Chapter 11 of the bankruptcy laws. Although the company claims it will honor all outstanding service claims and orders, it cannot do so until it receives more financing (see *MacBulletin,* May 1990). Order from Jasmine at your own risk.

The other hard disks to avoid are slow performers with little software and unhelpful manuals. Toshiba's MacKit doesn't even come with a hardware-installation manual. In all of these drives, formatting software is poorly designed, and in some cases (such as units from Relax and MacProducts) the driver doesn't work consistently. (Relax—which sells its driver to MacProducts—claims it was unaware of any problems. The company is working to fix the driver.)

We very nearly deleted the Westcom drives from this review. The company moved its headquarters during the review period and didn't leave a forwarding telephone number. It also was not listed in directory assistance. We only found out about the move when someone from Westcom called to request that we return the company's hard disks. The whole fiasco seemed close enough to a Twilight Zone event to make me uncomfortable with the company's ability (and willingness) to provide good customer support.

Portables

Advanced Gravis, Crate, Dolphin, iDS, Liberty, MicroNet, Relax, Ruby, Tallgrass.

The minute you see one of these small, lightweight hard disks you'll want one. They are cheaper and quieter than standard hard disks from the same company. How did the vendors achieve these advantages? Simply by removing the power supply. Instead of hooking these units to a power outlet, you attach a cable from the hard disk to the Mac's floppy drive port.

Don't be too hasty in buying one of these portables, however. We found that these tempting beauties have severe limitations. For instance, they won't run on a Mac II or IIx because those machines don't include a floppy drive port. This alone makes the portables impractical for any application where you need to move megabytes of data between a variety of nonnetworked Macs.

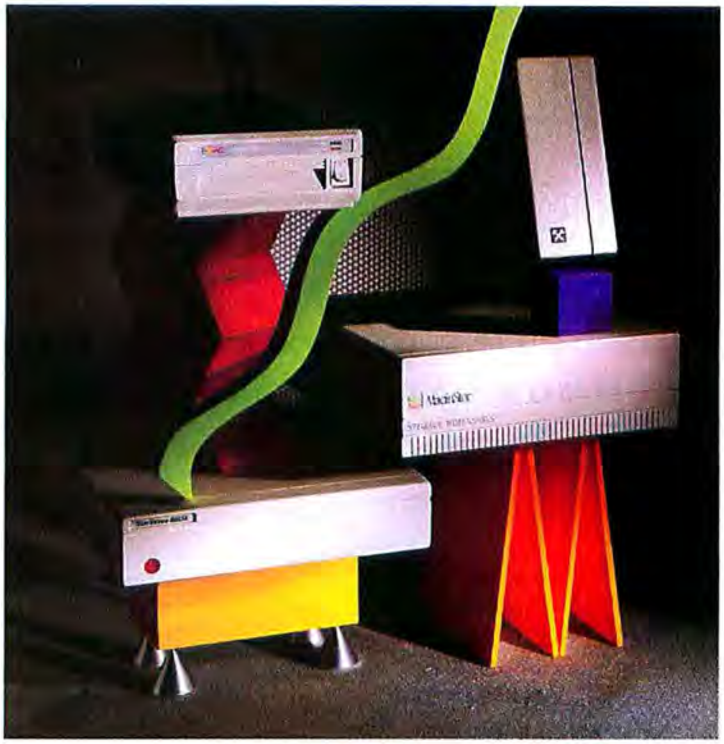
You can buy an external power supply to connect a portable as you would a standard hard disk. But an external power supply defeats the portables' size and weight advantages. Plus, the power supply costs an extra $70 or so. That's equal to what you save on the portable in the first place. Relax's Sierra 100 currently requires an external power supply—this drive can't power off the floppy drive as it is supposed to.

Even an external power supply, however, won't solve the problem these hard disks have in booting from a Macintosh IIcx or IIci with an internal hard disk. When a Mac boots up it starts with the peripheral with the highest SCSI address (6 is the highest, 0 the lowest). Because those Macs are so fast, you would normally turn on an external hard disk before turning on the Mac, thus ensuring that the platters are up to speed when the Mac calls on the drive. But since a portable takes its power from the Mac, you have to turn on both at once. Invariably, the portable's platters are not ready; the Mac passes them and goes to the internal hard disk, which is always set at a SCSI address of zero (0). You then have to restart the Mac to get the portable to mount. Even that scheme couldn't get the Aristotle HardPac and Tallgrass TravelPac to run on a Macintosh IIcx.

The only real advantages these portable hard disks offer are for Macintosh Portable users. Since a portable hard disk doesn't require a power outlet to work, you can use one with a Macintosh Portable while waiting in airports or working outdoors. Only portables from Dolphin and iDS offer a sleep feature that reduces power requirements to a bare trickle whenever the Macintosh Portable is idle for a while. Overall, we see no real reason to buy one of these units over the slightly bigger (but still small) hard disks like the EMAC Impact, FWB PocketHammer, La Cie Cirrus, Liberty 100, or Maxcess V-Series.

A Bit More to Know

All of the hard disks we tested used drive mechanisms from one of several vendors—usually Quantum, Seagate, or Connor. You can draw general conclusions about a product's performance once you know which mechanism it uses (Quantum-based units are generally the fastest, for example), but the efficiency of the vendor's software driver also counts. The Quantum mechanisms have a solid reputation for reliability (despite the seek problems these drives had last year) as do the Wren drives from Seagate (these drives are produced by Imprimis, which is now a part of Seagate). More recently, *Macworld* has heard good reports from users and dealers on mechanisms from Connor. Still, you'll want that reputation backed by a vendor who offers good service and support either to you or to your dealer.



EMAC's Impact, FWB's PocketHammer, Storage Dimensions' MacinStor, and Ruby Systems' StarDrive

Quantum-based hard disks are also a bit more expensive than products from other manufacturers. Some companies sell hard disks with different drive mechanisms at different prices (these are all listed in "Hard Disks Compared"). With these companies you can specify which mechanism you want. Other companies, however, sell hard disks that contain different mechanisms for the same price. These companies don't always know which units they will have in stock when you order, so they frequently cannot comply with requests for particular mechanisms. Buy these hard disks for their support, software, and case design rather than for performance statistics.

Mac hard disk buyers have reason to be pleased. Prices have dropped while quality has risen. Although no unit scores perfectly in every category, some, such as our top-picks, come closer than did hard disks in the past.

See *Where to Buy* for contact information.

Calling

THE INSIDE LINE ON SIX GENERAL-PURPOSE TELECOMMUNICATIONS PROGRAMS

by Larry Loeb

Silently and inexorably, data networks are growing every day. Business has for some time seen how much can be accomplished with computer-to-computer communications. Now individuals are realizing that with a Mac, a modem, and the appropriate software, they can take advantage of information services available by telephone.

Whether it's a local bulletin board service (BBS) or a commercial information service you're tapping into, you need a way to channel the information you want into the Mac. That's where telecommunications programs come in. Telecom programs both control what goes on between Mac and modem, and act as the intermediary between the Mac and the computer on the other end of the telephone line.

I looked at six of the most popular general-purpose telecom programs—Macknowledge, MicroPhone II, Smartcom II, VersaTerm-Pro, White Knight, and Zterm—to see what each offers. To review the programs, I used my Mac Plus with 2.5 megabytes of RAM and two U.S. Robotics Courier HST Dual Standard 9600-bits-per-second (bps) modems.

Most BBSs and information services communicate using text characters, and all of these programs support such text-based services. Some commercial information services, however, have developed software that lets you access information with the conventional Mac interface instead of text command sequences (see "Picture Perfect").

Getting Connected

The main purpose of communications software is getting you connected. To do that, the software has to be compatible with your modem. The easiest way to ensure compatibility is to make sure that the modem is Hayes-compatible, that is, it understands the Hayes AT command set. The Hayes command set is the standard method for communications programs to control modems. If you have a nonstandard or high-speed modem, or if your phone line goes through a PBX system, compatibility is something you need to pay particular attention to.

(For more information, see "Choosing a 2400-bps Modem," *Macworld,* May 1990, and "Getting Started with Communications," *Macworld,* May 1990.)

Macknowledge, MicroPhone II, Smartcom II, VersaTerm-Pro, White Knight, and Zterm all work with Hayes-compatible modems. For those of you who don't have Hayes-compatible modems, Macknowledge and MicroPhone II give you the option of selecting or writing special drivers.

Once the Mac and modem can talk to each other, the next step is to make sure that setup can talk to the remote modem and computer you're

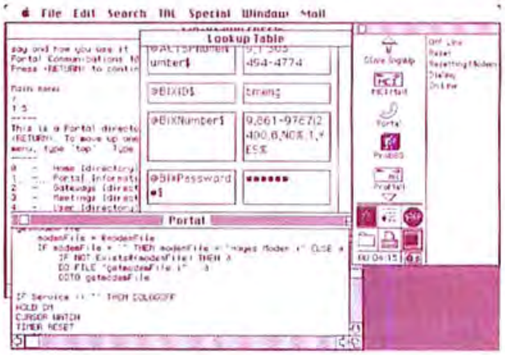
Information

JOHN HERSEY

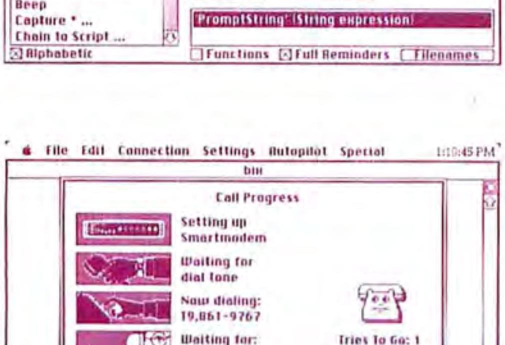
dialing in to. Whether that remote computer is a stand-alone Mac or an IBM PC, a BBS or an information service, a minicomputer or a mainframe computer, you must make sure that its *communications parameters* match those on your setup. Those parameters—bits per character, parity, and stop bits—ensure that the two computers are speaking the same digital language. All of the software I looked at lets you set these communications parameters.

Terminally Happy

Telecommunications software has to do more than just connect a Mac with another computer. You need an accurate display of the information the remote computer is sending to you. You also want to make sure the remote computer understands the commands and data you're sending to it. To do these things, the Mac must be able to mimic a display device the remote computer is familiar with. And this brings us to the topic of *terminal emulation*.



Macknowledge
In Macknowledge, a list of scripts appears in the Control Palette. The Lookup Table maintains ID, password, and telephone number information; the Macknowledge window is the terminal screen. The active window shows a simple TAL program.



Script Name: binon

☒ Menu
☒ Button

```
Send Text String "'at'"
Wait for Text "'at'"
Send Text String "'^M'"
Wait for Line Containing "at"
Wait for Line Containing "'OK'"
Send Text String "'atdp7874674^M"
Wait for Line Containing "' 2400'"
Send Text String "'a'"
```

Line: 8

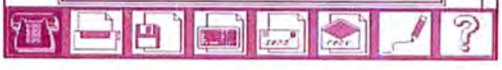
Abort Script
Alert * ...
Append to File * ...
Beep
Capture * ...
Chain to Script ...

OK
OK/Abort
OK/Cancel

'PromptString':(String expression)

☒ Alphabetic ☐ Functions ☒ Full Reminders ☐ Filenames

MicroPhone II
Thanks to MicroPhone II's script editor, writing a script in MicroPhone II is really easy. All you have to do is select commands and functions from scrolling lists, and fill in the blanks.



Smartcom II
You can see how icon-oriented the interface to Smartcom II is by looking at the bottom of the screen. Because you write scripts by clicking on icons, autopilots aren't as powerful—but they work without a hitch.

The emulation you choose depends on the service (or computer) you call. All the software I looked at supports a variety of terminals; the most commonly supported ones are teletype emulation (TTY) and VT100.

TTY is the simplest—some people might say the dumbest—of all terminal emulations. It's not much different from a typewriter, except it displays data on a computer screen instead of paper. The English-language characters used by TTY (and most other terminals for that matter) are defined by the ASCII character set.

By supporting VT100 or VT102 emulation, a program can make a Mac function like the Digital Equipment Corporation VT100 terminal series. VT100 terminals are more sophisticated than TTY terminals. For example, they can print in specific regions on the screen (like the top or bottom) without disturbing other parts of the display; TTY terminals, in contrast, just spew out lines of characters. Since most electronic services support it, VT100 terminal emulation is a good thing to have. I use this terminal setting almost exclusively.

Capturing Information

Chances are you'll probably want to save some of that text scrolling across your screen. Telecom programs have a screen buffer that temporarily holds incoming data. You can copy that information and paste it into another file. With the exception of Smartcom II and Zterm, all of the communications programs reviewed here let you select text and save it as a table to import into a spreadsheet.

But there are other ways to save online information. For example, you can save text to a *capture buffer*, a separate file you create on disk. Doing this puts all the information into one or more stand-alone files without continual cutting, copying, and pasting. You can also print text line by line, in some cases page by page, as soon as it's received by your modem.

Personally, I use file-capture capabilities in communications software more often than printing capabilities, because I often need to move files from my Mac to my Z88 laptop. But for sharing information, paper is still the best way. So don't ignore printing capabilities in communications programs.

Downloading Files

To capture more than text—for example, applications or formatted files such as PageMaker documents—your communications software must first support what is called *MacBinary* mode. MacBinary ensures that a downloaded Mac file or application turns up on your desktop as an icon you can double-click to open.

You also have to make sure that the file gets received without any errors. By using one of several *error-control* protocols with MacBinary, you can easily download error-free files from a remote computer, BBS, or information service.

Xmodem and Ymodem Because it's almost universally supported in one form or another on all computer systems that transfer information, support for the Xmodem protocol is absolutely necessary in a Mac communications program.

Scripts and macros make telecommunications easier

There are two main variants of Xmodem. The *classic* Xmodem protocol sends information 128 bytes at a time. The sending computer then waits for an acknowledgment from the receiving computer that information has been received correctly. The *1K* version of Xmodem sends 1024 bytes at a time instead of 128 bytes.

As a result, a lot of Xmodem transmission time is spent waiting for acknowledgments. But Xmodem works, even over noisy phone lines. Ymodem is an extension of Xmodem that permits *batch* transfers. Batch transfers let you group multiple files together and send them with one command.

Zmodem Zmodem is a much more efficient file-transfer protocol than Xmodem. In fact, based on characters transferred per second, Zmodem routinely beats out Xmodem by a factor of more than three to one. Unfortunately, not all information services support Zmodem file transfers (two that do are BIX and GEnie). If you often transfer files modem to modem, however, look for Zmodem support in your communications software. It will save you time, and as a result, cut down on your phone bill.

Finally, there's another protocol that may pop up. Kermit, developed by Columbia University, is marginally faster than Xmodem. Kermit is available on many minicomputers and UNIX systems, so you will want to make sure your communications software supports it if you transfer files between a Mac and those types of computers.

Scripts and Macros

To get onto and around on an online service, you type text commands, which don't usually vary from session to session. If you had a communications program that did the typing for you, it could eliminate typing errors. It would also save you from having to remember all the commands necessary to navigate that service.

That's where *macros* and *scripts* come in. Generally, a macro enables you to send a text string or execute a telecom command with one simple menu or keyboard shortcut. For example, a macro might be a specific command—such as "get mail." A script usually lets you perform a series of actions with one single command. You could write a script to dial a service, log on, download any messages waiting for you, and then log off. Some programs even let you assign a script to a menu item, ⌘-key combination, or button.

By the way, some programs use different terms. Smartcom II uses *autopilot* to refer to both scripts and macros; VersaTerm-Pro calls its macros *command sets*.

If you plan to do a lot of scripting, you'll be glad to know that some communications programs generate scripts automatically. Macknowledge, MicroPhone II, Smartcom II, VersaTerm-Pro, and White Knight can all "watch" while you perform a task. The program then records the prompts, your responses, and so on, necessary to accomplish that task in a script. Having this handy feature means you never have to write a script from scratch. Keep in mind, though, that a recorded script isn't always the optimal script. You may have to edit it further to get exactly what you want.

Now that you know what the features are, let's take an in-depth look at what each telecom program offers.

Macknowledge

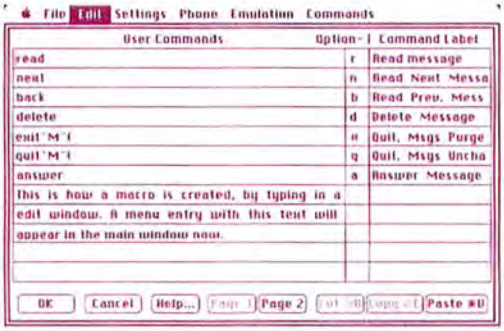
First let me say this: Macknowledge is not your typical general-purpose telecommunications program. Instead, it's a stand-alone set of scripts written for general-purpose telecom. More accurately, Macknowledge is a *run-time* version of Prometheus's Acknowledge, a framework or development environment for serious (and I mean very serious) telecommunications professionals.

Macknowledge is the only program I looked at that can automatically configure settings for different modems, a handy feature if you have a nonstandard modem. Prometheus provides a set of prewritten scripts for a variety of information services—BIX, CompuServe, Dow Jones, GEnie, MCI Mail, and others.

You activate those scripts by clicking on icons for those services in Macknowledge's Control Palette. The first time you use a script, Macknowledge asks for a user name, password, and access telephone number for that script's service. If you don't know the access number, a unique Macknowledge feature can help: a table of phone numbers uses your area code to help you select the right number. I thought that was great. Unfortunately, the only time you can see that table is the first time you run a particular script. If you want to change phone numbers later in a script—or user names or passwords, for that matter—you must do so in Macknowledge's Lookup Table, which maintains that information for scripts (see "Macknowledge").

Macknowledge scripts are written in Telecommunications Access Language (TAL), a full-featured programming language. Although the program offers a watch-me feature that records actions and then translates them into TAL code, I found that watch-me didn't work all the time. Sometimes my scripts worked and sometimes they didn't—but worst of all, I couldn't find a way to protect my password within a script. This was incredibly frustrating because it meant I had to learn TAL to use Macknowledge. A script editor called EZ-TAL tries to make writing or editing TAL scripts a point-and-click affair, but doesn't really succeed.

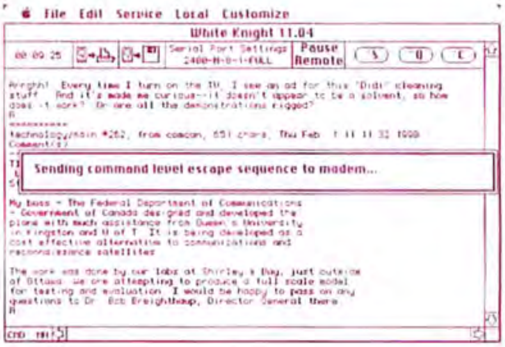
Aside from scripting, there were some other things that bothered me about Macknowledge. First, it doesn't support Ymodem and Zmodem protocols. Second, unless you close it, the Control Palette floats above the Macknowledge window (the terminal emulator screen) all the time, blocking your view of that screen. Third, the way the supplied scripts are written, you can only log off services from Macknowledge's menu. If you log off manually, the program isn't smart enough to know that you've already disconnected, and tries to log you off again.



User Commands	Option-1	Command Label
read	r	Read message
next	n	Read Next Messa
back	b	Read Prev. Mess
delete	d	Delete Message
exit^M^I	x	Quit, Msgs Purge
quit^M^I	q	Quit, Msgs Uncha
answer	a	Answer Message
This is how a macro is created, by typing in a		
edit window. A menu entry with this text will		
appear in the main window now.		

VersaTerm-Pro

VersaTerm-Pro lets you define up to 24 macros in each of 2 macro sets. For example, you could have 1 macro set for Kermit, and another for VMS Mail. Assigning a macro a Command Label makes it appear in the Commands menu.



```
Arrgh!  Every time I turn on the TV, I see an ad for this "Didi" cleaning
stuff.  And it's made me curious--it doesn't appear to be a solvent, so how
does it work?  Or are all the demonstrations rigged?
A
==========
technology/main #262, from comcon, 651 chars, Thu Feb  1 11 11 32 1990
Comment(s)
```

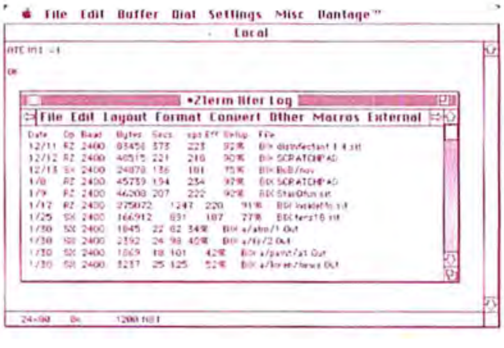
Sending command level escape sequence to modem...

```
My boss - The Federal Department of Communications
- Government of Canada designed and developed the
plane with much assistance from Queen's University
in Kingston and U of T  It is being developed as a
cost effective alternative to communications and
reconnaissance satellites

The work was done by our labs at Shirley's Bay, just outside
of Ottawa  We are attempting to produce a full scale model
for testing and evaluation  I would be happy to pass on any
questions to Dr  Bob Breithaup, Director General there
A
```

White Knight

Even though there have been a few changes to the user interface, White Knight still feels like faithful ol' Red Ryder. An area in the bottom left corner of the screen echoes any command characters you type for keyboard shortcuts.



Zterm

Zterm's unique file-transfer log lets you see almost everything about downloaded files: when, how, time, size, and so on. There's even an efficiency rating based on the number of characters transferred per second.

MicroPhone II 3.0

MicroPhone II 3.0 gets my vote as the most improved of the recent round of telecom-program upgrades. It now has a full suite of features, including support for Zmodem, ISO-7 international character sets, and optional password protection for documents or scripts. You also get a text editor DA that can manipulate text files under 32K in length.

Of the programs I looked at, MicroPhone II has the most extensive scripting abilities. To create a script, you can use either the program's Watch Me feature, import a text file as a script, or write a script from scratch. Editing a script is easy too, thanks to MicroPhone II's script editor. Depending on the command you select, the program is intelligent enough to help you complete that scripting command (see "MicroPhone II"). To learn more about scripting, you can always look at either the fully indexed, very readable manual or the copious sample scripts Software Ventures provides with the program.

You can create custom dialog boxes for scripts—a capability unique to MicroPhone II. Another unique feature is the program's ability to incorporate HyperCard external functions (XFCNs) and external commands (XCMDs) in a script. This means you can design and add custom functions to MicroPhone II that the Software Ventures gang never thought of.

My one big complaint about MicroPhone II is that it still has too few keyboard equivalents for commands. This problem has been fixed somewhat in version 3.0: you now can do things like quit, copy, cut, and paste using the standard keyboard shortcuts. But to perform more sophisticated tasks—for example, send or receive a file, or change file-transfer protocols—you still have to either make menu choices, click on an icon, or create your own macros.

Smartcom II

Smartcom II's attractive icon-based interface is likely to appeal to users with little or no programming experience. Where VersaTerm-Pro is stark and a little obscure, Smartcom II offers context-sensitive help at virtually any point—just click on the help button. (Neither MicroPhone nor White Knight offers any online help at all.) And rather than requiring you to conquer a scripting language, Smartcom II lets you construct autopilots using icons at the bottom of the editing window (see "Smartcom II"). You can design a script to become either a menu choice or a button. I found that Smartcom II's autopilot feature worked flawlessly, generating scripts that worked without any editing. One unique Smartcom II feature lets two connected Macs, both running Smartcom II, send mouse-driven graphics back and forth.

Despite Smartcom II's icon-based interface, some small elements are counterintuitive. I went bonkers looking for a way to hang up the phone until I finally read the manual, which told me to click on the phone icon. My biggest problem with Smartcom II, however, is that it's limited to Xmodem transfers. Most people eventually need more than that in a general-purpose telecom program. I know I do.

VersaTerm-Pro

VersaTerm-Pro 3.1's strong points are its terminal emulation capabilities. It is the only general-purpose telecommunications program that emulates Tektronix 4010, 4012, 4014, and 4015 graphics terminals and Data General's D200 terminal series. VersaTerm-Pro's VT100 emulation is excellent, providing direct support for UNIX's VI and EMACS editors. Indeed, VersaTerm-Pro is the program I choose when doing heavy work on a VAX.

VersaTerm-Pro is also the only program I reviewed that currently supports Apple's Communications Toolbox, which will be included in System 7.0 (until System 7.0 arrives, you install the Communications Toolbox as an INIT). The Communications Toolbox is a set of common *tools*—routines, functions, and features—that a program uses to provide data-connection, terminal-emulation, and file-transfer capabilities. (Several other vendors, for example Software Ventures, have announced their intention to support the Communications Toolbox.)

According to a draft manual I saw, VersaTerm-Pro will not use Communications Toolbox terminal-emulation tools. VersaTerm-Pro already provides text and Xmodem file-transfer capabilities, so Synergy Software has elected not to offer those Apple Communications Toolbox tools. However, Synergy does plan to ship the serial- and modem-connection tools—in addition to any other useful tools that crop up in the future—to VersaTerm-Pro users as soon as they become available from Apple.

In keeping with its terminal-emulation bent, VersaTerm-Pro offers good macro capabilities, but no scripting. Synergy supplies some prewritten macro sets (for VMS Mail, UNIX Mail, and Kermit, for example), and you can write your own using VersaTerm-Pro's Automatic Macro Define feature. The macro language is primarily based on text- and control-character entry (see "VersaTerm-Pro"). Help buttons are available in most dialog boxes, but there are few keyboard shortcuts. In addition to the lack of scripting, some other missing features make VersaTerm-Pro less useful as a general-purpose telecom program. For example, it doesn't support the 1K variant of Xmodem, nor does it support Zmodem.

White Knight II

White Knight is a renamed—and updated—version of Red Ryder 10.4. And if you like using

PICTURE PERFECT

Unlike general telecommunications software, custom software provides front ends tailored to specific information services. And that customization translates into more Mac-like interfaces to those services—a big difference from the text-based interfaces usually encountered on bulletin boards.

Two examples of front-end programs are Desktop Express and CompuServe Navigator. Desktop Express helps you navigate the MCI Mail service; CompuServe Navigator lets you bypass the sometimes tortuous CompuServe interface to get mail and follow threads. Both simply put a graphical user interface on top of the usual text-based interfaces. While you can log on to MCI Mail and CompuServe with a general telecommunications package, that isn't an option for Connect, America Online, or Prodigy. For each of these information services you must use dedicated telecom software.

The Connect Information Service was the first public online service to provide a noncharacter-based interface. (AppleLink was actually the first, but it's open only to Apple developers, employees, and dealers.) Connect software translates Mac screen actions into online commands. To enter and leave forums and download files, you simply open and close the right folders and files; to connect, read mail, disconnect, and so on, click on various icons.

America Online (originally called AppleLink Personal Edition for the Mac) is similar to Connect in execution; indeed, the two services feel a lot like each other even though they don't look alike. In America Online, you click on department icons to get to topic folders. Then you open and close folders to find messages or download files. Although America Online doesn't let you download files in the background, it does provide online conferencing and a sophisticated chat feature so you can "talk" with other users in real time.

Then, there's Prodigy. Yes, there are graphics and you can use the mouse, but still, Prodigy gets the dubious distinction of being the most un-Maclike Mac telecom program I've seen (maybe because IBM is one of the Prodigy sponsors?). All menus and DAs are inactive so you can't cut, copy, or paste any screen information—and you can only print when there's a print button on the screen.

keyboard shortcuts, White Knight is your program. You can pretty much do everything without ever touching the mouse. Keyboard commands are grouped together by function. For example, typing ⌘-F brings up the group for file-transmission commands; you then type **S** to send a file or **R** to receive one (see "White Knight").

Other enhancements to White Knight include Zmodem support and a reworked user interface. The scripting language has been somewhat improved by the addition of new script commands that reduce the need for "panic" options within a script (panic is what the program does when it can't carry out an action after a predetermined time period). Another addition to the scripting language is support for external commands, or RCMDs. White Knight RCMDs are similar to HyperCard XCMDs but proprietary; you can't use an XCMD as an RCMD.

White Knight lets you decide whether you want to capture incoming text streams with or without line feeds at the end of each text line. Smartcom II, VersaTerm-Pro, and MicroPhone II assume you don't. And with the exception of MicroPhone II, White Knight is the only program that lets you create a mini-BBS so that other people can download files from your Mac.

White Knight lets you record actions for scripts and macros. Unfortunately, White Knight's recorder feature was disappointing. To make usable scripts I had to manually insert "wait" statements between certain actions, just as Red Ryder used to make me do; I didn't have to do this with Smartcom II or MicroPhone II. While I had no trouble printing from within the other telecom programs, I did have a problem printing to my Hewlett-Packard DeskWriter from within White Knight. While there was a workable solution—copying text into a text editor that did print to the DeskWriter—it was still annoying.

Zterm

Zterm is a $30 shareware program, but you shouldn't let that keep you away from it. (Red Ryder garnered its fame as a shareware program too.) Zterm's primary strength is its support of Zmodem—it also offers all the other major file-transfer protocols. It's a cheap, fast way to send and receive files.

Zterm's macro keys let you keep communi-

TELECOM FEATURES

	Macknowledge	MicroPhone II 3.0	Smartcom II 3.01c	VersaTerm-Pro 3.1	White Knight II	Zterm .85
Company	Prometheus Products	Software Ventures	Hayes Microcomputer Products	Synergy Software	The FreeSoft Company	David P. Alverson[1]
Maximum transfer rate	57,600 bps	57,600 bps	38,400 bps	19,200 bps	57,600 bps	57,600 bps
Terminal emulation						
TTY	•	•	•		•	•
VT100	•	•[2]	•	•	•	•
VT52	•		•		•	
Other	Minitel, Prestel			Tektronix 4105, Tektronix 4014, Data General D200, VT220		
Text capture						
To disk	•	•	•	•	•	•
To printer	•	•	•	•	•	•
Copy table	•	•		•	•	
Text only	•	•	•	•	•	
File-transfer protocols						
Xmodem	•	•	•	128 only	•	•
Ymodem		•		1K		•
Kermit		•		•	•	
Zmodem		•			•	•
Background transfers	•	•	•	•	•	•
Macro mechanism	Scripts[3]	scripts	autopilots	command sets	macro buttons	macro buttons
Script mechanism	Scripts[4]	scripts	autopilots	command sets	autopilots	
Learn mode	•	•	•	•	•	

[1] Also available through BBSs. [2] Through VT102 emulation. [3] Through service files. [4] Through Connections files.

cations settings for different bulletin boards in one document. Smartcom II, for example, makes you save the settings for each information service in a separate document. Zterm is the only program that automatically logs file transfers for you, which is useful if you send or receive a lot of files (see "Zterm").

> **All of the programs get you online. The differences have to do with style and user interfaces.**

I found Zterm to be very stable overall, with one exception. When you launch the program, it opens a buffer that stores all text sent to and received from the remote computer; the more text there is, the larger the buffer grows. When the buffer grows to over 300K, Zterm sometimes unexpectedly quits under MultiFinder. Increasing the preferred application size in the Get Info dialog box does not help because Zterm grabs memory as it goes. You can, however, clear the buffer easily within Zterm. I should point out that a buffer that size is unusual—usually the result of logging on to seven or eight different services and reading a lot of information.

As of version .85 (the one I used), Zterm offers no scripting capabilities (though it does have macros), and there is still a bit of work to be done on the VT100 terminal emulation. In addition, the user interface can be confusing, so make sure that you read the accompanying documentation files.

Picking What's Right

When I started this article, I was an admitted White Knight snob. I still think White Knight is the precision tool of communications programs. Its scripting language gives you lots of leeway to modify the program, but you are expected to understand what you are doing. White Knight's manual assumes you're fairly familiar with telecommunications and with programming concepts. In the right hands, White Knight offers unparalleled performance; in the wrong hands, it's very unforgiving.

As a general-purpose telecom program, Macknowledge didn't offer me anything that another program couldn't do as well or better. Writing a Macknowledge script really requires some programming experience with a language such as Pascal. And all the different types of Macknowledge documents (phone journal, lookup tables, scripts, and general documents) make things very confusing for users. Whether or not you like Macknowledge depends on how much you like those supplied scripts, and on how much you like Acknowledge's general framework. I definitely didn't like the scripts. I can see how an experienced TAL programmer could develop a very nice Mac interface (like Connect's, maybe) for an information service using Acknowledge, but I don't recommend Macknowledge for general-purpose telecom.

On the other end, Smartcom II is the simplest to use of all the telecom programs. And, most important, it's bulletproof. I think it would be hard for anyone to make a nonrecoverable mistake with this program. I know many folks who are very happy with Smartcom II and have used it for years without incident. I miss the Zmodem protocol but find Smartcom II's ease-of-use quite seductive. If I let myself, I could succumb quickly.

VersaTerm-Pro is a great tool for working with VAXs or when you want Tektronix terminal emulation. In fact, a lot of people think there's currently no finer tool for getting at a VAX from a Mac than VersaTerm-Pro. Once you're logged on to the remote computer, it's fine. It's the getting there that VersaTerm-Pro doesn't help you much with: most notably, the program lacks the scripting a lot of people want for working with BBSs or commercial information services.

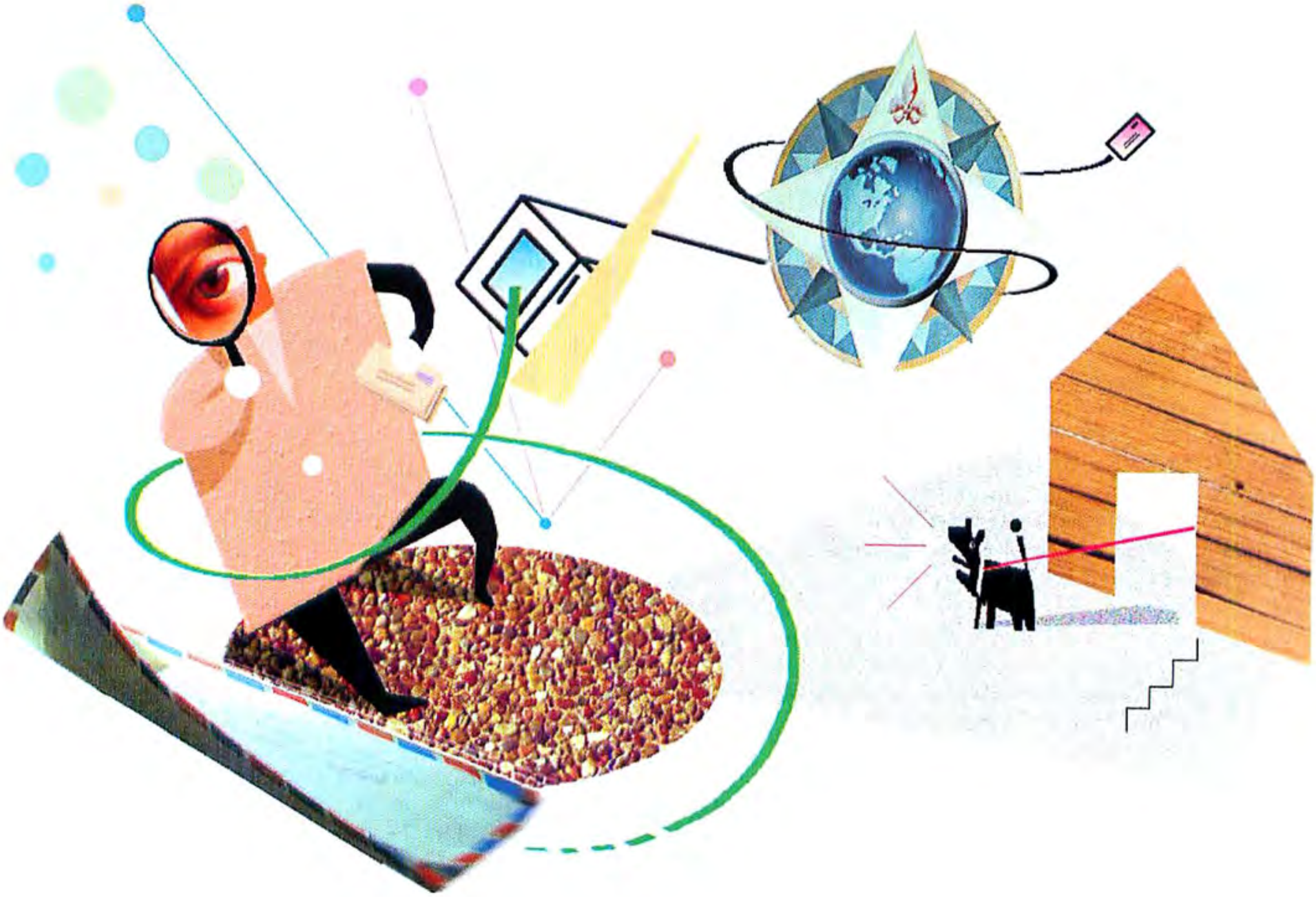
The program I now turn to for most of my day-to-day communications is Zterm. It's quick to load, quick to use, and supports Zmodem—exactly what I want to see in a telecom program. I don't mind Zterm's lack of scripts; I just write a few macros to do log-ons. And because I download many files from information services and BBSs, Zterm's file-transfer log more than compensates for any of the program's deficits.

For general users, though, I have to recommend MicroPhone II. It has come a long way since I last used it and was the best surprise by far of all of the telecom programs. I was impressed by its logical and well-executed interface; it offers the most-common terminal emulations and all the file-transfer protocols. Its scripting feature is powerful and friendly at the same time. Nonprogrammers will find writing scripts a lot easier in MicroPhone II than in White Knight; programmers can easily take advantage of script-language extensions and utilities. Unlike some of the other general-purpose programs, MicroPhone II gives you the choice between easing into telecommunications or diving in. That makes it a winner.

See *Where to Buy* for contact information.

Larry Loeb *is the editor of the Macintosh Exchange on the Byte Information eXchange (BIX), but his day job is being a dentist.*

An investigation of Macintosh electronic



E-MAIL

A Postal Inspection

BY DAVE KOSIUR

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mail software

Electronic mail (E-mail) has quickly become one of the most important applications for networked users. And like other network services—for example, file servers and print spoolers—the success of an E-mail system depends on how well it meets the requirements of users and network administrators alike.

Certainly, both users and administrators are interested in a system's functionality. But often the two have different points of view on what's required from an E-mail system. For example, a user wants an E-mail system that is easy to use; an administrator wants a system that's easy to set up and maintain, is reliable, and can be used on large networks. Then there are important control issues to consider. Who should define address lists—a user or the administrator? What mail forms should be used—anything a user can dream up, or only forms that meet corporate standards?

To help you pick an E-mail system, I'll take a look at how features of current Macintosh E-mail systems address user and administration concerns. I'll focus on the products that currently use a Mac as the mail server: CE Software's QuickMail, Microsoft's Microsoft Mail, and TOPS' InBox.

Not all E-mail systems that allow a Mac to send and receive mail (in other words, act as a client) require a Mac as a server. Two systems, Dayna Communications' DaynaMail and cc:Mail's cc:Mail, can run on Mac servers; however, both require PC-based servers to take advantage of their most sophisticated features. Another program, WordPerfect Office, will offer E-mail—and other network services—to Mac, MS-DOS, and VAX users when it's available (see "The PC Invasion").

What's Important in E-Mail?

To a user, the answer to the question is obvious: E-mail should be easy to use. But let's see what lies beneath that deceptively simple answer.

Addressing mail to anyone on the E-mail system should be easy. Finding someone's E-mail address shouldn't be a struggle, nor should you have to know which mail server is responsible for processing that person's mail. And, of course, you should be able to keep address lists for the individuals, or groups of individuals, you most often send mail to. Options such as status logs and customizable forms can also make using an E-mail system easier. Finally, some users, either in field offices or traveling on the road, may want remote access to E-mail too.

Addressing With InBox, the manager and each individual user can define address lists, but only the manager can create *groups* of addresses. To compensate, InBox lets users create their own *address books,* which can include names from any InBox server. A user can effectively define a group by putting several names into an address book, and then selecting all those names (via InBox's Select All command) as the address list for an E-mail message.

One unique feature of InBox is its support for *aliases.* Aliases let you enter a new name for anyone listed on the mail server when you put that person into an address book. For instance, in your InBox address book, your boss could be listed as Boss or your chief programmer as Head Hacker.

QuickMail, on the other hand, permits any user to define personal address lists or address groups. All you have to do is select names from any QuickMail servers on the network. This flexibility posed some problems in earlier versions of QuickMail: to update address lists, you had to manually query each server to get any address changes. And since each QuickMail server can hold multiple *MailCenters*—such as one for network communications and another for a telecom gateway—you had to query not only each server, but each MailCenter as well.

Happily, QuickMail 2.2 provides a nearly automatic solution for the updating problem. A facility called NameServer periodically polls all QuickMail servers and keeps track of all the latest valid addresses. Instead of going to each MailCenter, users just query NameServer with a new QuickMail command, Verify Addresses. In addition, a Find button in QuickMail's address window lets you search NameServer's database by first name, last name, or department for the address of any QuickMail user. Only the first few letters of the name are necessary to guide the search.

Unlike InBox or QuickMail, Microsoft Mail takes a more centralized view of E-mail. Thus it places more restrictions on users. Only the administrator or manager for each Microsoft Mail server can define user addresses or address groups. While this approach promotes addressing uniformity across workgroup or departmental boundaries, it prevents you from customizing the system to make it easier to use.

Microsoft Mail does, however, provide some features that can make E-mail addressing easier on large networks. Because Microsoft Mail automatically updates the address lists on each server, you always see an up-to-date *global* directory of all the E-mail users on the network. If seeing all the users is overwhelming (and it can be for large networks), you can switch to a *local* mode and see only the names of those users attached to the same server as you are. There's also a search mechanism to help you find someone's address; just type the first few letters of a name, and Microsoft Mail highlights the correct address in the address list.

Tracking Mail The most common method to check if mail you've sent has been delivered or read is to request a return receipt. InBox, Microsoft Mail, and QuickMail all support that option. But if you want more specific information on message status, only QuickMail can help you.

QuickMail maintains a mail log for every user that shows whether a sent message has been read or is still unread, and whether it has been printed, deleted, or filed. However, be forewarned: if you tell QuickMail to keep message information in the log for a long time (for example, 30 days after sending), or if you send lots of mail, the log can get very large. And the larger the mail log, the more slowly QuickMail loads.

File Enclosures Attaching files to a message is an easy and convenient way to move work files around among members of a workgroup. It's certainly easier than setting up a file server or pasting text into a message.

InBox, Microsoft Mail, and QuickMail all permit file enclosures, between two Macs and between a Mac and PC. Although you enclose a file in a mail message pretty much the same way in all the E-mail systems, there are some notable differences. InBox and QuickMail both permit multiple file enclosures per message; Microsoft Mail permits only one.

When it comes to sending files to PCs, only QuickMail automatically assigns DOS extensions to files sent from a Mac. Before you send a file to a PC user with Microsoft Mail, Microsoft recommends that you rename the file according to DOS conventions (8 characters long, with DOS extensions) to make it easier for the PC user to recognize the file you've sent. You should follow the same advice with InBox.

Mail Forms InBox has a very limited repertoire of message forms: a basic message form and a phone message form. Microsoft Mail and QuickMail, on the other hand, offer customizable forms, but differ in how they implement the feature.

In keeping with its centralized approach to E-mail, Microsoft Mail stores all forms on the mail server.

THE PC INVASION

Now that more Macs are living side-by-side with PCs, DOS-based E-mail vendors have finally taken note of the Mac. Several E-mail packages that run on MS-DOS servers now support Mac clients.

One system that has long supported both Mac and DOS clients is 3Com's 3+Mail. 3+Mail runs on 3Com's own server machines, but you can only administrate it from a PC. But with the variety of gateways to other systems and services provided by 3Com, Mac 3+Mail users can access some of the largest mail systems.

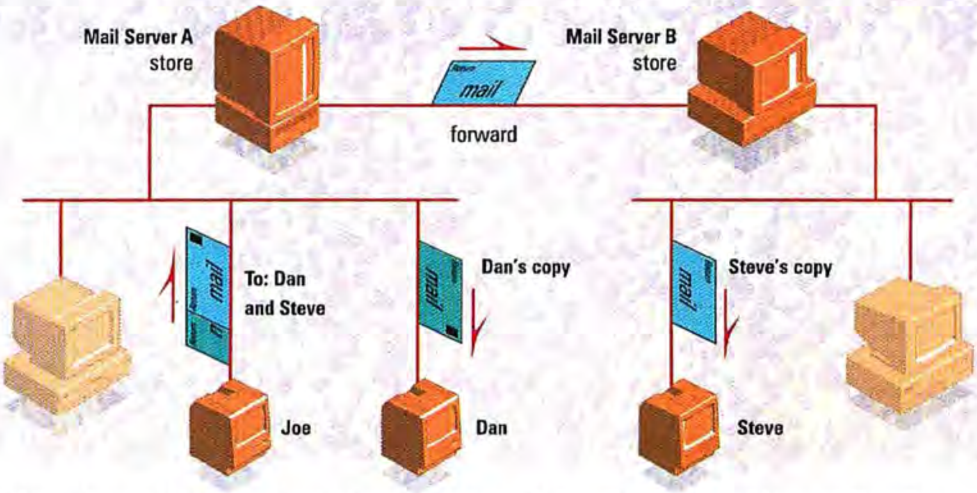
cc:Mail is another product that now supports both DOS machines and Macs. One of the more popular E-mail systems in the IBM PC world, cc:Mail includes such features as graphics file exchange between PCs and Macs, as well as a fax gateway. While Mac-only local area networks (LANs) can make good use of cc:Mail, many of its features—gateways and fax sending and receiving, for example—require a PC server.

DaynaMail, a newer entrant in the E-mail market, behaves much like cc:Mail. On a Macintosh-only LAN, DaynaMail is a simple, easy-to-use mail system without many frills; there are no customizable forms, for example. You can install DaynaMail on a network in one of two ways: server-based and node-to-node. Because DaynaMail is based on the Message Handling System (MHS), you can link a DaynaMail server to another MHS-based server to access gateways or other LAN E-mail systems. MHS is a store-and-forward mechanism developed by Action Technologies, and is included in Novell's Netware. DaynaMail's unique, node-to-node E-mail system is designed for LANs without a server. Mail can be sent only if both the sender and receiver are logged on to the network. Despite that limitation, the node-to-node configuration can prove useful in small workgroups.

The Coordinator, from Action Technology, has been described as a work-management and communications system that happens to include E-mail. Although a full-function Coordinator client is not yet available for Mac users, Action Technology does offer MacAccess, a DA. MacAccess allows Mac users on a Novell Netware network to send and receive mail to other Coordinator users via a Netware server.

Another newcomer to Mac E-mail is Network Courier, from Consumers Software. Consumers plans to offer a Mac client for Network Courier soon, which runs on MHS-based servers. With it, Mac clients will be able to take advantage of Consumers' gateways, which include gateways to X.400, PROFS, and MCI Mail.

STORE AND FORWARD



Joe, who is logged on to Mail Server A, sends mail to Dan and Steve. In a store-and-forward E-mail system, Server A stores mail for both Dan and Steve until it can deliver that mail. Dan receives his mail when he logs on to the network and Server A. Steve's copy gets forwarded from Server A to Mail Server B whenever Server A connects to Server B. That could be immediately, if both servers are on the same network, or later, if the connection is made by modem. Server B then stores Steve's copy until Steve logs on to that server.

While any user can design new forms using Microsoft's HyperCard forms stack, only the mail manager can install a form (via Microsoft's Forms Mover) on the server. Once installed, the form becomes available to all users of that server.

In contrast, QuickMail forms are stored on each user's Mac, not on the server. Using the QM Forms application, any QuickMail user can design and install personalized message forms. Should a recipient not have a given form, QuickMail sends the form along with the actual message. This approach does have one disadvantage; if too many users have their own customized forms, unnecessary increases in network traffic can result.

Remote Access Thanks to products from Shiva, Hayes, and InfoSphere, it's a relatively simple matter for someone with a modem to become part of an AppleTalk network, which allows a remote user to access the mail server just like any local user. However, due in part to the nature of AppleTalk protocols, network access via modem slows down E-mail system response time.

QuickMail offers two simpler, faster solutions for remote access to its mail servers. First, you can use the QM Remote application on a Mac to dial a mail server directly via modem. Once connected, you can either send or receive mail. Second, you can use any terminal-emulation program (on a Mac or even an IBM PC) to dial into the mail server. You then get a simple text-based menu system for sending and receiving mail.

Near-Mindless Management?

For E-mail system managers, installation and maintenance issues are key. You have to worry about propagation of address lists, storage of messages and files, and reliability. If you handle multiple E-mail servers, you want to make sure those servers communicate when they should. And nowadays, the appeal of a Mac-based E-mail system may depend on how seamlessly it can exchange mail with existing corporate E-mail systems (see "Gateways to the World").

Server Setup You can install InBox two different ways, either as a Mail-Server Message Center or as a File-Server Message Center. The Mail-Server Message Center relies on InBox software to send messages between users; it can only be installed on a Mac. The File-Server Message Center, meanwhile, uses existing file-service networks (AppleShare or TOPS) to send mail. It can be installed on any computer that runs the TOPS file server, such as a PC, VAX, or Sun workstation.

InBox handles up to 20 users per mail center. If you need more capacity, you have to use InBox Plus, which permits up to 100 mailboxes per message center, as well as more than one message center on a server. InBox Plus also provides gateways to other mail systems, a capability the plain vanilla InBox doesn't have.

Microsoft Mail does not depend on a file server, but can be installed to run in the background on AppleShare or TOPS servers. The Microsoft Mail server can also run in the background on any networked Macintosh. Frankly, I do not recommend the latter installation, unless you want to make an enemy of the person who works on that Mac.

Like Microsoft Mail, QuickMail doesn't require the existence of a file server, but will run in the background of an AppleShare or TOPS server. QuickMail has its own server software, QM Administrator, to maintain its

ELECTRONIC MAIL FEATURES

	DaynaMail 1.0	InBox 3.0	Microsoft Mail 2.0	QuickMail 2.2	WordPerfect Office
GENERAL					
Architecture	store-and-forward [†]	store-and-forward	store-and-forward	store-and-forward	store-and-forward
Client Macs supported	Mac Plus, SE, II	Mac Plus, SE, II	Mac Plus, SE, II	Mac Plus, SE, II	Mac Plus, SE, II
Server-server communications	MHS	via Router program	internal	internal	Internal
Remote access to server	indirect via network	indirect via network	indirect via network	direct via modem	direct via modem
Copies of message stored	1 per addressee	1 per addressee	1 per message	1 per addressee	1 per addressee
Server type	MHS, AFP, TOPS	InBox, AFP, TOPS	Microsoft Mail, AFP	QuickMail, AFP, TOPS	WP Office, TOPS, AFP
File storage on server	HFS	proprietary mail files	proprietary database file	HFS	HFS
Public messages	○	●	○	●	●
Mail polling	client activated	interactive	interactive	interactive	interactive
Message types	text	text	text, graphics, voice	text, graphics, voice	text, graphics
Encrypted messages	○	○	○	○	●
Customizable forms*	○	○	M	U	U
Address lists*	M, U	M, U	M	M, U	M, U
Group addresses*	U	M [§]	M	U	M, U
Global address updating	manual	automatic	automatic	manual [¶]	automatic
Aliases	○	●	○	○	●
CLIENT					
Type	DA	application, DA	DA	DA	DA, application
Number of enclosures	1	no limit	1	16 (+ clipboard)	no limit
Forwarding	●	●	●	●	●
Delivery receipt	●	●	●	●	●
Bad-mail notification	●	●	●	●	●
Delayed mailing	○	○	○	●	●
Conferencing	○	○	○	●	●
Online help	○	●	●	●	●
Individual address lists	●	●	○	●	●
Priorities	2	2	2	5	3
Import, export address book	○ [‡]	○	○	●	●
Local message-storage format	mail	text, mail	native	native, mail	native, mail
User mail-status log	○	○	○	●	●
User-defined aliases	○	●	○	○	○
ADMINISTRATION					
Server administration	at server	from workstation	from workstation	at server	server, workstation
Usage log at server	○	○	●	●	●
Controlled access to gateways	varies with gateway	○	●	varies with gateway	○
Special addressees	●	●	●	●	●
Custom installation	○	○	○	●	○

● = Yes, ○ = No. *M = manager-defined; U = user-defined. [†] DaynaMail is also available as a node-to-node mail system. [‡] Importing and exporting is supported in node-to-node version. [§] User can define address book and mail to all recipients in book simultaneously. [¶] User must query global address list for updates.

MailCenters. If for some reason you prefer to use AppleShare file services to control a QuickMail MailCenter, you can request a special version of QuickMail from CE Software. Despite this option, you're better off using the standard QuickMail software.

Architecture All three E-mail systems use a *store-and-forward* architecture. That means mail that's undeliverable—either because the recipient isn't connected to the network at the time, or because the recipient's server is unavailable—is held at the originating server. When unreachable users and/or servers become active on the network again, held mail gets forwarded accordingly.

Rather than incorporate server-to-server communications in the InBox Plus Message Centers, InBox Plus includes a second program, Router, which controls communications between different servers. Using it, you can design redundant routes between servers for added reliability.

In contrast, Microsoft Mail servers maintain server-to-server communications on their own. Not only do servers store and forward messages destined for other servers, but they also exchange user lists to form one large global address list. Every user has access to that list for addressing mail.

QuickMail also maintains server-to-server communications internally;

cc:Mail	3+Mail
store-and-forward	store-and-forward
Mac Plus, SE, II	Mac Plus, SE, II
internal	internal
indirect via network	indirect via network
1 per message	1 per addressee
AFP, TOPS, MHS, DOS	3Com servers
proprietary database	proprietary database
●	○
interactive	client-activated, interactive
text, graphics	text
●	○
○	○
M, U	M, U
U	M
automatic	automatic
●	●
application	application
20	25
●	●
●	●
●	●
○	○
○	○
●	○
●	●
3	0
●	○
native, mail	native, mail
○	○
○	○
from DOS workstation	from DOS workstation
●	●
○	○
●	○
○	○

however, address lists are specific to each MailCenter on a server. To ensure that a network-wide database of addresses exists, you install NameServer, a separate application, on any Mac on the network. You can set up NameServer to query all designated MailCenters for address lists at regular intervals. You can even use more than one NameServer, for example, if you wish to divide up the database for different workgroups.

Server Administration Once a Microsoft Mail server is set up, you can administrate it from any Mac on the network. This administration scheme is convenient because you can easily maintain all servers from one Mac—even if you have to use the Chooser to select each server one at a time.

Also included with Microsoft Mail is Microsoft Mail Administrator, a program for generating reports about mail servers. With it you can list servers, local users, local groups, and global users. A very detailed report on server usage includes information such as the number of messages and file enclosures in each user's mailbox and the amount of owned and shared space on the server. These reports should be sufficient for any manager to maintain mail servers.

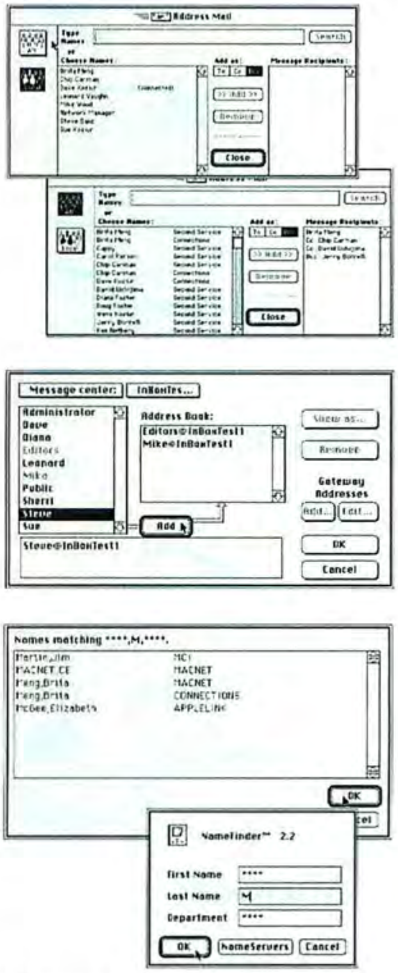
As with Microsoft Mail, you can administrate InBox mail servers from any computer on the network. Using an application called InBox Admin, you can add users, create mailboxes, and so on. However, InBox offers no special administration tools to generate reports about disk space or the number of messages stored per user.

All administration of a QuickMail mail server takes place on the server itself via the QM Administrator application. QM Administrator generates a variety of reports, among them Serial Number and Dead Mail. You can also get a detailed mail-usage report for each user on a MailCenter; this report lists the user's name and address, the number of mail-log entries and mail items, and the size of the mail log and mail items.

Mail Storage Microsoft Mail stores all messages and enclosed files in a single, proprietary-format database file on the server. While this scheme might offer performance advantages, it's also a case of putting all your eggs in one basket. If the file gets corrupted, everything's gone.

In contrast, QuickMail stores a separate copy of a message and enclosure for each addressee, using the Mac's Hierarchical File System (HFS). This does lead to some added requirements for server disk space, especially if large files are sent as enclosures. But if one file gets corrupted, it only affects one recipient.

InBox's storage method is, in some respects, a hybrid. Like Microsoft Mail, InBox uses a proprietary database scheme to store sender and receiver information. However, like QuickMail, it stores one copy of a message—and any enclosed files—for each addressee.



