54 NEW PRODUCTS: PAGE 211 ■ 35 PRODUCT REVIEWS: PAGE 172

MACWORLD

THE MACINTOSH MAGAZINE

May 1992 $3.95 Canada $4.95

NEW PRODUCTS

Mac LC II and LaserWriter NTR

How to Upgrade Memory

KEEPING YOUR MAC CURRENT: PAGE 142

69 Hard Drives Tested

MW LAB 300MB TO 2 GIGABYTES

Understanding SCSI

SEE PAGE 223

Personal LaserWriter

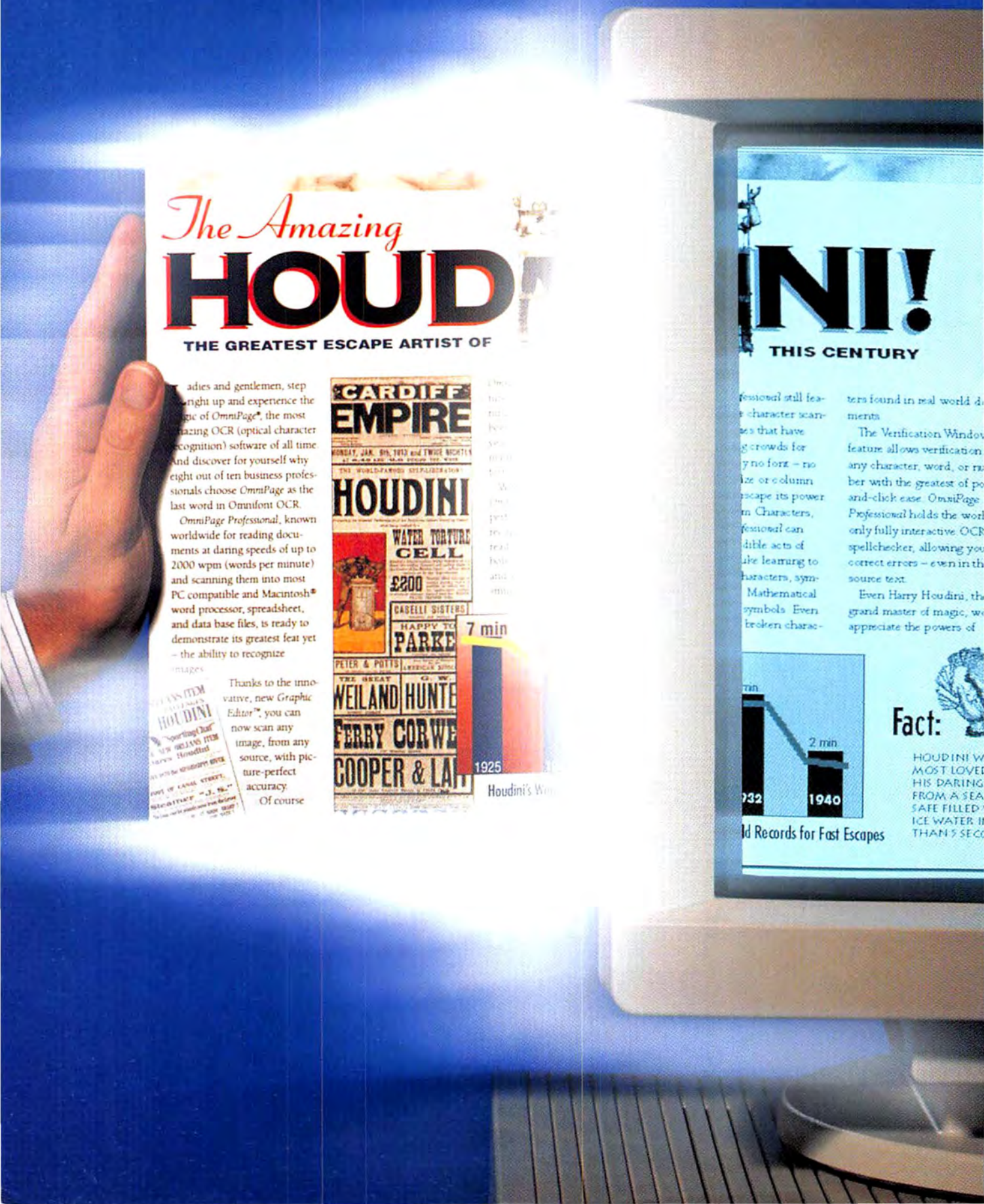
Improving Network Performance

MW LAB 15 ETHERNET BOARDS TESTED

A Visual Guide to Color Prepress

Macintosh LC II

OmniPage Professional...



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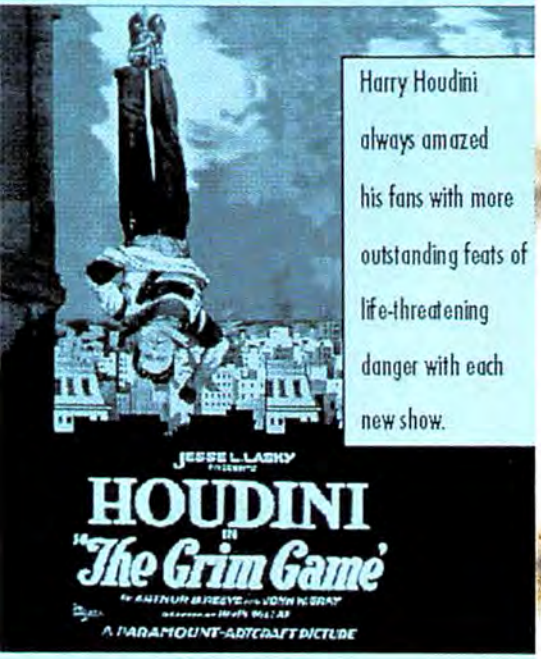

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Contents

MACWORLD THE MACINTOSH® MAGAZINE MAY 1992

FEATURES

MW LAB **More for Less: An Updated LC and LaserWriter Duo** 136

BY JIM HEID Apple upgrades the Mac LC and the Personal LaserWriter NT—but has economy beaten out innovation?

How to Keep Your Mac Current 142

BY SHELLY BRISBIN With System 7 and applications demanding more and more megabytes, adding memory to your Mac is quickly becoming a necessity. This step-by-step guide helps you choose the right kind of RAM for your Mac and shows you how to install it.

MW LAB **Moving Up to Ethernet** 150

BY DAVE KOSIUR Macworld Lab tests 15 twisted-pair Ethernet boards to find out how much they can speed up your network.

MW LAB **High-Capacity Hard Drives** 156

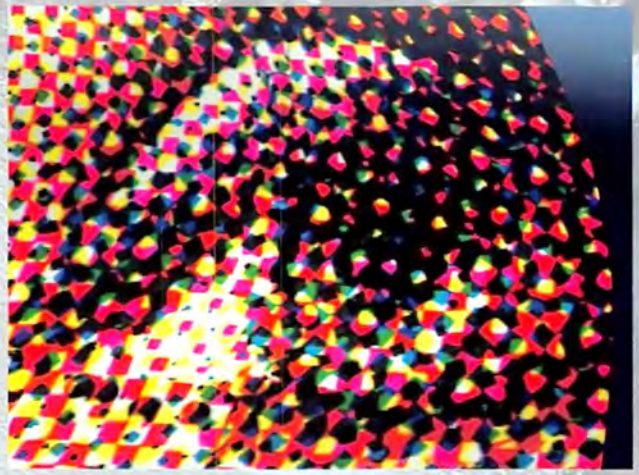
BY JIM HEID For some jobs only the biggest, fastest hard drives will do. Macworld Lab tests 69 of these monsters—ranging from 300MB to 2GB—to find the winners in quality, speed, and value.

Correct Color 166

BY SANJAY SAKHUJA If you've tackled the intricacies of color separations on the Mac, you'll appreciate our hands-on guide to solving prepress printing problems.

On the Cover

HOW DID APPLE MANAGE TO UPGRADE THE MAC LC AND THE PERSONAL LASERWRITER NT WITHOUT RAISING PRICES? FIND OUT ON PAGE 136. (PHOTO BY MARK JOHANN.)



Page 166

DEPARTMENTS

14 How to Contact Macworld

17 MacBulletin

21 Commentary/ Jerry Borrell
Macintosh clones come closer

31 Letters

51 Art Beat
BY CATHY ABES

55 The Iconoclast
BY STEVEN LEVY
System 7 disappointment

63 Conspicuous Consumer
BY DEBORAH BRANSCUM
Making Macs accessible

77 Updates

85 Lab Notes
BY TIM WARNER

109 News
BY DAN LITTMAN AND TOM MORAN

199 The Desktop Critic
BY DAVID POGUE
Label-making products

211 New Products

217 How To/Quick Tips
BY LON POOLE

223 How To/Getting Started
BY JIM HEID
SCSI

231 Where to Buy

288 Profile
Spaceship designer Lloyd Walker

290 Best-Sellers

REVIEWS

172 **Adobe Premiere and VideoSpigot**
Digital video editor and video-capture board and software

173 **Aldus PageMaker 4.2**
Page-layout software

176 **CA-Cricket Draw III 1.0**
Draw program

176 **Tiles 1.0.1**
Desktop organizer and file launcher

177 **GraphMaster**
Charting and graphing software

178 **DeltaGraph Professional 2.0**
Charting and graphing software

180 **MenuFonts 4.01**
Font utility

180 **Spectre**
Network arcade game

182 **VersionMaster 1.0.7**
Document manager

182 **NEC Intersect CDR-36M**
Portable CD ROM reader

189 **DataPivot 1.02**
Report generator

189 **Ringo LM 1.0**
Telephone-line–manager device

190 **Status Mac 2.0.2**
Network-management software

190 **Maple V**
Symbolic math software

191 **Math Shop, Math Shop Jr., Advanced Math Shop**
Mathematics education games

191 **ScanMatch 1.01**
Scanner calibration software

192 **Taste 1.02**
Word processor with page layout

192 **QBlazer**
High-speed modem

193 **ZP4 7.0**
Zip code verification software

Page 119

193 **Wallpaper 1.0.1**
Desktop-design software

194 **Shanghai II: Dragon's Eye**
Tile game

194 **Hot Keys 1.0**
Prerecorded macro package

195 **AudioTrax**
Digital audio and MIDI recording

195 **A Silly Noisy House**
Interactive preschool game

196 **In Control 1.0**
To-do list manager

196 **Panorama II 2.0**
Flat-file database

197 **American Discovery**
Geography game

197 **HardBall II**
Arcade game

Page 125

Page 156

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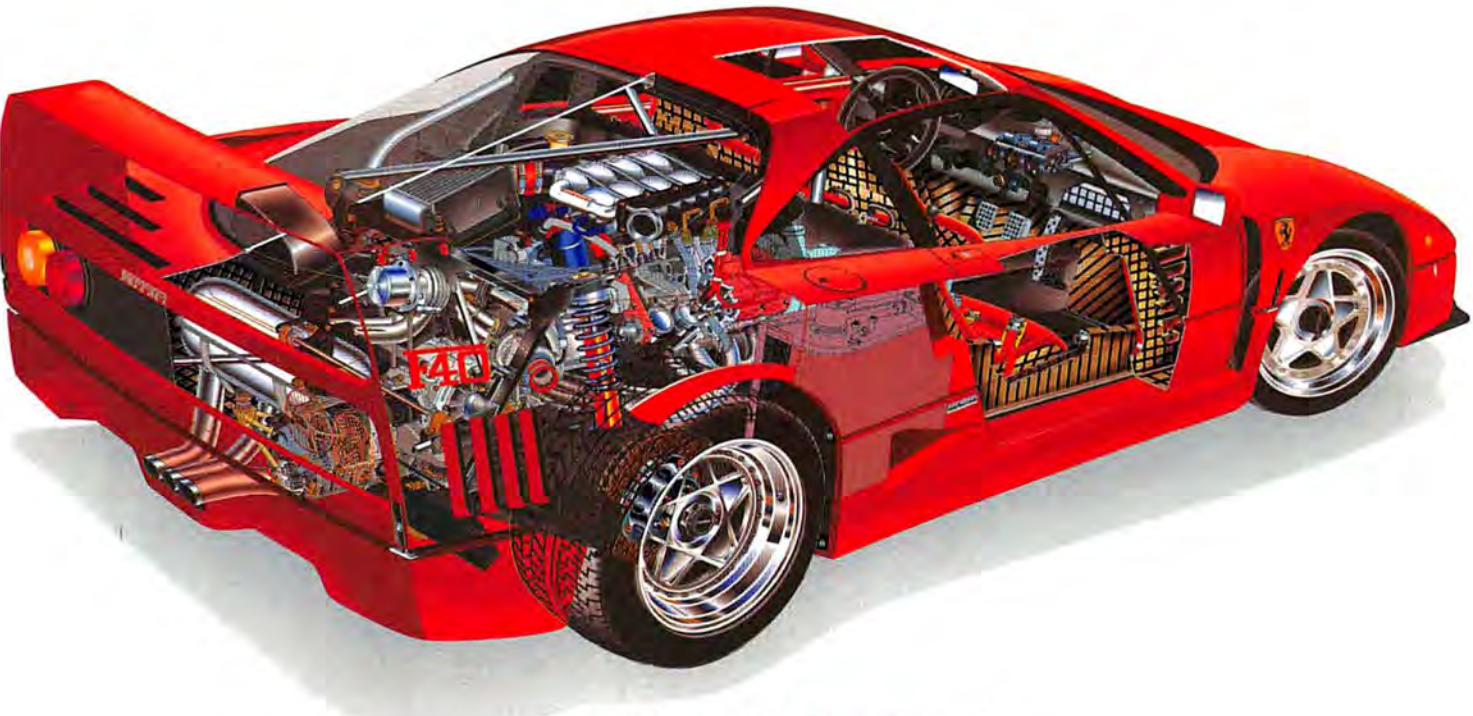

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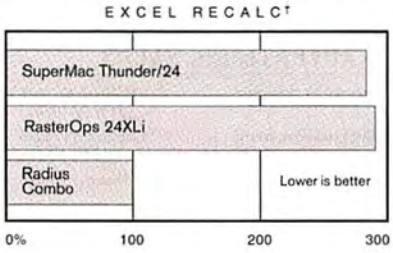

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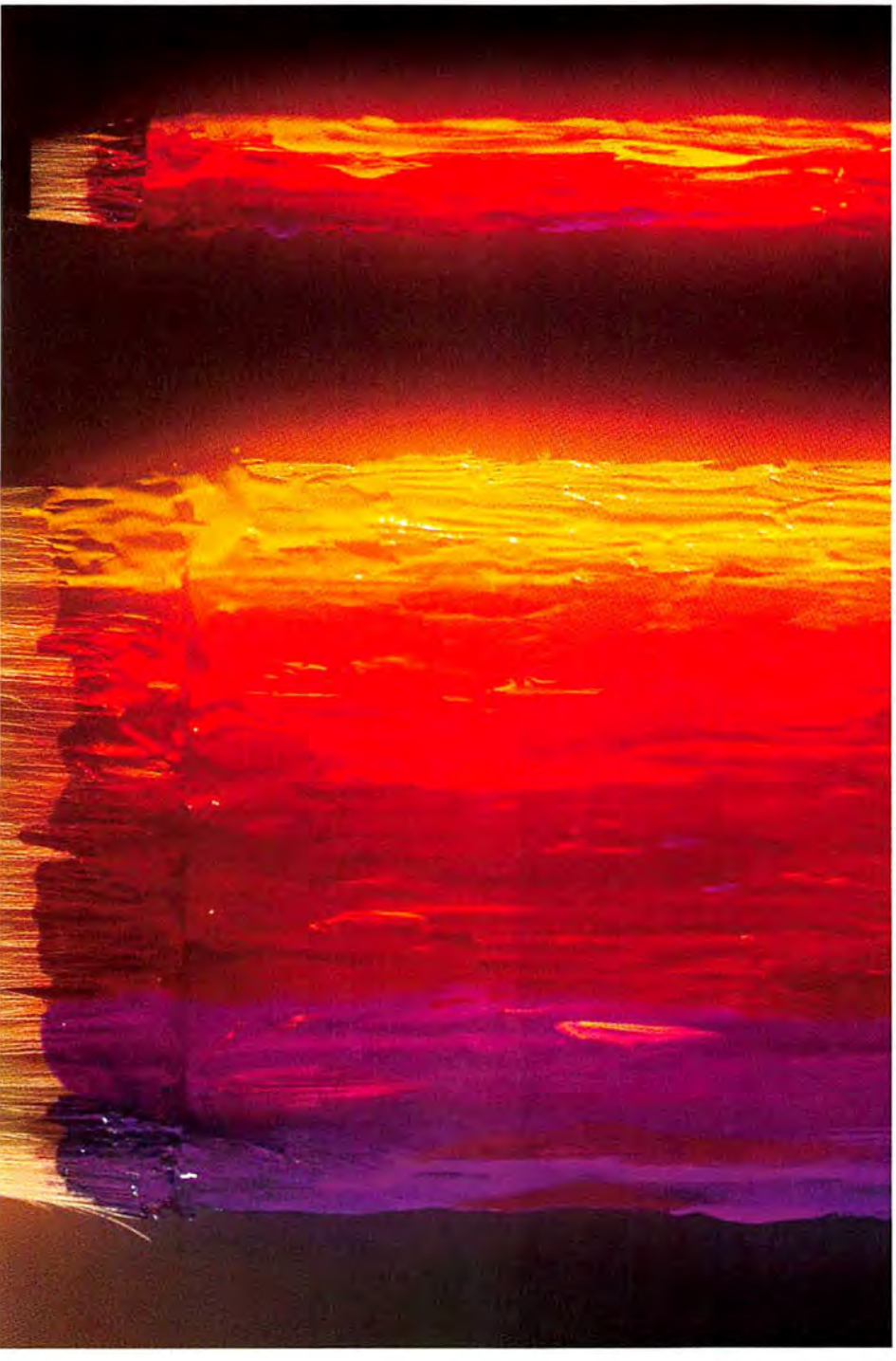

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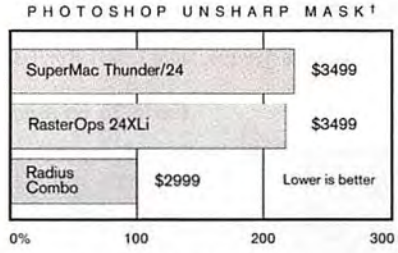

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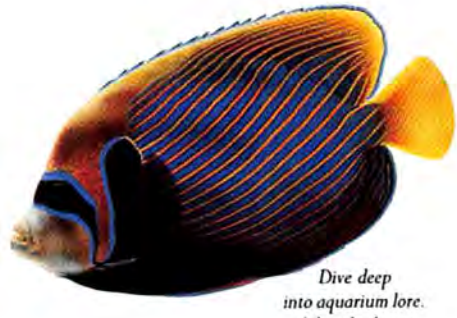

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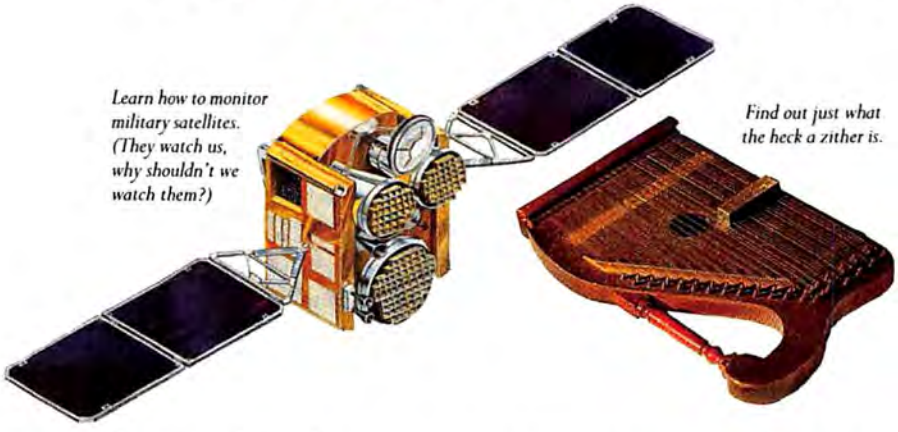

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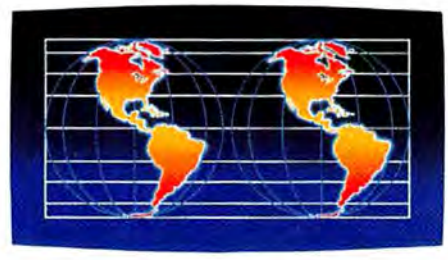

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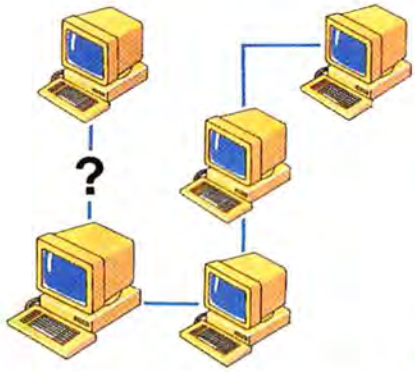

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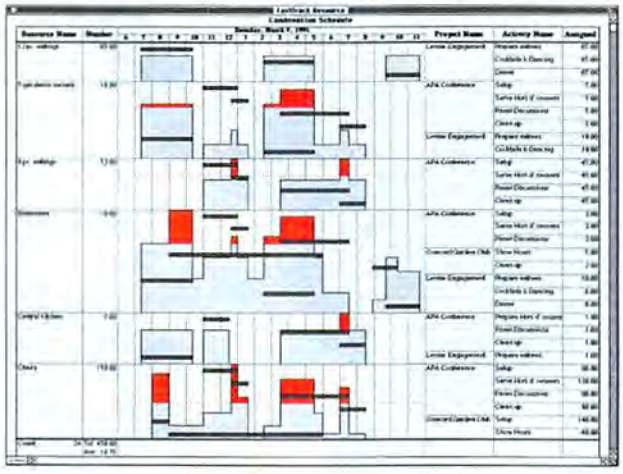

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MacBulletin

LATE-BREAKING NEWS

Apple announces repair programs for AppleColor High-Resolution RGB Monitors with defective capacitors and for trackballs on some PowerBook 140's and 170's. The serial numbers of affected monitors range from 7000001 to 7101012, from 5378111 to 5624450, and from 9000001 to 9029500. Apple says it has corrected the trackball problem, which sometimes shows up when other devices are connected to the ADB. Apple will replace trackballs under the warranty. Apple can be reached at 303/297-2321.

New Open Mail Spec: Apple, Borland, Lotus, and Novell have announced Vendor Independent Messaging, a specification to simplify making external E-mail functions accessible from nonmail software. Microsoft, which is promoting a competing Windows-only standard called Messaging Application Programming Interface, was absent from the announcement.

Odesta Breaks Up: Double Helix–publisher Odesta is breaking up, and a new company is forming to market Odesta's Mac-based products, including Double Helix and Matrix. The as-yet-unnamed company is owned by Albara, which also owns mail-order house Hardware That Fits. Odesta retains VAX-based Odesta Document Management System, but Odesta could not be reached for comment. At press time both companies were sharing Odesta's telephone number, 708/498-5615.

AlisaMail 3.0 adds QuickMail support to its ability to integrate Microsoft Mail with VAX E-mail systems, such as All-in-1 and VMSmail, as well as VAX-based mail gateways to other mail systems. Version 3.0 also provides tools for users to search VAX mail directories. Pricing depends on configuration. Alisa Systems is at 818/792-9474.

Printing Power: GDT Softworks' (604/291-9121) $149 PowerPrint supports QuickDraw printing from Macs to more than 850 laser and impact printers, including printers from Epson, NEC, and Canon. It includes a serial-to-parallel cable.

SuperMac's Spectrum/24 PDQ Plus is a faster, cheaper version of its Spectrum/24 PDQ accelerated 24-bit graphics adapter for large screens. The new board, which SuperMac (408/245-2202) says is twice as fast, is shipping now at a list price of $2399.

Moniterm has filed Chapter 11 and is looking for a buyer to take over the business. The company ceased production of its monitors in February. At press time Moniterm was still answering its phones (612/935-4151 or 800/933-5740).

Apple is offering trade-in credits for buyers or leasers of Apple equipment who want to turn in Apple or DOS-based computers or laser printers. Apple can be reached at 800/538-9696.

Some shortages of PowerBooks have occurred due to high demand for the 140 and the 170. Apple says it is making the notebook computers as fast as possible.

Back to Manhattan: Manhattan Graphics (914/725-2048), which recently reacquired DesignStudio 2.0 and ReadySetGo 4.5 from Letraset, is upgrading DesignStudio and calling it ReadySetGo 5.0. It's 32-bit clean, supports QuickDraw printers and TrueType, and lists for $395. m

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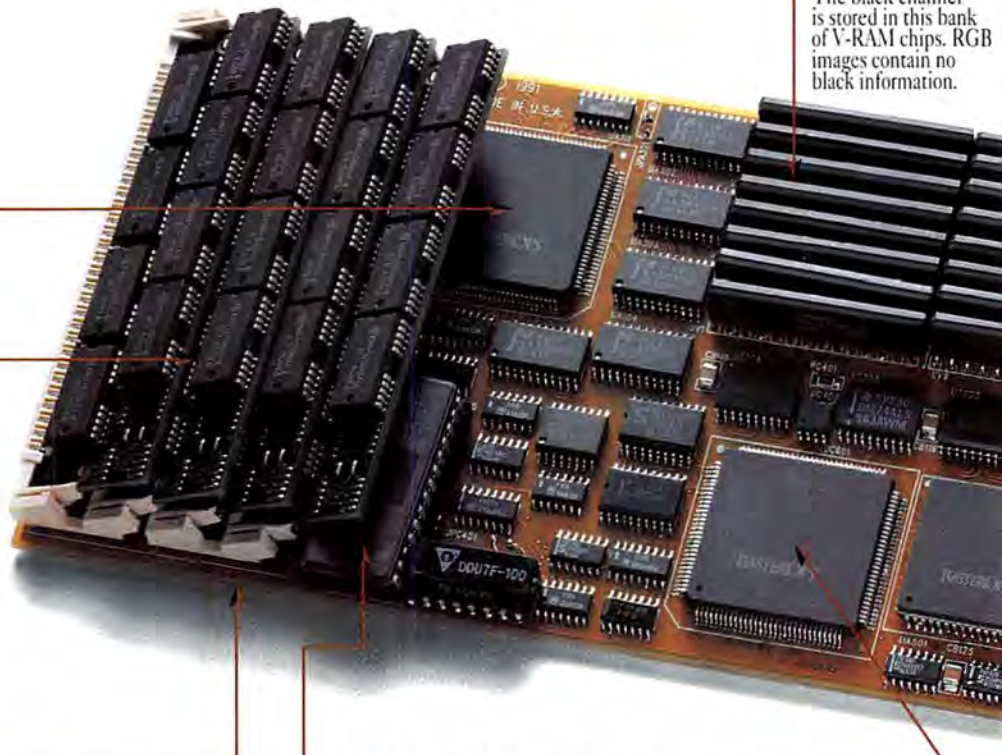

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ADVANCED 9-BIT DAC

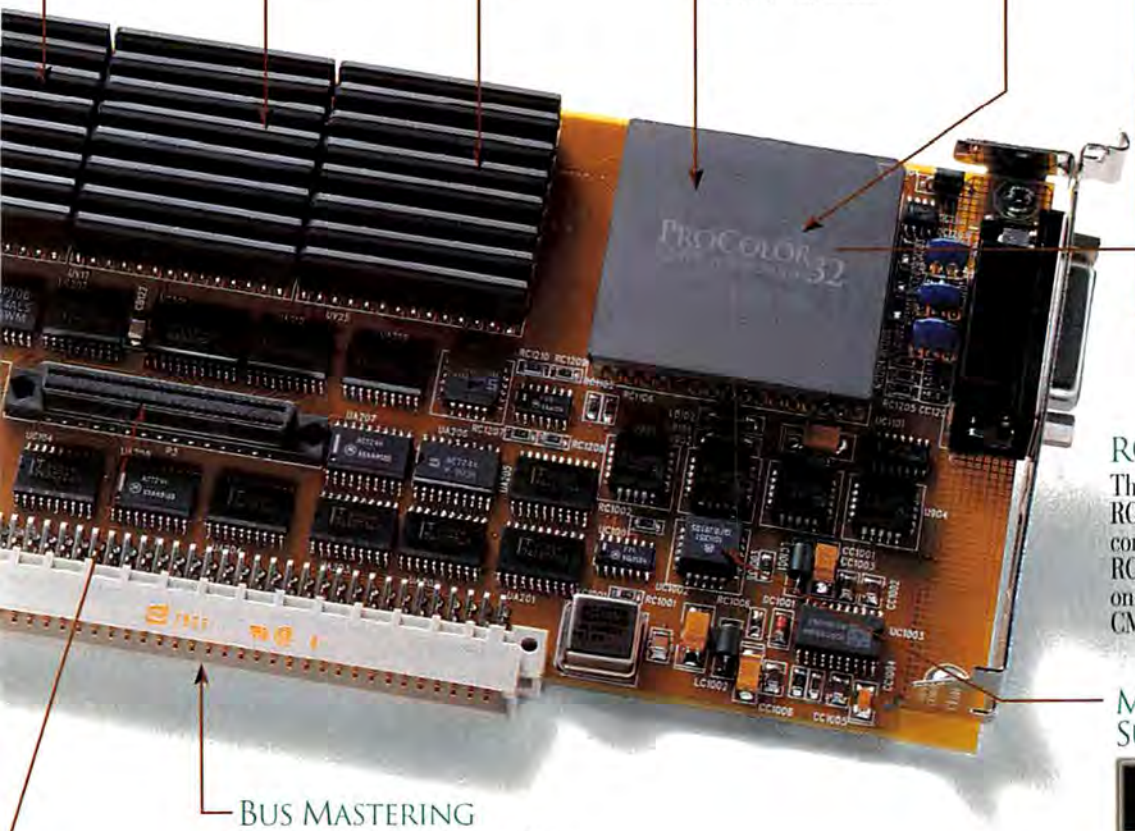
The 9-bit digital-to-analog converter (DAC) allows for gamma correction to be made without any on-screen color degradation.

In a CMYK image, the magenta channel is stored here. When working with an RGB image, the blue data is stored here.

In a CMYK image, the yellow channel is stored here. When working with an RGB image, the green data is stored here.

In a CMYK image, the cyan channel is stored here. When working with an RGB image, the red data is stored here.

The custom ASIC chip instantly converts CMYK data to RGB for screen display, bypassing time-consuming software conversions.



RGB MODE

The ProColor 32 supports both RGB and CMYK modes, providing complete compatibility with existing RGB software as well as simultaneous on-screen display of both RGB and CMYK information.

MULTIPLE MONITOR SUPPORT

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Opening Pandora's Box

BY JERRY BORRELL

IF APPLE LICENSES ITS OPERATING system to others, the resulting machines won't technically be clones in the same sense the word is used in the IBM PC market. But I think of them as clones because non-Apple computers (which may or may not be called Macintoshes) will be running the Macintosh Operating System and Mac applications.

The fact that there will be Macintosh clones is news to some, old news for others. Last year I quoted Apple's Mike Spindler when he stated unequivocally that the company would license its operating system. *Macworld* reported on a Macintosh clone under development by a company called NuTek in the April 1991 issue. Sony Corporation's manufacture of Apple's PowerBook 100 indicates one direction Apple is taking to ensure that there are more Macintoshes in the world.

Until recently, the discussion of clones had faded. Then in early February a company called Quorum announced a software "compatibility engine" that allows Mac applications to run on RISC-based computers from IBM, Sun Microsystems, Next, and Silicon Graphics (see *News* in this issue). At about the same time, Apple's behind-the-scenes work on clones began to gain notice. By early spring Apple's first formal step in broadening access to its operating system, licensing a subset of system code (otherwise known as the Holy Grail) to Radius, had been announced. And word began to slip out that Apple was aggressively courting vendors to build Mac clones.

Part of the impetus for Apple's drive to have others build clones of the Macintosh began when Apple shifted its business last year toward high-volume manufacturing with the Mac Classic and cut its overall profit margin to 31 percent. As a result of lower profits, the company had to change its way of doing business. Cost cutting, employee layoffs, fewer perquisites, loss of profit-sharing, more cost-conscious manufacturing, and a dramatic shift toward cautious budgeting ensued. Higher sales volume meant a higher share of all personal computer sales. Indeed, about 20 percent of all desktop personal computers sold in the United States last year were Macs. Apple executives were able to say they had addressed the concerns of Macintosh developers, as well as those of analysts and financial brokers, about whether Apple would be able to continue to grow. Given that kind of success, one might ask why Apple needs clones to pursue greater success in the personal computer market.

Why Apple Is Pushing for Growth

HOW MUCH MARKET SHARE DOES Apple want? One answer is that Apple wants to have as large a share of the personal computer market as is possible. Apple will soon face well-prepared clone developers for the first time. NuTek intends to announce its first clone machine at a major European computer show this summer. That means there will be Mac clones sold in the market from which Apple will derive no revenue. Apple is going to need its own clones if it's going to participate in such a market and gain market share. And this is an opportune time to pursue greater market share at the expense of DOS machines. Finally, I believe that John Sculley and Mike Spindler are bringing a flinty-eyed determination to bear on business. I think that Apple's executives believe they have the opportunity to lead the personal computer industry.

For all the grief and criticism that I and my colleagues in the media heap on Apple executives, they are as capable a group of people as those running any computer company in the world. Whether they are true leaders will be determined over the next six months as Apple pursues its own well-planned and aggressive strategy for developing Macintosh clones. At this stage luck is not involved—Apple's executives know exactly what they and other companies are doing.

The long wait for clones is almost over. Surprise—Apple is going to help.

Pandora's Box

WHEN OTHER COMPANIES finally began cloning the IBM PC's hardware and Microsoft's ROM BIOS, IBM lost control of its own market and became a minor player with its own technology. Apple's planners remember the IBM PC market, and their plans are acutely tuned to making Apple grow.