Editors@InBoxTest1
Mike@InBoxTest1

Steve@InBoxTest1

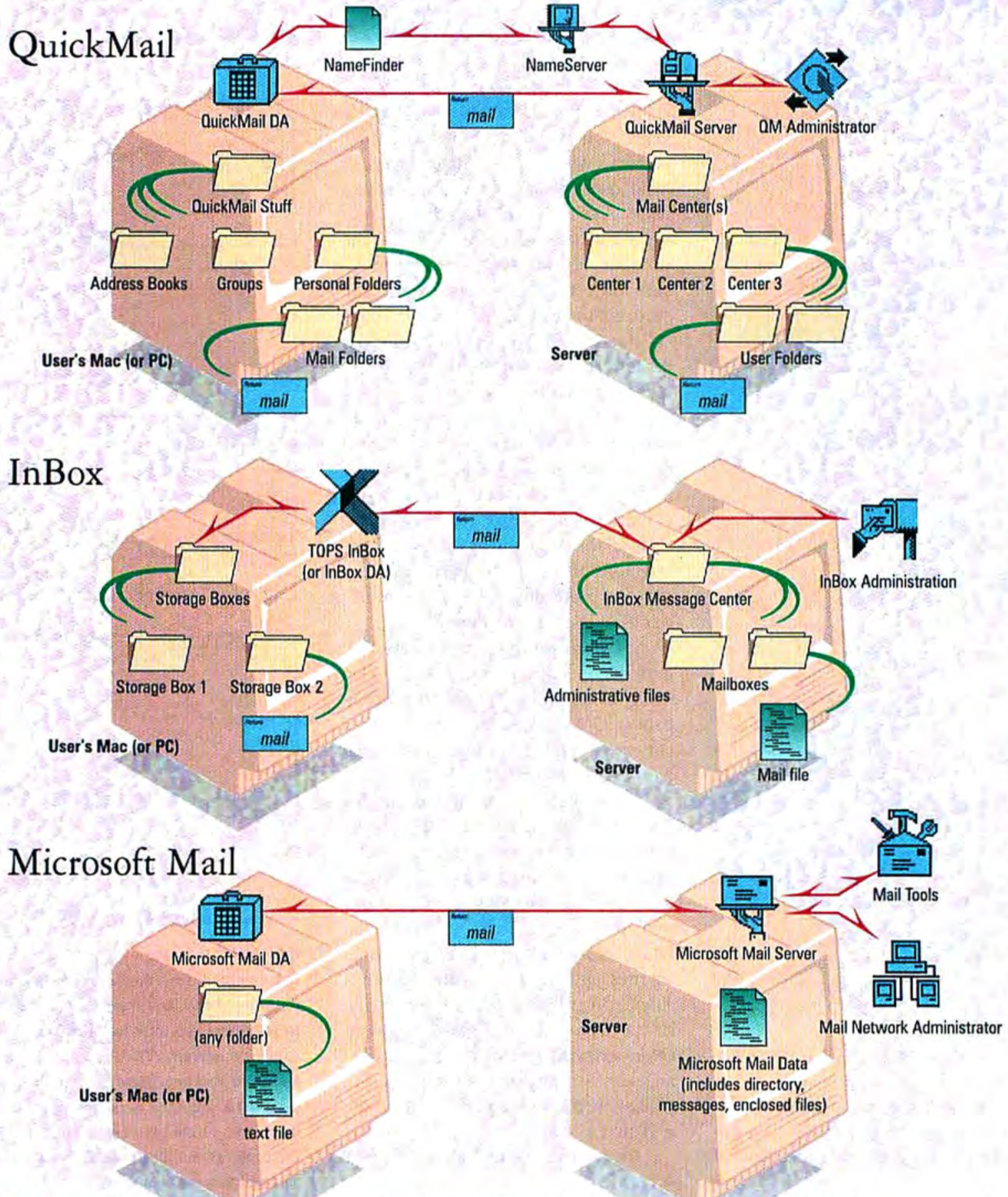
Names matching ****,M,****.

First Name: ****
Last Name: M
Department: ****

Addressing the Issue

This composite from the three major E-mail programs shows how users can deal with the large address lists often found on large corporate networks. The two screens from Microsoft Mail (top) show how the global address list is simplified by restricting the list to those users on the Local server (upper screen). The center screen illustrates the creation of a personal Address Book in InBox, with the user selecting only those names of interest. The two bottom screens show how a QuickMail user uses the NameFinder to find the addresses of any user on any MailCenter (in this case, names starting with the letter *M*) by searching the database of addresses maintained by QuickMail's NameServer on the mail server.

E-MAIL LAYOUTS



This diagram depicts how a client Mac and mail server from the three major Mac E-mail programs interact. In each case, the product's own names for components are used. A folder icon represents an HFS folder on either the user's Mac (for mail storage, for example) or the mail server (for storing unsent and received mail, as is the case with QuickMail and InBox). A text file icon on the user's side means mail is stored as text only. An envelope means mail can also be stored in its original format for rereading, replies, and forwarding. Text files on the server usually mean that some component of the mail system is stored as a special file. Microsoft Mail stores all mail and user information, such as directories, in one large file.

GATEWAYS TO THE WORLD

Simple LAN-based E-mail systems may suffice for small businesses and for workgroups within large corporations. But often Mac E-mail users in large corporations need to exchange messages with other workers in the same company. Those other workers may use an E-mail system, such as VMS mail or PROFS, installed on a mainframe computer. Or two geographically separate offices may use MCI Mail, EasyLink, or AT&T Mail to send E-mail between their two LANs. In either case, mail gateways are necessary to handle the differences in message formats and user addressing.

QuickMail, Microsoft Mail, and InBox all offer gateways into systems that are used by large corporations. At this point, QuickMail has the largest number of different kinds of gateways. Microsoft is offering a few gateways for Microsoft Mail and promising more in the next months. By virtue of its support for MHS mail servers, DaynaMail can use a variety of gateways. TOPS, meanwhile, plans several gateways for InBox, the newest product on the market, which currently offers fewer gateway options than its competitors.

Evaluation Time

Each E-mail vendor thinks that its product has certain features that make it better than the others. After working with InBox, Microsoft Mail, and QuickMail, here's what I think about how those features are implemented.

For addressing, it's a close call. I like QuickMail best because it offers the greatest flexibility in setting up address lists. But that reflects the fact that I consider user-defined address lists more important than automatic updating. Microsoft Mail's automatic global address updating scheme is better than QuickMail's.

Unlike QuickMail, Microsoft Mail lets you type an address, which can be more convenient than selecting one from an address book. If only Microsoft permitted user-defined address lists, it would have come out on top. InBox's alias feature is nice, but I consider its approach to user-defined address groups contrived, and not terribly intuitive.

For tracking mail, QuickMail is the clear winner. Microsoft Mail and InBox only offer receipts. Those receipts are themselves mail messages; delete one, and you won't be able to refer back to it. QuickMail's Mail Log status report contains more detailed information than a receipt—and you can tell QuickMail how long to track a message and its status. If you don't want a Mail Log (QuickMail has a receipt feature too), you can always turn the option off. QuickMail also lets you create your own folders to store mail you've already read.

Overall, QuickMail is the most flexible E-mail system for file enclosures. If you're using Macs for E-mail only, QuickMail and InBox are about equal in file-enclosure capability. Both allow you to enclose more than one file per mail message. I think it's archaic that Microsoft Mail supports only one.

If, on the other hand, you have both PCs and Macs on your E-mail network, QuickMail comes out ahead of both InBox and Microsoft Mail. QuickMail is the only system that filters file names and adds DOS extensions to a file when you're exchanging files between Macs and PCs.

When it comes to forms, I think QuickMail is more flexible than Microsoft Mail. Because Microsoft Mail's forms design program is based on HyperCard, Microsoft Mail forms are limited in size to HyperCard cards. QuickMail's QM Forms application puts no limitations on a form's size. InBox has no forms-design capability to speak of.

For remote access to E-mail, QuickMail is the winner again. It's the only package that lets you dial directly with a modem into a mail server. I find that capability particularly useful when I'm on the road. If I have a Mac with me, I use QM Remote to retrieve and answer mail; if I'm carrying around a laptop, I use a terminal emulator.

On the managerial side of things, InBox is the most flexible to set up; you can use a variety of computers as the mail server. Microsoft Mail and QuickMail both require a Macintosh. I occasionally find myself constrained by QuickMail's QM Administrator application, primarily because it must run in the foreground to send and receive mail by modem. Therefore, you are not able to use it and the AppleShare Print Server software on the same server simultaneously.

Some administrators may believe that Microsoft's globally updated address list is the best way to go and that QuickMail's NameServer still demands too much user interaction to ensure current address lists. That may be true for networks that are continually changing; however, I consider that situation to be rare. Networks have a tendency to settle down and require only minimal changes in address lists.

When it comes to administrative tools, InBox falls far short of Microsoft Mail and QuickMail, both of which offer extensive report-generation capabilities. I think Microsoft Mail may have a slight administrative edge over QuickMail here, because you can administrate any server from any Mac on the network.

QuickMail currently has the largest number of working E-mail gateways. If you want to link a Macintosh E-mail system to other mail systems, QuickMail has the edge.

It probably comes as no surprise that I consider QuickMail the best E-mail system. It offers the most features, including many that aren't available in InBox and Microsoft Mail. Most important, QuickMail is flexible enough that if you decide you don't want to use a feature, you can usually turn it off. Because of QuickMail's many features, it takes a little longer to learn than the others. Once you've learned it, though, you have a powerful package at your fingertips. ■

See *Where to Buy* for contact information.

. . . . .

***Dave Kosiur** is a* Macworld *contributing editor, and the editor of a Macintosh networking newsletter,* Connections. *If he keeps using E-mail so much, he'll forget what his mail carrier looks like.*

PRINTING WITHout POSTSCRIPT

AFFORDABLE PRINTERS COME OF AGE

By Charles Seiter

When Apple introduced the 300-dots-per-inch LaserWriter, we all wanted one. We were tired of the ImageWriter's jaggies, and PostScript output looked so precise and professional. Not all of us were able to rationalize the LaserWriter's $6000 price tag, however. Especially if our printing needs were limited to business correspondence and simple page layout.

Apple may have been the only game in town back then, but today a variety of hardware and software options await the low end user. Several major manufacturers now produce either high-resolution dot matrix or ink-jet printers that make the most of Apple's QuickDraw routines, and they do it at prices that make sense—in many cases, less than $1000.

You won't get PostScript at these prices, but all of the printers mentioned in this article ship with their own precision bitmapped or outline fonts. Bitmapped fonts are designed to take advantage of specific printer resolutions (300 dpi, for instance) and many are quite nice looking, but you must install each point size in the System file. Larger point sizes take up a great deal of memory and so you have always been limited in the number of bitmapped fonts you could store in the System at any one time.

Outline fonts, on the other hand, can be mathematically scaled, so they take up much less memory and they retain their smooth, optimized curves even when blown up to larger sizes. Three-hundred-dpi outline fonts used to be the exclusive domain of Apple's LaserWriter IINT, but now software utilities such as Adobe Type Manager (ATM) bring outline fonts to even the humblest non-PostScript devices, completely changing the rules of the game. In addition, Apple has recently announced that it will be including its own outline font manager, dubbed Royal, in System 7.0. (See Erfert Fenton's feature, "Battle Royal," in *Macworld,* April 1990, for an unraveling of many font mysteries.)

In this article I'll look at four kinds of printer-software combinations, each a step above the last in print resolution and in price. The first is the humble and familiar ImageWriter II. Because many readers rely on this printer, I'll use it as an example to show what ATM (and eventually System 7.0) can do for print quality. The second, still

PHOTOGRAPHS BY PIERRE YVES GOAVEC

conservative, category includes letter-quality (typically 24-pin) dot matrix printers. Two of these, the Apple ImageWriter LQ and the Epson LQ-950, use standard QuickDraw technology, while the GCC WriteImpact and the (P321SLC) Toshiba Three-In-One come with their own sets of outline fonts. The third printer category includes the ink-jet printers, represented here by Hewlett-Packard's DeskWriter, the Tektronix ColorQuick, and Kodak's Diconix M150 Plus. Finally, in the fourth category, I'll look at the high end of the range, the Apple LaserWriter IISC and the Personal LaserPrinter II from GCC Technologies.

ImageWriter II Meets ATM

For years, programmers have attempted to wring letter-quality type out of the ubiquitous ImageWriter. Special fonts that closely optimize ImageWriter printing at 10- and 12-point sizes (Boston and Beverly Hills are good examples) are capable of producing near-letter-quality text, but you don't always want to restrict your printing to these fonts. The problem is, of course, that the 9-pin print head of the ImageWriter II gives you 144-dpi print resolution, and type designers must exercise a considerable measure of ingenuity if they are going to avoid jagged lines along curves and slanted segments.

In the past there was no way around this except to stock your System with all the bulky bitmapped fonts for larger sizes, but in late 1989 Adobe Systems came to the rescue of non-PostScript printer users with Adobe Type Manager. This program supplies outline fonts for Times, Helvetica, Courier, and Symbol, and it works with Adobe's Type 1 PostScript fonts as well. (Owners of ImageWriters are unlikely to have purchased many Type 1 fonts, however.) Check out the initial capital *S* in "A Print Sampler" for an example of impressively clean printing from this faithful old device when used with ATM.

Images print more smoothly than they appear on a 72-dpi monitor—the ATM improvement is easy to see—but it is still clear that when making curves from dots it helps greatly if the dots are little (see "ATM Limits"). Nonetheless, using a few old familiar tricks (print larger pages in 14- or 18-point text and reduce by 10 to 20 percent in a photocopier, for example), it is possible to turn out semiprofessional output on an ImageWriter II with ATM.

For years,

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ImageWriter

The Promise of System 7.0

This combination also gives you a preview of wonders yet to come in Apple's System 7.0. With the outline font technology promised for 7.0, many of the distinctions between QuickDraw and PostScript printers are supposed to melt away. The new System (which will require a minimum of 2 megabytes of RAM) will use outline fonts for both screen display and printing. Text displayed on the screen will be much less jaggy and printers will produce the best output that their dot densities allow.

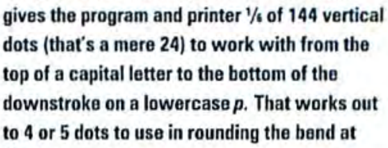
Much of what the new font scheme from Apple will accomplish is already in place with ATM. If you want to enter the wonderful world of outline fonts right now, with your existing QuickDraw printer, you should consider investing in ATM—you can at least count on what it promises. And you can get a package of 22 high-quality fonts from Adobe (this package, of course, works with ATM) for $99 or less.

Another package for use with ATM, TypeAlign, also priced at $99.95, is available from Adobe Systems. TypeAlign enables you to produce near-PostScript special effects: text stretching, rotating, curving, and free-hand kerning. For newsletter headlines or production of custom letterhead it's the next best thing to PostScript at a fraction of the price (see "TypeAlign Effects.")

Dots What It Takes

Since the ImageWriter II's fundamental problem is insufficient dot density, the obvious brute-force engineering approach to correcting this deficiency is to add more dots per inch in the print head. Apple realized this years ago and commissioned the ImageWriter LQ, a printer with a unique 27-pin print head and 216 dpi resolution in its slowest, highest-resolution print mode. Since the ImageWriter LQ is a QuickDraw printer relying on bitmapped fonts, it's fair to describe the LQ as a wide-carriage ImageWriter that prints at two to three times the ImageWriter's resolution. For several years, the LQ was the only printer of its kind available on the Macintosh market, but its reputation was marred by complaints of frequent mechanical problems.

Now the LQ faces three formidable competitors. The 24-pin Epson LQ series—here represented by the 180-by-360-dpi model 950—uses four printer-resident fonts (Compressed, Pica, Elite, and Proportional) for highest-speed letter-quality printing and four precision bitmapped fonts (the inevitable Times, Helvetica, Courier, and Symbol) for more Mac-like effects. The Toshiba Three-In-One, a 24-pin printer that offers resolution up to 360 dpi in high-resolution-graphics mode, includes four outline fonts, the names of which you might easily guess at this



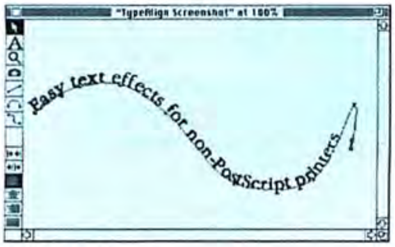
ATM Limits

One much-hoped-for effect of ATM is absent: laserlike printing at 10- and 12-point sizes. The problem is that 12 points is 1/6 inch; this gives the program and printer 1/6 of 144 vertical dots (that's a mere 24) to work with from the top of a capital letter to the bottom of the downstroke on a lowercase *p*. That works out to 4 or 5 dots to use in rounding the bend at the bottom of a lowercase *g*, and even an optimized outline font can't hide the fact that you're trying to make a smooth curve from 5 bricks. The problem is obviously worse at 10 points and less severe at 14 (sometimes 1 or 2 extra dots in a letter make a big difference in smoothness).

point (the same standard four). As with most printers that started life in the IBM PC world, the Toshiba Three-In-One has higher-speed Courier, Elite, and Draft resident fonts. It also handles bitmapped fonts reliably as long as you have installed the exact font and point size you want to use. Finally, GCC Technologies has released its 24-pin printer, the WriteImpact, at 180 by 360 dpi. WriteImpact's selling point is the set of 22 outline fonts that come with the printer, a set that can be expanded with a 38-font additional package from GCC.

Pin Comparison

As you can see in "A Print Sampler," all competent 24-pin (or, in the case of the Apple ImageWriter LQ, 27-pin) printers can in principle produce similar results. The exact appearance of type, particularly in very large and very small point sizes, is determined more by ribbon condition than by the brand name of the printer. A new ribbon, for example, can print clogged and dark-looking 10-point text, and very old ribbons aren't up to the task of printing blacks adequately for text that is 24-point or larger. The samples also show that using custom outline fonts, where provided, is the equivalent of using ATM. For example, the Toshiba Three-In-One gives smooth output since it employs GDT Softworks' outline font implementation, and the GCC Write-Impact uses Bitstream outlines. Used alone, the Epson LQ-950 output is not quite as good as previous printers, and the ImageWriter LQ comes in last, but ATM puts both of these back in the competition.



Easy text effects for non-PostScript printers.

TypeAlign Effects
One of the great advantages of PostScript printing is that it lets you apply effects to type. With Adobe Systems' TypeAlign, QuickDraw printers have access to many of the same special effects—rotation, skewing, perspective, and distortion.

The printers in this category are rugged, good at low-cost day-to-day output, and convenient for printing labels and envelopes. If you run these letter-quality dot matrix printers at optimal resolution with outline font software, they're a practical choice in situations where low speed (relative to laser printers) and high noise levels aren't objectionable.

The Toshiba Three-In-One is a 24-pin printer that offers up to 360 dpi.

Think Ink

Another approach to high-resolution printing is the ink-jet printer. Because it uses nonimpact technology, the advantages of this type of printer include compactness and quiet operation. Within the last few years, several companies have refined ink-jet technology, and although it's necessary for you to be more careful in selecting paper and in handling the sometimes-still-wet output, these printers have some advantages in light-duty printing situations.

GCC Technologies' WriteImpact is packaged with 22 outline fonts; an additional 38-font set is also available.

The best known ink-jet printer is the Hewlett-Packard DeskWriter, a 300-dpi printer with a loyal following and impeccable ergonomics. The DeskWriter depends on precision bitmaps—four standard fonts come with the printer (more are available from Hewlett-Packard)—but Adobe Type Manager specifically mentions the DeskWriter as a supported device for its outline font manipulation. This is a significant development, since at 300 dpi, outline fonts excel not just in the larger sizes (as we saw with the 144-dpi ImageWriter) but all the way down to 6 points or so.

Two other ink-jet printers, included more as examples of the craft than as direct competitors of the DeskWriter, are the Tektronix ColorQuick and the Kodak Diconix M150 Plus. Both of these are really special-purpose devices, but they give us an opportunity to see the effect of dots-per-inch in ink-jet practice. The Tektronix is optimized for color printing, but it does a creditable job of 216-dpi black-and-white printing. Since it costs as much as a low-end laser printer, you would probably consider it only

The ColorQuick Ink-Jet Printer from Tektronix has undeniable appeal for those in need of color capabilities.

if your printing activities include significant amounts of color work.

The Kodak Diconix (available in a previous incarnation as the GCC Write-Move) is a 192-dpi printer that comes with Adobe Type Manager as part of the package. The key feature of the Diconix, however, is its size—it's very slightly larger and heavier than the manual Apple provides with the ImageWriter LQ. This means you can put the Diconix in a briefcase and operate it from rechargeable batteries if you like.

Comparing Ink-Jet Printers

Comparing the print quality of the ink-jet printers is difficult, because the three printers really target different specialties. Only the DeskWriter represents a best-effort, no-compromise attempt at laserlike black text quality. Nonetheless, the Tektronix has undeniable appeal for those in need of color capabilities, and the Kodak printer boasts portability.

It's just shocking to see the tiny Diconix rapidly roll out text of decent letter quality. It's equally shocking to see the resolution obtainable with a combination of font and point size that optimally exploits the DeskWriter's set of precision bitmaps—results are not invariably this good, but for the fonts and sizes used in standard business correspondence the DeskWriter is outstanding (see "A Print Sampler"). Tektronix's ColorQuick is nearly in this same league, but at its price it is competitive only against other color printers.

None of the early non-PostScript printers could take advantage of outline fonts

Previewing PostScript Output

Because serious typography takes place in the wild blue yonder past 300 dpi—beyond most of our budgets—those in need of professional typeset quality should use a PostScript-based imagesetter of the kind found at service bureaus. The problem is that if you send pages directly to a service bureau, you can't be sure of what the output will actually look like. So, how do you avoid the expense and extra work entailed in fixing unanticipated glitches before sending a file to the imagesetter? How do you preview PostScript-device output?

One solution involves combining the Hewlett-Packard DeskWriter with the software package Freedom of Press ($495 suggested retail list) from Custom Applications. Freedom of Press lets you output PostScript files to non-PostScript devices; in effect, you operate a printer *as if* it were PostScript-based. This means that you can set up pages in any PostScript-oriented software and print them on the DeskWriter at less-than-typeset resolution but with correct spacing and layout.

Almost PostScript

For several years, the standard for high-resolution printing in the Macintosh realm has been the PostScript printer, specifically Apple's LaserWriter IINT and IINTX. None of the early non-PostScript printers could take advantage of outline fonts, and their output suffered. To match PostScript performance, some printers included a PostScript interpreter, which speeded up performance; but the interpreter amounted to another 68xxx-based computer complete with several megabytes of RAM buried somewhere inside the printer, and you had to pay premium prices.

That was then, this is now. With the advent of Adobe Type Manager and PostScript-clone interpreters, you can now get smooth fonts at 300 dpi

PRINTER SPECS

Printer	Vendor	List price	Street price	Fonts	Maximum dpi density	Speed (in characters per second)
9-pin						
ImageWriter II	Apple Computer	$599	$450	Apple System	144	250 draft/45 hi-res
24- or 27-pin						
ImageWriter LQ	Apple Computer	$1399	$750	Apple System	216 x 216	250 draft/118 hi-res [1]
Toshiba Three-In-One	Toshiba	$949	$670	4 outline, 3 printer resident	360 x 360	220 draft/90 hi-res [2]
WriteImpact	GCC Technologies	$699	$550	22 outline [3]	180 x 360	210 draft/90 hi-res [2]
Epson LQ-950	Epson	$799	$540	4 high-resolution bitmap, 3 printer resident	180 x 360	220 draft/80 hi-res [1]
Ink-jet						
DeskWriter	Hewlett-Packard	$1195	$845	4 high-resolution bitmap, additional packages available	300	120 draft/40 hi-res
Diconix M150 Plus	Kodak	$699	$525	draft, 4 ATM fonts	192	99 draft/24hi-res
ColorQuick	Tektronix	$2495	$1950	11 high-resolution bitmap	216	30 draft/20hi-res
High-end QuickDraw						
LaserWriter IISC	Apple Computer	$2799	$2095	Apple System	300	4 pages/min
Personal LaserPrinter II	GCC Technologies	$1399	$1140	22 outline [3]	300	4 pages/min

[1] *As quoted by vendor.* [2] *As tested by Macworld.* [3] *Can be expanded with 38 additional fonts.*

BEYOND THE ORCHARD

In the land where Apples are rare, Hewlett-Packard's LaserJet series dominates laser-printing applications. HP's low-end laser printers— notably the recently announced LaserJet III—cost $1000 less than Apple's low-end LaserWriter IISC. As an alternative to the IISC or to GCC's PLP II, you might want to consider a LaserJet operated with one of the many Mac-compatible interfaces currently available.

A LaserJet operated with Insight Development Corporation's MacPrint ($149), for example, offers 300-dpi resolution as a printer option at the Chooser level; using MacPrint is as simple as installing a standard Mac-only printer. The program includes precision bitmapped fonts in sizes from 9-point to 96-point for the usual Big Four—Times, Courier, Helvetica (in a variant called Triumvirate), and Symbol. Despite what would seem to be formidable format-translation obstacles, MacPrint allows you to use the variety of font cartridges developed by HP and third parties for use in the LaserJet.

Another product, JetLink Express ($149) from GDT Softworks gives you a set of thirteen 300-dpi outline fonts and simple Mac installation; an additional package with 35 more fonts is also available. If you want laser-printer output at the absolute lowest cost, you can contrive to get it by careful shopping for a LaserJet and comparison of catalog prices for these Mac-to-HP drivers.

Printer Interface III from DataPak Software ($125) can use all the Macintosh fonts, HP's built-in fonts and font cartridges, and it includes a standard interface cable.

Kodak's Diconix M150 Plus is a 192-dpi printer that is barely bigger than a bread box.

with less-expensive hardware. For instance, Apple's venerable LaserWriter IISC, a low-cost QuickDraw-based alternative to the IINT series, can now be enhanced with the outline fonts available in ATM, and it should soon benefit from the font-handling changes in System 7.0. Another example, GCC Technologies' Personal LaserPrinter II (PLP II) is shipped with the same set of 22 outline fonts as the WriteImpact dot matrix printer and can be supplemented by 38 more, each offering the unmistakable advantages of outline fonts.

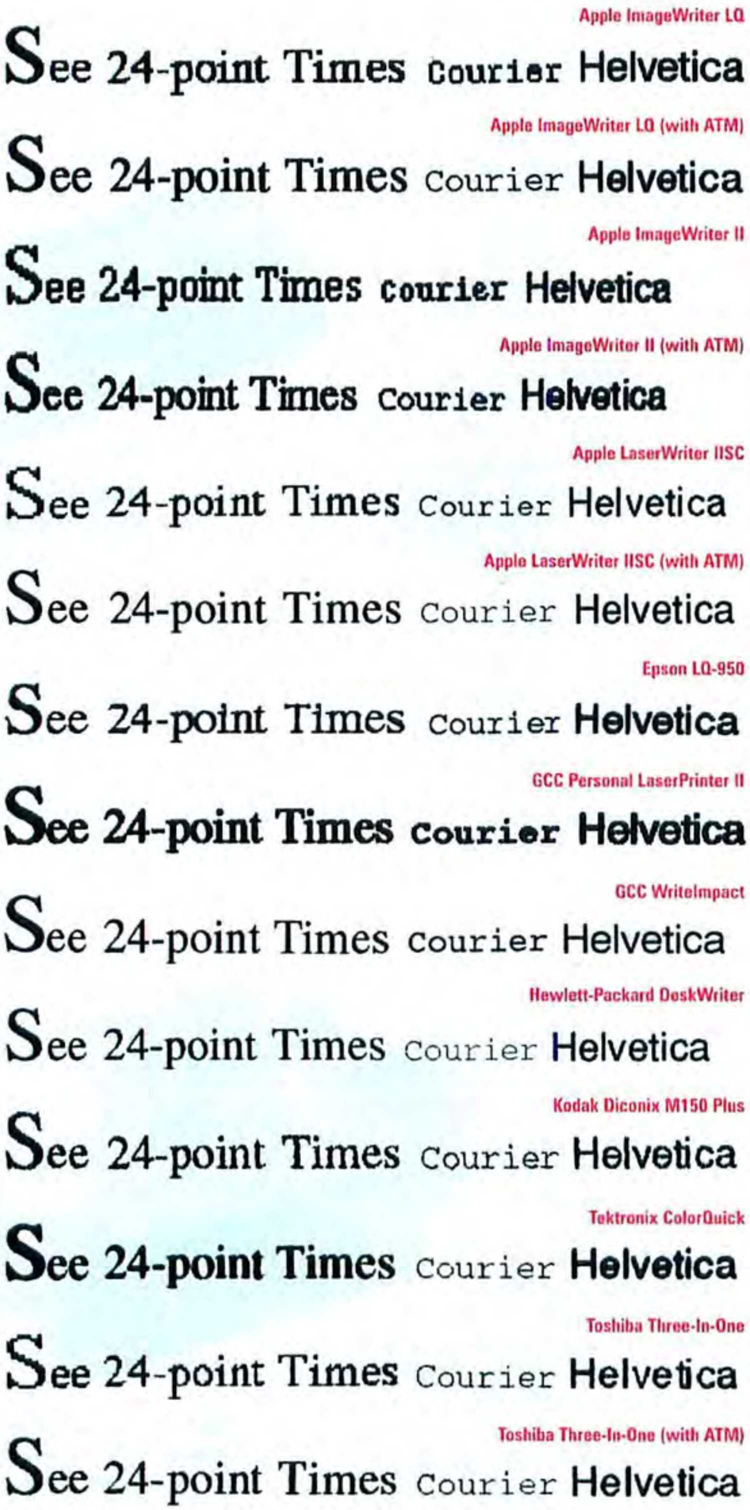
As you can see in "Printer Specs," even at 300 dpi, there are differences between properly smoothed fonts and relatively coarse bitmaps—note the difference between LaserWriter IISC output with and without ATM. Even with the improvement that ATM brings to the IISC, the expanded font set gives the PLP II greater flexibility than the IISC, and at a lower price; and the PLP II's output quality is equal to or better than the IISC's at any combination of font and size. When using outline fonts, both of these printers can compete with fancier, more expensive models for output quality, if not for speed. The PLP II is slower because it makes the Mac itself perform the outline computations. Networking capabilities are also somewhat limited, although both can be upgraded to Apple's and GCC's business-class laser printers.

Time to Choose

As recently as two years ago there were few acceptable alternatives to Apple's own printers. Those who attempted to install non-Apple printers typically found the process to be a nuisance, and the printers themselves were liable to exhibit unpredictable quirks. Now a dozen major printer manufacturers have entered the Macintosh market with printers that are not only good enough for business correspondence but for informal desktop publishing as well. They are no more trouble to install or operate than Apple's own offerings. These printers not only have the intrinsic hardware resolution to produce near-PostScript results from plain old QuickDraw units, but the recent in-

Apple's LaserWriter IISC can now be enhanced with the outline fonts available in Adobe Type Manager.

A PRINT SAMPLER



Apple ImageWriter LQ

See 24-point Times Courier Helvetica

Apple ImageWriter LQ (with ATM)

See 24-point Times Courier Helvetica

Apple ImageWriter II

See 24-point Times Courier Helvetica

Apple ImageWriter II (with ATM)

See 24-point Times Courier Helvetica

Apple LaserWriter IISC

See 24-point Times Courier Helvetica

Apple LaserWriter IISC (with ATM)

See 24-point Times Courier Helvetica

Epson LQ-950

See 24-point Times Courier Helvetica

GCC Personal LaserPrinter II

See 24-point Times Courier Helvetica

GCC WriteImpact

See 24-point Times Courier Helvetica

Hewlett-Packard DeskWriter

See 24-point Times Courier Helvetica

Kodak Diconix M150 Plus

See 24-point Times Courier Helvetica

Tektronix ColorQuick

See 24-point Times Courier Helvetica

Toshiba Three-In-One

See 24-point Times Courier Helvetica

Toshiba Three-In-One (with ATM)

See 24-point Times Courier Helvetica

Sample output from each printer has been enlarged by 127 percent.

troduction of ATM, and the imminent release of System 7.0, erases most of the class distinctions between these two types of output devices. And as a pleasant surprise, you can expect ongoing software developments in the coming year to enhance the output capabilities of any printer you buy.

If you don't have a printer now, the market sorts itself out pretty simply. First, there's not much reason to buy an ImageWriter II anymore—there are 24-pin printers for nearly the same price. Among 24-pin printers, you may as well pick the cheapest one you can buy locally; Adobe Type Manager has erased most of the differences that vendors' software packages used to create, but you are still likely to want to line up service you can reach conveniently. If your printing requirements are restricted to a few pages per day, the Hewlett-Packard DeskWriter (or for portability, the Kodak Diconix M150 Plus) is a quiet alternative to a 24-pin printer.

Finally, if you have a $1000 printer budget, scrounge up a few hundred more and get a GCC PLP II. The print quality compares favorably to that of printers costing thousands more, it's fast enough, and installation has been improved over the first PLP. In mid-1990, it's the outstanding bargain in QuickDraw printers.

As this article went to press, Hewlett-Packard announced an Adobe PostScript cartridge and an AppleTalk interface kit for the LaserJet models IID, IIP, and III. Since the IIP has a list price of $1495 and the AppleTalk kit and PostScript cartridge are priced at $275 and $695, respectively, this is a price breakthrough for a true PostScript printer, especially since LaserJets are often heavily discounted. When LaserJets are loaded to the recommended memory level, another $1000 or so must be added to this, but they are still important bargains for true Adobe PostScript. ▣

See *Where to Buy* for contact information.

. . . .

Charles Seiter *has been experimenting with non-Apple printers for* Macworld *for four years. His background includes development of custom drivers for high-resolution scientific plotting.*

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Ed Casey

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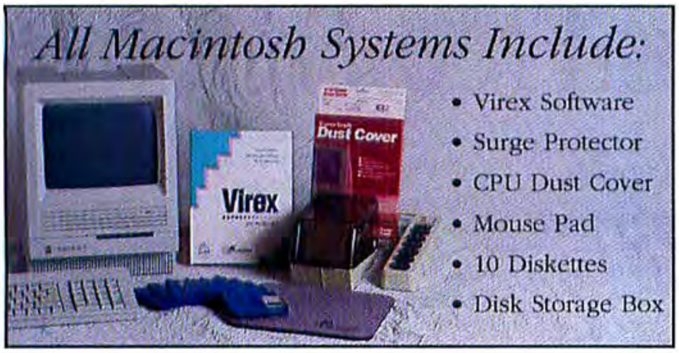

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Macintosh Masters III
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Winners in each category will receive valuable prizes—hardware and software. They'll also have their work published in *Macworld* and in our annual graphics calendar. Last year's winners walked away with a Mac II, a Tektronix color printer, and a Truevision NuVista board; check this space next month for a list of 1990 prizes.

PATTIE BELLE HASTINGS

DEADLINE

Macworld must receive entries by **July 5, 1990.**

RULES

Please submit no more than four works; each work must be accompanied by an entry form. Include a $5 (USA) administrative fee with your package (make check or money order payable to *Macworld*). Send hard and disk copies of each piece; disk copies may be omitted if the work will not fit on an 800K floppy. Animated entries may be on disk or half-inch videotape. Work will be returned only if you include postage and packaging. *Macworld* is not responsible for loss or damage. For more information, call 415/978-3176.

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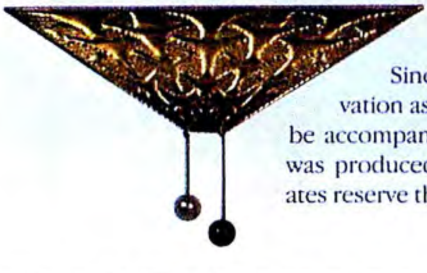

Since work will be judged on technical innovation as well as aesthetic value, each piece must be accompanied by a detailed description of how it was produced. *Macworld* and its international affiliates reserve the right to publish entries.

CATEGORIES

Fine Art

Illustration

Technical Illustration/ Rendering

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None of the Above (try us)

Send artwork, entry form(s), technical notes, and a $5 (USA) administrative fee to Macintosh Masters, *Macworld*, 501 Second Street, San Francisco, CA 94107, USA. Make checks payable to *Macworld*.

Entries must be received by July 5, 1990

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Title of work ______________________________

Contest category ______________________________

Return postage enclosed ___ No ___ Yes ________ Amount

Submission format(s)

___ Disk ___ Hard copy ___ VHS video ___ Beta video

___ 8mm video ___ CD ROM ___ Slide ________ Other

Required to view art

Hardware ______________________________

Software ______________________________

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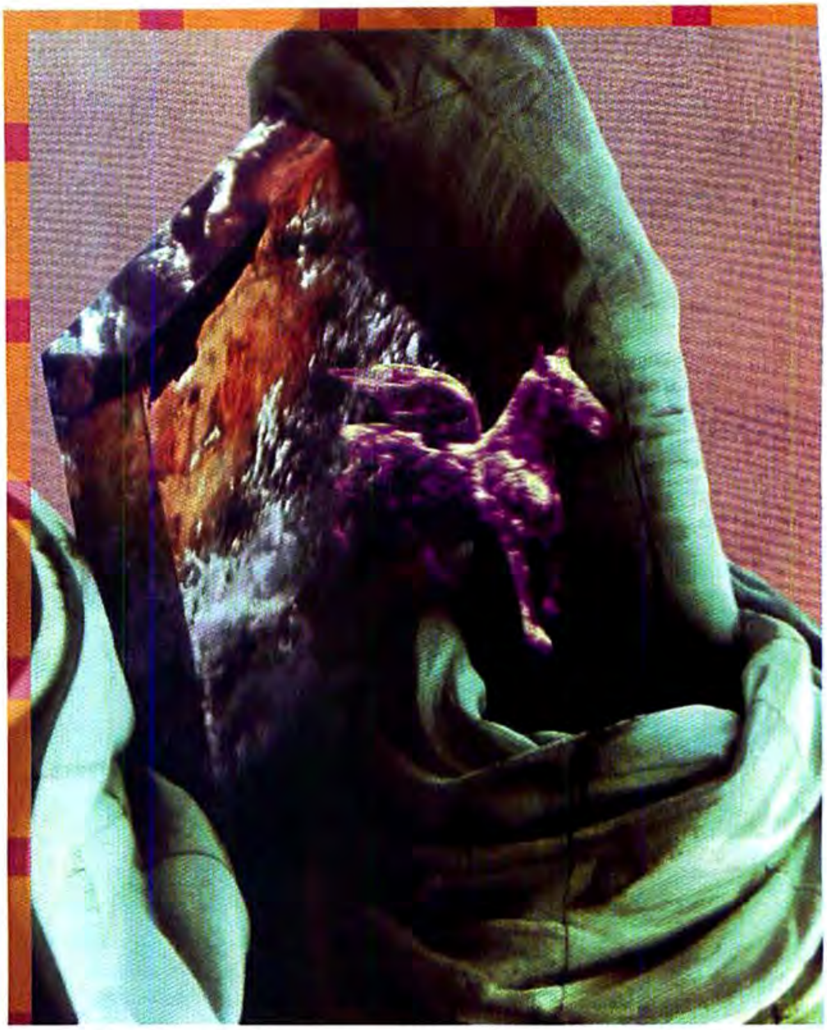
REVIEWS

Photo Design and Production Tool

ADOBE PHOTOSHOP 1.0

Pros: Full-featured; has multiple channels; good for special effects; easy to use. **Cons:** Expensive; manual needs more examples; no ruler guides. **Company:** Adobe Systems. **Requires:** Mac SE; 2MB RAM; System 6.0.2; hard disk. Color monitor recommended. **List price:** $895.



Patricia McShane composed this image using scans of 35mm slides. She skewed and rotated the earth and pasted it into masks for each face of the tablet, controlling the shadows using paste controls. With the Threshold, Brightness/Contrast, and Distort commands and the Motion Blur filter, McShane modified Pegasus to give him movement. Using a mask, she pasted the desert behind the foreground. A transparent border was added using paste controls. Color was corrected and imperfections were removed by cloning with the rubber stamp tool.

PATRICIA MCSHANE

Adobe's long-awaited Photoshop has finally arrived. The program was designed by Thomas and John Knoll, the same people who designed the original Barneyscan software, and was then acquired by Adobe, who added some real nice touches and made it more user-friendly. It's a rich program with features for the most sophisticated color professionals and a lot of practical production tools.

Adobe Photoshop is not a paint program. Even though Photoshop's paint tools rival those available in some of the best paint programs, not all of the paint tools found in popular paint programs are included. Photoshop is an image-manipulation program rivaled only by high-end systems like Scitex.

Tools of the Trade

Standard features include a magnifying tool that works like Illustrator 88's (actually it's more like FreeHand's magnifying tool, because the spot where you click the tool becomes the center of the screen).

The text tool lets you enter text through a window, similar to the way Illustrator does. You can specify font, horizontal alignment, point size, leading, character spacing, style options, and antialiasing. Letter spacing can be adjusted to 1/10 pixel or 1/10 point. You can kern individual letters pixel by pixel by bringing type in from an alpha channel (discussed later) and progressively deselecting and adjusting characters. Also, lots of special effects can be applied to type by using an alpha channel.

The smudge, brush, and airbrush tools all use the same set of brush sizes and shapes, including one custom brush shape available in the Brush window. You can create a custom brush shape from any 64-by-64-pixel selection; that custom brush becomes the default custom brush for all the painting tools. Each painting tool has options for adjusting fade-out, spacing (how close each color is to another), and repeat rate (the rate at which color is applied to the image when the mouse is stationary). All the painting tools except the line tool have an option for adjusting opacity (by percentage).

With the rubber stamp tool's unique Clone option, you click on an image on any spot you want to duplicate, click again anywhere else on the image or in another window, and you begin *cloning* the image—placing an exact or modified copy of the part you chose—at that point. You can also use the rubber stamp tool to save your image, make changes, and then, without saving again, have selected portions of the image revert to the last version you saved. For example, save a color image and then convert it into a gray-scale image, then wipe off the grays to reveal the color image that was last saved. You can apply effects, including patterns, to the image being restored. Super special effects.

All the paint tools work in normal mode, color-only mode, or a darken-only or lighten-only mode on pixels that are lighter or darker than the foreground color.

The blend tool creates blends from the foreground color to the background color in a linear or radial method. The blur tool and sharpen tool decrease and increase, respectively, the contrast between adjacent pixels. The line tool lets you adjust arrow length, width, and the angle of the arrowhead.

Photoshop's selection tools allow you to select parts of an image or specific colors. You can then move the selection or even change colors. The rectangular and oval selection marquees constrain the selection to a square, an oval, a specified height-to-width ratio, or a size you define and apply with the click of the mouse. The lasso tool not only lets you select objects freehand but also lets you use the option key to select with straight lines and freehand lines interchangeably. A basic magic wand, with tolerance setting, lets you apply a user-specified amount of fuzziness to the 1-pixel edge of a selection—letting you very accurately control how softly the edge of the selection blends with the background. The Eyedropper color-selection tool lets you select foreground and background colors from the active window or an inactive window on the screen.

All the selection tools are flexible and adjustable and work with the Shift and Control keys. The Grow command (in the Select menu) progressively selects pixels surrounding a selection with increasing tolerance. The Similar command finds and selects other pixels in an image that are similar to the ones selected.

The cropping tool is great. You access it through the Cropping Tool Options dialog box to preselect the width, height, and resolution of an image (to create a constraint); Photoshop automatically sizes or resamples your image as necessary. In addition, you can rotate the selection window to crop an image at any angle. The cropping tool is a very useful production tool that can be a real timesaver when you're preparing many images for output at the same size.

Multichannels

RBG, of course, is supported, along with CMYK, gray scale, bitmap, index color, HSL, HSB, and multichannel (any file with additional alpha channels being used for masks, and so on). Photoshop's files can have up to 16 different channels. An RGB file would initially have three channels: red, green, and blue. A channel is similar to a printing plate. For example, the RGB channels make up an RGB image. In addition, you can create up to 13 alpha channels, which are separate 8-bit channels that align with the RGB channels. These alpha channels can be used to edit an image or to save selection masks. Photoshop also allows you to perform calculations between channels and save the results to new channels. This is great for simulating blue-screen replacement effects (see "Star Quality," *Macworld*, June 1989). The ability to perform calculations and to have multiple channels or multichannel files will appeal to anyone who needs very sophisticated control of the color in an image.

Multichannel files are possible because Photoshop uses its own virtual memory, with your file size limited only by the space on your hard disk. Of course, a file larger than RAM capacity slows things down: the program has to access the hard disk with each operation. But until we have huge amounts of RAM, virtual memory is the only way to work on large files.

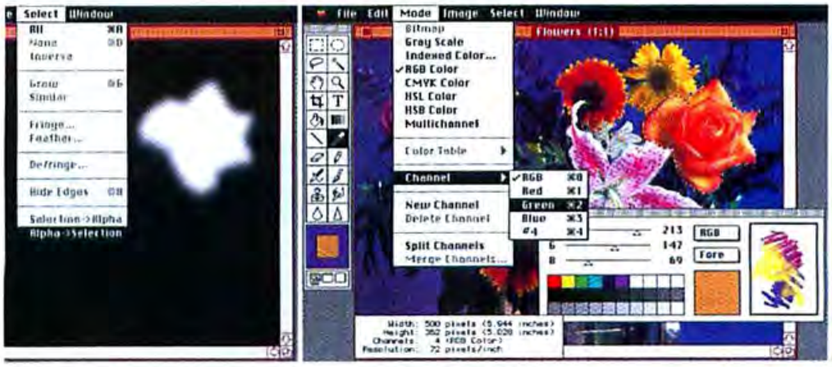
Photoshop also lets you set your monitor to emulate printed process color. Once your monitor is set you will see a good representation of the changes encountered by converting from RGB to CMYK color—an essential feature for correcting an image for process printing.

Photoshop has some great filtering effects and also supports plug-in filters created by third-party software developers.

The Joy of Photoshop

Printing with Photoshop is a joy. I do not have actual benchmark test re-

(continues)



Width: 500 pixels (5.944 inches)
Height: 362 pixels (5.028 inches)
Channels: 4 (RGB Color)
Resolution: 72 pixels/inch

A Nice Interface

On the left, an alpha channel (created from a selection of the rose) is copied back to the RGB channels in the form of a gradating selection. The Mode menu shows available image modes, along with all the file's channels as a submenu. Using a movable color palette, you define foreground and background colors as values of RGB, CMYK, or HSB, or mix colors on the scratch pad. At the bottom a pop-up shows image size, total channels, and resolution.

sults, but Photoshop seems to print through an imagesetter faster than anything I have encountered. And it gives you lots of control over printing. The Transfer Function dialog box enables you to adjust highlights, ¼ tones, midtones, ¾ tones, and shadows for all the process colors individually; to adjust the monitor's gamma curve settings; and to save all the settings as a transfer function file for future use or modification. As a result you have some real calibration control over the printer's dot gain. Halftone screens are created using Adobe's special algorithms.

The icing on the cake is *trapping*, the ability to have adjacent colors overlap to compensate for misregistration in printing. Photoshop is the only program I know of that can spread the appropriate sections of an image to create trapping in the final printed piece. The extent of the trap is set in pixels, points, or millimeters. The program then looks for changes in color based on the trap size and automatically sets traps.

Photoshop is easy to use. Considering the vast number of features and tools involved, I believe Adobe has done a good job of keeping things organized and simple. However, I think that the different ways in which Photoshop handles image size and resolution can be confusing. The features and tools work great but they take a little getting used to.

The big manual takes a good three days to get through, but it's worth reading. Each feature is first described in general terms, then followed by a detailed step-by-step example on its use. The manual has good screen shots and color, but the section describing how to split and merge channels could use at least one example. Overall, there need to be more examples in the manual.

I haven't worked with Letraset's ColorStudio yet, but I don't think there's a Mac program that can do as much as Adobe Photoshop. It gives me the feeling that with enough time, any touch-up or special effect can be achieved. If you want to experiment with and process high-quality color images on the Mac, this program is a must.—**Arne Hurty**

See* Where to Buy *or circle 704 on reader service card.

QuickDraw Page Printer

PERSONAL LASERPRINTER II

Pros: Excellent print quality and paper handling; outline fonts provide typographic versatility; well-designed software; easy to set up. **Cons:** Can't be shared on a network; only one SCSI connector; some documents require two-step printing. **Company:** GCC Technologies. **Requires:** Mac Plus; hard disk. Mac II; 2MB recommended. **List price:** $1399.

GCC Technologies' original Personal LaserPrinter (PLP) cost about half as much as PostScript-based printers such as the LaserWriter IINT. But at $2599 (later reduced to $2099), its price wasn't as personal as many would have liked. What's more, the PLP's Ricoh 1060 engine printed black areas poorly, and its spill-prone toner cartridges darkened many a carpet.

With the Personal LaserPrinter II, GCC has addressed all three criticisms. The PLP II uses a new print engine that produces deep, rich blacks yet still renders fine serifs and hairline rules well. A snap-in toner cartridge lets you keep your vacuum cleaner in the closet. And the price? $1399—now, that's getting personal.

It's Oki with Me

The PLP II weighs only 24 pounds and fits neatly on a desktop. Setting up its print engine, an Oki Electric OL-400, is a breeze: simply slide in the EP cartridge, which contains the photosensitive drum (good for about 15,000 pages) and snap in the toner cartridge (rated for 2500 pages). Like most laser printers, the PLP II prints 300 dots per inch.

The PLP II's paper cassette holds 200 sheets. That's 50 sheets more than the original PLP held and twice the capacity of the PLP's closest price competitor, the Qume CrystalPrint Publisher, a PostScript clone also known as La Cie's Panther PDX, Abaton's Quickstep, and Jasmine's DirectPrint. And unlike the CrystalPrint Publisher, the PLP II's cassette offers a self-centering manual-feed slot for printing on envelopes and other nonstandard paper sizes. The PLP II even comes with a desk accessory that prints envelopes and doubles as an electronic address book.

Next to the paper cartridge on the front panel is a small display screen and keypad used to view and adjust several key settings. Among other things, you use the keypad to change the printer's SCSI address, adjust print density, print a test page, and specify a *sleep* period. The latter is a handy feature: after a preselected interval without activity (two, four, six, or eight minutes), the printer goes into a semitorpid state—drawing only 60 watts of power instead of 800 and making virtually no noise instead of its normal hum, which isn't bothersome anyway.

Oddly, the PLP has just one SCSI connector instead of two. That means the printer must always be the last device in a SCSI chain. For most people, that won't be a problem. It could complicate life, however, if you have multiple SCSI devices containing internal terminator resistors. You may

(continues)

MARK JOHANN

The Personal LaserPrinter II from GCC combines affordable price with excellent print quality.

spend an afternoon twiddling terminators to get everything working. As an alternative, you can buy a two-connector adapter from GCC.

The Software Side

If you're familiar with the original PLP or with GCC's WriteMove or WriteImpact printers, you'll feel at home with the PLP II's software. Like the aforementioned printers, the PLP II uses Bitstream outline fonts. The fonts are stored on a hard disk (yes, a hard disk is required). The PLP II comes with the Courier and Symbol fonts, as well as Bitstream versions of Helvetica, Helvetica Condensed, Times, and Palatino (called Swiss, Swiss Condensed, Dutch, and Zapf Calligraphic, respectively). Additional fonts are available from GCC, as is a converter application that lets you use Bitstream's MacFontware library with the PLP II. I also used the PLP II with Adobe Type Manager with very good results.

During a print job, the PLP II's print driver uses the outlines to generate font bitmaps in the sizes required for the current page. A bitmapped image of the page is then created on the Mac's hard disk and transferred via the SCSI bus to the printer. A set of prebuilt font bitmap files containing common point sizes also accompanies the printer. You can reduce printing times by copying these prebuilt fonts to the hard disk; they use about a half-megabyte of disk space.

Let the Mac Do It

This let-the-Mac-do-it approach to imaging pages is identical to that of the original PLP and has the same advantages and drawbacks. On the plus side, this approach allows the PLP to be electronically simple, and therefore, inexpensive. A PostScript printer, by contrast, does its own page imaging using an internal microprocessor and several megabytes of costly RAM and ROM (see *Macworld,* October 1989, "Paging All Printers").

On the negative side, the PLP's approach can be slow. How slow depends on the print job and the Mac. You must endure long printing times if you print typographically complex documents using a 1MB Macintosh Plus. (And to rub salt in the wound, the PLP II does not work with popular print spoolers such as SuperMac's SuperLaserSpool.) With simple documents printed from a multimegabyte Mac II, performance is a bit more sprightly.

If you consider a maximum of 4 pages per minute (ppm) sprightly, that is. Still, the PLP II is generally faster than Hewlett-Packard's DeskWriter, a low-cost, 300-dpi ink-jet printer. You can boost performance by about 15 seconds per page by adding an optional 1MB upgrade to the PLP. Adding more memory and an accelerator board to the Mac boosts performance with complex documents, but you eventually hit the 4-ppm wall. (At press time, GCC announced the PLP IIS, an 8-ppm printer available for $1899.)

Another drawback is that you sometimes have to print complex documents in two steps, especially on 1MB and 2MB Macs. Two-step printing isn't complicated—you simply quit the application you're using and then run the PLP's Print Manager utility—but it isn't terribly convenient, either. Adding memory to the Mac usually eliminates the two-step routine.

My Personal Opinion

Because the PLP II requires the Mac to create page bitmaps, it can't be shared on a network. If you want to be able to print from more than one Mac, you'll be better served by a PostScript printer, which shares easily. You'll also need a PostScript printer if you plan to use PostScript-oriented applications such as Adobe Illustrator 88 or Aldus FreeHand. And if performance is more important than cost, you might consider Qume's CrystalPrint Publisher or one of its cousins, although, be cautioned, they don't do envelopes.

But if you are looking for top-quality output, compatibility with the vast majority of Macintosh applications, and the security that comes with buying from a veteran Mac hardware manufacturer, buy the PLP II. It is reliable, its software is well designed, and its manual is excellent. And its output looks great, even if you do have to wait a while to see it. Look at it this way: while you are waiting, you can think up ways to spend the money you saved.—**Jim Heid**

See Where to Buy or circle 792 on reader service card.

Text-Effects Utility

TYPEALIGN 1.0

Pros: Adds text-positioning capabilities to Adobe Type Manager fonts; good user interface. **Cons:** Works only with Type 1 fonts; limited number of effects. **Company:** Adobe Systems. **Requires:** Mac Plus; System 6.0.2; Adobe Type Manager. **List price:** $99.95.

In the biological world, many organisms adapt to certain ecological niches to cut down on competition. Adobe Type Manager evolved to fill the need for readable fonts for low-resolution devices such as the Mac's screen and dot matrix printers. Now, a new program called TypeAlign has developed a symbiotic relationship with ATM, enhancing the capabilities of the latter with a number of special effects (see *Reviews, Macworld,* February 1990 for a review of ATM). While ATM displays readable text at almost any size, characters become distorted when placed at an angle. TypeAlign lets you place text on a slanted or curved path, retaining smooth character shapes for screen display and low-resolution printing.

TypeAlign was developed by Emerald City Software. Adobe Systems recently acquired Emerald City and will be distributing and supporting all the Emerald City products.

Instant Effects

TypeAlign is installed as a desk accessory, making it available from within any application. Say you're laying out an ad in PageMaker, for example, and want to add the word *New!* at an angle. Open up TypeAlign, and a text-effects window appears (see "Align 'Em Up"). Select the straight line from the tool palette and draw a line at any angle (unfortunately, TypeAlign provides no digital readout, so you'll have to set the angle by eye). Next, click on the text tool and start typing. Smooth, readable text appears on the slanted line in Times, the utility's default font.

You can change the font or other text attributes—size, style, or shading—by selecting a block of text and choosing Type from TypeAlign's menu.

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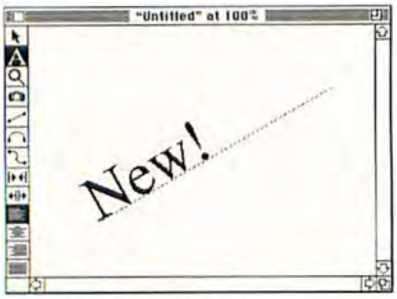
Kodachrome
FILM



Align 'Em Up

TypeAlign lets you place text at an angle or on an arc or free-form path. You can pop effects directly into the document you're working on, or save them for later use.

You can also add color to any or all characters in an effect if your screen and printer support color. TypeAlign lets you mix fonts, styles, shades, and sizes in a single effect. (Keep in mind that since TypeAlign works in conjunction with ATM, it works only with fonts supported by ATM—namely, the Type 1 PostScript fonts manufactured by Adobe and a few companies that license Adobe's font technology. The font-selection situation is improving, however; the recently released version 2.1 of ATM supports Bitstream fonts, and Image Club Graphics plans to release a utility that converts non-Adobe fonts to Type 1 fonts.)

You can edit an effect as you work on it, centering or justifying the text, for example, or adding or deleting characters. A kerning control lets you add or subtract space between characters. And you can zoom in for a closer look and increased kerning precision. (I had no trouble editing text on a Mac II, but found cursor positioning sluggish and ornery on a Mac Plus.) A template option lets you "see through" the TypeAlign window to the document below, to see how TypeAlign text will look in the document.

When an effect is ready, you can copy it to the Clipboard and paste it into your document, or save it as a PICT or EPS file. You can also save a TypeAlign effect in Illustrator 88 format and edit it with that program.

In addition to the angled line, TypeAlign lets you place text on an arc or on a free-form path you draw; you can reshape the freehand line by dragging control points or by adding and dragging new ones. Once you've placed text on a path, you can distort it (into a perspective effect, for example) by dragging a handle.

TypeAlign works with a goodly selection of Mac programs, including word processors and page-layout applications. It doesn't work with Canvas, CA-Cricket Draw, or SuperPaint, however, and although TypeAlign works with paint programs, these programs display text as bitmaps that don't take advantage of high-resolution printers such as the LaserWriter. Like its companion ATM, TypeAlign is a boon for ImageWriter owners, creating crisp text output at virtually any size. (Even ATM can't produce perfect ImageWriter characters at sizes below 8 points or so, but this shouldn't bother most TypeAlign users, since the program's effects are appropriate for display type at large sizes.) TypeAlign works with both QuickDraw and PostScript printers, taking advantage of the resolution and printing capabilities of whatever printer you use.

The Bottom Align

To increase TypeAlign's chances of survival, Emerald City employed a technique found among plants and animals: mimicry. The purple-and-yellow box with a large red letter closely resembled ATM's package, enticing ATM owners to go through the familiar routine of paying $99 for a text utility. Adobe purchased TypeAlign but may not even have to redesign its package.

Is TypeAlign worth $99? That's a matter of opinion. If you want a utility that's available at the flick of the mouse to place readable text on a slant, arc, or free-form path, then TypeAlign is a worthwhile investment. Because of its specialized typological niche, TypeAlign has a fairly limited repertoire, but what it does it does well.

If you already own a PostScript graphics program like FreeHand or Illustrator or a draw-and-paint program like SuperPaint, you can achieve many of TypeAlign's effects. Personally, I don't mind seeing scruffy-looking angled text on the screen, as long as it prints out cleanly on my LaserWriter. But if you've found that ATM enhances text on your ImageWriter or other printer, you might well want to enhance ATM's capabilities with TypeAlign.—**Erfert Fenton**

See Where to Buy or circle 812 on reader service card.

External Fax Modem

ABATON INTERFAX 24/96

Pros: Operates in background with or without MultiFinder; prepares documents for sending prior to transmission; displays faxes on screen; supports distribution lists; modem includes MNP Class 5. **Cons:** Allows phone-directory entries by name or company, not both. **Company:** Abaton (a subsidiary of Everex Systems). **Requires:** 512K; System 6.0. Hard disk recommended. **List price:** $599.

Although stand-alone facsimile machines are still too expensive for many small businesses, fax modems such as the Abaton InterFax 24/96 offer Macintosh users standard fax capabilities at a more modest price. The 24/96 is a dual-purpose unit. It sends and receives faxes at 9600 bits per second (bps) and functions as a 2400-bps Hayes-compatible data modem.

Hardware Setup

All you need to do to set up the hardware is connect the serial cable from the 24/96 (25-pin) to the Mac's serial port (8-pin), string the telephone cord from the 24/96 to a phone wall jack, and plug in the power cable. All cords and cables are supplied. Optionally, you can also connect a phone handset to the unit. The phone operates normally whether the 24/96 is on or off.

The software includes InterFax Control (a Control Panel device that enables you to monitor transmissions), FaxMaker (a Chooser-level print driver), two special-purpose fax fonts: SWA Swiss and Dutch (Helvetica-style and Times-style fonts), and the InterFax program.

The InterFax Program

Before using the 24/96 for the first time, most users will want to run the program's configuration routines. The modem configuration dialog box allows you to enter your name or a brief message that will appear in the page header whenever you send a fax, how many rings the unit must sense before answering the phone, and the speaker

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Circle 65 on reader service card

volume. Other configuration options specify whether or not page headers on faxes you receive should be printed, where on disk incoming and outgoing mail should be stored, and how—or if—you should be notified of incoming faxes.

Like any good fax application, Abaton's lets you set up a phone directory that can contain as many as 800 entries (and you can create multiple directories). If addressees have something in common, you can combine entries into distribution lists. When you want to send a fax to each of your sales reps, for instance, you just select the appropriate distribution list and let the 24/96 take care of them one after another.

To save time and paper, the 24/96 includes an on-screen viewer that lets you examine any incoming or outgoing faxes. Screen magnification can be set from 5 to 1000 percent, and the image can be rotated 90 degrees in any direction—which is a great way of handling faxes that were sent upside down.

The program logs all completed transmissions, both incoming and outgoing (see "Delivered Mail"). Unsuccessful transmissions, or faxes that have been scheduled for later transmission, appear in a separate Fax Schedule window as miniature envelopes with the recipients' names and a stamp icon. The image on the stamp shows if there were problems with the transmission.

The biggest advantage of using a fax modem is that, since most of your documents are created on the Macintosh and stored on disk, there's no need to scan them before sending. Of course, a fax modem's no good if you need to send copies of information that hasn't been created on the Macintosh (ad slicks or contracts, for example). Although the 24/96 has no scanning capabilities, the 24/96 can control a scanner if you should decide to add one to your system. Options are also provided to convert fax files into graphics (PICT, MacPaint, or TIFF formats), and to change the same graphic file types into faxes.

Sending and Receiving Faxes

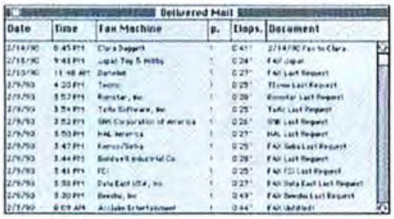
The FaxMaker driver allows you to create faxes from within almost any application that uses the standard Macintosh Print routines. All you have to do is open the Chooser from the Apple menu and select the FaxMaker icon as the current printer. Until you reset the Chooser, any application that you print from automatically sends the current document as a fax instead.

MARK JOHANN

Abaton InterFax 24/96

When you select Print from a word processor, spreadsheet, or other program, the FaxMaker's Print dialog box pops up. To send the document as a fax, you merely indicate the desired quality and page range, then click Schedule to select a destination from the phone directory (or to enter an unlisted one). You can also set a special delivery date and time, if you wish. Otherwise, the transmission occurs immediately.

For transmission, the file is compressed and font substitutions—if indicated—are automatically made. Because the Macintosh screen resolution is about one-third of a fax machine's printing resolution (approximately 200 dots per inch), fonts look best if you have a size that is three times as large as the font in use. The SWA Swiss and Dutch fonts that come with the InterFax 24/96 include the appropriate triple-size fonts for any point size between 9 and 24.



Delivered Mail

The InterFax application maintains a log of completed outgoing faxes, showing the date, time, recipient, number of pages, and the connect time. With this log, even if you schedule transmissions for the wee hours of the morning, there's no need to wonder if they got through.

Receiving a fax with the 24/96 requires no action on your part—other than making sure that the 24/96 and the Mac are on. The standard notification for an incoming fax is that the Apple icon changes to a flashing telecommunications symbol. You can also set a beep tone to indicate a successfully received fax.

The InterFax cdev

The InterFax cdev software shows how the current transmission is progressing and includes detailed information on the speed, fax quality, and number of pages; notifies you of unopened faxes; and shows when the next outgoing transmission is scheduled. The cdev also offers the only way to stop a transmission in progress. It also reports errors and automatically retries a call five times—at five-minute intervals.

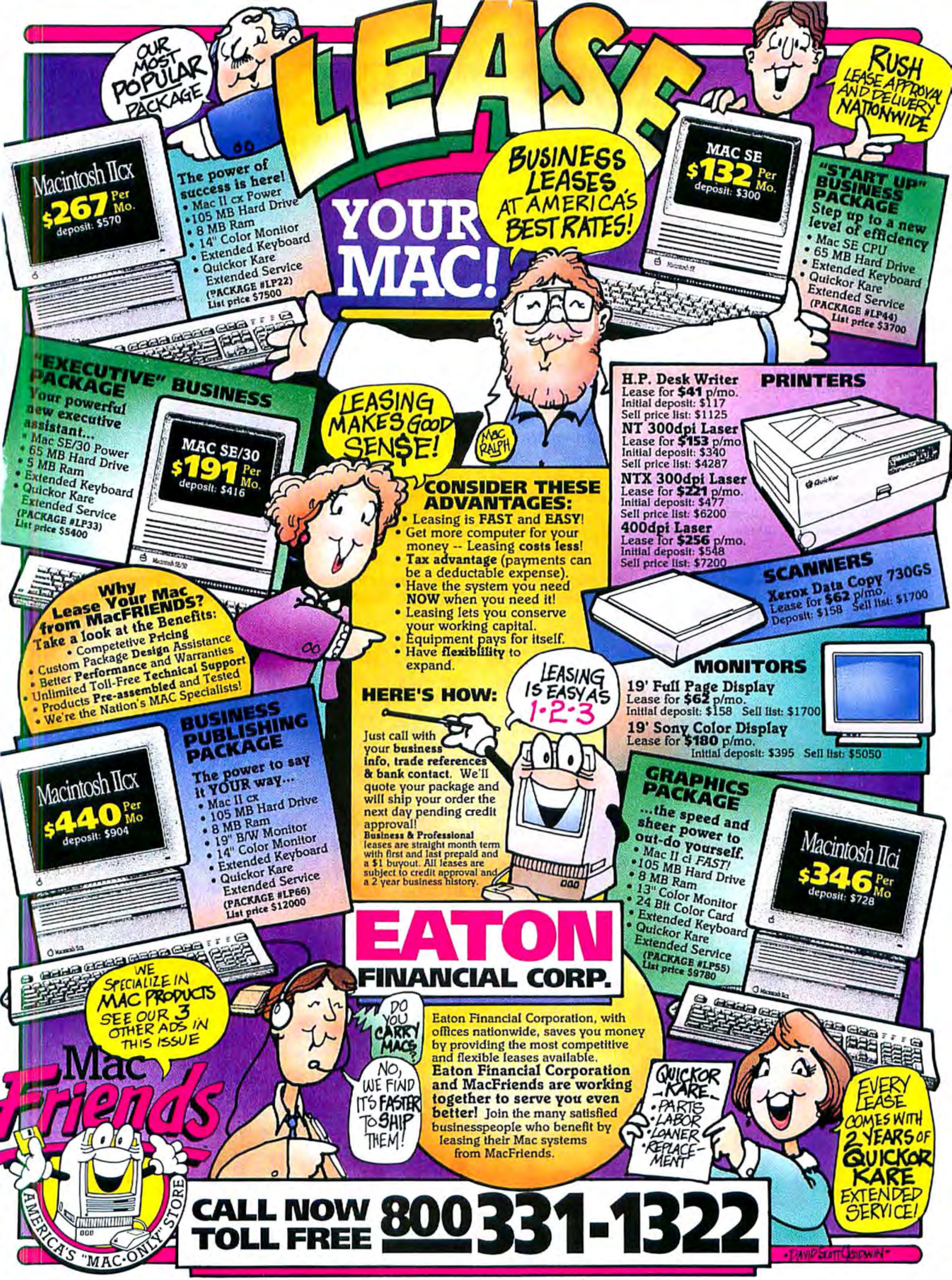
Modem Features

The 24/96's 2400-bps data modem includes built-in diagnostics, autoanswer, support for the Hayes AT command set, MNP Classes 2 through 5 (for automatic error control and data compression), and voice-to-data switching. To activate voice transmission you simply pick up your phone handset. You don't even need to do anything to switch between modem and fax capabilities. The 24/96 automatically uses whichever mode is appropriate for the current transmission. Nine LED status lights mounted on the front panel show what the fax or modem is up to at any moment.

In modem mode, the 24/96 operates flawlessly in my tests. In fax mode, the only problems I encountered were the result of my not reading the entire manual before plunging in. I didn't benchmark the 24/96 against a standalone fax machine, but I found the transmission times acceptable (about 24 seconds for a half page of text). If you're considering buying a fax modem, the 24/96 should be high on your list of candidates, and it comes with a one-year parts-and-labor warranty.

—Steven Schwartz

See Where to Buy or circle 702 on reader service card.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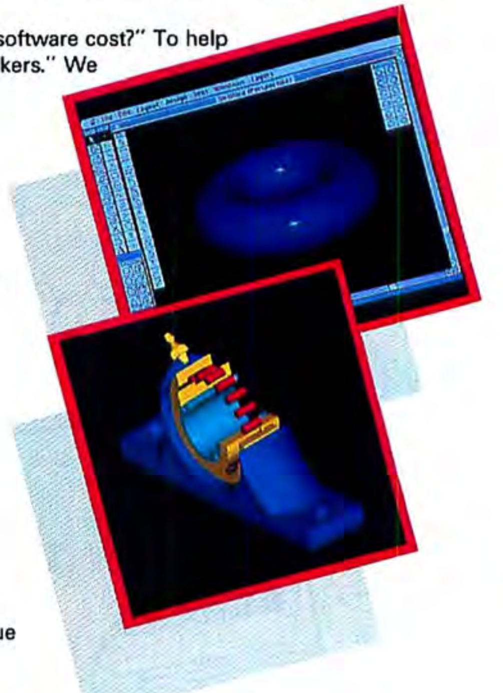

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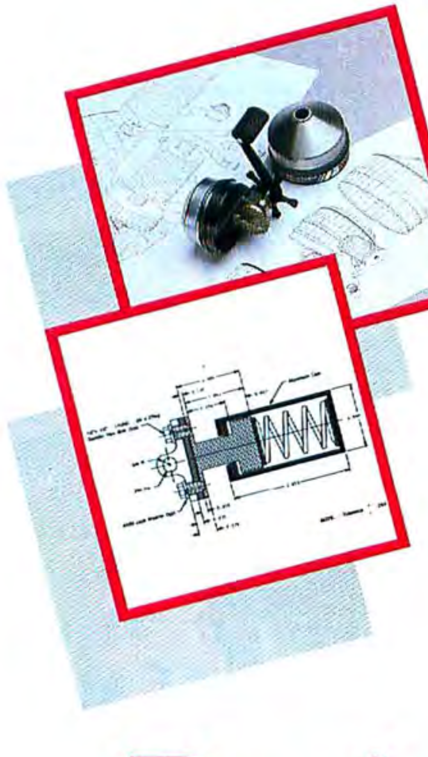

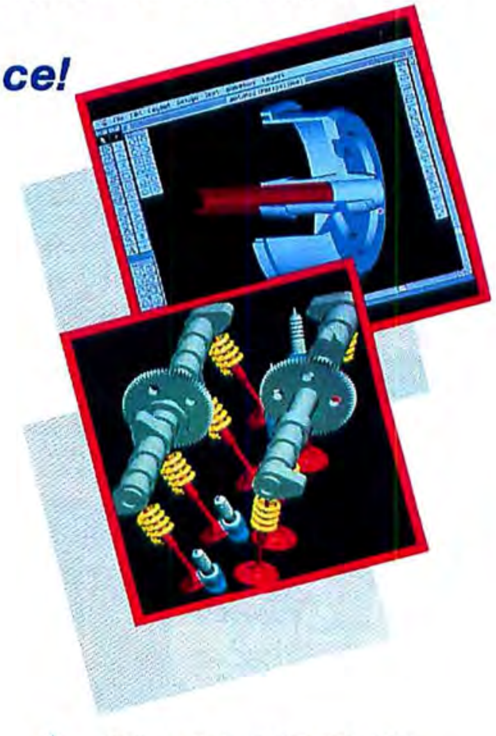

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Color Scanning from Noncolor Scanners

COLORSET 1.5

Pros: Enables capture of color images with gray-scale or black-and-white flatbed scanners; empowers 4-bit scanners to produce 8-bit images with 256 shades of gray; XCMD permits display of color images in HyperCard stacks. **Cons:** Difficult to scan bound materials; works well only with certain scanners. **Company:** Studiotronics. **Requires:** Mac SE/30; 2MB RAM; gray-scale scanner. **List price:** $399.95.

If you own a black-and-white scanner, but your Macintosh system uses color, you've probably wished many times for some way to capture color images for inclusion in a desktop presentation or a publishing project. Colorset, an ingenious combination of color acetate filters and software from Studiotronics, provides just such a capability.

Not a Scam

Scanning in color with a black-and-white or gray-scale scanner sounds at first like it's too good to be true, but a scanner that's color-blind has a great deal in common with one that isn't. Both read gray-scale information using the same type of light-detecting sensor, a charge-coupled device (CCD) array. Color scanners differ in that they record colors by positioning three color filters (red, green, and blue) between the image being scanned and the CCD array. The simplest color scanners scan an image three times, changing the filter with each pass. The information from the three scans is then combined to form a color image. Colorset works the same way, except you have to pitch in and change the filters yourself.

When you initiate a scan with Colorset you indicate the region of the image you want to scan. Then the software prompts you to position one of the three filters between your image and the glass plate of your scanner for each of three successive scans. Colorset then combines the information from all three scans and presents a color image in an editing window.

Regardless of the kind of monitor you have, you're given the option of creating an image in 8-, 16-, or 32-bit mode (256; 65,536; or 16.7 million colors). If your monitor is limited to 8 bits, ColorSet will display scanned images using 256 colors but still retain all of the color data for the color mode that you selected when the scans were made. In other words, you don't need a 32-bit color monitor to create a 32-bit image. If your scanner, like the Apple Scanner, only captures 4 bits per pixel, the images will be limited to a maximum of 4096 colors. However, images scanned in 32-bit mode with 8-bit scanners can contain a maximum of 16.7 million different colors.

Editing Tools

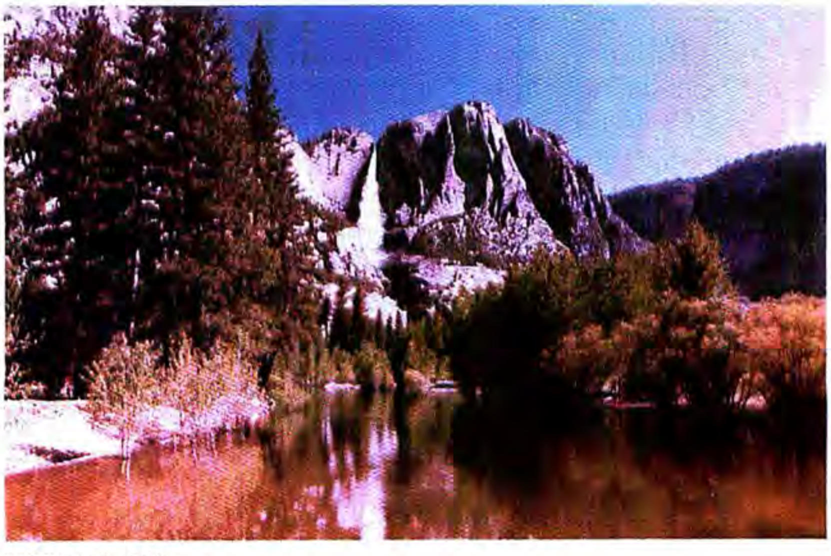
Although Colorset doesn't provide all the capabilities of an advanced image processing program like Photoshop or ColorStudio, it does supply enough editing tools to create usable images most of the time. Six slider controls enable you to adjust the contrast and brightness of each of the primary colors. To adjust the contrast or brightness of a specific area of an image, you use a brush tool to select the desired area first. If you wish to change a subset of colors, you first select the desired colors by clicking or shift-clicking on the appropriate color squares in a color palette box. Although Undo isn't available after each adjustment, you have the ability to mark (that is, save) the condition of the color palette after each change that you decide to keep. Choosing Revert to Original later on will then reset the image to the marked palette instead of the original palette. When you finish editing your image you can save it to disk in 8-bit PICT, 32-bit PICT, or in color or gray-scale TIFF format. By saving a scanned image in gray-scale TIFF format, users of 4-bit scanners can create 8-bit images with 256 shades of gray.

Registration Woes

A major drawback to using Colorset is the need to maintain perfect registration of the three scans. Typically this is achieved by securing the top of the image to be scanned with a low-tack tape (a roll of 3M's Post-it Correction & Cover-up Tape 658 is included with Colorset). Securing a page bound in a magazine or book is difficult, if not impossible. In most cases you'll have to either cut out the image or remove the page from the binding. Also irksome is the need to keep the filters clean and free of lint.

All Scanners Are Not Equal

Colorset works better with some scanners than with others. In my tests with the Apple Scanner I had to manipulate the images to bring out blue hues *(continues)*



RGB Yosemite Falls

The original image was a 4-by-5-inch color print that was scanned at 150 dpi using a 4-bit Apple Scanner. Adjustments were made to enhance the contribution and contrast of the blue component of the image. The final image was cropped, fine-tuned, and color-separated using Adobe's Photoshop software.

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correctly. However, the clarity of the images I got was surprising, considering the inherent limitations of using a 4-bit scanner to create color images. Studiotronics claims that the best results are obtained with the Hewlett-Packard ScanJet Plus and that acceptable images can be obtained with Abaton's 300/GS scanner. Due to the limited range of control over brightness and contrast with Microtek's scanners, however, Studiotronics does not recommend using Microtek scanners with Colorset.

Color in HyperCard Stacks

Included with Colorset is an XCMD for displaying color PICT files in a display window from within HyperCard stacks. Using the ShowScan installer stack you can install the XCMD in any of your stack projects or into your Home stack. When you call the XCMD from a HyperCard script you need to specify the file name and path of the PICT file you wish to display and the x and y coordinates of the top left corner of the window that will contain it. You can also specify the number of seconds that ShowScan will display the image; by setting the delay value to zero, you can make the image window remain on screen until you click the mouse button. Since ShowScan's display window typically covers most of HyperCard's window, you'll need to use a graphics program to annotate your color pictures if you want text to accompany an image.

If you already own an Apple Scanner or HP ScanJet Plus, Colorset is a practical and economical way to get color images into your Macintosh. If the pictures you need to scan are bound, or if you need to scan a lot of color images on a frequent basis, consider purchasing a color scanner instead. Keep in mind that working with color images obtained from either Colorset or a color scanner, particularly large ones or those that are 32 bits deep, will tax the resources of almost any Macintosh system, particularly with regards to the amount of disk space you'll need. However, scanning color pictures for display on the Macintosh is undeniably a lot of fun and can bring new ideas and creativity to your work.—**David L. Foster**

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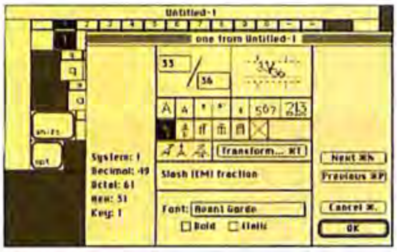
Font-Creation Software

PARAFONT 1.02

Pros: Closely approximates traditional typographic symbols; makes modification of PostScript fonts easy; allows generation of entire sequences of related symbols with a single command; can apply identical set of modifications to any number of original fonts. **Cons:** ParaFont fonts consume more printer memory than comparable conventional fonts. **Company:** Design Science. **Requires:** 512KE. **List price:** $99.

Despite the unarguably high quality of most PostScript fonts, the traditional typographer can still find subtle aesthetic failings to criticize. For example, since Macintosh fonts lack genuine fraction characters, you have to create ungainly simulations by typing out full-size numerals separated by a slash character. And have you noticed how all the numerals in a Macintosh font are allotted the same amount of space on a line, regardless of each numeral's actual width? That's fine when you want to line up digits in a table, but it results in unnatural-looking spacing for numbers within a block of text.

Design Science's ParaFont lets you quickly and easily correct these and similar deficiencies by generating symbols from existing characters in any PostScript font. Of course, you could use Fontographer to hand-tailor symbols for every font you use, character by character—assuming you have the time and design skills. But the ParaFont solution is much faster, and the results will satisfy all but the pickiest typographers.



33 / 36

System: 1
Decimal: 49
Octal: 61
Hex: 31
Key: 1

Slash (EM) fraction

Font: Avant Garde
☐ Bold ☐ Italic

Almost One

The highlighted *1* in the background keyboard layout window has been selected for modification by ParaFont. In this particular case, a fraction composed of several scaled numerals will be substituted for the *1*.

ParaFonts

ParaFont relies on the same basic techniques utilized by such font special-effects packages as Laser FX and Smart Art, though the emphasis here is on typographic detail rather than flash. The fonts created with any of these programs contain no character outlines of their own. Instead, they simply consist of PostScript language commands that create and then modify copies of entire fonts or individual characters already resident in the printer. This results in an inherent, but usually tolerable, drawback: a ParaFont font consumes more printer memory than an ordinary font, since both the original font and the copy must be present.

ParaFont can change a character's proportions by scaling the vertical and horizontal dimensions independently. The program can slant a character forward or back, or reposition it relative to the text baseline. ParaFont can change the amount of space to the right of the character, the thickness or relative position of an accompanying underline, or the width of the outline that prints when you choose Outline on the Style menu. For convenience, you can reassign a character to a new key, or combine several characters into one (to create complete fractions that you can type with a single keystroke, for instance). In fact, you can even merge characters from other fonts into the base font.

Relying on these few basic modifications and ParaFont's built-in options, you can rectify standard Mac fonts' most common typographic omissions. To create a one-key typographically correct fraction, for example, you just type the numerator and denominator into the appropriate dialog boxes. The program then downsizes the original numerals to 65 percent of their width but only 60 percent of their height—a change of proportions consistent with typographic convention. You can create fractions with a diagonal bar or horizontal bar; in either case, ParaFont positions the numerals properly as numerator or denominator, as the case may be. If you can't anticipate all the

(continues)

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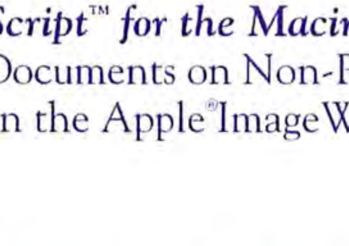

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fractions you'll be using ahead of time, you can also generate two sets of similarly scaled individual numerals, one set raised above the baseline for use in numerators, the other on the baseline for denominators.

ParaFont can also turn ordinary capital letters into small caps, which are often used for titles, headings, and other items that benefit from a delicate emphasis. In this case, ParaFont shrinks the letter to 90 percent of its original width and scales its height to a little more than that of a lowercase *x* in that font. Similarly, another option creates elevated, miniaturized superior characters, which are smaller, not as high as the standard superscript, and have different proportions. You can have the program build facsimiles of the ligatures that are missing from most Mac fonts. Other numeric functions automatically add proportional spacing to standard numerals or transform them into old-style numbers (where the numbers descend the baseline) for use in formal text. Finally, for situations where these automatic modifications don't fit your needs, ParaFont lets you type in your own scaling, slanting, and spacing values for each character.

Easy Transformations

ParaFont is extremely easy to operate. For the main screen you can choose a Key Caps–like representation of the keyboard layout or a simple table of characters. The one design gaffe I uncovered in ParaFont is that this window fills only about half the display and can't be enlarged to show the entire font at once. Double-clicking on a character in the main window (which looks a lot like the keyboard in Key Caps) brings up the transformation dialog box for that particular character. Alternatively, you can select a group of keys in the main window's keyboard graphic; ParaFont then automatically generates a series of modified characters en masse. For example, you can have the program generate a complete set of commonly used fractions all at once.

By substituting new characters for rarely used symbols, you can produce a ParaFont font that includes all the ordinary letters, numerals, and punctuation marks from the original font, along with a generous supply of new fractions, small caps, and ligatures. When a font is complete, you just tell the program to save it in PostScript and screen formats. If you want to apply the same modifications to another font, you simply change the base font and resave using a new name.

For most Mac users, the quality of ordinary PostScript fonts is more than sufficient. But if you want your desktop published documents to look professionally typeset down to the finest detail, get a copy of ParaFont.

—Steve Cummings

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HyperCard and CD Audio Program

CD COMPANION SERIES: LUDWIG VAN BEETHOVEN SYMPHONY NO. 9

Pros: Highly interactive; beautifully designed. **Cons:** None. **Company:** The Voyager Company. **Requires:** Mac Plus; hard disk; CD ROM player. **List price:** $99.95.

Reading about great music is a lot like reading about great food. No one would argue that reading a restaurant review is anything like eating the meal it describes; likewise, reading about a symphony is a pale substitute for hearing it performed. Now, however, The Voyager Company's first CD Companion Series title, Beethoven's Ninth Symphony, uses the Mac to bridge the gap between first-hand experience and expert commentary by using HyperCard to control a CD player. The product consists of a five-level HyperCard stack, written by UCLA professor Robert Winter, and a CD with a digitally remastered 1966 Decca recording of Beethoven's Ninth Symphony, performed by the Vienna Philharmonic with Joan Sutherland, Marilyn Horne, James King, and Martti Talvela.

Exposition

CD Companion, though, is much more than just a tour through the symphony with simultaneous translation. Each of the stack's five levels offers a fully interactive way to explore the music at your own speed and in your own sequence, and each level is designed to take you through the symphony in a different way. All the levels work together; at any point it is easy to switch from one to another to go into a particular subject in greater depth, return to the symphony for uninterrupted listening, pause the music to look up unfamiliar terms in a glossary supplemented with audio examples from the CD, search for any word on any card, or refer to on-screen help. By conveying the same information in a variety of ways, CD Companion allows you to learn about the symphony in whichever way you learn best.

Development

The first level, The Pocket Guide, presents the symphony structurally; all four movements and their sections appear on one card for easy access in any sequence. Click on the Scherzo da capo in the second movement, and you immediately hear that section; to compare that with the closing of the third movement, just move the cursor to the Coda of the third movement and click to hear that section.

The next two levels, Beethoven's World and The Art of Listening, are longer sections that provide background about Beethoven's life and times as well as an explanation of the symphonic form in general and the Ninth Symphony in particular. Both essays are amply illustrated with graphics and audio examples from the CD (see "Learning By Doing"). Throughout, Winter's commentary strikes a delicate balance—it manages to be

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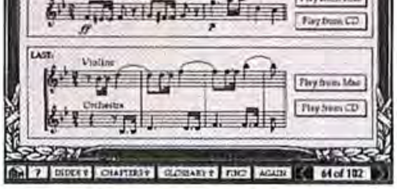

And the closing area is framed by themes whose strong dotted rhythms are unmistakably related to the Defiance Theme.

Learning By Doing

In The Art of Listening, you can learn about specific musical themes in the Ninth Symphony by following highlighted notes on the musical score. Playing the music from the Mac allows you to hear it in a simplified form. Playing it from the CD lets you hear it in its full symphonic beauty.

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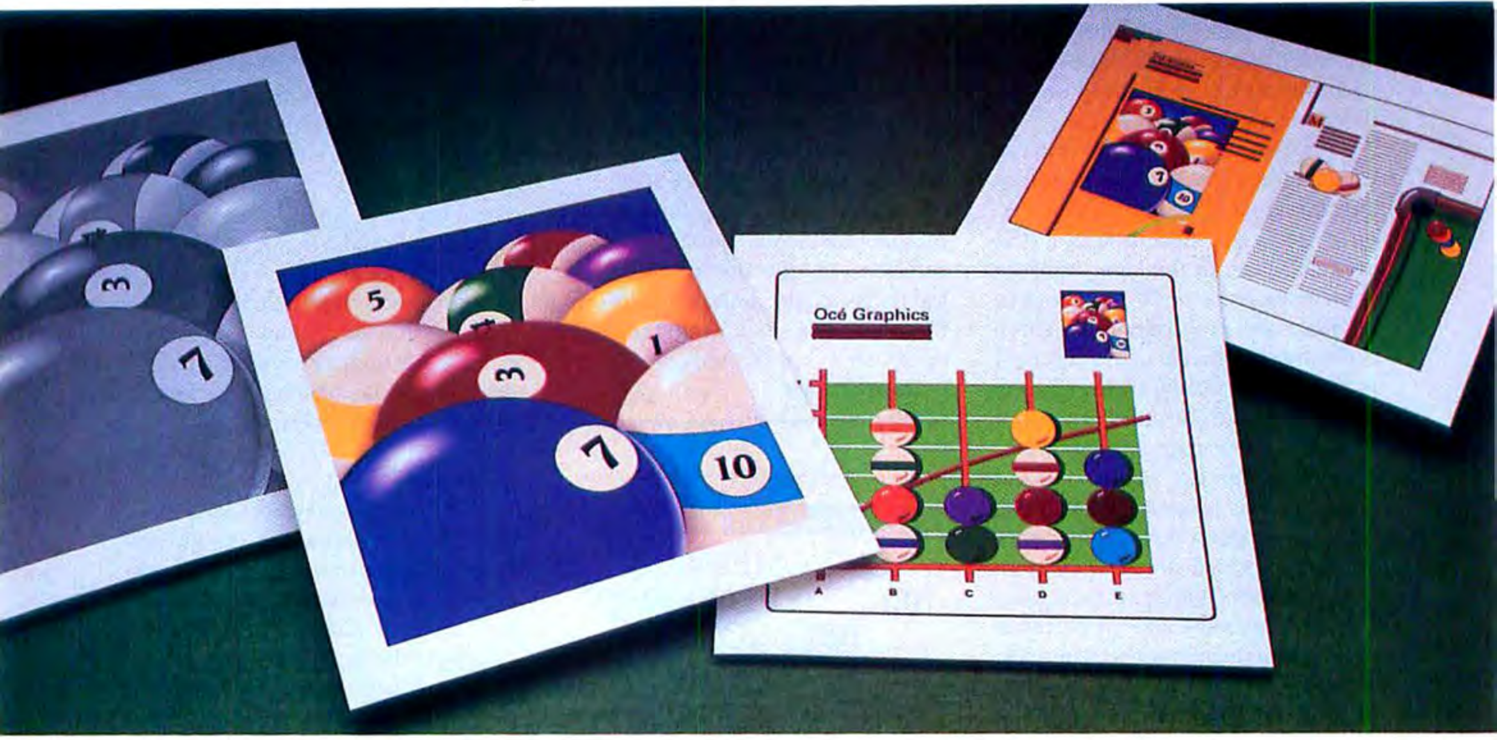

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both academically comprehensive and intellectually involving. Surprisingly, it isn't boring.

The fourth level, A Close Reading, was my favorite. It provides simultaneous commentary on the symphony as it plays. On the left side of the screen, you can read about the music in a commentary box and see the number of the measure currently being played; to the right is a map of the symphony so that you can always see where you are within the larger structure of the work. Above the commentary box is the name of the movement you're in, along with Beethoven's musical markings for it (Allegro ma non troppo, un poco maestoso). By clicking on the movement number, you can move directly to the relevant section in The Art of Listening to read more about that movement; you're able to return to the same card in A Close Reading with one mouse click. And you can pause at any time to use the Notes section for your own notes.

Buttons occasionally appear, inviting you to hear something in isolation, such as a theme or variation. Clicking on these buttons brings up a card with the score for just those measures so that you can see them, hear them, and then return to the symphony when you are ready to move on. During the "Ode to Joy" choral section, the lyrics appear in either English or German. The most magical thing, though, is how easy it is to resume the symphony after a pause; there are none of the awkward gaps or skipped sections that I remember from the music lab at my university, where I would read a workbook and skip a needle all over a mistreated record.

Recapitulation

The fifth level of the stack, The Ninth Game, is a funny, irreverent quiz. Designed for one to four players, the game makes it fun to answer questions about specific musical features of the symphony, factual questions about the score itself, and the life and times of Beethoven, as Beethoven's bemused portrait looks on. Correct answers are greeted with cries of "Sehr gut" and "Ach, du Liebe" that sound as if they come from Beethoven himself, while incorrect ones prompt shouts of dismay and sounds of breaking glass, along with helpful replies from Ludwig himself to help you learn from your mistakes. If you particularly please the master, he dons sunglasses and sports a flower on his lapel, or winks at you in a gleeful manner (see "Ludwig Incognito").

Coda

If the combination of flexible interactivity, expert commentary, and definitive recordings of great music appeals to you, CD Companion is for you. The Voyager Company plans to release future volumes in the series and is currently working on Stravinsky's *Rite of Spring.* If using HyperCard to control an audio CD sounds like a tantalizing prospect, The Voyager Company also sells CD AudioStack, two stacks that provide you with all the tools you need to create your own companionable CD and stack programs. CD AudioStack even comes with its own audio CD, The Movies Go to the Opera, to practice on. Personally, I'm looking forward to an in-depth investigation of The Beatles' *Abbey Road.*—**Liza Weiman**

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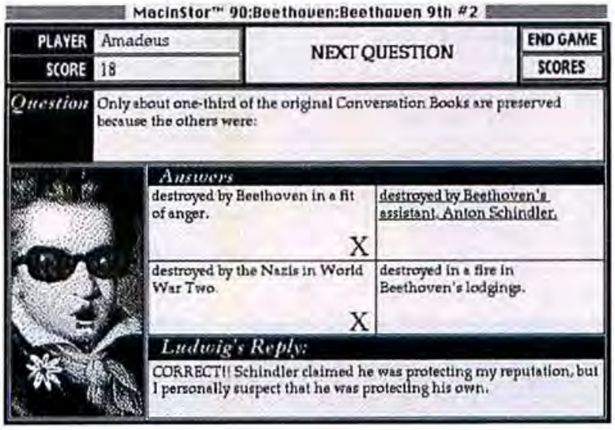
Ludwig Incognito
The Ninth Game lets you reinforce your knowledge by taking a quiz. Here Ludwig shows his delight with a correct answer by wearing his sunglasses and a boutonniere. He also adds more information about the answer.



PLAYER Amadeus
SCORE 18

Question Only about one-third of the original Conversation Books are preserved because the others were:

Answers

destroyed by Beethoven in a fit of anger.	destroyed by Beethoven's assistant, Anton Schindler.
destroyed by the Nazis in World War Two.	destroyed in a fire in Beethoven's lodgings.

Ludwig's Reply:
CORRECT!! Schindler claimed he was protecting my reputation, but I personally suspect that he was protecting his own.

MIDI Sequencer

MASTER TRACKS PRO 4

Pros: Clean screen layout; graphic song-overview window; support for 32 MIDI channels; full sync capabilities; flexible edit filters and quantize controls; full graphic display and editing of all data. **Cons:** No graphic display of note velocities; no snap-to-grid mode in graphic editing windows; no density control for pencil tool in controller editing windows. **Company:** Passport Designs. **Requires:** Mac Plus; MIDI instrument. **List price:** $495.

Passport's original Master Tracks Pro was very successful because it was one of the first programs for the Mac to offer graphic editing capabilities and innovative windows that could display data such as tempo changes and pitch-bend movements in easy-to-understand graphic form. Even better, the program's layout was extremely clean, and it was simple to operate and learn. Over the years Passport has refined the editing displays and added many new features, but Master Tracks Pro 4 still has as simple a layout as the original Master Tracks product.

Look-and-Feel

Because of their excellent visual design, earlier versions of Master Tracks Pro have long been popular among users who need a professional-level program but have little experience with computers. This simplicity is not achieved at the expense of power, however; Passport has endowed Pro 4 with high-end features like 32-MIDI-channel capability, sync to MIDI time code (MTC), and advanced tempo controls that greatly simplify composing music locked to video. With 64 multichannel tracks to record on and a built-in System Exclusive data librarian that can store patches from most synthesizers, Pro 4 should be able to satisfy the needs of all but the most demanding professionals.

Passport also includes one feature that no other Mac program has, a measure-by-measure graphic overview of the song being worked on. In Pro 4 it's in the main window, called the

(continues)

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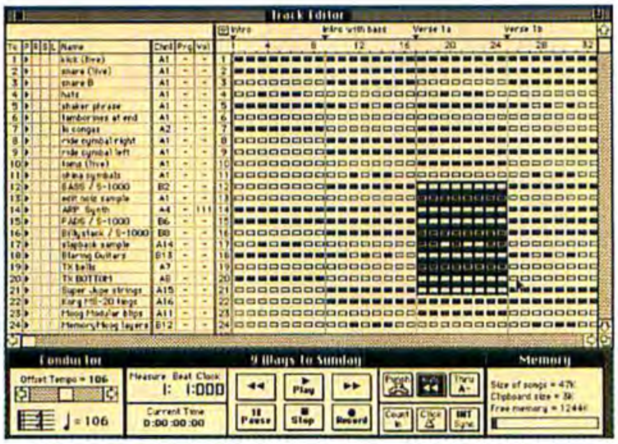
Right on Track
Master Tracks Pro 4's main window, the Track Editor. The grid on the right of the window shows what's going on in each track, displaying measure numbers and markers across the top. The transport controls at the bottom operate just like those on a tape recorder.



Track Editor (see "Right on Track"). Each box on the grid represents one measure of music; a solid box indicates that there is data at that measure in the track, a hollow box indicates an empty measure. As you build up more and more tracks, this display provides invaluable visual feedback about the song under construction. You can quickly insert markers at any point in a sequence to delineate sections. The Track Editor window scrolls while the sequence plays back, keeping the currently playing measure at the left edge of the window. You do most of your editing with the mouse by dragging to select edit regions and clicking to set paste or insert points. If you hear a bum note that needs fixing, a quick double-click anywhere in the grid opens the Step Editor for that track, precisely at the measure you clicked on.

Step In for Editing

The Step Editor is where most tweaking of single notes takes place. You can stretch, move, erase, and insert notes with the mouse, and zoom the display to any of six views. Double-clicking on a note pops up a box showing the note's start time, pitch, MIDI channel, attack and release velocity, and duration, all of which can be edited numerically. Non–real-time, or *step,* recording can be done from this window as well, allowing you to use live MIDI input to place notes on screen. You make region-specific edits in the Step Editor in much the same manner as in the Track Editor window, using the mouse to select the data in question, but in the Step Editor the regions can be as small as 1/240 beat. In the Track Editor, in comparison, the regions always snap to measure boundaries, making selecting large regions much quicker. Unfortunately, in the Step Editor you can't set the cursor to snap to any grid when selecting regions, so selecting rhythmically precise regions is trickier than it needs to be.

Two other features make Master Tracks Pro 4 stand out: the Fit Time, which very elegantly creates the tempo changes necessary to make a selected region of measures fit a specified number of minutes or seconds; and the Change Filter, which allows you to specify what notes will be affected by editing commands chosen from the Change menu. Other programs have similar filters, but none of them allow you to specify a map of beats within the measure that will be affected, or allow you to select every *x* measure.

In Control

Master Tracks Pro 4 also offers graphic display of MIDI Continuous Controller data. Pro 4 displays movements of the pitch-bend wheel, changes in keyboard pressure (aftertouch), program-change commands, and any of the 128 MIDI controllers as plots of data value against time. A slow fade on a synthesizer's volume pedal looks like a ramp on the screen, and if it's not perfect, you can easily redraw it with the pencil and eraser tools. For users of synthesizers and effects devices that can map incoming MIDI controllers to sound parameters, Pro 4 provides an excellent environment for automation control. You can even edit tempos in this fashion, which makes creating complex tempo changes a breeze. Like both the Track Editor and the Step Editor, these editing windows can scroll during playback and can zoom in to any of six magnifications.

One drawback to using the pencil to draw controller data, however, is that Pro 4 enters one controller event for each screen pixel you draw across. If you zoom way in to draw a precise curve, you wind up entering lots of data, which hogs memory and clogs up the MIDI data stream. Although there is a menu command that thins out controller data within a region, you have to thin out the data each time you draw it.

Filling the Bill

Passport has really made Pro 4 a complete workspace by including niceties like a notepad that stores text information inside a file, and a song playlist that cues up strings of separate files to create a set for live playback. Passport has added a List Editing window, which is very efficient for some operations. There is also a facility for remote control of play, record, rewind, and so on, buttons from keys on a MIDI keyboard.

Many companies have refined graphic editing even further than Passport, however, leaving Pro 4 a little shy on features. Opcode's Vision, for example, can show the attack velocity of each note in graphic form and has sophisticated cursor controls that make editing individual notes much quicker (see *Reviews, Macworld,* October 1989). And Mark of the Unicorn's Performer can show five or more different types of MIDI controller data in one window, as opposed to Pro 4's one-per-window display.

This slight feature gap is offset by the fact that both competing programs are much more confusing and harder to learn. Pro 4's interface is far smoother and cleaner than either competitor's, and Pro 4's Track Editor makes cutting and pasting sections of songs easier than on any other program. With 95 percent of the capabilities of the competition, and a simple design that makes everyday operations less confusing, Pro 4 stands out as the one professional-level sequencer that you don't have to be a rocket scientist to use.—**Charles Clouser**

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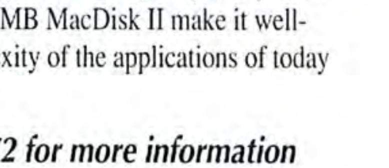

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Interactive Statistics Program

DATA DESK 3.0

Pros: Superior implementation of exploratory data analysis; rich graphics set; HyperViews; new linear modeling section extends professional capabilities. **Cons:** Lacks tests found in other high-end Mac statistics packages. **Company:** Odesta Corporation. **Requires:** Mac Plus; second disk drive. **List price:** $595.

The competition between Data Desk and other Mac statistics programs has a curious history. Data Desk started as a single-minded proponent of exploratory data analysis (EDA); it expected the user to graph all data in several different styles and use plots as the basis of most analysis. The other programs, by contrast, were mostly table-based products designed to receive numbers from a spreadsheet and grind that data through different kinds of textbook analysis. Through the years newer Mac statistics offerings have included more EDA features, while Data Desk has stayed well ahead of the pack in exploratory graphics and has added more traditional statistics as well. Version 3.0, the newest release, offers innovative use of color as a plot variable and a complete General Linear Model unit, carefully integrated with the rest of the program.

The Data Desk Way

The essence of exploratory data analysis is to plot data points in several different ways by using different grouping points for classification. In the business example provided with Data Desk, plots show businesses grouped by industry category or profitability category, plotted against gross sales. Since Data Desk makes it so easy to explore data, you might ultimately find that different industries fall into distinct plotting zones on a scatterplot of log (sales) versus log (assets), a useful insight into business structure (see "A Capitalist Plot").

Once you have found an interesting relationship by examining a variety of plots, you can perform numerical tests for statistical significance. Besides highlighting relationships for further investigation, graphical methods also allow the investigator to note and edit outliers or other anomalies in the data.

Vital Statistics

Data Desk has always included standard summary statistics, regression analysis, correlation statistics for nonparametric analysis, and principal components analysis. Data Desk allows unlimited variables and variable values, stored in the program's own relational structure, and a huge library of menu-based transformations. A feature called HyperViews gives context-based suggestions to pursue on appropriate lines of analysis.

Data Desk now includes a linear modeling section for analysis of variance and covariance (n-way ANOVA and ANCOVA) that accommodates most experimental designs, including unbalanced designs and designs with missing cells. The modeling section is especially useful because it accepts sets of data points selected and cut from Data Desk with the lasso tool—this makes ANOVA an efficient follow-up to insights developed during graphics manipulation. As an aid to beginners, linear modeling is performed from a Design Window that steers you through the initial model setup.

Other new features are sliders and the use of color as a plotting variable (rather than mere chart decoration). You can point to a plot axis, select it, and slide it, changing the plot origin. You can also define slider controls for any type of graph and use slider values in a computation.

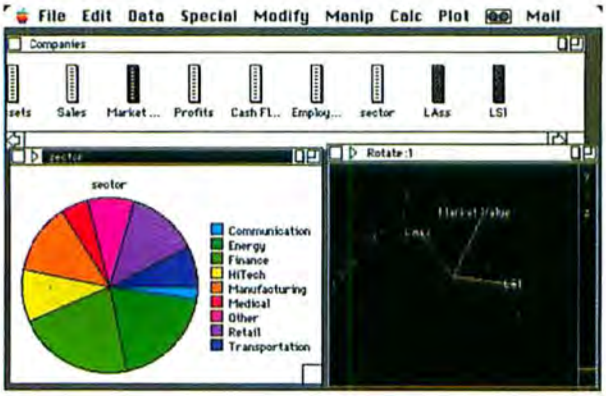
Color as a variable is a simple but powerful concept; you can, for example, display a profit-versus-loss plot for a collection of businesses using variable blueness for degrees of profit and redness for loss. For really information-packed plots, color can be used as a fourth variable on a three-axis rotating plot. There's one more important graphics enhancement—Data Desk now offers scatterplot matrices. Plots can also now be presented in sequence through link buttons, and each window can include a note panel for comments.

Real-World Conclusions

If you need a statistics program that includes the whole list of tests from the handbooks, you should pick Systat instead. If you need to make presentation graphics from data sets, Abacus Concepts' StatView II is better, and if your main concern is performing ANOVA on well-defined experiments, the top choice is Abacus Concepts' SuperANOVA (see *Reviews, Macworld,* May 1990). If you're a student you'll find that Data Desk 3.0 is not specifically keyed to mainstream college texts, unless you're lucky enough to be working with Student Data Desk.

But Data Desk does something that no other statistics program does as well. Specifically, it lets nonprofessionals investigate and find the same relationships in data that a professional statistician would find. That's a large claim, but it's a fact that Data Desk lets you perform a better analysis, with less formal background, than does any other Mac statistics product. For the vast range of possible users who are neither professional analysts nor analysts-in-training, Data Desk 3.0 offers the shortest path from numbers to real-world conclusions.—**Charles Seiter**

See Where to Buy or circle 720 on reader service card.



A Capitalist Plot **Data Desk encourages you to investigate data through plots first and traditional tabular analysis second. This figure shows businesses color-coded by industry category, one of Data Desk's many applications of color in data analysis.**

Database Publishing Utility forPageMaker

DATASHAPER 1.0

Pros: Quickly automates extensive formatting of data; thorough documentation; wide variety of format templates. **Cons:** Creating original format file may involve trial and error. **Company:** BenWare. **Requires:** Mac 512KE; 1MB RAM; hard disk; Aldus PageMaker 3.0. **List price:** $149.95.

Database publishing has always been the black hole of desktop publishing on the Macintosh. Despite the abundance of jazzed-up, feature-laden desktop publishing programs, formatting database or spreadsheet files in page-layout programs has always been cumbersome.

Considering the time, energy, and patience desktop publishers spend on formatting individual fields from tab-delimited files, it is a wonder that Aldus, Quark, and Letraset have never addressed the issue of database publishing. Conventional front-end typesetting systems have had this capability for quite some time.

Repetitive Redundancy

When you've placed a tab-delimited text file in PageMaker, formatting is tedious and time consuming if you want different type specifications for each field in the file. Electronic style sheets for formatting in PageMaker and other page-layout programs apply to either lines or paragraphs—there is no way to automate the process of selecting Field 1 and formatting it one way, selecting Field 2 and formatting it another way, and so on.

A good illustration is the 4-field, tab-delimited FileMaker text file that we use to produce the *Where to Buy* section here at *Macworld*. To get from here:

701 (tab) Product (tab) Great Product Inc., (tab) 415/555-5555

to here:

701   Product   Great Product Inc., 415/555-5555

always took hours.

In addition, the work was mentally and physically repetitive, making it doubly tedious. Imagine having to format individual database fields and add punctuation over and over again to hundreds of entries.

The Tab's Delimit

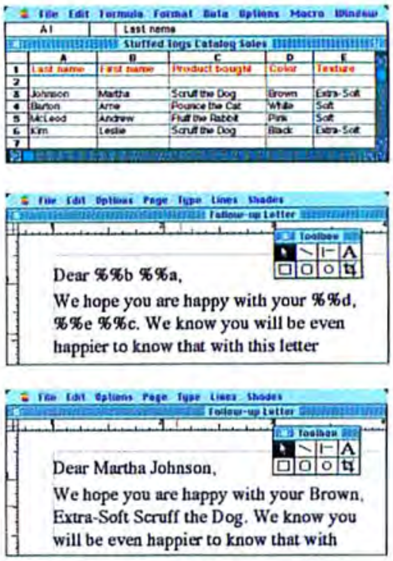
DataShaper imports and formats unformatted text-only, tab-delimited files from a variety of spreadsheet and database programs. The program works best with database and spreadsheet applications that use the standard Mac character set. DataShaper is compatible with Ashton-Tate's dBase Mac, Microsoft Excel, Microsoft File, Claris's FileMaker II, ACIUS's 4th Dimension, FoxBase+/Mac, and most programs that save tab-delimited text-only files. It worked successfully with all the programs mentioned. Files that use commas rather than tabs to delineate fields need to be converted to tab-delimited files (use the search-and-replace capabilities in most word processors).

After installing DataShaper, you open PageMaker, where you create placeholders (a pair of percent signs followed by a lower-case letter, for example, %%a) to correspond to every field in the data file. DataShaper then formats, rearranges, and reorders each placeholder complete with punctuation, spacing, tabs, and alignment. Next, DataShaper creates a format file by exporting the placeholder file using the filter in the Export menu.

Once the format file has been created, you select the file using the Place option in PageMaker's File menu. Another dialog box appears, in which you select the unformatted data file. PageMaker then automatically formats the text.

Because each field is identified as %%a, %%b, %%c, and so on, you must be familiar with the contents of each field in the data file. Creating my first format file involved some trial and error as I learned how to identify placeholders as categories.

The only bug I found in DataShaper could be dangerous, although not fatal. While documentation is otherwise meticulous and well-organized, it refers to two distinctly different files as format files. One is the placeholder file where the user specs the %%a field, %%b field, and so on; and the other format file is the file created when the Export function is used from the placeholder file. While checking for bugs, I named the file I was creating with the Export function the same name as the placeholder file that was currently open. The program alerted me that I could not copy over that file and had "failed to export." I then tried to create a format file with a different name but got the error message "Failed to export. No room in local heap." This was the only problem I encountered in my extensive use of DataShaper.


File Edit Formula Format Data Options Macro Window
File Edit Options Page Type Lines Shades
Toolbox
File Edit Options Page Type Lines Shades
Toolbox

A1 Last name

Stuffed Toys Catalog Sales

	A	B	C	D	E
1	Last name	First name	Product bought	Color	Texture
2					
3	Johnson	Martha	Scruff the Dog	Brown	Extra-Soft
4	Barton	Arne	Pounce the Cat	White	Soft
5	McLeod	Andrew	Fluff the Rabbit	Pink	Soft
6	Kim	Leslie	Scruff the Dog	Black	Extra-Soft
7					

Follow-up Letter

Dear %%b %%a,

We hope you are happy with your %%d, %%e %%c. We know you will be even happier to know that with this letter

Follow-up Letter

Dear Martha Johnson,

We hope you are happy with your Brown, Extra-Soft Scruff the Dog. We know you will be even happier to know that with

Hard Sell for Soft Toys

Using a Microsoft Excel file of catalog orders (top screen) you can automatically create a personalized follow-up letter (bottom) once a placeholder file has been set up (middle) and a format file created.

It takes time to learn to format correctly, but DataShaper ultimately saves time and is an absolute necessity if you deal with tab-delimited database or spreadsheet files. In one test, a file that took four hours to format in PageMaker without DataShaper now appeared exactly as it should (formatted and specced) after a 30-second filter pass with DataShaper.

Support Galore

With two software tutorials, nine software templates (ranging from a mail merge model to tape-cassette and VHS labels), and documentation that includes troubleshooting and advanced techniques, DataShaper is a small but incredibly useful product for desktop publishers. Automating redundant formatting tasks should have been one of the first things desktop publishing on the Mac could do for us. Fortunately, despite one fly in the ointment, DataShaper is a balm for many a tired desktop publisher's hands.**—Luis Camus**

See **Where to Buy** *or circle 721 on reader service card.*

Macintosh Training That Works

"I have been using FileMaker for about a year now and decided to get the MacAcademy tape to see how the program was presented, the content, and to see if other tapes would be useful. After looking at the tape I promptly ordered three more! Needless to say I was pleased, as the tapes are professionally done and most useful. You and your company do a fine job." Mr. James H. Patterson, M.D.

DAYTONA BEACH, FL- *"There's got to be a faster, easier, and less expensive way!"* This statement sums up the frustration that Randy Smith felt three years ago as he tried to find training for the Macintosh computer.

That frustration led to the creation of MacAcademy, now the nation's leading Macintosh training program, and the recent introduction of the country's **first complete Macintosh Video Training Series**. MacAcademy teaches over 18,000 people each year in 65 major metro areas. The program is proud of the fact that both beginning and advanced Macintosh users, from over 12,000 companies large and small, have found MacAcademy's live workshops to be an excellent, low priced training solution.

In order to offer additional training, MacAcademy's next step was to put each of their dynamic training workshops on video. (And to offer an additional dozen training videos for programs not even offered at MacAcademy.)

Now you may choose from over 26 different, 2-hour, VHS MacAcademy Videos for only $49 each. A complete list of programs can be found in the coupon below.

MacAcademy Video Training tapes offer tremendous advantages for today's Macintosh user. When using the videos you actually *see* the steps take place on a Macintosh screen. A small inset will show you the instructor and the mouse or keyboard. The instructors featured on the videos are MacAcademy's top rated teachers who have trained employees of all but two of the USA's Fortune 500 companies and who have each received a consistent rating of *excellent*.

Training videos offer the valuable advantage of building a learning and reference library. If you ever want to brush up on a technique, simply go back to the video and review the technique demonstrated. If you hire a new employee, simply have them review the video for the program they'll be using. Videos offer the unique flexibility of teaching both individuals or hundreds of people at one sitting.

In addition to a super $49 price, the videos also carry a 30-day satisfaction guarantee. If you're not totally satisfied, simply send the tape back for a full refund.

MacAcademy will continue offering the nation's highest rated live training courses in major cities. But in addition, you may also build your Macintosh training library.

Videos may be ordered by phone with credit card information, or by mail with check, credit card, or purchase order. You may also send orders by FAX. Your business is appreciated and your satisfaction is guaranteed.

The MacAcademy Video Library features over 26 Macintosh training tapes. Each two hour VHS video tape captures the unique and effective teaching and learning techniques of MacAcademy's top instructors.

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- ____ Intermediate PageMaker
- ____ Advanced PageMaker
- ____ Beginning Excel 2.2
- ____ Intermediate Excel 2.2
- ____ Advanced Excel 2.2
- ____ Beginning FileMaker II
- ____ Advanced FileMaker II
- ____ Beginning Word 4.0
- ____ Advanced Word 4.0
- ____ Beginning QuarkXPress
- ____ Intermediate QuarkXPress
- ____ Advanced QuarkXPress
- ____ Dollars and Sense
- ____ Works: Integration
- ____ Works: Word Processing
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Circle 406 on reader service card

2-D CADD Package

ASHLAR VELLUM 1.0

Pros: Simple user interface; good documentation; full-featured tool set. **Cons:** Lacks floating tool palette; requires a lot of memory. **Company:** Ashlar. **Requires:** Mac II; 4MB RAM; System 6.0.2; hard disk. **List price:** $995.

Over the past few years, many Macintosh CAD products have claimed superiority, ease of use, and speed. Ashlar Vellum 1.0 is different in that its forte is in enabling people who are unfamiliar with CAD programs to become productive users in a matter of hours.

The Basic Features

Vellum 1.0 has a small and simple tool palette and well-organized menus. The Selection Mask dialog box allows you to quickly and easily select only certain objects, colors, or layers. Unfortunately the tool palette does not move from its position on the left side of the drawing window, which results in extensive mouse mileage for anyone who uses a large-screen monitor. Similar tools are grouped together under one tool icon on the palette; for example, you can draw a circle by selecting either center, radius, diameter, three points, or two tangent lines from under the circle tool.

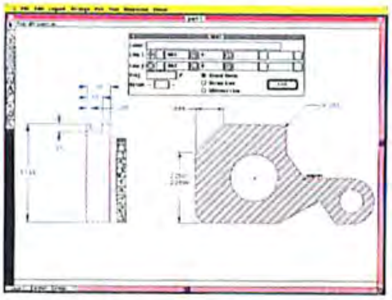
Vellum's basic engineering functions include calculations of perimeter, area, centroid, and moments of inertia of any selected object. Vellum also includes trimming, and another tool that lets you choose between filleting and chamfering by selecting from pop-up icons (most CAD packages require that you select each individual line when filleting or chamfering; Vellum, on the other hand, allows you to select a corner by holding down the Shift key and clicking the pointer near the corner you need filleted or chamfered).

No CAD package is complete without special duplication commands like linear and polar duplication, and Vellum offers easy special duplication commands through a floating dialog box. Vellum also gives you a floating dialog box for editing geometric objects. You can change an object's shape, color, or location by simply keying in the new parameters.