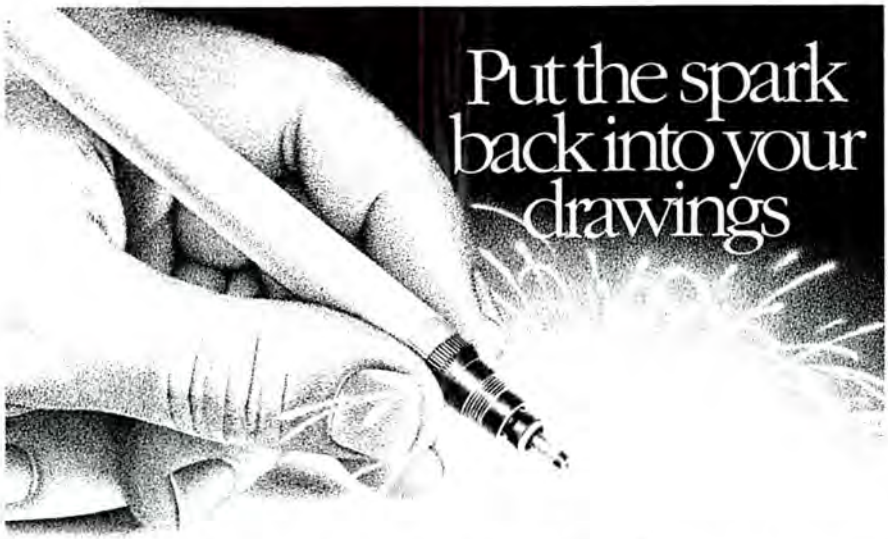
Of course, the model on the PC side is not strictly analogous to the Mac market. The IBM PC market changed when Phoenix Technologies developed a clone of the IBM PC's ROM-based operating system that Microsoft had developed for IBM. That development meant that anyone who built an 8086-based PC and used Phoenix's ROM BIOS would have a computer that could run Microsoft's DOS and therefore DOS applications. Then several companies, most notably Chips and Technologies, began to build sets of silicon chips that both emulated Intel's higher-cost microprocessor and integrated supporting chips into the chip set. Manufacturers could buy cheaper hardware and software equivalents to IBM's and Intel's offerings—and did, to the tune of 60-million-plus DOS clone computers.

NuTek has approached cloning the Mac by playing the roles of both Phoenix and Chips and Technologies. NuTek has written its own operating system for its Mac clone and has implemented this code in a chip set. NuTek too plans to sell its technology to original equipment manufacturers, other companies that will build and sell computers incorporating NuTek hardware and software that can run Macintosh applications.

Quorum's approach in the near term is different—to help developers convert their Mac applications to code that will allow the applications to run on other companies' RISC-based platforms. Quorum can already demonstrate three Macintosh applications—Aldus Persuasion, Claris's MacWrite, and Cambridge Scientific's ChemDraw—running on Next, IBM, Sun, and Silicon Graphics workstations. This approach should prove less threatening to Apple—and more encouraging to those who develop software for the Mac—because it opens a new market (of more than 1 million installed workstations) to Mac applications.

Ironically, Apple could be

continues



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seen as pursuing this same strategy in establishing Taligent with IBM, since one goal of that group will be to produce an operating system that allows Mac applications to run on multiple platforms. But by deciding who will receive access to the Macintosh Operating System, and how, Apple effectively gains control over those companies, as well as the future of the Macintosh.

Apple hopes to forestall the efforts of companies not anointed by its approval. And Apple wants to allow others to build true commodity machines ($500-to-$700 Macs). It has traditionally allowed its developers to prepare the ground for new high-end technologies such as high-performance graphics or the new multiprocessing RocketShare software from Radius that supports up to four 68040 Rocket boards running on the NuBus. In the near term, offering new market opportunities to its long-suffering developers looks like a just reward. By increasing the number of Macs sold, Apple not only offers developers more incentive, but also pursues its goal of growth at the expense of DOS and Windows computers.

The Maturing Market

ANOTHER TRUISM: THE MARKET FOR Macintosh has matured. Technology now moves forward incrementally. The easy problems have been solved. The tough problems—international text, color prepress, high performance, true multitasking, real-time software-based video, type, faster printing, networking, and other issues—have to be addressed. These problems will take time.

The only way to ensure that the Macintosh market continues to have the strength and resiliency to wait for solutions to the problems above is to derive new revenues from Macintosh sales to new customers while the problems are being worked on. Apple's developers need new customers for their software applications. New customers for their peripherals. Apple must continue to grow if it is to reconcile its requirements for R&D spending with stockholder demands for profitability. It has to grow in order to ensure that it will not become one of the dozens of failed Silicon Valley companies.

So the race for market share is on. Licensing its operating system and developing Mac clones is vital to Apple's continued success. The issue now becomes whether Apple can put its strategy into place before NuTek or Quorum have a chance to succeed. And whether Apple, once it helps open the market for clones, can control its own destiny. One thing is certain: as the Mac market matures, it's becoming much more complex. **m**

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La Cie's PocketDrive eliminates the hassle of fumbling with cables at the back of your Macintosh every time you connect or disconnect the drive. Instead, the PocketDrive comes with a unique PocketDock™ desktop docking cable that lets you plug in the PocketDrive in seconds. With a second PocketDock (only $99), you can have fast and easy connection at work and at home. There's even a miniature T-connector (only $59) for connecting to other Macintosh systems.

Pocket Silverlining and an extendible 2-Year warranty.

Every PocketDrive comes complete with one PocketDock, our award-winning Silverlining hard disk management software and our extendible 2-Year Limited Warranty. For only $1 per MB, you can enjoy 72-hour warranty service for up to 5 years.

Price does not include shipping. Add 5% surcharge for American Express. Add sales tax where applicable. La Cie is a trademark of La Cie, Ltd., a Quantum Company. All other trademarks are the property of their respective companies. All specifications, terms, descriptions, products and services herein are subject to change without notice or recourse. La Cie, Ltd., all rights reserved, printed in U.S.A.. © Copyright 1991. 19552 SW 90th Court, Tualatin, OR 97062. Phone: (503) 691-0771, Fax: (503) 691-5590.

# of our size.

La Cie CirrusOptical Drive

Set your sites on a CirrusOptical™ magneto optical drive.

Introducing CirrusOptical. La Cie's remarkable new 3 1/2" magneto optical drive that offers massive storage capacity, superb reliability and high-speed performance in a compact case.

Space consciousness.

Smaller, faster and less expensive than conventional optical drives, La Cie's CirrusOptical uses cartridges that are the same size as 3.5" floppies, but store eighty-eight times more data than high-density floppy disks. Engineered to fit within our space-saving, award-winning Cirrus case, the CirrusOptical offers the reliability of optical media, 30ms seek times and the economy of removable cartridges.

La Cie MicroOptical Drive

$1699

Lose Weight. Lose Wait.

Until now, optical technology had a reputation for being slow. CirrusOptical drives at 45ms are faster than the conventional opticals. La Cie's CirrusOptical leaves the others in the dust.

Try one on for size.

When you need major-league performance in a pint-sized package, call us. We offer surprisingly small prices and a huge commitment to service and support.

"I'm now taking the safer course of buying from corporate-owned companies such as Quantum-backed La Cie..."
MacWeek

LACIE LIMITED
A QUANTUM COMPANY

To order or for more information, call toll-free

800-999-0143

6 a.m.-6 p.m.PST Mon.-Fri.
International 503-691-0771 Fax 503-691-5590

We're proud

The drive to satisfy.

At La Cie customer satisfaction is the driving force behind everything we do. From our innovative product design to our capable, courteous customer support, La Cie goes the extra mile to assure you quality, service and value.

La Cie award winning chassis. Quantum power under the hood.

Sleek. Streamlined. Easy handling. Economical. La Cie drives deliver the advantages of award-winning design and state-of-the-art technology. Inside and out. For high-speed performance you can depend on, all La Cie hard drives up to 400MB incorporate the world's most respected and most trusted drive mechanisms–Quantum!

La Cie hard drives from

$299

Internals. Space savers. Portables.

La Cie offers customers a complete line of hard disk drives featuring state-of-the-art components, whisper-quiet half-speed fans, access times as low as 15ms, wide-range power supplies and La Cie's exclusive switchable termination and SCSI ID.

- 50MB-1.6GB Internal
- 50MB-1.6GB ZFP
- 50MB-400MB Cirrus
- 50MB-400MB Tsunami
- 50MB & 100MB Bacster™
- 40MB & 80MB PocketDrive

Drive the La Cie Express.™

We love all our drives, but take a look at our newest arrival. La Cie's new ExpressDrive™ Perfect for sensitive installations, the ExpressDrive is empowered with the performance of a Quantum fixed drive and the security and convenience of a removable drive, yet none of the risks of open-air media.

ExpressDrive from

$Call

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# of our drive.

Readable. Writable. Removable.

Economical, versatile, ideal for archival backup, La Cie's comprehensive line of removable media options includes:

- Removable cartridge drives
- ExpressDrive
- 3 1/2" & 5 1/4" magneto opticals
- CD ROM

Every drive has a Silverlining.

Acclaimed the most powerful hard disk manager available, La Cie's Silverlining is included free with every hard drive!

Tape backup with Retrospect.

Tape drives from

$649

Tucked neatly inside our Cirrus case, La Cie's 155MB or 600MB tape drives and 1.2GB or 2.0 GB DAT drives come with Retrospect software offering easy, economical data protection.

Up to 5-year warranty.

Ask about our generous warranties. La Cie offers up to a 5-Year Limited Warranty on Quantum drives and a speedy 72 hour turn-around on all warranty service!

Ready for a drive.

Don't let the quest for the right mass storage solution drive you wild. Call us. Our friendly, highly qualified staff will gladly help you select the perfect device to suit your needs and budget.

"Silverlining has bailed me out of so many tough situations, I've lost count."
Bobker's Dozen Best, MacUser, December, 1990

"La Cie hard disks are the most reliable and convenient disks I've ever had..."
James J. Haf, Lansing, MI

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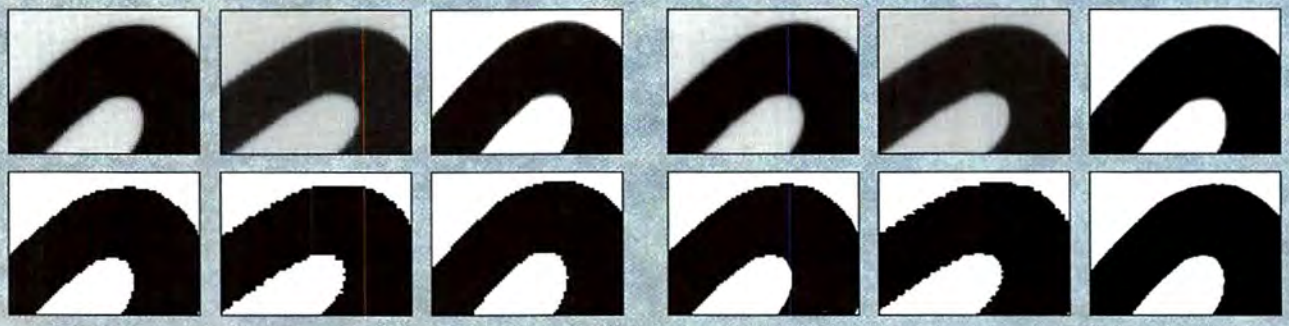
International 503-691-0771 Fax 503-691-5590

We're proud

Microtek 600ZS $2,195*

Howtek Scanmaster 3 $8195**

La Cie Silverscanner $1,399



Microtek 600ZS 300 dpi at 1600%

Howtek Scanmaster 3 300 dpi at 1600%

La Cie Silverscanner 300 dpi at 1600%

Microtek 600ZS 600 dpi at 800%

Howtek Scanmaster 3 400 dpi at 1200%

La Cie Silverscanner 600 dpi at800%

Image is everything.

We believe quality is a priority. Our image as a company that produces quality products is well known. We're so confident in the quality of our scanner image that we are willing to compare it to other scanners right here. Compare for yourself.

Great color the first time.

Just look at the difference in the color scans. The single-pass Silverscanner has three separate noble gas-filled lamps for red, blue and green that are balanced so you get great scans the first time. With Silverscanner's built-in gamma correction, you get clean, bright scans with excellent detail in those hard-to-get areas that don't require difficult adjustment like other scanners. This can mean substantial time savings when every second counts.

The shadow knows.

Do you want good shadow detail? Then compare the black and white scans. The Silverscanner can give you production quality gray-scale scans for magazines, newspapers and brochures.

Lay it on the line.

When comparing line art, the Silverscanner really shines! At 1200 dpi you get what amounts to an ***electronic stat***. The comparison is incomplete, however, because some scanners don't have hi-res capability (too bad). But even if you compare at 400 or 600 dpi, it's clear how much better the Silverscanner is, especially bundled with Color It!

La Cie Silverscanner with Color It

$1399

Price does not include shipping. Add 5% surcharge for American Express. Add sales tax where applicable. La Cie is a trademark of La Cie, Ltd., a Quantum Company. All other trademarks are the property of their respective companies. *Price advertised in Macworld, Sept. 91. **From Howtek price list, effective 3-1-91. All specifications, terms, descriptions, products and services herein are subject to change without notice or recourse. Bundles in U.S.A. only. Ad design and production by Graphic Witness. Subject photos by Dennis Carney. © Copyright 1991 La Cie, Ltd., 19552 SW 90th Court, Tualatin, OR 97062. Phone: (503) 691-0771, Fax: (503) 691-5590). All rights reserved. Printed in U.S.A.

# of our image.

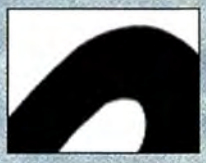
Microtek 600ZS $2,195*

Howtek Scanmaster 3 $8195**

La Cie Silverscanner $1,399

Microtek 600ZS
1200 dpi at 400%—n/a

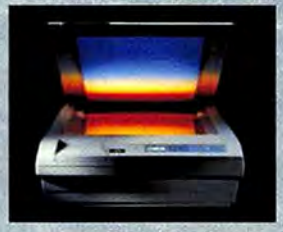
Howtek Scanmaster 3
1200 dpi at 400%—n/a



La Cie Silverscanner
1200 dpi at 400%

La Cie Silverscanner
1200 dpi at 100%

All scans were done at default settings with no corrections. The color images were separated using Adobe Photoshop. The logo was scanned as grayscale and as line art. This entire ad was done on the Macintosh using Silverscanner, Photoshop, Quark XPress and a PostScript Imagesetter. The entire production cost was $145.



Software to die for!

We're proud of our image when it comes to quality software, too. La Cie has always had a reputation for powerful, well-written software. La Cie's exclusive plug-in modules for Photoshop, ColorStudio, Digital Darkroom, Enhance, ImageStudio and RagTime have been hailed as some of the best software ever written for flat-bed scanners. Enjoy features like fast dynamic ***color*** previews, independent color/brightness controls, nine scan modes, savable scan settings, color dropout, magnified previews, proof scans, 25% to 400% scaling in 1% steps, and 25 dpi to 1200 dpi in 1 dpi steps.

Silverscanner is OCR and Apple System 7 compatible and can be purchased with full versions of Adobe Photoshop ***and*** Letraset's ColorStudio— a $2139 value for only $1899!

La Cie Silverscanner with Photoshop and ColorStudio

$1899

Who ya gonna call?

La Cie offers you toll-free expert technical support. We know scanning inside and out. We can help you. And we'll be here for you tomorrow because La Cie is a Quantum Company.

Seeing is believing.

La Cie is so proud of the Silverscanner, we used it to produce this ad. Not just the comparisons, ***everything.*** Call and order yours today.

"The choice is clear . . . buy the La Cie Silverscanner."
Macworld, June 1991

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International 503-691-0771 Fax 503-691-5590

We're proud of our value.

50MB Quantum $299*

50MB	$299 Int.	$339 Ext.	155MB Tape Drive	$649
100MB	$429 Int.	$479 Ext.	600MB Tape Drive	$999 ~~$1199~~
120MB	$529 Int.	$579 Ext.	1.2-2.0GB DAT Drive	$1499 ~~$1799~~
240MB	$729 Int.	$789 Ext.	128MB CirrusOptical	$1699
400MB	$1399 Int.	$1499 Ext.	ExpressDrive	$Call
1.2GB	$2009 ~~$2749~~ Int.	$2099 ~~$2899~~ Ext.	Silverscanner	$1399
80MB PocketDrive	$649		Silverlining	$149

Call for products not listed.

You'll be delighted at La Cie's competitive prices. Especially when you consider what you get absolutely free. Like our acclaimed Silverlining software. Five megabytes of public domain software. A 2-Year Limited Warranty on Quantum mechanisms (extendible to 5 years). 72-hour turn-around on warranty service. Prompt, courteous, competent service.

At La Cie, we take pride in the unsurpassed value we offer customers. From our state-of-the-art technology to our award-winning design, La Cie never stops working to bring you better products and services than ever before. And because we're a Quantum Company, you can be assured La Cie will continue to provide you service and support for years to come.

LA CIE LIMITED
A QUANTUM COMPANY

To order or for more information, call toll-free

800-999-0143

6 a.m.-6 p.m.PST Mon.-Fri.
International 503-691-0771 Fax 503-691-5590

*Prices subject to change. Please call for lowest current prices and volume discounts.

Letters

MAY 1992

PowerBook Fans and Foes

MY CONGRATULATIONS TO GAlen Gruman for being willing to give that type of abusive testing to the PowerBook 170 (*Reviews*, February 1992). His comments on the sturdiness and durability of the unit add a new dimension to hardware reviews, and I would like to see more of it.

Marc Glasgow
via CompuServe

BEFORE I READ YOUR REVIEW I WAS privileged to try out the Macintosh PowerBook 170. I found the product perfect in every detail. I have tried many DOS laptops, and the PowerBook 170 so far exceeds their feel that I don't even see them as comparable. Your commentator simply had a negative, subjective twist to everything.

Wayne Bent
Sandpoint, Idaho

AFTER A FEW MINUTES OF TINKERing around, I noticed that one pixel on my PowerBook 170 screen wasn't actively turned on. Apple's service department told me that Apple wouldn't take back or repair the computer unless five or more pixels were burned out.

Apple shouldn't have built a machine with a display that it knew had defects, let alone sell it for a high price tag. I believe that if you pay top dollar for a product, it should be perfect.

Scott Handley
Santa Clara, California

THE MACINTOSH POWERBOOK IS one of the most elegantly engineered pieces of machinery that I have ever owned. Basically, I find it hard to imagine that any Macophile would be disappointed with one of these machines. The PowerBooks have set Macintosh users free in a new way.

Peter Cotsis
Hillsdale, New Jersey

New Design: Better or Worse?

I LIKE THE NEW LOOK AND FEEL. I think the color drop cap effect makes the Q&A area of *Quick Tips* easier to read and visually appealing.

Aaron Alpher
Ashburn, Virginia

THE LAYOUT OF THE NEW ISSUE IS too busy! Following the text as it changes columns (as in *Macworld News*) is difficult. There is also not enough white space on the bottom and sides of pages.

Although I don't mind the small text used for the *New Products* section, I'm sure others, with average eyesight, would appreciate a somewhat larger type.

Darren Hayes
Eugene, Oregon

THE NEW LAYOUT IS HARD TO READ and makes it very confusing to find information. Even the late-breaking-news page (*MacBulletin*) is hard to read and does not look as important as it did before.

Les Clark
Edwardsville, Illinois

I THINK THE NEW *MACBULLETIN* LAYout is great. It is extremely easy to read in large type, and the pale green background is restful on my eyes.

However, I find the type too small in the responses to letters and in the *Reviews* and the "Editors' Choice" sections. To add the extra eyestrain of focusing on very small type to that from looking at a VDT all day is to add insult to injury.

Andrew Ruff
Palo Alto, California

The Desktop Opinion on DTP

DESKTOP PUBLISHING DIVERSIFIES" (February 1992) is the most complete and objective review I have seen of DTP programs. In particular, I appreciate

continues

Royalty Checks.
(wow! for my program?)

Cash Advances.
(nothing like cold, hard cash.)

Fame & Fortune.
(I could look good in a limo...)

Sound Good?
(you betcha! where do I sign?)

If you've written this year's blockbuster Macintosh utility or game, we want to publish it and give your name well-deserved exposure. But do not send evaluation copies of your products just yet! Unsolicited samples will be returned. If you have a program ready to market, please send us your name and address and a short, one paragraph description of your product. We will provide you with an application packet and detailed instructions to ensure that the intellectual property rights of both parties are adequately protected. Please write to: John Runser, Kiwi Software, Inc., 6546 Pardall Road, Santa Barbara, CA 93117 or E-Mail to AppleLink D0862, America Online KiwiSoft, or Compuserve 73207, 1276.

(okay, but I want my contract to state: "No yellow packaging!")

Kiwi SOFTWARE, Inc.

CORRECTIONS

The Iris SmartJet costs $49,000, including a $10,000 Adobe RIP ("Color Printer Progress," April 1992). The Iris 3047 Color Ink Jet uses paper as large as 34 by 47 inches.

George Forman is a videographer only, not a karate teacher ("Frame by Frame," March 1992).

*The correct phone number for Amtex Software Company, maker of Tristan, is 613/967-7900 (*Reviews, *March 1992).*

*Quicken's minimum System requirement is 4.1 (*Reviews, *December 1991).*

the detailed attention to strengths in typography and type manipulation. I bought PageMaker earlier this year and soon found myself confronted with one review after another saying QuarkXPress was the superior program. The support for this choice always seemed to be Quark's kerning control and its features for trapping. Thanks to Mr. Heid's article, I can now see that PageMaker in fact offers many excellent features that Quark doesn't and vice versa. Instead of a popular opinion, I now have a good knowledge of each program's strengths and weaknesses.

Stephen Hagen
Costa Mesa, California

YOU MENTION THAT PAGEMAKER'S kerning controls aren't as precise as Quark's, but the difference shows up only in large point sizes. I object. Quark provides the best tools for kerning and the ability to set up kerning tables. In an environment like *Money* magazine, where high-quality typography is an absolute necessity in all point sizes, we realized that the kerning values for font pairs that we used in small sizes, medium sizes, and display sizes were very different. Therefore, to provide a true interface on both the design and editorial sides, we were forced to use Fontographer to create three font masters. The kerning values are very different, because as the point sizes get larger, the character relationships are greater.

Andy Schwartz
Editorial Systems Manager
Money *Magazine*
New York, New York

Jim Heid responds: "What you're describing—varying intercharacter spacing depending on point size—is tracking, and PageMaker handles it best, allowing five kern tracks per font versus QuarkXPress's one. But as I pointed out in the article, you have to buy a third-party product, PMtracker from EDCO Services (800/523-8973, 813/962-7800), in order to create your own kern tracks."—Ed.

Computer Era Commiseration

UNLIKE STEVEN LEVY, I DID NOT have the privilege of an after-sale follow-up call from Computer Era (*The Iconoclast*, February 1992). In fact, I received no return calls at all to my several anxious inquiries as to why the SE/30 with 4MB of RAM and an 80MB hard drive that I had bought was equipped with only 1MB of RAM and contained no hard disk! I'm sure if my name had been Steven Levy, with my picture appearing in every issue of *Macworld*, I too would have enjoyed a more satisfactory experience.

Fred Screiber
New York, New York

WILISCHER-GRODHER, THE EDITOR of the *Mac Street Journal*, wrote "...no store employees have ever returned our numerous calls or would connect us to anyone on the executive staff." Inexcusable, yet perhaps understandable, behavior from a company called to account by inquiring columnists. But hey, take heart: we were under an expensive technical-support contract with Computer Era in 1990 and received exactly the same treatment.

Craig Swanson
New York, New York

THOSE LETTERS FROM SATISFIED customers of Computer Era may not be as unsolicited as Steven Levy thinks. When I bought my LC there a few months ago my salesman asked me twice to write a letter to his manager telling him how good I thought that salesman was. I almost did it, until I remembered that I had to wait for hours to complete the sale, was pressured mercilessly until I made it clear I wasn't going to pay for services I didn't need, and was sold two smaller items that were not even in stock, but that were available in a dozen stores nearby for 10 percent to 20 percent less. I did, however, get a good price on my major equipment, which is probably why people will keep going to Computer Era.

Peter LaVigne
New York, New York

EVEN THOUGH IT HAS BEEN THREE years since I screamed obscenities at the man from Computer Era who sold me my IIcx and laser printer, let me add my hoarsest compliments to Steven Levy for his more-than-fair indictment of that store's rotten advertising and sales practices. Levy got it all right: the phony-baloney business with the receptionists at the front door; the hushed sales floor upstairs; and the wholly insincere cooing,

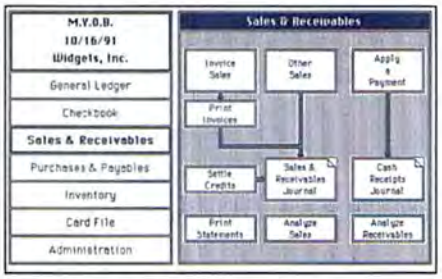
continues

M.Y.O.B.

...helping you Mind Your Own Business

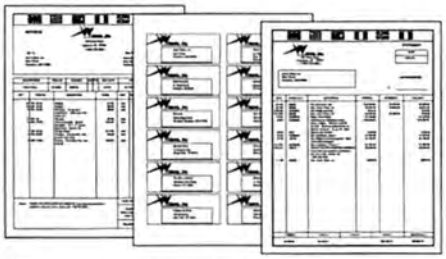
New! Version 3.0

Incredible Accounting Software!



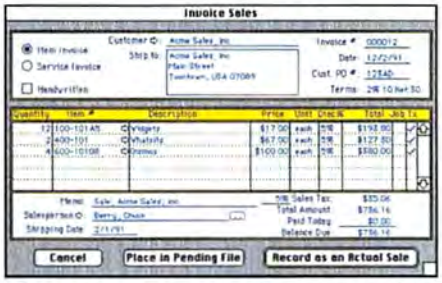
"M.Y.O.B. really takes advantage of the Macintosh interface…command buttons …are arranged in a flow chart. As a result, you don't need to be an accountant to know the order in which the command should be used."

MacWorld, November, 1991



"The forms customization feature is highly flexible and lets you change the look and content of printed checks, invoices, statements, purchase orders and mailing labels to give them a unique look and feel."

Mel Male, Reviewer



"Only a few programs make good use of the Macintosh interface. Teleware's M.Y.O.B. has one of the best interfaces."

MacWorld, October, 1991

1990 Honorable Mention Maker

1989 Honorable Mention Maker

1992 W 100 Windows Magazine Annual Win Award

PCComputing

1992 M.Y.O.B.: Best Value for Windows

Only M.Y.O.B. Has:

Easy Interface Unique graphic windows display every function in clear on-screen flow charts. No need to learn obscure commands — just point and click.

Simple Screens Invoices look like real invoices. Checks look like real checks. There's nothing new to learn.

Customizable Forms Design your own invoices, statements, purchase orders, checks and mailing labels. M.Y.O.B. includes an integrated drawing program that lets you add text, draw lines and boxes, move and resize fields, and paste graphics.

Analysis Windows

- **Sales** Analyze by item, customer or employee. Track sales, costs, profits.
- **A/R & A/P** Ages 30/60/90 day. Just click to go from customer/vendor summary to original invoice or purchase order.
- **Inventory** Interactive "order book" shows what's on hand, what's due from suppliers and what's back-ordered.
- **Balance Sheet** Analyze this year, last year, this year vs. last year, or vs. budget.
- **Profit & Loss** Analyze for any period (including YTD) in this year, last year, this year vs. last year, or vs. budget.
- **Cash Flow** Projects your checkbook balance into the future.

System 7.0 Savvy!

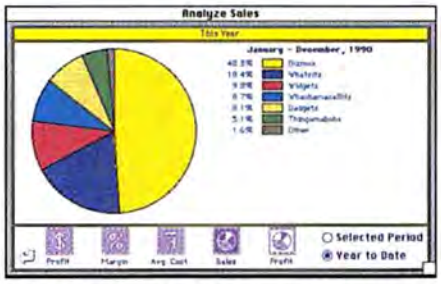
Version 3.0 Enhancements:

Importing, Backorder Tracking, Increased Password Protection, Customer/Vendor Credit Terms, Simplified Error Correction, Packing Slips, Expanded Reporting Capabilities, Expanded Payables and Receivables Analysis, Expanded Job Costing *and more!*

TELEWARE

Retail Price: $249 Macintosh System Requirements: Mac Plus with at least 1 megabyte of memory; System 6.0 or later; hard drive with 2 megabytes of free space.

Circle 76 on reader service card



"It's like having a full-time accounting manager watching over your shoulder."

Ken Landis, Reviewer

"Best Off-the-Shelf Solution."

Donald Shea, Management Consultant

Retail Price: $249

Send me a Fully-functional M.Y.O.B. Macintosh Demo Disk for only $5.00!!!

Name _____

Company Name _____

Address _____

City _____

State _____ Zip _____

Daytime Phone ( ) _____

Preferred payment method (check one)

☐ Check or money order enclosed ☐ Visa ☐ MasterCard

Card No. _____

Exp. Date _____

Signature _____

Mail to: TELEWARE
PO Box 346 • Rockaway, NJ 07866

or Call Toll-Free

1-800-237-8400

Ext. 586

24 Hours a Day – 7 Days a Week, USA & Canada only.

AD CODE MW0592

cajoling, and stroking by the salesman, who was nontheless not too timid to ask for cash payment (with a credit card backup) right away, or he couldn't promise immediate delivery. I surrendered to him and he stiffed me anyway.

Lee Eisenberg
New York, New York

A Healthy Storage Industry

IN DEBORAH BRANSCUM'S RECENT article "The Storage Spiral" (*Conspicuous Consumer*, February 1992) some doubt was cast on the future of Mirror Technologies and the entire drive industry. There were suggestions that Mirror may go the way of Jasmine Technologies. For the record, nothing is further from the truth. Indeed, Mirror's sales for the third quarter ending December 31, 1991, were up 88 percent from last year, and net profit for the quarter was $271,989. Mirror will be profitable in the current fiscal year, ending March 1992.

Branscum's article made it seem like doomsday for all marketers of Macintosh hard drives. The facts suggest otherwise. There are now several million Macintoshes in existence and almost all include hard drives. The secondary market for these users, who are buying larger drives or replacing dead ones, is quite large. Mirror is well positioned to attain greater market share.

Ronald Eibensteiner
President/CEO
Mirror Technologies
Roseville, Minnesota

Seeking Service, Silence

AFTER READING YOUR FEBRUARY 1992 article "Seeking Midrange Hard Drives," I consulted with a dealer on purchasing the Mirror 210, rated as an Editors' Choice.

He rated the same unit as a worst buy. Prospective owners would be well served to consult with dealers who repair units or send them back to the factory for repair.

William Raiford
Memphis, Tennessee

YOUR ARTICLE OMITS ANY MENtion of the single criterion I and most of my associates consider when buying a hard drive: noise.

Have you ever experienced a high-pitch fluttering hum for eight hours a day? The drive I have gave me headaches for the first few weeks.

What a shame that you analyzed all those drives, optimizing your article for such a secondary matter as drive speed.

Brian Bogrope
New York, New York

How to Influence Politics

YOUR REPORT OF NEW JERSEY'S bumbling attempt to license software designers must be received with more indigestion than indignant surprise (*The Iconoclast*, January 1992).

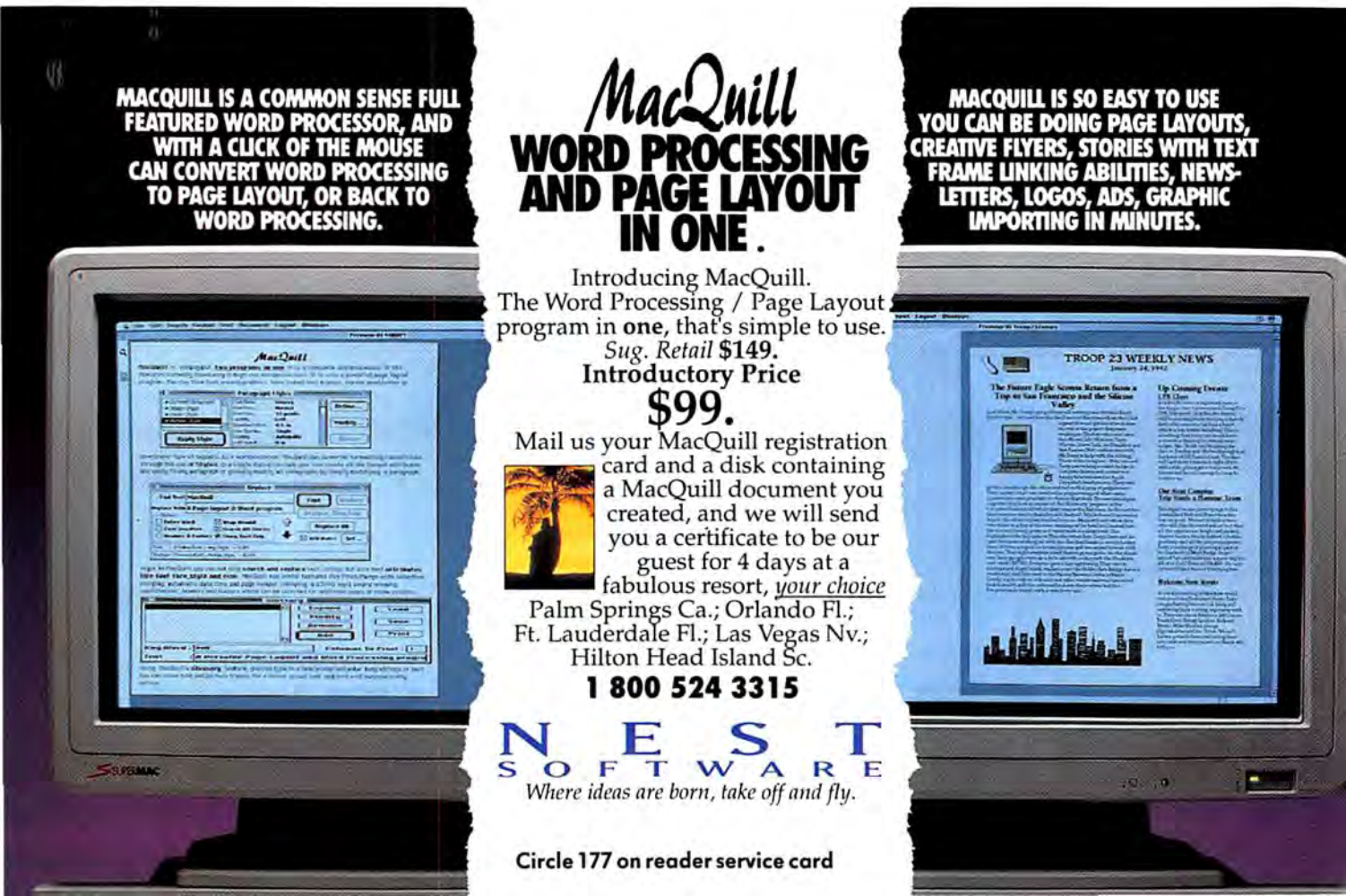
I would wholeheartedly support your final suggestion to Assemblywoman Kalik, except that we already possess an established mechanism for licensing state legislators. It's called voting.