In addition to using the menu or keyboard commands to execute functions such as zooming and construction-line drawing, Vellum also offers some unique commands. For example, to zoom in on a particular area, you hold down the ⌘ key and drag diagonally across the area of interest. This fills the screen with a new view defined by the diagonal line you traced on the screen. Vellum's construction lines are temporary dotted lines you create by holding down the ⌘ key and dragging the cursor. They enable you to establish endpoints and intersections relative to the rest of the geometry of your drawing and, unlike lines created using the tool palette's line tool, construction lines can be easily erased.

A floating palette with tools for horizontal, vertical, oblique, perpendicular, and angular dimensioning is available. Vellum calculates these dimensions and places them as a geometric entity on your drawing. However, because you do not have control over where Vellum places the geometric entity, you must drag it to a place where it does not interfere with other geometric objects or dimensions. Most CAD programs allow you to specify placement without having to go through this extra step.

A floating dialog box is used for placement of geometric dimensioning and tolerancing, for example, concentricity, perpendicularity, flatness, total runout, parallelism, and positional and material conditions, which are based on ANSI Y14.5.



Dimensioning

Vellum shows the coordinates at the bottom of the screen as well as the user response at the upper left of the drawing window. Geometric tolerancing is done through the floating dialog box, where you type numerical values and datums. Each of the pop-up boxes gives you a choice of symbols.

Complementing Vellum's superior dimensioning capabilities is its integrated parametric-design feature, which lets you enter variables for dimensions that can be redrawn to give you the actual shape of an object. For example, a rectangle can be expressed as a value, with the adjacent side defined as a value of the first. You can then take this feature a step further: While setting the dimensions of an object, you can define the value of the object as something other than the actual value of the geometry. When all dimensions have been specified, Vellum draws the object to the specifications outlined by the dimensioning.

Vellum has an unusual feature, called the Drafting Assistant, that lets you see your cursor trailed by an endpoint, midpoint, intersection, center, or tangent. This attribute can save you considerable time, since it eliminates the need for constant trips to the menu to select different point snaps.

Strikes and Fumbles

Although Vellum performed with no problems, I was disappointed at the memory and storage requirements for this 2-D package. I used a Mac IIx with 8MB of memory and the program on a Pinnacle Micro erasable optical disc. When you run the Vellum installer, the program checks to make sure that your machine has 4MB of memory.

A DXF translator is built into Vellum; however, it did a sloppy job of translating different AutoCAD Release 10 DXF files. Layers, vertical dimensions, and text notes did not transfer properly. The tool palette should float so that you don't have to mouse across the screen to get to it.

At $995, it's hard for Vellum to compete with Claris CAD, IDD's Dreams, or Diehl Graphsoft's Blueprint—especially if you do not need built-in parametric design or geometric tolerancing. If and when Vellum uses less memory and disk space, and is less expensive, it may give Claris and other high-end CAD vendors a real run for their money. I am looking forward to the future release of Ashlar's 3-D package to complement Vellum. **—Victor Elgohary**

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Nonrelational Database

RECORDHOLDER-PLUS 3.1

Pros: Excellent online help; table-of-contents window; helpful input pattern and verification features. **Cons:** Limited telephone support. **Company:** Software Discoveries. **Requires:** Mac 512K. **List price:** $99.95

RecordHolderPlus version 3.1 is the latest upgrade of a fine database-management program that has been around for years. Although 3.1 costs about twice as much as the original version, it is still proof that well-written, competent programs need not cost as much as a major appliance.

Multiwindowed Interface

RecordHolderPlus makes fine use of the Macintosh interface. In the data entry mode, three windows appear on screen: Display, What to Find, and Table of Contents (see "RecordHolderPlus Data-Entry Mode"). The scrollable and resizable display window is where records appear one at a time and where you enter and change data. The What to Find window is where you enter search terms and Boolean operators to call up specific records. You can even hunt for partial matches in any text field. This feature, combined with the program's capacity—a file can be as large as 16MB if you have a hard disk, and a record or field can be as large as 32K—makes RecordHolderPlus very practical for storing text-intensive records.

The Table of Contents window displays a list of the fields you have chosen to index the records in a database. This unique feature of RecordHolderPlus not only gives you an easy way to view the records in a file but also provides a way to access them. With the Table of Contents window active, you can scroll until the record you want appears, or you can type in the first few characters and the program moves to the section of the list you want. Clicking on an entry brings the appropriate record into the Display window and makes that window active. New to version 3.1 is an autoscroll feature, which automatically adjusts the Table of Contents window to show the record that is in the Display window.

Data-Entry Shortcuts

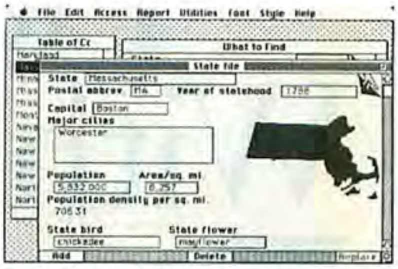
RecordHolderPlus makes data entry especially easy by offering a variety of input options. For instance, you can tell the program to convert the first letter of each word or all characters in a particular field to uppercase, a veritable godsend for those of us who never learned to use the Shift key properly. Input patterns take the awkwardness out of entering values like telephone numbers by automatically putting in parentheses, hyphens, or any other constant characters that you specify.

RecordHolderPlus supports a wide variety of field types. In addition to the standard text, number, money, and date fields, you can have check boxes and radio buttons; table lookup fields with a limited number of entry options; and pictures. You can also designate computed fields using field names and arithmetic operators or complex numeric and text functions.

You can customize the data entry form—that is, the way the record appears in the Display window—by dragging each field to where you want it on the screen. You format report layouts in much the same way. RecordHolderPlus's flexible report mode now supports footers and up to four levels of subheads, and subtotals along with the heads and totals that have always been available. The import feature is also quite flexible, allowing you to import text files with various types of delimiters and with fields that correspond to only some of the fields in your database. For example, you can use an imported text file of names and phone numbers from some other application to get your database started and fill in other fields manually.

Incremental Changes

The changes that have been made to RecordHolderPlus are incremental, little niceties to make a good program even better—but it's still completely compatible with previous versions. RecordHolderPlus 3.1 also has password protection, which lets you prevent unauthorized people from changing a file structure, updating records, or opening a file. The program now lets you avoid printing duplicate records and detects and skips duplicate records when you import a file. RecordHolder was never impossibly slow, but the new version is peppier.



State Massachusetts
Postal abbrev. MA
Year of statehood 1788
Capital Boston
Major cities Worcester
Population 5,832,000
Area/sq. mi. 8,257
Population density per sq. mi. 706.31
State bird chickadee
State flower mayflower

RecordHolderPlus Data-Entry Mode

The Display window, which shows the current record, can be resized. The dog-ear in the upper-right corner of the window lets you flip backward or forward through the file.

Like all good programs, RecordHolderPlus comes with a tutorial designed to introduce the new user to the program's basic features. Unlike many programs, it has an outstanding online help feature. Under the Help menu you have a choice of context-sensitive help or an index that leads you quickly to any part of the extensive online documentation.

Few Quibbles

Any complaints I've ever had with the program have been minor. For instance, nowhere in the manual does it say that in a group of radio-button fields one button must always be on. Perhaps the program's biggest shortcoming is its limited telephone support—only three hours a day, five days a week. Given the comprehensiveness of the manual and the quality of the online help, however, chances are that you will never need any additional assistance.

Don't be fooled by product marketing claims, or the lack of them. Although RecordHolderPlus is inexpensive enough for people whose needs don't justify spending $250 or more for one of the big-name database programs, it is sophisticated and powerful enough for small and medium-size businesses that don't require a relational or networked database, and it is easy enough for anyone to learn how to use.—**Gerry Lukos**

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Personal Finance Software

ANDREW TOBIAS MANAGING YOUR MONEY 3.0

Pros: Excellent for financial planning and investment tracking; tax tables updated annually; new technical-support phone system. **Cons:** Check-writing management not as convenient as dedicated check-writing software. **Company:** MECA Ventures. **Requires:** Mac Plus; second disk drive. **List price:** $219.98.

Managing Your Money 3.0 has the same general look-and-feel as the previous versions. The main (or Home) screen still allows you to write checks; spend, receive, and transfer money; record and handle investments; plan for insurance and retirement; estimate your current year's taxes; and schedule reminders and write yourself notes. Managing Your Money's (MYM) Help icon is still in the lower-left corner, the Exit icon at the lower right, and the Quote-of-the-Day light bulb icon is still next to Help, ready to give you a wise (and usually humorous) quotation on a click's notice.

The top menu bar still duplicates many of the palette icons, although it has been altered somewhat. Net Worth has been removed, and its selections have been integrated into the Money menu. The Reports menu items, unlike many others, are window-sensitive, so selections' availability depends on the window you're using.

What's New?

Much of what's new in version 3.0 are incremental improvements. You can now record transactions with the Enter key rather than by using the mouse. Some menu commands are different "to make the program more intuitive for nonfinancial folks," according to MECA. The latest tax laws have been incorporated (for estimating taxes), and an IRA Decision Analysis menu selection has been added. MECA updates its tax tables nearly annually—a feature usually available only in a dedicated tax program.

There are, however, a few more-noticeable improvements, the most significant of which is MYM's increased printing capabilities. Printing accuracy for the LaserWriter IISC and ImageWriters with sheet feeders has been improved, and MECA has added support for the Hewlett-Packard DeskWriter.

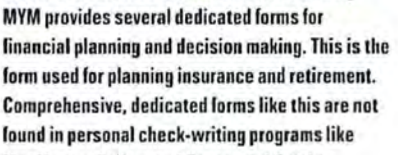
An obvious improvement is MECA's customer support. The company has installed a new technical-support phone system (similar to WordPerfect's), which I tested and found to be excellent. Since MYM offers unlimited free telephone support, this is definitely an important plus.

MYM's Strength

Managing Your Money's greatest strength is its noncheckbook financial functions. While checkbook programs, such as MacMoney or Dollars and Sense, allow you to track investments and perform insurance and tax functions, these functions are done as checkbook manipulations or add-on windows. MYM treats all those distinct financial functions as dedicated activities, thus making the work easier and more efficient.

In addition to features found in the high-end check writers like projecting savings yields and loan costs, MYM offers powerful financial functions that can help you analyze the tax benefits of an IRA account, analyze bond yields and investments, and make mortgage refinancing decisions. MYM also has a dedicated menu to track your stock investments.

Another strong point is the excellent calendar-management segment that makes it easy for you to schedule daily activities and reminds you of important events.



MYM's Insurance & Retirement Planning
MYM provides several dedicated forms for financial planning and decision making. This is the form used for planning insurance and retirement. Comprehensive, dedicated forms like this are not found in personal check-writing programs like MacMoney, Dollars and Sense, and Quicken.

MYM's Weakness

Unfortunately, MYM's basic check-writing segment is not as quick and convenient as most dedicated checkbook programs. It's not that MYM's basic spending money, receiving money, and transferring money screens are poor; they're not. Writing a check or making a deposit in MYM is fairly simple. The check appears at the top of the screen, and an entry form for assigning the cost to a category is on the bottom. To write a check you click on the source account, fill in the amount, and type the name and address of the payee onto the check portion of the screen. Then move to the bottom of the screen and click on the category you want to charge. The program fills in the amount and the check is ready for printing.

To charge to two or more categories ($50 to a credit card account and $3 to an interest-paid account, for example), you keep clicking in the category window until the total equals the amount of the check. To see the categories to which the check amount is charged, you click on a Recap button and the amounts paid to each category appear in a pop-up window.

To edit checks, you select Review Transactions from the Money menu and your entries appear in a scrollable window. Double-clicking takes you to the check-writing window. After editing the check or category assignments, you click on the Record button, which returns you to the Review Transactions window.

Dedicated check-writing programs allow you to work on your checkbook with a scrollable check register in the same window. In addition, check-writing programs like MacMoney offer you a Name box, where you can click on a name. The payee name, address, and a default category are automatically entered on your check. With MYM, however, you must type the payee information and select the payment category each time. You could, of course, set up the check as a recurring transaction, but this option is also available in check-writing programs.

The Bottom Line

If you just want a check-writing program, stick with the high-end programs

(continues)

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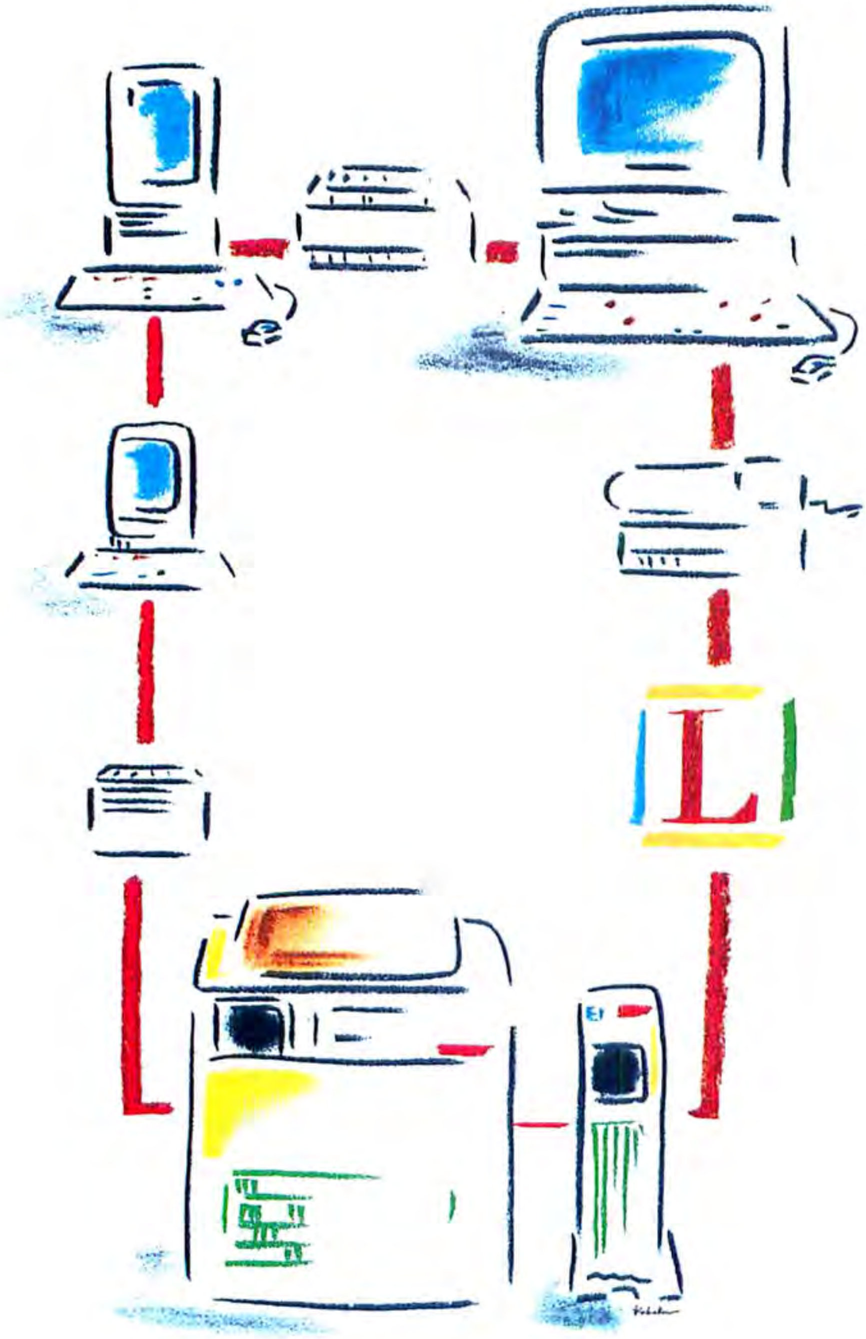

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like MacMoney or Dollars and Sense, or the simple but still fairly powerful Quicken. However, if you are serious about managing your personal finances and willing to invest the effort of setting up the program and a little extra time to maintain your information, you'll benefit greatly from Managing Your Money. If you really want to plan for your retirement, meet your insurance needs, plan for your children's education, and manage your investment portfolio, I don't think you'll find any personal financial management software that will do a better job of guiding and assisting you.— **Alan L. Slay**

See **Where to Buy** *or circle 707 on reader service card.*

Math Education Game

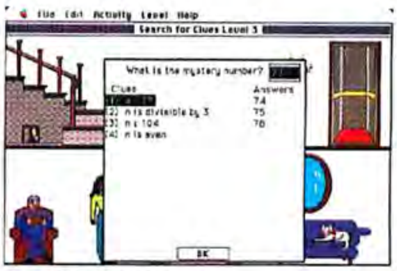
MATH BLASTER MYSTERY

Pros: Educational and fun; teaches more-advanced concepts than most math games; uses color; 30-day money-back guarantee. **Cons:** Students may lose interest in some activities. **Company:** Davidson & Associates. **Requires:** Mac Plus. **List price:** $49.95.

Macintosh owners are blessed with a variety of quality software for helping students with math concepts. Preschoolers and elementary school kids have fun learning basic arithmetic with programs like Math Rabbit, KidsMath, and NumberMaze. High-school students can take advantage of Brøderbund's Geometry and Calculus programs to learn higher math concepts. Now Davidson & Associates has partially bridged the gap between those two age groups with Math Blaster Mystery, an outstanding educational program for middle-school mathematicians.

Math Blaster Mystery isn't just another arithmetic drill-and-practice program; it's a collection of math activities designed to help preteens develop logical thinking skills and learn strategies for solving problems. These activities use color graphics, simple animation, and clever games to make the learning process fun.

The opening picture menu offers four activity choices: Follow the Steps, Weigh the Evidence, Decipher the Code, and Search for the Clues. Each activity can be adjusted to any of four different skill levels.



Search for the Clues

Each picture in Math Blaster Mystery reveals another clue to narrow the search for the mystery number. When a guess doesn't match all of the clues, the program highlights the discrepancy and waits for another guess.

Step by Step

Follow the Steps looks at first glance like a multiple-choice practice drill. The program displays a word problem like this Level 4 example: "Erin flipped a coin ten times. It came up heads six times and tails the other four times. What is the probability that it will come up heads the next time she flips the coin?"

Instead of asking immediately for the solution, Follow the Steps guides the student through the problem-solving process with this series of prompts: "What does the problem ask you to find?" "What information is needed to solve the problem?" "Select the correct expression." "Select the correct solution." For each of these intermediate steps, the program displays four possible answers; by choosing correctly, the student progresses to the next prompt, until the final solution is reached.

A menu provides students with instant access to a variety of formulas and definitions that may be helpful in solving the problems. Twenty-five problems are provided for each of four skill levels, and Math Blaster Mystery includes an easy-to-use editor for adding additional word problem data files.

Playing the Numbers

The next two activities do look like games; in fact, they're based on traditional, nonelectronic games. Weigh the Evidence is a graphic variation on the classic Towers of Hanoi puzzle. There are three scales. Four labeled weights appear on one scale's balance pan; three of the weights must be moved to one of the other two pans to match the target weight. The student must first figure out which three of the weights add up to the target value and then move them, one at a time, without ever placing a heavier weight on a lighter one. Depending on the skill level, the weights can contain a combination of positive numbers, negative numbers, decimals, percentages, or fractions.

Decipher the Code is like a mathematical version of hangman or Mastermind. The screen contains a series of blank boxes; the student must guess what numbers and arithmetic operators go in those boxes. For example, the solution to an eight-box level 4 puzzle might be $5 + 31 = 4 \times 9$.

Digital Detective

The last game, Search for the Clues, is the most original and entertaining of the bunch. For each puzzle, the screen is crowded with colorful pictures reminiscent of a pulp mystery: a cat on a couch, a maid with a feather duster, and the like. A click on any of these animated pictures might reveal a clue for solving a number mystery, such as $n < 25$ or n is odd or n is a factor of 39. The student reads the clue, guesses a number, and returns to the picture screen to select another clue, repeating the process until the correct number is guessed (see "Search for the Clues").

Throughout all four activities, the program awards points based on logical responses. Students can print out certificates showing point totals and ranks (Computation Cadet, Digital Detective, Chief Problem Solver, and so on). Points and ranks provide motivation for many kids, and they're used in the program's automated recordkeeping option.

As a parent and a teacher, I'm impressed with Math Blaster Mystery. It's a thoughtfully designed tool for helping kids to develop a variety of prealgebra skills and concepts. My under-12 software testers approve, too, but for a different reason. They like Math Blaster Mystery because it's fun.— **George Beekman and friends**

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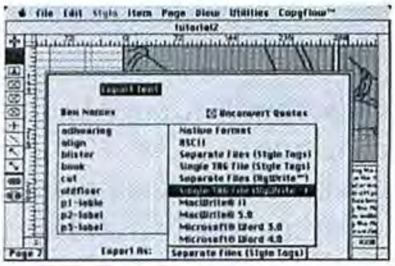
Import-Export Extension for QuarkXPress

COPYFLOW 2.0

Pros: Simple, straightforward design; adds XyWrite file support to QuarkXPress. **Cons:** Not a full-featured document manager; depends on Quark's somewhat erratic import-export filters; copy protected. **Company:** North Atlantic Publishing Systems. **Requires:** Mac SE; 2MB RAM; hard disk; QuarkXPress 2.12. **List price:** $395.

Until North Atlantic Publishing Systems released CopyFlow last year, there was only one way to get text and illustrations into and out of desktop-publishing documents: story by story, picture by picture. Not only was this tedious and boring, it caused intolerable delays. Users of QuarkXPress and CopyFlow, an extension or add-on to QuarkXPress, can now import or export files, saving precious time over the course of a publication's production cycle. Quark dubs these add-ons X-Tensions, and they are actually strings of program code that modify QuarkXPress. As with other XTensions, after you've placed CopyFlow in QuarkXPress's folder and launched the program, the add-on modifies QuarkXPress.

You can specify which folders to import from and which to export to. Most typically, these folders are on a network server and are accessible by a workgroup composed of writers, editors, and artists. As soon as new or modified files are ready, you can quickly import them into the QuarkXPress document.



Supported File Formats

CopyFlow uses all formats supported by QuarkXPress. It also adds support for XyWrite and North Atlantic's own style tags. All selected boxes from a document can be combined into a single file for easy editing.

CopyFlow creates a new menu and adds a configuration option under the Utilities menu.

Boxes Filled Like Magic

To use CopyFlow, you first open a QuarkXPress document, and using the CopyFlow menu, select the folders that will be used for importing and exporting files. After you've created your page layout, you then assign a name to a single text box, series of linked boxes, or any graphics box. The name of the destination box must match the name of the file to be imported—that's how CopyFlow knows where to send each story or illustration (it can import any graphics file normally accepted by QuarkXPress). When you've named the boxes, CopyFlow lets you import all or selected files. This looks almost like magic, as box after box fills itself before your eyes. You can use the batch export command to send all or selected stories or graphics to the export folder, where they can be edited and then reimported.

CopyFlow has some nice touches. For example, you can use it to get around QuarkXPress's annoying lack of master pages by assigning the same name to more than one box. If a box name isn't unique, CopyFlow places the specified text or picture file throughout the document in every box with that name. If you replace a graphics file, CopyFlow retains any scaling and positioning adjustment you've made to the picture.

CopyFlow can import or export every file format supported by QuarkXPress (these are available in the XTensions supplied with QuarkXPress). In addition, CopyFlow supports XyWrite, an MS-DOS word processor (see "Supported File Formats").

CopyFlow can combine *every* exported file into a single large tagged file, for convenient one-pass editing. When the file is reimported, text is placed in the appropriate boxes.

Tags for Text: One Works, the Other Doesn't

CopyFlow uses two different text-style tag formats: Quark's Extended Style Tags 2.12 (which didn't ship with the QuarkXPress 2.12 upgrade but is available from CompuServe and other on-line services) and North Atlantic's own style tag format. Of the two style tag formats, North Atlantic's is far superior. If you apply a significant amount of QuarkXPress-specific formatting to text—such as tracking, kerning, or fractional font sizes—you must use one of the style tag formats; otherwise, QuarkXPress's special text formatting information tends to get lost when stories are exported, and some of QuarkXPress's word-processor import filters don't work terribly well, anyway. Although similar to Quark's Extended Style Tags, North Atlantic's style tags are more compact and accurate. Stories that I exported and reimported using Quark's Extended Style Tags often contained erratic formatting changes, while North Atlantic's were consistent and predictable.

North Atlantic's tags, however, don't recognize any local overrides of style sheet formatting. For example, if you took a paragraph with a style sheet that called for 13-point leading, and changed that paragraph's leading to 15 points, that information would be lost if you exported and then imported the story using North Atlantic's tags. You must create a new style sheet every time you create a new paragraph format, even if you use that format only on a single paragraph in your document.

CopyFlow uses a copy-protection scheme: once you launch it with QuarkXPress, it can be used only with that particular copy of the program; if you subsequently drag CopyFlow into a folder with a different copy of QuarkXPress, the XTension won't function. Upgrades to QuarkXPress shouldn't disable CopyFlow, since QuarkXPress's upgrades don't change the program's serial number. North Atlantic will upgrade CopyFlow to work with the upcoming QuarkXPress 3.0, and CopyFlow will be available for $30 to registered users.

A Publishing Lifesaver

I found CopyFlow easy to learn and use, and quick. Even if you're a single user, and not part of a workgroup that's always under the gun to make deadlines, CopyFlow is worth considering simply because of the way it relieves you of the boring task of importing and exporting files one by one.—**Eric Taub**

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Drawing and Mapping Program

AZIMUTH 1.0

Pros: Produces maps with a nearly infinite range of viewpoints; object-oriented drawing tools make customizing maps easy. **Cons:** Poor documentation; slow; key-disk copy protection. **Company:** Graphsoft. **Requires:** Mac Plus. **List price:** $395.

Graphsoft's Azimuth is an object-oriented drawing-and-mapping program for those who want to create illustrations using maps of states or provinces, countries, and continents. It works best on a top-of-the-line Macintosh with a fast microprocessor, but it will run on a Mac Plus and enable you to produce almost infinite variations of a map. You can create a two-dimensional outline map centered on any point by entering the appropriate latitude and longitude, or you can make the land mass appear as if it were being viewed from a satellite orbiting the planet or from the space shuttle coming in for a landing.

Unfortunately, this program, which incorporates CAD as well as regular drawing features, is flawed by documentation that appears still to be in the draft stage. Be prepared for some frustration because basic steps are missing from the instructions. To make matters even worse, the manual lists no technical support telephone number. Even when I did manage to phone Graphsoft, no one could answer my questions. Finally, I reached a programmer who spent over an hour walking me through the fundamentals of creating a map. When the secrets of using Azimuth were unlocked, however, it revealed itself to be a clever program.

Tailoring a Map

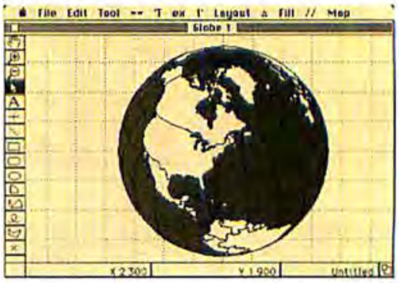
Azimuth comes on 6 disks and gives you 12 menus (not counting the Apple menu), plus a full complement of tools (see "Azimuth Window"). You manipulate the data file for a given map by setting different combinations of view angle (or *aim*), azimuth, distance, and scale, replotting after each try.

According to my dictionary, an azimuth is "an arc of the horizon measured between a fixed point and the vertical circle passing through the center of an object." It is a difficult concept to grasp and perhaps even more difficult to envision, given the multiple variables you have to work with. I had the most satisfactory results plotting the horizon before plotting a map.

When the principal map appears on the screen at precisely the view, angle, and scale that you want, you are ready to add surrounding states or countries one by one (see "Michigan Map"). An accompanying application called CombineData, which is not documented in the manual, lets you group several maps into one file. By using this feature, you can add surrounding maps all at once, thus saving some steps and maybe a little time. Even so, the more complicated the map, the longer the plotting takes. While plotting the Eurasian land mass on a map of the globe, Azimuth tied up my Mac Plus for 30 minutes. State and country maps are faster to complete than whole continents, but each time you change the aim you must do another "initial" plot. So until you have the knack of choosing the combination of settings that will produce the map you have in mind, you're liable to spend a lot of time replotting.

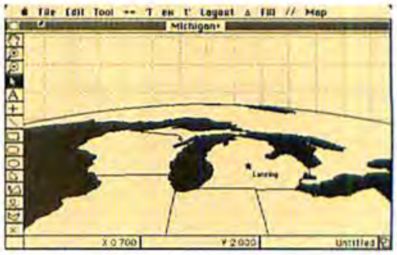
You can use Azimuth's drawing tools, including plain and filled shapes and a freehand line tool, to customize your cartographic creations. A locus tool lets you affix markers or symbols to your maps to designate cities and other features. You have to eyeball the placement of symbols, however, because although Azimuth displays the cursor's on-screen coordinates, it does not let you place a locus using latitude and longitude coordinates. It also lacks an on-screen ruler.

Azimuth lets you compose sets of maps in layers, as if you were working on sheets of clear tracing film. An element that is common to all maps, such as a frame, can be made visible to all layers while individual maps can be designated as visible only when the layer containing them is active. The program offers three options for saving finished maps: a floating-point format that retains the coordinate system; a lower-accuracy PICT format that can be opened in other Macintosh programs; and a scaled PICT format intended for use with the MacPlots II printer driver.



Azimuth Window

In order to fit all 12 menus on the menu bar, some of them are in code. The == menu lets you manipulate the layers of a map. Under the 'T, ex, and t' you'll find the Text Style, Text Size, and Font menus.



Michigan Map

This map of Michigan was replotted until the desired view was achieved. Then Canada, Ohio, Illinois, Indiana, and Wisconsin were added one at a time. The text label for Lansing is an object that can be moved, but the star is "glued" to the Michigan map.

One graphic designer I spoke with exports Azimuth maps into MacDraw II; another moves them into Aldus FreeHand. They are both enthusiastic about Azimuth, however, because, as one designer put it, the program does what no other software can do on an off-the-shelf Mac. Significantly, perhaps, both got one-on-one lessons and did not learn the program from the manual.

Getting Lost in Azimuth

The manual is Azimuth's biggest shortcoming. It is filled with dense paragraphs, but it fails to explain simple aspects of the product. If you need to produce maps of varying sizes and views to illustrate publications, Azimuth will do it for you. Be prepared, however, to learn by doing.

—Gerry Lukos

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Address-Book Managers

ADDRESS BOOK PLUS 1.0

Pros: Prints address books, Rolodex cards, envelopes, and labels; paper sizes are customizable; includes dialer DA. **Cons:** Doesn't print two sides; DA opens slowly. **Company:** Power Up Software. **Requires:** Mac Plus. Hard disk recommended. **List price:** Basic package $89.95; with binder $129.95.

DYNODEX 1.1

Pros: Prints two-sided address books; good user interface; flexible selection facility. **Cons:** Limited paper sizes; no DA version; doesn't print envelopes or labels. **Company:** Portfolio Systems. **Requires:** Mac Plus. Hard disk recommended. **List price:** $199.95.

Maintaining an address book can be a real pain. Scribbled names and phone numbers, misfiled entries, and the inevitable rubouts as your friends and contacts move can make it a messy job. Address Book Plus and DynoDex take different approaches to the problem of maintaining and printing an address book.

Address Book Plus

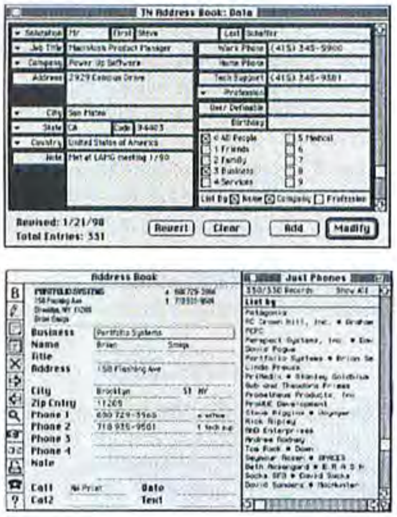
Power Up offers Address Book Plus in two packages with identical software. The basic package includes pin-feed six-ring paper to use in a loose-leaf binder; the Pocket Address Book package comes with a leather binder and a spiral binding that you put together after you have printed your address book pages.

The program opens to the Browse format, a horizontal listing of all the fields in the address book. Address Book Plus comes with six display formats: Browse, Address Book, Phone List, Rotary File, Label, and Envelope. The Browse format is the default when you create a new Address Book file. The new data that you enter in the Data Entry window is immediately visible in the Browse format.

Address Book Plus comes with 16 predefined fields such as Job Title, Birthday, and a section for remarks. You can rename any field using the Modify Field dialog box. Some of the fields have a Smart List option. Smart List is a search feature that gives you the option of scrolling through a list to look for a particular entry, or typing the first few letters of the item you want directly into the appropriate field. For example, instead of typing *San Juan Capistrano,* type *san* in the city field, press Tab, and Address Book Plus automatically gives you the first entry that starts with *san.* If there is more than one possible entry, a pop-up menu with all the options appears.

Address Book Plus not only lets you display entries by name, company, and/or profession, but it also has ten user-defined categories. Categories could include business, personal, service club, and so on. Each entry must be assigned at least one category. This allows you to list a person by name, *Dr. John Brown,* by profession, *Doctor,* and as a personal contact.

Despite all of its convenient data entry features, Address Book Plus sometimes feels awkward in use. Because the entry screen covers the Browse format on Macs with 9-inch monitors, you will be constantly switching back and forth between the two views. Another problem is that the Address Book Plus program and documentation refer to the address-book print-out sizes in generic terms, such as senior loose-leaf, rather than associating size with a specific brand of address book such as the Day-Timer. This can be confusing if you are trying to buy an address book to use with your printouts.



Entry Ways

Double-clicking on a name in Address Book Plus's Browse format brings up this entry screen (top). The field labels with triangles have configurable pop-up lists of their most common values to speed up data entry. The Browse listing is behind the entry window. DynoDex (bottom) puts the list and the entry screen side by side, which is easier to use. The area at the top of the entry screen is a WYSIWYG display of how the record will print.

Address Book Plus integrates well with Power Up's new DA, Letter Writer Plus, a word processor designed for easy letter creation and envelope printing. Letter Writer Plus is an improved version of ExpressWrite (see *Reviews,* October 1989). Address Book Plus documents can serve as mail merge data files for Letter Writer Plus. The combination of the two packages should easily meet most people's needs for address books and common business correspondence.

DynoDex

One of the most successful companies in recent years is filoFax, a British firm whose six-ring organizer has spawned several clones, including Day Runner and Lefax. DynoDex can print double-sided address pages in the filoFax format. The DynoDex package includes a six-ring binder, clear letter tabs, and 100 sheets of the punched and perforated DynoDex paper.

The DynoDex user interface emphasizes speed and convenience. The data entry screen is always visible, and almost all menu choices have keyboard equivalents. If you prefer using the mouse, there's an icon palette with the most common functions. At the top of the entry screen is a WYSIWYG display of how the record will print (see "Entry Ways"). DynoDex lets you rename all the field headers and control which fields are printable. It also has an Initial Caps function that speeds data entry by automatically capitalizing first letters. A small but useful feature DynoDex has that Address Book Plus doesn't is that it lets you set tab order, so you can skip over fields that you don't normally use, like the country field.

Instead of a Browse screen, DynoDex displays fields in Just Phones (shows names and phone numbers), *(continues)*

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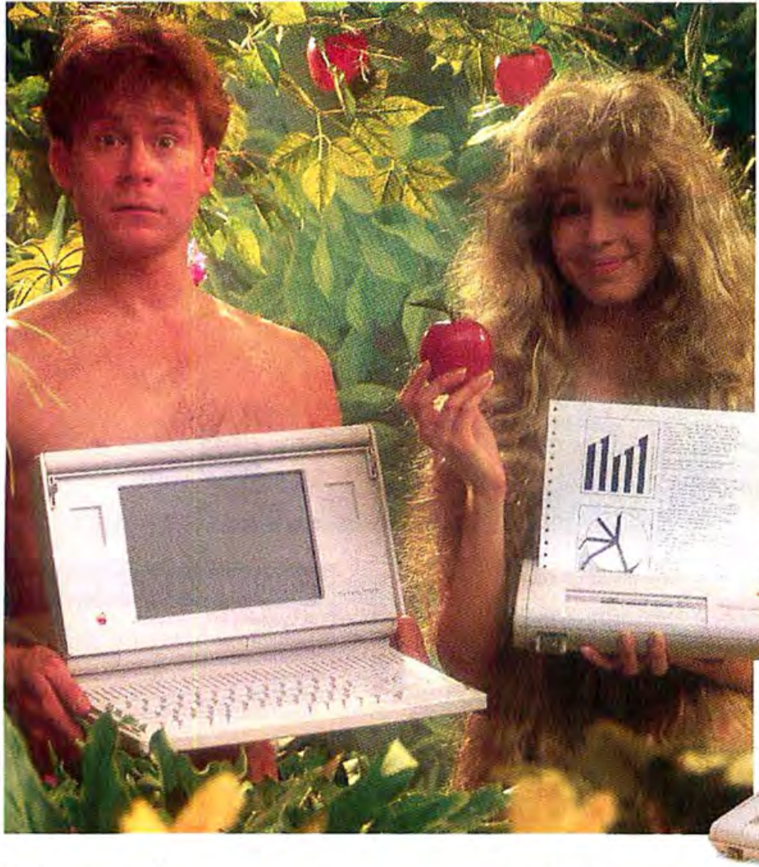

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Name and Address, or All Fields. You can print any of these lists. Having the lists next to the entry screen, rather than behind it as with Address Book Plus, makes it easier to browse the list and view and change the entries.

DynoDex provides many more flexible tools for finding, categorizing, and selecting records than Address Book Plus does. Both programs let you find records using any field, but DynoDex gives you the capability to change the found records. Its selection function can use two fields at once, with logical and arithmetic operators.

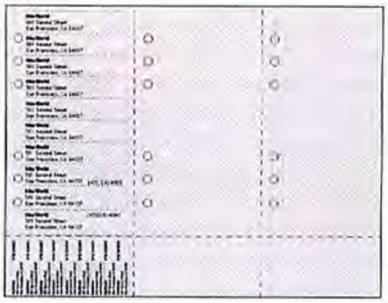
Telephone Dialing

DynoDex dials from within the application; Address Book Plus comes with a DA called Address Book Dialer. Both programs let you specify tone or pulse dialing through a serial port or the Macintosh speaker. Presumably, the DA is for quick and easy use while you're working in other applications; unfortunately, the Dialer takes a long time to open, and this problem gets worse as you add names. On an SE/30 with 5MB of RAM, the Dialer took 12 seconds to open a file of 330 names and 20 seconds for a 650-name file. This is too slow for casual use; the best solution is to leave the DA open all the time under MultiFinder.

The two programs share a disadvantage when dialing through a modem. They dial the number just fine, but at the end of the dialing string they don't send a command to disconnect the modem. This leaves the modem on the line, preventing the recipient from hearing you until the modem times out and switches off. There are workarounds in both programs, but both should tell the modem to disconnect.

Printing

Both Power Up and Portfolio Systems supply paper for use with their products. Portfolio provides six-ring DynoDex paper in four colors and also sells unpunched half-page paper. Power Up has a large selection of pin-feed and single-sheet pages for its program. One sheet of the six-ring DynoDex paper provides three filoFax-size pages, and the extra space on the page is used to print the DyNet, a reduced listing that you can staple together and carry with you (see "DynoPrinting"). Although it's possible to print on an ImageWriter with DynoDex, it's best to use a laser printer or another sheetfed high-resolution printer like the HP DeskWriter. The current version of DynoDex can print the DyNet only on PostScript printers and the GCC Personal LaserPrinter. Portfolio plans to provide DyNet printing on QuickDraw printers, such as the Apple LaserWriter IISC and the HP DeskWriter, in the next release. DynoDex prints in four main formats: six-ring; three-ring half-page, which is used by the larger Day Runner; three-ring letter size; and DyNet.



DynoPrinting

This diagram shows the ingenious way that DynoDex gets the most out of its perforated six-ring paper. The three organizer pages have ten entries each, and the small area at the bottom of each organizer page that would normally be wasted is used for a miniature listing called a DyNet.

Printing flexibility is where Address Book Plus shines. It has five standard sizes for address books and phone lists, and two standard sizes for envelopes, Rolodex cards, and labels. And for every format, if you don't like the standard sizes, you can define a custom paper size. You can print to single-sheet paper on the LaserWriter or to tractor-feed paper on the ImageWriter. Unlike DynoDex, which only lets you set one font for the whole print job, Address Book Plus allows complete control over the font and style of individual fields. DynoDex prints four lines for each record, regardless of how long or short that record is; Address Book Plus intelligently expands and shrinks the record height to match the amount of information. Unfortunately, Address Book Plus prints on only one side of the page.

I found printing with both programs to be very easy. DynoDex gives you exhaustive instructions on feeding the pages so that both sides print correctly, and Address Book Plus's preset formats resulted in perfect print jobs on both LaserWriters and ImageWriters. Printed output from both programs was excellent.

Get Organized

Both programs have much to recommend them. And both have faults. They both have excellent import and export functions, so your address books can easily be used as mail merge data files. DynoDex suffers from the lack of a DA version and from its inability to print envelopes and labels. Portfolio Systems said at press time that DynoDex 2.0, which should be available by late spring, would add those features. Address Book Plus's DA needs to be faster, and adding two-sided printing and better selection functions would also help.

If its somewhat limited selection of print formats meet your needs, and if you have a high-quality printer, then DynoDex is a good choice for its excellent user interface and double-sided printing. But if you need to print other-size address books, Rolodex cards, labels, and envelopes, or if you'll be printing on an ImageWriter, then Address Book Plus is a better choice. **—Tom Negrino**

See Where to Buy or circle 703 (Address Book Plus), 727 (DynoDex) on reader service card.

* * *

32-bit Graphics Board

SPECTRUM/24 SERIES III

Pros: Built-in graphics accelerator; hardware pan and zoom; support for 13- and 19-inch monitors; huge virtual desktops; RGB NTSC video output. **Cons:** Expensive. **Company:** SuperMac Technology. **Requires:** Mac II; 2MB RAM. Hard disk and additional RAM recommended. **List price:** $3999.

Since the Spectrum/24 board was reviewed in the January 1990 *Macworld,* two significant things have happened: SuperMac has augmented its 24-bit board with a graphics accelerator, and Apple has released two 24-bit graphics boards of its own (including one with an accel-

(continues)

erator). Because of these developments, a brief second look at the Spectrum/24 is in order.

All the earlier advantages of the Spectrum/24 are still in place. You can create a virtual desktop larger than the actual display (up to 4096 by 1536 pixels), and pan smoothly and quickly. You can zoom in and out (2× magnification), with full panning and functionality while zoomed in. And you can get a 32-bit display on a large 1024-by-768-pixel screen.

Do You Need an Accelerator?

The major new feature of the Spectrum/24 is the on-board graphics accelerator. Why do you even need an accelerator? Simple. In 32-bit mode, each pixel uses four times as much memory as in 8-bit mode. That means that if you scroll an image in 32-bit mode, you are moving four times the data that you would in 8-bit mode. This doesn't mean, however, that every graphic operation takes four times as long, because much of the work is independent of the current bit depth, (otherwise, 8-bit graphics would take eight times as long as 1-bit graphics).

The graphics accelerator on the Spectrum/24 works with certain 32-bit QuickDraw commands (but only when the display is in 32-bit mode). When you start up, the SuperMac cdev patches the selected low-level QuickDraw commands. When those commands are called, control is passed to the accelerator on the Spectrum/24. The accelerator carries out the necessary operations and then returns control to QuickDraw. This acceleration affects only the display connected to the Spectrum/24.

SPECTRUM/24 BENCHMARKS

Benchmarks	Spectrum/24 32-bit mode unaccelerated	Mac IIci 8-bit mode	Spectrum/24 32-bit mode accelerated
1-pixel-wide color lines	220	100	200
Vertical scrolling	510	100	70
Simple pattern fill, unclipped	800	100	120
Hilite mode, non-clipped	250	100	250
Horizontal scrolling	830	100	120
Invert area, unclipped	910	100	910
Pixel pattern fill, non-clipped	410	100	60
Short 1-pixel-wide color lines	120	100	130
Region-clipped vertical scroll	450	100	70
Region-clipped horizontal scroll	710	100	110
Shrink image	190	100	190
Solid fill, unclipped	790	100	120
Window movement	650	100	110
Vertical lines	90	100	80
Horizontal lines	100	100	90
Shallow lines	390	100	340
Steep lines	100	100	100
Text drawing	260	100	60
Enlarge image	250	100	250
Blend rectangles	10	100	10
Polygon fills	400	100	120
Regular copyBits	480	100	40
Clipped pattern fill	360	100	60
CopyBits, 1-bit to 8-bit	190	100	200
Oval fill	440	100	60
Mapped copyBits	110	100	110
Region-clipped hilite mode	270	100	270
CopyBits, blend mode	10	100	10

Tests comparing the Spectrum/24 board in both accelerated and unaccelerated modes with the Macintosh IIci in 8-bit mode indicate which of 28 benchmark operations are substantially improved. Scores for each benchmark are shown as normalized values, with the Mac IIci 's being set at a constant value of 100.

Adding a graphics accelerator to the Spectrum/24 board improved the performance of only some operations. Using GeeBench, a QuickDraw routine -performance program developed by Apple's Jean-Charles Mourey, we ran 28 comparison tests (see "Spectrum/24 Benchmarks").

The single greatest boost is in the performance of the Regular CopyBits routine, whose performance improved by a factor of 12.0. Other benchmarks—mostly scrolling and filling routines—show a six- to sevenfold improvement in speed. There is no apparent acceleration in line drawing (which doesn't really need it—speed is already comparable to 8-bit mode) or in highlighting and inverting text.

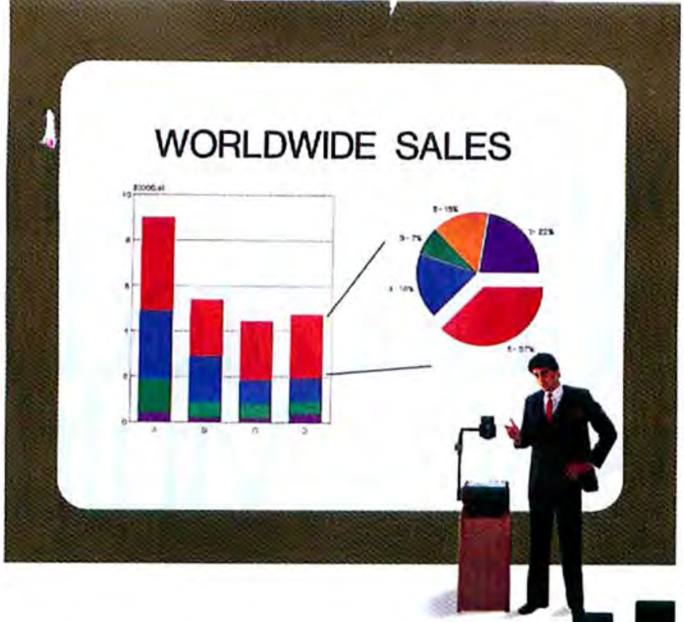
Overall, the Spectrum/24 display in accelerated 32-bit mode performs as well as, if not a bit better than, the Mac IIci's built-in video in 8-bit mode (which itself is just a touch faster than 8-bit mode on Apple's 8-bit video board).

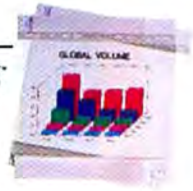
Should you consider buying this board? Possibly, but only if you need both the graphics acceleration and the large screen display. The SuperMac ColorCard 24 with accelerator costs $1498 and gives you an accelerated 24-bit display on Apple's standard 13-inch RGB monitor. For a little more ($1999) you could get Apple's new Macintosh Display Card 8•24GS, which has two additional benefits: it supports Apple's complete line of Mac monitors, and it boosts performance of all video boards plugged into the Mac. There are nonaccelerator 24-bit video boards but if you're going to go to 24-bit color you'll be better off in the long run spending your money now for graphics acceleration.

Given the downward trend in video board prices, your best bet is to carefully evaluate your needs and shop around. The Spectrum/24 is a powerful and expensive solution intended for people who really need the large display and acceleration, pan, zoom, virtual desktop, and so forth. If that doesn't describe you, you could save thousands of dollars by choosing something more modest.

—Bruce F. Webster

See **Where to Buy** *or circle 805 on reader service card.*


WORLDWIDE SALES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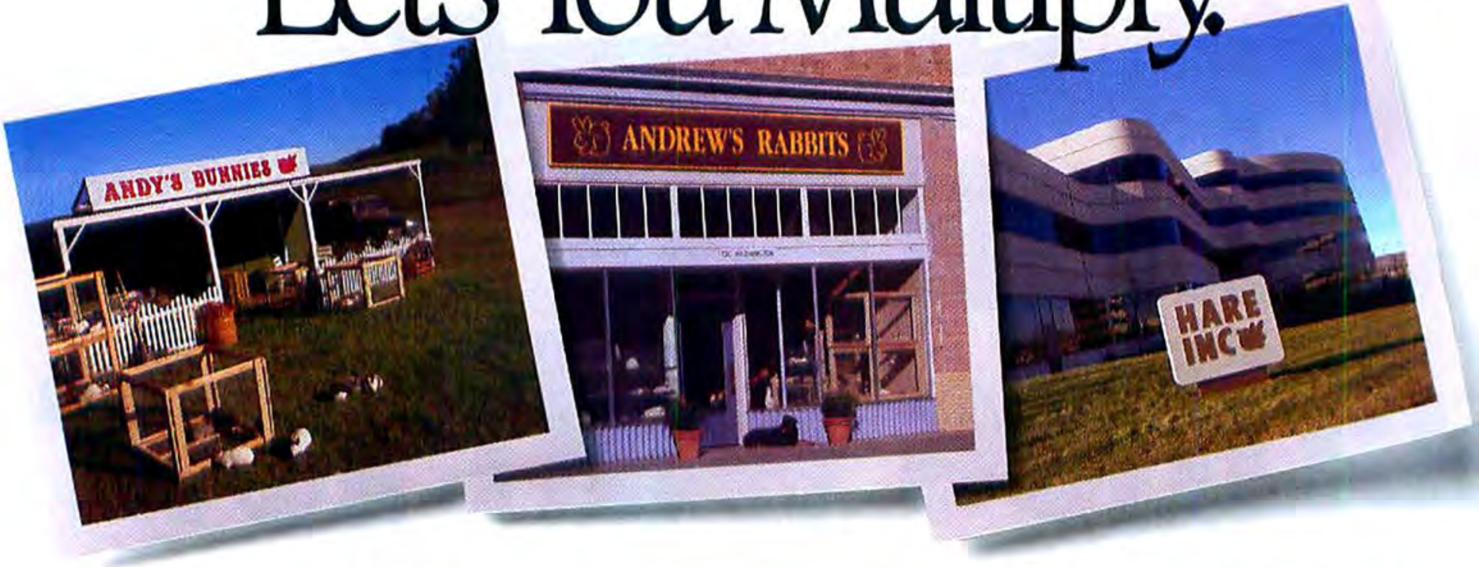

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Physics Experiment Simulator

INTERACTIVE PHYSICS 1.0

Pros: Solid implementation of classical mechanics; attention to pedagogic detail; detailed and convenient interface. **Cons:** Lacks orbital mechanics section. **Company:** Knowledge Revolution. **Requires:** Mac Plus; hard disk. **List price:** $249.

Interactive Physics (IP) is a remarkable program—at once more and less than its name suggests. What you get with IP is a complete, fast mechanics-simulation engine, reminiscent of that found in Simul, with an interface that makes it easy, even fun, to set up simple or complex simulations. You also get a short but exceptionally clear manual, a set of demonstrations of fairly complicated setups, and a large portfolio of experiments—some corresponding to standard topics in classical mechanics, and others to topics in beginning mechanical engineering courses.

The material covered is covered exceptionally well, but I wish there were files of simulations for celestial mechanics, electricity and magnetism, wave behavior, and maybe even quantum mechanics. In view of the magnitude of the programming effort required to simulate plain Newtonian mechanics, however, Knowledge Revolution may have to issue these other topics as additional programs. In contrast, Sensei's program, Physics, is a set of standard simulation-demonstrations carefully keyed to physics textbook contents such as electricity and magnetism, orbits, and waves; though more inclusive, it doesn't compete with IP's depth in mechanics.

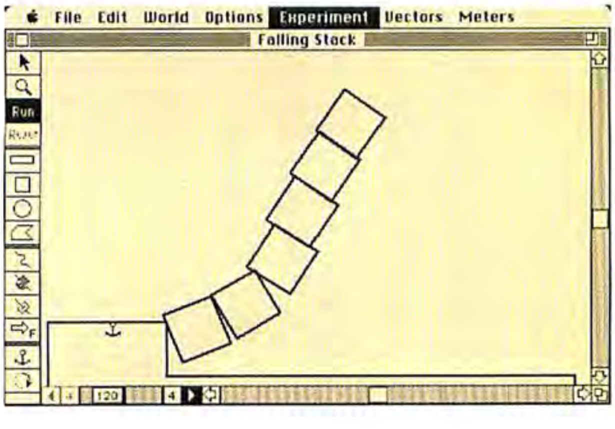
Artificial Reality

You can model elementary situations in mechanics in Simul, Stella, or Extend; but IP, with an interface specifically designed for these tasks, takes only about five minutes to learn.

To create a spring simulation in IP, all you do is draw a polygon with a MacDraw-like tool, pick a spring from the tool palette, and connect the spring from any point on the screen to the perimeter of the polygon. Then you pick a dashpot, or damping force, from the tool palette and connect it at another arbitrary point on the periphery of the polygon. To make your model even more complex, draw a square underneath the polygon and secure its position with the anchor tool.

When you select Run from either the palette or the Experiment menu, the polygon falls, stretches the spring, and strikes the square. Then, after clunking past the square, the polygon wobbles around in irregular damped oscillation for many seconds until it finally comes to rest with the spring in a stretched position.

Accurate simulation at this level of complexity really belongs to engineering rather than introductory physics. A simulation with dashpots and colliding blocks and irregular masses is almost too complex for beginners, except to illustrate how common highly irregular or actually chaotic dynamical systems are in real life. A more typical beginning-physics example would be a spring connected to the center of a circle, bobbing endlessly along a single axis; this serves as the simplest model of regular oscillation.



Earthquake! **The simulation engine in Interactive Physics can handle quite complex experiments. These blocks started from a precarious perch on the base at lower left and will topple to the ground and bounce (you can set the elasticity of the blocks).**

In the artificial reality of IP, the same tools model both simple and complex systems with ease. A sophisticated user could supplement the program's omissions by adding experiments, for example, setting up models with springs and masses to mimic wave interactions or orbital mechanics.

A Class Act

This last idea may suggest one way to use IP in classroom instruction, its intended market. In contrast to some types of physics-lab practice, in which you must model mechanical systems as special cases of electronic oscillators, in IP you can fabricate mechanical analogs of the electromagnetic systems. This method at least has the advantage of highlighting the power of simple differential equations to describe dynamical systems of any kind.

But Interactive Physics goes far beyond the type of problem that allows an analytical solution. One demonstration, starting with a set of blocks offset on a base, lets you watch the blocks slowly tilt over, slide off each other, and crash, tumbling and bouncing, to the ground. Individual parameters, such as mass, surface friction, and elasticity, can be set for each block; you can even set gravity to match the planet of your choice (see "Earthquake!"). Although simulation is ostensibly in the domain of physics, it doesn't take much imagination to see its value as a demonstration in civil engineering or architecture.

The Newtonian Realm

Knowledge Revolution has produced a specialized simulation program that emphasizes Newtonian mechanics: springs, masses, levers, inclined planes. IP's simulation kernel is efficient enough that the program can handle problems in practical mechanical engineering beyond the beginning-physics domain suggested by its name and documentation (the Car Crash demo is quite convincing). Interactive Physics delivers this power to the average Macintosh user—if you can use MacDraw you can use IP. It deserves to find admirers both inside academia and out in the real-world engineering trenches.—**Charles Seiter**

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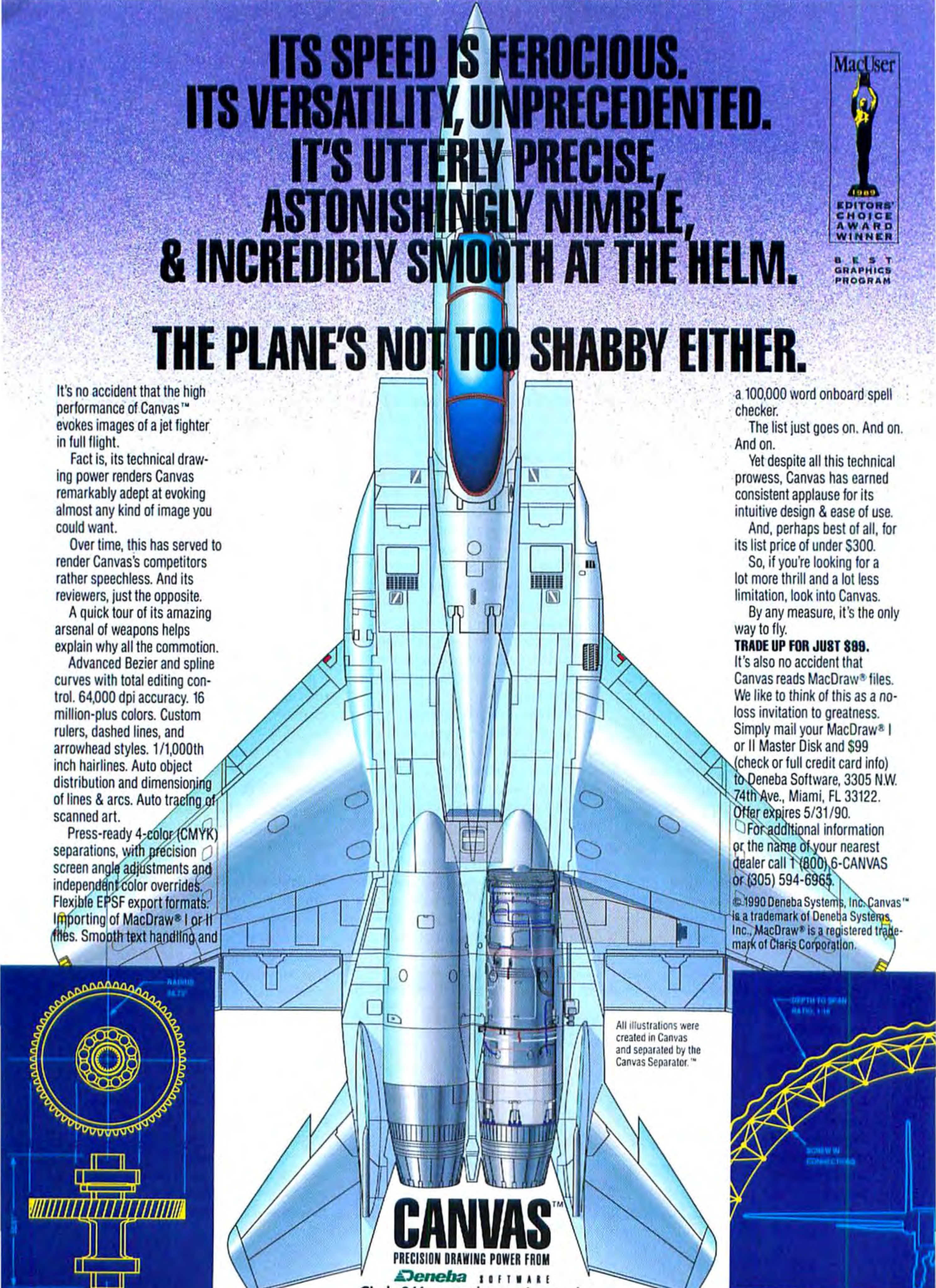

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Office Applications Package

THE MICROSOFT OFFICE 1.0

Pros: Includes four popular and powerful applications plus many bonus resources; HyperCard shell allows for quick online reference searches. **Cons:** Printed manuals are not included; multiple levels of menus and documentation may confuse beginners. **Company:** Microsoft Corporation. **Requires:** Mac Plus; 2MB RAM; hard disk; CD ROM drive. **List price:** $949.

The Microsoft Office is far more than just a Microsoft program delivered on a CD-ROM disc; it's a package of four of Microsoft's most powerful and most widely used applications tied together with a fancy HyperCard ribbon and decorated with a bevy of miscellaneous tools and toys.

The Crowded Office

The four Microsoft programs included on the Office CD ROM—Word 4.0a, Excel 2.20a, PowerPoint 2.01b, and Mail 2.0—are functionally identical to their popular floppy-disk counterparts. Why, then, should you consider buying the Microsoft Office package rather than buying the programs separately? For starters, to save money. These four applications purchased separately would cost approximately $1310 list price; the Microsoft Office lists for $949. This would be a significant savings in and of itself (if you already own a CD ROM drive), but there's more.

Microsoft has enlisted many other companies to contribute ancillary software to the package. Bonuses include screen fonts from Adobe; a laser-font family from Bitstream; a sampling of clip art in EPS, bitmap, and PowerPoint format from T/Maker, Genigraphics, and Multi-Ad Services; Smart Art DA with six text-manipulation effects; SmartScrap DA; Word Finder thesaurus; DocuComp document comparison software; business templates for Excel from several companies; and a number of other goodies. Limited test-run versions and animated demos of several programs, including Gofer, GeoQuery, and Adobe Illustrator are also tossed into the deal. Finally, the package includes five slick multimedia "introductions" (read, commercials) for the Office and each of its principal applications.

This makes for something of a hodgepodge. To smooth the seams, Microsoft has built a HyperCard shell with a series of hierarchical menus and buttons for navigating quickly between programs. This shell must be installed on a hard disk along with the applications using the Office Installer stack. (While it's technically possible to run the applications directly from the CD ROM, the CD player's slow access time makes that solution less than practical.) You can leave the other Office files on the CD or move them to the hard disk, depending on how often you access them and how much space is available on the hard disk.

The Paperless Office

No printed documentation comes in the package at all (there is, however, a coupon allowing you to order all the manuals for an additional $15). The manuals normally packed with Word, Excel, PowerPoint, and Mail have been translated into a series of HyperCard stacks, each of which can be read sequentially like a book or used as a quick-lookup reference. Many sections of the documentation are enhanced with helpful animated sequences.

The powerful search engine built into the Microsoft Office documentation makes it easy to locate references to particular topics in a fraction of the time it would take with a standard set of manuals. In general, the Office's online documentation has a number of thoughtful touches that make it easy to use across applications. On paper, this seems like a great idea. Nobody likes to read manuals anyway, and online help is both more immediate and more flexible. Nevertheless, replacing manuals with online documentation involves some trade-offs, especially for new users of the software.

MARK JOHANN

The Microsoft Office CD ROM and the manuals it replaces

You Can't Take It with You

In the first place, you can't take it with you. Secondly, the interactive tutorials (Getting Started with Word, and so on) aren't effective unless you have enough memory to run HyperCard and the application simultaneously under MultiFinder, switching back and forth between the two as you read instructions and carry them out. On a small screen, this constant window swapping quickly becomes tiresome.

The third trade-off involves the complexity of the Office's overall structure. In spite of Microsoft's efforts to unify the package, the multiple levels and forms of documentation make it easy for new users to feel lost in hyperspace. Inside Word or Excel, for instance, you can use the application's built-in help function. You can return to either application's Office menu screen and browse or search for keywords. If you choose to browse, you have several separate books to choose from. If all of these choices confuse you, you might need to hit the Help button in the Office menu for Office Help. If you still can't find what you're looking for, don't forget the Read Me files that are tucked away in a hierarchy of folders on the CD.

The Office of the Future?

If you have a CD ROM drive, the Microsoft Office is a superb collection of software at an extremely competitive price, with or without the optional printed manuals. By itself, it's probably not sufficient justification for buying a CD drive unless you're buying software for an officeful of Macs. But if the Office is indicative of the kinds of things that we can expect, the future of CD ROM looks bright indeed.—**George Beekman**

See Where to Buy *for contact information.*

WINDOW SHOPPING

by Lawrence Stevens

This month I review an application that helps maintain an inventory of your possessions and a stack that shows how to protect those possessions from earthquakes. I also look at a stack that will help you learn a foreign language and another that will add spice to your English.

Know Your Stuff 2.1

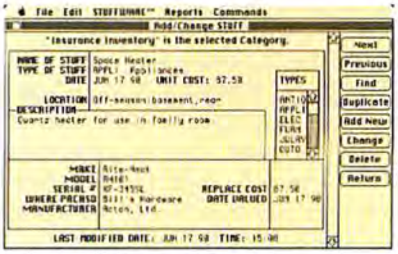
Many of us live in houses crowded with electronic equipment, hobby paraphernalia, and collections ranging from art to baseball cards—and run one or more part-time businesses to help us pay for all those possessions.

A new Omnis 3–based application, aptly titled Know Your Stuff ($49.95 from Working Systems), provides an easy-to-use personal and business inventory system.

Most database programs are either so general that they take hours just to learn and then more time to set up, or so specific that they can be used only by, say, real estate sales people. What I like most about Know Your Stuff is that it can be customized for almost any type of list, but it also has enough structure that you can learn it and set it up in about two hours.

First you choose the general categories of stuff that you want to track. These can be as diverse as an inventory of your part-time jewelry business, a detailed list of your collection of rare stamps, and a roster of your Cub Scout den. You designate each category as either single or multiple—the latter being used for lists in which the quantity of each item, such as in a retail business, can vary.

RON CHAN



"Insurance Inventory" is the selected Category.

NAME OF STUFF: Space Heater
TYPE OF STUFF: APPL: Appliances
DATE: JUN 17 90 UNIT COST: 57.50
LOCATION: Off-season: basement, rear
DESCRIPTION: Quartz heater for use in family room.
MAKE: Rite-Heat
MODEL: [illegible]
SERIAL #: [illegible]
WHERE PRCHSD: Bill's Hardware
MANUFACTURER: Acton, Ltd.
REPLACE COST: 67.50
DATE VALUED: JUN 17 90
LAST MODIFIED DATE: JUN 17 90 TIME: 15:00

Entering Data in Know Your Stuff

This screen contains both preset and user-defined fields. The Types scrollable field contains the Type classifications, which you can define during setup. You can enter a particular Type by clicking on its abbreviation in that field.

The categories come preset with eight fields (called Labels): Name of Stuff, Type of Stuff, Date, Unit Cost, Location, Description, Last Modified Date, and Time (the last two are entered automatically by the program) (see "Entering Data in Know Your Stuff"). Additionally, multiple categories include Quantity, Total Cost (entered automatically), Max Quantity, and Min Quantity. Virtually all that remains is to create a list of Types such as Appliances or Tools, and to name up to five additional alphanumeric labels, three numeric labels, and one date label.

As with all Omnis-based applications, Know Your Stuff lets you prepare reports using a full range of logical comparisons. You can search for records that contain, equal, or do not equal a set of characters within a specific field or fields. The program also looks at numeric and date fields for data that is lesser or greater than a specific number or that falls within a range. You can also create an Order Report that lists all records where the Quantity is below the Min Quantity.

Know Your Stuff is not without problems. One easily correctable shortcoming is that the manual is too skimpy; it attempts to explain things in a sentence or two when at least a paragraph is needed. A more serious failing is that Know Your Stuff does not print address labels. The program exports (and imports) only in comma-delimited fields, so the exported text will not work with most spreadsheets or label software. Of course there are workarounds for this—you can import the list into a word processor and use a global change to replace commas with tabs or returns as needed, but that's an extra step.

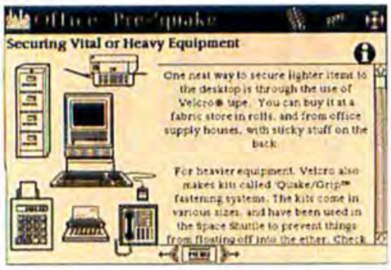
If you can get up the ambition to do the input, Know Your Stuff does an excellent job of doing the tracking.

Earthquake Preparedness Stack

The need to keep inventory lists was dramatically demonstrated when California's Loma Prieta earthquake forced many homeowners to tally up their losses for insurance and tax purposes. The Earthquake Preparedness Stack ($24 from Environmental Compliance Associates) won't help with insurance but can assist in protecting your possessions by explaining everything a layperson needs to know about earthquakes, including information ranging from how earthquakes are formed to how to survive one.

The user interface is as well-conceived as the textual material is informative. You get to any of the six sec-

(continues)



Securing Vital or Heavy Equipment

One neat way to secure lighter items to the desktop is through the use of Velcro® tape. You can buy it at a fabric store in rolls, and from office supply houses, with sticky stuff on the back.

For heavier equipment, Velcro also makes kits called 'Quake/Grip™ fastening systems. The kits come in various sizes, and have been used in the Space Shuttle to prevent things from floating off into the ether. Check

Preparing for an Earthquake

The Earthquake Preparedness Stack displays advice on how to prepare for an earthquake. This screen provides ways to protect office equipment.

tions—'Quake Basics, How and Where, Changing the Planet, Measuring 'Quakes, Experiencing a 'Quake, and Preparedness & Survival—by clicking on buttons. Each section is made up of one or more cards that display maps, diagrams, or scanned photos malong with explanatory labels and scrollable fields (see "Preparing for an Earthquake").

The most exciting, but probably least informative, section is Experiencing a 'Quake, where, complete with sound effects and animation, you view the crumbling of Stanford University's Main Gate during the 1906 San Francisco earthquake.

The last section, Preparedness & Survival, is the most valuable. You click on any area of a sketch of a house, such as the basement or the attic window, to have the program display a field that describes how to earthquake-proof that area. Or you can view drawings of public places, such as a city street or a classroom, and learn what someone in that area should do during a quake. This section provides some surprising information, including the fact that staying indoors in a downtown area is a good choice (falling glass is a greater potential hazard than the possibility of a building collapsing on you); and if you are on an upper floor of a high rise during an earthquake, expect the building to sway—it is built to do that.

The information here is clear and accurate. The scientific data is about equal to the information you'd find in a good encyclopedia, and the information on preparedness and survival is about what you would see in pamphlets available from state and federal agencies.

If you or your company is located in earthquake territory, I strongly recommend adding this to your library. It's cheap enough, and 10 percent of the purchase price goes to earthquake relief agencies.

MacFlash Cards 1.01

MacFlash Cards ($25 per module from The Language Quest Software Company) is another good example of a HyperCard learning tool; this one is for memorizing foreign-language vocabulary words. Level 1 and Level 2 modules are available for German, French, Spanish, Russian, and Latin. Last month I reviewed another flash card–like vocabulary builder, called VocabuLearn/CE from Penton Overseas, that included an audio cassette and a hard-copy word list. MacFlash Cards provides no audio or hard-copy material, but it gives you more control than VocabuLearn/CE over how you study.

As with standard flash cards, you view an English or foreign word and, after trying to remember the foreign or English equivalent, you can look at the correct answer. You can choose whether the foreign or English word appears first, and you can specify that the cards be displayed in either alphabetical or random order.

MacFlash Cards provides a number of ways to designate certain words for later review. The program can collect all the words you view at each practice session into a Word Set (which you can save to disk). Alternatively, you can select specific words to be placed in a Word Set. Finally, as you go through a practice session, you can mark cards that you have trouble with and later have the program include only those marked entries in your session.

While the marking system could have been the program's strongest feature, it falls short in that you must mark a minimum of 250 cards to have a review session. The program also can't eliminate cards as you learn them, a practice I use with paper flash cards.

One quibble is that the program requires you to use an arrow key to get to the first word card. The developers didn't take into account that many schools, including the one in which I occasionally teach, still have some older keyboards that lack arrow keys. There are HyperCard workarounds (⌘-3, for example), but they are not described on the screen or in the documentation.

Besides one quibble and two shortcomings, MacFlash Cards is an excellent learning tool that, by providing so many ways to view cards, helps you remember the words.

Slang Thesaurus

When I wasn't studying flash cards during late elementary and early junior high school, one of the things my buddies and I did was try to find dirty words in the classroom dictionary. Of course, none were to be found there, and we had to content ourselves with less exciting, but equally verboten, slang words such as *ain't.* While my lexicographical interests have broadened a bit, perusing Slang Thesaurus ($35 from Slippery Disks) still fascinates me.

Of course this HyperCard stack contains the standard obscenities and racial epithets that you would expect. But this extensive list also includes slang words and phrases including Yiddishisms; military usage words; and Cockney, Australian, West Indian, and Spanish colloquialisms.

If you like Cockney rhyming slang, you'll find *too Irish stew* for *too true* (words of approval) and *Uncle Ned* for *bed.* Military slang includes *lumpy chicken* for *gossip* and *yard bird* for *recruit.*

The HyperCard interface on this stack is fine. Each letter of the alphabet has one or more index cards filled with nonslang words. You click on any of these words to get to a card that contains, in four scrollable fields—Nouns, Adjectives, Verbs, and Adverbs/Phrases—the slang equivalents.

As you view the slang words, you can select, by highlighting, those words that you want placed on a short list for printing. Unfortunately, this short list only contains the slang words, not the nonslang equivalents.

If part of the load of your nine-to-five is to churn out a smoking bit of prose, this stack can fork over a handy leg up. ▣

See Where to Buy or circle 770 (Know Your Stuff), 778 (MacFlash Cards), 801 (Slang Thesaurus) on reader service card.

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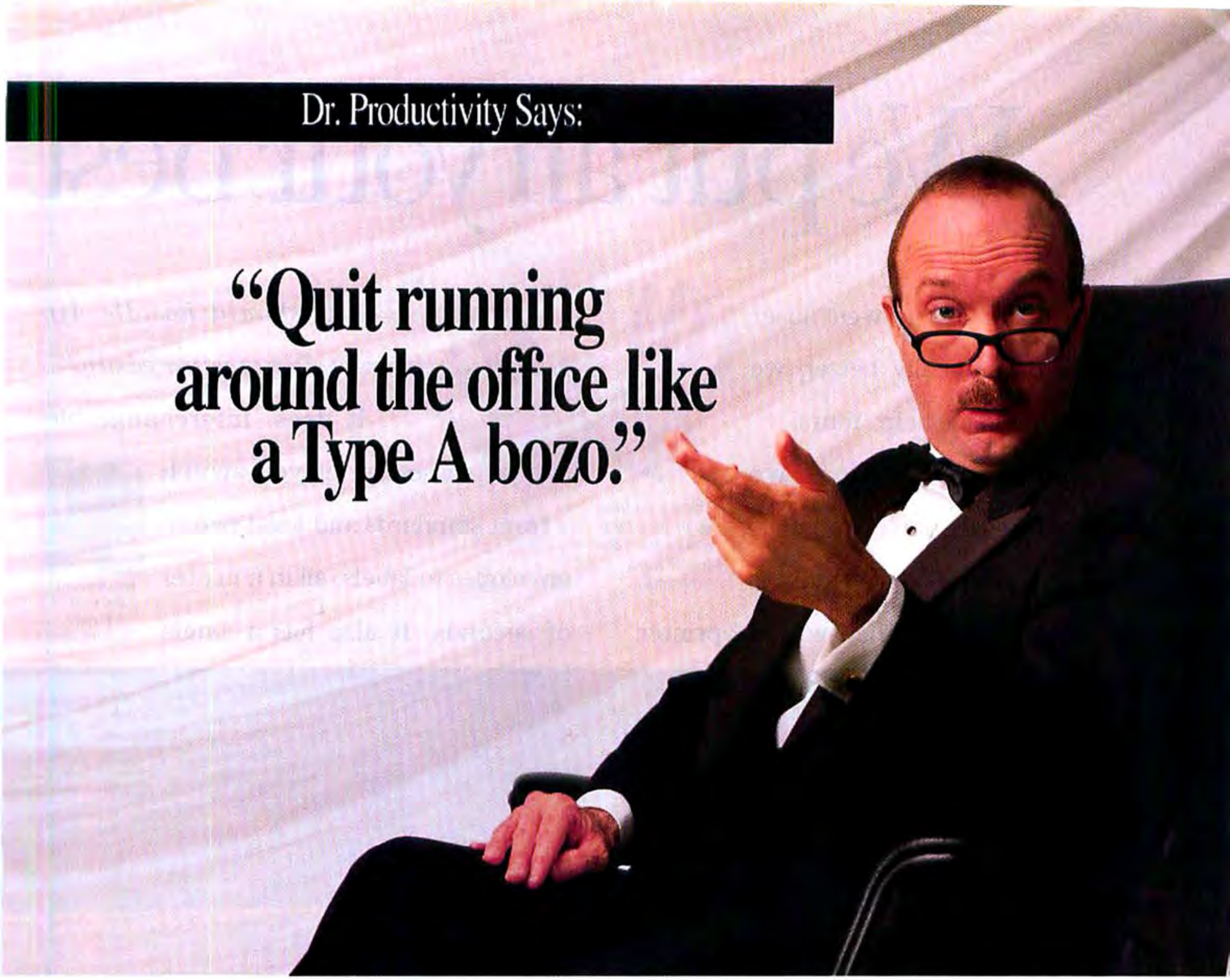

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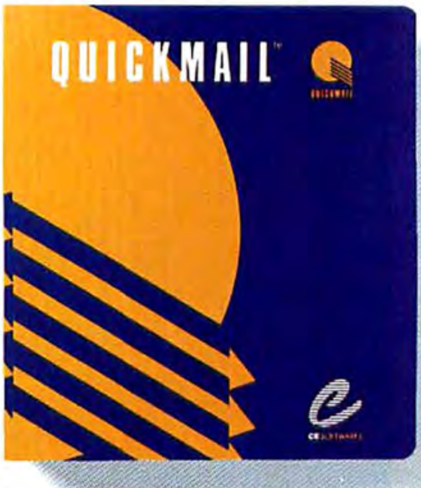

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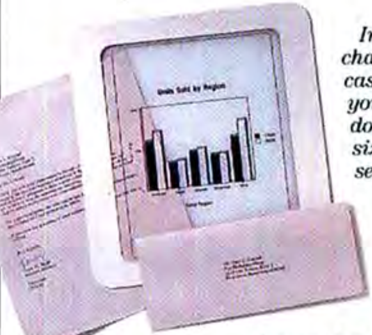
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NEW PRODUCTS

Edited by Mary Margaret Lewis

This section covers Macintosh products formally announced but not yet evaluated by Macworld. All prices are suggested retail. Please call vendors for information on availability.

HARDWARE

AMIE

Interface emulator that enables the Mac to link to a Unisys/Sperry network. Makes the Mac plug-compatible with the Uniscope terminal network. Hardware supports various forms of connectivity and handles communications-line protocol. Software emulator is compatible with UTS and SVT terminals. $1395. Air Land Systems, 703/573-1100.

C21LMAX 21" Flat Screen Monitor

C21LMAX 21" Flat Screen Monitor

21-inch flat-screen color monitor with tilt-and-swivel base. Adjusts dynamically to horizontal scan frequencies from 48kHz through 96kHz and vertical-frame rates from 60Hz through 80Hz. $3895. Image Systems, 612/935-1171.

ClearVue/GS and ClearVue/GS30

ClearVue/GS and ClearVue/GS30

Gray-scale display systems for the Mac II and SE/30. These systems display 256 shades of gray, have a 75Hz refresh rate, and offer hardware Pan and Zoom capability. $2195 each. RasterOps, 408/562-4200.

ComputerEyes/Pro

ComputerEyes/Pro

Video digitizing system that consists of a NuBus board and bundled software. Captures images from any standard video source; captures either black-and-white or color images with 8 or 24 bits of color information per sample. Supports MacPaint, TIFF, and PICT2 file formats. $449.95. Digital Vision, 617/329-5400.

DigiChannel Nu/Xi

Multichannel communications board that works with A/UX to let Mac act as host computer in microprocessor-based multiuser system. Has Motorola 68000 12MHz microprocessor, 256K of dual-ported RAM, and up to 128K of ROM. Eight-port version $1295; four-port $995. DigiBoard, 612/922-8055, 800/344-4273.

DigiChannel Nu/Xi

Dynamac SE/30

SE/30 with 2MB, 5MB, or 8MB of RAM that comes with 40MB, 100MB, or 180MB hard drive; built-in 2400-baud data modem; and built-in 4800-baud sending fax modem. CPU is the size of Mac Portable. $8995. Dynamac Computer Products, 303/296-0606, 800/234-2349.

Half Height Drive Series

Series of 100MB, 200MB, and 250MB half-height disk drives offered as internal and external devices for the Mac SE, SE/30, II, IIx, IIcx, and IIci. Includes backup, optimizer, spooler, and cache software. $1099 to $1999. PLI, 415/657-2211.

JX-600 Commercial Color Scanner

Color scanner scans from 30 dpi to 600 dpi and can zoom from 1200 dpi to 100 dpi. Includes color-separation capabilities. $14,995. Sharp Electronics, 201/529-9500, 800/223-2121.

MacBlitz

MacBlitz

Cocomputer board for the Mac that uses RISC technology to let Macintosh users access machines running UNIX via the standard Mac interface. Has its own memory, UNIX operating system, RISC processor, input/output controller, and can perform simultaneous operation and file sharing with the host computer. Under $10,000. DuPont, 302/733-9886.

MacLab/8

Self-contained, software-configurable data-acquisition platform that connects to the Mac and can be used in conjunction with MacLab software packages. Files can be exported to any of the statistical, graph, spreadsheet, and page-layout programs available on the Mac. $3950. World Precision Instruments, 203/469-8281.

MacTwin

Hardware-and-software 5250-emulation product that provides local access to an S/3X or AS/400 system from a Mac SE, SE/30,

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MacTwin

or Mac II. Supports up to seven sessions, with one session available for attaching to Mac-compatible printers. SE model $995; Mac II model series $1095. Emerald Technology, 206/485-8200.

NetAxcess

Gateway that gives machines on an AppleTalk network access to IBM AS/400 or System/3X machines. Consists of a NuBus board and HyperCard interface. Provides transparent database access and file transfer to host system for mass storage. $3995. KMW Systems, 512/338-3000.

NetModem V.32

NetModem V.32

9600-bps, V.32, and Hayes-compatible stand-alone modem for AppleTalk networks. All Macs and PCs on a network can access the NetModem V.32 for outgoing communications. Modem includes dial-in network-access feature to let remote users access the network from a single Macintosh or PC and any other modem. $1999. Shiva, 617/864-0914.

Pentax Desktop Scanner

Pentax Desktop Scanner

Flat-bed scanner emulates Apple scanner. User directly adjusts gamma (gray-scale intensities) while adjusting contrast. Bundled with scanning DA that allows user to scan images into any application via Clipboard. Comes with SCSI interface and cable. $1599. Pentax, 303/460-1600.

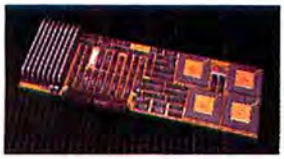
PixelView I and PixelView II

PixelView I and PixelView II

15-inch single-page and 19-inch dual-page display systems. Each comes with monitor, interface board, and necessary cables. Systems have glare-reduction coatings, 72-dpi resolution, 78Hz refresh rate, and ability to capture screen images to disk. PixelView I $667; PixelView II $897. Mirror Technologies, 612/633-4450, 800/654-5294.

QuaSi

Workstation that uses an SE logic board. Open-ended configuration enclosure allows the use of an 800K drive as well as up to two $3^1/_2$-inch or $5^1/_4$-inch mechanisms for use of hard disk, CD ROM, or tape backups. Comes with full-page monochrome monitor. $1890. Shreve Systems, 800/227-3971.



RP88B25 Coprocessor

RP88B25 Coprocessor

25MHz coprocessor for Mac II that uses Motorola's 88000 RISC architecture. Has built-in floating-point processor and provides up to 9 MFLOPS and 21 MIPS. $10,995 to $18,495 depending on configuration and memory. Tektronix, 503/627-7844, 800/835-9433.

Stowaway 2400

Compact, portable 2400-baud modem based on TLP technology; designed to eliminate the possibility of a line being dropped during a communication session due to low battery power. Supports V.22 bis, CCITT, V.22/Bell, 212A/Bell 103 standards, and the extended Hayes AT command set. $295. Vocal Technologies, 408/980-5181.

SureKey/2

SureKey/2

Mouse-size lock box (with software) that plugs into any Mac serial port and is used for data security. Can be set to automatically lock at a specified time. Computer can continue to run while locked. $350. Key Concepts, 219/234-4207.

SOFTWARE

4D Mover

Software that simplifies copying objects from one 4th Dimension 2.0 database to another. Lets you move commonly used parts of different databases into new or existing databases to reduce design time. 1MB min. memory. $200. ACIUS, 408/252-4444.

Adobe Type Sets 1 and 2

Two font software packages for use with Adobe Type Manager. Each set contains seven display fonts from the Adobe Type Library. To be used with non-PostScript printers. 1MB min. memory. $99 per set. Adobe Systems, 415/961-4400.

The AIM Problem Solver

Introductory version of the AIM machine learning tool that synthesizes network solutions from databases of examples. Determines network structure, node types, and coefficients automatically. Allows 25 input variables and has a separate Encode Module to automatically produce royalty-free networks in ANSI C code. 1MB min. memory. $495. AbTech Corporation, 804/977-0686.

CheckFree

Electronic bill-payment service that provides the ability to pay all bills and handle all routine financial tasks electronically, regardless of the financial institution an individual uses. Transmissions to the CheckFree Processing Center are encoded. Payment requests are handled through the Federal Reserve Bank network rather than the consumer's individual bank account. 512KE min. memory. Software kit and manual $49.95; software kit and quick-refer-

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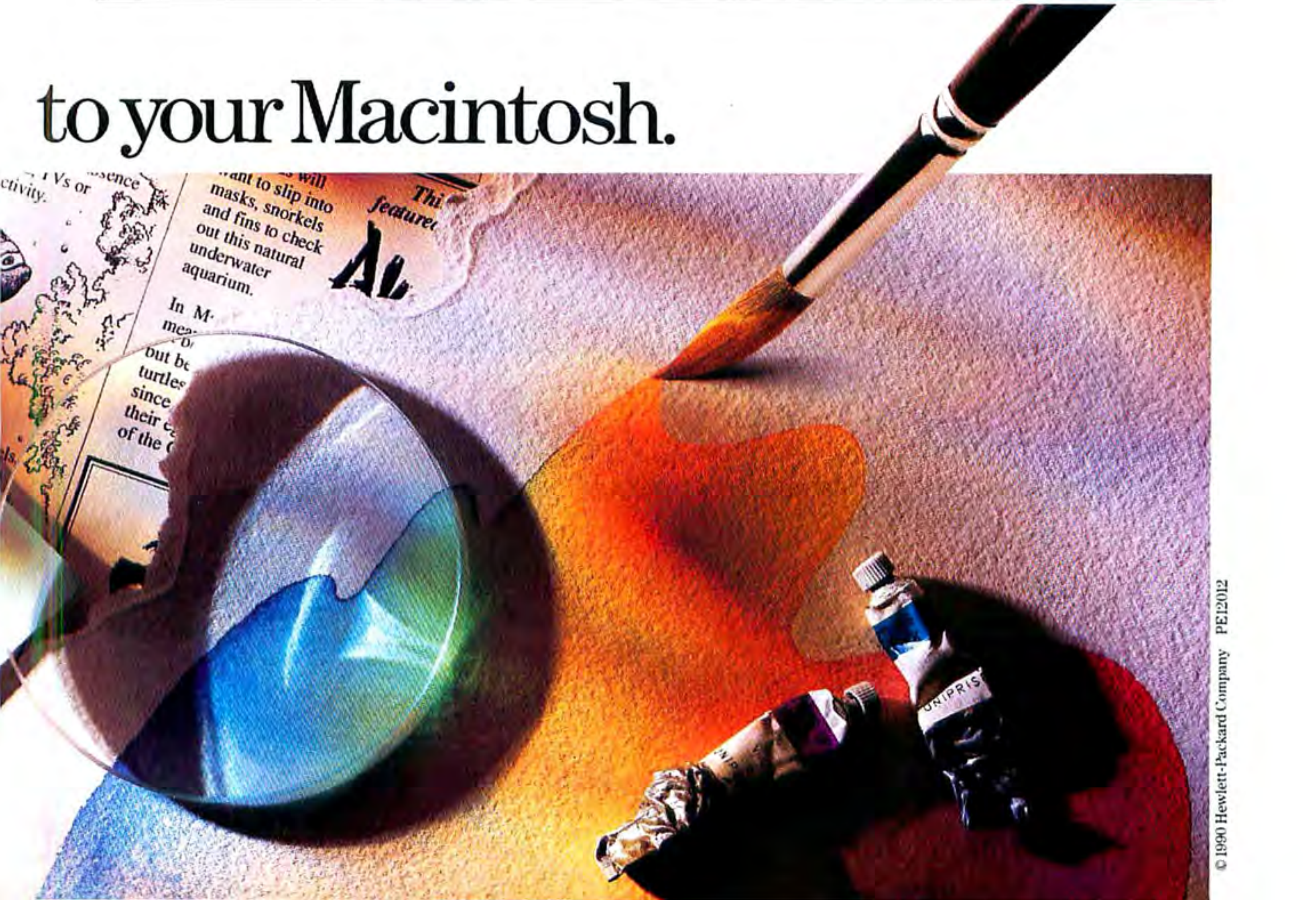


ence guide $29.95; monthly service charge for up to 20 transactions $9. CheckFree Corporation, 614/898-6000.

The Contractor Solution

Business-management software for contractors that provides estimating, job costing, and accounting functions, and includes office-management features such as letter writing, bill paying, and processing paperwork. Program keeps track of whether each job is making or losing money, and keeps up-to-date general ledger entries, calculating 1099 totals and monitoring subcontractor's insurance. 2MB min. memory. $3995. Vertical Solutions, 805/257-6911.

DiskDoubler

File-compression utility designed to compress any Mac file that is compatible with MultiFinder. Compresses individual files on a disk maintaining the folder structure; is available at Finder level. 1MB min. memory. $59.95. Salient, 415/852-9567.

Documentor for Psychiatry

Medical charting program designed to help psychiatrists document cases and create and maintain outpatient charts. Can be used to track and measure patient diagnoses, medications, lab tests, consents and releases, and appointments. Prints prescriptions, reports, and progress notes. 2.5MB min. memory. $2985. Lanstar, 313/663-6363.

The Duel: Test Drive II

Driving-simulation program in which the Ferrari and Porsche can compete, or each car can race against a replica of itself. Gives users cockpit perspective. User must be able to shift and steer at speeds exceeding 190 mph in order to avoid crashes, tickets, and blowing an engine. The Duel: Test Drive II Car Disk, California Challenge, and The Supercars add-on software is available. 1MB min. memory. $54.95. Accolade, 408/985-1700.

Electric Design System

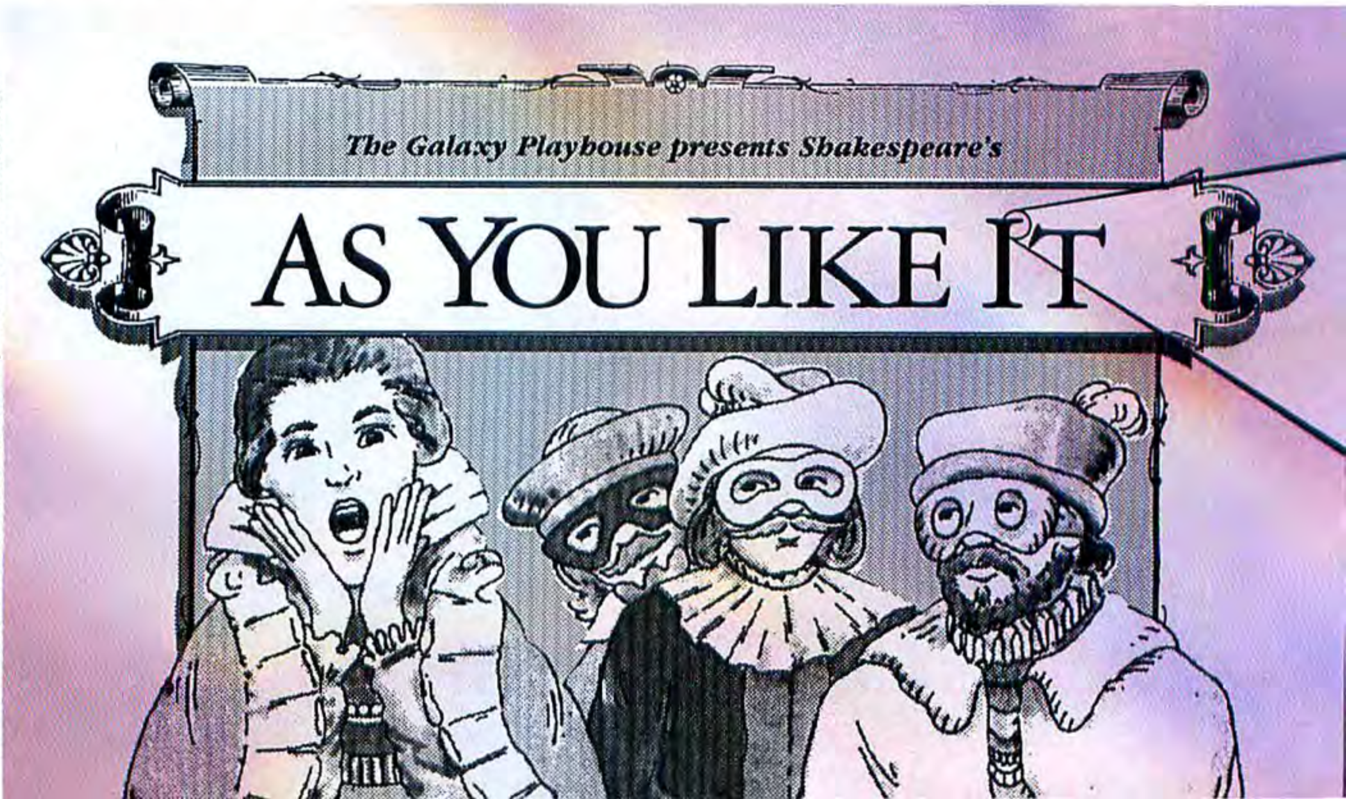
Software for layout and design of analog or digital integrated circuits. Provides for design entry, rules-driven layout, synthesis and analysis tools, and interfaces to other CAE/CAD systems. Supports a variety of design technologies including: MOS, Bipolar, Schematic Design, System Architecture, and a General Artwork facility. 5MB min. memory. $4900. Electric Editor, 408/441-0710.

Flash

Background file-transfer program that runs over AppleTalk-compatible networks. Sends and receives any combination of files and folders simultaneously. Alerts user when files arrive and keeps a record of all file transfers. 1MB min. memory. $199.95. Beagle Bros, 619/452-5500.

GolfBase

Personal electronic record-keeping program for golfers. Automatically adjusts scores using USGA Equitable Stroke Control, computes USGA handicaps, and contains a handicap index; lets user view and print summaries of scoring history for any course and golfer. Program plots and prints histograms and calendars of gross score, adjusted score, handicap differentials, and match re-



sults. Prints completed scorecards. 512K min. memory. $49.95. Jim Holbrook, 206/641-0352.

The Grade Machine

Teacher's grade-keeping application that provides full-screen editing of grades in a spreadsheet format, generates progress reports for individual students and summaries for the entire class. Progress reports may be made confidential. Teacher controls grading scales, comments, extra credit, and other preferences. 512K min. memory. Single user $39.95; site license available. Misty City Software, 206/828-3107.

How To Use Microsoft Works, Macintosh Version 2

Self-paced learning tutorial that includes four audio disks and a data disk with practice files and an indexed Quick Reference Guide. Designed to help user learn Microsoft Works. 1MB min. memory. $119. FlipTrack Learning Systems, 800/222-3547.

HyperEntrepreneur

HyperCard-based program designed to help user learn what it takes to start a small business and to decide whether or not to start one. Includes self-assessment exercises, examples, games and quizzes, and advice on beginning a business. 1MB min. memory. $285. Hyper Train, 518/834-7203.

HyperSource Micro

Training software that consists of three segments: one for Aldus PageMaker, one for desktop-presentation packages (Aldus Persuasion, CA/Cricket Presents, Letraset USA StandOut, Microsoft PowerPoint, and Symantec More II), and an examination of Apple's Mac product offerings. 1MB min. memory. $119. Prism Technologies, 705/674-8254.

Intuit's IsSpice for Macintosh

Spice program for all Mac platforms; provides universal gateway for circuit designers to perform powerful CAE functions using enhanced version of Spice compatible with Berkeley Spice 2G.6. 1MB min. memory. Professional version $210; without coprocessor $95. Intusoft, 213/393-9494.

KiwiFinder Extender

Tool for organizing hard disk and retrieving files; designed to extend the scope of the Finder. Allows user to view hard disk seven different ways. Files may be arranged by file name, type, creator folder, creation date, modification date, and keywords. 1MB min. memory. $99.95. Kiwi Software, 805/685-4031.

LandCADD Light

LandCADD Light

Software that combines a limited number of functions from various modules of LandCADD landscape-design software. LandCADD Light can be operated as a stand-alone product or in conjunction with any LandCADD module or any architectural or civil engineering application software. 1MB min. memory. $695. LandCadd, 303/688-8160.

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Layouts
Collection of 219 page-layout templates for business cards, brochures, newsletters, and other personal publishing needs. This package includes a quick reference guide, tutorials, and a pictorial index. Has the ability to alter color and typeface and to insert custom logos and other graphics. 1MB min. memory. $179.95. Starburst Designs, 702/453-3371.

Letter Writer Plus
Business letter software that lets user add graphics or text headers at the top of the page, change the position of a header, and scale graphics just by typing a new scale factor in the dialog box. Can be linked with Power Up's Address Book Plus. 1MB min. memory. $89.95. Power Up, 415/345-5900.

LifeArt
Collection of human anatomy clip art to be used for medical publishing, slide production, and two-dimensional animation. Consists of 70 illustrations of the body's major anatomic parts. 1MB min. memory. $229. TechPool Studios, 216/932-5200.

MacBible
Multilingual bible concording program with modules available for New International Version, Revised Standard Version, King James Version. Designed for studying biblical texts and their translations. 1MB min. memory. Concording program $220, each module $75. Zondervan Electronic Publishing, 616/698-3222, 800/727-7759.

The Macintosh Yellow Pages
HyperCard-based directory of all major Mac products including software, hardware, accessories, books, CD ROM titles, and magazines. Contains an index to aid in product searches. 1MB min. memory. $39.95. The Macintosh Yellow Pages, 617/225-7121.

MakeTest
Application for teachers and trainers to create test questions and print tests. Stores answers, topics, difficulty levels, and notes with questions; provides variety of printing options. Can be used to create multiple-choice, true-false, essay, matching, and free-form tests. 1MB min. memory. Single user $149; 5-pack $399; 10-pack $699; 20-pack $999. Mountain Lake Software, 415/665-5302.

MacTools Deluxe
Disk-management utilities for data recovery, hard disk backup, disk optimization, partitioning file-management, and encryption and password protection of data. 1MB min. memory. $129. Central Point Software, 503/690-8090.

MicroCat
HyperCard-based program designed to guide technicians in component-level Mac repair. Lets user point to graphic or text that comes closest to describing the damaged machine and indicates which component is faulty and how to test it. Covers common and uncommon repairs. 1MB min. memory. $100. Micromat, 415/898-6227.

Nastalique Nizami
Typesetting software for Indo-Iranian languages Urdu and Farsi. Requires a PostScript printer for out-

put. 1MB min. memory. Contact vendor for price. Pakistan Data Management Services, 87 D.A.C.H.S., Off Shaheed-e-Millat Road, Karachi, Pakistan.

Partner

Partner

Software that automates the task of creating and editing graphics within a word processed document or publication. Lets user keep all publication data, graphics, and text in one file. 1MB min. memory. $99. Salient, 415/852-9567.

PerfectPartner

Business-management program for the day-to-day operation of small businesses. Captures data about a company's customers, products, employees, and services necessary to prepare sales receipts and project invoices for all transactions as soon as completed. Tallies financial information from receipts and invoices to provide status and payment history. 1MB min. memory. Single copy $459; volume discounts available. The Process Resource, 508/226-6616.

Professional Investor

HyperCard-based professional portfolio-management software for the Macintosh. Designed for stockbrokers, financial planners, and portfolio managers. Tracks clients, portfolios, and transactions; maintains a history of all transactions for each client's portfolio; keeps track of each tax lot; and allows for selling partial lots. 1MB min. memory. $349.95. Balthrop, Brader, Wood Associates, 503/741-2225.

Professional Output Manager-Desktop PS1

Utility program that functions as a driver for graphics programs to specialized imaging and printing devices. Provides graphics professionals with the ability to preview images via an electronic light box, arrange images in any order, and schedule imaging or output for unattended operation. 1MB min. memory. $595. Visual Business Systems, 404/956-0325.

QuickHelp for 4th Dimension

Desk accessory help system for 4th Dimension version 2. This DA contains an entry for every command in the 4th Dimension language and includes a description of the commands, associated commands, manual references, and a complete parameter specification. 1MB min. memory. $99. After Hours Software, 818/783-5690.

Retail Engine Sales Recorder

Software to record sales for one or more stores. Optional bar-code reader can be used to scan tags with SKU or UPC information. Allows user to define criteria for report searches and sorts. 1MB min. memory. Houlberg Development, 619/287-7444.

Sauna

Tool for thermal modeling of electronic equipment. Can be used to create thermal models of entire electronic enclosures, circuit

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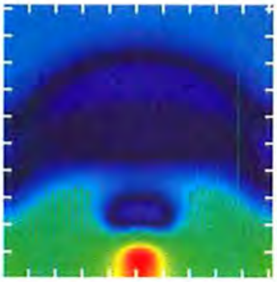
boards or heat sinks, with a solver feature that can predict set of temperatures. 1MB min. memory. Standard version $995, advanced versions $2995. Tatum Labs, 313/663-8810.

SBT Sales Orders

Sales-order processing system that generates, schedules, and maintains sales orders and back orders; tracks inventory; and writes sales orders and COD tags. Can be used separately or integrated with the SBT Accounts Receivable and SBT General Ledger modules. 1MB min. memory. $695. Software Business Technology, 415/331-9900.

SpeedPlanner

Prepublication planning and production tracking system that yields full pagination for PICT-compatible page-layout programs. Electronically dummies pages; contains ad stack tools for placing ads in predetermined patterns, following specified criteria; and automatically locates ads and stories, placing them onto appropriate page. 1MB min. memory. Preplanning package $4995; full-pagination package $8995. Digital Technology, 801/226-2984.



Spyglass Transform

Spyglass Transform

Interactive data-analysis tool designed to convert floating-point numbers into images. Can represent data as simple scaled color images, interpolated images, polar images, or line graphs. Program lets user select part of a generated image and see the corresponding data values. 1MB min. memory. $395. Spyglass, 217/355-1665.

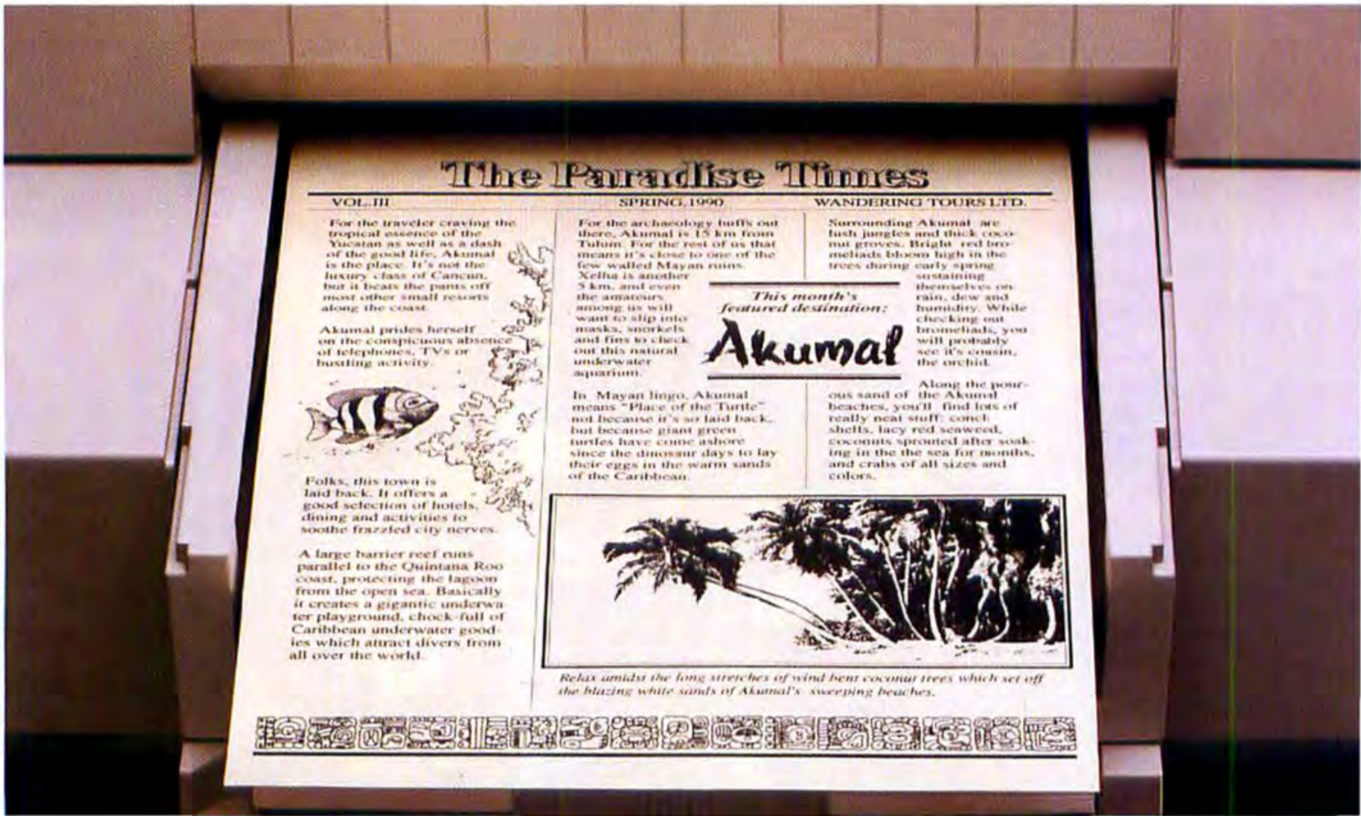
Spyglass View

Spyglass View

Visualization software that displays color and gray-scale images to represent scientific data. Displays data in a variety of formats such as surface or contour plots, raster images, or dithered images; can show a cross-section of an image as a line graph. Multiple images may be used to create animation. 1MB min. memory. $395. Educational discount available. Spyglass, 217/355-1665.

Starflight

Fantasy role-playing adventure game that takes user into a galaxy of 270 star systems and 800 planets. Takes place in the year 4619. The player's mission is to find colonizable worlds, gather minerals and ancient artifacts, and learn the secrets



of alien races. 1MB min. memory. $49.94. Electronic Arts, 415/571-7171, ext. 541.

StrataFlight

StrataFlight

Add-on motion-scripting utility that lets users add motion to three-dimensional, 32-bit color images and scenes created with StrataVision. Supports creation of a series of independent PICT files and viewing of both PICS and PICT file formats. 1MB min. memory. $189. Strata, 801/628-5218.

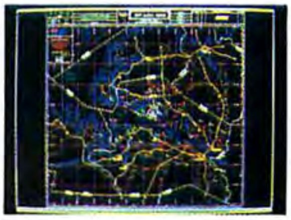
SymbolWorks

Re-creation of a collection of universally understood interpretative symbols used by designers. Contains more than 120 encapsulated PostScript illustrations for use with page-layout, illustration, and CADD applications capable of importing EPS files. 1MB min. memory. $99.95. International SymbolSigns Library, 916/442-4045.

SymbolWorks

SyncMaster

Mac-compatible interface and synchronizer with dual-port design that has two MIDI inputs and six MIDI outputs. Includes SMPTE reader-generator that reads and generates all SMPTE formats. Supports flywheeling, jam sync, and reshaping of SMPTE code. 1MB min. memory. $349. J. L. Cooper Electronics, 213/306-4131.


Techbase

Techbase

Database-management system for analysis of numeric data sets used in engineering and scientific applications. Relational database lets user add or delete fields and tables at any time. Produces flat, polygon, cell, layer, or block table types. 1MB min. memory. $2030. Minesoft, 303/292-6449.

Tracon-Air Traffic Control Simulator

Air-traffic-control simulation re-creates environment of terminal radar approach control centers at various major U.S. airports. Generates realistic traffic flows from various aircraft types and thousands of possible routes along real airways and radio fixes. 1MB min. memory. $49.95. Wesson International, 512/328-0100.

Tracon-Air Traffic Control Simulator

Visual Arts–Publishers Resource

Collection of desktop publishing images. Includes office, food and leisure, flowers, technology, sports, geography, and other types of images. Contains dingbats and page borders. 1MB min. memory. $250. Electronic Pen, 404/296-8623.

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ACCESSORIES

Archive DiskFile Modular Cube Unit

Cardboard file that holds 75 standard $3^1/_2$-inch disks. Files fit together in a cardboard sleeve to form a pull-drawer cube. $7 per file. Weber & Sons, 201/431-1128, 800/225-0044.

BNC-Net Series

Devices to protect from coaxial spike, surge, and interference problems on a network. Available in *tee* or *in-line* configurations. Devices install directly on equipment to be protected. $60. Electronic Specialists, 508/655-1532.

Compuvision Lenses

Lenses that are designed to block 100 percent of UV light exceeding wavelengths of 400nm, and a major fraction of blue light above 400nm. Glasses are designed to blunt the hazards of UV light, and filtration of blue light improves vision. With frames $29.95; clip-ons $19.95. American International Optical Direct, 503/692-8049.

SideClip

SideClip

Paper holder that attaches to the side of any computer monitor to hold documents for easy viewing. Allows the user to hang papers next to the monitor to prevent neck- and eyestrain caused by constant looking up and down. Holds up to eight pages at a time and swings out of the way when not in use. Attaches with Velcro. $6.95. Kensington Microware, 212/475-5200, 800/535-4242.

Surge

Surge-protection device that provides four-line protection. Device can be used interchangeably for protecting modems, fax machines, fax modems, answering machines, and solid-state telephones on phone lines. Uses metal oxide varistor technology to help protect equipment. $25. Museum Quality Solutions, 804/474-4939.

ZipKit

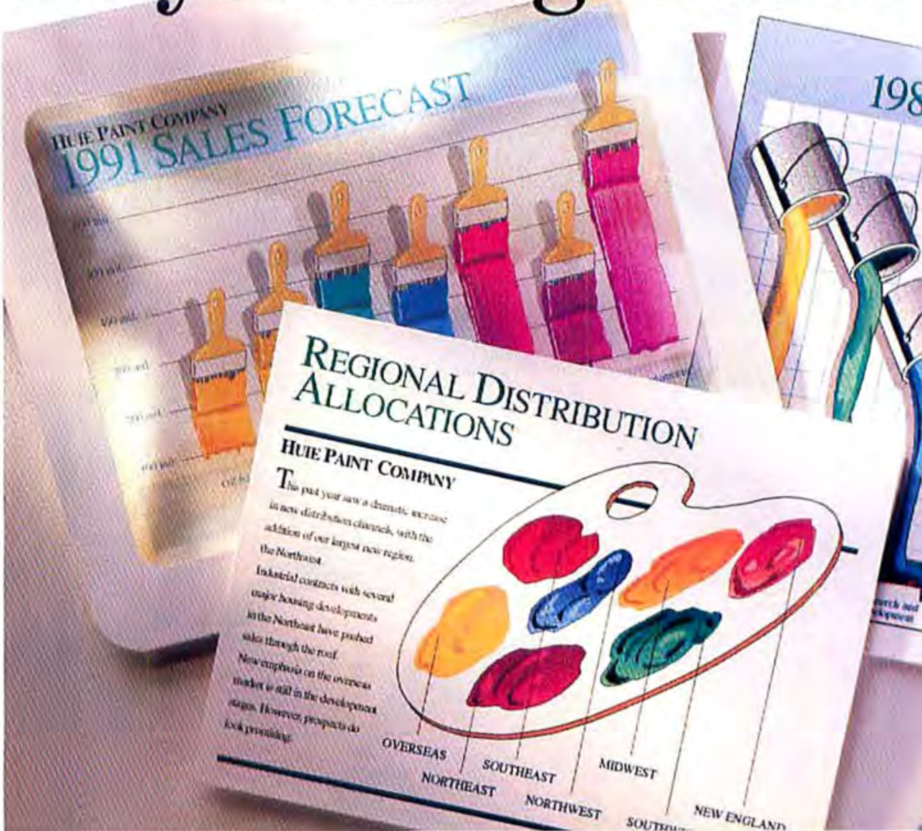
Toner recharging kit available for Series I and Series II LaserWriters. Enables user, even one who isn't mechanically inclined, to disassemble, clean, recharge, and reassemble cartridge easily. Necessary tools included. $55. Dart Products, 305/255-8508.

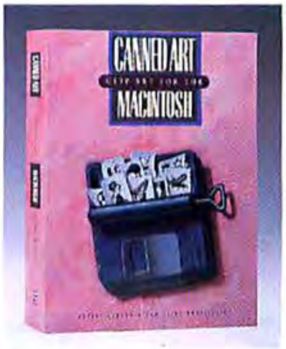
ZipKit

BOOKS & VIDEOS

Canned Art

An 800-page book that includes more than 15,000 samples of commercially available clip art from more than 35 vendors, as well as discount coupons for clip art. Covers a wide range of subject matter including holidays, historical figures, and business images. Coauthored by Erfert Fenton and Christine Morrissett.





Canned Art

$29.95. Peachpit Press, 415/527-8555.

Computer Assisted Publishing: Digital Pre-Press

Book that explores practical methods to automate publishing in a large corporation using digital prepress. For managers of electronic publishing systems and data-automation centers. Written by David R. Shaw $42.95. Curvet Press, 613/258-2468.

Designing and Writing Online Documentation

How-to guide about creating electronic documents that communicate clearly. Teaches how to create menus, messages, hypertext, and help files; discusses the nature of online documentation; and gives a variety of reasons for using online documentation in software design. Written by William Horton. Hardcover $34.95; softcover $24.95. William Horton Associates, 205/536-8207.

Macintosh Repair and Upgrade Secrets

Book that provides repair and upgrade information for all models of Macintosh. Includes reference list of parts for the Macintosh and has instructions for disk drive, RAM, and ROM upgrades and previously undocumented upgrades for power supplies, disk drives, and monitors. Written by Larry Piña. $32.95. Howard W. Sams & Company, 317/573-2676.

Mastering Graphics on the Macintosh

Book that focuses on specific software such as MacPaint, MacDraw, and HyperCard and how to use them; emphasis is on design rather than technical details. Written by Dan McNeil. $21.95. Chilton Book Company, 215/964-4000, 800/345-1214.

Music and the Macintosh

200-page hands-on guide to Macintosh music software with a discussion of synthesizers, samplers, sequencers, and synchronization. Describes what a user needs to know to begin producing music on the Mac. Written by Gary Yelton. $16.95. MIDI America, 404/452-8154.

On Macintosh Programming: Advanced Techniques

Essential Mac programming concepts, source code, and advice from programmer and author Daniel K. Allen. Book details Mac architecture, operating system, QuickDraw, managers that make up the Toolbox, and the Standard Apple Numeric Environment. $24.95. Addison-Wesley Publishing, 617/944-3700.

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To have your product considered for inclusion in *New Products,* send an announcement with product name, description, minimum memory, peripherals required, pricing, company name, and phone number (and two copies of software) to New Products Editor, *Macworld,* 501 Second St., San Francisco, CA 94107. We reserve the right to edit submissions.

Hand Tools.

You know what it's like.
If you're in graphic arts, you know there's a lot of grunt-work.

Like rubbing-down type. And tracing and filling letters to comp-up headlines.

Trying to get true colors from a junkyard of dried-out markers.

Inking and re-inking rules and borders because of clogged pens.

T-squaring elements to be sure they're aligned and square.

Counting characters.

Spinning proportion wheels.

Tracing off the Lucy.

Wouldn't it be nice to spend more time exercising your brain instead of your wrist? Exploring concepts? Refining layouts? Trying "What if" design options? Or experimenting with color combinations?

That's exactly what you can do using today's advanced layout, design, and illustration programs, the Macintosh II™ family of computers and a CalComp DrawingCard™ display system.