Kent Klinner
Los Angeles, California

On a Spacey Opinion

GRANT SCHAMPEL THINKS TWO spaces between sentences looks better than one (*Letters*, January 1992). If Grant's playing with his own computer, he can do whatever he wants (if two spaces look good, maybe three or four would

continues



Circle 177 on reader service card

Which Comes First...

DUAL PAGE MONOCHROME DISPLAY WITH VIDEO CARD
Screen size (flat) — 19 inch diagonal
Resolution — 74 DPI WYSIWYG (same as Apple Two Page)
Vertical Refresh Rate — 75 Hz

FULL PAGE MONOCHROME DISPLAY WITH VIDEO CARD
Screen size (rounded) — 15 inch diagonal
Resolution — 80 DPI WYSIWYG (same as Apple Portrait)
Vertical Refresh Rate — 75 Hz (same as Apple Portrait)

FULL PAGE GRAY-SCALE DISPLAY (256 SHADES) WITH VIDEO CARD
Screen size (flat) — 15 inch diagonal
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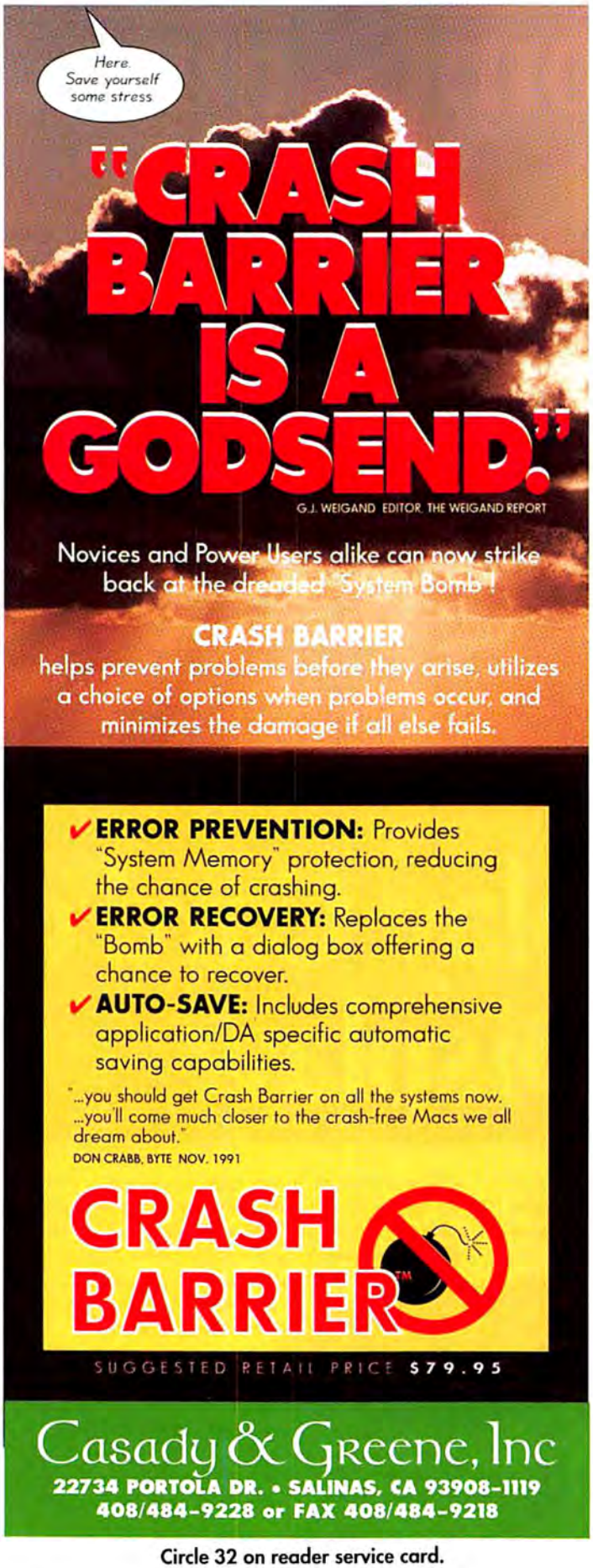
End users circle 202 on reader service card

Dealers circle 204 on reader service card



Circle 32 on reader service card.

look even better). If he's preparing a job for a client, he'd better use one space or his job will bounce as high as the moon.

If you use two spaces between sentences in justified copy, the computer sometimes has to end a line between sentences. The extra space may go at the end of one line or the beginning of another. Your client won't like that. He'll think you're an amateur. He'll be right.

William Johnson
Des Plaines, Illinois

TYPOGRAPHY IS AN ART, A SKILL. It is part of the graphic arts, the "arts" implying that some sort of training and eye is necessary. A typist does not magically become a typesetter because he's sitting in front of a Mac and owns Aldus PageMaker, any more than a doodler becomes an artist because he owns Adobe Illustrator.

Just the other day a local printer told me he had bought a Mac and was going to save money on typesetting by doing it himself. When he asked me why I like QuarkXPress, I told him one reason was because of the kerning capability. He asked me what kerning was.

J. R. Bidwell
Aquebogue, New York

Flawed Canvas

AFTER READING WHAT DEKE MCClelland wrote about Canvas 3.0 in "Top Draws" and *Reviews* (both January 1992) and comparing it with my own personal experience with this product, I am convinced that his writing is only self-promotion for his Canvas 3.0 book.

In actuality the product is not bug free, is inconsistent in how it applies commands to objects, has lousy customer support, and is sparse in the area of documentation. I am glad that I purchased it with a money-back guarantee.

George Force
Union, New Jersey

Scanning for Old Systems Only

AS A RESULT OF YOUR TESTS ON 8-bit scanners ("Grade-A Gray Scale," October 1990 and "Scanners in View," October 1991), I bought a Xerox GS plus with MacImage 2.3 software to run the scanner. At the time I had a Mac Plus, which really was slow in running some of the files I was scanning. Now I have a Quadra 700, and MacImage is not compatible with System 7.0.1. I called Xerox about this, and they informed me that

continues

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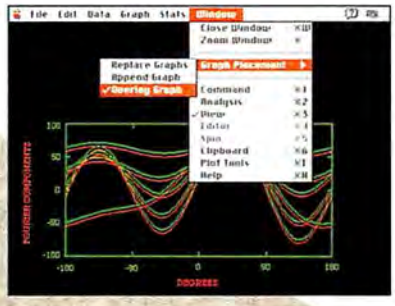

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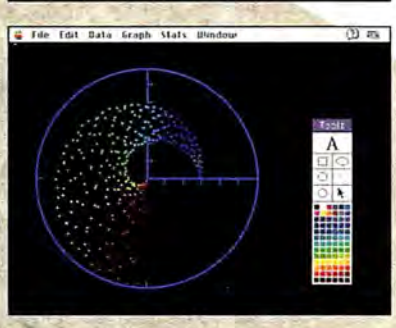

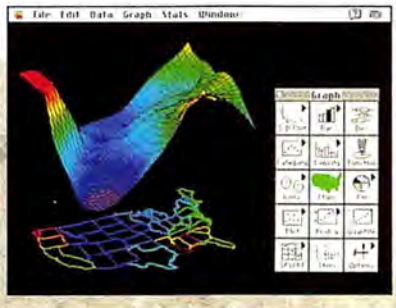

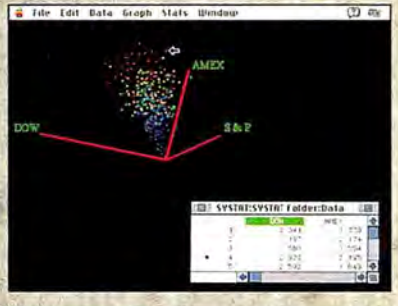

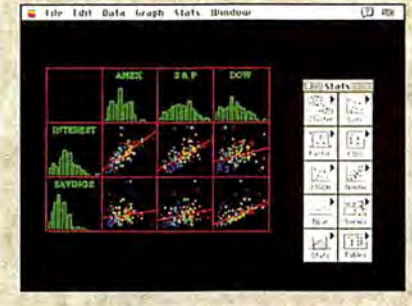

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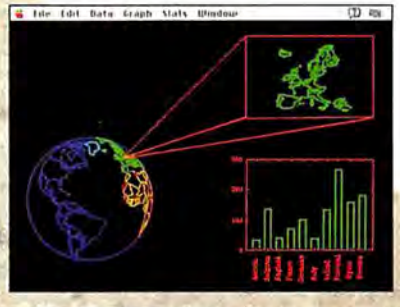

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Circle 29 on reader service card

they will not upgrade MacImage to support System 7.0.1. So now I have a scanner that I can't run on my Quadra.

Philip Bach
Charlotte, North Carolina

Xerox Imaging Systems has discontinued offering the GS plus scanner and, as you noted, won't upgrade it to be System 7–compatible, because the scanner was not developed internally. However, Xerox is planning an upgrade path for GS plus owners; owners can call the company at 800/248-5000.—Ed.

Faxing for New Products

PLEASE ADD FAX NUMBERS TO *NEW Products*. We outside the United States would be very grateful, since calling is just too expensive. And so would the companies, who might sell more this way.

Joshua Sternbuch
Zurich, Switzerland

We are now running fax numbers as well as telephone numbers in *New Products*.—Ed.

More of the QuickTime Team

I WAS PLEASED TO SEE THE PHOTO of the QuickTime team in *Macworld* (*Commentary*, January 1992). Unfortunately, several members of the core team were not in the picture.

Michael Arent, Jonathan Cohen, Mitchell Yawitz, and Angela Greene worked with me on human interface components. Others from the Advanced Technologies Group include Eric Hoffert and Rich Williams.

Missing non-ATG members include John Worthington, Casey King, Kip Olson, David Van Brink, John Mitchell, Andy Poupart, Duncan Kennedy, Rachel Cohen, Doug Camplejohn, Scott Jenson, Bill Fernandez, Guillermo Ortiz, Gary English and his team, and Doug Enfer.

Michael Mills
Principal Scientist
Human Interface/ATG and
the QuickTime Team
Apple Computer
Cupertino, California

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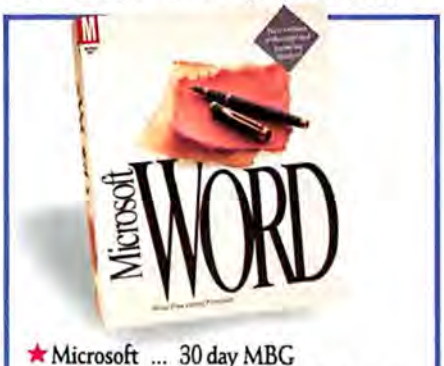

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6053 ❼Adobe Plus Pack 2.0. . . . . 118.
6156 ❼Adobe Plus Pack/ATM . . . . . 174.
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3980 ❼Aldus Digital Darkroom 2.0. . . . . 259.
3507 ❼Aldus Super 3D 2.5 . . . . . 325.
7467 ❼Aldus PrePrint 1.51. . . . . 325.
4751 ❼Aldus Persuasion 2.1 . . . . . 325.
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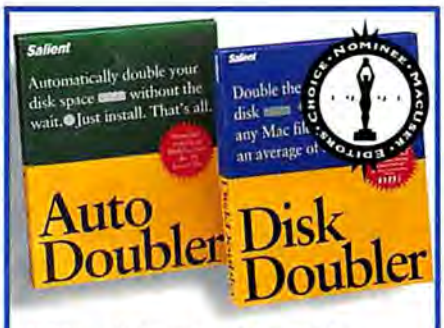

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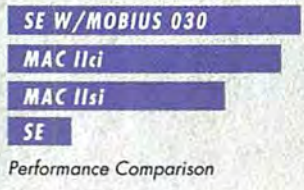

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Art Beat

Behind Macworld's Graphics

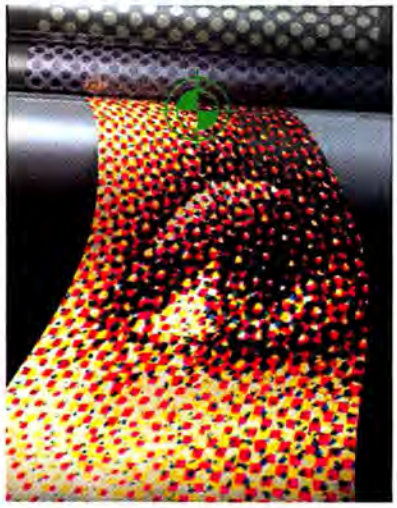
BY CATHY ABES

Artist: French-born illustrator Erik Adigard and his partner Patricia McShane do Macintosh graphics from their San Francisco studio, M.A.D. "We're trying to bring something to the technology, take it to new levels," says Adigard. "The challenge is to see how much emotion I can put into a medium that has no emotion whatsoever."

Hardware: Mac IIfx with 32MB of RAM and 160MB internal hard drive; Microtek MSF-300 ZS scanner; SyQuest 45MB removable-cartridge hard drive.

Software: Adobe Illustrator 3.0; Adobe Photoshop 2.0; Ray Dream Designer.

How It Was Done: For the illustration that opens our "Correct Color" feature, Adigard began by putting his Mac keyboard face down on the 300 ZS and scanning it. After he opened the scanned image in Photoshop, he stretched it using the Perspective command (from the Image menu's Effects submenu) and rotated it with the Rotate tool. He gave the keyboard dimension and volume by selecting areas with the magic wand, feathering with the lasso, and adding color, highlights, and contrast.



A detail of the final image, which appears on page 167 of this issue.

Then he lassoed the top half of the keyboard with a large feather edge and created a negative effect by using the Invert command (from the Image menu's Map submenu). This turned the keys, which were originally yellow, to blue. But Adigard wanted the keys to be a warmer color. So he selected the Color Balance command (from the Image menu's Adjust submenu) and used the Cyan, Magenta, and Yellow sliders in the resulting dialog box to reduce the blue and add more red, producing a warm brown.

Adigard created the repeating dot textures for the rollers in Illustrator. Because Illustrator allows variable line weights, he knew he could quickly and easily change the size of the dots. He then opened the dot patterns in Photoshop, where he filled each one with a different color gradation; in one he put a graduated fill in the dots and in the other he gradated the background. Finally, he saved the textures as PICT files.

Next Adigard created the rollers using the 3-D modeling and rendering package Ray Dream Designer. In Ray Dream's LightForge module, he created a circle, extruded it into a cylindrical object, and duplicated it twice, making a separate LightForge file for each cylinder. Then the artist imported the dot patterns from Photoshop, mapping the larger one on the top roller and the smaller pattern on the second one. He used a built-in Ray Dream texture on the bottom roller. Then he brought all three rollers into a file in Ray Dream's SceneBuilder module, where he resized them, moved them close together, and manipulated the lighting.

After rendering the scene in SceneBuilder, Adigard imported the resulting PICT file into the Photoshop file that contained the keyboard. He did some fine-tuning of the rollers: using the airbrush tool to blend them into the background scene, creating shadows, reflecting some of the background, and adding fine lines between the rollers.

continues

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The original scan of Adigard's Macintosh keyboard.

The keyboard image after the artist stretched, rotated, and feathered it, and added color, highlights, and contrast—all in Adobe Photoshop.

One of the dot patterns Adigard created in Adobe Illustrator for use as a texture map for one of the rollers he'd created in Ray Dream Designer.

The three rollers after all the texture maps had been applied in Ray Dream Designer.

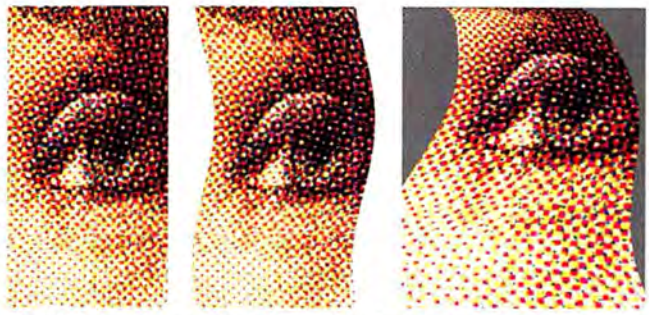
The image of the lithographed eye was scanned in at 600-dpi resolution and opened in Photoshop. To accentuate the dot patterns from the lithograph, Adigard used Photoshop's Sharpen filters. He used the Color Saturation and Color Balance commands to change the dots' coloring to simulate the four CMYK colors.

Next, Adigard needed to change the rectangular image that contained the eye into a wavy shape that he could then manipulate to look like a sheet of paper sliding out between the rollers. He used the Wave filter (100 percent horizontal, 0 percent vertical) to distort the shape. Because he used different settings for minimum and maximum wave length (10 and 300, respectively) as well as minimum and maximum amplitude (5 and 50), a somewhat different wave pattern was generated each time, even when he used the same settings again.

Once he'd gotten the wave he wanted, he used the Perspective function to stretch its width at the bottom so it would appear to be moving forward. To select the shape of the eye, Adigard first selected the background using the magic wand, and then deselected the eye image using the lasso tool with a feather edge of about 55 pixels. After importing the wavy eye image into the file that contained the keyboard and the rollers, he used the distort tool (Effects menu) to align the top of the paper to the angle of the rollers.

Now with the paper in position, Adigard did some more deselection using the lasso again, with the feather edge set at about 30 pixels. He used the lasso with various feather edges to create highlights and shadows on the paper, giving it a more three-dimensional look. The slight reflection (of the paper) on the second roller was done by using Photoshop's Flip command and pasting a small part of the paper at about 30 percent transparency.

Adigard created the two registration marks in Illustrator and imported them into Photoshop. The bright-green one was pasted onto the image with 80 percent opacity. He gave the bottom registration mark a magenta color, applied a mosaic filter, and built up its contrast with the Brightness/Contrast command. Then he placed the mark over the keyboard, using Darken Only mode (at 50 percent) to give the mark a transparent effect. **m**



The lithographed eye scanned at 600 dpi and opened in Photoshop (left); the eye after the dot patterns were accentuated and recolored and the image's rectangular shape was transformed into a wave (center); and the image after it was stretched and distorted to simulate a sheet of paper coming out between two rollers (right).

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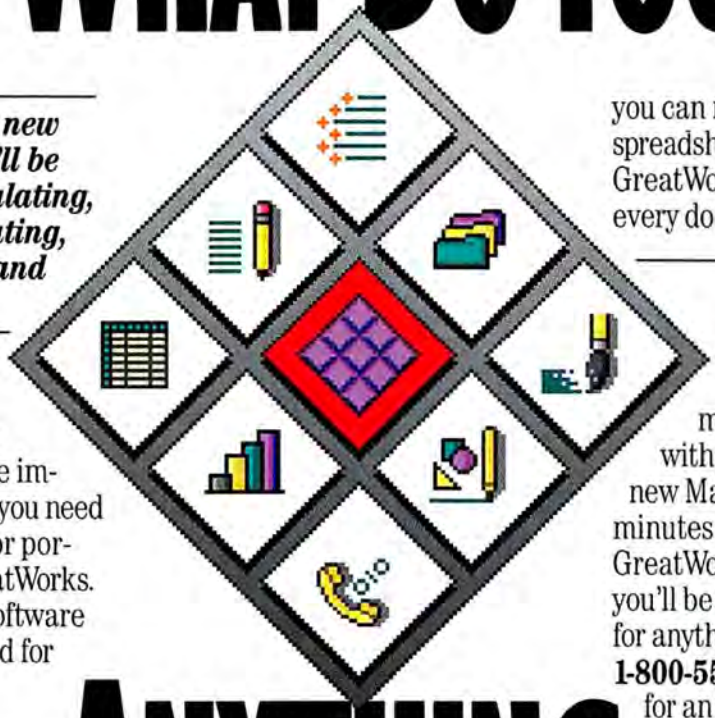

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Is That All There Is?

BY STEVEN LEVY

RANDALL ROTHENBERG works alone in his home office, writing books on a Mac SE. He may not be a power user, but his computer is the center of his professional life. He spends six to eight hours a day on it, using not only a word processor, but also programs that manage his money, organize his notes, and connect him to online databases. He takes computing seriously. So when he began reading the advertisements and articles in computer magazines about Apple Computer's System 7—and received a note from Apple itself, trumpeting the benefits of the new operating system—he figured that an upgrade was not only a good idea, it was a necessity.

"It seemed only logical," he says. "I got the feeling from what I was reading that if I didn't, I would be technologically behind the eight-ball."

Coincidentally, Rothenberg was in the process of ordering a new external hard drive. (Like many users, he had discovered that a 20MB internal hard drive won't even get you a ride on the bus these days.) He also told the mail-order firm to include Apple's $99 System 7 upgrade kit. When the order arrived last December, he found that the new drive was already formatted with System 7. He decided that now he *had* to upgrade. "It would not only be silly, but dangerous to have two different systems on my disk drives," he said.

It was easy to follow Apple's crisp instructions for installation. From then on, *easy* dropped from Rothenberg's vocabulary when discussing System 7.

Rothenberg's normal work procedure was to launch Microsoft Word and HyperCard, in which he kept his notes, alternating between the two programs. The 2MB of memory on his SE had been sufficient, if just barely. After his upgrade, they were in no way adequate. He might as well have tried to shoehorn a Toyota into the machine. He raced to the documentation and found that there was nothing wrong with his computer—System 7 simply needed more memory. "It was right there in the manual that 2 megs is a minimum," he admits. "But why didn't they tell you that if you don't have 4 megs, you're out of business?"

Rothenberg went to the computer dealer and bought two more megabytes of memory for $120. It cost $70 to install.

When he got home, he launched everything. Well, almost everything. Rothenberg discovered that On Location, which he used religiously to unearth hidden files and search for data, didn't work right on System 7. He had suspected this after running System 7's Compatibility Checker and seeing that On Location was on the enemies list. He sent away for the new version, which cost him $25. Then, when he tried to use Word Finder, the thesaurus feature that came with Microsoft Word, he discovered that it would not come up on the screen. Compatibility Checker hadn't mentioned this. He went to the phone. The Microsoft people suggested a workaround that Rothenberg found unsatisfactory. The other possibility was dealing directly with Microlytics, the company that makes the thesaurus. He called Microlytics, which told him that for a nominal fee, he could get an upgrade that worked on System 7. He sent for it. Three months later, he was still waiting; Microlytic announced it began shipping the upgrade February 3.

Still, he had Word and HyperCard. He began to work. He noticed that the computer ran much slower than before. Sometimes he would type something and, as in a poorly dubbed foreign film, the words would hesitate before appearing on screen. He guessed he could live with that. He completed a project and invoked the command to print it out on his Hewlett-Packard ink-jet printer.

It would not print out.

This was something else Compatibility Checker had failed to note. Rothenberg called HP and, after being tossed around like a volleyball for a while, finally got someone to talk to him. "We've heard this problem exists," said the person, "but we don't know what to do with it." HP suggested perhaps he should call Insight, the company that wrote the printer driver. He called. "Yes," the Insight support person cheerfully admitted, "there is a problem." It would be solved by ordering an upgrade. For $45. Plus $15 for the overnight shipping Rothenberg needed.

"I paid $60—close to the cost of the original software—just to make the printer driver work on System 7," says Rothenberg.

Three months after upgrading to System 7, Rothenberg is almost where he was before, except his Mac runs slower, he's still waiting for Word Finder, he's out a few hundred dollars, and he's lost time making long-distance phone calls. Oh, and a few times his machine has crashed, and he suspects it's the new system. But that's not so bad. "It gets me to back up more often," he says. Overall, he is not a fan of System 7.

But wait a minute, I say to him, after hearing his tale of woe. What about the benefits of System 7? How about the improved Find command? The alias capability? Publish and subscribe? The improved menu protocols? The easier way to use desk accessories? Balloon help?

"There are no benefits," replies Rothenberg. "I use On Location to find files. It's marginally easier to install desk accessories, but so what? I don't work on a network, so that stuff is useless to me. The only interesting thing is balloon help—when I'm bored I use it like a game, running the cursor around the screen to see when a balloon pops up."

Rothenberg is angry. "I know Apple can say that I should have read the fine print—but they should have made it clear that for people who use the computer in a certain way, System 7 is a bad choice."

After the System 7 switch, some users are wondering what got into them

A Savvy Switch?

IS ROTHENBERG'S SITUATION typical? I suspect more so than Apple would like to admit. Months after the much-ballyhooed release of System 7, many users are just recovering from the shock of paying lots of money to basically restore their computer to its pre-System 7 state. For many, the benefits at this point

continues

seem dubious, especially for the run-of-the-mill user.

Some software developers who have spent a lot of time making their products "System 7–savvy" aren't convinced that their users are getting good value. "I'm not crazy about the speed. I'm not crazy about the memory," says Mark Simonsen, president of Beagle Bros, whose customers are people like Rothenberg. "For a few users, the balloon help will be useful. Other than that, I'm not sure that System 7 is the thing for them to do." Peter Sispoidis, president of game company Changeling Software, says that his game is "better under System 6, to be honest with you." Conal Ryan, president of On Technology, publisher of On Location, thinks that introducing System 7 was "the right thing to do," but wonders whether it's the right thing for users to upgrade. "It makes you wonder," he says. "I can't get Word and AppleLink to work together on a 4MB PowerBook."

Apple Computer executives don't seem to see the problem. I recently spoke to some Apple executives evangelizing System 7, and all were in agreement on the launch of this major project. "Ours has been a near complete success. About 25 percent of our users have upgrades—a million and a half—and there's been no problems to speak of," says Steven Goldberg, the System 7 product manager.

After we chatted a bit about how wonderful System 7 was, I told Goldberg about Randall Rothenberg. Did Rothenberg upgrade too soon? Should he have upgraded?

To my surprise, Goldberg did not claim that the real value of System 7 is yet to come, but that "60 to 70 percent of the benefits are out of box." These are the same things he called no benefit at all, things he got in exchange for making some of his software obsolete. Goldberg's mother apparently appreciated these things more. (Maybe she got her upgrades free.) "The system's easier to use for my mom," he says, "not having to worry about the Font/DA Mover. And my secretary has aliases of everything!"

> *"Apple should have made it clear that for people who use the computer in a certain way, System 7 is a bad choice."*

Does this mean that Apple is insisting that everyone upgrade? "I'll be frank," says Goldberg. "If someone has a Mac Plus or SE, and all they do is MacWrite, I'm not sure if there's a lot in 7.0 for that type of person. But we think that most Mac users aren't like that—the average user has six or seven applications." Like Rothenberg.

Charlie Oppenheimer, director of Macintosh system software marketing, agrees. "There are benefits to almost every user to upgrade to System 7. But everyone should evaluate their own needs before they do it."

What with Apple's eagerness to get people to upgrade (and, I'll admit, the computer press shares the rap here), this

continues

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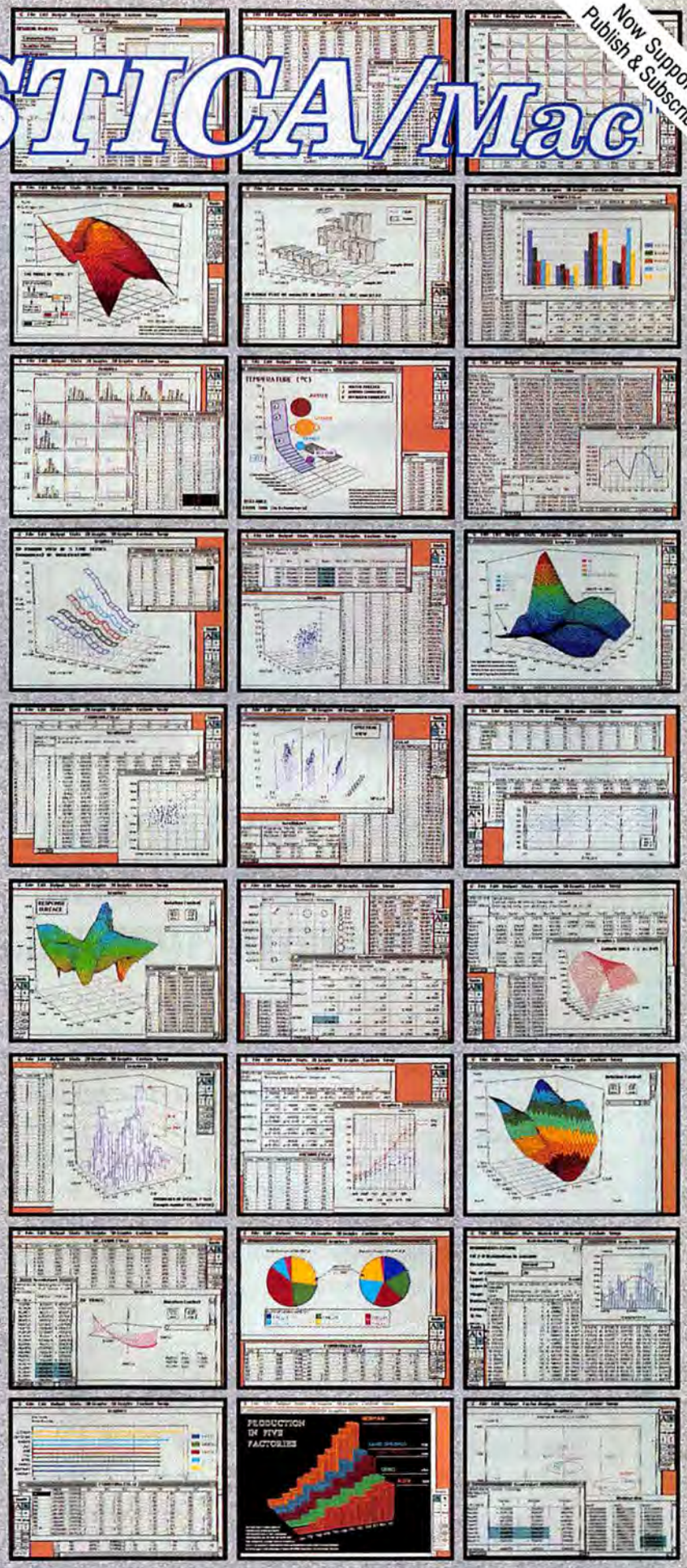

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caveat was hard to find. As was the warning that the switch might cost money, time, and aggravation in getting the new system up to, um, speed. Interestingly, when Apple ran focus groups of upgraded users to find out why they did the deed, many seemed to have acted out of a fear of becoming obsolete. They felt they had to upgrade just to stay in place. "People want to stay current with their investment," says Goldberg. "They want to be with the mainstream. They say, 'Maybe I don't know what it'll do but I want to stay current.'" Just like Rothenberg.

My Way or the Highway

DO NOT COUNT ME AS A CRITIC OF System 7 itself. It is fairly stable (I'm delighted that it seldom crashed my computer—I expected the worst), and it is geared to deliver the next level of power to Macintosh users. There is a time to build highways, and this was one of them. Apple had many ideas to advance the state of computing, and System 7 was the way to do it. Those whose computing styles and needs can accommodate things like QuickTime, publish and subscribe, virtual memory, and AppleTalk Remote will find System 7 a boon. When developers begin using the capability to link programs through Apple events, there will be more benefits. Besides, the operating system really did need a major overhaul. As Charlie Oppenheimer points out, starting from scratch enabled Apple to write System 7 in a modular fashion that allows new features to be easily plugged in, without requiring tedious rewrites. (QuickTime is the first major extension to be added in this fashion.) This will allow Apple to implement new ideas in a timely fashion.

System 7 will be even better if, as Charlie Oppenheimer promised me, Apple finds ways to make it consume less space on disk and in memory, and make it run faster. System 7 Tune-Up is a first step. This new software from Apple supposedly eases some of the memory crunch and speed loss that System 7 users experience, especially those who own machines with lower memory and weaker processors. In future Macintoshes, some of System 7 may be installed on ROM chips, which would certainly decrease memory consumption and increase speed.

Still, building highways is not painless. People who live in the path of these roads tend to get bulldozed. Randall Rothenberg was one of those people. Did Apple set the course of its highway to bulldoze the fewest people? Did it give them proper notice they were in the dozer's path? I don't think so. Only a third of Mac users are connected to networks (giving them the biggest gain from System 7), and of those, few genuinely need all of 7's capabilities. It is reasonable to assume that a clear majority of Macintosh users are more like Randall Rothenberg. They don't know or care what *32-bit clean* means, they have no use for QuickTime, and they will never log in on AppleTalk Remote. These were among the users urged, by Apple and others, to upgrade. Little mention was made of the hidden costs. Not all users have had Rothenberg's troubles, but I suspect that more than a few are now staring at System 7's slightly slicker screen presentation, aliases and all, and asking, "Is that all there is?"

Before I got off the phone with Rothenberg, I told him about System 7 Tune-Up. Maybe, I suggested, Tune-Up would make things better for him.

"Another upgrade?" said Rothenberg. "No, thanks. I'm not going to risk it." **m**

STEVEN LEVY's *Artificial Life* (Pantheon) will be published in June.

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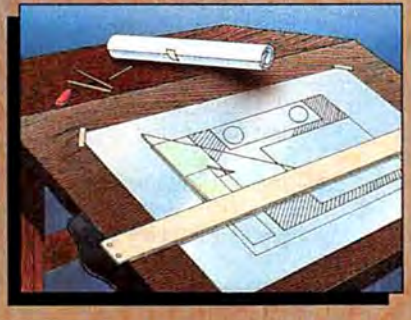
The Evolution of CAD

From the beginning of time, man has tried to express himself through graphics.

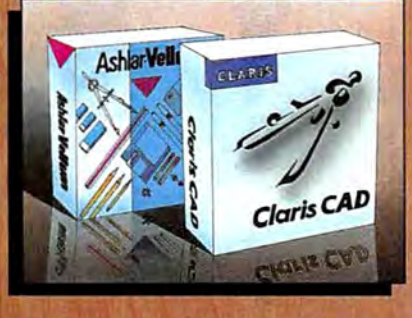
In the beginning man had to use primitive tools for creating graphic designs.

In the 15th Century design tools were quill ink pens and crude styles of paper.



By the 18th Century man had advanced to the drafting table with the T-squares, slide rules, precision ink pens and the dreaded eraser.

In the 20th Century the first CAD programs were very slow and extremely difficult to use, not to mention the expense of buying them.