CalComp large screen displays help you get the most from your Macintosh. For one thing, they never let you lose sight of the big picture. DrawingCard is the first 21″ system to give you two full pages of color side-by-side at actual size. That's critical when you're designing double-truck ads, brochure spreads or creating a large horizontal illustration.

DrawingCard's flat screen eliminates distortion and with its excellent resolution and contrast you can see the effect of small changes in the colors right on the screen. Or evaluate the visual effect of half-point variations in type size and leading. You can even see the precise amount of letter overlap when you set your headlines "tight and touching."

And with DrawingCard displays, what you see on the screen is what you get on your printer because screen resolution is true 72 dpi.

All screen images were scanned, imported, displayed and photographed on CalComp DrawingCard displays.

How to build a better burger.

GrayVision System displays 256 shades of gray.

ChromaVision system displays 256 colors.

ChromaVision Plus displays 16.7 million colors.

75Hz refresh rate for flicker free images.

21-inch, two-page display shows two side-by-side pages.

More "live" image area: 1152 X 870 pixel.

32-bit QuickDraw compatible.

Producing this spread for the B.Y.O.B. (Build Your Own Burger) restaurant on a Macintosh equipped with DrawingCard is faster and easier than with conventional manual methods.

You can use it for rough thumbnails, full comps, final mechanical art—even finished film with halftones or final 4-color separations.

With DrawingCard's crisp, clear image you can control your work precisely because you can see your work precisely.

DrawingCard also lets you command a full palette of gray-scale tones and color. So whatever your needs, there's a CalComp DrawingCard System for you.

B.Y.O.B.
Build Your Own Burger

21″ ChromaVision Plus

Power Tools.

There are three DrawingCard systems to choose from. Our 8-bit GrayVision display system with 256 shades of gray is ideal for desktop publishing and design projects using line art and black-and-white halftones.

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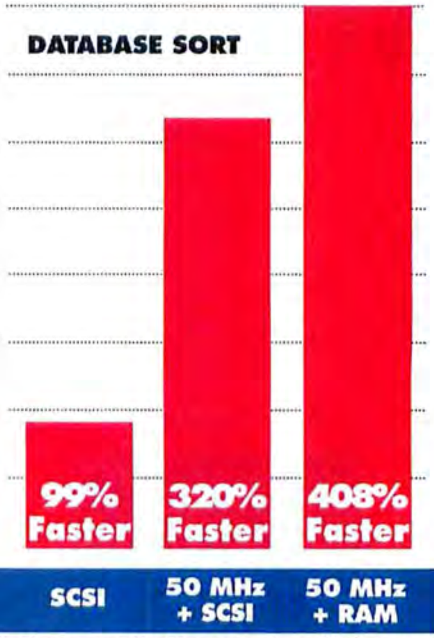

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Quick Tips

HIGH-DENSITY DISKS, PRINTING BITMAPPED IMAGES, SE/30 STRATEGIES, AND MORE

BY LON POOLE

Can you name three differences between 1.44MB (high-density) floppy disks and 800K (regular) disks? Too many people think there are only two significant differences: price, and that extra little hole opposite the write-protect hole. In an attempt to cut costs, these foolish people cut an extra hole in an 800K disk and then initialize it as a 1.44MB disk. I'm not going to tell you where to buy the hole punch that makes the conversion, because I wouldn't be doing you any favor.

The third and most important difference between 1.44MB disks and 800K disks is the coating that magnetically stores your programs and documents. The magnetic bits in the coating of a 1.44MB disk resist demagnetization more strongly than the magnetic bits on an 800K disk do. (A disk's ability to resist demagnetization is expressed in terms of *coercivity*, which is measured in oersteds. The coercivity of an 800K disk is 600 oersteds, whereas the coercivity of a 1.44MB disk is 720 oersteds.)

A 1.44MB disk must resist demagnetization more strongly than an 800K disk because initializing at the higher capacity packs the magnetic bits in the disk's coating closer together. When you initialize an 800K disk at 1.44MB, its magnetic bits may eventually demagnetize each other. "You might start seeing data loss in a month's time," says Dick Clark, a training specialist at disk maker Dysan. He also warns that hopped-up disks are more susceptible to external magnetic fields. "A magnetic paper-clip dispenser with a paper clip sticking out the top has a strong enough magnetic field to affect a disk leaning against it," he says.

If you need 1.44MB disks, buy the real thing.

Early Warning

A tip published last December suggested tearing off the last 50 sheets of a box of fanfold paper to serve as an early warning. To Don Hauser of Brea, California, this provides an upset stomach to replace a headache (to quote an old ad). What if you are in the middle of a printing job when you arrive at your "early warning system"? Instead, Hauser suggests marking with a red marker in the tear-off margin of the paper at the point where you wish to be alerted. That way, there is no interruption—just a bright red alert.

Printing outside Crop Marks

The tip in January showing how to print a job ID outside the crop marks of a PageMaker document is somewhat misleading. The screen illustrating the tip shows a text block being created on a master page. However, this text will not print on the regular pages, asserts Jo Ellen Ackerman of Cliffside Park, New Jersey. PageMaker sees this text as being on the pasteboard, not on the page.

Ackerman's solution is to create the job ID as a graphic using any drawing or painting program. Alternatively, you can type the job ID in PageMaker, copy it, paste it into the Scrapbook, and use PageMaker's Place command (in the File menu) to convert the text to a graphic. If you're putting the graphic at the bottom of the page, be sure to include blank space at the top of the graphic. If you're putting the graphic at the top of the page, include blank space at the bottom of the graphic. Place the graphic on the master pages with the blank space on the page and the job information hanging off the page, as shown in "Job Info." The graphic will print on all pages where master items are showing.

Best Bitmaps

Bitmapped (paint) graphics don't always look their best when printed on a LaserWriter. They're created by HyperCard and by paint-style graphics applications at 72 dots per inch. Those dots are 4.1666667 times larger than the dots a LaserWriter uses to print the bitmapped graphics at 300 dpi. Because that's not an even ratio, bitmapped graphics can look lumpy on a LaserWriter. However, reducing the printed image by 4 percent (using

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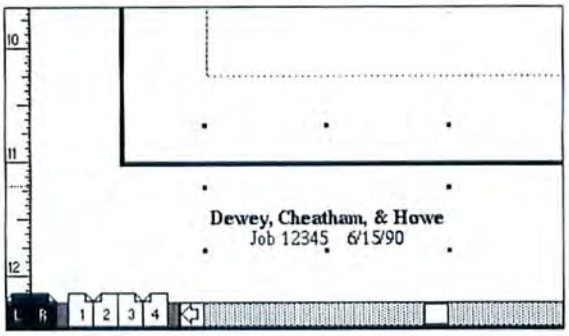

Job Info
To print text outside the crop marks of a PageMaker publication, create a graphic that contains the text and position it as shown here.

Precision Bitmap Alignment) makes the screen dots exactly 4 times larger than LaserWriter dots and eliminates the lumpy quality.

So when using a LaserWriter to print any document that includes bitmapped graphics, choose Page Setup from the File menu, click its Option button, and set the Precision Bitmap Alignment option. Or you can enter 96 as the Reduce or Enlarge option of the Page Setup command.

Instead of reducing the whole document, you may be able to reduce just the bitmapped graphics to 96 percent. A graphic pasted into Microsoft Word, for example, can be reduced by pressing the Shift key and dragging the handle in the lower-right corner of the graphic. The percent reduction is reported in the lower-left corner of the document window as you drag.

The more you reduce an image, the sharper the output. (Remember to start out with a large enough original so that you won't end up with an image that's too tiny.) When printing on an ImageWriter I or II, reduce to 50 percent. The best reduction amounts for a LaserWriter are 75, 50, or 25 percent when you set the Precision Bitmap Alignment option as well. If you don't set that option, then reduce to 72, 48, or 24. You can either scale individual graphics to these sizes or use the Page Setup command to reduce the whole document. (Exception:

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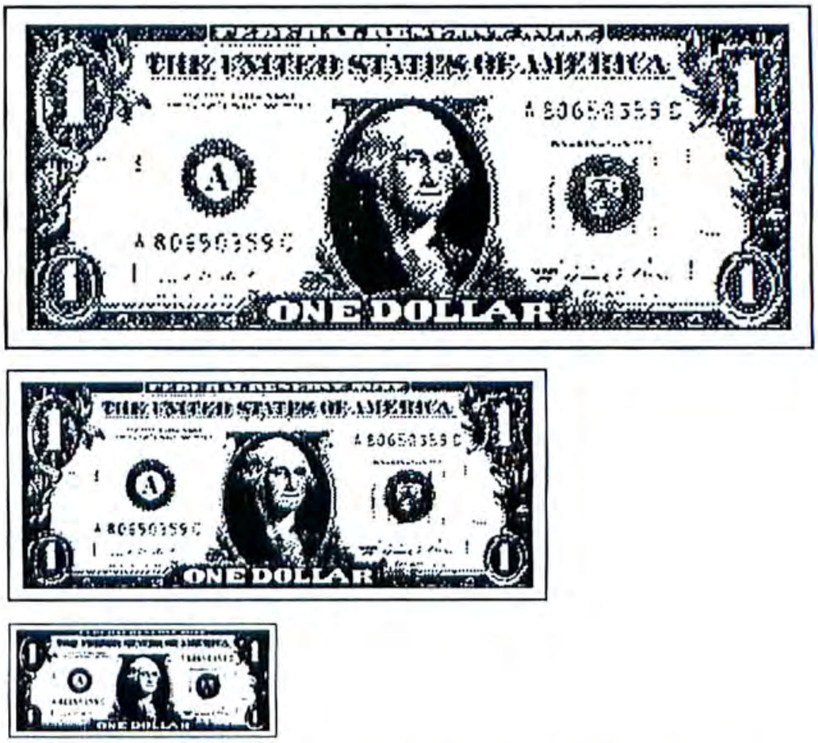

Reduced Bitmaps
Get sharper bitmapped graphics on a LaserWriter by reducing them to 75 percent (top), 50 percent (middle), or 25 percent (bottom) with the Precision Bitmap Alignment option set.

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you can't set a 24 percent reduction using Page Setup. You have to set the reduction to 25 percent and check Precision Bitmap Alignment.)

At any of these reductions none of the dots that make up the bitmapped graphics are lost; they are simply condensed into a smaller area. For example, reducing by 50 percent effectively increases the resolution of bitmapped graphics from 72 dots per inch to 144 dots per inch. The more dots per inch, the finer the detail of the printed image. "Reduced Bitmaps" illustrates the kind of improvement you can get.

Unfortunately, some patterns in bitmapped images reduce poorly: the dots clump together when the patterns are reduced. Jean-Jacques Greif of Paris, France, suggests using sparser or coarser patterns if you know in advance that you're going to reduce the picture. For example, use a light gray pattern for the desktop instead of the standard medium gray, as shown in "Reduced Desktop Grays." Also, he recommends you turn off the Page Setup command's Graphics Smoothing option. When you're reducing with smoothing on, thin white lines and inverted (white) text can be overwhelmed by dark backgrounds.

Change Standard Application Font

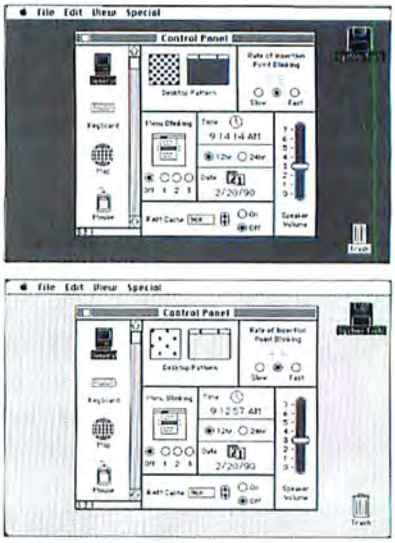
Q Is there a way to change the standard font in an application? I am using Adobe Type Manager and would like to designate one of my outline fonts as the standard font.

Marc Berezin
Soldotna, Alaska

A The factory setting for the standard application font is Geneva. You can change it using the Font List module of MasterJuggler from ALSoft (713/353-4090). Most application programs use the standard application font in new documents unless you change it using the Font menu or an equivalent, but not all do. Microsoft Word, for example, uses New York. To change the standard font in Word, use the Define Styles command (from the Format menu) to change the Normal style, and click the Set Default button.

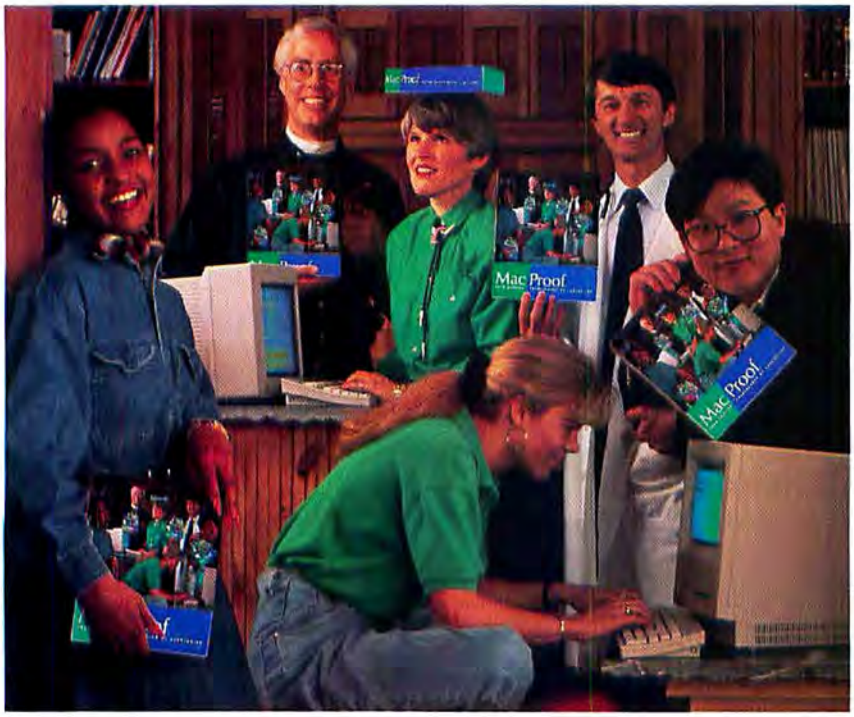
SE/30 Enthusiast

Q When I discovered the small price difference between the SE and the SE/30 I became enthused about the latter. I have a few questions, though. Is there only one internal floppy disk drive because of the internal hard disk



Reduced Desktop Grays

A light gray desktop pattern doesn't turn black when reduced to 25 percent.



drive, or because of space limitations? I'd like an SE/30 with two internal floppy drives. Also, how much of the software I use on my Plus will be compatible? Lastly, I'm trying to find a board for the SE/30 that sends composite NTSC signals to my color TV.

Ryan Rasmussen
Monticello, Minnesota

A I assume you plan to use an external hard disk with the SE/30. You won't notice the machine's high performance much if you saddle it with just a couple of floppies. That's probably why Apple designed it for just one internal floppy. There's room inside for a second floppy drive (in place of an internal hard disk), but the cabinet has only one opening for floppy disks. You'd have to perform major surgery to get a second floppy drive in an SE/30. However, you can connect an external floppy drive.

Software compatibility prospects are excellent if you're using software published in the last year and a half. When Apple introduced the SE/30, the company tested over 100 popular application programs and found that 95 percent were compatible. Since then, the other 5 percent have probably been revised to work with the SE/30.

The SE/30 is color-ready. Several manufacturers, including RasterOps (408/562-4200) and SuperMac Technology (408/245-2202), make video adapter boards that output the same color signal as a Mac II. I don't know of any SE/30 video adapters with NTSC output, but you can use a regular SE/30 video adapter with an external NTSC converter designed for standard Mac II color video, such as the NTSC Converter from Julian Systems (415/686-4400) or the RGB/Videolink 600 from RGB Technology (415/848-0180). For more information, see "Mac TV Tools," *Macworld*, September 1989.

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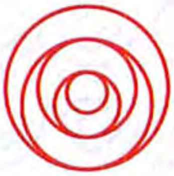
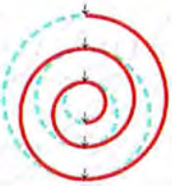
SPIRAL TEXT

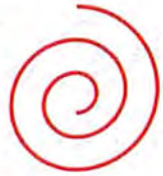
The hard part of creating spiral text in Aldus FreeHand 2.0 is constructing a spiral path. These instructions show one technique. (This tip was contributed by Giovanni Gotti, of Dongo, Switzerland.)



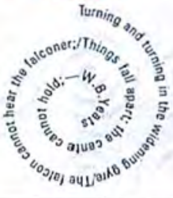
Draw a circle and use the Ungroup command (Element menu) to ungroup it. Next draw and ungroup three or more additional circles, decreasing the radius of each by the same amount.(The Snap To grid can be helpful here.) Then align the circles as shown.



Using the Knife tool, cut each circle in half at the points indicated. Then remove the half- circles you don't need.



Working from the outside in, select the remaining half-circles two at a time and join them using the Join Elements command (special submenu of the Elements menu).


Turning and turning in the widening gyre/The falcon cannot hear the falconer;/Things fall apart; the cente cannot hold;—W.B.Yeats

First select your text, then select the spiral and use the Join Elements command to bind the text along the spiral path.

Signature Font

Q Is there a way to download cursive signatures into a LaserWriter IINTX? We want to cut down printing time when we print form letters. It seems to us that downloading the signatures before beginning the print job would quite radically decrease the formatting time in the printer. Presently we scan our signatures as EPS files and paste them into our letters.

J. Michael Yeager
Henry J. Urbanek
Waterford, Connecticut

A The Art Importer from Altsys (214/424-4888) creates PostScript fonts that contain artwork instead of letters, punctuation marks, digits, and so on. For example, you could create a font that has your cursive signature where Times has the letter *A*. You could then insert your signature by choosing your special font and typing an *A*. Instead of displaying an *A*, the Mac displays your signature. Using an art font is a lot like using the Symbol font.

The Art Importer accepts EPS and PICT drawings, but doesn't accept bitmapped images. Scanned images are bitmapped, although they may be saved as PICT or EPS files. To use a scanned image with The Art Importer, you must first convert it to an EPS or PICT drawing by tracing. Both Adobe Illustrator and Aldus FreeHand have automatic tracing features that do most of the work for you.

MultiFinder on Demand

Q I'd like to use MultiFinder on demand by double-clicking on its icon, as described in last February's *State of the Mac* column. How do you move the icon to the desktop so it is accessible at any time? Nothing I have tried moves it from its menu location.

W. Scott Champney
Johnson City, Tennessee

A Open the System Folder, locate the MultiFinder icon, and drag the icon out of the folder. You can put it anywhere on the desktop. If MultiFinder is active when you move its icon, you can temporarily inactivate it by restarting the Mac and holding down the ⌘ key from the time you see the Welcome to Macintosh message until the Finder's menu titles appear. If you want MultiFinder always inactive, use the Set Startup command in the Finder's Special menu to set the Finder option, and then restart. You can activate MultiFinder without restarting the Mac by holding down the ⌘ and Option keys while double-clicking the MultiFinder icon. Once MultiFinder is active, double-clicking on its icon results in a message advising that it couldn't be opened because it's busy.

You know MultiFinder is active when you see a miniature icon in the upper-right corner of the menu bar. Also, About MultiFinder appears at the bottom of the Apple Menu.

PC Display on Compact Mac

TIP: SoftPC from Insignia (415/771-7001) works very well for running MS-DOS programs on a Mac II, SE/30, or accelerated SE. However, a compact Mac's 9-inch monitor doesn't display IBM graphics satisfactorily. The solution is to use Stepping Out II, a Control Panel device from Berkeley Systems (415/540-5536) that lets you work on a bigger screen area than your monitor can display at once. (You pan across the big screen area by moving the pointer to the edge of the screen.) Set Stepping Out II for a standard Mac II screen size (640 by 480 pixels) and enlarge the SoftPC window by clicking its zoom box.

John Willis
Frederick, Maryland

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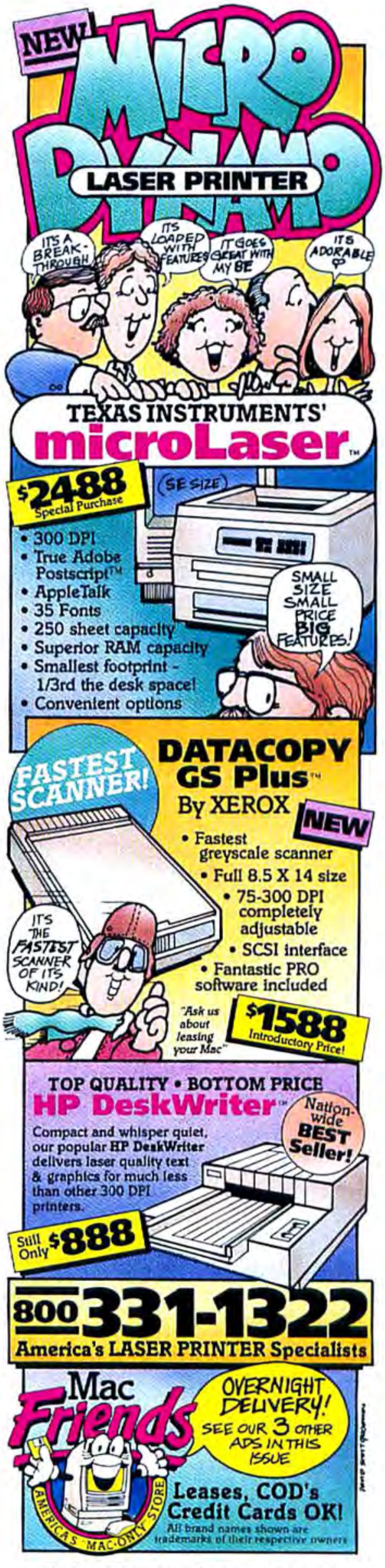
Lon Poole answers readers' questions and selects their tips for this monthly column. He has written many personal computer books, most recently the quick reference HyperTalk *(Microsoft Press, 1988), and has just finished a new book of Mac tips (to be published this summer by Microsoft Press),* Amazing Mac Facts.



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Getting Started with Virus Protection

FROM PREVENTION TO CURE, AN INTRODUCTION TO AVOIDING DIGITAL INFECTION

BY JIM HEID

Have you had any viruses lately? I refer not to the cold-and-flu variety, but to *computer viruses,* programs that invade the Mac and slow its performance, cause system errors, or—at their most evil—destroy applications and documents.

The term *virus* implies a natural entity that you can't help but pick up now and then, like a cold. The truth is, computer viruses are tools of vandalism—they're bricks heaved through your Mac's windows by people with apparently nothing better to do with their time and programming skill. No cures exist for the viruses that cause colds, but computer viruses could be stopped dead if their creators turned their energies toward being productive, not destructive.

SCOTT BALDWIN

But then, so could war, crime, and pollution. And like them, viruses will be around for some time. What can you do? First, don't lose any sleep over viruses. They exist, but your chances of being victimized by one are small, especially if your Mac isn't on a network and you don't swap software with other users. Second, be prepared—just in case. Arm yourself with knowledge of how viruses spread, of their symptoms and remedies, and of the measures you can take to avoid them.

It Came from Ohio

Some of the technical concepts behind viruses have been around for decades, but the first microcomputer viruses appear to have been created in 1983 by Frank Cohen, a University of Cincinnati professor who was researching his doctoral thesis on computer security. Cohen's viruses were created under controlled conditions; none reached the outside world. Interviewed in 1988, when viruses enjoyed a burst of media attention, he admitted to being reluctant to publish his findings, but did so to warn the world of the virus threat. "I had planned to devote my thesis to ways to defend against viruses," he said. "Instead, I used it to prove that you can't defend against them."

Viruses are difficult to fight because they're designed to spread. A virus contains software instructions that enable it to copy itself into legitimate files, called *hosts.* Some viruses infect only application files, while others invade documents or the Mac's system files. Still others begin by infecting a system file and then copy themselves to uninfected applications.

Most viruses spread when you copy an infected file from one Mac to another, although some spread simply when you insert an infected floppy disk. Now imagine millions of Mac users exchanging files through user groups, office and university networks, and online bulletin boards and information services—the propagation possibilities are endless. Last year, a new virus was discovered in Belgium in early December; by Christmas, it had spread throughout the United States.

A virus doesn't just replicate itself, it also inflicts its own unique symptoms on the machines it infects. Viruses can be malicious or mischievous. A malicious virus might deliberately damage applications, cause system errors, or erase files on a hard disk. A

(continues)

mischievous virus might simply display a message or joke at a predetermined time; its creator is out to soap your windows, not smash them. To date, most Macintosh viruses have fallen into this second category.

But even a mischievous virus can be trouble. It might cause a system error by trying to use memory or resources that a legitimate program is already using. Its programmer may not have tested it thoroughly, or it might conflict with your Mac's combination of hardware and start-up documents (INITs). The bottom line: There's no such thing as a benign virus.

Names and Strains

Most Mac viruses have odd-sounding names—nVIR, Hpat, INIT29—that reflect the technical makeup of the virus's software. Some viruses earn more pronounceable monikers, like the "Peace" virus, set loose by an attention-hungry editor of a Canadian Mac magazine. It was designed to display a "universal message of peace" on March 2, 1988, and then erase itself. Its victims—including Aldus Corporation, which inadvertently shipped a few thousand infected copies of FreeHand—didn't find the medium appropriate to the message.

Now and then a new strain of an existing virus appears. That's been the case with the nVIR virus, whose original program code was once posted on a computer bulletin board in an attempt to aid creators of antivirus software. It may have helped them, but it also gave budding virus creators a head start in creating new strains.

"Field Guide to Viruses" lists the names and symptoms of the viruses that have been identified as of late February.

Is Your Mac at Risk?

Generally, the more Macs your machine comes in contact with, the greater the risk of infection. Consider yourself at risk if any of the following describe you.

- You swap programs, HyperCard stacks, or disks with other Mac users. Even an erased disk can carry the WDEF virus if you erase the disk by dragging its contents to the Trash. If a friend hands you a blank disk to fill with your latest shareware finds, be sure the disk was erased using the Finder's Erase Disk command before you insert it into your Mac.

FIELD GUIDE TO VIRUSES

Virus Name	Nature of Infection	Symptoms	Comments
ANTI	Infects applications only (including the Finder), not other system files or documents.	May cause crashes due to its poor programming.	Disinfected applications aren't identical to original, but generally still run. Best approach is to replace infected application with an uninfected copy from its master disk.
INIT 29	Infects any file (document or application) containing resources. Spreads only via applications and system files.	Its poor coding may cause printing problems, INIT conflicts, and MultiFinder crashes. If you insert a locked floppy disk, a dialog box appears saying the disk needs repairs. Normally, this dialog box doesn't appear with locked disks.	INIT 29 can spread very rapidly because it infects unlocked floppies as soon as they are inserted.
nVIR (strains "A" and "B")	Infects System file first, adding code that subsequently infects each application you run. Finder and DA Handler files usually become infected.	System crashes. Files may disappear. Mac may beep when applications are started. "B" strain causes Mac to say "Don't panic" if System Folder contains the Macintalk file. Otherwise, you may hear random system beeps.	The original program code for nVIR was posted on some bulletin boards and information services. As a result, several "clones" have appeared: Hpat, nFLU, AIDS, MEV#, and F*** (whose actual name can't be printed here). Their symptoms are generally the same.
Peace (also called MacMag, Drew, and Brandow)	Infects System file.	"A message of peace" appeared on March 2, 1988; virus then destroyed itself.	Rare these days, but still could be encountered on old disks.
Scores	Infects System file first, lies dormant for two days, then searches for and infects a new application at $3\frac{1}{2}$-minute intervals. Adds invisible files called Scores and Desktop_ (the _ character represents a space) to System Folder.	System crashes; printing problems. Miscellaneous problems with MacDraw and Microsoft Excel. May cause "insufficient memory" messages. Increases size of files it infects by 7K. Notepad and Scrapbook files may have generic document icons (dog-eared page).	System 6.0.4's System file is irreparably damaged and must be replaced with an uninfected copy from its master disk.
WDEF (strains "A" and "B")	Infects only the invisible DeskTop file contained on all floppy and hard disks. Spreads rapidly through the sharing of floppy disks.	Slows performance. Significantly slows performance of AppleShare server. Crashes Mac IIci and Portable. "B" strain causes Mac to beep each time a DeskTop file is infected.	You can remove this virus from an infected disk by rebuilding its DeskTop file: Press ⌘ and Option while inserting the disk. (For hard disks, restart and hold down ⌘ and Option.) To avoid infecting an AppleShare server, do not grant "make changes" privilege to the server's root directory (desktop level).

- You download programs and HyperCard stacks from bulletin boards or information services. Most bulletin boards and information services check incoming files for viruses before making them available to subscribers, but a new virus can slip through undetected if the service's virus-detection software can't recognize it.
- You're connected to other Macs on a network. A network is an ideal transmission medium for viruses, especially if several users access applications stored on a file server.
- You use a desktop publishing service bureau or university laser-printer center. Some service bureaus have been criticized for taking a cavalier attitude toward virus checking and prevention. If you use a bureau or central printing station regularly, look into its virus-prevention measures.

How to Protect Yourself

If you don't fall into the preceding categories, you aren't immune from viruses, but the threat is minimal. Whether or not you're in the high-risk group, here's how to protect yourself.

- Lock floppy disks whenever possible. A virus can't infect a locked disk. *Always* lock the original master disks of an application before inserting them; you'll need virus-free masters in case one of your programs gets infected. To lock a disk, slide its plastic write-protect tab so you can see through the square hole. If you don't have a hard disk, it won't be possible to work with locked floppies. Your best defense is to do the following.
- Back up religiously. If the worst happens, you'll have something to fall back on—unless the backups are infected, too. To avoid that, keep at least two sets of alternate backups made at different times. Don't neglect to back up the files in your System Folder, too; most viruses attack them first, and by having a backup, you won't have to laboriously reinstall your favorite fonts and desk accessories. (See this March's *Getting Started* for tips on backing up.)
- Be wary of a new freeware or shareware program. Instead of trustingly copying it to your hard disk, run the program from a floppy first and watch for abnormal behavior, such as system crashes or significantly slowed performance. Use the Control Panel or Alarm Clock desk accessory to change the Mac's date setting, then run the program again; some viruses lie dormant until a certain amount of time passes. (The Scores virus, for example, waits four days before doing some of its dirty work.)

Bypassing your hard disk protects you from *Trojan horse* programs, which appear to be legitimate applications, but which damage or erase files when you run them. A Trojan horse differs from a virus in that it isn't designed to spread by replicating itself; if a Trojan horse strikes, you can prevent future problems by deleting it. Trojan horses have been rare in the Mac world, although earlier this year two surfaced on a bulletin board system in Edmonton, Alberta. Called Mosaic and FontFinder, they appear to be utility programs, but when run, they erased the directory of the Mac's hard disk and displayed a message saying "Gotcha." Prior to their appearance, the Macintosh world's best-

(continues)

known Trojan horse was a HyperCard stack called Sexy Ladies, which displayed smutty images while erasing data from the disk it was stored on.

▪ Protect your networks. Only applications known to be uninfected should be copied to a network file server. If you're in charge of running a server, establish guidelines to prevent anyone else from copying programs to the server. Also consider using the file server for document storage only, and running applications from local hard or floppy disks (not a bad approach in any case, given the less-than-blazing speed of LocalTalk cabling).

▪ Consider using one or more *virus-detection* utilities. These are programs you can use to scan suspect disks for viruses, remove viruses from infected programs, and guard against future infection. They're often described as the vaccines of the computer world, but the truth is, they're more like chicken soup—not guaranteed cures, but certainly worth trying.

If you suspect a virus infection, see "When Infection Strikes" for some tips on what to do.

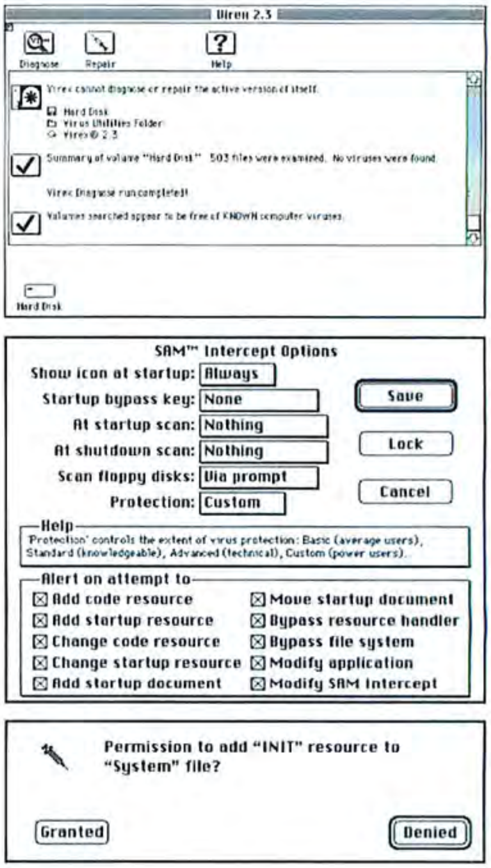
Mac Medicine

After the Big Mac Viral Epidemic of 1988 (which snared more media attention than victims), programmers on the side of law and order began developing ways to detect, disable, and prevent viruses. Today, you can choose from four commercial virus-detection utilities and nearly a dozen shareware or free ones.

The commercial packages—HJC's Virex, Symantec's SAM, Mainstay's Anti-Toxin, and 1stAid Software's Anti-Virus Kit—include an application for scanning suspect disks and repairing infected ones, and a *watchdog* INIT, which can help prevent infections (see "Virus Hunt").

It's a good idea to use a virus-detection application's scan mode to check for viruses before backing up. Virex also has a Record/Scan command that saves information about the size and contents of one or more files. If you suspect infection, run the Record/Scan procedure again, comparing the results with the first scan. This is a useful way to spot a new virus that the utility might not otherwise detect. Anti-Virus Kit has a similar feature called Inoculator.

Watchdog INITs provide several lines of defense against future infections. They automatically scan a newly inserted floppy disk for viruses; if one is found, you can eject the diseased disk and throw it away or you can try to repair it. The INITs also display a warning dialog box if you try to start an infected application. Virex's INIT also watches for the Mosaic and FontFinder Trojan horses.



Virex cannot diagnose or repair the active version of itself.
Hard Disk
Virus Utilities Folder
Virex® 2.3

✓ Summary of volume "Hard Disk" 503 files were examined. No viruses were found.

Virex Diagnose run completed!

✓ Volumes searched appear to be free of KNOWN computer viruses.

Show icon at startup: Always
Startup bypass key: None
At startup scan: Nothing
At shutdown scan: Nothing
Scan floppy disks: Via prompt
Protection: Custom

Help
'Protection' controls the extent of virus protection: Basic (average users), Standard (knowledgeable), Advanced (technical), Custom (power users).

Alert on attempt to
☒ Add code resource
☒ Add startup resource
☒ Change code resource
☒ Change startup resource
☒ Add startup document
☒ Move startup document
☒ Bypass resource handler
☒ Bypass file system
☒ Modify application
☒ Modify SAM Intercept

Permission to add "INIT" resource to "System" file?

Virus Hunt

Commercial virus-detection utilities include a scan-and-repair application such as Virex (top) and a watchdog INIT such as Symantec's SAM Intercept (middle). When a program attempts to modify a file in the way that a virus would, a watchdog INIT displays a dialog box that lets you grant or deny access to the file. At bottom, a warning displayed by CE Software's free Vaccine watchdog.

SAM's watchdog INIT can also help prevent "unauthorized" modifications to applications and the System Folder. When a program (virus or otherwise) tries to modify an application or system file or attempts to add a new INIT to the System Folder, a warning appears that lets you prohibit or permit the operation. (You can also tell SAM to automatically allow a specific type of modification, to eliminate unnecessary warnings.)

As for the free and shareware virus utilities, the most popular are John Norstad's Disinfectant (a detection and repair application), Don Brown's Vaccine (a watchdog INIT), Jeffery S. Shulman's VirusDetective (a detection and repair DA), and Apple's Virus RX (a detection application). "Virus Fighters" summarizes the features in these and other virus utilities.

At least one virus-detection utility belongs in every Macintosh user's software library. Start with Virus RX, Disinfectant, and Vaccine—they're free, and they may be all you'll need. For extra protection, consider one of the commercial packages. I've never needed one, so I can't make a firsthand recommendation. My colleague Bruce Webster, however, favors Virex and SAM (see *Reviews, Macworld,* January 1990).

If security is extremely important, you might also consider Casady & Greene's AME. Short for Access Managed Environment, AME provides more security than you'll find at a Secret Service company picnic. You can create a list of people permitted to use your Mac, and then define privileges—such as the ability to create or delete files, use printers, or insert floppy disks—for each user. For virus protection, you can register your healthy applications as "trusted," and then instruct AME to compare an application to its registration to verify that it hasn't been altered. If it has, AME won't allow it to run.

No Sure Cures

As I mentioned earlier, a virus-detection utility can't guarantee immunity. It's possible for a new virus to bypass a utility's detection and prevention features. When a new virus appears, a detection utility must be revised to recognize it. Updates for commercial programs usually cost $15–$25; if a few new viruses appear each year, you'll spend a small sum keeping your medicine cabinet up to date—and you'll be partially unprotected until the latest versions arrive.

It's also worth noting that watchdog INITs can cause problems if you're not careful. SAM's Intercept INIT, in particular, lets you intercept certain activities that some programs perform as part of their normal operation. SAM includes a list of over a dozen software and hardware products that Intercept may not work properly with—one of them is HJC's Virex INIT. With virus utilities, two watchdogs do not necessarily offer twice the protection of one.

Some people believe virus-detection utilities challenge virus writers to create new strains that can bypass their protection measures. They may be right; the WDEF virus contains a stealth mechanism that enabled it to evade most detection utilities when it appeared last December. Last January

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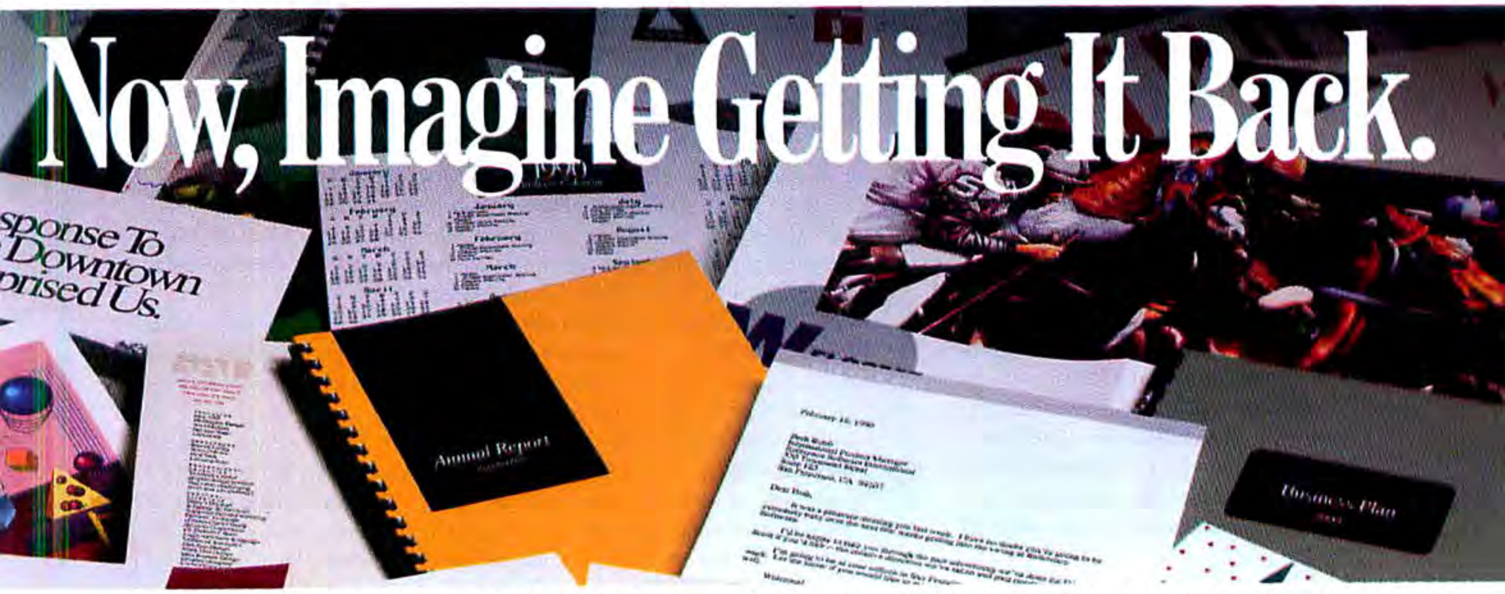
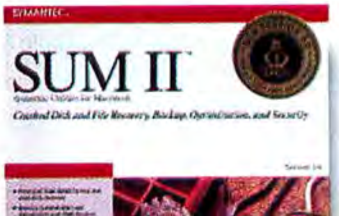




VIRUS FIGHTERS

Product	Developer	Price	Description
Anti-Virus Kit	1stAid Software	$79.95	Includes watchdog INIT and scan-and-repair application. May no longer be available; will not be updated.
AntiPan	Michael Hamel	free	Removes nVIR infections and prevents future nVIR infections. Detects nVIR clones.
AntiToxin	Mainstay	$99.95	Includes watchdog INIT and scan-and-repair application. Awkward design; not recommended.
Eradicat'Em	Dave Platt	free	INIT that repairs and protects against WDEF infections.
GateKeeper	Chris Johnson	free	INIT-cdev that protects system files and applications against infection. An alternative to Vaccine—more thorough checks, but requires some setup time. Recommended for use with GateKeeper Aid.
GateKeeper Aid	Chris Johnson	free	INIT that repairs and protects against WDEF infections.
Symantec AntiVirus for Macintosh (SAM)	Symantec	$99.95	Includes watchdog INIT and scan-and-repair application.
Vaccine	Don Brown (CE Software)	free	INIT-cdev watchdog that warns you when a program attempts to modify system or application resources. Highly recommended.
Virex	HJC	$99.95	Includes watchdog INIT and scan-and-repair application. Recommended.
Virus RX	Apple Computer	free	Detects Scores, nVIR, INIT29, ANTI, and WDEF. Doesn't repair infected applications.
VirusBlockade II	Jeffery S. Shulman	$30 (shareware)	Virus-detection cdev. Works with VirusDetective to scan inserted floppies for viruses.
VirusDetective	Jeffery S. Shulman	$35 (shareware)	A powerful desk accessory you can configure to detect new viruses as they appear. Doesn't repair infected applications, but does cure WDEF infections.

this escalating software arms race prompted 1stAid Software to discontinue its Anti-Virus Kit. At this writing, Anti-Virus Kit is still sold and supported, but will no longer be updated as new viruses appear.

What Are My Chances, Doc?

How likely are you to get a virus? In a *Macworld* reader survey that ran in the October 1988 issue, only about 8 percent of our readers had been infected. I've never had a virus, and I hang out on a half-dozen information services and run untested shareware with abandon. I do use Vaccine, but I don't back up as often as I should. OK, I'm a hypocrite—a doctor who tells you to watch your diet while his own cheeks bulge with M&M's.

Or maybe I simply give viruses the attention they deserve. The virus threat is minimal; you'll probably never see one. But they are out there, and new ones could appear at any time.

See *Where to Buy* for contact information.

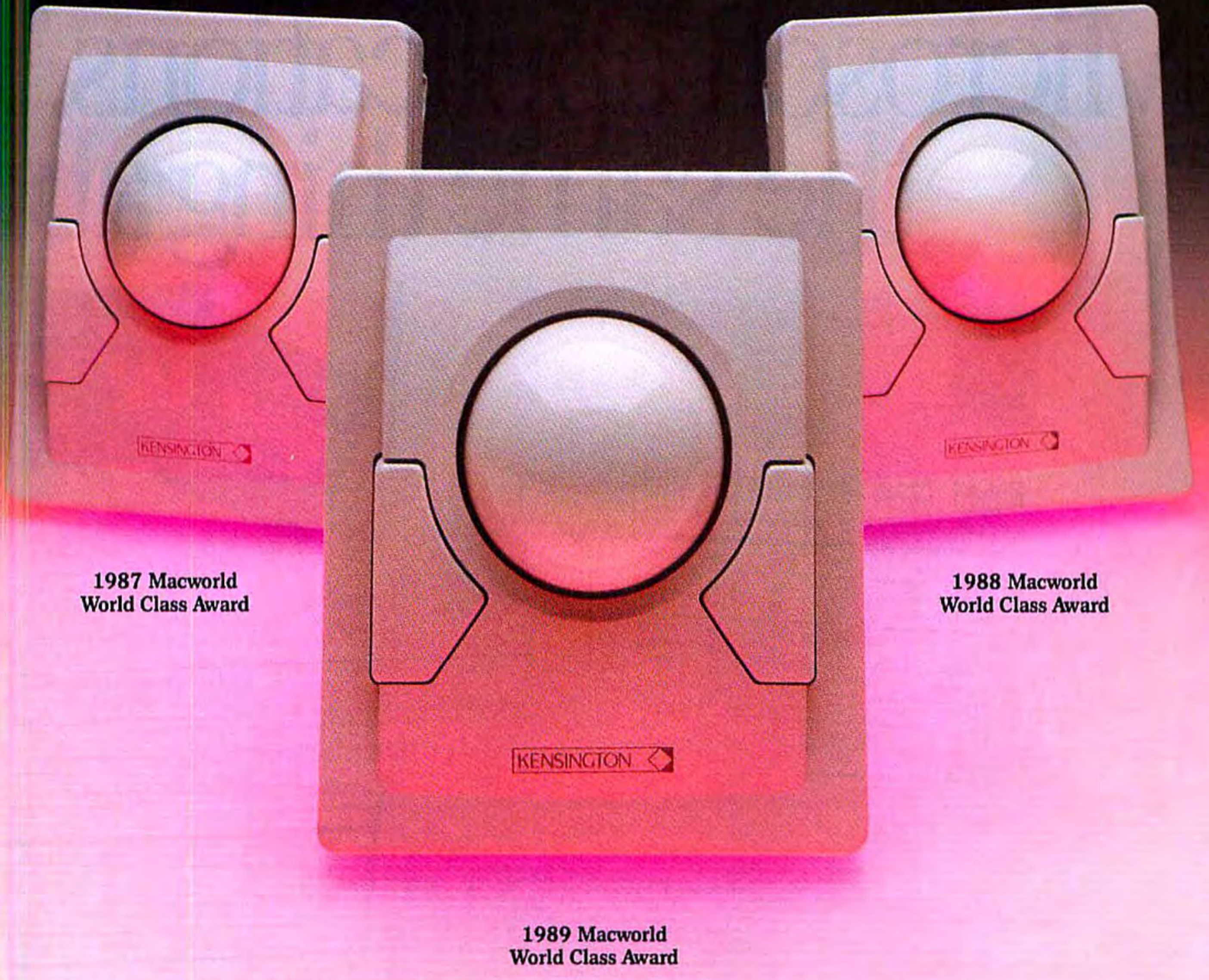
Jim Heid is a Macworld *contributing editor who each month focuses on a different aspect of Mac fundamentals. His latest book, coauthored with Peter Norton, is* Inside the Apple Macintosh, *an advanced user's guide published by Brady Books.*

WHEN INFECTION STRIKES

Your Mac is acting up. Should you suspect a virus? Not at first, unless the problem is a dialog box containing a universal message of peace. Most system errors or other problems can be traced to nonviral causes: conflicting INITs, a damaged disk, loose or damaged printer cables, or application bugs (see "Getting Started with Troubleshooting," *Macworld,* August, 1989). I learned this the hard way last year: I spent two days trying to eradicate a suspected WDEF infection after my system slowed to a glacial pace, but the problem turned out to be conflicting INITs. It goes to show that even the threat of a virus infection can impair your productivity.

After you've eliminated nonviral possibilities, compare your list of symptoms to those in "Field Guide to Viruses." Run Apple's Virus RX utility, Disinfectant, and any other virus detectors you might have. If the detection utility identifies an infection, you need to take action.

- Isolate the patient. If you're on a network, disconnect the LocalTalk connector where it attaches to the Mac's printer port. Inform other members of the network before disconnecting your Mac and be sure they know your machine is infected—theirs probably are, too.
- Replace the infected files with healthy backups if you have them. (You did back up yesterday, didn't you?) If you don't have healthy backups, use a virus utility to try to repair the damaged files. First, because the disinfecting process itself could damage the files, back up the files the utility says are infected. Copy them to floppy disks and be sure to clearly label those disks as infected. If one utility fails to repair the files, try another. If you can't fix a file, delete it. Once you've successfully repaired or deleted all infected files, run the detection utility again.
- After you repair the files, erase the infected backup disks. Don't use the Finder to erase the disks; you might reintroduce the virus when you insert an infected disk. Instead, use a magnetic bulk eraser such as Radio Shack's catalog number 44-232. A bulk eraser uses a strong magnetic field to scramble the disk's microscopic magnets, so don't use it near your good disks.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Product Portfolio Breakout

High Growth Markets	1989	1990	1991	1992
Medical Applications	15	25	40	60
Industrial Applications	30	39	46	51
Total	45	64	86	111
% of total	55%	63%	68%	72%
Mature Markets				
Defense Applications	36	38	40	42
% of total	45%	37%	32%	28
Total Revenue	81	102	126	15

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1989	1990	1991	1992	1993
15	25	40	60	85
30	39	46	51	72
36	38	40	42	44
81	102	126	153	201

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Explosive Growth Potential

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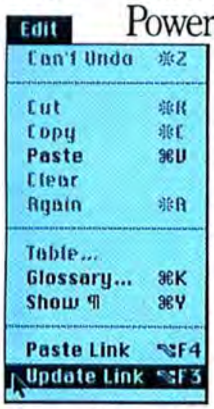

After you update your data in Microsoft Excel, select "update link" from Word's edit menu, and the change will automatically appear elsewhere.

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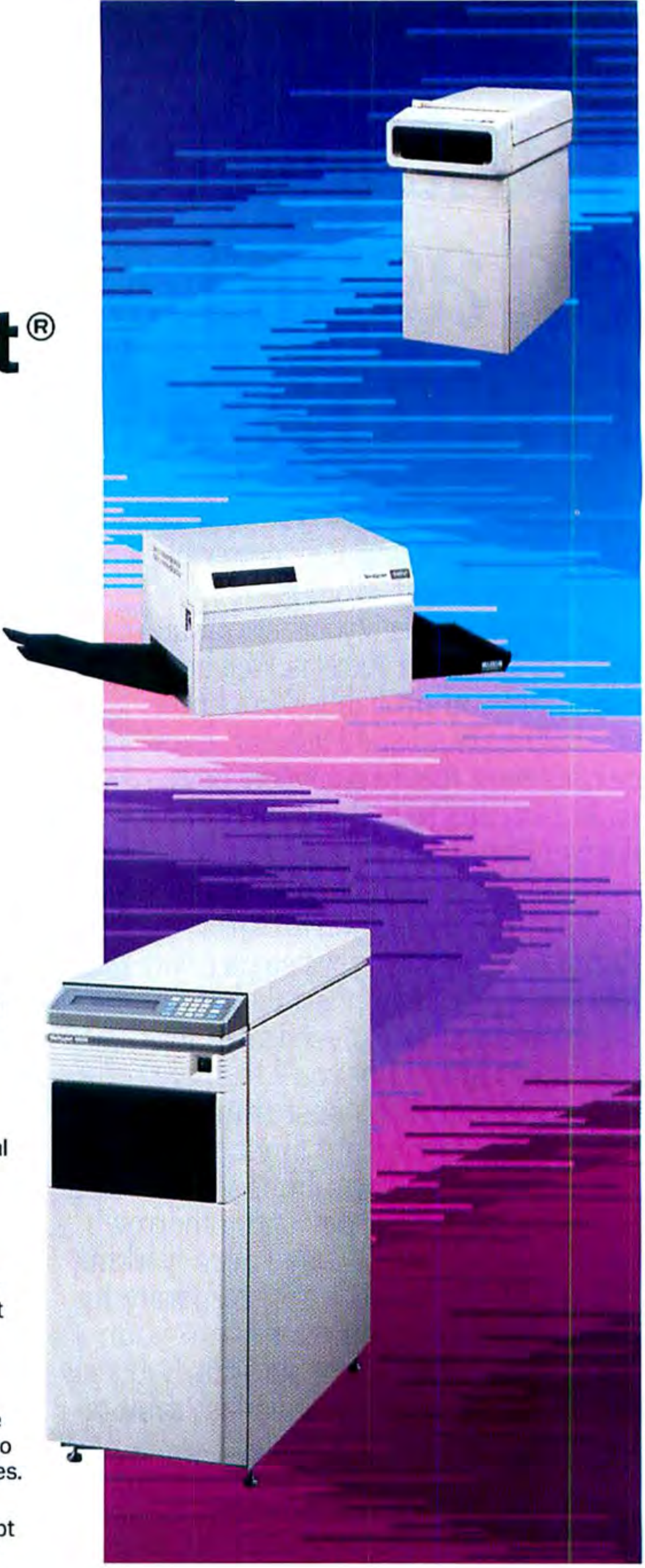

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Insights on Panorama 1.5

WIDENING YOUR DATABASE HORIZONS

BY TOM NEGRINO

When ProVue Development's Panorama was introduced, it provided a wide variety of tools for organizing data. Now with the release of version 1.5, you'll find even more versatility in this flat-file database, including line items in forms and variable record heights in reports, as well as improvements in macros, lookups, equations, and Flash Art. In this collection of tips, shortcuts, and workarounds, there should be enough to satisfy everyone from the casual user to the advanced database designer. Except where noted, these tips apply to all versions of Panorama. Thanks to Russ Wyllie of ProVue and Panorama power user Derek Martin, Jr., for sharing their expertise.

In Fine Form

Because Panorama's form-and-report generator is so fully featured, if you don't study the manual thoroughly you can easily miss tips for speeding up your work. For example, when you're designing a print report form, it's usually important to line up objects on one tile with those on another. In a typical report, titles on a header need to line up with data-cell objects on a body tile. To simplify report setup, instead of creating each tile from scratch by clicking and dragging, Shift–Option–drag a tile to make a second tile of the same dimensions so that they'll align automatically. To align tiles that already exist, choose the Align Objects command from the Arrange menu and select the Left & Right option from the resulting dialog box.

The Magnify tool in graphics mode lets you zoom in up to eight times, without affecting the other tools and commands. Pressing the Shift key turns the magnifying glass into a microscope, which lets you zoom out to a 25 percent view of your form.

If you've selected an entire object, the Nudge commands allow you to move it pixel by pixel. After you've changed the size of an object by dragging one of its handles, you can use either the Nudge commands or the arrow keys to tweak its size. Each nudge moves the handle that was dragged one pixel. You can continue nudging an object's size until you select another object.

When you're working with smaller objects, you may find it difficult to select the handles at the corners of the object. Pressing the S key invisibly expands the handles to fill nearly the entire object. This is especially useful when you have many small objects selected and there are many handles visible.

One of the forms editor's most useful features is Cluster Resize. If you select many objects at a time with the marquee, dragging on one object's handle causes all the objects to resize at the same time. This saves a lot of time when you're adjusting the height or width of rows and columns in a table. An added bonus is that if you resize the objects in the middle of a table, the surrounding objects move to make room for them.

The Dimensions dialog box not only lets you specify an object's size precisely, it also lets you key in the dimensions relative to the upper-left corner of the object. Just type a plus sign before the number (see "Setting Sizes").

Date- and Time-Stamping a Report

To put the current date and time in a report, enter the following text into a paragraph object in the form window. Then place the paragraph object onto a header or footer tile.

```
{datepattern(today(),"Month dd, yyyy,")
+timepattern(now(),"HH:MM AM/PM")}
```

The date and time will appear in this format: **February 5, 1990, 3:00 PM**

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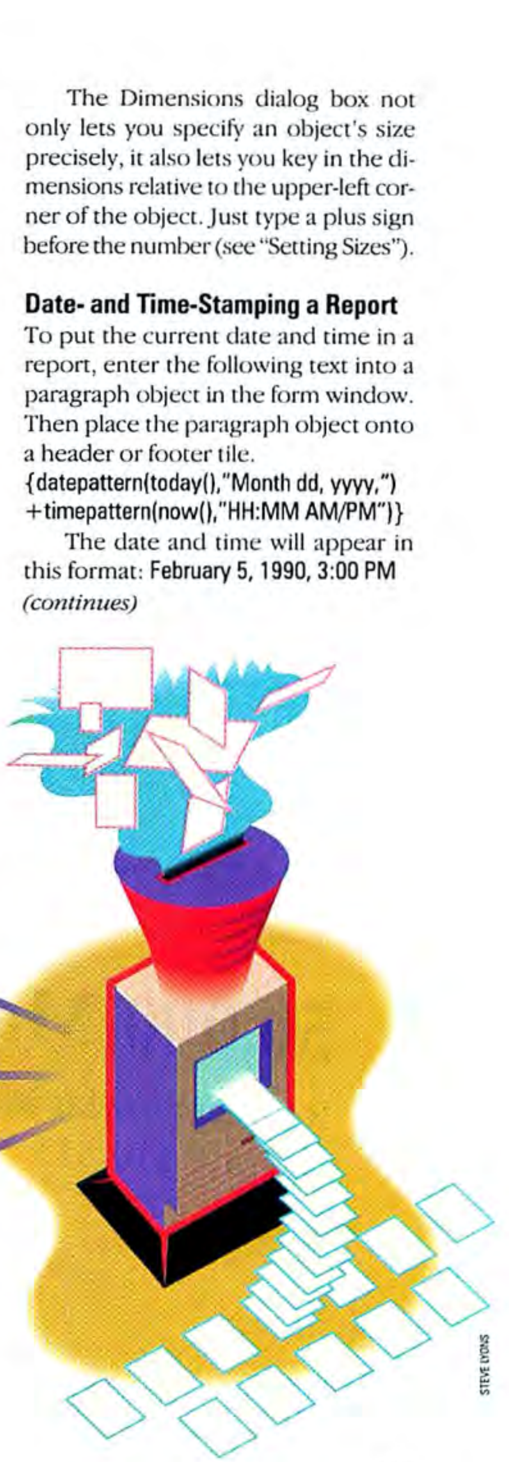

STEVE LYONS

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Charles Hotel	864-1200	$160/$170
Colonnade	424-7000	$150/$170
Copley Plaza	267-5300	$150/$170
57 Park Plaza	482-1800	$100/$110
Four Seasons	338-4400	$200/$220
Guest Quarters Suites	783-0090	$145/$165
Hilton at Dedham Place	329-7900	$125/$135
Holiday Inn:		
Boston/Brookline	277-1200	$110/$120
Government Center	742-7630	$117/$133
Randolph	961-1000	$82/$90
Howard Johnson:		
Cambridge	492-7777	$120/$130
Southeast	288-3030	$75/$85
Hyatt Regency	492-1234	$150/$170
Inn at Children's	731-4700	$95/$105
Lafayette Hotel	451-2600	$150/$170
Lenox Hotel	536-5300	$145/$165
Logan Airport Hilton	569-9300	$135/$155
Marriott Long Wharf	227-0800	$205/$225
Meridien	451-1900	$185/$205
Omni Parker House	227-8600	$145/$165
Park Plaza	426-2000	$120/$140
Ritz Carlton	536-5700	$185/$205
Royal Sonesta	491-3600	$130/$130
Sheraton Tara, Braintree	848-0600	$120/$120
Tremont House	426-1400	$108/$120

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Special Instructions for International Attendees.

If you're preregistering from outside the U.S. and prefer to have your badge sent to you instead of picking it up at Bayside Exposition Center, be sure to check the appropriate box on the preregistration form. Also, please add an additional $45 to your preregistration cost. We will Federal Express your badge directly to you. Please fill in the exact street address and be sure to include your telephone number. Do not use a Post Office Box.

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Saturday, August 11	10 a.m.-3 p.m.

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Please choose your package and fill out this form completely. Incomplete forms will be returned. Use one form per person. (Make photocopies to register additional people.) Then send the completed form(s) along with payment to: MACWORLD Expo, P.O. Box 4010, Dedham, MA 02026. **Please do not staple check to form.**

Registration cards must be received by July 10. Cards received after July 10 will be returned. Purchase orders cannot be accepted. Registration fees are not refundable. For further information call the MACWORLD Expo/Boston Hotline at 617-361-3941. U.S. attendees will be mailed their badges on or about July 24. (Be sure to check box indicating where badge should be sent.) All other badges will be held at the Preregistration Counter at the Bayside Exposition Center for pick up beginning Wednesday, August 8.

MACWORLD Expo Attendee Bonus:

All registration fees to MACWORLD Expo/Boston include a six month, $7.50 paid subscription to *MACWORLD Magazine*. (*MACWORLD*'s basic subscription rate is $30.00 for 12 issues.) When you preregister, we'll include your *MACWORLD Magazine* subscription request form in the preregistration package.

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☐ Package One $65
Conference sessions* and exhibits.
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Last Name First Name
Street Address
City, State, Zip
Country
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If mailing to company address:

Title
Company

☐ Check enclosed (make payable to MACWORLD Exposition) Amount: $

☐ Master Card ☐ Visa ☐ American Express Amount: $

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Card holder signature (Signature necessary to be valid.)

If card holder is other than registrant, please print name below:

Last Name First Name

Cash only at the door. After July 10, you must register at the show.

Please check the appropriate boxes:

Your industry or profession
- a. ☐ Manufacturer (non-computer)
- b. ☐ Manufacturer (computer industry)
- c. ☐ Distributor/dealer/retailer/service
- d. ☐ Finance/insurance/real estate
- e. ☐ Business services
- f. ☐ Professional (law/medicine)
- g. ☐ Health services
- h. ☐ Communications/publishing
- i. ☐ Education
- j. ☐ Government
- k. ☐ Consultant
- l. ☐ Other (specify)

Your title
- m. ☐ CEO/president/vice president
- n. ☐ Comptroller/treasurer/accountant
- o. ☐ DP/MIS manager
- p. ☐ Owner/partner
- q. ☐ Engineer
- r. ☐ Doctor/lawyer/dentist
- s. ☐ Educator
- t. ☐ Art director/writer/editor
- u. ☐ Consultant
- v. ☐ Marketing
- w. ☐ Sales
- x. ☐ Other (specify)

Size of your organization (number of employees national/international)
- y. ☐ Under 50
- z. ☐ 50-99
- aa. ☐ 100-499
- bb. ☐ 500-999
- cc. ☐ 1,000-5,000
- dd. ☐ Over 5,000

Which personal computer(s) do you own/use?
- ee. ☐ Macintosh
- ff. ☐ Macintosh Plus
- gg. ☐ Macintosh SE
- hh. ☐ Macintosh II
- ii. ☐ Apple II Series
- jj. ☐ IBM PC (or compatible)
- kk. ☐ None
- ll. ☐ Other (specify)

*All conference sessions are on a first-come, first-served basis with no guaranteed seating.
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MACWORLD EXPOSITION
Boston, August 8-11, 1990

Mac

talking on undercover tapes about how they can do six ths in prison 'standing on heads.' It's time to find out er they can do 10 years ng on their heads. We

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EXTRA! EXTRA! MACWORLD Expo comes to Boston, August 8-11.

Mark your calendar and make your reservations. The biggest Macintosh event in the world comes to Boston Wednesday, Thursday, Friday, and Saturday, August 8, 9, 10, and 11, 1990.

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With over 400 exhibiting companies, there's something for everyone.

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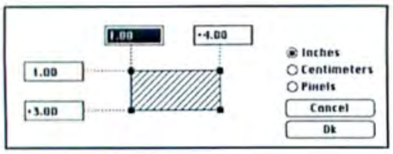


1.00
+4.00
1.00
+3.00

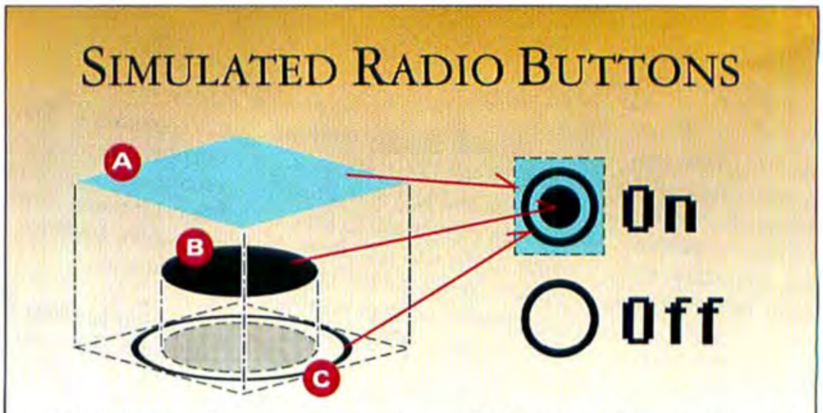
● Inches
○ Centimeters
○ Pixels

Setting Sizes

By adding a plus sign before the values in the Dimensions dialog box, you can specify an object's dimensions relative to its upper-left corner. Here, the object's upper-left corner is one inch across and one inch down from the upper-left corner of the layout. From that point, the object will be four inches wide and three inches tall.

Hiding Macros

Often you'll want to create macros that don't need to be listed in the Macro menu, because either they work behind the scenes in your database or they execute automatically. For example, a macro that automatically calculates invoice prices after you enter the amount and cost of a line item shouldn't be listed in the Macro menu, because a user could choose it accidentally at the wrong time and make the data incorrect. To keep a macro from showing in the Macro menu, when you name it put a period before the macro name.



SIMULATED RADIO BUTTONS

With Panorama 1.5, you can simulate radio buttons (shown here) and check boxes by using Flash Art, graphics tools, and macros. A click on a transparent button object **(A)** triggers a macro. If the conditions of the macro are met, the Flash Art object **(B)** will appear. The underlying graphic **(C)** remains on the screen whether the Flash Art object is on or off.

Making Check Boxes and Radio Buttons

Panorama doesn't have a tool for creating check boxes and radio buttons on forms, but with version 1.5 you can create reasonable facsimiles of these objects by using a column in the database, either a circle or a rectangle, a Flash Art object, and a simple macro attached to a button object. These facsimiles then look and behave like standard Macintosh buttons (see "Simulated Radio Buttons").

To create a check box, first create a column in the design sheet to hold the data, which we'll call ChkBx. Set the data type to Compressed, and create a value bar with only one value—

On. Now create and name a new form and click on graphics mode. Use the rectangle tool to draw a square, then use the line tool to draw two lines forming an *X* through it. Select the two lines you have just drawn and cut them. Open the Flash Art window and paste them in, naming the window *X*, then close the window. Return to the form, select the Create/Edit Flash Art tool, and draw a square Flash Art object that exactly covers the previously drawn square. When the Flash Art dialog box appears, enter the following Flash Art caption equation:

`?(ChkBx="On","X","")`

This equation says, "If the value in the column ChkBx is On, then display the Flash Art object called *X*. Otherwise, display nothing."

Then make sure the Center button in the dialog is selected, and click OK. Now open a new macro window, name the macro .ChkBx (note the period before the name, preventing the macro from being listed in the Macro menu), and enter the following script:

```
ScrapCalc {info("ColumnName")}
If {ChkBx "On"}
Column {ChkBx}
"On"
Else
Column {ChkBx}
""
Column clipboard
```

Once the macro is created, return to the form and choose the button tool. Use it to draw a button object that covers the previously drawn square and Flash Art objects. Then, when the button dialog appears, select your new macro—.ChkBx—from the list, make the button transparent, turn off the auto-highlight feature, and click OK. Using the Create/Edit Caption Text tool, name your check box according to the value you want it to have, select data mode, and you will find your check box ready to use. If you place a double quote character (") in the Default column of the design sheet, the check box will default to the previous record's setting for each new record.

You can create radio buttons (generally a group of them) in a similar fashion. In an accounting database, for example, you might want to use a group of radio buttons to indicate the credit card (MasterCard, Visa, American Express, and so on) to which a sale was charged. Create another column in the design sheet to hold the data (this time called RdBtn). Give it a type attribute of Compressed, and add a value bar, entering a different value for each button in the group. Now open a form and click on graphics mode. Use the oval tool to draw a small, white-filled circle (hold down the Shift key while drawing to get a perfect circle), and then a smaller circle, filled black. Select the black circle you have just drawn and cut it. Open the Flash Art Gallery and paste it in, naming the window Btn. Return to the form, select the Flash Art tool, and draw a Flash Art object that covers the previously drawn white circle. When the Flash Art dialog box appears, enter the following Flash Art caption equation:

`?(RdBtn="Value","Btn","")`

Then select the Center button, and click OK. You should substitute the actual value (such as MasterCard) you're using in the button for the value parameter in this Flash Art caption equation. Copy this first two-part but-

(continues)

ton and paste another button for each possible value. Open the Flash Art dialog for each one, and change the value parameter to reflect the value associated with that button. Now open a new macro window, name it .RdBtn1, and enter the following script:

```
ScrapCalc {info("ColumnName")}
Column {RdBtn}
"Value"
Column clipboard
```

Create one macro for each possible value, naming them so that each is easily identified. The fastest way to do this is to copy the first macro and paste it into successive new macro windows, changing the value parameter in each one.

Once your macros are created, return to the form, and choose the button tool. Use it to draw a button object that covers each of the previously drawn circles and Flash Art objects. When the button dialog appears, select the associated macro from the list, make the button transparent, turn off the auto-highlight feature, and click OK. With the Caption Text tool, name each button, select data mode, and your radio buttons are ready to use.

Again, placing a double quote character in the design sheet's default column will default the button setting in each record to the previous record's setting. If the buttons don't work correctly on the first try, chances are you've left out a quote mark or made some other typo in the equation.

Hiding Columns in the Data Sheet

You may want to design a database with some hidden columns to hold data that users don't need to see, such as the ChkBx and RdBtn columns described in the last tip. Although you can't completely hide a column in the data sheet, you can make it virtually inaccessible. First, go into the design sheet and set to zero the column width of any columns you want hidden (this actually makes them each one pixel wide). Next, move all your zero-width columns to the end of the data sheet. Finally, in the last normal-width column put an automatic macro that jumps to the next record or creates a new record whenever a user tries to leave that column.

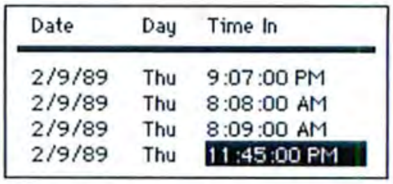
Skipping Columns during Data Entry

The Time Card example file that comes with Panorama includes an equation that calculates the day whenever you enter a date in the Date cell (see "Column Jumping"). So why bother tabbing through the Day column when you never key data into it anyway? Using Panorama 1.5's Close Window macro, you can make Panorama skip the Day field every time you tab out of the Date field. Just create a macro consisting of this one command:

```
Column «Time In»
```

Then set it up as the Close Window macro on the Date field.

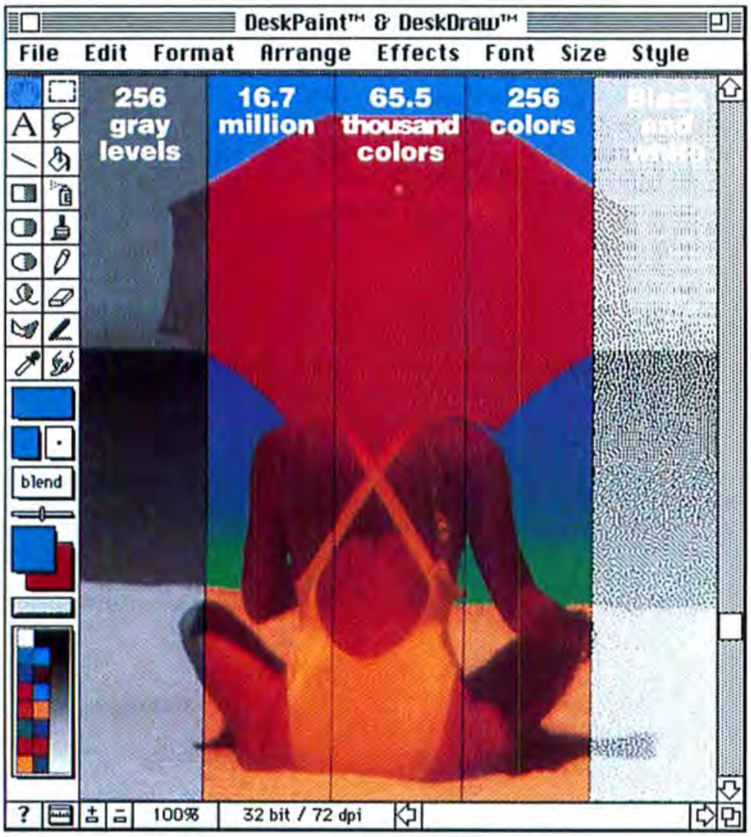
(continues)



Date	Day	Time In
2/9/89	Thu	9:07:00 PM
2/9/89	Thu	8:08:00 AM
2/9/89	Thu	8:09:00 AM
2/9/89	Thu	11:45:00 PM

Column Jumping

Using a Close Window macro, you can skip over any column in the data sheet that's automatically filled in or that you don't want users to enter, such as the Day column shown here.



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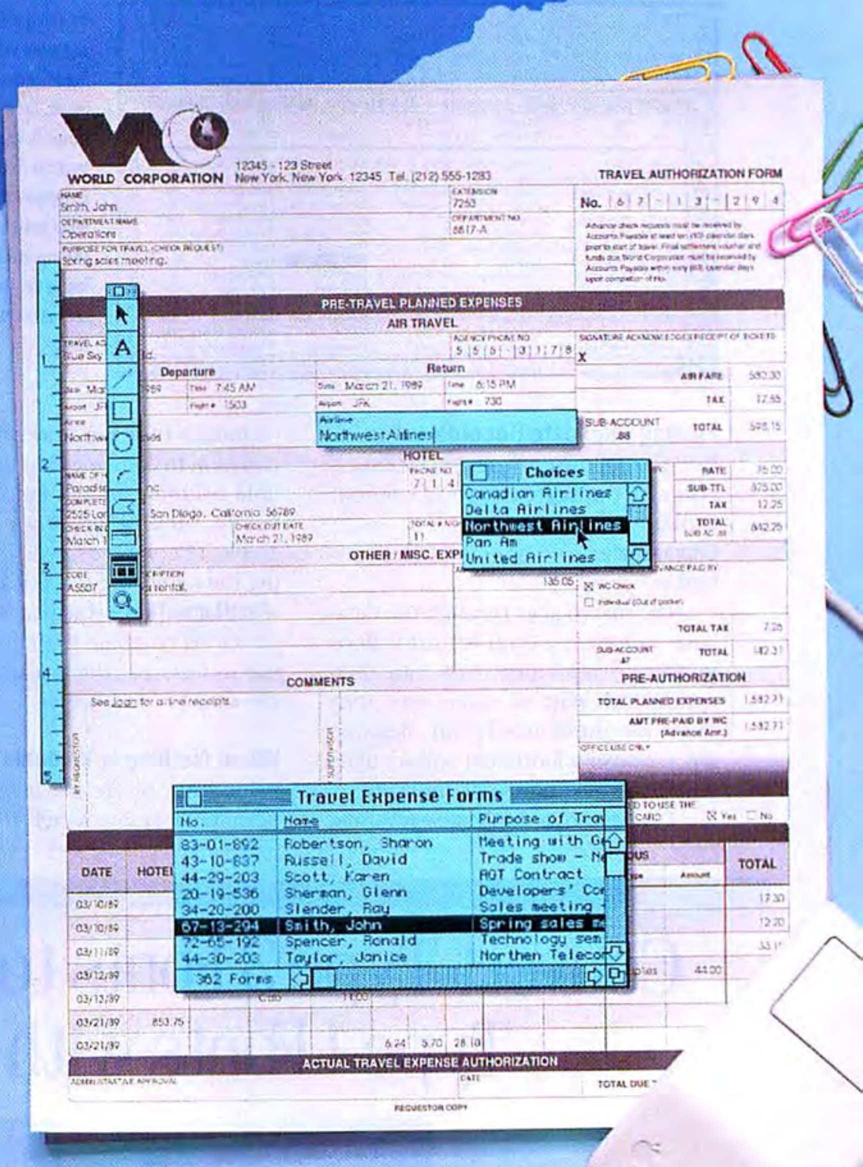

WORLD CORPORATION 12345 - 123 Street New York, New York 12345 Tel. (212) 555-1283

TRAVEL AUTHORIZATION FORM

No. 6 7 - 1 3 - 2 9 4

NAME Smith, John

EXTENSION 7253

DEPARTMENT NAME Operations

DEPARTMENT NO. 8817-A

PURPOSE FOR TRAVEL (CHECK REQUEST) Spring sales meeting.

PRE-TRAVEL PLANNED EXPENSES

AIR TRAVEL

Departure

Return

Date March 21, 1989 Time 6:15 PM

Airport JFK Flight # 730

Airline Northwest Airlines

AIR FARE 580.30

TAX 17.85

SUB-ACCOUNT .88 TOTAL 598.15

HOTEL

San Diego, California 56789

CHECK OUT DATE March 21, 1989

Choices

- Canadian Airlines
- Delta Airlines
- Northwest Airlines
- Pan Am
- United Airlines

OTHER / MISC. EXP

COMMENTS

See Joan for airline receipts.

TOTAL TAX 7.25

PRE-AUTHORIZATION

TOTAL PLANNED EXPENSES 1,582.71

AMT PRE-PAID BY WC (Advance Amt.) 1,582.71

Travel Expense Forms

No.	Name	Purpose of Trav
83-01-892	Robertson, Sharon	Meeting with G
43-10-837	Russell, David	Trade show - N
44-29-203	Scott, Karen	AOT Contract
20-19-536	Sherman, Glenn	Developers' Co
34-20-200	Slender, Ray	Sales meeting
67-13-294	Smith, John	Spring sales m
72-65-192	Spencer, Ronald	Technology sem
44-30-203	Taylor, Janice	Northen Teleco

362 Forms

ACTUAL TRAVEL EXPENSE AUTHORIZATION

REQUESTOR COPY

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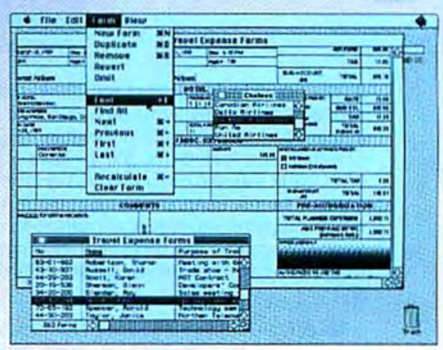
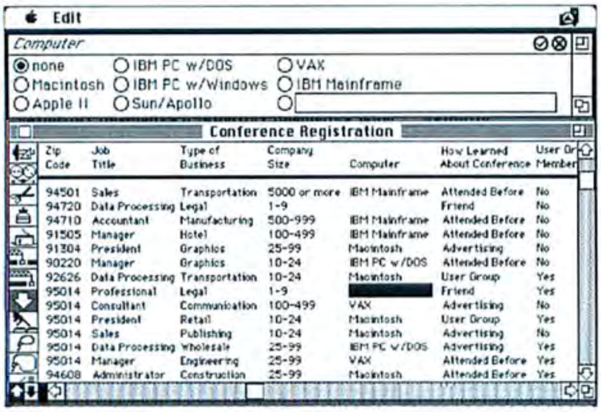


Informed Manager

Circle 297 on reader service card



● none ○ IBM PC w/DOS ○ VAX
○ Macintosh ○ IBM PC w/Windows ○ IBM Mainframe
○ Apple II ○ Sun/Apollo ○

Zip Code	Job Title	Type of Business	Company Size	Computer	How Learned About Conference	User Gr Member
94501	Sales	Transportation	5000 or more	IBM Mainframe	Attended Before	No
94720	Data Processing	Legal	1-9		Friend	No
94710	Accountant	Manufacturing	500-999	IBM Mainframe	Attended Before	No
91505	Manager	Hotel	100-499	IBM Mainframe	Attended Before	No
91304	President	Graphics	25-99	Macintosh	Advertising	No
90220	Manager	Graphics	10-24	IBM PC w/DOS	Attended Before	No
92626	Data Processing	Transportation	10-24	Macintosh	User Group	Yes
95014	Professional	Legal	1-9		Friend	Yes
95014	Consultant	Communication	100-499	VAX	Advertising	No
95014	President	Retail	10-24	Macintosh	User Group	Yes
95014	Sales	Publishing	10-24	Macintosh	Advertising	No
95014	Data Processing	Wholesale	25-99	IBM PC w/DOS	Advertising	Yes
95014	Manager	Engineering	25-99	VAX	Attended Before	Yes
94608	Administrator	Construction	25-99	Macintosh	Attended Before	Yes

No Value

By using a data entry equation you can leave fields with value bars blank. In this example, *none* is one of the value buttons listed for the Computer column. If the none button is checked, the equation enters nothing in the field and moves on to the next field.

Finding Duplicate Records

Use the following macro to locate a potential duplicate entry in a column:

```
SortUp
Unpropagate
Find = ""
```

The macro goes through the database, comparing each record it finds to the previous one. You can then check each pair to make sure they really are duplicates before deleting any. Choosing Find Next will advance you to the next potential duplicate.

To make this duplicate-searching technique more accurate, first use an equation to combine elements of multiple columns into an empty column before running the macro. For example, to combine the first initial plus the last name, use this equation:

```
«FirstName»[1,1]+«LastName»
```

Or to combine the zip code plus the address, use this equation:

```
str(«Zip»)+" "+«Address»
```

When Nothing Is Valuable

Value buttons are a convenient way to enter data into a cell. Not only do they limit the choices to a few entries, but they also make sure the entered value is spelled correctly. However, they're very authoritarian, forcing you to make an entry in a cell whether you want to or not. That means you don't have the option of using a value bar to tab through a cell without entering data. But there is a way to get around this limitation. Set up the following equation in the design sheet («Computer» is the name of a column in this example):

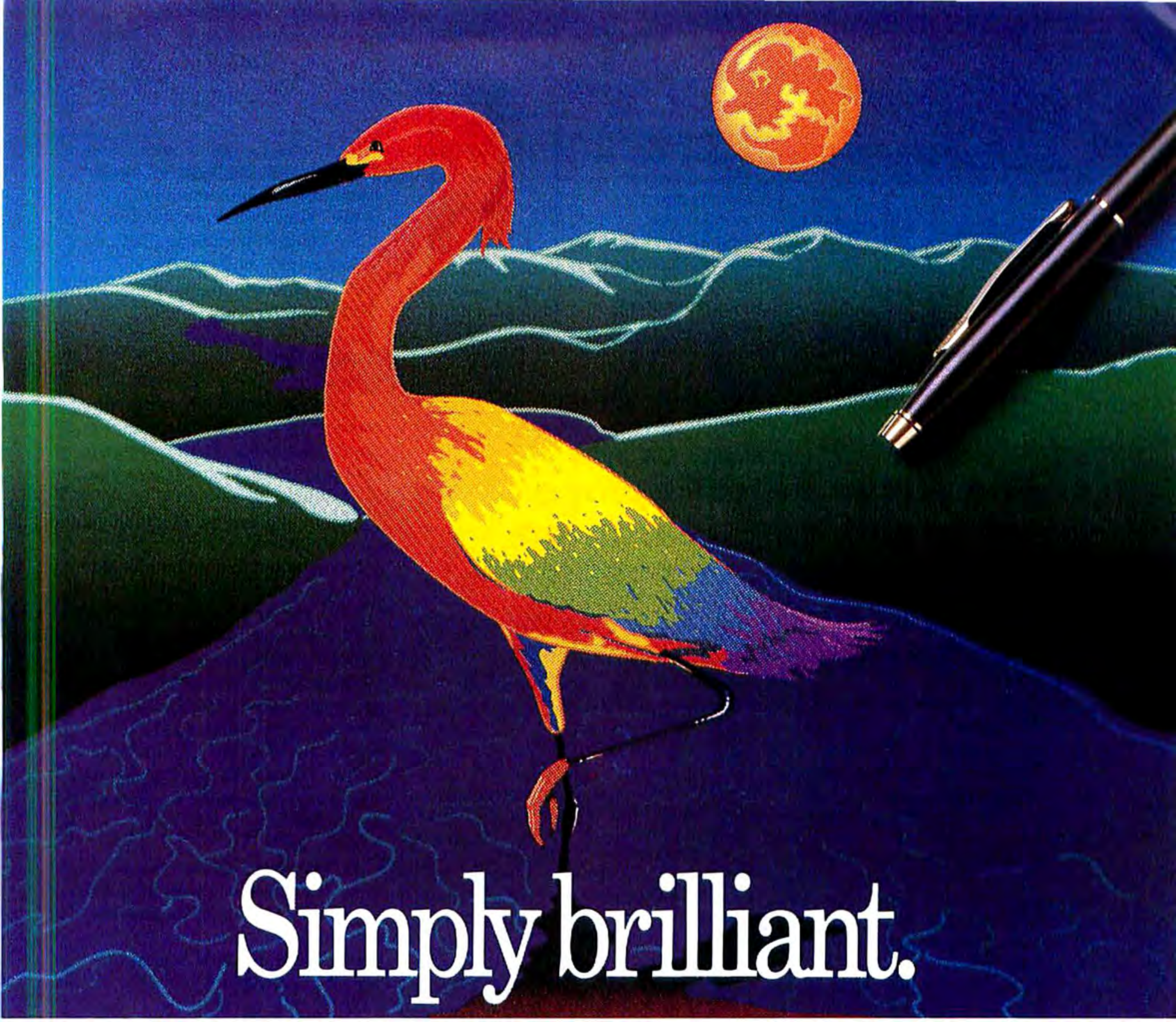
```
«Computer»=
?(«Computer»="none","",«Computer»)
```

When you select the None button, the equation swoops in, intercepts the data, and skips to the next field (see "No Value").

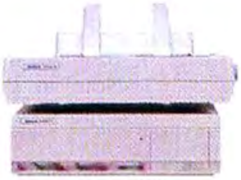
Selecting Unusual Groups of Dates

Panorama 1.5's new Select Logic Equation option allows for some rather unusual date selections. For instance, here are some equations for choosing all records entered on a Tuesday, all records in a particular quarter, everything entered on weekends, and only

(continues)



ColorQuick*


Phaser CQS

4693 DX

Phaser CP/CPS

those entered during the work week:

```
datepattern(«Date»,"DayOfWeek")="Tuesday"
datepattern(«Date»,"Quarter yyyy")
="First 1989"datepattern(«Date»,"Day")
="Sat" OR datepattern(«Date»,"Day")
="Sun"datepattern(«Date»,"Day")
"Sat" OR datepattern(«Date»,"Day")
"Sun"
```

Equation Tips

- Equations can do a lot more than just perform math operations. How about copying the entire contents of one column into another? Just click in the empty field, choose Equation from the Math menu, choose the name of the field containing the data from the Columns menu, and click OK. The contents of the first column will be pasted into the empty one.
- A fairly common application of automatic equations is to update a Modification Date column whenever you modify a cell in a record. For instance, you might want to update the Dues Paid Through column of a club membership roster whenever you change a dollar amount. To do so, paste this equation into the columns you would like updated:

```
«Date»=today()
```

- The following equation concatenates three text fields into one three-line field—chr(13) is the ASCII value for a carriage return.

```
«Field 1»+chr(13)+«Field 2»+chr(13)
+«Field 3»+chr(13)
```

- If you come up with a good equation that you use only occasionally, rather than relying solely on your own (human) memory, paste it into your NotePad DA, along with a notation about what it does.

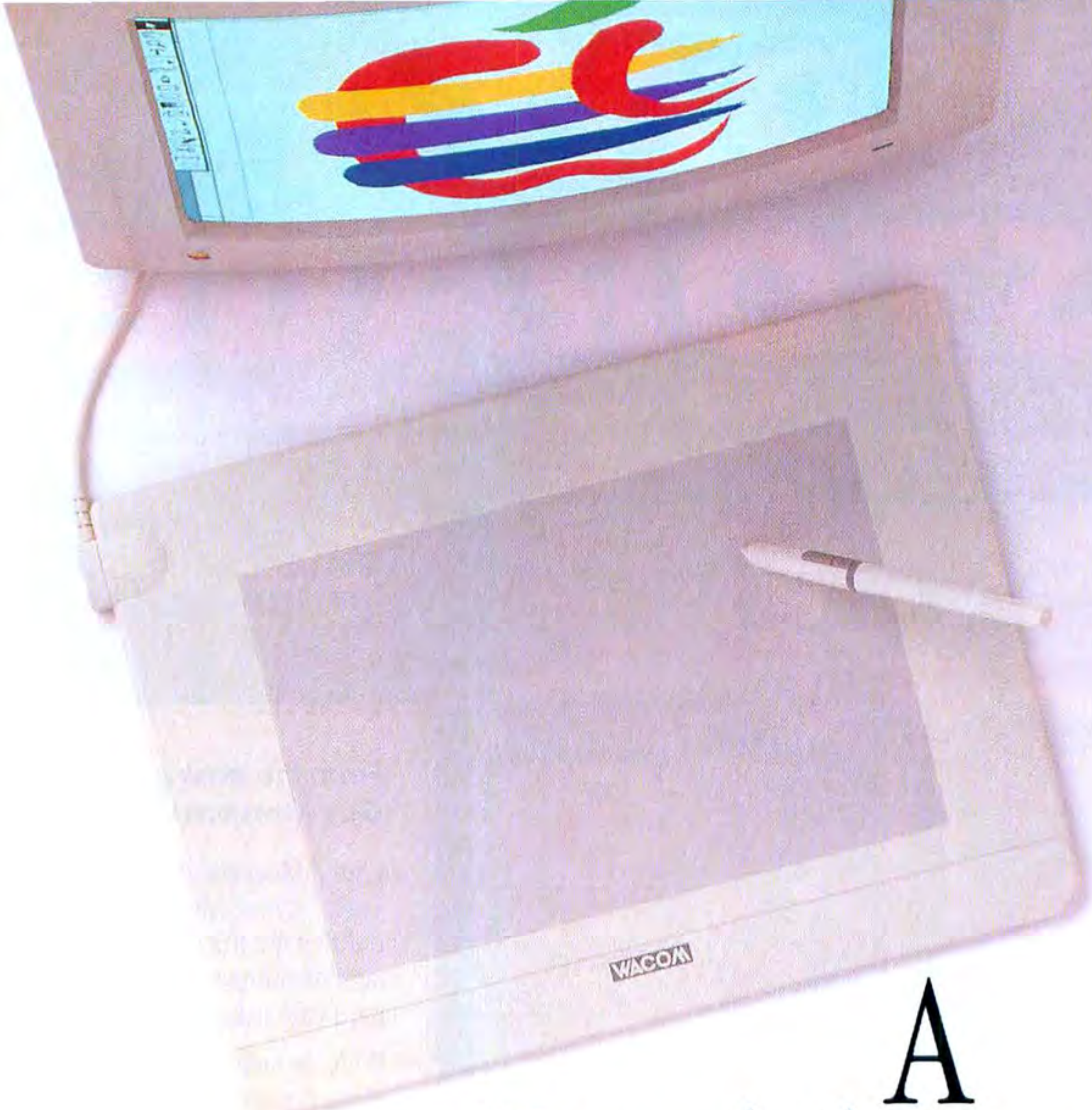
Sharing the Wealth

If you've found a shortcut or undocumented trick not mentioned here, spread the word to other *Macworld* readers by sending it to *Quick Tips, Macworld,* 501 Second St., San Francisco, CA 94107. ◼

See *Where to Buy* for contact information.

Tom Negrino is a Macintosh consultant and writer, and a director of the Los Angeles Macintosh Group. He is a frequent beta tester of new database products.

PC
MAGAZINE
EDITORS'
CHOICE
November 28, 1989
Wacom SD-421L



A "Breakthrough" Graphic Tool for Macintosh Artists

The Wacom cordless, pressure-sensitive stylus.

The Mac has always had great potential in graphic arts. But until now, no one has really provided a tool to unleash it. There has always been some form of mechanical trade-off imposed by input devices that inhibited artists from letting their imaginations flow naturally.

Now, Wacom introduces a totally "real" graphic tool, one that let's you interact with the Mac as intuitively as you would with a canvas. With Wacom's cordless, pressure-sensitive stylus your will is converted through manual pressure to line width, spray density, color change and other programmable effects. This allows you to create "real time" artistic images free of the artificiality and limitations of other input devices. And since the Wacom stylus has neither cable nor battery, it is also ultra-light and maintenance free.

Wacom, a leading name in computer graphics worldwide with proven man-machine interface technology, invites you to a new era in Macintosh graphics with a promise:

Once you experience it, you'll never look back.

Performance/Specifications: • Resolution: 1,270 lines/inch (0.02mm) • Accuracy: ±0.01 inch (±0.25mm) over entire active surface • Maximum reading speed: 205 points/second

Wacom SD-Series Digitizers: • A0 to A5, square or rectangular • Surface types: standard, magnetic, electrostatic, or transparent menu panel • Pointing devices: Pressure-sensitive, stroke-type or nonstroke-type cordless stylus, 4-button or 12-button cordless cursor

WACOM

Circle 507 on reader service ca

WACOM Inc.
West 115 Century Road, Paramus, NJ 07652, U.S.A.
Tel: (1) 201-265-4226, Fax: (1) 201-265-4722

WACOM Computer Systems GmbH:
Hellersbergstrasse 4, D-4040 Neuss 1, West Germany
Tel: (49) 2101-16001, Fax: (49) 2101-101760

WACOM Korea Co., Ltd.
371-36, Karibong-Dong, Kuro-Gu, Seoul, 152-020 Korea
Tel: (82) 2-869-5595, Fax: (82) 2-869-1241

WACOM Co., Ltd.
International Division
4-1-12, Ikebukuro, Toshima-ku, Tokyo, 171 Japan
Tel: (81) 3-985-0097, Fax: (81) 3-985-8636

UPDATES

Here's our list of the current versions of Mac software that were shipping at the time we went to press. We hope you'll find it useful, because these days keeping track of the latest CPU is tough enough.

CopyFlow version 2.0 adds menu selections that give the user the ability to automatically import and export text or artwork to and from page layouts; is fully integrated with QuarkXPress; and supports Quark Extended Style Tags and North Atlantic Publishing Systems' style tags. North Atlantic Publishing Systems, P.O. Box 682, Carlisle, MA 01741; 508/250-8080. Free upgrade; $395 new.

Falcon version 2.2 includes midair collisions; supports the Mac SE/30, Portable, IIcx, and IIci; and has increased support for non-Apple hardware, including SuperMac, RasterOps, and Radius monitors. Sphere, Inc., 2061 Challenger Dr., Alameda, CA, 94501; 415/522-3584. $3 upgrade; $59.95 new.

Pyro version 4.0 is programmable and includes Aquarium, Blocks, Dimwit (a Macintosh II screen dimmer), Doughnuts, Fireworks Too, Kaleidoscope, Marquee, Restless Picture, Slinky, and Stars modules. All selected modules are used in rotation from one screen save to the next so you do not have to open the Control Panel. Fifth Generation Systems, Inc., 11200 Industriplex Blvd., Baton Rouge, LA, 70809; 504/291-7221. $15 upgrade; $39.95 new.

PRODUCT UPDATES

Product	V.	Req.	Rev.	Price
1st Aid Kit ★	2.8	512KE/3.0		•
4th Dimension	2.0	1MB/6.02	3/90	•
Aatrix CheckWriter II ★	2.01	512K/4.1		$10
Aatrix TimeCard	2.0	512K/4.2		Free
Accountant Inc.	2.1	1MB/6.02		$9.50
ACCPAC Bedford Simply Accounting	1.1	1MB/5.1		$50
AccuText ★	1.1	4MB/6.02	2/90	•
Adobe Type Manager	1.2	1MB/6.02	2/90	Free
AdWriter	2.0	1MB/6.0		Free
After Dark	1.1	512KE/3.2		$5
Alchemy	1.1	1MB/6.0		$25
Aldus FreeHand	2.0	1MB/6.03		•
Aldus PageMaker	2.02	1MB/4.1		•
Aldus Persuasion	2.0	1MB/6.0		•
AmPack Plus ★	4.2.2	512K/3.2	1/90	$29.95
Analog Connection WorkBench	3.0	1MB/5.0	5/90	$50
Anatool ★	3.1	512K/3.0	7/89	$35
AntiToxin	1.3	1MB/6.0.2	1/90	$15
APL.68000	7.0	512K/3.2		•
AppleShare File Server	2.0	512K/3.2		•
Archie	2.0	1MB/6.0		$75
ArchiText	2.0	1MB/6.02	7/89	Free
Aristotle's Politics	2.0	2MB/6.03		Free
The Art Importer	2.0	1MB/6.0	5/90	$20
ArtRoom	3.0	512K/3.2		$199
AutoCalc	2.0	1MB/6.0		$95
AutoSave II	1.1	512KE/4.2		$7.50
Aztec C	3.6	512KE/4.2		•
BackFax ★	1.02	1MB/6.03	1/90	Free
Back to Basics: Professional	2.0	512K/3.2		$75
Ball & Stick ★	2.2	1MB/6.0		Free
Bill-It	2.0	1MB/6.03		$29
Bridge	6.0	512K/3.2		$17
Business FileVision ★	1.5	1MB/6.02		•
Business Sense ★	1.2	1MB/6.0		•
Business Session ★	3.2	512K/3.2		Free
CA-Cricket Presents	2.0	1MB/6.0		Free
Calculator Construction Set ★	2.06	512K/3.2	4/90	$25
CanOpener	1.1	512K/3.0		Free
Canvas	2.1	1MB/6.0		•
Capture	2.0	1MB/6.0	2/90	$15
ChromaScan	1.1	4MB/6.02		Free
Client/Mac	2.0	1MB/6.0	7/89	$370
Colorset ★	1.5	1MB/6.0	6/90	Free
Colleague 2 ★	2.05	2MB/6.03		•
Comment	2.02	1MB/6.0		•
Commtact	2.0	1MB/6.0		Free
CompileIt 1.5	1.5	1MB/6.02	3/90	Free
CompuServe Navigator ★	2.1	512K/3.2		•
Computerized Classic Accounting	2.2	1MB/6.0		•
ConcertWare	5.1	512KE/4.2		$35
Control	1.5	1MB/4.1		Free
CopyFlow	2.0	2MB/6.0	6/90	Free
Cue	3.0	1MB/6.03		•
Data Desk	3.0	512K/4.02	6/90	$125
DataMerge	2.0	512K/3.2		Free
dBase Mac ★	1.01	1MB/4.1		Free
Deluxe Music Construction Set	2.5	512K/6.02	9/89	•
D.E.S.	4.0	1MB/6.0		•
Design Dimensions ★	2.15	5MB/6.03		Free
DeskPaint ★	2.1C	512KE/4.2	5/90	Free
DiagramMaker ★	1.1	1MB/6.02		•
Digital Darkroom	1.1	1MB/6.02		Free
DiskFit	1.5	512K/4.1		•
Network DiskFit ★	1.5	512K/4.1	12/89	•
DiskTop	4.0	1MB/6.0		•
Display AdBuilder	1.1	1MB/6.03		•
Dollars and Sense	4.1	512KE/3.2		•
DragonWave	1.1	1MB/6.03		•
Dreams	1.1	1MB/6.02		•
DynoDex ★	1.1	1MB/6.0	6/90	Free
Easy Color Paint	1.1	1MB/6.0		•
Empower ★	2.05	1MB/5.0		Free
Empower II ★	3.0	1MB/5.0		•
EndLink	1.1	512K/3.2		Free
EndNote	1.2	512KE/3.2		Free
Extender Gra'Pak	3.0	1MB/6.02		$30
Falcon	2.2	1MB/3.2		$3
Fastback II	2.1	512KE/4.1	12/89	$30
Fast Forms ★	1.2	512K/3.2		$25
Ferrari Grand Prix ★	1.6	512K/3.2		$10
FetchIt	2.0	512K/6.01		•
FileMaker II ★	1.1	1MB/4.2		•
Finale	2.0	1MB/6.02	5/90	Free
Financial Analysis	3.0	512K/3.0		•
Findswell	2.01	512KE/3.2	3/90	•
Fontographer	3.0	1MB/6.0	5/90	•
FontShare	2.0	1MB/6.0		Free
FormsProgrammer ★	2.03	1MB/6.02		$15
FoxBase+/Mac ★	2.10	1MB/6.0		$75
Freedom of Press ★	2.2	1MB/6.0		Free
FreeFlow	3.0	1MB/6.03		Free
Full Impact ★	1.1	1MB/6.0		Free
FullWrite Professional ★	1.1	2MB/6.02		Free
Gofer ★	2.01	1MB/4.1		$25
GOL	2.0	1MB/5.0		•
Great Plains Accounting Series	5.2	1MB/6.0		•
Help DA	3.0	1MB/6.0		Free
HFS Backup	3.0	512K/3.2	8/89	$35
Hybase ★	1.1	1MB/6.0		Free
HydroMac	2.0	1MB/6.0		•
HyperAnimator ★	1.5	1MB/6.03		$29.95
HyperCard ★	1.2.2	1MB/6.03		$10
HyperDA ★	1.2	512K/3.2		$10
HyperEngine Developer's Tool ★	1.1	1MB/6.03		Free

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***Bold** = first time the product is being listed.*

★ = *minor update.*

***Req.** = min. RAM and system software required*

***Rev.** = last time(in past year) reviewed this or an earlier version.*

***Price** = cost for update to registered owners.*

• = *contact your dealer for update policy.*

PRODUCT UPDATES

Product	V.	Req.	Rev.	Price
HyperLibrary	2.0	1MB/5.0		•
HyperPort Chess	2.0	1MB/6.0		$10
HyperWindows ★	1.2	1MB/6.02		$20
Icon-It	2.0	1MB/6.02		$29
Iconia ★	7.0	1MB/6.0		•
Igor ★	1.1	1MB/6.0	5/90	Free
Image Grabber	2.0	1MB/6.02		Free
ImageStudio	2.0	1MB/6.0		Free
ImageWriter LQ Print Driver ★	2.0	512K/3.2		Free
In-CAD	2.0	2MB/6.0		•
InfoLogic Envelope ★	6.0	512KE/4.0		$5
Insight Expert Accounts Payable	2.2	1MB/6.0		•
Insight Expert Accounts Receivable	2.2	1MB/6.02		•
Inspiration	2.0	1MB/4.2		Free
Instant-Expert Plus	3.0	1MB/5.0		Free
JetLink Express ★	1.01	1MB/6.0		Free
KidsTime ★	1.2	512K/3.2		$15
KiwiEnvelopes	3.0	512KE/4.1		$10
LAN Package	3.1	1MB/6.0		•
Language Systems Fortran Compiler ★	1.2	1MB/6.03		•
LapLink Mac III		512K/2.0		•
LaserPaint Color II ★	1.02	1MB/6.03		Free
LetrTuck +	2.0	512K/3.2		$20
Lookup	2.0	1MB/6.0	5/90	$15
Mac86	2.0	1MB/6.02		$10
Mac286	2.0	1MB/6.02		$10
Mac3270	2.0	1MB/6.03		•
MacAnalyst	2.0	2MB/6.0		$125
MacArchitrion	4.0	2MB/6.03		Free
MacAtlas Paint	2.0	512K/3.2		$35
MacClassAds	4.0	1MB/6.0		•
MacClint ★	1.1	1MB/5.0		Free
MacConcept	3.0	1MB/6.03		•
MacDesigner	3.0	2MB/6.0		$125
MacDraw II	1.1	1MB/6.0		•
MacEnvelope	4.1	512KE/3.2	7/1	•
MacFalcon	2.1	1MB/6.03		•
MacFlow	3.0	1MB/6.03		$30
MacFortran	2.4	512K/4.2		•
MacFortran/020	2.4	512K/4.2		•
MacFortran for MPW	1.1	2MB/6.02		Free
MacHerbal	2.0	512K/3.2		$49
MacHotel	3.3	1MB/6.03		Free
MacLine	3.0	512K/3.0		$25
MacLinkPlus/Wang VS	4.0	512KE/3.2		$45
MacMainFrame 3270/CUT	2.1	2.5MB/6.02		$100
MacPhonebook	2.0	512KE/3.2	1/90	•
MacPrint	1.1	1MB /6.02		Free
MacProject II	2.0	1MB/6.0	8/89	•
MacProof ★	3.2.1	1MB/6.02	2/90	$30
MacRecorder	2.0	512K/3.2	12/89	•
MacSchedule	2.0	1MB/6.0		$30
MacSmarts	3.0	1MB/6.0		•
MacTell	3.5	512K/3.0		•
MacTerminal ★	2.31	512K/3.2		Free
MacToPic	2.0	1MB/6.0		$25
MacVision	2.1	1MB/4.2	7/89	•
MacWrite II	1.1	1MB/6.0		Free
Managing Your Money	3.0	1MB/6.03	6/90	$49.95
MapGrafix	2.0	4MB/6.03		Free
MarketMaster	II+	1MB/6.03		$25
MarkUp	1.02	1MB/6.0	5/90	Free
Master Tracks Pro 4	4.12	1MB/4.1	6/90	$45
MathType	2.1	512K/6.02	11/89	•
Matlab	1.2	1MB/3.0		•
MaxPage ★	1.2	512K/3.2		Free
McClint	2.0	1MB/4.2		$25
McCPrint	2.0	512K/4.2		$25
McMax	2.0	1MB/5.0	8/89	•
Memorybank Manager	3.0	1MB/6.0		Free
Mesa Graphics Plotter Utility	1.03	512KE/5.0		•
MGMStation ★	2.5	512KE/3.0		•
MicroPhone II	3.0	512KE/4.2		•
Microsoft File	4.0	512K/3.2		•
Microsoft Mail	2.0	1MB/6.02	1/90	•
Microsoft Word	4.0	512KE/3.2	10/89	•
Microsoft Works	2.0	512K/6.0		•
MindWrite ★	2.1	512KE/4.2		•
MiniCad +	2.0	1MB/6.0	11/89	•
MiniDraw	4.0	512KE/4.2		$17
MockPackage Plus Utilities	4.4	512KE/3.2		$15
Modern Artist	2.0	2MB/6.02		$150
MOMARS	3.1	1MB/6.03		•
Monte Carlo	2.0	1MB/6.03		$60
More II ★	2.01	1MB/4.1		Free
MSFL: Pro League Football	2.0	1MB/6.0		•
MultiLedger ★	1.1	512K/3.2		Free
Multi-User Appointment Diaries	3.01	512K/3.2		•
Music Publisher	2.0.3	1MB/6.0		Free
MyTimeManager	2.0	1MB/6.0	5/90	•
Navigate	2.0	1MB/6.0		Free
Nemesis Go Master	4.0	512K/4.1		•
The NightWatch ★	1.03	512KE/3.2		•
Nisus	2.0	1MB/6.02	9/89	Free
NuPaint ★	1.04	512K/3.2		Free
Nutrition Stack	2.0	1MB/6.02		$20
OmniPage ★	2.1	1MB/6.02	2/90	Free
Omnis 3 Plus/Express	2.0	512KE/3.2		•
On Schedule	2.0	1MB/3.0		•
P51 Mustang Flight Simulator	2.04	512K/3.2		$10
PacerLink	5.0	512K/5.0		•
Panorama	1.1	1MB/4.2		Free

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Go beyond New York, Venice, and Geneva for only $99.

Now that Adobe Type Manager™ is opening up a whole new world of type to every Macintosh® user, it's time to venture beyond the standard fonts—like New York, Venice and Geneva.

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So if you've been tempted to explore the wonderful world of fonts, this is your chance to travel first class. With a select group from the Adobe® Type Library.

ADOBE®

Adobe Type Set 1:

Hobo
TRAJAN™
Bodoni Poster
Freestyle Script
VAG Rounded Bold
COTTONWOOD™
Linotext*

Adobe Type Set 2:

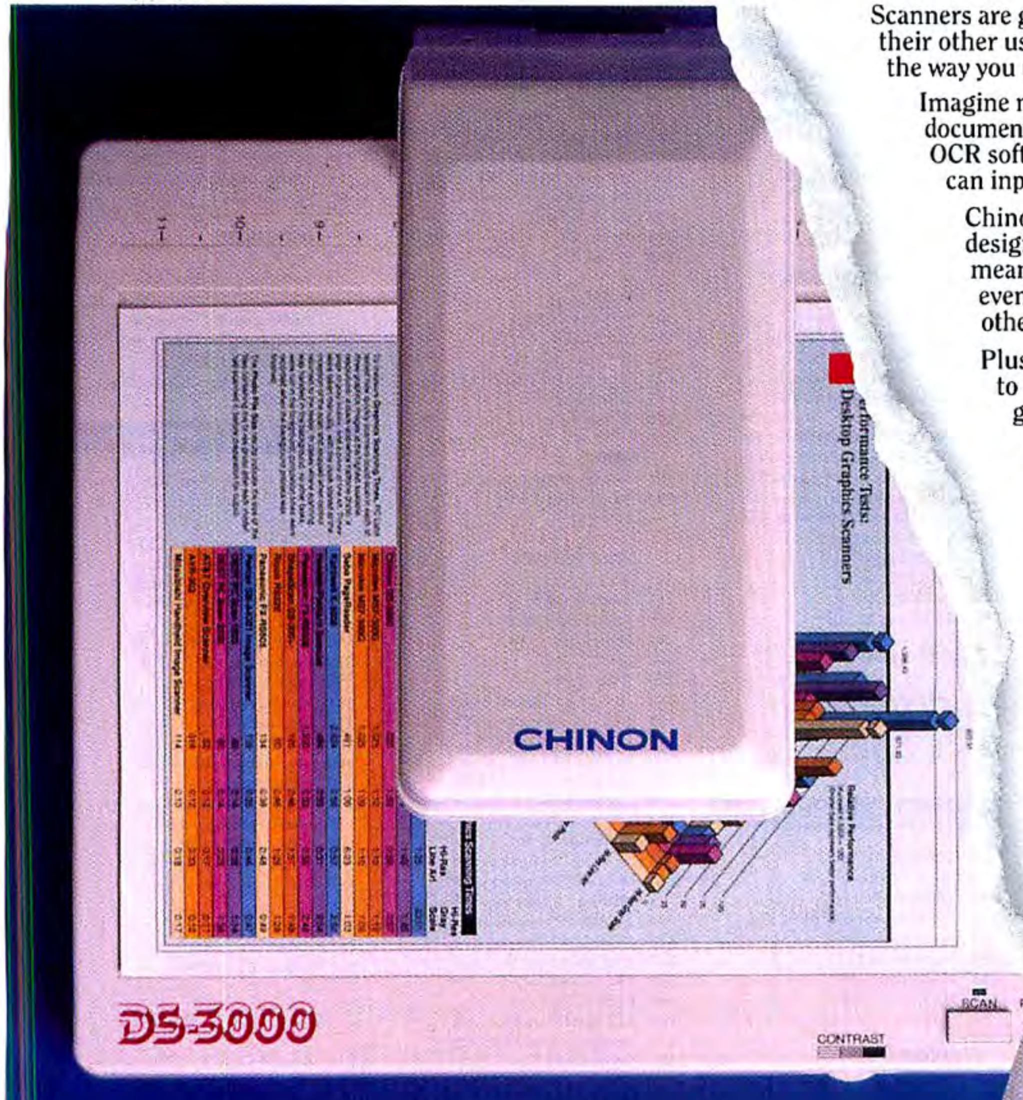
Franklin Gothic®
Present* Script
LITHOS™BOLD
PEIGNOT*DEMI
Cooper Black
JUNIPER™
COPPERPLATE

PRODUCT UPDATES

Product	V.	Req.	Rev.	Price
PEGASYS II	3.2	1MB/6.03		Free
Performer Sequencer ★	3.2	1MB/6.0		Free
Personal Golf Stats	2.0	512K/3.2	2/90	Free
Personal Reference Catalog	2.0	1MB/6.0		$10
Personal Phone ★	1.1	1MB/6.0		•
The Phrase Thesaurus	2.0	1MB/6.0	6/90	Free
PICT Detective	2.0	512KE/6.0		$20
PixelPaint ★	1.2	2MB/4.1		Free
Plains & Simple ★	1.06	1MB/3.2		•
PowerDraw	3.0	1MB/6.0		•
PowerStation ★	2.5.2	512K/4.1		Free
PowerTools	3.0	4MB/6.0		•
Practica Musica	2.1	512K/3.2		$10
Printer Interface III	2.0	512K/6.02		$22.50
Pro-Cite ★	1.3	512K/4.1		•
Professional Composer	2.3	1MB/6.03		Free
Professional Image II	2.0	1MB/6.0		$22
The Programmer's Online Companion	2.0	1MB/6.02		$10
PropsForms	2.0	1MB/6.03		Free
Prototyper ★	2.01	1MB/4.1	9/89	$79
Publish or Perish	3.0	512KE/3.2		$10
Pyro	4.0	512K/4.1		$15
QuarkXPress	2.12	1MB/6.02		•
Quicken ★	1.5	512K/3.2	1/90	•
QuickLetter ★	1.02	512KE/3.2	10/89	Free
QuickMail	2.0	512KE/3.2		•
QuickShare	2.0	512KE/3.2		$75
QuickShot ★	2.1	1MB/4.2		$5
RagTime 3		2MB/6.0		$150
Real Estate Edge	2.0	1MB/6.03		Free
Read-It OCR	2.1	1MB/6.03	12/89	•
Reports ★	1.2	1MB/6.0		Free
Retail Engine	3.0	1MB/6.0		•
Sales Associate	1.10	1MB/6.03		Free
Sales and Market Forecasting Toolkit	2.0	1MB/6.0		$49
SAM	1.3	1MB/6.0	1/90	•
ScheduleMaker ★	3.01	1MB/6.0		$25
ScreenSnap ★	2.2	1MB/4.2		•
ScriptEdit	1.1	1MB/6.04	3/90	•
Second Sight	2.0	1MB/6.02		$33.75
Sentinel	2.0	512K/4.1		$20
Shanghai	2.0	1MB/6.02	2/90	$13
SimpleSpan	2.5	512K/3.2		•
Smart Alarms	2.9.1	512K/3.2		$12
SmartForm Assistant ★	1.1	1MB/6.0		Free
SmartForm Designer	1.1	1MB/6.0	7/89	Free
SmartScrap & The Clipper	2.0	1MB/6.03	8/89	$20
Snap ★	3.1	1MB/3.0	9/89	•
SoftPC ★	1.3	2MB/6.0	9/89	•
Sound Designer Universal ★	1.5	512K/6.03		$45
Spelling Coach Professional	3.1	512KE/4.2		•
Spellswell ★	2.2	512K/3.2	5/90	$20
Springboard Publisher	2.0	1MB/6.0		•
Stepping Out II	2.0	1MB/4.1		Free
StickyBusiness	1.06	512KE/6.03		Free
Still Light	3.0	1MB/6.0		Free
StrataVision 3d ★	1.0.2	2MB/6.03	4/90	Free
Suitcase II	3.0	512KE/4.1	10/89	$25
Super 3d	2.0	512KE/6.02	10/89	$200
SuperGlue II with GlueNotes	2.1	1MB/6.0	1/90	•
SuperLaserSpool	2.0.2	512K/4.1		•
SuperPaint	2.0	1MB/6.02	8/89	$50
SuperSpool	5.0	512K/4.1		$20
Synchronicity	2.0	512KE/3.2	12/89	$5.00
Systat	5.0	1MB/6.0		$90
Teacher's Rollbook ★	2.2	512K/3.2		$17.95
Ternary Plot	3.0	512K/3.2		•
TextPert ★	3.01	1MB/6.0		Free
TGRAF-07/Mac	2.0	2MB/6.0	9/89	•
Think C	4.0	1MB/5.0	2/90	•
Timbuktu	3.0	1MB/4.1		Free
TimeMinder	2.0	1MB/4.2	9/89	$50
Timeslips III	1.1	512KE/4.2	2/90	$50
TML Pascal II	3.0	1MB/5.0		$79.95
TMON ★	2.8.4	512K/4.0		•
TOPS/Mac	3.0	512K/3.2		•
Trapeze ★	2.1	1MB/6.0		$35
TrueBASIC ★	2.02	1MB/6.0		Free
TrueForm ★	1.1	1MB/6.2	4/90	Free
Turbosynth	2.0	1MB/6.03		$35
Typeface Library	1.5	1MB/6.03		•
TypeStyler	1.01	1MB/4.1		•
UNITize ★	1.3	512KE/3.2	10/89	$20
UpBeat	2.0	1MB/6.0		$75
VersaCAD/ Macintosh Edition ★	2.11	1MB/6.0		Free
Virex ★	2.5	1MB/4.2	1/90	•
Virtual	2.0	1MB/3.2	10/89	Free
Voyager	1.2	1MB/6.0	4/90	•
VMacS	2.0	1MB/6.0		$25
Wall Street Investor	3.0	1MB/5.0		$150
White Knight	11	1MB/6.02		$35
Wingz ★	1.1	1MB/6.0		Free
Word Finder	2.0	512K/3.2		•
WordPerfect for the Macintosh ★	1.0.3	1MB/4.2		Free
WorksPlus Spell	2.0	1MB/6.03	1/90	•
WriteNow	2.2	512K/3.2		$49

To have products listed in this section, send upgraded software, an outline of changes since the previous release (indicate if it's a maintenance upgrade), upgrade price, minimum RAM and system software, suggested retail price, company name, mailing address, and phone number to *Updates, Macworld,* 501 Second St., San Francisco, CA 94107.