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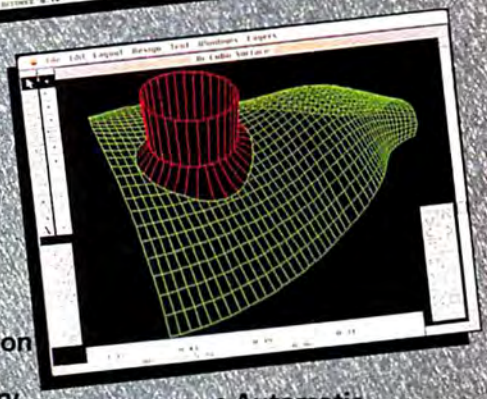

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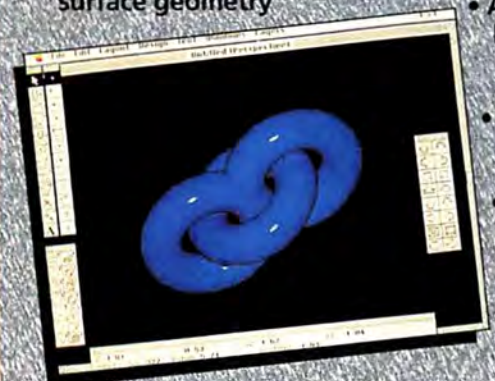

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7 REASONS WHY YOU NEED A NEW WORD PROCESSOR.

Because you're ready to see what System 7 can do.

Apple calls System 7 the biggest improvement in Macintosh since Macintosh. And WordPerfect® is now System 7 savvy.

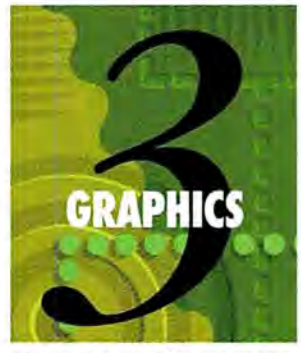
So now (among lots of other new things), WordPerfect will automatically keep track of changes that you (or someone else) might make to imported files (charts, graphics, whatever), and update your WP documents accordingly. Now, a change made in one place can be a change made in many places. Apple calls it "Publish and Subscribe," and it works between programs on your hard drive, as well as among people on your network. Publish and Subscribe assures you that your documents will always reflect the latest information available.

And it's just one of the new System 7 tricks that WordPerfect 2.1 has mastered.

Because WordPerfect does columns better than the Greeks.

Pick a starting point, click on the ruler, and see your text in two columns. Or in three columns. Or five columns. With vertical rules beside or between them, if you like. Drag a guide on the ruler and try *unequal* columns. Highlight text in a box that jumps across columns.

Go crazy with the design, or stick with the tried-and-true. The point is, WordPerfect gives you formatting options that other word processors don't. And exploring them couldn't be much easier.



Because you'd use more graphics if using them were easy.

WordPerfect not only gives you full control over the placement of graphics in your text, it also gives you a color drawing program for modifying imported artwork (or starting over from scratch) without ever leaving the program.

You can print graphics under your text (as "watermarks") or on top (as overlays).

You can use the drawing tools to rotate text to any angle that strikes your fancy (something many page-layout programs still can't do).

And WordPerfect gives you 36 border styles and 64 fill patterns — which you can use in any of 256 colors — for highlighting graphics, paragraphs, columns, pages, even blocks of text.

Because a movie is worth who-knows-how-many words.

If a picture is worth a thousand words, what's a movie worth? With WordPerfect and QuickTime, you can calculate it for yourself.

Apple's QuickTime is a new technology that lets you work with digital video and sound as easily as you now work with text and graphics files.

Imagine being able to place (and size) a QuickTime movie anywhere in a document. You could add urgency to a memo with a few well-chosen words delivered "live." Or help an audience visualize your latest brainstorm with a 3-D simulation they can start, stop and replay.

We have a feeling that words can't begin to describe all the ways you'll think of to use it.

Because you get tired of repeating yourself, yourself, yourself.

Perhaps because they've heard it's a powerful programming language, WordPerfect's macro editor intimidates some people at first. It shouldn't.

It's no more complicated than a tape recorder. Click "record" and it memorizes your keystrokes. Click "play" and it repeats them.

With no more knowledge than that, you can create a WordPerfect macro. And can spare yourself the effort of formatting M-E-M-O-R-A-N-D-U-M, T-o-:, F-r-o-m: (and so on) across the top of the page every time you want to fire off a memo, for example.

But simple as recording your own macros can be, we also ship a number of them with the program. For formatting addresses to print on envelopes. Placing "drop caps" at the start of paragraphs. And other jobs you'd rather not do twice.

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Because even if you never call us, it's nice to know we're here.

Like any good Mac program, WordPerfect 2.1 is easy to use. But unlike many Mac programs, you're not on your own with it. You get toll-free help from one of the largest support staffs in the industry.

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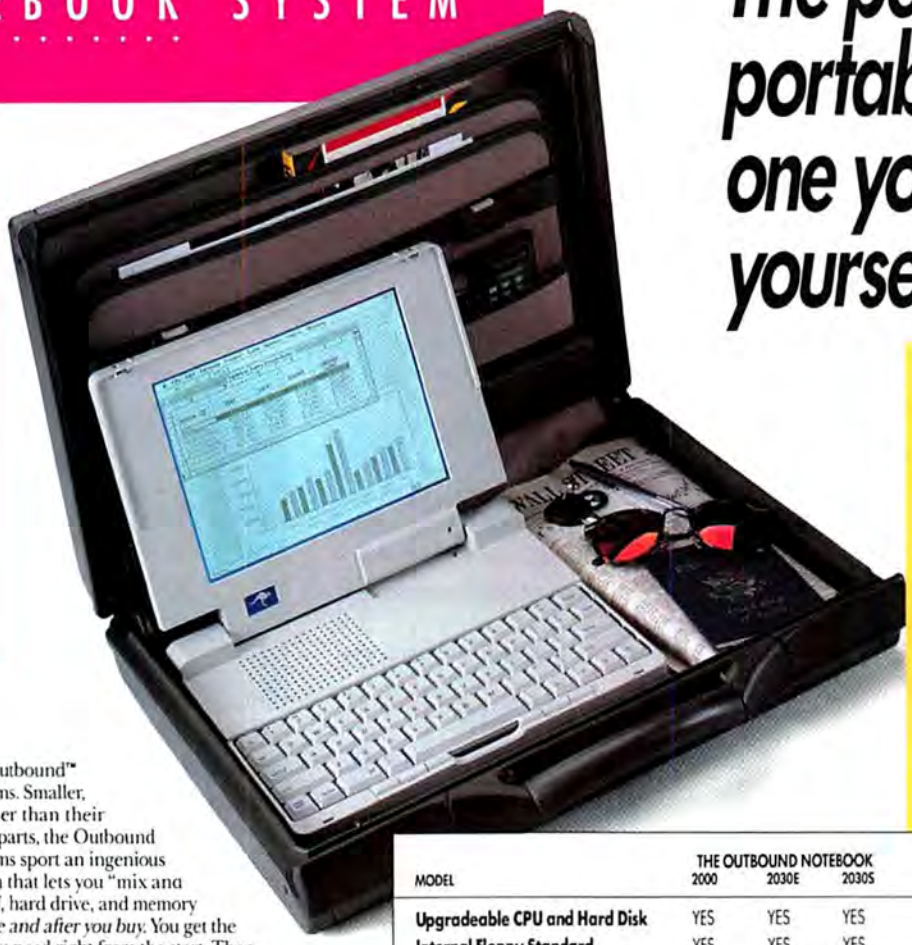

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Your Outbound Notebook is ready for action the minute you unpack the box, because the Macintosh ROM is already installed for compatibility with the thousands of Macintosh applications. Systems come with the memory conscious System 6.0.7 installed, and are completely compatible with System 7. And of course, all models include an internal SuperDrive™-equivalent 3½" floppy disk drive for working with high and low density Mac and MS-DOS diskettes.

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Building an Accessible Society

BY DEBORAH BRANSCUM

A HUGE NUMBER OF AMERICANS—an estimated 43 million—have disabilities, but you won't find many of them in the workplace, the grocery store, or the beauty salon. Both bigotry and physical barriers have kept many people outside the work force and mainstream society. A Louis Harris poll reports that fewer than 30 percent of disabled Americans between the ages of 16 and 64 are employed. But the Americans with Disabilities Act (ADA) may help change that.

This year the sweeping civil rights legislation outlaws discrimination against Americans with a broad range of disabilities. These include hearing, speech, and vision impairments; developmental disabilities such as cerebral palsy; learning disabilities such as dyslexia; and health problems including heart disease, cancer, and HIV infection. The heart of the legislation is its requirement that employers make "reasonable accommodations" for employees with handicaps. Because reasonable accommodation is left undefined, some managers are reportedly terrified of the potential costs of hiring or keeping qualified workers who happen to be disabled. But employers don't need to panic.

"In the vast majority of cases, accommodation is going to mean raising a desk higher or lower or widening a doorway—not an onerous burden," says Guy Thomas, a Macintosh user and bulletin board system operator who does his computing from a wheelchair. Experts agree that most solutions will be low tech and low cost. And automated offices will discover that it is fairly easy to put a disabled employee to work on a Macintosh—thanks to a wide selection of adaptive programs and devices.

The Accessible Mac

APPLE HAS WON PRAISE FOR BUILDING features into the Mac that make computing easier for many. Easy Access, for example, lets users adapt keystrokes and mouse clicks for one-handed or single-switch use. CloseView enlarges on-screen text and images up to 16 times their standard size. It also allows users to invert the screen images to white on black, which benefits some visually impaired individuals. Both features are accessed via the Control Panel and are available through an Apple dealer if they are not already in your Mac's System Folder.

The PowerBook has both those features in a portable package. An ideal computer for business travelers, it's equally useful for users in wheelchairs—assuming the batteries don't run out. And they shouldn't, thanks to a device from Don Johnson Developmental Equipment (708/526-2682 or 800/999-4660) that allows a PowerBook and an electric wheelchair to share the same 12-volt battery.

Other new products include the Unicorn Smart Keyboard, which won first place in February in the Johns Hopkins national contest for assistive computing devices. It's part of the trend toward inclusive products that fit a broad range of human ability. "It's a tool that will serve people with disabilities very well, but not just people with disabilities," says Jacquelyn Brand, president of the Foundation for Technology Access.

Compared with older products from Unicorn Engineering (510/528-0670 or 800/899-6687), the Smart Keyboard is less expensive (at $395) and doesn't require a separate interface but connects directly to Macintosh, Apple IIGS, and IBM and compatible computers. Seven different overlays fit into the flat panel, which works with standard software programs. Large keys and other access features make the keyboard useful for young children and individuals with certain learning disabilities, as well as physically disabled Mac users. Unicorn Engineering officials expect the product will also be used by small businesses for customized cash registers. That's good news for the keyboard's other customers, because a broader market means lower prices for all.

Technology can't erase a disability, but it can help compensate for one

Don Johnson Developmental Equipment has long been known for its popular software-and-hardware interface for the Mac called Ke:nx. Version 2.0 of the $780 box gives users access to several new input methods, including Edmark Corporation's Macintosh TouchWindow.

Word-prediction programs are intended to help users type text more quickly by offering them a list of words to choose from. Don Johnson's $290 Co:Writer is a new program that uses artificial intelligence principles to help predict word usage, including subject-verb agreement, according to the company. Madenta Communications (403/450-8926 or 800/661-8406) offers a similar program, called Telepathic, that uses frequency to predict word usage; Madenta also sells a collection of on-screen keyboards called ScreenDoors that include a word-prediction feature.

One Size Does Not Fit All

THESE PRODUCTS ARE JUST A SMALL sample of the hundreds available to aid Mac users with disabilities. But there is no perfect solution for any given user and no single solution for all. Guy Thomas, for example, needs only one special device for his Mac—an off-the-shelf Kensington trackball that he finds easier to use than a mouse. Visually impaired users, however, have much more specific needs.

"Blind users for years have been able to use Apple IIe's, Apple IIGSs, and PCs," says product manager Catherine Mack of TeleSensory (415/960-0920), which makes a braille translator and printer for Mac users. "When the Macintosh first came out, the blind community was both mad and scared. They were mad that Apple ignored them and scared that it was part of a trend." But thanks to OutSpoken, a spoken interface from Berkeley Systems, "not only is the Macintosh accessible, at this point in time it's more accessible than the PC," says Mack, who points out that blind computer users may assume that because there's no spoken interface for Windows-based PCs, there must be none on the Mac.

Because one size does not fit all, managers should avoid assumptions about required products for disabled employ-

continues

ees. And they should beware of companies or consultants who claim to have a single expensive answer. "Reasonable accommodation isn't about throwing a lot of money at the situation; it's about both sides collaborating to come up with a solution," says Lisa Wahl, director of DCCG, a user group for disabled individuals and their families in Berkeley, California.

Lisa Cohn, director of the Special Technology Center of Mountain View, California, also fears that in response to the ADA, some companies may decide upon standard approaches to their employees. "Employers need to understand that each disabled worker needs an individualized solution; they need to choose their own tools to get the job done," Cohn says. Accommodation doesn't mean just dropping off a trackball, but letting an employee try out ten trackballs and choose the one that fits, she says.

Assistive Technology Centers

BOTH DCCG AND THE SPECIAL TECHnology Center are part of 46 Assistive Technology Centers nationwide. These centers offer disabled individuals and their families a low-cost opportunity to try out computers, adaptive devices, and software. With the passage of the ADA, an increasing number of employers are turning to the centers for advice as well.

The network of centers was the brainchild of Jacquelyn Brand. Some years ago she struggled to put together a computer system that would help her disabled daughter participate in elementary school. In the process, she founded DCCG, formerly the Disabled Children's Computer Group, so that other parents and their children in the San Francisco Bay Area could share similar information.

After DCCG took off, Brand moved on to create, with the help of Apple Computer, the Alliance for Technology Access, with centers in 35 states. Now an independent organization, the 46 centers draw national clout from the Foundation for Technology Access (510/528-0747 or 800/992-8111), which Brand heads. Among its many activities, the foundation refers consumers to local centers, works with schools on the best ways of mainstreaming disabled students, and pushes manufacturers for better products.

"Excellently designed products are inclusive products," says Brand. "People complained bitterly about having to spend money on curb cuts in the early days. It was just for a few people, it was expensive, it was even dangerous. And then it turned out to be a tremendous boon to huge numbers of people that we never thought about. People with young children in strollers, bikers, elderly—the whole range. Likewise, the electronic curb-cut notion is that as we develop products that are more available to more people, we serve populations that we never knew were in need. . . . As we get to more universally accessible products, it will expand the market way beyond that which we could predict and way beyond that which equals the numbers of disabled people in this country."

Additional Resources

EFFECTIVE JULY 26, COMPANIES WITH 25 or more employees are required to make reasonable accommodations for employees with disabilities, provided the accommodations do not create an "undue hardship" on the company. The new law will cover businesses with 15 or more employees effective July 26, 1994. Additional provisions cover transportation, utilities, and companies that cater to the public, such as banks, restaurants, and self-service laundries. For a summary sheet about the ADA, contact the National Organization on Disability (202/293-5960) in Washington, DC. The President's Committee on

continues

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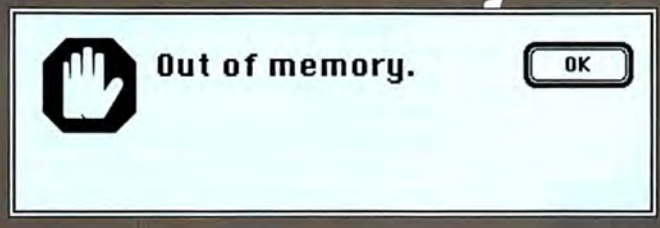

If you think the only way to avoid running out of memory is to avoid running a couple of your favorite applications, think again.

Think about all those memory-hogging fonts and sounds you've got stuffed into that bulging System File.

Then do what over 200,000 resourceful Mac users do every day.

Instead of closing your applications, open a Suitcase.™

Suitcase is the award-winning utility that lets you park your growing collection of fonts, DAs, FKEYs and sounds *outside* the System File.

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It even lets you put your screen and printer fonts on a server for all to share.

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The more resources you have – and the more organized you are – the more memory and disk space you'll save.

But whether your dividends are measured in megs or merely in Ks, Suitcase is guaranteed to save you gigabytes of aggravation.

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Because System 7 still stuffs your resources into your System File.

And System 7 still makes you close down all your applications and restart your Mac each time you install a new font.

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Employment of People with Disabilities (202/376-6200) also has information, and sponsors a project called the Job Accommodation Network (800/526-7234), which helps businesses identify accommodations for disabled employees.

The Trace Research & Development Center (608/262-6966) maintains a database of adaptive devices and a clearinghouse of information for individuals with disabilities. Two major conferences are held each year for the disability community. One is sponsored by California State University, Northridge (818/885-2578). The other is sponsored by Closing the Gap (612/248-3294), which also publishes a newsletter and an annual resource directory. An annual conference on technology and learning disabilities is sponsored by Educational Computer Conferences (510/222-1249). Additional information on what's often called the invisible disability is available from the Learning Disabilities Association (412/341-1515).

Service Hero

Reader Alek Grguric of Toronto, Canada, recently called Relax Technology to get the scoop on the latest version of extension/utility software for its optical drives and to find out how to upgrade his old non-ISO drive to an ISO-compatible optical drive. The technician "informed me that all I needed was an EPROM upgrade and the new software version," writes Grguric. "Much to my surprise he said that this hardware upgrade was free of charge and that he would mail it out to me immediately. Three days later the new EPROM, software, and manual arrived in the mail (along with a catalog of Relax's entire line of hardware products)."

Apple Computer's Worldwide Disability Solutions Group (408/974-7910) offers a database of more than 1400 products, publications, and services for disabled Mac and Apple II users. The database, called Solutions, is available as a book or HyperCard stack. A newer HyperCard stack (it requires HyperCard 2.0), called Macintosh Disability Resources, is a collection of answers to the hundreds of questions Apple receives every week on adaptive technology and the Mac. AppleLink users can explore the Disability Solutions folder under Community Connections on AppleLink and can link the group directly (Disability).

Into the Future

IF SUCCESSFUL, THE ADA WILL BENEFIT us all. Businesses are not required to hire disabled workers who can't do the job, but to give qualified disabled individuals an equal opportunity for employment. Those companies that respond to the spirit of the law will gain access to a new source of talented workers at a time when the overall labor pool is shrinking. Many of these workers will be moving from tax consumers to taxpayers for the first time. And existing employees will have the security of knowing that an illness or disability need not be grounds for dismissal.

"Somebody once said that on some level, the most basic disability is being unemployed," says Brand. "We're going to turn that around with the ADA." **m**

Research assistance by CAROLYN BICKFORD.

Send nominees for sainthood to Service Heroes, *Macworld*, 501 Second St., San Francisco, CA 94107, or via AppleLink (Macworld1) or America Online (Branscum). Conversely, drop *Conspicuous Consumer* a line if a company is ignoring you.

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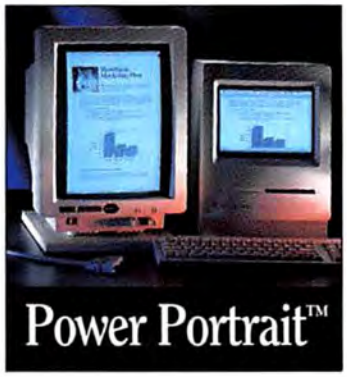

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System 7 1st Anniversary

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To help users identify those products which fully utilize System 7's powerful features, Apple computer has created the "System 7 Savvy" award program. When you purchase any of the System 7 Savvy software listed on this page you can be assured that are getting the finest in System 7-compatibliity.

System 7: What's In It For You

True Type: System 7 takes full advantage of Apple's new scalable-font technology, giving users the benefits of smooth type at sizes from 1 to 32,768 points, on-screen as well as on paper.

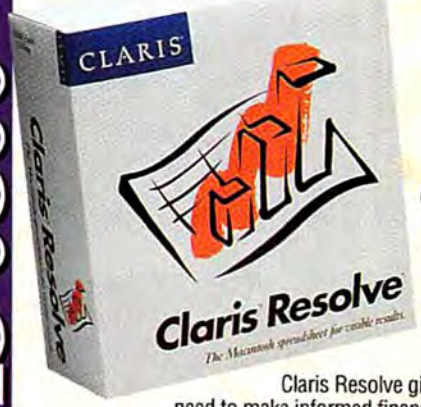
File Sharing: If you're part of a network, you can share any folder or volume on your hard disk with other users—without using a dedicated server.

Find Command: A fast, powerful file-searching utility is available from the File menu or from the keyboard. You can search for files by name, creation or modification date, size, label or comments.

Publish and Subscribe: With Publish and Subscribe you can create and control live links between imported data and the original documents, so you can create files that are updated automatically to reflect changes made elsewhere.

Multitasking: If you haven't been using MultiFinder, the gentle push of System 7 will introduce you to the world of doing two or more things at once. With System 7 you can always open more than one application at a time.

32-bit addressing and virtual memory: System 7's 32-bit addressing scheme makes it possible to have almost unlimited physical RAM.



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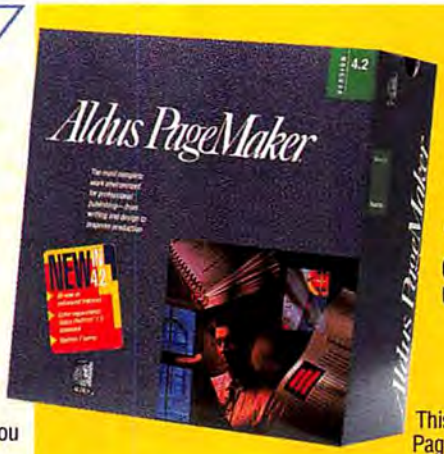

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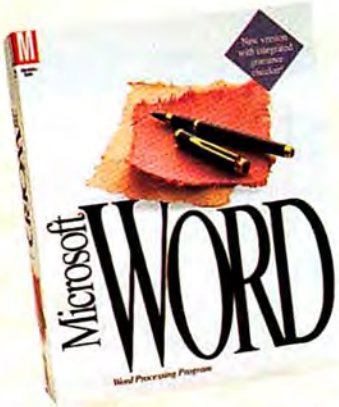

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PROmotion II allows you to create exciting, full-color presentations, develop interactive training systems. With it you can quickly and easily add animation, color and sound to any HyperCard 2.1 stack. The program operates as a stand-alone professional animation tool which allows you to create color animations containing path-based actors and background props, with multiple audio tracks. Other features include automatic scalling and cel-based tweening. Prints to video and exports to QuickTime. Motion Works #1039 ? ✓

ADDmotion II

$94

ADDmotion II provides 24-bit color, sound recording and editing as well as animation. Both PROmotion and ADDmotion use an interface which follows traditional animation techniques such as cel-based actors, onion skinning and path-based motion. ADDmotion II files are exportable to QuickTime. Motion Works #0194 ? ✓

PrimeTime

$64

PrimeTime is a collection of media clips designed to give you a running start into the world of multimedia. The CD includes over 100 animated actors, background props and sound clips covering business, education and entertainment as well as numerous examples of uses for animation and multimedia. Motion Works #1038 ? ✓

Accelerators

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4904	Fastmath Classic II	169	? ✓
4120	Fast Math LC	139	? ✓
DayStar Digital			
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4182	Dual Port IIsi with FPU	169	? ✓
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4320	Universal Powrcashe 40MHz w/FPU	1199	? ✓
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4647	68881 Math Coprocessor Upgrade	74	?
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4927	Mono Video Adapter Port Classic	254	? ✓
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4952	NewLife 16MHz with out FPU-Classic	489	? ✓
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Radius			
4207	Radius Rocket	1799	? ✓
Sigma Designs			
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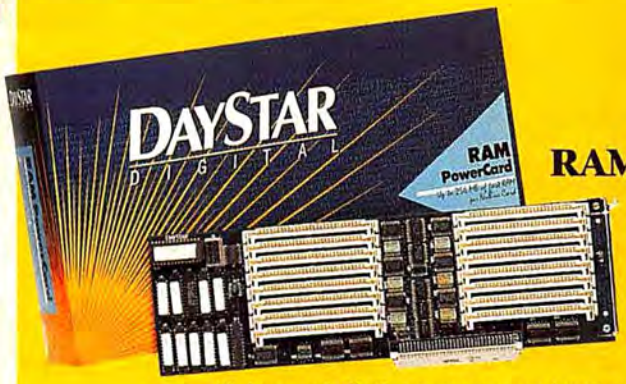
0215	Sigma Double-Up Board	149	? ✓



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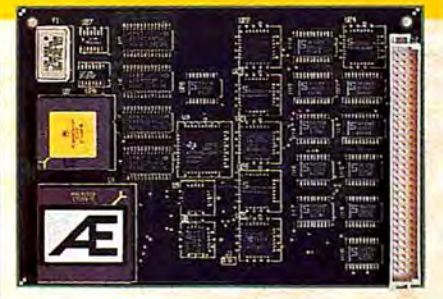

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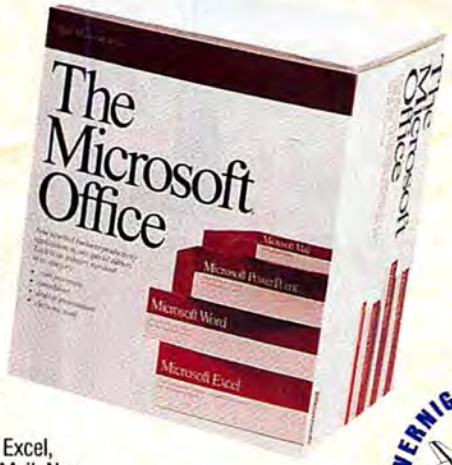

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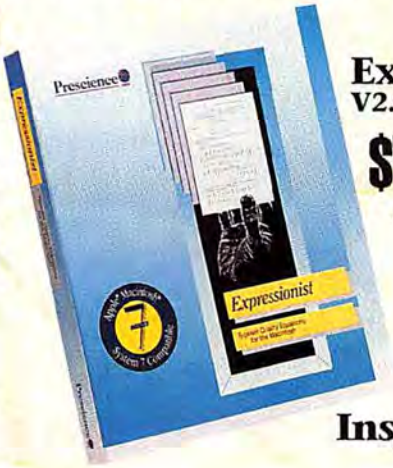

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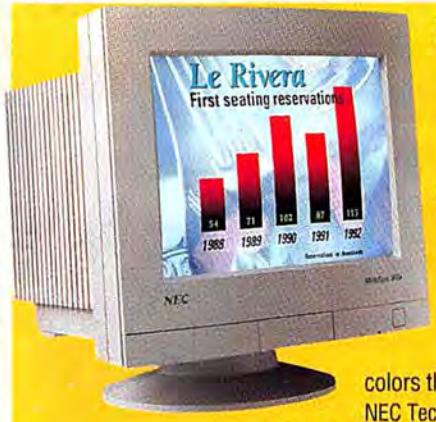

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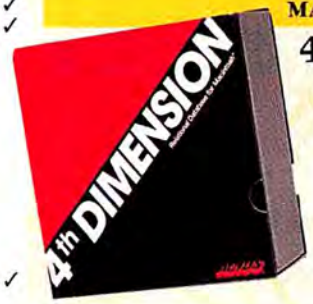

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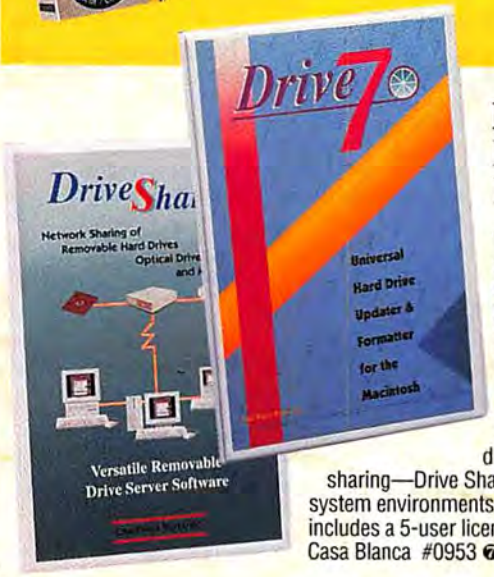

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2700	Etherport II	188	✓
2542	Shiva Telebridge	408	✓
1406	Shiva Netserial	274	✓
1405	Shiva Netbridge	408	✓
2985	Ethergate	1295	✓

Tops

4715	Tops Repeater 2.0	118	✓
1677	Tops Flashcard (Dos)	149	✓

Circle 70 on reader service card

12-Port LocalTalk StarController

$1024

Now you can manage and expand your network easier than ever. StarController's patented circuitry amplifies LocalTalk signals. With Star Command software (included) you can manage your Star Controller from any Mac on the network. Supports up to 12 nodes. Farallon #4738 ✓

24 Port LocalTalk StarController

$1298

Now you can manage and expand your network easier than ever. StarController's patented circuitry amplifies LocalTalk signals. With Star Command software (included) you can manage your Star Controller from any Mac on the network. Connects up to 24 nodes. Farallon #4739 ✓

SCSI Link

$299

DaynaPORT SCSI/Link is a small Ethernet connector box with a compact, portable design that makes ideal for Macintosh PowerBooks and Portables. Both 10BASE-T and thin-Ethernet cable systems are supported. Dayna Communications, Inc. #0488

Asante MacCon3 +Nubus 64K

$249

The Asante's MacCon3 for NuBus series Macs is the first set of Ethernet cards that support all three Ethernet media—thick, thin and 10BASE-T on one card. Supports the entire Mac II family (si requires optional adapter), the fx and the Quadras. Asante #0511 ✓

Networking Software

DataClub Classic Single User

$119

DataClub Classic is the only Mac-based networking software that gives you the convenience and performance of a dedicated file server without the expense of dedicated hardware. International Business Software #4990 ✓

CALL FOR EVERYDAY LOW PRICES

DataClub Elite

$1149

DataClub Elite is everything you need to install the fastest server-based network for Macintosh work groups. You get the power and simplicity of DataClub's unique parallel architecture. Plus DataClub's exclusive Smart Client software to boost network performance by up to four times that of AppleShare! International Business Software #4747 ✓

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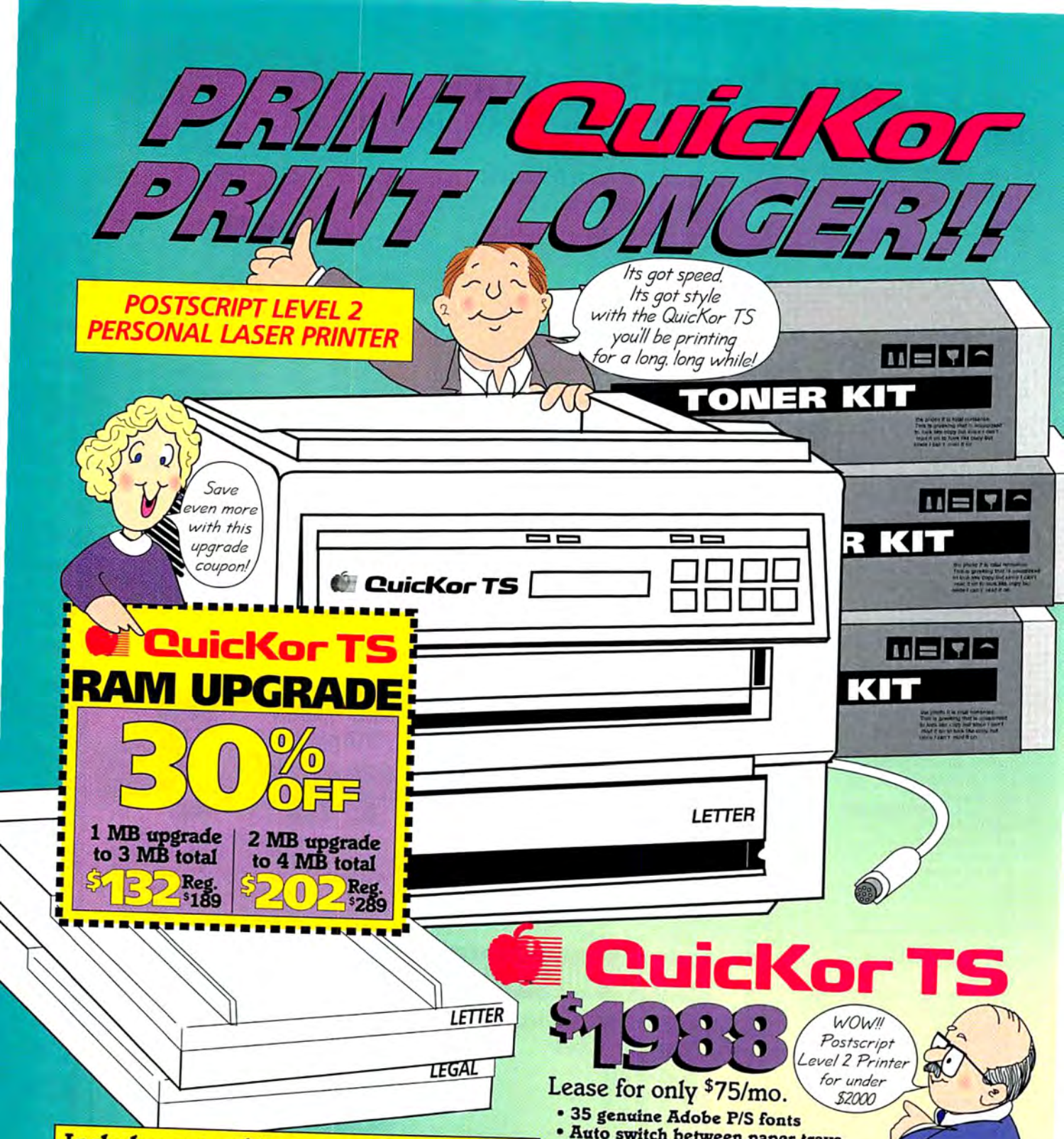

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Circle 58 on reader service card

Updates

MAY 1992

THIS SECTION LISTS THE LATEST VERSIONS OF SELECTED MAC APPLICATIONS THAT WERE ANNOUNCED BY THE TIME WE WENT TO PRESS.

PRODUCT	V.	REQ.	★	$
4TH DIMENSION	2.2	1MB/6.0		$99
A4	3.0	2MB/6.0.5		$395
AATRIX CHECKWRITER II	3.02	512K/4.1		*
ACCOUNTANT, INC. PROFESSIONAL	3.0	1MB/6.0.3		*
ACCUTEXT	3.0	4MB/6.0		$150
ACTA 7	7.0	512KE/6.0.5	2/92	$33.50
ADDMOTION	2.0	2MB/6.0.5		*
ADDRESS BOOK PLUS	2.0	1MB/6.0.2	2/92	$25
ADOBE ILLUSTRATOR	3.2	2MB/6.0.3		*
ADOBE PHOTOSHOP	2.0.1	2MB/6.0.2	9/91	$199
ADOBE TYPE MANAGER	2.0	1MB/6.0.2		FREE
AFTER DARK	2.0	512KE/4.1		*
AGENT DA	2.0	1MB/6.0.5		$30
AGFATYPE	3.0	2MB/6.0.2		FREE
AGFA TYPECHART	1.5	1MB/6.0.4	7/91	FREE
ALARMING EVENTS	1.0.3	1MB/6.0.2	11/91	$15
ALDUS DIGITAL DARKROOM	2.0	1MB/6.0	9/91	*
ALDUS FREEHAND	3.1	1MB/6.0.5	8/91	*
ALDUS PAGEMAKER	4.2	4MB/6.0.5	5/92	*
ALDUS PERSUASION	2.1	4MB/6.0.5		*
ALDUS SUPER 3D	2.5	2MB/6.0.5		*
ALDUS SUPERCARD	1.6	2MB/6.0.4		$50
ALDUS SUPERPAINT	3.0	1MB/6.0.5	3/92	$65
ALLIANCE POWER TOOLS	2	1MB/6.0.4		*
AMAZING PAINT	1.0.1	512KE/6.0.4		$15
AME	2.0	1MB/6.0.2		$49.95
ANTITOXIN	1.4	512K/3.2		$15
APPLESHARE FILE SERVER	2.0	512K/3.2		*
ARCHICAD	4.03	5MB/6.0		10% OF LIST
ASHLAR VELLUM	2.10	4MB/6.0.2		*
ASHLAR VELLUM 3D	2.10	4MB/6.0.2		*
ATONCE	1.2	1MB/6.0.5		*
AUDIOMEDIA	2.02	2MB/6.0.7		$29
AURACAD	3.01	1MB/4.0		$90
AUTHORWARE PRO	1.7	2MB/6.0.5		*
AUTOSAVE II	2.0	512KE/4.2		*
A/UX	2.0	4MB/6.0.5		*
AZIMUTH	2.1	1MB/6.0.2		$45
BACKFAX	2.0	1MB/6.0.3		$75
BACKMATIC	2.0	1MB/4.2	2/92	*
BILL-IT	2.6	1MB/6.0.3		*
BITSTREAM TYPEFACE LIBRARY	1.5	1MB/6.0		*
BUSINESS SENSE	1.5	1MB/6.0.7		$69
CA-CRICKET PRESENTS	2.0.1	1MB/6.0		*
CALENDAR	1.1.2	512KE/6.0	11/91	FREE
CANOPENER	2.0	512K/3.0		$29
CANVAS	3.0	1MB/6.0.2	1/92	*
CAPTURE	4.0	128K/4.1		$30
CARBON COPY MAC	2.0	1MB/6.0.5	4/92	*
CAT III	1.1	1MB/6.0		*
CHECKLIST	2.0	1MB/6.0	2/92	*
CINEMATION	1.0	4MB/6.07		NA
CLARIS CAD	2.0.2	2MB/6.0		$79
CLARIS RESOLVE	1.0.1	1MB/6.0.5	1/92	NA
CLARISWORKS	1.0	1MB/6.0.5	3/92	NA
CLICKCHANGE	1.05.2	1MB/6.0.4		$5
CLICKPASTE	2.1	1MB/6.0		*
CMS UTILITIES	7.0	2MB/7.0		$25
COLOR MACCHEESE	2.07	1MB/6.0.5		$15
COLORSTUDIO	1.5	4MB/6.0.5	3/92	*
COMPUSERVE INFORMATION MANAGER	1.5	1MB/4.1		*
COMPUSERVE NAVIGATOR	3.1	512K/4.1		*
CONCERTWARE+	4.0	512KE/4.2		$15
CONNECTIONS	2.0	2MB/6.0.5	4/92	NA
CORRECT GRAMMAR	2.0	1MB/4.2		*
DATACLUB CLASSIC	2.0	2MB/6.0		*
DATA SHAPER	1.2	1MB/6.0		$40
DECK	1.03	2MB/6.0.7		FREE
DELTAGRAPH PRO	1.0	2MB/6.0.5	5/92	$75
DELUXEMUSIC CONSTRUCTION SET	2.5	512K/6.0.2		*
DESCARTES	1.04	2MB/6.0.3	6/91	FREE
D.E.S. DOCUMENT EXCHANGE SYSTEM	4.1	1MB/6.0		*
DESIGNCAD	3.0	2MB/6.0.5		*
DESIGNCAD 2D/3D	3.0	2MB/6.0.5		$50
DESIGNSTUDIO	2.0	1MB/6.0	11/91	*
DESKPAINT	3.07	1MB/6.0.5		$19.95
DIGITAL DARKROOM	2.0	1MB/6.0.4		$80
DISKDOUBLER	3.7	1MB/6.0.2	3/92	$15
DISKEXPRESS II	2.10	1MB/6.0		FREE
DISKFIT PRO	1.0	1MB/6.0	4/92	$32.50
DISKTOP	4.01	1MB/6.0		*

continues

V. = version #. **Req.** = min. RAM and system software required. ★ = last time (in the past year) this or an earlier version was reviewed. **$** = cost of update to registered owners. **NA** = first version, not applicable. * = contact your dealer for update policy. **Blue** = new version. **Yellow** = reviewed product.

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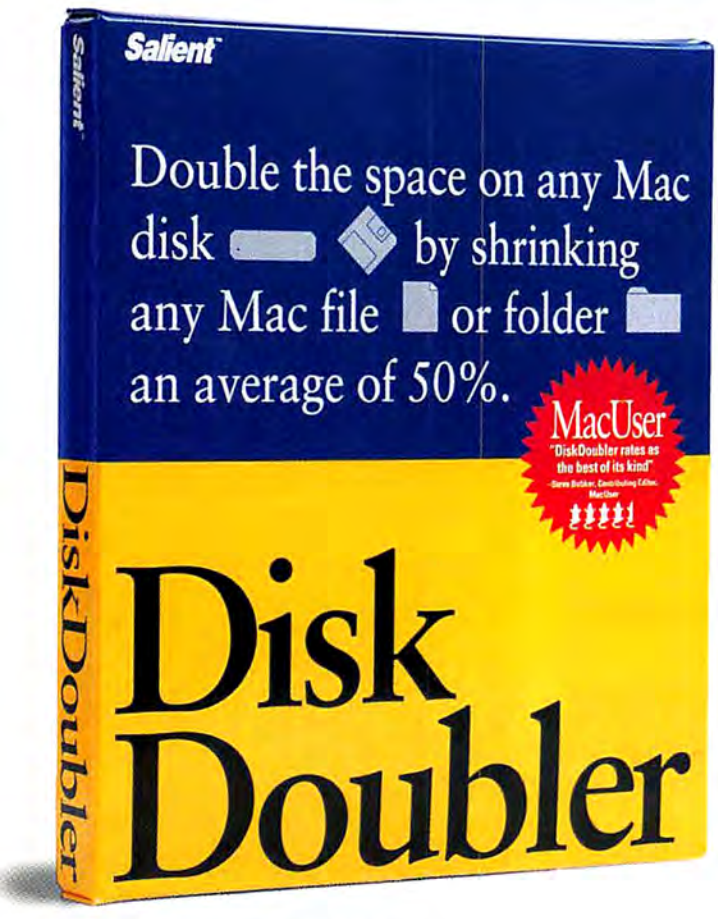
Circle 131 on reader service card

PRODUCT	V.	REQ.	★	$
DISPLAY ADBUILDER	1.1	1MB/6.0.3		*
DOLLARS & SENSE	5.0	512KE/3.2		*
DOUBLE HELIX	3.5	1MB/6.0		$99
DREAMS	1.1	1MB/6.0.2		*
DYNAPERSPECTIVE	2.3	2MB/6.0.5		$149
DYNODEX	2.0	1MB/6.0	2/92	$25
EASY COLOR PAINT	2.02	1MB/6.0.2		*
EHELP	2.0	1MB/4.1		$445
EMPOWER II	4.0.7	2MB/4.2		*
ENCORE	2.0.7	2MB/6.0.2		*
ENHANCE	2.0	2MB/6.0.3	11/91	$100
EVOLVE	1.1	2MB/5.3		$25
EZ VISION	1.0	1MB/6.0.3		NA
FASTBACK PLUS	2.6	1MB/6.0	4/92	*
FAST FORMS	2.0	1MB/6.0		$25
FASTLABEL	3.1	1MB/6.0		$10
FASTTRACK	1.5	512KE/5.5		$20
FAXGATE (MICROSOFT MAIL)	3.0	1MB/6.0.3		$9/WORKSTATION
FAXGATE (QUICKMAIL)	1.5	1MB/6.0.5		$9/WORKSTATION
FILEGUARD	2.7	1MB/4.2		$18
FILEMAKER PRO	1.02	1MB/4.2		FREE
FILEVISION V	1.1	1MB/6.0.2		*
FILMMAKER	2.5	5MB/6.0.3		*
FINALE	2.6	1MB/6.0.2		FREE
FLEXICAD	2.20	5MB/6.0.4		*
FONTMONGER	1.0.5	2MB/6.0.2	10/91	FREE
FONTOGRAPHER	3.5	1MB/4.2		*
FONTSHARE	2.2	1MB/6.0		FREE
FONTSTUDIO	2.0	1MB/6.0.5		*
FORM Z	2.0	2MB/6.0		*
FOXBASE+/MAC	2.01	1MB/6.0		FREE

PRODUCT	V.	REQ.	★	$
FRAMEMAKER	3.0	1MB/6.0	3/92	*
FREEDOM OF PRESS LIGHT	3.0.1	2MB/6.0.3		FREE
FREEDOM OF PRESS PROFESSIONAL	3.0.2A	4MB/6.0.3		$250
FULL IMPACT	2.0	1MB/6.0		$50
FULLWRITE PROFESSIONAL	1.5	2MB/6.0.2		*
GENERIC CADD	1.1	1MB/6.0.5		*
GEOQUERY	3.0	1MB/6.0		*
GOFER	2.0	1MB/4.1		$25
GRACELAN	2.0	1MB/6.0.5		*
GRACELAN UPDATE MANAGER	1.0	2MB/6.0.5		NA
GRAMMATIK MAC	2.05	1MB/6.0		$15
GREAT GANTT	1.4	1MB/6.0		*
GREAT PLAINS ACCOUNTING SERIES	6.0	1MB/4.2		*
GREATWORKS	1.0	1MB/6.0.2	1/92	NA
GUIDE	2.0	512K/4.1		$50
HAND-OFF II	2.2.1	1MB/6.0		FREE
HELP	1.0.1	1MB/6.0	2/92	FREE
HYPERCARD	2.1	1MB/6.0.3		$49
HYPERDA	2.0	512K/3.2		*
ICON-IT	2.1	1MB/6.0.2		*
IF:X FORMS DESIGNER	1.1	1MB/6.0		FREE
IGOR	1.2	2MB/4.1		$35
IMAGESTUDIO	1.7	1MB/6.0		$99
INFINI-D	1.1	4MB/6.0.4	9/91	FREE
INFOLOGIC ENVELOPE	1.1C	512KE/4.0		$5
INITPICKER	2.02	1MB/6.0		$10
INSIDE OUT	II	1MB/6.0.2		*
INSIGHT EXPERT ACCOUNTS PAYABLE	2.1.1	1MB/6.0		*

PRODUCT	V.	REQ.	★	$
INSIGHT EXPERT ACCOUNTS RECEIVABLE	2.2	1MB/6.0.2		*
INSIGHT EXPERT GENERAL LEDGER	2.2	1MB/4.2		$99
INSPIRATION	3.0	1MB/4.2	12/91	*
INSTANT-EXPERT PLUS	2.0	1MB/5.0		FREE
INTERFACE RAVE	2.0.5	2MB/6.0.4		FREE
INTOUCH	1.1.7	512KE/4.2	3/92	FREE
ITHINK	2.0	2MB/6.0.2		$149
KALEIDAGRAPH	2.1	2MB/6.0.5	9/91	$20
KIWIENVELOPES	3.1	512KE/4.1		*
LABVIEW	2.2	4MB/6.0.5	10/91	*
LANGUAGE SYSTEMS FORTRAN	3.0	2MB/6.0.4		$100
LAPLINK MAC III	3.2	512K/2.0		FREE
LAPLINK MAC PLUS III	3.0	512K/2.0		*
LASERPAINT COLOR II	1.02	1MB/6.0.3		FREE
LETRASTUDIO	2.0	2MB/6.0		*
LIGHTSPEED COLOR LAYOUT SYSTEM	2.5	1MB/6.0.5		*
MACANALYST	3.1	2MB/6.0		*
MACARCHITRION	5.5	2MB/6.0.3		*
MACBRAIN	3.0	1MB/6.0.5		$295
MACDRAFT	2.1	1MB/6.0.2		*
MACDRAW II	1.1	1MB/6.0		*
MACDRAW PRO	1.0.1	1MB/6.0.5	11/91	$99
MACENVELOPE	5.1	1MB/4.2		$29.95
MACENVELOPE PLUS	2.0	512KE/3.2		$50
MACFLOW	3.5.4	1MB/6.0		$30
MACFORTRAN II	3.1	4MB/6.0.3		$99
MACGLOBE	1.0	1MB/6.0.4	4/92	*
MACLABELPRO	1.5	1MB/6.0.3		$19.95



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PRODUCT	V.	REQ.	★	$
MACLINKPLUS/PC	6.0	1MB/6.0.3	3/92	*
MACMONEY	3.5	512KE/4.0		$12
MACPAINT	2.0	512KE/3.2		$25
MACPALETTE II	2.2	1MB/6.0.5		*
MACPHONEBOOK	3.0	1MB/6.0	9/91	*
MACPLOT PROFESSIONAL	3.7.4	1MB/6.0.5		*
MACPLOT STANDARD	3.7.4	1MB/6.0.5		*
MACPROJECT II	2.5	1MB/6.0		$99
MACRECORDER	2.03	512K/3.2		*
MACRENDERMAN	1.1	5MB/6.0.5		$75
MACROMIND DIRECTOR	3.0	2MB/6.0.5		$195
MACSCHEDULE	2.5	1MB/6.0		$30
MACSCHEDULE PLUS	1.0.5	1MB/6.0		FREE
MACSPIN	3.01	512K/4.3	3/92	*
MACTERMINAL	3.0	512K/3.2		$65
MACTOOLS DELUXE	1.2	1MB/6.0		*
MACTOPS	3.1	1MB/6.0.5		*
MACWRITE II	1.1	1MB/6.0		FREE
MANAGING YOUR MONEY	4.0	1MB/6.0.3		*
MANAPRO GENERAL LEDGER	3.1	1MB/6.0		NA
MAPGRAFIX	2.1.1	4MB/6.0.3		*
MAPLE V		2MB/6.0.7	5/92	*
MARCOPOLO	1.1	1MB/6.0		FREE
MARKET ANALYZER PLUS	2.0	2MB/6.0.2		$99
MARKETMASTER	3.5	1MB/6.0.3		*
MARKUP	1.03	1MB/6.0		FREE
MASTERFINDER	1.1	1MB/6.0.5	6/91	*
MASTERJUGGLER	1.57	512K/6.0		$15
MASTERPLAN	1.03	512K/6.0.5		FREE
MASTER TRACKS PRO	4.52	1MB/6.0.2		*
MATHCAD	2.06	1MB/6.0.2		FREE

PRODUCT	V.	REQ.	★	$
MATHEMATICA	2.0	1MB/6.0		*
MATHTYPE	2.1.1	512K/6.0.2		*
MATHWRITER	2.0	2MB/6.0.5		*
MEDIATRACKS	1.01	1MB/6.0.2		FREE
MENUFONTS	4.01	1MB/6.0.5	5/92	$20
METAPICT	2.0	512KE/4.5		$69
META PRO	2.03	1MB/6.0		*
MICHAEL'S DRAW	1.0	1MB/6.0.5	12/91	NA
MICROPHONE II	3.0	512K/4.2		*
MICRO PLANNER MANAGER	1.0	2MB/6.0		*
MICROSOFT EXCEL	3.A	1MB/6.0.2	9/91	*
MICROSOFT FILE	2.0	512K/3.2		*
MICROSOFT MAIL	3.0	1MB/6.0.2	8/91	*
THE MICROSOFT OFFICE	1.5	1MB/6.0.2		$129
MICROSOFT POWERPOINT	2.01	1MB/6.0		FREE
MICROSOFT PROJECT	1.1	1MB/6.0.4	11/91	NA
MICROSOFT WORD	5.0	512KE/3.2	4/92	$129
MICROSOFT WORKS	2.0e	512K/6.0		*
MINDLINK	2.0	1MB/6.0		*
MINDWRITE	2.1	512KE/4.2		*
MINICAD+	3.1	1MB/6.0	7/91	*
MOCKPACKAGE PLUS UTILITIES	4.4	512KE/3.2		$15
MODELSHOP II	1.1	1MB/6.0.2	3/92	FREE
MORE	3.1	1MB/4.1		*
MR. FILE	1.1.1	1MB/4.2		FREE
MULTI-AD CREATOR	3.0	2MB/6.0.3		*
MULTILEDGER	1.1	512K/3.2		$75
MUSICPROSE	2.1	1MB/6.0		FREE
MUSIC PUBLISHER	2.5.2	1MB/6.0	12/91	$15
MYADVANCEDMAILLIST	3.0	512K/4.1		*
MYDISKLABELER III	3.0.4	1MB/6.0		*

PRODUCT	V.	REQ.	★	$
M.Y.O.B.	2.0	1MB/6.0	10/91	*
MYTIMEMANAGER	4.0	1MB/6.0.3	11/91	*
NETMINDER ETHERNET	2.0	2MB/6.0		*
NETWORK BUNDLE FOR THE MAC	3.0	512K/3.2		*
NETWORK SUPERVISOR	2.0	2.5MB/6.0.3		*
NISUS	3.05	1MB/6.0.2		*
THE NORTON UTILITIES FOR THE MACINTOSH	1.1	1MB/4.2		$19
NOW UTILITIES	3.0.1	1MB/6.0.4	2/92	$49
NUBASE FOR THE MAC	1.3	1MB/4.1	1/92	$75
OMNIPAGE	3.0	4MB/6.0		$25
OMNIPAGE PROFESSIONAL	1.0	5MB/7.0		*
OMNIS SEVEN		2MB/6.0		*
ONCUE	1.3	512K/4.2		$10
ON LOCATION	2.0	1MB/6.0.5	5/92	$25
ON SCHEDULE	2.0	1MB/3.0		*
PANORAMA	2.03	1MB/6.0	5/92	*
PAYROLL	4.0	2MB/6.0.5		$89
PERFORMER	3.61	2MB/6.0.2		*
PERSONAL PRESS	1.01	1MB/6.0.2		FREE
PHONENET LIAISON	3.0	1MB/4.2		$75
PHOTOMAC	1.5	2MB/6.0.3		$75
THE PHRASE THESAURUS	2.0	1MB/6.0		FREE
PICKTURE	1.0	512K/6.0		NA
PICTUREBOOK+	1.0	1MB/6.0	2/92	*
PICTUREPRESS	2.0	2MB/6.0.4		*
PIXELPAINT	2.1	2MB/4.1		*
PIXELPAINT PROFESSIONAL	2.01	4MB/6.0.5	9/91	$125
PLAINS & SIMPLE	1.06	1MB/3.2		*

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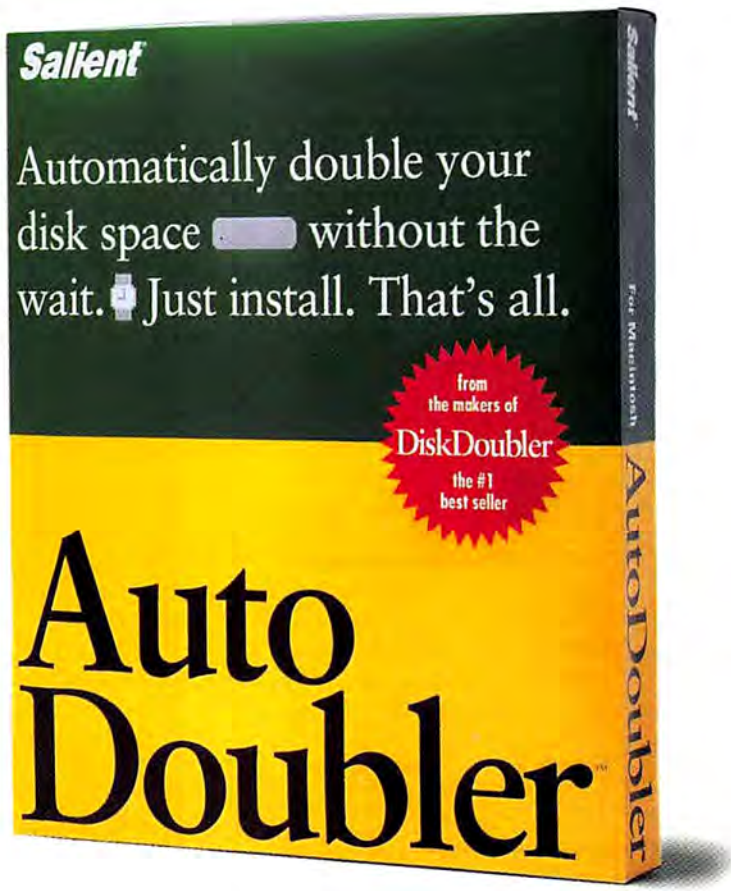
Circle 39 on reader service card



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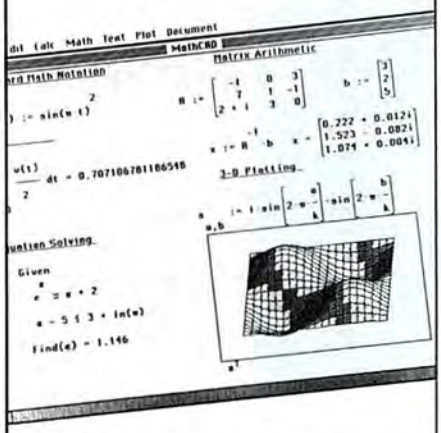

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TYPE: 3.5" OPTICAL
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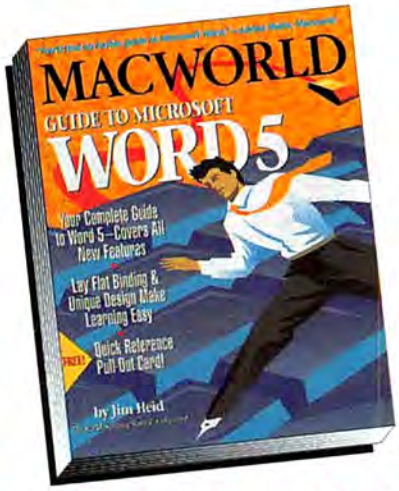

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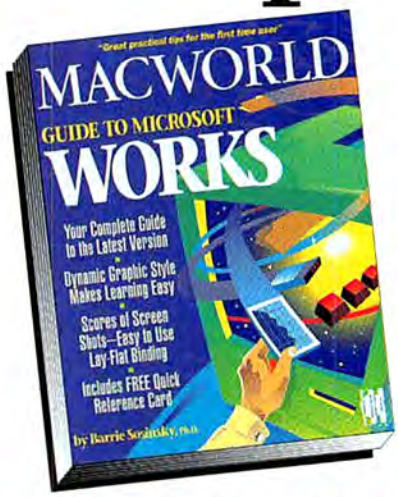

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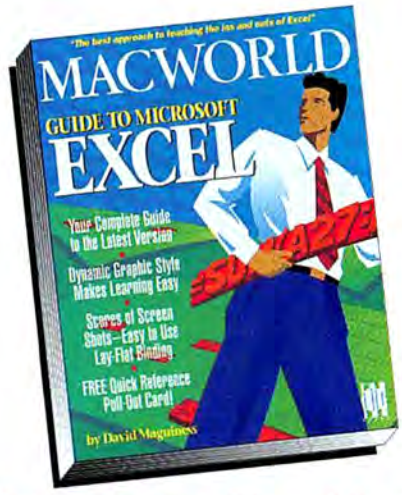

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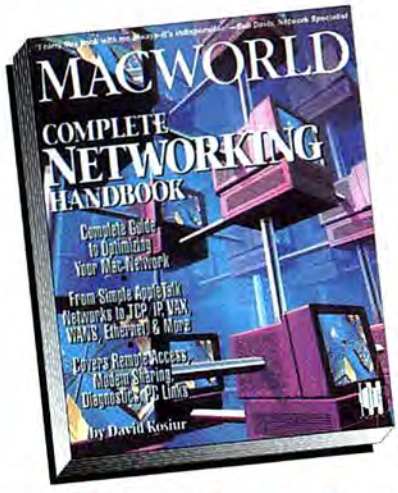

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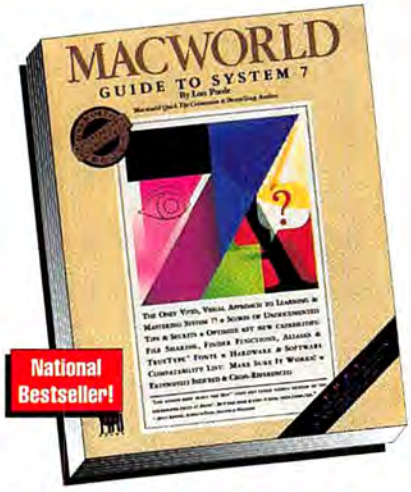

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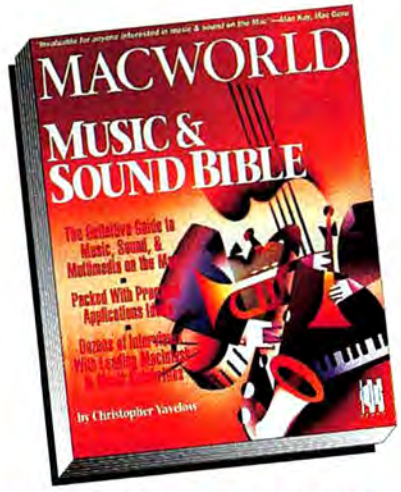

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Macintosh Programs Can Be Learned in a Few Hours With the Right Training

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I've seen their frustration, have empathized with their confusion, and understood their computer fears. I've talked to workers who have had new computers and new programs simply dropped on their desk with the directive to, "learn this." I've listened to people who have struggled night after night trying to read and understand a computer manual. Can you imagine trying to understand and master 4th Dimension from the manual?

You would be surprised at the number of people who have confided with me the fact that they've given up trying to learn some of the programs. They put the box on the shelf and write the expenditure off as a bad investment.

Hard Earned Money Wasted

Can you imagine how much money has been wasted on programs and computers that are sitting abandoned? Right now think of the people working on Macs in your office. Do they really understand the computer? Do they know what to do when it goes down? How many programs are each of your people using? Have they really mastered the programs they're using? Do they know the short-cuts and valuable techniques that will save you time, money, and increase your professionalism?

An Excellent, Low Cost Training Answer

Four years ago I founded MacAcademy. My purpose was to create a training organization that provided training similar in nature to the Macintosh itself - simple, easy to use, and effective.

Now, four years later the concept has proven to be a great success. Right now people are benefiting from MacAcademy training in over 100 cities in the U.S., in Canada, Great Britain, Australia, Japan, Hong Kong, and 22 additional countries throughout the world.

MacAcademy training is successful for one reason - it works!

The Video Answer

Two years ago we introduced the MacAcademy Video Training Library. This library now includes over 45 different titles. Each video is 2 hours long and offers clear, concise, effective training for the Macintosh and over 20 popular programs. In many cases you can purchase up to 6 hours of training for one program.

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Lab Notes

Server-Client Optimization

BY TIM WARNER

EVEN THOUGH ETHERNET CAN THEORETICALLY increase network performance over 40 times, in practice Ethernet networks transfer data only 3.5 times faster than LocalTalk networks do. As our lab tests for this month's feature on Ethernet networks showed, an assortment of bottlenecks such as printer performance, router delays, and server performance can slow a network to a fraction of its promised speed. So overcoming these typical bottlenecks is crucial to maintaining a network's speed and efficiency.

Print spoolers are cheap and ubiquitous; good routers, though they are expensive, are fast and relatively headache free. However, people only occasionally print or send data through a router, while servers are in constant use for electronic mail, group projects, archiving, and backup. This month's *Lab Notes* focuses on server optimization.

HANK OSUNA

Eliminating Bottlenecks

THE THREE MAIN BOTTLENECKS TO server performance are CPU speed, hard drive input/output, and NuBus speed. Video performance, a fourth bottleneck, can be improved simply by running the server in 1-bit mode. When users transfer data between their Macs and the server, the server takes time to process the data request. The bulk of this time involves setting up the transfer with the server, decoding the data from Ethernet, then setting up the transfer to the hard drive. For all but the largest files, the amount of setup time for a transfer constitutes more than 50 percent of the entire transaction time; for very small files—because proportionally there is more setup for small files—that amount can reach as high as 80 percent.

In our tests, we used eight IIci's—each with a cache card and 8MB of RAM running in monochrome mode; four of these were configured as AppleShare servers. All the Macs were connected via Ethernet adapter boards and an NRC multigate hub. To automate the testing, we used a program that coordinated the file transfers to make them occur simultaneously. We sent files of varying sizes between matched pairs of workstation Macs (clients) and servers, then looked at the efficiency of the transactions.

Because much of this processing is handled by the CPU, the most obvious way to improve server performance is either to use a machine with a very fast CPU as a server, such as a IIci or a Quadra, or to put an accelerator in the existing server. During our testing we discovered that using multiple servers was another effective strategy.

As we added client-server pairs to the network in our Ethernet throughput tests, we observed that increasing traffic on the network did not significantly increase the time it took to transfer files within each pair. In other words, all the transfers occurred within the time it would take a single pair to transfer the same data. Even when we artificially loaded the network with packets using EtherPeek to simulate extremely high network usage, the transfers within pairs took the same amount of time. (In contrast, we found that under LocalTalk, adding more network traffic quickly cripples network performance.) If, however, many files are being sent to or retrieved simultaneously from the same server, speed quickly degrades—by as much as 30 percent per additional user.

continues

Circle 146 on reader service card.

After CPU speed, the chief obstacle to fast server access is hard drive input/output. We addressed the SCSI bottleneck by using a DayStar PowerCard RAM disk for our low-level tests. To assess the importance of disk access on Ethernet throughput, we compared the low-level results with results obtained by using two hard drives—an Apple internal hard drive and a MicroNet 643 with the NuPort SCSI NuBus Interface. Our tests showed that the faster drives improved server performance considerably—about 10 to 15 percent—over the Apple drive.

The speed of a SCSI transfer is determined by three things: the performance of the hard disk assembly (HDA), the speed of the SCSI controller chips on the computer's logic board, and, in the case of SCSI accelerator boards, the rate of NuBus. Data caching schemes improve performance somewhat, but they don't enhance access time—the time it takes for the drive head to find the proper track and settle on the appropriate block of data. Because high transfer rates for reads and writes are desirable in a server, hard drives with fast SCSI chips and advanced disk technologies are the ideal for a fast server.

But the speed of the SCSI electronics on the Macintosh logic board is just as important as hard drive speed. Previously, the IIci had the fastest SCSI port in the Macintosh line; the IIfx, because of its ill-fated SCSI/DMA chip, is slightly slower. NuBus and Processor Direct Slot (PDS) boards from MicroNet, PLI, FWB, and Storage Dimensions have SCSI transfer rates far beyond the capabilities of most Macintosh models. These boards use faster SCSI chips and SCSI-2 specifications to achieve sustained transfer rates ranging from 4MB to 9MB per second. Some of these boards require high-speed disk arrays to achieve the transfer rates that SCSI chips can handle. Such high transfer rates also require the use of bus-mastering techniques, which allow the board to control the computer—reading and writing directly to system memory.

You'd think with this kind of speed, a NuBus board would be the answer, but not even an accelerated SCSI configuration will eliminate the NuBus bottleneck. NuBus offers transfer rates of up to 36MB per second in burst mode, but because high-speed modes are not explicitly supported, Apple's implementation is limited to 4.2MB per second. Additionally, NuBus data transfers are subject to the same kinds of overhead that hard drives are. Only NuBus boards that take over control of the bus, called bus masters, can circumvent Apple's limitations and support high-speed transfers to system RAM.

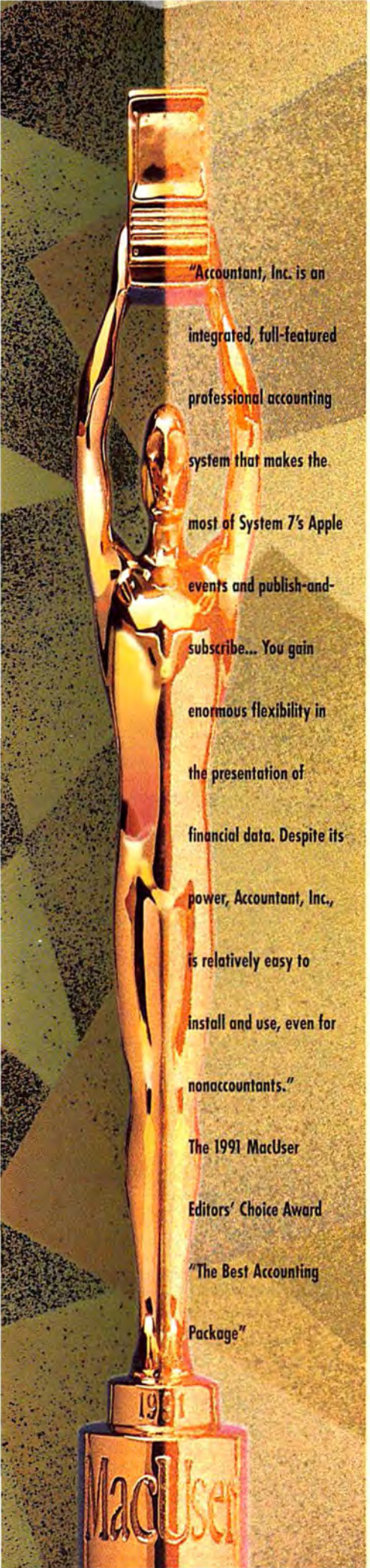
Another method of overcoming NuBus limitations is to use a Processor Direct Slot (PDS) board. Several vendors have Ethernet boards that fit into PDS slots. Some even have pass-through connectors that let you attach a second PDS board, such as a cache card. The PDS board from NRC uses Sonic chips from National Semiconductor that allow direct memory access (DMA) to system RAM, and is therefore very fast. PDS boards broaden the range of server possibilities to include lower-end Macs such as the SE/30, the LC, and the IIsi. In fact, a IIsi makes a great server: it has a fast SCSI port, a PDS slot for Ethernet and cache cards, and it is relatively inexpensive.