If You Buy A Scanner For Desktop Publishing, You're Only Getting Part Of The Picture.



Scanners are great for Desktop Publishing. But their other uses can make a huge difference to the way you use your computer.

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1 2 3 4 5 6 7 8 9 10
11 12 13 14 15 16 17 18 19 20
21 22 23 24 25 26 27 28 29 30
31 32 33 34 35 36 37 38 39 40
41 42 43 44 45 46 47 48 49 50

51 52 53 54 55 56 57 58 59 60
61 62 63 64 65 66 67 68 69 70
71 72 73 74 75 76 77 78 79 80
81 82 83 84 85 86 87 88 89 90
91 92 93 94 95 96 97 98 99 100

101 102 103 104 105 106 107 108 109 110
111 112 113 114 115 116 117 118 119 120
121 122 123 124 125 126 127 128 129 130
131 132 133 134 135 136 137 138 139 140
141 142 143 144 145 146 147 148 149 150

151 152 153 154 155 156 157 158 159 160
161 162 163 164 165 166 167 168 169 170
171 172 173 174 175 176 177 178 179 180
181 182 183 184 185 186 187 188 189 190
191 192 193 194 195 196 197 198 199 200

201 202 203 204 205 206 207 208 209 210
211 212 213 214 215 216 217 218 219 220
221 222 223 224 225 226 227 228 229 230
231 232 233 234 235 236 237 238 239 240
241 242 243 244 245 246 247 248 249 250

251 252 253 254 255 256 257 258 259 260
261 262 263 264 265 266 267 268 269 270
271 272 273 274 275 276 277 278 279 280
281 282 283 284 285 286 287 288 289 290
291 292 293 294 295 296 297 298 299 300

301 302 303 304 305 306 307 308 309 310
311 312 313 314 315 316 317 318 319 320
321 322 323 324 325 326 327 328 329 330
331 332 333 334 335 336 337 338 339 340
341 342 343 344 345 346 347 348 349 350

351 352 353 354 355 356 357 358 359 360
361 362 363 364 365 366 367 368 369 370
371 372 373 374 375 376 377 378 379 380
381 382 383 384 385 386 387 388 389 390
391 392 393 394 395 396 397 398 399 400

401 402 403 404 405 406 407 408 409 410
411 412 413 414 415 416 417 418 419 420
421 422 423 424 425 426 427 428 429 430
431 432 433 434 435 436 437 438 439 440
441 442 443 444 445 446 447 448 449 450

451 452 453 454 455 456 457 458 459 460
461 462 463 464 465 466 467 468 469 470
471 472 473 474 475 476 477 478 479 480
481 482 483 484 485 486 487 488 489 490
491 492 493 494 495 496 497 498 499 500

501 502 503 504 505 506 507 508 509 510
511 512 513 514 515 516 517 518 519 520
521 522 523 524 525 526 527 528 529 530
531 532 533 534 535 536 537 538 539 540
541 542 543 544 545 546 547 548 549 550

CATALOG INFORMATION

551 552 553 554 555 556 557 558 559 560
561 562 563 564 565 566 567 568 569 570
571 572 573 574 575 576 577 578 579 580
581 582 583 584 585 586 587 588 589 590
591 592 593 594 595 596 597 598 599 600

601 602 603 604 605 606 607 608 609 610
611 612 613 614 615 616 617 618 619 620
621 622 623 624 625 626 627 628 629 630
631 632 633 634 635 636 637 638 639 640
641 642 643 644 645 646 647 648 649 650

651 652 653 654 655 656 657 658 659 660
661 662 663 664 665 666 667 668 669 670
671 672 673 674 675 676 677 678 679 680
681 682 683 684 685 686 687 688 689 690
691 692 693 694 695 696 697 698 699 700

WHERE TO BUY

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

801 802 803 804 805 806 807 808 809 810
811 812 813 814 815 816 817 818 819 820
821 822 823 824 825 826 827 828 829 830
831 832 833 834 835 836 837 838 839 840
841 842 843 844 845 846 847 848 849 850

851 852 853 854 855 856 857 858 859 860
861 862 863 864 865 866 867 868 869 870
871 872 873 874 875 876 877 878 879 880
881 882 883 884 885 886 887 888 889 890
891 892 893 894 895 896 897 898 899 900

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11 12 13 14 15 16 17 18 19 20
21 22 23 24 25 26 27 28 29 30
31 32 33 34 35 36 37 38 39 40
41 42 43 44 45 46 47 48 49 50

51 52 53 54 55 56 57 58 59 60
61 62 63 64 65 66 67 68 69 70
71 72 73 74 75 76 77 78 79 80
81 82 83 84 85 86 87 88 89 90
91 92 93 94 95 96 97 98 99 100

101 102 103 104 105 106 107 108 109 110
111 112 113 114 115 116 117 118 119 120
121 122 123 124 125 126 127 128 129 130
131 132 133 134 135 136 137 138 139 140
141 142 143 144 145 146 147 148 149 150

151 152 153 154 155 156 157 158 159 160
161 162 163 164 165 166 167 168 169 170
171 172 173 174 175 176 177 178 179 180
181 182 183 184 185 186 187 188 189 190
191 192 193 194 195 196 197 198 199 200

201 202 203 204 205 206 207 208 209 210
211 212 213 214 215 216 217 218 219 220
221 222 223 224 225 226 227 228 229 230
231 232 233 234 235 236 237 238 239 240
241 242 243 244 245 246 247 248 249 250

251 252 253 254 255 256 257 258 259 260
261 262 263 264 265 266 267 268 269 270
271 272 273 274 275 276 277 278 279 280
281 282 283 284 285 286 287 288 289 290
291 292 293 294 295 296 297 298 299 300

301 302 303 304 305 306 307 308 309 310
311 312 313 314 315 316 317 318 319 320
321 322 323 324 325 326 327 328 329 330
331 332 333 334 335 336 337 338 339 340
341 342 343 344 345 346 347 348 349 350

351 352 353 354 355 356 357 358 359 360
361 362 363 364 365 366 367 368 369 370
371 372 373 374 375 376 377 378 379 380
381 382 383 384 385 386 387 388 389 390
391 392 393 394 395 396 397 398 399 400

401 402 403 404 405 406 407 408 409 410
411 412 413 414 415 416 417 418 419 420
421 422 423 424 425 426 427 428 429 430
431 432 433 434 435 436 437 438 439 440
441 442 443 444 445 446 447 448 449 450

451 452 453 454 455 456 457 458 459 460
461 462 463 464 465 466 467 468 469 470
471 472 473 474 475 476 477 478 479 480
481 482 483 484 485 486 487 488 489 490
491 492 493 494 495 496 497 498 499 500

501 502 503 504 505 506 507 508 509 510
511 512 513 514 515 516 517 518 519 520
521 522 523 524 525 526 527 528 529 530
531 532 533 534 535 536 537 538 539 540
541 542 543 544 545 546 547 548 549 550

CATALOG INFORMATION

551 552 553 554 555 556 557 558 559 560
561 562 563 564 565 566 567 568 569 570
571 572 573 574 575 576 577 578 579 580
581 582 583 584 585 586 587 588 589 590
591 592 593 594 595 596 597 598 599 600

601 602 603 604 605 606 607 608 609 610
611 612 613 614 615 616 617 618 619 620
621 622 623 624 625 626 627 628 629 630
631 632 633 634 635 636 637 638 639 640
641 642 643 644 645 646 647 648 649 650

651 652 653 654 655 656 657 658 659 660
661 662 663 664 665 666 667 668 669 670
671 672 673 674 675 676 677 678 679 680
681 682 683 684 685 686 687 688 689 690
691 692 693 694 695 696 697 698 699 700

WHERE TO BUY

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

801 802 803 804 805 806 807 808 809 810
811 812 813 814 815 816 817 818 819 820
821 822 823 824 825 826 827 828 829 830
831 832 833 834 835 836 837 838 839 840
841 842 843 844 845 846 847 848 849 850

851 852 853 854 855 856 857 858 859 860
861 862 863 864 865 866 867 868 869 870
871 872 873 874 875 876 877 878 879 880
881 882 883 884 885 886 887 888 889 890
891 892 893 894 895 896 897 898 899 900

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701 **3+Mail** 3Com Corp.; 408/562-6400, 800/638-3266.

A

702 **Abaton InterFax 24/96** Abaton, a Subsidiary of Everex Systems; 415/683-2226, 800/444-5321.
703 **Address Book Plus** Power Up Software Corp.; 415/345-5900, 800/851-2917.
704 **Adobe Photoshop, Adobe Type Manager** Adobe Systems, Inc.; 415/961-4400, 800/833-6687.
706 **America Online** Quantum Computer Services, Inc.; 703/448-8700, 800/227-6364.
707 **Andrew Tobias Managing Your Money** MECA Ventures Inc.; 203/226-2400.
708 **AntiToxin** Mainstay; 818/991-6540.
* **Anti-Virus Kit** 1stAid Software, Inc.; 617/783-7118, 800/843-3497.
709 **AppMaker Bowers** Development Corp.; 508/369-8175.
710 **Ashlar Vellum** Ashlar; 408/746-2980.
711 **Azimuth** Graphsoft; 301/461-9488.

C

712 **cc:Mail** cc:Mail; 415/961-8800, 800/448-2500.
713 **CD Companion Series Ludwig Van Beethoven** The Voyager Company; 213/451-1383.
714 **ColorQuick Ink-Jet Printer** Tektronix, Inc.; 503/682-7377, 800/835-6100.
715 **Colorset** Studiotronics, Inc.; 407/657-0677, 800/780-3825.
716 **CompuServe Navigator** CompuServe, Inc.; 614/457-8600.
717 **Connect Business Information Network** Connect Inc.; 408/973-0110, 800/262-2638.
718 **The Coordinator** Action Technologies; 415/654-4444.
719 **CopyFlow** North Atlantic Publishing Systems, Inc.; 508/250-8080.

D

720 **Data Desk** Odesta Corp.; 708/498-5615, 800/323-5423.
721 **DataShaper** BenWare Co.; 206/547-9623.
722 **DaynaMail** Dayna Communications, Inc.; 801/531-0203.
723 **Desktop Express** Dow Jones & Co., Inc.; 609/520-4000.
724 **DeskWriter** Hewlett-Packard; 800/752-0900.
725 **Diconix M150 Plus** Diconix, a division of Eastman Kodak, Inc.; 800/342-6649.
726 **Dimensions Presenter** Visual Information Development, Inc.; 818/918-8834.
727 **DynoDex** Portfolio Systems, Inc.; 718/935-9501, 800/729-3966.

E

* **Earthquake Preparedness Stack** Environmental Compliance Associates; 408/659-2320, 800/266-2320.
728 **ElectricImage Animation System** Electric Image; 818/444-1819.
729 **Epson LQ-950** Epson America, Inc.; 213/539-9140, 800/922-8911.

F

730 **FaceWare Pack** FaceWare; 217/328-5842.
731 **Freedom of Press** Custom Applications, Inc.; 508/667-8585, 800/873-4367.

H

HARD DISKS

732 Advanced Gravis Computer Technology Ltd.; 604/434-7274, 800/663-8668.
733 Apple Computer, Inc.; 408/996-1010.
734 BSM; 214/699-8300.
735 CMS Enhancements, Inc.; 714/259-9555.
736 Crate Technology; 818/766-4001.
737 Deltaic Systems; 408/954-1055.
738 Dolphin Systems Technology; 714/558-3220.
739 Ehman, Inc.; 307/789-3830, 800/257-1666.
740 EMAC; 415/498-1111, 800/821-0806.
741 FWB, Inc.; 415/474-8055.
742 GCC Technologies; 617/890-0880, 800/422-7777.
* Hard Drives International; 602/967-4999, 800/234-3475.
743 Heart Data Corp.; 818/998-1691, 800/999-8133.
744 iDS Systems, Inc.; 408/441-0500, 800/733-0078.
745 Jasmine Technologies, Inc.; 415/282-1111.
746 La Cie, Ltd.; 503/684-0143, 800/999-0143.
747 Liberty Systems, Inc.; 408/983-1127.
748 MacProducts USA; 512/343-9560, 800/622-3475.
749 Maxcess; 215/928-1213, 800/356-2892.
750 MicroNet Technology, Inc.; 714/837-6033.
751 Microtech International, Inc.; 203/468-6223, 800/626-4276.
752 Mirror Technologies, Inc.; 612/633-4450, 800/654-5294.
753 PCPC; 813/884-3092.
754 Peripheral Land, Inc.; 415/657-2211, 800/288-8754.
755 Procom Technology, Inc.; 714/549-9449.
756 Relax Technology; 415/471-6112, 800/848-1313.
757 Rodime, Inc.; 407/994-5585.
758 Ruby Systems, Inc.; 415/967-1187, 800/888-1668.
759 Storage Dimensions, Inc.; 408/879-0300.
760 SuperMac Technology; 408/245-2202.
761 Tallgrass Technologies Corp.; 913/492-6002, 800/825-4727.
762 Toshiba America Information Systems; 714/583-3000, 800/334-3445.
763 Westcom; 919/355-0902, 800/442-8591.

764 **HyperCard** Apple Computer, Inc.; 408/996-1010.

I

765 **ImageWriter II, ImageWriter LQ** Apple Computer, Inc.; 408/996-1010.
767 **InBox** TOPS; 415/769-9669, 800/445-8677.
768 **Interactive Physics** Knowledge Revolution; 415/553-8153.

J

769 **JetLink Express** GDT
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Softworks, Inc.; 604/291-9121.

K

770 **Know Your Stuff** Working Systems, Inc.; 206/775-9999, 800/825-9999.

L

771 **LaserJet IID** Hewlett-Packard; 800/752-0900.

772 **LaserJet IIP** Hewlett-Packard; 800/752-0900.

773 **LaserJet III** Hewlett-Packard; 800/752-0900.

774 **LaserWriter IINT, LaserWriter IINTX, LaserWriter IISC** Apple Computer, Inc.; 408/996-1010.

M

777 **MacAccess** Action Technologies; 415/654-4444.

778 **MacFlash Cards** The Language Quest Software Co.; 415/941-2879.

779 **MacInterface** Holder, Egan & Company; 800/782-9976.

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780 **Macintosh Programmer's Workshop** Apple Computer, Inc.; 408/996-1010.

781 **MacJet** QMS, Inc.; 205/633-4300, 800/631-2692.

782 **Macknowledge** Prometheus Products, Inc.; 503/624-0571, 800/477-3473.

783 **MacPrint** Insight Development Corp.; 800/825-4115.

784 **MacRenderMan** Pixar; 415/258-8100, 800/888-9856.

785 **Master Tracks Pro 4** Passport Designs, Inc.; 415/726-0280.

786 **Math Blaster Mystery** Davidson & Associates, Inc.; 213/534-4070, 800/556-6141.

787 **MicroPhone II** Software Ventures Corp.; 415/644-3232.

* **Microsoft Mail** Microsoft Corp.; 206/882-8080, 800/426-9400.

* **Microsoft Office** Microsoft Corp.; 206/882-8080, 800/426-9400.

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N

788 **Network Bundle** TOPS, a Sun Microsystems company; 415/769-9669, 800/445-8677.

789 **Network Courier** Consumers Software, Inc.; 604/688-4548.

P

790 **Panorama** ProVue Development Corp.; 714/892-8199.

791 **ParaFont** Design Science, Inc.; 213/433-0685.

792 **Personal LaserPrinter II** GCC Technologies; 617/890-0880, 800/422-7777.

793 **Printer Interface III** DataPak Software, Inc.; 818/905-6419, 800/327-6703.

794 **Professional Programmer's Extender** Invention Software Corp.; 313/996-8180.

795 **Prograph** TGS Systems; 902/429-5642, 800/565-1978.

796 **Prototyper** Now Software, Inc.; 503/274-2800, 800/237-3611.

Q

797 **QuickMail** CE Software, Inc.; 515/224-1995.

R

798 **RecordHolderPlus** Software Discoveries, Inc.; 203/872-1024, 800/437-5200.

S

799 **Sculpt 3D** Byte by Byte Corp.; 512/343-4357.

800 **Serius89** Serius Corp.; 801/272-7788, 800/876-6847.

801 **Slang Thesaurus** Slippery Disks; 213/274-3600.

802 **Smalltalk/V Mac** Digitalk, Inc.; 213/645-1082, 800/922-8255.

803 **Smartcom II** Hayes Microcomputer Products, Inc.; 404/441-1617.

Solarian Public domain.

805 **Spectrum/24 Series III** SuperMac Technology; 408/245-2202.

806 **StrataVision 3d** Strata, Inc.; 801/628-5218, 800/678-7282.

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807 **Symantec AntiVirus for Macintosh (SAM)** Symantec Corp.; 408/253-9600, 800/441-7234.

T

808 **Think C** Symantec Corp.; 408/253-9600, 800/441-7234.

809 **Think Pascal** Symantec Corp.; 408/253-9600, 800/441-7234.

810 **Toshiba Three-In-One (P321SLC)** Toshiba America Information Systems, Inc; 714/583-3000, 800/334-3445.

811 **TurboStar** Nuvotech, Inc.; 415/331-7815, 800/232-9922.

812 **TypeAlign** Adobe Systems; 415/324-8080, 800/223-0417.

V

813 **VersaTerm-Pro** Synergy Software; 215/779-0522.

814 **V.I.P.** Mainstay; 818/991-6540.

815 **Virex** HJC, a subsidiary of Microcom, Inc.; 919/490-1277.

W

816 **White Knight** The FreeSoft Co.; 412/846-2700.

817 **WordPerfect Office** WordPerfect Corp.; 801/225-5000, 800/321-4566.

818 **WriteImpact** GCC Technologies; 617/890-0880, 800/422-7777.

Z

819 **Zterm** Shareware by David P. Alverson.

Public domain software, freeware, and shareware are available through online information services; user groups (call 800/538-9696 ext. 500 for information on a local user group); or mail-order clearinghouses such as Budgetbytes (800/356-3551 for orders, 913/271-6022 in Kansas), Educomp (800/843-9497, 619/259-0255 in California), or the Public Domain Exchange (800/331-8125, 408/496-0624 in California).

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Table of Contents
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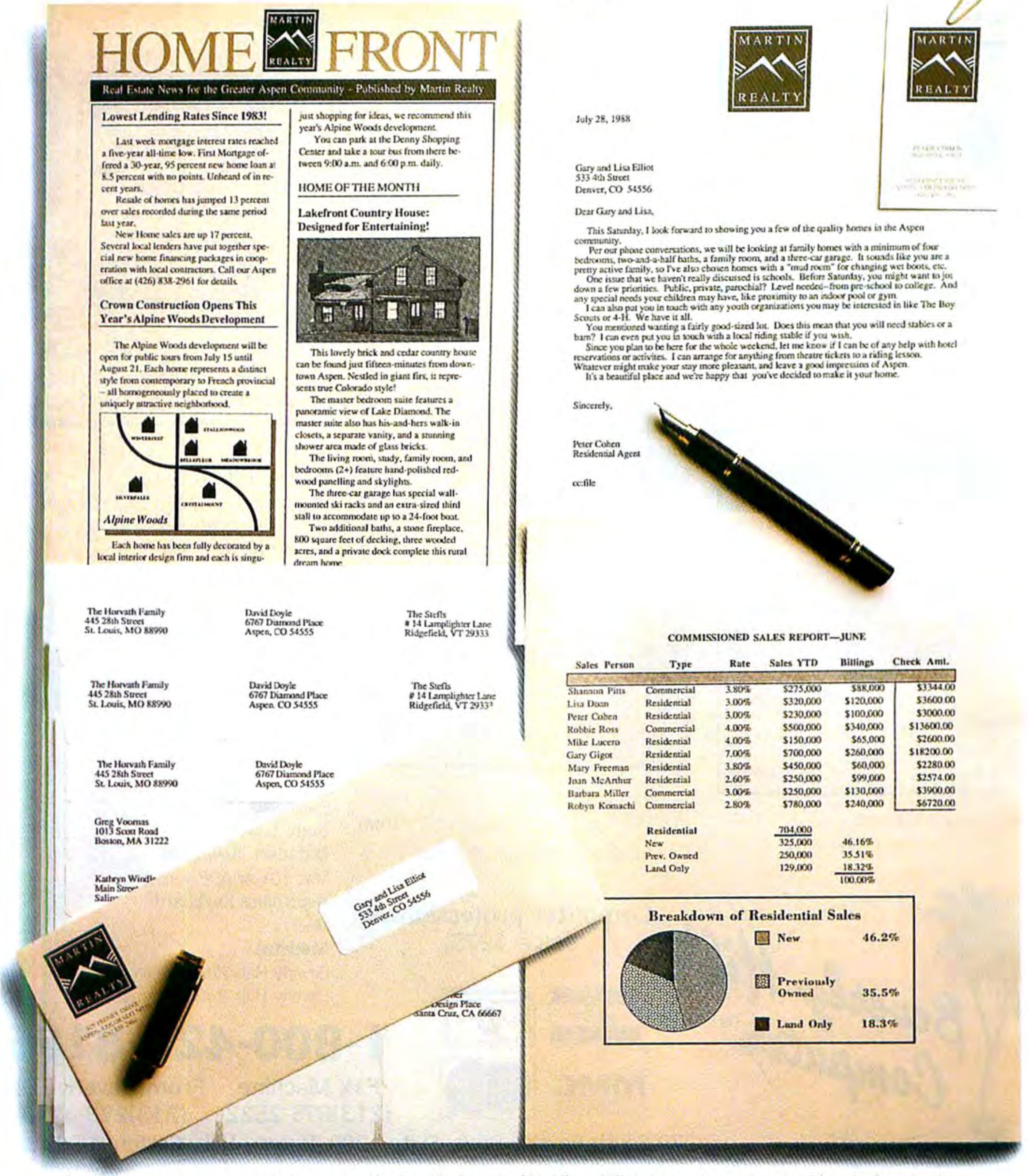

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Resale of homes has jumped 13 percent over sales recorded during the same period last year.

New Home sales are up 17 percent. Several local lenders have put together special new home financing packages in cooperation with local contractors. Call our Aspen office at (426) 838-2961 for details.

Crown Construction Opens This Year's Alpine Woods Development

The Alpine Woods development will be open for public tours from July 15 until August 21. Each home represents a distinct style from contemporary to French provincial – all homogeneously placed to create a uniquely attractive neighborhood.

Alpine Woods

Each home has been fully decorated by a local interior design firm and each is singu-

just shopping for ideas, we recommend this year's Alpine Woods development.

You can park at the Denny Shopping Center and take a tour bus from there between 9:00 a.m. and 6:00 p.m. daily.

HOME OF THE MONTH

Lakefront Country House: Designed for Entertaining!

This lovely brick and cedar country house can be found just fifteen-minutes from downtown Aspen. Nestled in giant firs, it represents true Colorado style!

The master bedroom suite features a panoramic view of Lake Diamond. The master suite also has his-and-hers walk-in closets, a separate vanity, and a stunning shower area made of glass bricks.

The living room, study, family room, and bedrooms (2+) feature hand-polished redwood panelling and skylights.

The three-car garage has special wall-mounted ski racks and an extra-sized third stall to accommodate up to a 24-foot boat.

Two additional baths, a stone fireplace, 800 square feet of decking, three wooded acres, and a private dock complete this rural dream home.

MARTIN REALTY

July 28, 1988

Gary and Lisa Elliot
533 4th Street
Denver, CO 54556

Dear Gary and Lisa,

This Saturday, I look forward to showing you a few of the quality homes in the Aspen community.

Per our phone conversations, we will be looking at family homes with a minimum of four bedrooms, two-and-a-half baths, a family room, and a three-car garage. It sounds like you are a pretty active family, so I've also chosen homes with a "mud room" for changing wet boots, etc.

One issue that we haven't really discussed is schools. Before Saturday, you might want to jot down a few priorities. Public, private, parochial? Level needed--from pre-school to college. And any special needs your children may have, like proximity to an indoor pool or gym.

I can also put you in touch with any youth organizations you may be interested in like The Boy Scouts or 4-H. We have it all.

You mentioned wanting a fairly good-sized lot. Does this mean that you will need stables or a barn? I can even put you in touch with a local riding stable if you wish.

Since you plan to be here for the whole weekend, let me know if I can be of any help with hotel reservations or activites. I can arrange for anything from theatre tickets to a riding lesson. Whatever might make your stay more pleasant, and leave a good impression of Aspen.

It's a beautiful place and we're happy that you've decided to make it your home.

Sincerely,

Peter Cohen
Residential Agent

cc:file

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St. Louis, MO 88990

David Doyle
6767 Diamond Place
Aspen, CO 54555

The Stefls
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Kathryn Windl
Main Stre
Salin

Design Place
Santa Cruz, CA 66667

Gary and Lisa Elliot
533 4th Street
Denver, CO 54556

COMMISSIONED SALES REPORT—JUNE

Sales Person	Type	Rate	Sales YTD	Billings	Check Amt.
Shannon Pitts	Commercial	3.80%	$275,000	$88,000	$3344.00
Lisa Doan	Residential	3.00%	$320,000	$120,000	$3600.00
Peter Cohen	Residential	3.00%	$230,000	$100,000	$3000.00
Robbie Ross	Commercial	4.00%	$500,000	$340,000	$13600.00
Mike Lucero	Residential	4.00%	$150,000	$65,000	$2600.00
Gary Gigot	Residential	7.00%	$700,000	$260,000	$18200.00
Mary Freeman	Residential	3.80%	$450,000	$60,000	$2280.00
Joan McArthur	Residential	2.60%	$250,000	$99,000	$2574.00
Barbara Miller	Commercial	3.00%	$250,000	$130,000	$3900.00
Robyn Komachi	Commercial	2.80%	$780,000	$240,000	$6720.00

Residential	704,000	
New	325,000	46.16%
Prev. Owned	250,000	35.51%
Land Only	129,000	18.32%
		100.00%

Breakdown of Residential Sales

▨	New	46.2%
▨	Previously Owned	35.5%
■	Land Only	18.3%

Everything you see above was created using some combination of the five tools within Microsoft Works 2.0: word processing, spreadsheet, database, drawing and communication. As you can see, the real power of Microsoft Works 2.0 comes into play when all the tools are used together.

PRINTERS & MONITORS

Dot Matrix

Seikosha	$215
Imagewriter/Mac Compatible	

EPSON Letter Quality Printers

LQ-510*...(24 PIN)	$328
LQ-850, LQ-950, LQ-1050, LQ-2550	Call
EPSON LQ Printer Software	$59
(*Requires Serial Card)	

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H.P. Deskwriter	
300 d.p.i.	$849
Hewlett Packard PaintJet	$1298

Hard Drives

CMS Externals

MacStack 20...32ms	$398
MacStack 30...28ms	$488
MacStack 45...28ms	$548
MacStack 60...38ms	$648
MacStack 80...28ms	$748
PD 100...25ms	$898
PD 170...18ms	$1498
44 Megabyte Removable	$798

CMS Internals

(SE, II, IIcx, IIci)

40 Megabyte	$448
100 Megabyte	$848
200 Megabyte	$1498
UNIMAC Kits	Call
Cutting Edge 800K Drive	$149
Tape Back-up Systems	
CMS TS-60...60 Meg	$698
CMS TS-150...150 Meg	$798
Kodak Printer	
Portable M150	$528

GCC Business Laser	$2998
GCC PLP Laser	$1595
PLP Plus Laser	$1695

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Monitors

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640 x 480 Resolution	$509
Fine Dot Pitch, Tilt & Swivel Base	

E-Machines	
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Big Picture Z-21 IQ	$2598
Big Picture T-16 color	$2898
Big Picture T-19 color	$4398
NEC MacSync	$498
Radius	
Full Page Display	$1095
Other Models	Call
Raster Ops	
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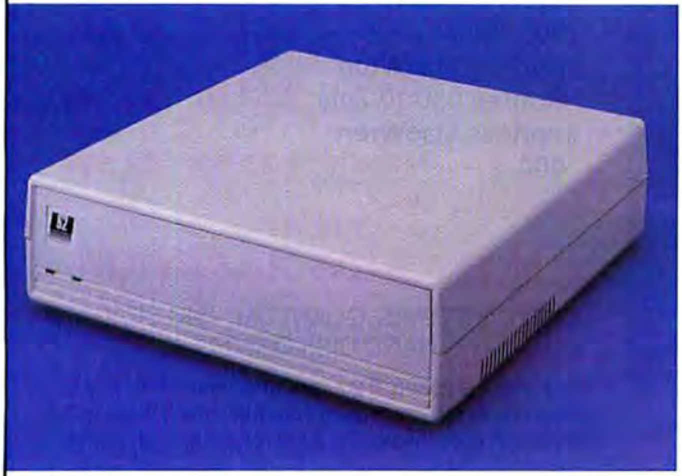

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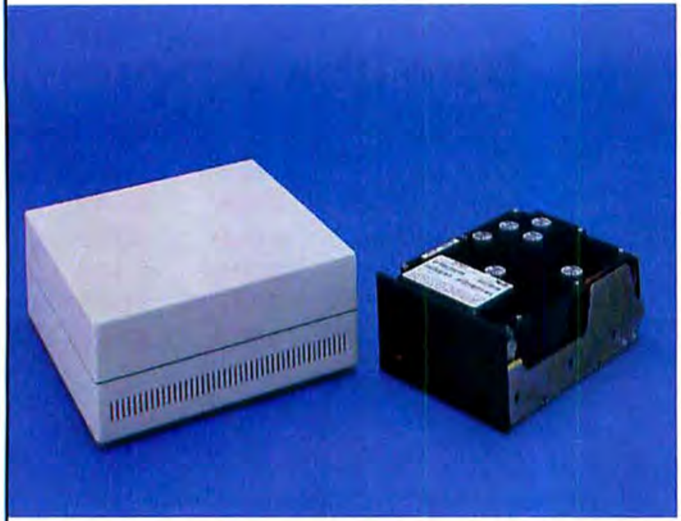

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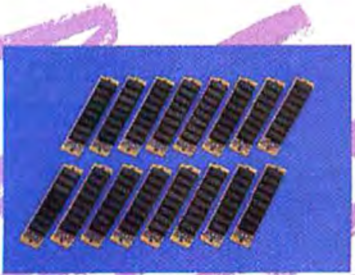

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Omnis 5	355
BRODERBUND	
TypeStyler	117
Drawing Table	72
CAERE	
OmniPage	534
OmniSpell	72
OmniDaft	72
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Supercard	123
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Smartscrap	46
SuperGlue II	59
The Curator	69
SOFTWARE VENTURES	
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OMNIPAGE

$510

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TYPE!	22
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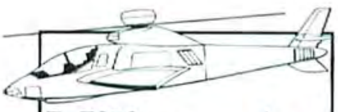

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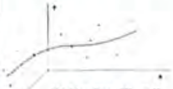

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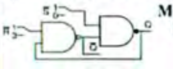

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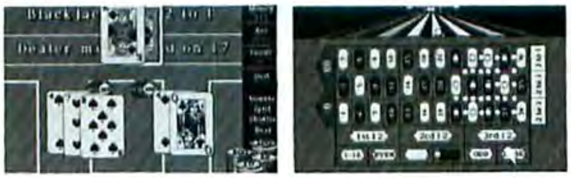

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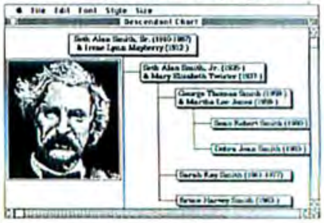

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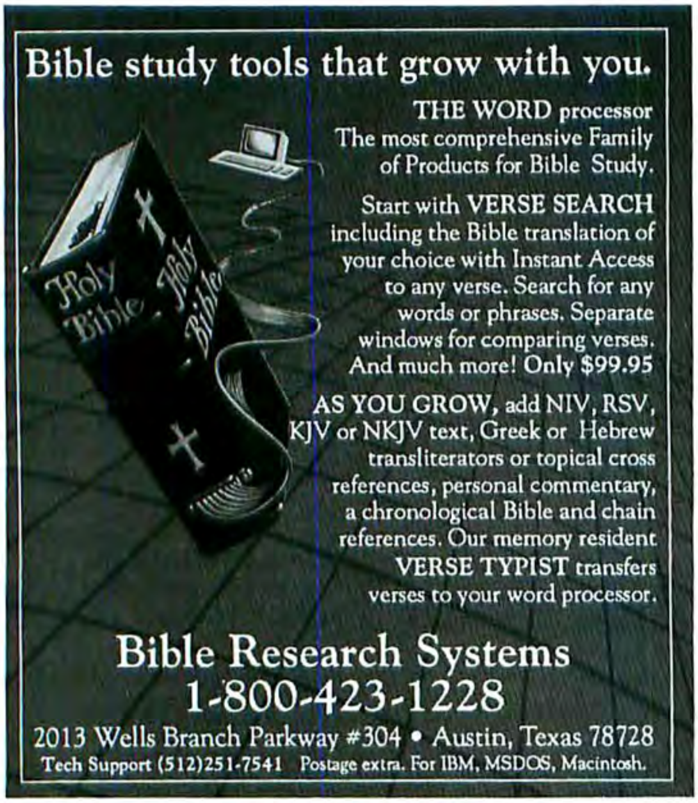

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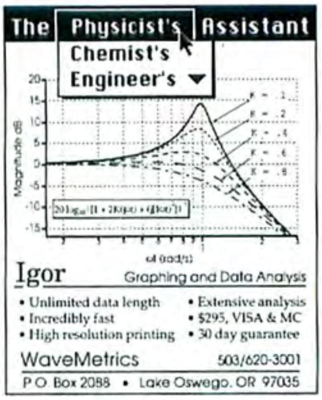

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The American Institute for Computer Sciences offers an in-depth correspondence program to earn your BSc & MS degrees in Computer Science at home. BSc subjects include: MS/DOS, BASIC, PASCAL, C, Data File Process, Data Structures & Operating systems. MS program includes Software Engineering and AI.

AMERICAN INSTITUTE for COMPUTER SCIENCES
1704-MW 11th Avenue
South Birmingham, AL 35205
205-933-0339

Accessories

Mouse Pads

Company Logo Specialist

Qty.	Canvas	Hard Surface
12	$8.50 w/logo	N/A
72	5.90 w/logo	7.15 w/logo
144	3.96 w/logo	5.21 w/logo
500	3.40 w/logo	4.65 w/logo
1000	3.28 w/logo	4.53 w/logo

Canvas or Hard Surface in a variety of colors. Size 9.5"x8"x3/8". Multi-color OK. SAMPLES with your logo $12.50. ENTIRE pad imprintable and 100% guaranteed.

Computer Expressions
3833 Chestnut Street
Philadelphia, PA 19104
800/443-8278

Mouse Pads

Custom Printing Available.

Cloth: 13 Colors

Size:	8x71/4	8x91/2	81/2x11
12 Pads	3.25	3.50	3.75
72	3.00	3.25	3.50
144	2.85	3.00	3.25

PLASTIC: Blue, Platinum, Gray, Red & Black. Size: 81/2x11

12 Pads	6.50	36	6.00
72	5.75	144	5.25

ASK US ABOUT OUR PICTURE PADS!

Precision Line Inc.
14100 23rd Ave. N.
Minneapolis, MN 55447
612/557-1979, 1-800/328-0077

Supplies

1.4 MB HIGH DENSITY 100% ERROR FREE PREMIUM BULK
800 KB DOUBLE DENSITY 100% ERROR FREE PREMIUM BULK

1.4 MB 85¢ EACH IN LOTS OF 25
LIFETIME WARRANTY!
800 KB 45¢ EACH IN LOTS OF 50

3M DS/DD 800K (1MB) Boxes of 10
Minimum 2 Boxes .... $ 10.20

SONY BULK — 3.5" DS/DD 800K (1MB)
Lots of 50 .... 69¢

ZOOM 2400Bd MODEM w/QuickLink II .... $ 119.00
Seven (7) Year Warranty! .... Mac 6' Cable — $ 9.95

AMERICAL GROUP
800-288-8025
12132 Sherman Way, N. Hollywood CA 91605
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CIRCLE 676 ON READER SERVICE CARD

Reclaims Desk from Disks

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Vertical Solutions • P.O. Box 7535 • Olympia, WA 98507 • 206 352 2087

CIRCLE 694 ON READER SERVICE CARD

For your ad to appear on *The Macworld Catalog* screen, call 800/888-8622.

The Macworld Catalog

NUVU GIVES EYESIGHT TO THE MAC BLIND

ENLARGE YOUR MONITOR SCREEN OVER 70%!

High quality lens by 3M coupled with a Polaroid anti glare filter. In a sleek mounting hood designed specifically for Mac monitors.

FINALLY A BIG CLEAR PICTURE!

To order, or for more info:
•800-872-1051•
Other models available.
Dealer inquiries invited.
Less Gauss Inc.
Box 5006 Rhinebeck, N.Y. 12572

CIRCLE 601 ON READER SERVICE CARD

3.5" DS/DD Bulk Disks
39¢ ea. in lots of 25

3.5" DS/HD Bulk Disks
89¢ ea. in lots of 25

3.5" Disk Cases - Protects up to **50** Disks
$2.97 each (for 2 or more)

Apple ImageWriter I & II Ribbon
$1.67 each (In Packs of 6)

4-Color Apple ImageWriter II Ribbon
$5.97 each (In Packs of 2)

Mouse Pad $2.99 each

3.5" User Labels - In Assorted Colors
($1.50 per pack of 50 labels)

Add shipping - **50¢ per 25 3.5" disks; 75¢ per disk case; $1.50 per pack of ribbons; 50¢ per mouse pad; User Labels - No shipping charge**
Add Order Processing, Packaging & Handling - **$3.00 Per Order**

MEI/Micro Center - 1100 Steelwood Rd.
Columbus, Ohio 43212
Call 1-800-634-3478

MWC4

Pack your Mac in seconds!

Cordura case has internal padded pockets for mouse, keyboard and drive.
Available in six colors.
Extended Keyboard version also available.
For a dealer near you call toll free
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CIRCLE 670 ON READER SERVICE CARD

DUST COVERS
ComputerWear
100% COTTON CANVAS

MAC, SE, II, & PRINTERS
Beige w/ Grey Trim Breathable! Static-Free!

NEW! Seal-Skins
For Keyboards

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Int'l:(415) 759-1466 Fax: (415) 564-0506
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CIRCLE 586 ON READER SERVICE CARD

DISKETTE DUPLICATION

Quality Duplication at Affordable Pricing ◆ Custom Labeling & Packaging ◆ Fast Turnaround

Disk & Dupe	500	2000	5000
5.25" DS/DD	.55	.53	.49
5.25" DS/HD	.79	.75	.69
3.5" DS/DD	.75	.72	.67
3.5" DS/HD	1.89	1.79	1.59

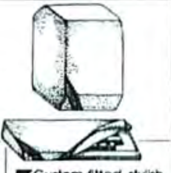
Prices Include Sleeves

(800) 426-0247
PRINCETON DISKETTE
432 Macarthur Dr. ■ Brick, NJ 08724

CIRCLE 563 ON READER SERVICE CARD

Dust Covers

for a Clean Machine



Protect your equipment from dust, spills, and aggravating downtime with ABCOM DUST COVERS for personal computers.

◤ Attractive, water resistant packcloth in NAVY, SILVER, or BROWN

◤ Custom-fitted, stylish, and durable.

◤ With the original rainbow ribbon accent.

◤ Extensive selection of dust covers for over 400 models, including:
- **IBM**
- **APPLE II SERIES**
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and numerous printers.

MC & VISA ACCEPTED. PLEASE WRITE OR CALL FOR COMPLETE PRICE LIST AND BROCHURE
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CIRCLE 552 ON READER SERVICE CARD

The Best Case Scenario
Airline Check-in or Local Use
Zero Halliburton Aluminum Mac Cases:
Lightweight, Durable, Distinctive Styling
Plus/SE IIcx II/IIx Monitor Cases
Portable Attache ImageWriter II
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CIRCLE 607 ON READER SERVICE CARD

Questions?

Use the Reader Service Card to request free information about the products you see in *The Macworld Catalog*.

For your ad to appear on *The Macworld Catalog* screen, call 800/888-8622.

BEST-SELLERS

BUSINESS SOFTWARE

Months on chart	Last month	This month	
61	1	1	**Microsoft Word** Microsoft
52	3	2	**Microsoft Excel** Microsoft
40	2	3	**Microsoft Works** Microsoft
48	4	4	**Aldus PageMaker** Aldus
21	5	5	**WordPerfect for the Macintosh** WordPerfect
2	6	6	**Quicken** Intuit
15	—	7	**QuarkXPress** Quark
37	7	8	**MacWrite II** Claris
14	9	9	**FileMaker II** Claris
3	—	10	**dBase Mac** Ashton-Tate

EDUCATION SOFTWARE

Months on chart	Last month	This month	
15	1	1	**Where in the World Is Carmen Sandiego?** Brøderbund
1	—	2	**Where in Time Is Carmen Sandiego?** Brøderbund
2	5	3	**Where in the USA Is Carmen Sandiego?** Brøderbund
28	2	4	**Reader Rabbit** The Learning Company
44	3	5	**Math Blaster** Davidson & Associates

ENTERTAINMENT SOFTWARE

Months on chart	Last month	This month	
6	1	1	**SimCity** Maxis Software
41	2	2	**Flight Simulator** Microsoft
4	3	3	**Tetris** Spectrum HoloByte
1	—	4	**Shufflepuck Cafe** Brøderbund
1	—	5	**Leisure Suit Larry in the Land of the Lounge Lizards** Sierra On-Line

NETWORK/DATA COMMUNICATIONS

Months on chart	Last month	This month	
40	1	1	**TOPS** TOPS
43	3	2	**LocalTalk** Apple Computer
36	2	3	**AppleShare** Apple Computer
9	5	4	**Netware for the Macintosh** Novell
7	4	5	**MacLink Plus** DataViz

HARD DISKS*

Months on chart	Last month	This month	
1	—	1	**MacKit 140** Toshiba America
21	1	2	**MacStack SD20** CMS Enhancements
4	3	3	**MacStack SD40** CMS Enhancements
32	—	4	**Apple Hard Disk 20SC** Apple Computer
6	—	5	**Apple Hard Disk 40SC** Apple Computer

ADD-IN BOARDS/MEMORY

Months on chart	Last month	This month	
1	—	1	**ColorBoard 264** RasterOps
30	3	2	**Radius Accelerator** Radius
1	—	3	**Spectrum/8 Series III** SuperMac
13	—	4	**Video Board/Large Screen** Ryad
17	3	5	**Radius Interface Display** Radius

UTILITY SOFTWARE

Months on chart	Last month	This month	
2	2	1	**Adobe Type Manager** Adobe
2	3	2	**SUM II** Symantec
2	1	3	**SAM** Symantec
2	4	4	**PC Tools Deluxe for the Macintosh** Central Point Software
1	—	5	**Fastback II** Fifth Generation Systems

PRODUCT WATCH

Recent or forthcoming products of particular interest.

ColorBoard 364 *RasterOps*
24-bit graphics and real-time video board

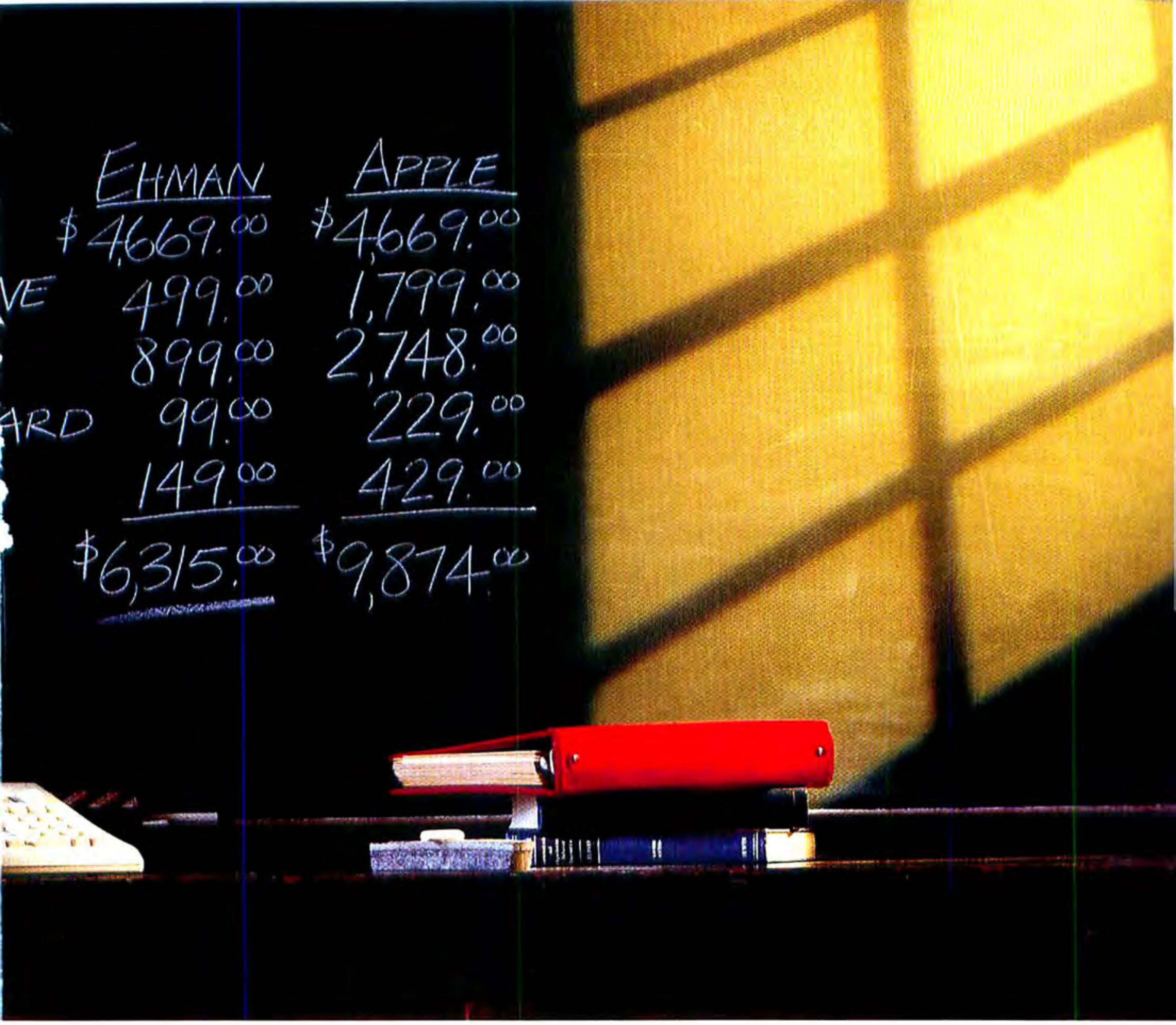
DrawTools *Paracomp*
Illustration tools for MacDraw II

Shade *SystemSoft* 3-D rendering package

Source: Exclusive InfoCorp survey of more than 125 Macintosh retailers and selected mail-order vendors. Covers sales during February 1990.

*Does not include hard disks installed at the factory.

Ehmanomics
101


EHMAN
APPLE
$4669.00
$4,669.00
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1,799.00
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2,748.00
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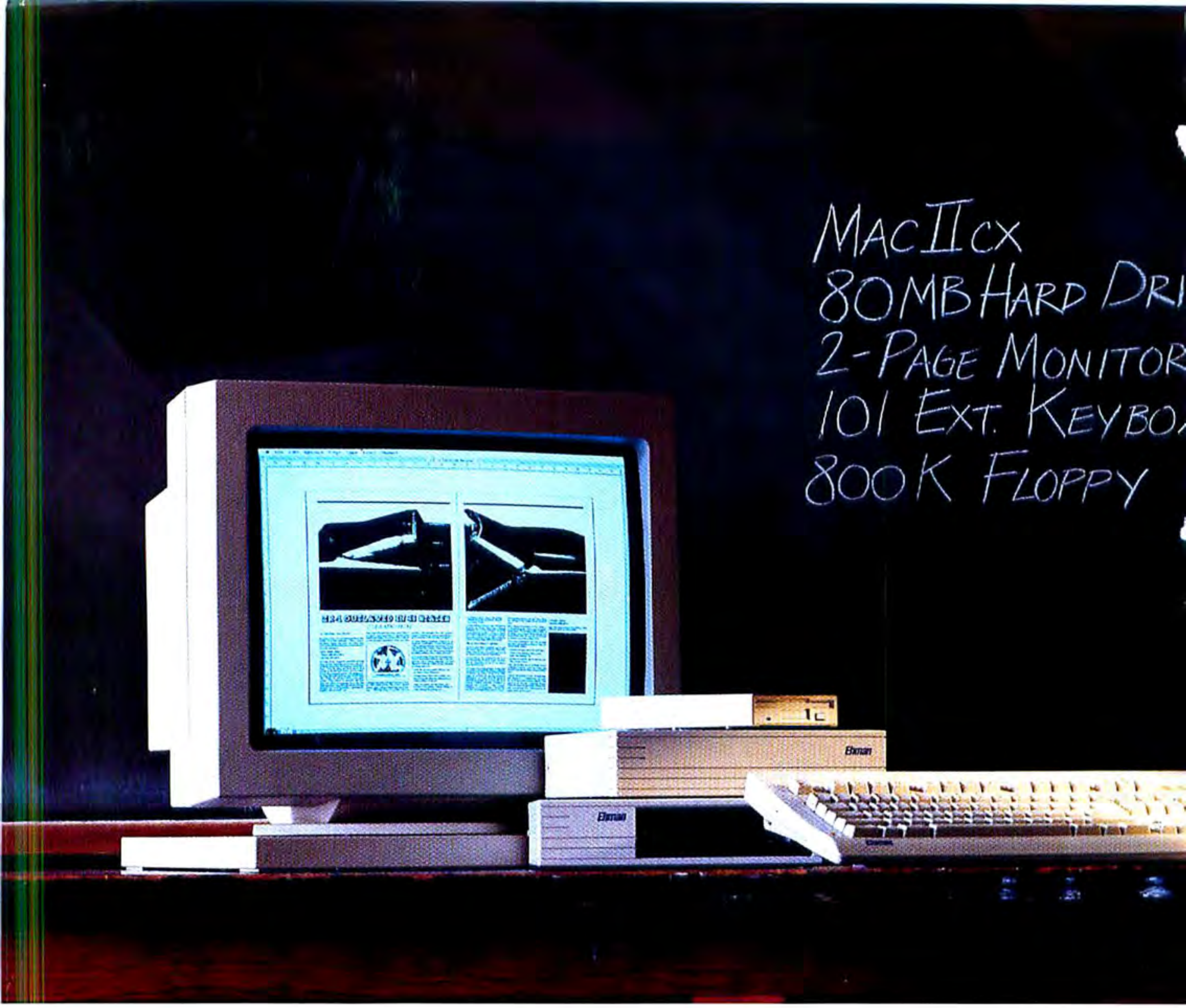
$6,315.00
$9,874.00



The Study of Su
Performance In Ma

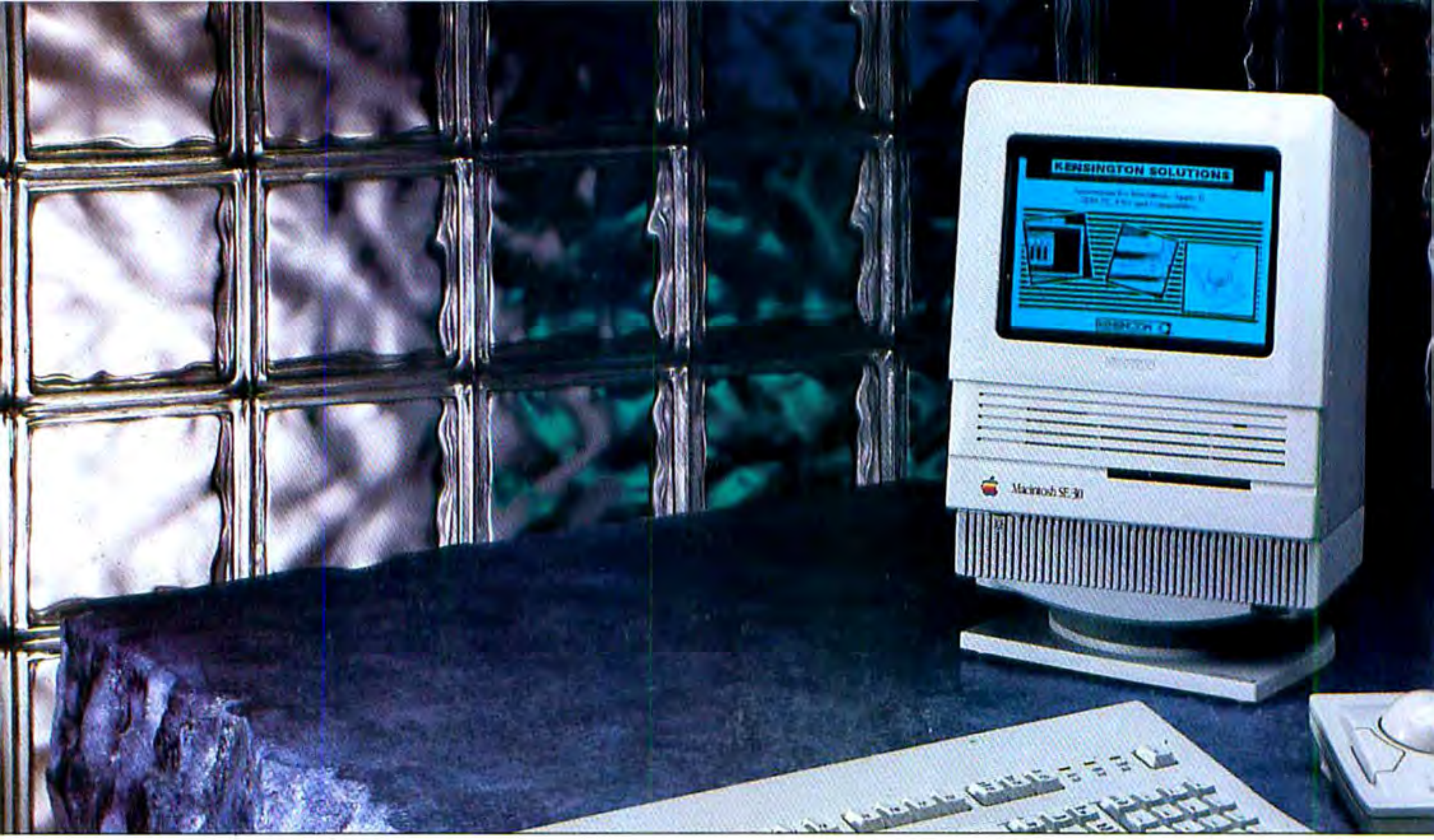
There is a concept they teach in college business classes. It goes something like this: When demand goes up, prices go up. That may be true in Economics, but not in Ehmanomics.

Ehman is now a leading manufacturer of Macintosh peripherals because we understand the real law of supply and demand: You need add-on peripherals, and we make them affordable.

It doesn't take a rocket scientist to tell you that because our quality is comparable to any on the market and our prices are lower, Ehman peripherals really are a better buy. Since 1985, tens of thousands of Mac users have been discovering that Ehman is out front in providing Macintosh users with the best combination of price and performance available.

Ehman can save you hundreds of dollars over a peripheral with an Apple logo on it, without sacrificing quality or performance. Our hard drives are fast, quiet and very reliable with a mean time between failure (MTBF) rating of up to 100,000 hours. Our two page monitor has a higher refresh rate than either Apple or Radius at less than half the price.

We even make one peripheral, a 45 MB Removable hard drive, that Apple doesn't. It's the



EYESORE VS. EYE PROTECTION

As today's monitors get bigger and brighter, anti-glare filters become less of an option and more of a necessity.

The right filter can combat eye fatigue, help eliminate headaches, even reduce overall body stress.

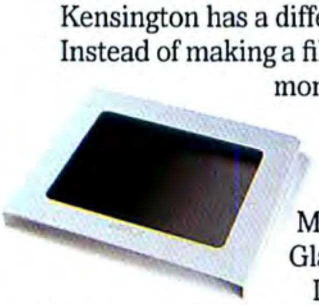
Yet, the irony is that something so good for your eyes can be such an eyesore.

In fact, most filters look like they belong to someone else's system.

The fit is sloppy. The colors don't match. The materials are different.

Kensington has a different idea.

Instead of making a filter that will fit on any monitor, we make filters that will only fit a *specific* monitor.



An example is our Maccessories® SE Anti-Glare Filter.

It looks so much a part of the SE, you would think it was designed by the same people who designed the SE.

Circle 30 on reader service card

The styling is complementary. The color identical. Even the same material is used.

And unlike generic filters, the fit is perfect. So light passes through the filter, never around it.

Kensington uses only optical quality glass with a ceramic anti-reflection and scratch-resistant coating.

The result is a 96% reduction in glare. And an improvement in contrast and clarity of up to 20 times.

In short, the most advanced eye-protection system you can find today–it even filters out VLF and ELF radiation and dissipates static.

Kensington has custom designed screens for the Mac, Mac Plus, Mac SE, Apple IIGS, as well as for the entire Mac II family of large screen monitors.

For a free brochure, and the dealer nearest you, call 800-535-4242. In New York call 212-475-5200.

KENSINGTON

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