The Options

BECAUSE ITS DESIGN ADDRESSES SEVeral bottlenecks at once—including the NuBus bottleneck—the Quadra makes the best Mac server. It has built-in Ethernet and a fully implemented DMA controller. Its SCSI port is nearly twice the speed of the IIci's, and the Quadra's internal SCSI bus chip—with its very high sustained transfer rates—lends itself to a high-performance drive system. Unlike the IIci, the Quadra has built-in 24-bit video with no CPU overhead. Finally, NuBus '90, Apple's latest implementation of NuBus, is twice as fast as the old NuBus, so vendors who take advantage of it can get data-transfer rates twice as high as those that currently exist. The JackHammer board from FWB is a NuBus '90 bus master that supports block-mode transfer (which allows higher data-transfer rates than the operating system uses) to system RAM, and itself boasts a transfer rate of 20MB per second.

Unfortunately, no effort has been made to optimize AppleShare 3.0, which runs under System 7 on the Quadra. In fact, AppleShare will need to be incorporated into system software before the benefits of high-performance computers will be fully realized. Still, the Quadra is the best Mac around for the job. If your server's not a Quadra, you can mitigate the overhead of NuBus and SCSI transfers somewhat by increasing the size of the buffer on the server's adapter board. Most boards have 16K buffers; increasing the buffer on a server Ethernet board to 64K improves performance slightly.

Once the bottlenecks of server and client performance are eliminated under Ethernet, the burden will again be on the wiring. By that time other, higher-speed network wiring schemes, such as fast token ring and fiber optics (FDDI), may be more affordable and more widespread. Fiber is so fast that it will take a new generation of applications to even approach using the entire bandwidth. **m**



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Thunderous Color!

REVIEWER'S NOTEBOOK: *The advanced new line of NEC monitors is designed specifically for Macintosh users. They are magnificent, introducing flat-square screen, razor sharp resolution and rich color to the world. Faster, brighter screens are a must — without loss of focus. These features are available today from the NEC team of display researchers. The FG Series of monitors are packed with features, enclosed in a sleek cabinet that actually gives you more image area than conventional monitors. Each pixel is defined with unmatched clarity and saturated with color. No wash-out, no blur. The amazing new 4FG provides microprocessor-controlled, digital color. The on-board AccuColor system allows you to match PANTONE and Trumatch colors on screen! The Invar Shadow Mask allows a 20% brighter picture with no loss of clarity or contrast. And NEC's non-interlaced refresh technology allows flicker-free images.*

An affordable technological leap? The NEC FG displays are actually less than any of the other pricey nameplates, and deliver more quality, advanced design and performance. How can you possibly beat that? Destined to become "Product of the Year."

The NEC MultiSync 3FGx. The designers and engineers went crazy on this one, packing unparalleled features and performance into this amazing new monitor. Like the new NEC FullScan capabilities and larger screen sizes, where you can see up to 36% more active screen display — without distortion. Its 15" screen is flat, and provides a high refresh rate. That means crisper images, brighter colors, richer tones and more contrast. You'll notice the difference immediately when looking at your desktop! In fact, the 3FGx has been fine tuned for flicker-free images demanded by end users. The new flat-square screen design also enhances the display of single-pixel fonts on your Mac, so even your type will look better.

The NEC MultiSync 4FG. The 4FG revolutionizes monitors in one very important area: color accuracy. This new standard in video excellence is based on the concept of multiple-frequency engineering. And only NEC can do it. The award-winning 4FG is a 15" flat-square screen, digitally controlled monitor that features AccuColor. This revolution allows you to adjust colors to your preferences, or to match your printer's capabilities — even match Pantone and Trumatch colors! Like the 3FGx, the 4FG provides crisp images — 36% larger than conventional 14" monitors!

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The NEC MacFG Display Interface Cards!

REVIEWER'S NOTEBOOK: *Snap one of these color monsters into your Mac and get out of the way! You have never seen colors explode off the screen like they do with the MacFG line of high-color Display Interface cards. Including QuickDraw Accelerator, your MacFG cards can deliver incredibly fast graphics processing and greatly enhanced video performance for your MultiSync monitors.*

Tiger tested these cards on a MultiSync 4FG and a Mac IIfx with impressive results: not only did we get the visual impact of richer, deeper downright bone-crushing color, but we saw improved resolution, sharper detail and outstanding contrast. Supports the NuBus Macintosh II family and the sensational new Quadra 700 and 900 computers. These advanced boards are the product of a joint venture, combining the talents of NEC and Radius, a leader in the Macintosh color display interface arena. Together, they've just made computing history.

It's an amazing sensation. Open up a file on your Mac and instantly feel the smooth color pour out of your NEC FG monitor. So crisp, so vibrant — it's almost real! The MacFG 8X Color Display Interface Card offers multiple display modes with real-time, switch-on-the-fly capability — just make your resolution selection from the Control Panel Device (CDEV) without restarting. This feature allows you to customize your resolution for each application you use. The 8X, 256-color card includes QuickDraw Acceleration for superfast processing and NuBus Block Transfer technology. The 8X is also upgradable to 16-bit, 65,536 colors or 24-bit, 16.7 million colors that really bring the house down. Includes RadiusWare software.

The Color Invader: MacFG 24X Color Display Interface Card. This superior card has all the built-in features of the MacFG 8X card with one very important addition: it fires out 16.7 million thunderous colors! It's as if the images were painted in vivid oils right on the surface of the monitor!

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We even dragged in an HP IIIP for Mac, a Texas Instruments Turbo and an Epson 7500 to battle feature for feature with the Silentwriter 95, but they proved to be no match.

The Silentwriter 95 is PostScript Level 2, with full HP III (PCL 5) emulation. Imagine, you can print PostScript and PCL — the Silentwriter 95 automatically switches emulations for you. One printer can handle your PCs and Macs. It's all here, built right in to the Silentwriter 95. We weren't able to find this combination of features anywhere else at any price. Full-featured PostScript laser technology at an affordable price! The print quality is absolutely perfect. Documents look typeset with the Silentwriter's Sharp Edge technology and Microfine toner. Now there's no reason to buy an off-brand printer. NEC is a name you know. The Silentwriter is a great-looking machine as well. Clean, striking design with solid performance.

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Color it Powerfully and Flexibly. The Colormate's 68020 processor and state-of-the-art NEC print engine combine to produce one full-color page per minute. The printer's 4Mb of memory — unavailable on any other printer at this price — handles even the most complex color art and photographs with ease. The Adobe PostScript interpreter provides shading, type scaling, and rotation capabilities — and permits the Colormate to work with popular graphics packages like Aldus PageMaker and FreeHand, Adobe Illustrator 88, AutoCAD, Quattro Pro, Lotus Freelance, Harvard Graphics and more.

Standard RS-232, RS-422, Apple LocalTalk and Centronics parallel interfaces permit easy integration with any network, multiuser system, or personal computer. A built-in library of 17 Adobe fonts provides plenty of on-line type variety, and the printer supports downloading of additional fonts. A built-in SCSI interface permits hookup to an optional 20Mb hard disk for bitmap font caching and easy access to permanently stored fonts and forms overlays.

Color it with Ease and Efficiency. The Colormate is designed for maximum serviceability. The printer is shipped with a printer support kit providing screen fonts that let you see on your monitor how the printer-resident fonts you select for your documents will look on paper. (If you don't like what you see, you can change it *before* you print it!)

Color it with Precision. NEC-designed polyethylene ribbons ensure maximum print quality and cost-effectiveness. The printer's autosense mechanism recognizes which ribbon is installed and allows the printer to switch operations accordingly. Precision alignment mechanisms in the printer assure pinpoint registration as colors are laid down on the page.

EDITOR'S NOTE: We just saw a demo of the Colormate, and we're all pretty impressed. It's not like other color printers, it doesn't have that washed-out, dull finish appearance on the page. We noticed rich, clean color, even when dots were used to create color. Steve (our NEC rep) had megabytes full of graphics, charts, color illustrations, maps, cartoons and more, he printed them for us on the Colormate.

FREE FROM TIGER!

2 Replacement Color Cartridges — for months of color printing! A $200 Value.

NEC COLORMATE PS
BBG8525A NEC Colormate PS Model 40 . . . $4295.00

Sorry, free shipping is not included and no returns on these items.

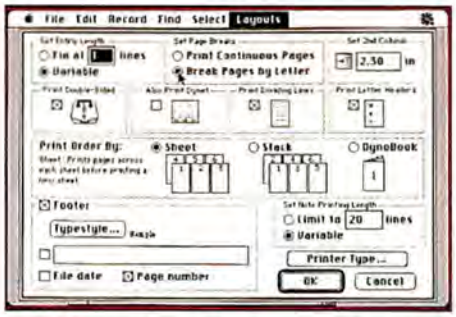
FEDERAL EXPRESS

Take Your Information With You!

REVIEWER'S NOTEBOOK: *Dynodex — The Real Contacts Database is an incredibly full-featured address book database manager. Includes both application and desk accessory versions. Allows you to print address books for virtually all popular-format personal organizers (including Filofax®, Franklin®, Time/Design®, Day Runner® and the ever-popular Day-Timer®). You can also create custom designs and sizes for whatever purpose you can imagine. Dynodex's data entry screen is well organized, fast and gives you 22 fields (all user-renamable).*

DynoPage turns your Mac into a printing press, allowing you to print any file — as a booklet! Just print and fold! You can print pages that fit perfectly into your personal organizer, print multiple pages to a sheet (dozens of layouts are built right in) and print any file in double-sided format.

With Dynodex and DynoPage, you've got the most sophisticated, easy-to-use tandem of personal organization tools in the business. In fact, they're so perfect together, TigerSoftware has arranged to bundle them and offer them to our readers for just $99! It's a steal! And if you purchase this exclusive bundle, we'll even throw in a FREE copy of SuperGlue II, the best way to share graphics, spreadsheets and formatted documents. With SuperGlue II, you can send formatted electronic documents to someone else who doesn't have, or know how to



use, the same software, fonts or system file you used to create a document. It's a $119 value! PLUS — if you use Touchbase, InTouch, Address Book Plus, QuickDEX, My Advanced MailList or MacPhonebook — you're eligible for a special competitive upgrade price on Dynodex of just $49!

Dynodex and DynoPage have received the excellent ratings for their masterful printing and easy-to-use operation. They stand far above the rest in productivity, organization, portability, connectivity and security.

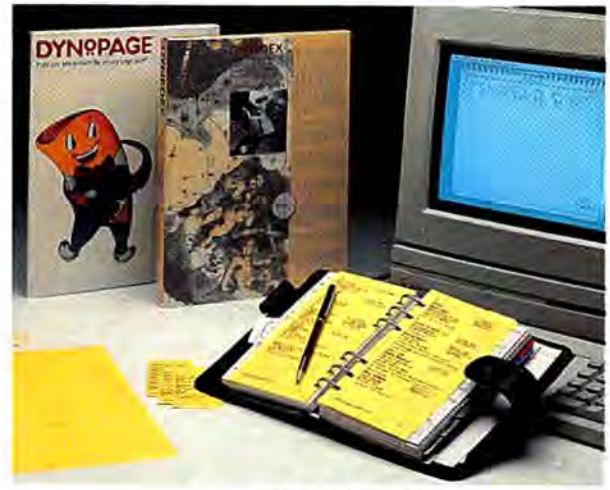
Dynodex is a true personal organizer, capable of handling names, addresses, phone numbers, notes and all other important information — and allows you to print perfect double-sided address book pages that fit virtually any personal organizer.

You'll now have instant access to your personal contacts both on and off the computer. At your computer, instantly look up and dial any number you need from the powerful Dynodex application — or the convenient desk accessory. On the road, all of your contacts are available in your personal organizer. Now your contact information is personal and portable.

The powerful Dynodex database delivers ultra high speed searches: instantly select subsets based on multi-level queries with a set of eight logical and arithmetic operators; for example, "all clients in California contacted within the last 6 months." On sorting: you get 3-key, ascending or descending on any field, along with Dynodex's speedy find, change and global delete. You can delete duplicates, Fast-Find and display any record instantly by simply clicking on it in the list window.

If your information resides elsewhere, Dynodex allows you to quickly import it for immediate use. Any text file, tab-delimited or comma delimited file is ready to use, and Dynodex includes a free copy of DynoStack, for importing HyperCard, Focal Point and QuickDex address files.

On to Dynodex's powerful (and very smart) printing capabilities: You can print any size address page, even double-sided pages. Print in any font, size and style on a field-by-field basis for great looking pages. You can set Dynodex to break pages on a new letter of the alphabet or print continuous listings. Dynodex also prints beautiful pages on DynoPaper, specially designed micro-perfed paper available in a variety of colors and punched-hole configurations to fit your favorite personal organizer. You can use Dynodex to print envelopes, postcards, Rolodex® cards, mailing labels and Post Net bar codes, too.



Dynodex 2.0 Wins *MacWEEK* Target Award

Editors Call It "Best Overall Choice" In Contact Management Category

In choosing Dynodex 2.0 as an award recipient, *MacWEEK's* editors wrote: "Dynodex significantly edges out the competition in performance, especially with larger address lists. The program's strong points include a streamlined interface, complex phone-dialing capabilities, versatile import and export features, and a thorough and well-written manual. It also offers unparalleled printing versatility, including support for address books, labels, envelopes and rotary-file cards. While different address utilities target different user needs, Dynodex 2.0 is the best overall choice for management of names and addresses on a daily basis."

Also Available: DynoPage

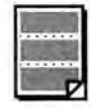
DynoPage 1.7 adds new printing functionality to virtually any of your Macintosh applications. Print in ways you never thought possible: double-sided pages, mini-pages for personal organizers, booklets, business cards, trifold brochures and more!

DynoPage prints in a variety of useful configurations, and comes complete with 40 sheets of Dynodex Instant Address Book Paper (six-ring along with half-page), dozens of pre-designed layouts, a comprehensive manual brimming with tips and techniques and a valuable coupon for big discounts on personal organizer products. Here's a look at what you'll be able to create with DynoPage:

FULL PAGE: Print any file to double-sided pages and preview any document. See it on the screen as it will print!

HALF PAGE: Desktop publishers love this great DynoPage feature. Just print and fold and you've got an instant center-stapled booklet.

FOUR "UP": With this convenient feature, you can quickly print greeting cards or mini-booklets. It's also perfect for archiving your printouts.



TRIFOLD: Allows you the flexibility in any columnar layout. Prints both portrait and landscape modes with just a click! Great for brochure layouts!

THUMBNAIL: Here's a very helpful feature for long document previews. Print thumbnail reductions to see an overview of your pages.

INDEX CARDS: Print absolutely ANY size form including index cards, postcards, change of address cards — and hundreds of other possibilities!

DYNODEX 106: Print to absolutely any six-ring organizer including the popular Filofax and Day Runner (paper included).

DYNODEX 120: Print to absolutely any half-page organizer and create insert sheets for products from Franklin and Day-Timer (paper included).

DAY-TIMER SR. POCKET: Print to this or absolutely any other organizer system. DynoPage includes dozens of pre-designed layouts to fit your needs.

DynoPage is fast, easy and truly productive, allowing you to create mini-pages for your organizers, appointment books and calendars. Print booklets, manuals, trifold brochures and more.

Positive Response from Users & Reviewers

DynoPage already has high marks from users and reviewers. *Macworld* said, "...if you ever need non-standard pages, thumbnails, double-sided pages, or other unusual printouts, DynoPage has no equal."

Jean-Louis Gassée of Be Systems has said "If you have an organizer, you have to have Dynodex & DynoPage."

TIGER EXCLUSIVE

DYNODEX COMPETITIVE UPGRADE $49.00

PORTFOLIO SYSTEMS

BBG2823 **Dynodex** w/FREE SuperGlue II **$72.00**
BBG2824 **DynoPage** w/FREE SuperGlue II **$72.00**
BBG2442 **DynoPaper** (white, cream, gray, yellow) . . **$14.00**
BBG2825 **Dynodex/DynoPage Bundle** w/FREE SuperGlue II **$99.00**
BBG2826 **Dynodex Competitive Upgrade** **$49.00**
Macintosh Plus, SE series, II series, or Portable; System 6.0.3 or later.

THE SHARP WIZARD VS. MAC POWERBOOK

Pick up any Macintosh magazine and you'll see pages and pages of advertisements and reviews on PowerBook computers. They sport all kinds of bells and whistles, come with tons of software and promise all the functionality of a desktop Macintosh. And that's great.

But if you talk to people who actually buy and use PowerBooks, they'll tell you that while their PowerBook is extremely cool, it's more computer than they really need when they hit the road. Let's face it, using a PowerBook to retrieve phone/FAX numbers, price lists, appointments, to do lists, birthdays and flight arrangements is overkill. What you really need is a Sharp Wizard 8000 (or its bigger brother, the 8200, pictured below). Small, compact, without the inconveniences of battery recharging, The Wizard 8000 has everything road warrors need: scheduler, word processor, spreadsheet, city guide—even games! Its built-in applications are extremely easy to learn and use. And it fits in your pocket! PowerBook users are turning to Wizard for INSTANT retrieval of names and numbers. The PowerBook can't do that...

Designed to Do What Your PowerBook Can't. The Wizards from Sharp are sophisticated, powerful computers designed specifically to organize all of your personal information. Whether you're jotting down names, numbers and expenses or creating 3-D charts and downloading spreadsheets. Its power has been allocated to fast, easy collection, storage and retrieval of anything. The Sharp Wizard delivers the ultimate in portability.

The Wizard focuses on the fundamentals. Like an extra wide, super-crisp screen which allows an impressive 40 character by 8 line view. The display is the single most important feature in any small computer, and nothing I've seen compares to The Wizard. I love the way each key is exactly where you'd expect it to be. Search with one stroke, perform any task by just touching an icon. The Wizard's keyboard is tight and responsive; the keys are crafted from superior materials.

Hold it in your hand — you'll see and feel the attention to precise detail. The Wizard is deceptively light and superbly balanced, with a mar-resistent case that can handle life on the road.

I've been using a Wizard OZ-8200 for a number of months now, and I can tell you that it fills a big need in my business life. I used to carry a PowerBook and quickly realized that I spent too much time babysitting the thing, along with all of my programs, files and diskettes. What I needed is something much smaller and lighter, yet fast and powerful. I carry my PowerBook sometimes — but my Wizard is always with me. Unlike my PowerBook, which requires booting-up, opening a word processor or note pad, the Wizard requires just one keystroke and is ready to receive my thoughts.

With the software now available for the Wizard, I can run spreadsheets, create finished documents, organize my expenses, communicate with my desktop back at the office or my Mac at home — even send faxes and play a few furious rounds of Hatris or Box Jockey! I've also quit carrying my pocket tape recorder to record ideas and memos — the Wizard does it better.

When you think about it, a Macintosh is often overkill for road trips — what you need on the road is a small, fast, convenient machine designed to gather information now. The Wizard is the perfect answer, providing all the functionality of a Macintosh with an optional spreadsheet, memo pad and other amazing organizational tools. Just touch an icon and the Wizard is ready to go! The Wizards feature huge (40 character by 8 line), super-crisp screens, solid QWERTY keyboards, full compatibility with your desktop PC or Macintosh — and with the new OZ-8200, you'll pack 128K of memory!

The Wizard does so much more. The real news is that the OZ-8200 128K Wizard is in stock and ready to ship. With this powerhouse in your briefcase, you're ready to do just about everything you do on your desktop PC or Mac. And the Wizard's sleek design makes it the perfect traveling companion (unlike the excess baggage of a PowerBook). It's about the size of a checkbook, weighs almost nothing and runs on standard CR-2032 batteries.

Organizer Accessories. There's an optional modem, printer, fax and a slew of software cards that turn the Wizard into a fully functioning office, so you can conduct business anywhere. With the Link cable, you can download information from your Macintosh to your Wizard and have up-to-the-second information when you take it on the road. There are several models to choose from, one for your business life.

Expand The Sharp's Mind... When you add software and memory cards to your Wizard, you put all kinds of possibilities at your fingertips. Memory and applications simply slide under the touch-sensitive screen which acts as a keypad to perform tasks, open applications — and more.

Time Expense Manager. The powerful way to manage and prioritize your schedule, track your expenses and deadlines, and account for time spent on projects or meetings.

Money Planner. Turn your Wizard into a full-featured, highly powerful financial calculator. Loans, interest rates, depreciation and statistical analysis — or program your own equations! Change one value and all affected values automatically change right on the screen.

Spreadsheet. Create fully functional, Lotus 1-2-3 file compatible, 26-column-by-999-row spreadsheets on your Wizard, or download a spreadsheet from your Macintosh! This card will hold 64K of data! Built-in features include: 10 templates, complete formatting, sorting and "freezing pane" functions, math and financial calculations, spreadsheet-linking capabilities, cut & paste and more.

North American City Guide. Includes over 12,000 detailed entries from 23 North American cities: New York, Los Angeles, Chicago, San Francisco, Atlanta, Montreal, and more.

The Organizer Bible. This card contains both New and Old Testaments from the King James version Holy Bible. Instantly go to any Book, Chapter or Verse.

8-Language Translator. Instantly translate words and commonly used phrases in English, Chinese, French, German, Japanese, Italian, Swedish and Spanish.

Tetris, Hatris, Box Jockey, Backgammon. From the Soviet Union comes Tetris. The all new Hatris, where you must position falling hats on top of each other. And Box Jockey challenges you with over 130 mazes — each one more difficult.

Thesaurus Dictionary. Over 42,000 definitions, 500,000 synonyms, and an 87,000 Spelling Corrector. Can even be used with any of the Wizard's built-in modes.

Something for Nothing! Buy a Wizard OZ-8000 or OZ-8200 and **get a handsome Leather Case and Video Guide FREE!** *(a $69.98 value)* Buy any 2 software cards — **get 1 software card FREE** *(must be of equal or lesser value)!*

SHARP WIZARD

BBG6310	**ZQ-5200 Sharp Wizard**	$199.95
BBG6311	**OZ-7200 Sharp Wizard**	$239.99
BBG6312	**OZ-8000 Sharp Wizard**	$299.99
BBG6309	**OZ-8200 Sharp Wizard 128KB**	$399.99
BBG6313	**Organizer Modem**	$179.99
BBG6314	**Organizer Talk** (OZ-7000 series only)	$99.99
BBG6315	**Organier Fax/Modem**	$499.99
BBG6320	**Time Expense Manager**	$119.99
BBG6321	**Dictionary/Thesaurus**	$129.99
BBG6322	**8 Language Translator**	$99.99
BBG6323	**Money Planner**	$99.99
BBG6324	**Spreadsheet II**	$179.99
BBG6325	**Scientific Computer Card (7000 series)**	$109.99
BBG6317	**Scientific Computer Card II**	$109.99
BBG6326	**North American City Guide**	$79.99
BBG6330	**Box Jockey**	$49.99
BBG6331	**Organizer Chess**	$109.99
BBG6332	**Tetris Game** (7000 series only)	$49.95
BBG6318	**Hatris Game** (8000 series only)	$49.95
BBG6319	**Backgammon Game (7000/8000 series)**	$49.95
BBG6333	**Organizer Bible**	$149.99
BBG6340	**Portfolio Card**	$129.99
BBG6341	**32K RAM Card**	$79.99
BBG6342	**64K RAM Card**	$129.99
BBG6345	**128K RAM Card** (7200/8000/8200)	$149.99
BBG6346	**Mac Organizer Link**	$109.99
BBG6347	**IBM Organizer Link II**	$129.99
BBG6350	**Leather Case (OZ-7000 series)** *(Reg. $34.99)*	FREE w/OZ-7200
BBG6351	**Leather Case (OZ-8000 series)** *(Reg. $34.99)*	FREE w/OZ-8000 or 8200
BBG6399	**Video Guide** *(Reg. $34.99)*	CALL!
BBG6352	**Battery Pack (for OZ-8000 series)**	$34.99
BBG6353	**Printer**	$169.99
BBG6354	**Dubbing Cable**	$29.99

WIN A WIZARD!

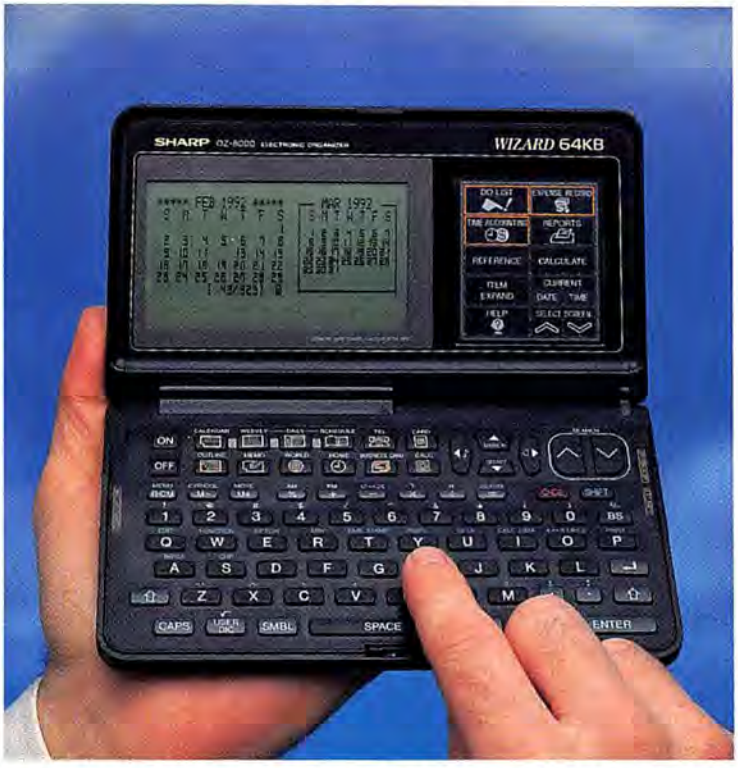
THIS SHARP WIZARD OZ-8000 CAN BE YOURS!

The Wizard OZ-8000 is a sophisticated, powerful computer designed to organize all your personal information. It offers all the functionality of a PC — in a fast, capable little package about the size of an ordinary checkbook. Complete with 64K of memory, 40 character by 8 line screen and a typewriter-style keyboard.

The Wizard is more practical than a PowerBook because it's built to handle the information that you need on the road. Names, addresses, phone numbers, notes, memos — anything you "gotta' have now!" Hey, PowerBooks are incredible, but there's nothing like a Wizard to snap on and get to work instantly. These incredible little organizers are sweeping the sales honors here at Tiger — we can't keep them in stock! But we've got one set aside for a lucky winner.

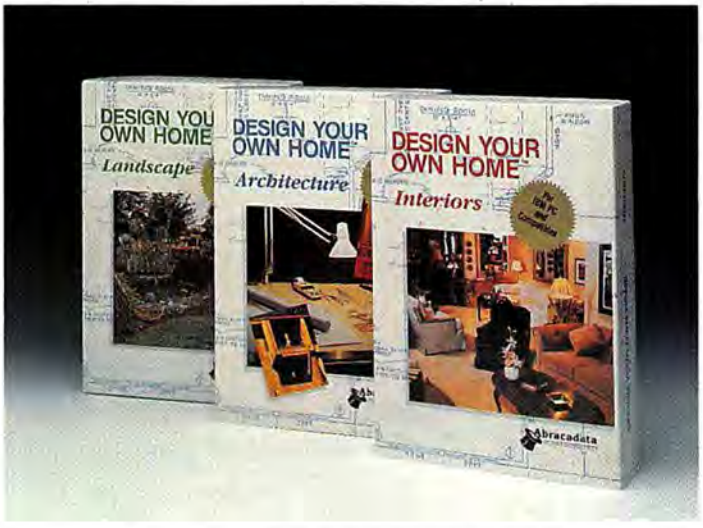
OFFICIAL CONTEST RULES:

No purchase necessary. Void where prohibited. To enter, simply clip this ad and send it to Tiger Wizard Giveaway, 800 S.W. 37th Ave., Coral Gables, Florida 33134. No phone entries, please. No computerized or copied entries. For the names of winners, please write to "Contest Winners," c/o TigerSoftware and enclose a stamped, self-addressed envelope. Winners will be notified by mail and are responsible for all taxes. Prizes unclaimed after 90 days will not be awarded. In case of dispute, Tiger judge's decision is final.



Design Your Dream House on Your Macintosh

Go ahead — design that new addition to your home! Put your imagination to work on the interior, then plan the perfect landscape. Experiment with different layouts, colors, shapes and arrangements with the Design Your Own Home Series. It's fast, easy and fun — the results are clean, precise and professional. It's your home, who could design it better than you?



These three simple-to-use computer aided design systems include dozens of sample floorplans, predrawn furnishings, plants, flowers, trees and shrubs. You can modify plans to suit your taste, or start from scratch to create just the environment you've been dreaming of. The Design Your Own Home Series is fast and easy — yet contains enough power for professional use.

ARCHITECTURE. You can create a designer home right on your Mac. Instantly draw floorplans, building side views and structural details. Rearrange your ideas, add notes and labels. Design Your Own Home automatically calculates distances, areas and angles, and uses all appropriate standard architectural scales. There's a complete library of pre-drawn architectural shapes and symbols — choose windows, doors, stairs, bathtubs and more. Add color overlays of electrical systems, plumbing plans. Use stud tool to speed drawing and aid in lumber estimates. The program includes: grids, snap lines, stud/beam repeaters, text, circles, ellipses, boxes, arcs and more. Perfect for home, school or professional use.

INTERIORS. Bring your own unique interior design ideas to life with Design Your Own Home Interiors. This remarkable system is easy-to-use yet extremely powerful. Arrange furnishings and they're automatically kept to scale! Explore the possibilities of color, texture and wallpaper. Select from dozens of pre-drawn furnishings and shapes. Modify plans quickly and easily.

LANDSCAPE. Ask any real estate professional, they'll tell you that landscaping can significantly increase the value of your home. In any given neighborhood, two identical homes may sell for many thousands of dollars difference — simply because of the care taken to enhance the look of the property. Design Your Own Home Landscape allows fast, easy planning with a variety of useful tools. Change the placement of trees and shrubs, arrange plants, steps and walks exactly the way you want quickly. You can even "age" trees, shrubs and plants to see how they'll look when matured.

FREE FROM TIGER!

WORLD ATLAS

With Any Design Your Own Home Series Purchase.

The Software Toolworks World Atlas for Macintosh is the perfect single-source reference guide for travelers, educators, business people and students of all ages. Only World Atlas gives you instant access to the most accurate maps available on a personal computer. Includes over 250 highly detailed, B&W or color maps of the world, regions, countries, even oceans, plus a huge database of international information. ***A $69.95 value — Yours Free.***

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BBG2001 **Architecture**	$63.00
BBG2002 **Interiors**	$63.00
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BUY ALL 3 – SAVE $30.00!

Requires 1MB or more; mouse, ImageWriter, LaserWriter.

The Best Way to Improve Your Writing.

REVIEWER'S NOTEBOOK: *One of the more popular categories in software is the grammar checker, arguably the most important word processing add-in. With today's business climate, poorly written correspondence is separating success and failure. RightWriter's depth and attention to the details of written communication makes it the premier grammar checker for the Mac. Conclusive testing has established RightWriter as the most accurate, most flexible and easiest to use over any of its competitors.*

Improve Your Writing by Checking Grammar, Style, Punctuation, and More. In business, you're judged by what you say — and by how you write. Nothing can kill the confidence of a prospective customer or client faster than a proposal littered with grammatical, usage and punctuation errors.

The fact is, there's no excuse for sloppy, error-filled written communication. Each letter, report, proposal, press release or other business document you prepare should represent you as a professional.

RightWriter 3.1 is designed to flag errors in your writing from a rule base of over 4,500 — including rules of grammar, style, usage, punctuation, sentence structure, subject-verb agreement and more. RightWriter produces a copy of the document and performs its analysis. Then displays (or prints) your document with flagged errors and explanations. These explanations are your guide to better writing.

Good Writing is Good Business. Good writing can mean profit for your organization, satisfaction for your customers, and advancement for your career.

A well-written sales letter or proposal can make the difference between a successful sale and a lost opportunity. Nothing can kill the confidence of a prospective client faster than a proposal littered with errors in grammar, word usage and punctuation.

Clear, easy to read manuals result in customer satisfaction and lower support costs. Good writing helps you get your best ideas across.

RightWriter works with your word processor to help you make your business writing strong, clear and to the point. Not a spelling checker — RightWriter is a sophisticated expert system that applies the rules of good writing directly to your documents.

To use RightWriter, create a document with your word processor. Then run RightWriter on the document using a few simple mouse selections.

RightWriter inserts comments into your document pointing out problems in style, word usage, grammar, and punctuation. Use your word processor to make the changes you consider appropriate. Then tell RightWriter to remove its comments. The result — strong, clear business writing.

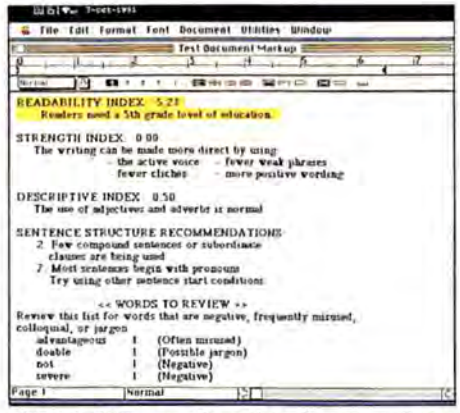
RightWriter also rates your documents for readability and strength. These summary indexes help you target your writing to specific audiences. The result is powerful, effective writing.

Turn on/off specific rules to suit your particular style.

Change Writing Styles. RightWriter is primarily an aid for **Business and Technical Writing.** The RightWriter rules are based on the mistakes commonly made by business professionals when writing letters, memos and reports. Since many of these rules are common to all types of writing, RightWriter is also useful for other applications.

Additionally, RightWriter allows you to select the **type of writing** before analyzing a document. By making this selection, you actually change the rules RightWriter uses for the analysis.

The standards for business writing differ in several important ways from those for fiction. Where business writing should be concise, fiction must often set the scene. Also, good fiction writers create their own style and use literary license. With **fiction** selected as the type of writing, RightWriter can find many common problems in fiction writing, without imposing the stricter rules employed for business writing. The types of writing you can select include: **general business, technical reports and articles, proposals, manuals** and **fiction.**



A Detailed Summary. *Along with specific recommendations about your writing, RightWriter provides information about the document's overall strength and clarity. These comments are your guide to better writing.*

RightWriter also provides an option to change the word dictionary. This is especially useful for technical, legal, medical and other types of writing with specialized vocabularies. For advanced users, there are even options to turn specific rules on or off.

How RightWriter Knows When Your Writing is Wrong. RightWriter proofreads your documents using two artificial intelligence (AI) technologies called parsing and expert systems. Each technology has a separate, unique function, but together they rely on one another to identify parts of sentences and to locate errors.

Parsing performs the critical function of sentence dissection. It first identifies sentences' individual parts, breaking each sentence into major phrases and looking for both dependent and independent clauses. Parsing goes further by identifying the subject and predicate of each clause and noting the word's part of speech. This technology, for example, can tell the difference between "can" used as a noun and as a verb.

The expert system relies on the parser to break down sentences so it can determine their accuracy. RightWriter's expert system examines your writing, judges the accuracy, and suggests improvements without your making any specific query.

The Compatible Grammar Checker. RightWriter for the Mac is fully compatible with any document from: MacWrite® version 2.2 through 5.0; MacWrite II version 1.0 and 1.1; Microsoft® Word version 3.0 and 4.0; WordPerfect version 1.0.0 through 1.0.4; WriteNow™ version 1.0, 2.0 and 2.2... or any other standard ASCII editor.

Over 4,500 Rules, Including:

Grammar Rules
- Noun-Verb Mismatch
- Sentence Fragment
- Run-On Sentence
- Misused Verb
- Misused Pronoun
- Misused Article
- Wrong Verb Form
- Misused Word
- Possessive Use
- Is This Correct?
- Repeated Word
- Capitalization

Style Rules
- Passive Voice
- Split Infinitive
- Long Sentence
- Sentence Length
- Difficult Sentence
- Use Verb Form
- Long Paragraph
- Start With But
- Conjunction Start
- Weak Sentence Start
- End With Preposition
- Negative Sentence
- Use Simpler Terms
- Use Simpler Word
- Consider Omitting
- Ambiguous Wording
- Cliché
- Overused Phrases
- Single Word Quote
- Contraction

Usage Rules
- Colloquial & Slang
- Archaic
- Sexist
- Legalese
- Computer Terms
- Vague
- Wordy
- Redundant
- Questionable Word
- Not A Word
- Offensive
- Rephrase
- Modified Absolute
- Misleading Euphemism
- Negative
- User Flag

Punctuation Rules
- Missing Question Mark
- Unnecessary Comma
- Missing Comma
- Misused Semicolon
- Misused Quotes
- Reversed Punctuation
- Unbalanced Quote
- Unbalanced Bracket
- Unbalanced Parenthesis

BONUS!

Strunk & White's The Elements of Style Electronic Edition

INCLUDED FREE WHEN YOU BUY RIGHTWRITER FOR THE MAC!

The Elements of Style Electronic Edition. Reviewers have called it "...the best book of its kind" and raved, "The work remains unparalleled, direct, correct and delightful." Now *The Elements of Style* is available on diskette for your Mac.

Based on an original work by William Strunk Jr., a Professor of English at Cornell University, this updated third edition, prepared by noted writer and grammarian. E.B. White, has become a classic of conciseness. It's the ideal tool to make your writing crisp, succinct and powerfully effective. Includes rules of usage, composition, form and more.

Get RightWriter, *$99.95 value*
Elements of Style, *$59.95 value*

Both Just $29.95!

RIGHTWRITER MAC 3.1

BBG3366 **RightWriter Mac** **$29.95**
Requires 512K and any Macintosh computer, 800K 3½" diskette drive, System 3.2 and Finder 5.3 or later.

Simple, Intuitive Contact, Time, Client and Communication Tracking.

REVIEWER'S NOTEBOOK: *A must for businesspeople who need to track dozens of commitments, outside contacts and opportunities. Provides fast, easy sales and marketing information management. As information changes and grows, the SuperOffice database is updated, allowing instant access to all kinds of useful combinations, perfect for the rigors of this environment. Excellent reporting, a great set of tools for easy customer/client management, comprehensive customer tracking, direct mail de-mystification, telemarketing tracking, lead management (how many of those do you burn?), sales forecasting and much more. In-depth contact management and follow-up tools. Completely menu driven, simple to understand and use to its potential, SuperOffice is a magnificent productivity tool. Conventional databases simply cannot produce easy, on-demand customer information management with the speed and completeness of SuperOffice.*

"The Information Law" states that knowledge must be accessible to everyone — including the managers and executives that are responsible for the company's success. If not, then "Murphy's Law" automatically kicks in and you could be headed for trouble. Managers and executives require a unique set of figures, indicators and reports. They need raw power behind their information and contact management efforts. While computers are used for a variety of "back-office" tasks; word processing, accounting, orders, billing and payroll, they sometimes hold information about customers, markets and trends hostage. SuperOffice is the first product we've seen that combines dozens of important features used often in fast-paced environments, with an easy-to-use operation — that won't change the way you work. You get timely information about your customers and clients, sales activity and tracking, direct mail, lead and inquiry management, sales forecasts, employee activity reporting/tracking and more.

SuperOffice allows employees at any level of expertise to become productive instantly. Work loads are more easily handled and time isn't wasted, vital information doesn't sit untouched or lost and efficiency is boosted with little effort. This remarkable product puts four powerful, easy-to-use office management tools — client contact directory; daily schedule planner; follow-up tracking and correspondence templates — together with a shared database! So vital, up-to-the-second data is at everyone's fingertips. It's the most advanced concept in company-wide data access and it works like a charm.

All of the individual tools are fully integrated for streamlined operation, and can be used as a single- or multi-user database system.

Diary. Included in the Diary is the Agenda, an advanced time planner that allows complete control over daily schedules in a familiar format. References include customer names and notes detailing the activity. Privacy encourages use of program for all scheduling, eliminating the need to maintain multiple calendars and ensuring that action items are not overlooked.

Planned activities in the To-Do List remain visible until scheduled in the Agenda or completed. Activities that are not yet scheduled for a specific time and date are entered in the To-Do list from either the Diary or the Follow-Up module. Activities not completed on a scheduled day "fall-off" the Agenda and reappear in the To-Do list for rescheduling.

Follow-Up. Follow-up provides a comprehensive overview of past and planned activities by account and provides key information about the types of services you are providing your customers and clients. When a customer calls, anyone within the organization can scan all past and planned activities and be of immediate service. This improved response time means greater customer/client satisfaction.

Follow-up allows you to view all company-wide activity related to a specific customer or all customers, including meetings, telephone calls, product demonstrations and correspondence. Follow-up is directly linked to the Diary to capture all planned and completed activities.

Customers. The Customers' file stores all data about your customers, clients and prospects, including address, phone, fax, and key contacts. An unlimited number of customers and contacts can be entered, with room for notes about each person. Because SuperOffice utilizes a shared database, all users can edit any record. This eliminates data synchronization problems and allows everyone to have the same up-to-date information about each customer.

Included in Customers is a scrollable "Interests" table (user-defined and allowing an unlimited number of entries) that provides a number of variables for sort and search functions. Also included is automatic dialing using a modem for efficient telemarketing.

Customers also allows you to record anticipated and actual dollar sales per account, with probability estimates for anticipated sales. This allows performance tracking vs. budgeted quota for assigned sales personnel, a quick overview of pending business activity, future sales forecasting and the ability to adapt sales and marketing strategies in a timely and productive manner.

Letter, Fax and Spreadsheet Templates. SuperOffice simplifies correspondence by providing a direct link between a selected customer record and various pre-designed letter and fax templates, which work with most popular word processing software. By searching for a specific account and choosing a template, the company's mailing address, contact person and date are automatically inserted in the document. The correct font, size and style are already in place, ensuring ease-of-use and error-free writing, while maintaining a consistent style, feel and message for all company correspondence.

Saved documents are archived by account, allowing a comprehensive overview of all correspondence by all users. Spreadsheet templates work with Microsoft Excel™ and Lotus 1-2-3,™ allowing the creation of quotes, price lists, forecasts and travel expense forms.

Reports. Four report types allow a variety of options.

- **Customers, Businesses & Categories:** segments customers/clients and prospects by business type and category, allowing you to target specific categories for further investigation or action.
- **Customer Lists & Mailing Labels:** for targeted mailings, this report allows you to search the customer database on a variety of criteria, including contact name, zip code, business type, category, interest, total sales, and number of employees. It automates mail-merge, defines follow-up activity to selected customers and automatically creates a follow-up note in each account record. Customer Lists is an excellent tool for direct marketing, telemarketing, and lead management and fulfillment, as well as evaluation of the effectiveness of a specific marketing campaign.
- **Customer Follow-up:** lists all the customers with whom you have planned or completed activities. Reports can be generated by account, employee, group, all employees and/or follow-up type.

- **Sales Reports:** lists actual and projected sales by customer, employee, group, and/or all employees, with a probability of close and specified dollar amount.

Quickly view weekly sales reports indicating actual sales vs. budget, as well as expected future sales including the level of outstanding quotes and expected close dates.

Specifically designed to track the kinds of information needed by business people dealing with clients or the public.

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DOLLARS+SENSE

When You Buy SuperOffice — A $69.95 Value

Dollars and Sense has been the leading Macintosh program since 1984 because it dispenses with drudgery. Your computer can generate checks, automatically record income and expenses, help balance your checkbook, and produce great-looking financial statements. At tax time your data will automatically be ready to prepare a return or to export to a tax program like Macintax.

Relax. Let Dollars and Sense Do the Figuring. Once transactions are recorded, Dollars and Sense helps interpret your financial situation in graphic detail. Questions about your past, present and future are answered quickly and easily with lists, charts and graphs that clearly show whether you're headed for big bucks or the big bang.

Requires no accounting experience. Includes predefined sets of accounts for personal, business and real estate. Or customize your own with up to 9 levels of subaccounts.

SUPEROFFICE

BBG2467A **SuperOffice Single User** **$239.00**
BBG2467B **SuperOffice 5 User** **$989.00**
BBG2467C **SuperOffice 10 User** **$1499.00**

Requires 286 or higher; Windows 3.0; Minimum 2MB RAM; Monochrome, gray scale or VGA monitor; Any laser printer or dot matrix printer.

Call for further information on Macintosh Version.

The Art Of The SCAN

REVIEWER'S NOTEBOOK: *The Logitech series of advanced mice and scanners has won acclaim from the press — and thousands of loyal users. No other manufacturer engineers so much precision and innovation into their products. From an incredibly sharp hand scanner, to the all new breed of "programmable" mice, they're a pleasure to work with. We put the ScanMan 32 hand scanner through it's paces, performing over 50 scans of various black and white images — photos, line art, logos, type, illustrations — even poor-quality photos. The ScanMan 32 features 32 gray scale performance, with adjustable scanning resolutions from 100 dpi for quick scans; up to 400 dpi for magnificent finished images. Use scanned images in word processors, multi-media, desktop publishing, HyperCard, OCR and more. Hold a Logitech device in your hand and you'll notice the superior craftsmanship, the precise movement of the rollers and the extra large scanning window so you can see as you scan. Scan instead of re-keying data: capture text (with OCR software) with crisp, clean results.*

The Science of Scanning. Logitech technology destroys the old barriers of scanning, increasing the speed and accuracy of anything you scan. Superior image quality, with the ability to produce halftones for reproduction. The set of output controls provide the best possible results on any printer or monitor screen. Its 4" wide scanning area allows full-page scans with just two quick passes.

And Logitech's rugged construction and precision roller system allows straight, unwaivering scans. No curving, no skipping. The scanning speed indicator controls the movement for perfect scans every time. There are three settings for scanning photos and another for scanning line art. Its shape is perfect, its weight and components distributed equally for balance. All of which makes getting an image from paper—into your Mac, simple and easy.

The ScanMan 32 gives you a free set of software editing tools, including a 32 gray scale palette for detailed retouching. There's also a handy dimension box and tear off tool palette; use them alone or incorporate them as a desk accessory. Pop up real-time brightness and contrast controls, refine images with amazing flexibility, rotate, flop and invert images. Save your scans in a variety of formats, including MacPaint, TIFF and PICT).

Here's What You Get: The ScanMan 32 contains everything you need. The Model 32 Gray Scale scanner, SCSI interface box and cable, power supply adaptor, ScanMan software, version 2.0, CatchWord Pro OCR software and complete user guide. Fast, easy, compatible — and powerful — the ScanMan 32 is a superior hand scanner.

Actual unretouched scan.

Included with ScanMan 32 — CATCHWORD PRO: Powerful Optical Character Recognition (OCR) software that allows you to capture printed, hard-copy data by scanning it, rather than typing it. But, without quality software and a high quality scanner (like the ScanMan 32), scanning text won't work properly. "Dirty" scans produce unwanted characters and commands, requiring enormous cleanup — creating more work than rekeying.

CatchWord Pro delivers an amazing 99% accuracy in OCR testing, used in tandem with the ScanMan 32. CatchWord Pro is compatible with popular word processors, spreadsheets, databases and desktop publishers — so you can scan information directly into your application and use it immediately! Different typestyles and sizes are no problem, any printed characters, in any size of typestyle are instantly recognized. It will even automatically convert two scans into one, full-page image.

What about larger, memory-intensive photos and pages packed with small type — don't they slow my system to a crawl? The answer is "no" and only Logitech can say that. While other scanners are notorious for system slowdown, all of your ScanMan 32 scans zip along with Logitech's ingenious memory management features that automatically swap image data between your system's RAM and hard disk.

The instrument itself is a masterpiece. From the genius of the respected industrial design firm, Frogdesign — also responsible for the new line of NEC monitors and other distinctive hardware products, the ScanMan 32 is different from the ground up. First, you'll notice that it's heavier, with precision rollers that provide more "grip" along with a superior guidance system for light-touch control. All of which means you can scan quickly and accurately — once — and capture the image perfectly. While many other hand scanners rely on you to move in a straight line as you scan, the ScanMan 32 provides fully balanced, direct movement.

Using the ScanMan 32, you can create instant layouts, experiment with backgrounds and special effects. Add text and explore sizing and cropping options within seconds. That's why the hand scanner has caught fire in the design world: its ability to let you see many different visual combinations.

Businesses use scanners to capture text as described above and for keeping archival records of paper documents with instantaneous access. Logitech's advanced technology gives you more flexibility, more creative tools and more value than any other scanner.

Although there are two basic scanning modes in ScanMan, there are in fact three ways of scanning an image: Line art mode, Gray mode, or Mixed mode.

Line Art Mode. Line Art mode is useful for scanning black and white line drawings, diagrams, and text. This mode produces high-contrast images in black and white (no grays).

Gray Mode. Gray mode is useful for scanning photographs, color images, and drawings where the high-contrast black or white character of Line Art mode detracts from the quality of the image.

Desktop publishing programs enable you to combine your ScanMan images with text. Most of these programs accept either PICT or TIFF format files. PICT format enables you to work with compact files, although you won't be able to change the display format of the document or the grays. In TIFF format, you can alter the screen angle, dithering options and proportions of the document.

Mixed Mode. The third, and less common method of scanning is Mixed mode. Mixed mode is useful for certain specialized applications, and for experimenting with ScanMan to produce different effects.

LOGITECH

BBG2509 **ScanMan 32** w/CatchWord Pro	$365.00
BBG2511 **TrackMan MAC**	$79.00
BBG2510 **MouseMan MAC**	$69.00
BBG2220 **ScanMan 32** w/Digital Darkroom	$289.00

ScanMan 32: *Macintosh Plus or better running System 6.0 or later. Hard disk recommended.* ***TrackMan/MouseMan:*** *Any ADB Macintosh running Macintosh, A/UX or X-Windows Operating Systems.*

Everything Begins With A Great Idea...

REVIEWER'S NOTEBOOK: *It is a rare and valuable individual who can consistently come up with great ideas. Whether it's to solve a problem, build an effective business plan, create an advertising campaign or position a product. The fact is, there's no substitute for original thinking. IdeaFisher is a unique software product that actually helps you generate high-potential thoughts. It's not magic; it is designed to help you identify relevant issues, examine new perspectives and analyze existing information. It directs you towards associations between words and questions, and adds analogical reasoning (analogy and metaphor) to unearth new avenues of thought. Use it once, and you'll unlock the potential of your inner creativity, a power that everyone possesses, but only a few ever truly cultivate.*

Idea Fisher is the brainchild of Marsh Fisher, co-founder of Century 21 International Real Estate Company. It is a 7 megabyte computer companion for high-powered brainstorming sessions that help you trigger new ideas. Innovative ideas, from your memory, sparked by dynamic association. It is composed of two distinct databases: QBank and IdeaBank. QBank contains nearly 6,000 questions to clarify, analyze and solidify your thoughts. When you answer questions posed in QBank, IdeaFisher generates key concepts to explore in IdeaBank. IdeaBank contains 61,000 words and phrases, 387 topical categories and 28 major categories. Its cross-referenced system provides you with over 700,000 associative links. These two sets of data link to stimulate convergent and divergent thinking, reminding you of images, facts and feelings. In all, these mental connections open the door to millions of idea-associations. IdeaFisher becomes a pipeline to rich imagery and creative solutions lodged within your memory and subconscious. Again, IdeaFisher isn't magic, it's a crowbar that loosens your own inner originality.

The IdeaBank is the "Idea Base" in which information is organized as your mind would organize it, into clusters of associations. The categories included are: Actions/motions, Agriculture, Animals, Business/industry/occupations/money, Clothing/jewelry/grooming, Colors, Communication/education/the arts, Comparison, Emotions/behavior/personality, Energy/technology, Containers/storage, Foods/cooking/eating, Government/law/politics, ... and dozens more.

IdeaFisher helps you tap your own resources, based on the powerful stimulus of language, association, memory and knowledge. That's the secret here. The more you explore a concept, based on your review of associated words and phrases, the more original thought will be uncovered. In fact, Linus Pauling's research on the subject states that the more ideas you can generate, the more likely you are to produce an excellent one.

Further, research has shown that the most innovate solutions tend to be found among the last 50% of all the answers generated on the topic, while the most obvious, unoriginal ideas tend to appear in the first 50%. That second 50% (containing the excellent idea) is often buried in our subconscious: our memory. That's why techniques of creative thinking cannot overcome one simple obstacle: our inability to remember everything we know. Whereas human beings, fortunately, have a vast capacity for recognizing important information, we have a much lower capacity for recalling it.

But how does IdeaFisher actually work? Let's begin by looking at an analogous example. Try to remember your high school graduation class. At one point in your life they were perhaps the most important people you could ever imagine. You knew more about them than any other group. Back then, it seemed as if they would never be forgotten; each one held a special place in your mind. But today, you might be hard pressed to remember even a small fraction of them. Their names, where they lived or what they were like. They've been covered with layers of more recent people, your wife, children, business associates and friends. But if you open your yearbook, the personalities would come rushing back, your mind would send hundreds of bits of information back to the forefront, and restore your memory with great clarity. The names, pictures and autographs would set off a flurry of associations. It would be a powerful "remembering" experience. You would be able to produce stories, facts and images that you haven't considered in years. In contrast, you could try using the phone book instead of the yearbook — with far less dramatic results. Why? Simply because most of the information would not be relevant. IdeaFisher works like the yearbook, providing vast pools of detailed information that generate associations. That's the key.

IdeaFisher embodies a system of memory and association, known as "The New 3 R's." It is a systematic approach to creative thought. These steps are: Recording information (memorization); Retrieving information (recalling and reconstructing); and Re-combining information (putting information together in different ways). Together, these steps unleash a storm of new thoughts.

Recording: When you set off to create a new idea to be used in your work, you must accumulate as much information as possible. Most successful people are curious about their subject, and therefore, usually very knowledgeable. Your mind holds a massive amount of information from your ongoing education of your industry and society. That information is stored within your memory. Recording information is the easy part and the more you know, the more material you can use to re-combine later in step 3.

Retrieving information is the most difficult and, frankly the most unreliable. IdeaFisher's two distinct databases work to jog your memory with hundreds of associative questions and words to allow your recorded information to merge, on demand, with the problem you are trying to solve.

Then, the re-combining process will yield new, fresh and innovative thinking, targeted directly at the subject at hand. IdeaFisher stores a collective memory of the common culture. Re-combining: Ecclesiastes taught us that "There is no new thing under the sun." The educator Rudolph Flesch observes that "... a new idea is the reassociation of existing ideas," — or parts of ideas — to form new combinations. This step combines (and is dependent on) steps 1 and 2 to be effective. By acting as a warehouse for information (step 1), and by aiding in reminding you of what you already know (step 2), IdeaFisher sets the stage for the act of imagination: creating new combinations (step 3). Moreover, IdeaFisher's Modification Questions help you break through barriers of ordinary thinking and imagine the unimagined.

Often, two simple concepts can be combined to create a new and larger idea. Like the swimming pool slide. It was brought to market by a traveling salesmen who, in his travels, came upon a group of youngsters playing on a playground slide. Within eyeshot, he noticed another group of children splashing in a small wading pool. He instantly reflected on his own childhood, his early life by a lake in Minnesota. Suddenly the idea was formed: construct a slide designed specifically for a pool. That man made many millions of dollars from the strength of a single idea: relating two seemingly unrelated things into a new idea.

IdeaFisher is in use today in marketing firms, corporations, engineering and planning firms, ad agencies, schools, law firms and everywhere that ideas can make a difference. Many of today's successful writers, inventors, trainers and students use it to enhance their creative thinking skills. Using IdeaFisher, you can develop new products or services, develop strategies, create advertising campaigns, and more.

NOW AVAILABLE — SPECIALIZED QBANK MODULES

Requires the IdeaFisher.

The Presentation Planning Module™: *How can you be confident that you have prepared an effective presentation?* Creating effective speeches and presentations is an ongoing dilemma for many people. Preparation is the key to success. Fisher Idea Systems has designed a new tool to help you structure your efforts and produce better results. The Presentation Planning Module contains over 300 specific, common sense questions that systematically guide you through the creative and planning process. The questions help you identify your primary objectives and they assist you in developing and delivering your message with confidence and effectiveness.

The Strategic Planning Module™: *Where will your company be in five years, and how will you get there?* Strategic Planning is the most vital issue any company or business person will have to face. It is one of the most difficult and demanding tasks you as a leader must effectively resolve.

Fisher Idea Systems has designed a new tool to help you structure your approach to the planning process and produce better results. The Strategic Planning add-in module for IdeaFisher contains more than 700 specific questions you should consider when thinking about the future.

The module consists of two components. The first, "Developing a Strategic Plan," is designed to guide you through an analysis of your current situation. This will enable you to understand your strengths and weaknesses. The second, "Implementing a Strategic Plan," is designed to guide you through the issues involved in putting your plan into action.

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QBANK MODULE OF YOUR CHOICE SAVE UP TO $65 WITH THIS BUNDLE!

FISHER IDEA SYSTEMS

BBG2434 **IdeaFisher Bundle** $389.00
BBG2436 **Strategic Planning Module** $65.00
BBG2437 **Presentation Planning Module** $49.00

Macintosh Plus, SE series, or II series with 1MB RAM and 7MB of hard disk storage.

Upgrade to 1-2-3: Just $69.95!

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REVIEWER'S NOTEBOOK: *The thoroughbred of Macintosh spreadsheets. Not a step-child of the original DOS product, Lotus 1-2-3 for the Mac has been designed from the ground up to exploit the power and flexibility of the Mac. Revolutionizing financial software with true 3-D worksheet capabilities: Excel doesn't have it, Claris Resolve doesn't have it. Fully featured, with System 7 support; completely customizable with desktop tear-off menus, most functions require just a mouse click. Excel users will be surprised at the power and grace engineered into Lotus 1-2-3 for the Mac.*

Lotus' deep understanding of advanced spreadsheet and financial modeling technology is present here. True 3-D worksheet management, incredibly nimble relational database power and easy-to-use formulas. Over 14 million people rely on the Lotus concept to create budgets, perform precise forecasting and instant analysis. Proposals and presentations ring with clarity with Lotus' financial graphs and tables. It's easy to edit cells, create graphs, and import data, using the same menus, tools and file formats across worksheets, graphs and macros.

Using 1-2-3 for the Mac is fast and simple. It embraces new System 7 and provides the classic 1-2-3 menu for complete keystroke compatibility. We love the use of floating toolboxes and palettes, allowing customization of your workspace. Moving around is silky and streamlined, allowing you to quickly select ranges (before or after starting commands). You get in-cell editing and the ability to directly manipulate chart elements. You also get 256 colors, 49 different fill patterns and 230 line styles and thicknesses for use in your spreadsheets.

Along with the brutal power of 3-D worksheets, you can easily customize database forms for automatics fill-in and printing, perform a host of advanced relational capabilities, including swift queries (a particularly useful feature), an ever-active macro recorder (an incredible time saver!), and automatic compression routines for any printer. By the way, Lotus throws in a free copy of Adobe Type Manager.

With 1-2-3 for the Mac, complicated tasks, like consolidations, don't require tedious linking or endless dialog box activity, just a couple of mouse clicks is all it takes. Easily bring remote data right into 1-2-3 through DataLens and the Apple Data Access Language. Read FoxBase and dBASE files directly.

Lotus 1-2-3 for the Mac towers over the capabilities of Excel in a host of areas. Its ability to perform true 3-D functions is an enormous advantage. And the spectacular range of colors and graphic devices available within the worksheet. Excel doesn't allow pop-up functions or range names, Excel doesn't allow you to directly manipulate elements in charts, or perform in-cell editing Lotus 1-2-3 for the Mac does. Excel doesn't include relational capabilities, floating toolboxes or palettes, you can't customize your workspace or have your macro recorder on all the time. 1-2-3 does.

When it comes to spreadsheet features, no one even comes close to 1-2-3 for the Mac. That's because only Lotus has engineered true 3-D worksheet power into 1-2-3. Excel users are converting in droves to the newest, hottest spreadsheet product, finding features like relational joins and queries, the 1-2-3 Classic menu for 100% keystroke compatibility, vast color and graphics support and a dozen other advantages. In fact, we've compiled a feature-by-feature comparison for your review. But there's an intangible difference: The proven 1-2-3 approach to the worksheet. Just the feel of the in-cell editor, pop-up functions and macros display the refined Lotus functionality. John Sculley, CEO of Apple says "...This is a spectacular product." And MacWeek raves: "The most impressive aspect of the program is its implementation of the Macintosh interface. Mac aficionados will have no problems with the program — 1-2-3 Mac is a Mac application to the core." The numbers have never looked so good...

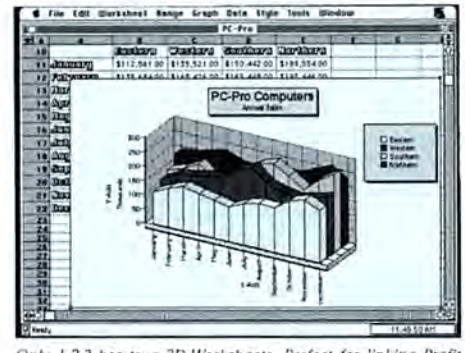
More Powerful Than A Locomotive. True 3-D worksheet management lets you tackle complex tasks, without complicated linking or dialog boxes. Bring remote data right into Lotus 1-2-3 through DataLens® and the Apple Data Access Language. Then work with it using full relational database power and custom database forms. No matter what you're doing, you'll see only one set of menus, tools and file formats. You'll get so much done with so little to learn.

No Mac Is An Island. Share files, macros and applications with Excel users? With PC users? Yes. You heard right. 1-2-3 for Macintosh directly reads and writes Microsoft® Excel for Macintosh files. So you can make the switch to 1-2-3 and never look back. What's more, 1-2-3 for Macintosh is fully compatible with all 1-2-3 files and macros, including PC versions. More than fourteen million people already rely on Lotus 1-2-3 for accounting, budgeting, forecasting, analysis, proposals, presentations and much more. Now Mac lovers can, too.

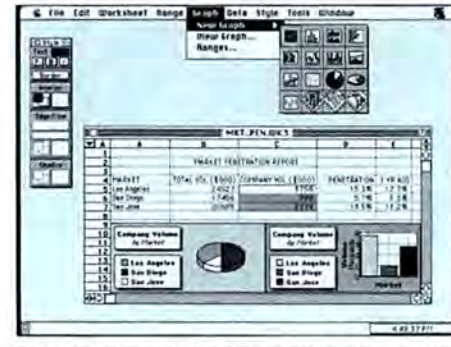
See How The Newest Macintosh Spreadsheet Stacks Up.

Features	Lotus 1-2-3 for Macintosh	Microsoft Excel 3.0
Optimized for Macintosh		
• Supports system 7 features	Yes	Yes
• Floating toolboxes and palettes for custom workspace	Yes	No
• Directly manipulate chart elements	Yes	No
• In-cell editing	Yes	No
• Context-sensitive, graphical help	Yes	No
• Select ranges before or after starting commands	Yes	No
• Supported colors/fill patterns/ line styles and thicknesses	256/49/230	16/18/32
Powerful Spreadsheet Features		
• True 3-D worksheets	Yes	No
• Pop-up functions and range names	Yes	No
• Menu promotion	Yes	No
• Same menus, tools, and file formats across worksheets, graphs, and macros	Yes	No
• Adobe Type Manager included	Yes	No
• Automatic compression on all printers	Yes	No
• Macro recorder always active	Yes	No
• Customizable database forms	Yes	No
• Relational joins and queries	Yes	No
• Directly reads FoxBase and dBASE files (.DBF)	Yes	No
Compatibility		
• **Reads and writes all 1-2-3 files**	Yes	Yes
• Runs all 1-2-3 macros without translation	Yes	No
• Reads and writes Excel files	Yes	Yes
• 1-2-3 Classic Menu provides keystroke compatibility	Yes	No

"Classic" 1-2-3 menus work the same as the 1-2-3 everyone knows and loves. (Or use the standard Mac menus — your choice.)



Only 1-2-3 has true 3D Worksheets. Perfect for linking Profit Centers and multiple departments.



Fantastic charting including 2-D and 3-D charts in numerous styles and types — all available with the click of the mouse. And only 1-2-3 has floating toolboxes for ease-of-use.

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CheckFree

When You Buy Lotus 1-2-3 for Macintosh

Now you can pay your bills electronically — via modem — regardless of which bank you use, or who's on your payment list. CheckFree uses its built-in telecommunications program to handle payments through the Federal Reserve System for 100% safety and reliability. And with CheckFree, you'll pay all of your bills in about ten minutes! That's it. No checks! CheckFree keeps an electronic check register for you and works seamlessly with financial management software like Quicken and Managing Your Money. ***A $29.95 value. Yours Free!***

ORDER YOUR COMPETITIVE UPGRADE TODAY!

If you are a current 1-2-3 user, you are automatically eligible. If you use Excel, Claris Resolve or another competitive spreadsheet, you too are eligible.

ALSO FREE WITH 1-2-3 — DYNOPAGE

LOTUS 1-2-3 MAC

BBG2485 **Lotus 1-2-3 Mac** $325.00
BBG2486 **Lotus 1-2-3 Mac Upgrade** $69.95

Upgrade Or Switch to Publish-It! Easy 2.1 For Only $99.

The Only Integrated Desktop Publisher Available Today.

REVIEWER'S NOTEBOOK: *If you're about to enter the world of Macintosh desktop publishing, or if you're an experienced user who wants fast, pro-quality results without dredging through hundred-page-manuals, Publish-It! Easy is the award-winning, System-7 Savvy product that MacWorld magazine calls "...the Swiss Army Knife of desktop publishers". Now for a limited time, you'll be able to switch or upgrade to this 4-and-a-half mice rated package for only $99 — if you currently own a desktop publisher or word processing program. This is a $150 savings off the suggested retail price of $249.95. Simply send us the title page of the DTP or word processing manual you are currently using, and you'll own Publish-It! Easy Version 2.1 for only $99. Publish-It! Easy is also available in the new Corporate Network File Server Version.*

The printed page. It can be an adversary or a joy. If you've got new Publish-It! Easy loaded on your Mac, you'll enjoy the process of laying out a page — and produce handsome newsletters, brochures, catalogs, reports, bulletins, advertisements, flyers, coupons and more! With the toolbox of advanced, easy-to-use features such as The Slide Show (complete with dozens of features and effects, outperforming some stand alone packages!), instant thumbnails (view and edit up to 100 pages), built-in database and mail merge, spell checker and thesaurus, your ideas will look extraordinary on paper as well as on-screen. Draw, paint, edit text, add graphics instantly and use a host of other state-of-the-art publishing tools with sleek controls. In fact, this one program eliminates the need and expense of having separate drawing, painting, word processing mail merge and presentation software — that's how incredibly full featured this package is! And don't worry — Publish-It! Easy doesn't punish you for mistakes or experimentation — it provides 5 levels of Undo to get you right back to the beginning, so you can explore other creative avenues. Print your quality pages on any Chooser-selectable printer.

Unique "What-If" Features. And Publish-It! Easy's unique "What-If" design features makes new and exciting layouts come to life with "Libraries" and "Proxies" that take the mystery and legwork out of the design process. Change type styles or sizes and the text automatically reflows. Headlines instantly fit into the area they're supposed to and subheads tuck cleanly into proper position. Indents are done for you, page numbering and book binding margins are automatically added and more. Publish-It! Easy even handles vertical text justification, aligning text with the top, center or bottom — or any way you like it — with just a mouse click. You can quickly import text from your favorite word processor (including Microsoft Word/Works, WordPerfect, MacWrite I and II, WriteNow and others) — with all type styles and fonts intact! Touch up scanned images with extensive professional tools and import graphics from Adobe Illustrator, MacPaint, SuperPaint, Freehand, FullPaint or any other drawing or painting program with PICT, PICT2, EPS, TIFF or PAINT file formats!

Graphics From Scratch... You can also create your own graphics from scratch with 65 pen sizes, then paint them using an assortment of 32 brush sizes and an airbrush. For typographer-quality text effects, Publish-It! Easy allows you to mix typestyles, sizes and styles in any combination you like — even print grayscale or textured type to create an endless variety of unique effects. Of course, you get precise control of the kerning, leading, stretching, condensing and rotating of your type (in one-degree increments). Pop in a graphic image, and Publish-It! Easy automatically wraps text around it.

Includes FREE File-It Database... File-It is an incredibly useful database and merge program built right in to Publish-It! Easy. Now you can integrate customized information (names, addresses, phone numbers, personal notes, even entire paragraphs) into form letters you create in Publish-It! Easy. It includes three sample databases, seven professionally designed templates and an assortment of mailing label formats, so all you have to do is drop in your data and create a form letter in seconds! Preview your information before you print and retain all of the desktop publishing features (stylized fonts, rotated type, mixed text and graphics) when you create your customized documents. A powerful database takes care of all the details for you, like math, logical "if-then" functions, multiple sort levels and more. A great accessory to Publish-It! Easy that you won't find in other packages.

Here's how easy it is!

- **Extensive On-Line Help.** An extensive on-line help system guides you through every command, tool and object at the press of a key.
- **Libraries and Proxies.** Experiment with document design all you want. *Easy's* "Libraries" & Proxies let you alter page layout and type styles instantly — making changes and experimentation easier than ever before.
- **Multiple UNDO Levels.** Lets you UNDO a text mistake you made up to five steps back.
- **Find and Replace.** Instantly change any word or any font, font size or font style throughout your document in a single command.
- **Multiple Windows.** Open, arrange and work on as many documents and windows on your screen as memory permits.
- **Thumbnail Editing.** View and edit up to 100 pages at a time in thumbnail view. You can quickly move elements from one page to another.
- **Layout Aids.** On-screen, movable pica, metric and inch rulers, and a customized alignment grid help to layout your document.
- **Dynamic Time, Date & Page Number Stamps.** Automatically update as you modify your document.
- **Service Bureau Checklist.** Provides all the essential information for service bureaus, such as font list, document size, file statistics, etc.

Here's how powerful it is!

- **Full-Featured Word Processing.** You can type, spell-check, and format your documents right from within *Easy.*
- **Dynamic Text Flow.** Watch your text automatically being reformatted as you change the size, shape or location of your text frames.
- **Converts Apple II Word Processor files and Graphic files.** For importing into *Easy.*
- **Slide Show™.** Create and prepare slides, handouts or on-screen presentations. Works in Auto-Repeat or Manual Mode — with your choice of 49 transitions (special effects between slides). *Easy* has all the tools you need to transform your documents into presentations.
- **Spot Color Separations.** Define up to six spot colors and apply them to your text or graphics. Then print them out as spot color separations.
- **Zoom Palettes.** Palettes drop out of sight to give you the maximum working area.

Corporate Network Version Available!

Page layout fast and easy, with a palette of powerful tools. You can easily view double-page spreads.

Add columns and headlines with sleek menus.

FREE! ONLY FROM TIGER

MacGallery

Have some fun, and save the hassle of creating artwork from scratch. MacGallery gives you a rich variety of well over 400 ready-to-use bit-mapped images. You get a superb assortment of light-hearted artwork that's perfect for holiday greeting cards, special occasions, fliers, memos, stationery, business cards, newsletters, and lots of other projects!

- Contains more than 400 ready-to-use images!
- Covers a wide range of topics including many holidays and special occasions, nature, food, sports, religion, teddy bears, borders, fantasy, mortised cuts, phrases, and more!
- Comes with the MacGallery Tour Guide. A handy reference filled with practical tips, ideas, and suggestions, plus a visual index!

PUBLISH-IT! EASY 2.1

BBG2712 **Publish-It! Easy 2.1 (Upgrade or Switch Offer)** $99.00
BBG2470 **Publish-It! Easy 2.1** $135.95
BBG2720 **Publish-It! Easy 2.5** Promotional Pack (One Network Filer Server, One Node Lan Pack, plus another One-Node Lan Pack FREE) $399.00

Any Macintosh running System 6.0 or later with 1MB RAM.

The Integrated Package That's Truly Integrated.

Work With All 7 Programs At Once! It's Seamless... It's BeagleWorks!

REVIEWER'S NOTEBOOK: *Beagle Bros. Software has consistently offered up some of the finest products we've seen for the Apple Computer. Each is clean, powerful and easy to use. Now, Beagle Bros. assembled a product that offers an integrated software program with seven modules. Beagle Bros. went back to the drawing board to create a new concept of integration, allowing users instant access to all information in the modules. Their efforts have produced In-Context Editing™, which links the word processor (with speller/thesaurus), spreadsheet, database, charting, drawing program, paint program and communications. This high level integration makes life very easy. Link documents and combine data from any of the individual modules into a single document and make changes without ever leaving that document.* ***Feature for feature, BeagleWorks beats ClarisWorks, GreatWorks and Microsoft Works in every area we tested.*** *It's the only one of the four that is System 7 SAVVY, so it takes full advantage of Publish & Subscribe, Balloon Help, TrueType, AppleEvents, Virtual Memory, 32-bit file addressing and color icons. An incredible value, ready-to-run for users of any expertise level. Great starter application that won't be quickly "outgrown."*

A new definition of integration. For example, you can actually combine information from any of the seven modules into a single document. Or create new information in another module without leaving the module in which you are currently working. And with the innovative In-Context Editing, when information is changed in one document, the information in the linked documents changes with it. Automatically.

Publish & Subscribe information from any of the modules. BeagleWorks includes some powerful desktop publishing features like wrapping text around objects, setting multiple columns on and off anywhere on the page, and reduction and magnification as well as page preview in any module.

You'll love the full-featured Spreadsheet that allows you to create up to 256 columns and 16,385 rows. A powerful tool bar and time-saving recalc automatic summation features. The charting modules creates robust, 256-color line, bar, column, area, scatter and exploded pie charts. The database module allows 16,000 records per file, 256 fields per record and easy mail-merge. Sixty-four built-in functions are all at your command and BeagleWorks provides 32 report formats for your data.

Wanna' draw? Just pop open BeagleWorks' draw module and choose from a palette of tools, colors, patterns and line widths and shapes. The streamlined, tear-off menus make it a pleasure to work with. While you're in a creative state, zip into the paint module and get crazy with a host of spectacular studio tools — and some nifty special effects as well. Airbrush, spray can, paint bucket, pencil, line and more. Provides 256 custom colors and 128 patterns.

When you're ready to connect your Mac to the world, BeagleWorks' communications module makes use of Apple's Communications toolbox to give you powerful connectibility! It stores commonly used phone numbers with a variety of convenient settings. Autodial, autoanswer, uses a modem or direct serial connection.

In-Context Editing™ — Allows editing of one file from within another by simply double-clicking.

Multiple Columns — Can be turned on or off anywhere on the page.

Automatic Irregular Text Wrap — Text takes on shape of the graphic.

Common Tool Bar — Frequently used tools are easily accessible.

Word Processor: Automatically wrap text around objects; format in multiple columns; graphic ruler with tool bar for quick formatting; multiple headers and footers, custom styles and more; Microlytics® spelling checker and thesaurus.

Spreadsheet: Apply a different type style to any cell; create up to 256 columns and 16,384 rows; tool bar allows easy access to formatting.

Chart: Chart types include Line, Bar, Column, Area, Scatter, Exploded Pie and more; 256 custom colors.

Database: Manage databases with more than 16,000 records per file and 256 fields per record; mail merge with word processor; 64 built-in functions; up to 32 report formats of your data; tool bar provides easy access to formatting and alignment.

Draw: Tear-off menus for tools, colors and patterns.

Integrated Software: Who Leads The Pack?

FEATURES	BeagleWorks	ClarisWorks	GreatWorks	Microsoft Works
System 7 Savvy	YES	NO	NO	NO
In-Context Editing™ (multiple documents)	YES	NO	NO	NO
Paint module	256 Colors	NO	Blk & Wht	NO
Common tool bar w/module-specific tools	YES	NO	NO	NO
Automatic irregular text wrap	YES	NO	NO	NO
Multiple Columns can be turned on/off anywhere on the page	YES	NO	NO	NO

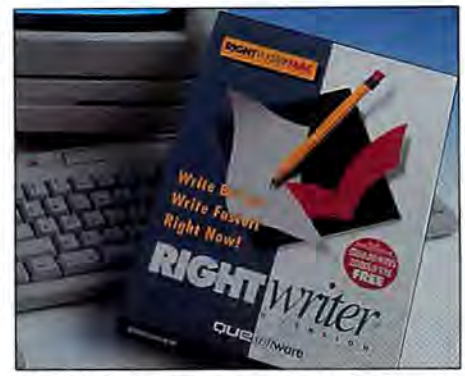
BeagleWorks is the clear winner overall when it comes to true integration and powerful features.

FREE! ONLY FROM TIGER

RightWriter for the Mac

FREE WHEN YOU BUY BEAGLEWORKS!

RightWriter for the Mac. One of the more popular categories in software is the grammar checker, arguably the most important word processing add-in. With



today's business climate, poorly written correspondence is separating success and failure. RightWriter's depth and attention to the details of written communication makes it the premier grammar checker for the Mac. Conclusive testing has established RightWriter as the most accurate, most flexible and easiest to use over any of its competitors.

RightWriter for the Mac is designed to flag errors in your writing from a rule base of over 4,500 — including rules of grammar, style, usage, punctuation, sentence structure, subject-verb agreement and more. RightWriter produces a copy of the document and performs its analysis. Then displays (or prints) your document with flagged errors and explanations. These explanations are your guide to better writing.

RightWriter Contains Over 4,500 Rules, Including:

Grammar Rules

- Noun-Verb Mismatch
- Sentence Fragment
- Run-On Sentence
- Misused Verb
- Misused Pronoun
- Misused Article
- Wrong Verb Form
- Misused Word
- Possessive Use
- Is This Correct?
- Repeated Word
- Capitalization

Style Rules

- Passive Voice
- Split Infinitive
- Long Sentence
- Sentence Length
- Difficult Sentence
- Use Verb Form
- Long Paragraph
- Start With But
- Conjunction Start
- Weak Sentence Start
- End With Preposition
- Negative Sentence
- Use Simpler Terms
- Use Simpler Word
- Consider Omitting
- Ambiguous Wording
- Cliche
- Overused Phrases
- Single Word Quote
- Contraction

Usage Rules

- Colloquial & Slang
- Archaic
- Sexist
- Legalese
- Computer Terms
- Vague
- Wordy
- Redundant
- Questionable Word

BEAGLEWORKS

BBG2700 **BeagleWorks** $184.00
BBG2701 **Competitive Upgrade** $95.00

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Best-Selling Wayzata CD titles For Business, Information, Packed With High-Quality Art!

Make a grand entrance into the amazing world of CD-ROM—or expand your library with selections from Tiger's collection of best-selling current releases. Dozens of new packages are available each week, so call us for late-breaking CD titles.

Clip Art Masterpieces. A classic disc. Contains over 1300 magnificent turn-of-the-century engraved and woodcut images. Available in 300 dpi TIFF and PICT formats. The powerful image index finds any specific topic in seconds! Includes animals, body parts, characters, faces, couples, events, foods, plants, kids, sports, transportation and hundreds more!

Down To Earth! Subtitled "Close Ups Of Our Natural Environment," this disc contains over 750 original resolution color and black and white images in PICT, TIFF and EPS formats. Includes color video-digitized images and color drawings. Fascinating shots of trees, landforms and more.

Quick Art Lite. Over 1500 pro-quality images on a single CD. Each 300 dpi and available in TIFF format. Includes animals, borders, food, holidays, mail, maps, money, science, office, travel, sports, hundreds more.

Quick Art Deluxe. Look out! Here comes a truckload of professionally drawn, top-quality images! Over 3000 in all, with 300 dpi crispness and available in TIFF format. Great desktop publishing companion — the only art library you'll ever need, on one CD-ROM! Includes a paper catalog to identify images. You get (in addition to topics listed above in Quick Art Lite) birds, buildings, education, fish, gardening, medicine, music, mystery, weather and thousands more!

EPS Professional Vol. 1. The definitive collection of CD-ROM graphic design. Includes an incredible 900 fully resizable, Encapsulated PostScript images. From the graphic design studios of Christopher Marshall Designs (CMD) and LasArt, EPS Professional contains design elements for T-shirts, alphabetic designs, four-color pieces, covers and backgrounds. Supports PostScript laser printers, imagesetters and other high-end output devices.

GAIA/Environmental Resources. The ultimate database for environmentally conscious Mac users. Contains an incredible collection of wildlife photos and environmentally sensitive scenes, one of the finest portfolios we've ever seen. Over 400 images in all, with 24-bit color, in PICT and TIFF formats. Also includes databases of environmental organizations and ecology-oriented publications.

PhotoBANK Volume 1. Don't hire a photographer — use PhotoBANK original images! PhotoBANK is brimming with over 500 Mb of high-resolution color photos. These photos have never been published before. Each photo is available in 3 formats: 24-bit PICT (1285×886 pixels), 24-bit PICT (640×480 pixels) and 8-bit PICT (640×480 pixels). Topics include nature, patterns, flags, backgrounds, hotels, statues, animals, girls, traffic, finance, buildings, the beach, the city — many more.

Sound Library 2000. Over 2000 digitally recorded sounds to use on your Mac! Great for desktop presentations, background effects and your own radio commercials! Sounds include animals, household sounds, musical instruments, nature, planes, cars, beeps, people and dozens of digital special effects. Browse, listen or duplicate sounds.

Space Time & Art. 300 fascinating 24-bit color images on the subject of space. Great disc — hours of exploring is in store for you — see NASA views of space and photos from Voyager missions along with a collection of astonishing original oil paintings by noted space fantasy artists.

Trade Opportunities: International And Domestic. The vast market "over there" is opening up. This priceless title includes information from the Department of Commerce "Trade Opportunities Program, Commerce Business Daily, External Affairs and International Trade Canada 1991 Companies for World Markets and a complete section on selling to international markets. Where do you fit in to the global economy?

Wayzata World Fact Book 1991. The world almanac of the Federal government, based on the CIA World Fact Book produced annually by the CIA. Covers territories, countries, protectorates and disputed land claims worldwide. All kinds of information is included: socioeconomic, geo-political, demographics and more. Includes data from the Bureau of Census, Defense Intelligence Agency, Defense Nuclear Agency, Department of State, Department of Interior and US Coast Guard.

NEW! BBS In A Box Vol. IV. From the Arizona Mac Users Group comes over 8,000 files and 500 Mb of compressed Mac software—games, applications, utilities, and more.

CD-ROM COLLECTION

BBG9300	**Clip Art Masterpieces**	$119.20
BBG9301	**Down To Earth!**	$199.20
BBG9302	**Quick Art Deluxe**	$239.20
BBG9303	**Quick Art Lite**	$159.20
BBG9304	**EPS Professional Vol. 1**	$239.20
BBG9305	**GAIA/Environmental Resources**	$199.20
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BBG9308	**Space Time & Art**	$159.20
BBG9309	**Trade Opportunities**	$239.20
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BBG9311	**MACnificent 7 Education & Games for System 7.0**	$63.20
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BBG9317	**Newsbytes** 1983-Aug. 1991 Computer Industry News	$103.20
BBG9318	**Disc to the Future: Programmer's Reference**	$103.20
BBG9319	**All of MacTutor** Includes Articles 1-6	$199.20
BBG9320	**Best of MacTutor** Vol. 1-6 Source Code	$103.20
BBG9321	**CD Fun House 7.0**	$52.00
BBG9322	**GEM Macintosh 2.0** (Public Domain)	$95.20
BBG9323	**BBS in a Box** (from Arizona Mac Users Group Vol IV)	$95.20

Additional titles added continuously. Call for updated list.

Quality Memory – at Just a Fraction of the Price You'd Pay for Apple Memory!

REVIEWER'S NOTEBOOK: *Here at Tiger we love our Mac LC and II computers, but we kept getting "The application could not be opened" and "Application has unexpectedly quit" messages. We found out that the amount of memory they came with from Apple just wasn't enough for the newer applications. So we called Apple and priced out more memory. Wow! We were in shock! $995 for 4MB of memory! We knew something wasn't right. So we set out to find a better way.*

Who Needs It? Desktop publishing, high-end graphics, animation, CAD, modeling, and a multitude of other applications demand more memory. Quark cries for at least 8MB (MegaBytes). PhotoShop wants to put up "Out of Business" signs unless it gets 4MB. System 7 demands 2MB all for itself, then you must have some more for your applications. And if those applications don't get what they want, they can be pretty tough characters to work with.

When you try to run an application but don't have enough memory, two problems may occur. If you are really short on memory, the application may simply refuse to launch. The Mac will display a dialog box that says "The application could not be opened." Worse, it may let you open the document but later quit in the middle of the session displaying "Application has unexpectedly quit." Usually you get a warning before you launch telling how much RAM you ought to have versus how much is actually available. If the amount is 75% of the total normally required, you are probably risking an "Unexpected Quit." All of your recent changes since the last Save will be lost. Ever notice the colors reverse on your screen? That's the way some applications warn you of low memory.

PowerBook Shortages! The new PowerBook revolution has really taken off. Everybody wants one of these fantastic portable Macs. And as soon as they get one... they want more RAM, which has made the availability pretty scarce. The PowerBook needs a physically different (smaller) size than the other Macs. And if you've tried to get some, you know that although it's advertised all over, getting it delivered to your door is another story. The supply is incredibly short. But you're in luck! Since you're reading Tiger, you know practically the only source for this new PowerBook RAM. Tiger has it!

Printers Need Memory Too... LaserWriters use memory to store fonts and prepare graphics for imaging. Ever been stopped from printing a page with several different fonts or perhaps a large graphic image? ...then you need more memory. Adding memory to a LaserWriter increases the space so you can print with more fonts, bigger graphics, and speed up overall printing in many cases.

Z-COM designs, assembles, tests, and packages their memory upgrade products. With a multi-million-dollar assembly facility, including a Class-100,000 Clean Room, all Z-COM products are manufactured using the highest quality equipment under the tightest tolerances and the strictest controls. Everything is double checked, from board tolerance and thickness, to the consistency of the solder paste. Z-COM controls the manufacturing process from the moment the ICs arrive at our facility, through the manufacturing process, up to the final packaging.

FREE BOOK & DISKETTE!

What is memory and why do you want more of it? Order now and get "The Macintosh Memory Guide" from Connectix absolutely free. A simple explanation of memory and how to get the most out of your Macintosh. Packed with tips on making your Mac faster; best explanation of 32-bit addressing mysteries. Includes HyperCard stack on diskette for easy reference. A complete memory guide — FREE! Picks up where your Apple Users Guide left off.

Z-COM

BBG2835	**1MB for SE30, II, IIx, IIcx, IIsi**	$59.00
BBG2836	**2MB for Plus, SE, LC**	$95.00
BBG2837	**4MB for IIci, IIsi**	$185.00
BBG2838	**16MB for IIci, IIsi, IIx, IIcx**	$655.00
BBG2839	**4MB for IIfx**	$180.00
BBG2840	**16MB for IIfx**	$655.00
BBG2841	**4MB for LC**	$180.00
BBG2842	**8MB for LC**	$339.00
BBG2843	**2MB for PowerBook 100, 140, 170**	$195.00
BBG2844	**4MB for PowerBook 140, 170**	$395.00
BBG2845	**6MB for PowerBook 140, 170**	$519.00
BBG2846	**1MB×8 SIMM Modules 80 ns**	$35.00
BBG2847	**2MB×8 SIMM Modules 80 ns**	$65.00
BBG2848	**4MB×8 SIMM Modules 80 ns**	$99.00

SIMM Modules have a 5-year warranty; all other memory has lifetime warranty. 60ns, 80ns and 100ns RAM also available.

The Mac Is A Perfect Fax Machine!

REVIEWER'S NOTEBOOK: *Turn your Mac into a full-featured, lightning fast fax machine. DoveFax and DoveFax+ each provide 9600-baud fax-modem features and 2400-baud data modem capabilities. You receive faxes without interruption and a handy re-dial feature makes sure your fax gets sent. Fully Group III compatible, The Dove Fax delivers the highest quality facsimile reproduction of any product we tested. Installs in 5 minutes. Tested 100% Hayes compatible. Communicate reliably with over 2 million fax machines around the world. Your Mac is a perfect fax machine — create your documents and fax them instantly — and take advantage of the features engineered into each DoveFax — and the power of your computer.*

DoveFax is your connection to other computers, databases services, banks, bulletin boards and more. DoveFax+ includes an easy-to-use, sophisticated voice messaging system — never miss another call! DoveFax devices are very competitively priced, loaded with value — hundreds less than buying a modem, fax machine and answering/messaging machine separately.

DoveFax. Great-Looking Faxes, Automatically.

DoveFax allows you to use the power of your Mac to create handsome cover sheets with great looking type and graphics. Dove Fax supports multiple phone books, distribution lists, call grouping and the ability to fax documents to multiple locations. The QuickFax desk accessory allows you to whip off faxes whenever you need to, without waiting. There's an on-line fax directory, on-screen display of faxed documents and fax preview feature that lets you see precisely what your faxed document will look like before you send it. But perhaps the most impressive feature is the intuitive DoveFax software interface that makes it all possible — and makes it all simple. Schedule and send faxes whenever you choose — even when you're not around — to avoid high-priced phone rates. When a fax comes in, it's automatically logged and you can even convert faxed documents to PICT, TIFF and leading paint formats.

Some Very Handy Faxing Utilities... DoveFax includes software that really cranks up your Mac's ability to handle faxes. The FaxManager is a built-in application that controls your fax activities. It is responsible for sending and receiving faxes, view and print received faxes. It also allows you to manage and use your fax phone books. FaxPrint is the advanced printer driver for the DoveFax modem. FaxPrint is quickly installed in your system folder allowing faxes to "print" from within an application. FaxMenu is a startup application (INIT) that allows you to fax documents directly from within an application.

DoveFax includes the most extensive set of built-in and communications software we've ever seen. These utilities make a big difference in ease-of-use and productivity. And every DoveFax is tested individually for any defects. Dove has one of the highest customer satisfaction ratings in the category. Compatibility is not problem — DoveFax and DoveFax+ meet all appropriate FCC, EAI and CCITT telephone standards, along with many international standards.

How The Dove Fax Works... Basically, if you can print a document, you can fax it. That's the beauty of using your Mac as a fax machine. You create beautiful pages on your word processor or desktop publisher — and DoveFax takes care of getting it to its destination. The FaxPrint file that resides in your system folder is actually a printer driver just like your Laserwriter and Imagewriter drivers. FaxPrint (included with Dove Fax) creates an image of your document, but instead of sending along to a printer, it spools it to the FaxSpool folder in your system folder. From there the file is sent through the DoveFax modem and over the phone line. That's all there is to it.

In addition to being able to send faxes in the background, while you continue to work, you can receive faxes in the background as well. DoveFax can be quickly set up to automatically answer your phone and receive faxes while you work. The modem answers the phone after a certain number of rings (you decide in the Chooser) and makes the connection. The incoming faxes are logged in, checked for completeness, dated and stored on your hard disk. You can call them up on your screen or print hard copies. Multiple page faxes are viewed by just "flipping pages." It's fast and easy — and a lot more convenient than waiting at the fax machine.

The Dove Fax modem is also an easy to use,

2400-baud Hayes compatible data modem that allows fast, reliable connection to other Macs, computers and on-line services. We've discussed the advantages of a fax/modem, but a highly reliable, super fast data modem is a must for your Mac, too. DoveFax provides blistering 2400-baud transmission, great for PowerBook users on the road. Its small footprint (or "palmprint") and ultra light weight makes it a perfect traveling companion.

DoveFax+. DoveFax+ contains voice modem features that opens the door to another level of convenience and productivity. Now your Mac will answer the phone for you, play back personalized recordings to callers, record incoming messages, forward messages to another phone and much more.

Also From Dove... MaraThon Boards: Low-Cost, High-Output Accelerators.

The same dedication to quality and value is brilliantly displayed in the MaraThon 68030 Racer Accelerator Boards, featuring on-board 16MHz and 32Mhz Motorola chips. Greater speed, enhanced performance at an affordable price. Your productivity will skyrocket — everything moves faster, draws faster, calculates faster. Each product is designed to provide speed improvement for any expertise level — and any budget. Call a Tiger Macintosh specialist for complete details on these incredible accelerators.

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ACCU- WEATHER

You can't change the weather, but you can get timely forecasts and radar screens to see exactly what it's doing with new Accu-Weather.

With new Accu-Weather, your Mac becomes a personal meteorological information service, providing data for the nation and the world. Using your modem, you'll access the same information that radio and television stations use to prepare their broadcasts.

DOVEFAX

BBG2812	DoveFax/LAN	$495.00
BBG2813	DoveFax+	$355.00
BBG2814	DoveFax Deskop	$265.00
BBG2815A	MaraThon 030 SE	$365.00
BBG2815B	MaraThon 030 II	$695.00
BBG2815C	MaraThon 030 Plus	$365.00

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PRICES IMPOSSIBLY LOW! **CALL 1-800-666-2562**

The MacRenderMan and Showplace Bundle

MacRenderMan and Showplace (bundled together in this offer) represent the finest software available for 3-D image creation, viewing and manipulation. MacRenderMan allows you to create incredibly realistic images, while Showplace allows you to import those images and create scenes, with complete control of lighting, texture, backgrounds, vantage points and dozens of other effects. Altogether amazing, surprisingly easy and fast. In fact, RenderMan was used in creating the academy award winning film, Tin Toy. Impressive results can be achieved in a short time, but if you get the urge, you can get crazy with these products and never be seen or heard from again...

MacRenderMan. Fascinating photo-realistic design made easy (and fun). Three distinct dimensions in full color, with a variety of surface textures and designs. In our first session, we created several billiard balls with a variety of whacked-out designs and colors in under an hour. That hour passed quickly; most of the real work was handled by MacRenderMan transparently.

We began the modeling process by describing the objects (geometry and appearance), the characteristics of the lighting (the light sources) and the view we wanted of the object (the camera, if you will). We then had a scene! We could change the texture of the surface (and how the light reflects off of it) and easily control the various shading techniques. The more you work on your images, exploring the powerful capabilities of MacRenderMan, the more detailed your images become. This is a great tool for CAD projects, product design, animation, merchandising, architecture and presentation graphics. Nothing else can compare to the images you'll create with MacRenderMan, the most visually accurate picture making product available for the Mac today.

MacRenderMan is used with 3-D design applications that produce RenderMan Interface Bytestream (RIB™) files. Use your favorite 3-D design system to shape objects. The design software will record these geometric descriptions into a RIB file and spool the file. MacRenderMan reads the spooled RIB file and produces a color rendition, computing it in the background under MultiFinder.

Showplace. Showplace is the forum for your objects created with MacRenderMan technology. Build a dazzling 3-D scene by quickly importing and arranging MacRenderMan images, or choose from the library of Pixar ClipObjects, including furniture, lamps, a sleek racing bicycle, billboard, shopping bag, a theater spotlight and more. Then turn your camera loose and move around your scene to create spectacular effects and perceive a multiplicity of angles.

Change the "look" of an object by changing its surface: you could have an oak grain table and a stucco-painted wall, or a stucco-painted table and an oak grain wall, or an oak grain shopping bag and brushed chrome walls! With Showplace, you can decide the *appearance* of an object independently of its *shape*. Showplace's ability to combine any object with any appearance (including those you create) is one of its most powerful features.

These "Looks" include: bricks, brushed chrome, gold and copper, concrete, gray and rose granite, veined marble, natural oak, plastic and sky patterns, among others. Manipulate characteristics such as shininess, size, roughness and reflectivity. It's your own world of

Magnificent pictures, life like shadows...

synthetic reality! Then take a TIFF or PICT image and wrap it around any 3-D object in your scene to create dramatic effects, impossible in 2-D graphics programs.

Using Showplace, you could create a slide presentation that features MacRenderMan images in a variety of shocking, unusual and impossible ways. Like messages on balloons and billboards, in the pages of books and emblazoned on the surface of a table. You can add fog, smoke and atmospheric conditions to your scenes, adjust the lighting and create masterful shadow detail.

Showplace comes complete with a videotape that walks you through the production of a scene in detail. We found that the videotape alone was enough to get us going with Showplace, all the functionality is explained in a simple, straight forward manner. Although Showplace is a lot of fun just to play with, you'll soon discover how you can work the intriguing scenes into your presentations and on-screen demos.

These fine products transcend any paint or draw programs you've ever used, employing technology seen only in high-end design and animation studios. The images will certainly stop an audience! If you need a presentation that's a cut above, nothing will deliver the impact like Showplace.

BBG2410 ..... **$525**

ALSO AVAILABLE: CD-ROM VERSION

MacRenderMan and Showplace applications, complete online documentation for both products, a gallery of images created with Pixar products and a sample of Pixar animation all on one CD-ROM!

BBG2411 ..... **$365**

SAM

Let's talk viruses. They're becoming a serious problem. Industry watchers have estimated that corporations have lost hundreds of millions of dollars in time and equipment — attributable directly to computer viruses. With Symantec Antivirus for Macintosh (SAM), you can forget about vulnerability to viruses forever. SAM's state-of-the-art technology detects intruders and launches a counterstrike: the frontline protection actually intercepts invaders whenever an application is launched. If a virus is detected, SAM removes it and immediately goes about repairing the damaged areas of the disk. You'll even get information and preventative measures against new strains with access to Symantec's Virus Newsline. SAM supports standard network environments (TOPS and AppleShare) and is compatible with MultiFinder.

SAM delivers solid protection with its innovative SAM Intercept — actually prevents viruses from entering your system, performing extensive checks when applications are launched and instantly detects attempts to bypass the system — usually a viral attack. Automatically scans floppy and removable disks when you insert them. The SAM Virus Clinic scans all of your files, folders, volumes and file servers for viruses and for changes in files that could indicate infection. Infected files can be repaired or deleted immediately.

BBG2706 ..... **$59**

SUM II

The amazing new SUM II is the most powerful, flexible combination of crashed disk and file recovery, backup, optimizer and security in one package. It contains utilities to quickly handle any problem. In fact, we recovered crashed disks and some deleted files with SUM II Recover — and we didn't even have SUM II installed! Instantly diagnoses any problem and repairs it immediately. Includes new SUM Backup, SUM TuneUp, SUM Shield and SUM QuickCopy. All excellent examples of top-notch software programming: fast and easy, with powerful functionality built-in. All the utilities are here. Above and beyond any competitive package we've seen.

There's also a new SUM QuickFix that is designed especially to repair damaged hard disks using advanced new techniques and new SUM Encrypt allows encryption security—including DES. Keeping your data safe, secure and efficiently organized. That's the mission-statement of SUM II. A widely-acclaimed collection of world-class utilities for the Mac.

BBG2705 ..... **$89**

NEED MEMORY? DON'T PAY MORE! CHECK TIGER'S PRICES!

Tiger features high-quality Z-Com memory — the best in the business! Shop around — pay more if you like — but why would you? Call one of Tiger's memory specialists on the SIMMs you need to get the most from your Mac. We've prices this memory so low — we can only say "Shame on you!" if you buy it anywhere else!

BBG2846 1×8 80ns **$35**

BBG2847 2×8 80ns **$65**

BBG2848 4×8 80ns **$99**

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THREE TITLES — ONE LOW PRICE!

Talking Moose

Moose humor is all the rage! Once your Mac goes idle, Talking Moose takes the stage with his band of crazy clowns, zany mice, wacky camels, riotous beavers and a host of other animated performers. They'll fire joke after joke at you (in either low-memory black and white or dazzling color) until you cry "uncle." Talking Moose not only gives your Mac a personality — it puts a chuckle in even the most pressure-filled days. Includes an INIT, a CDEV, desk accessories, HyperCard XCMD's, FKEYs and a hilarious written history of the Talking Moose Show. You can even write the jokes and have the Talking Moose loonies perform them! You select the time between Talking Moose shows along with speed adjustment, pitch, rate, pauses and more.

THE TALKING MOOSE'S CARTOON CARNIVAL.

Bates the Mouse. Bates is a Northwestern sort of mouse, born into a prominent family of mice in the hotel and lodging industry. Bates joined the carnival in a fit of depression, immediately after being denied a spot on People magazine's most-eligible bachelors list.

Maj. Tom Beaver, Retired. Tom is one of the Talking Moose's oldest friends, since he was born in a river near the Moose's hometown. Tom knew that he wanted more out of life than a split-level dam and a gourmet bark collection. Tom had always dreamed of reaching the stars, so with a few helpful prods from some familiar antlers, he began training.

Stinko the Evil Clown. Stinko was born Francis Brown in a sleepy little town in Iowa. He had a happy and fulfilling childhood, grew up and became a moderately successful storm door salesman. He led a pretty humdrum life — that is, until the notorious "Birthday Clown Incident," an event that will live in infamy.

Thunder 7

Once you've collected yourself and stopped giggling, get back to work with the word mastery of Thunder 7. It's a spell checker FOR ALL OF YOUR APPLICATIONS! No more typos, punctuation or capitalization errors in your spreadsheet, database, page layout and communications applications — even desk accessories. Sure, you've got a spell checker in your word processor, but Thunder 7 avoids embarrassing errors in those other programs. And Thunder 7 is INTERACTIVE — so you are alerted to errors as you type, so when you're done... you're done! Thunder 7's thesaurus is based on the 1.4 million word Miriam-Webster classic. You get a complete list of definitions, synonyms, antonyms, compared words, contrasted words and related words. In fact, Thunder 7 will automatically correct frequently misspelled words without bothering you!

- Interactive spelling checker watches the words you type, alerting you to spelling, capitalization, and punctuation errors the moment you make one.
- User definable glossaries expand abbreviations and correct frequently misspelled words on the fly.
- Broad compatibility with other Mac applications. Using external modules for reading and manipulating stylized text, Thunder 7 stays compatible with the latest applications.
- Works with any Mac from Plus or Classic to IIfx or IIsi running System 6.0.3 to 7.0 with 1Mb of memory.

Screenshot.

Clean, crisp screen captures made simple. All features are available from within one moveable window. Screenshot is a Control Panel Device, so you can set it up and capture the screens you need with almost any key combination. Anything that you can get on the screen is ready to capture with just a click (you can even capture portions of the screen if you like). Output to a printer or save a captured image in one of several graphic formats. Great for presentations, ads, brochures, training materials and hundreds of other uses.

BBG2799 **ALL THREE TITLES . . .** **$99**

Additional Baseline Publishing titles available... Call for details!

FontBank

This is a great value on a complete (and we mean complete!) library of 250 Type 1 (the best) display faces for use with any application that supports PostScript (including ATM). You already know the value of great looking type in your documents. Now great type costs less. These faces can be used with more than 4,000 Macintosh applications and run beautifully with all Macs. Includes screen fonts as well as printer fonts. Why pay more for foundry-quality type?

Type 1 PostScript fonts — the best you can buy. Smooth and crisp on the screen and on the page. The standard for Macintosh and adopted by Microsoft for Windows. Buy them from Adobe and pay through the nose. Or, take advantage of FontBank's staggering array of quality fonts at down-to-earth prices. You'll create attention grabbing documents and eye stabbing graphic elements for any graphics programs and desktop publishers. With such a wide variety of faces available to you, creating incredible headlines is fast, fun and amazingly professional. The headline is the face of good advertisements. Wimpy headlines are usually ignored, while bold headlines attract the reader, and if your message is important, the casual reader becomes curious — and persuaded.

FontBank has assembled a vast array of looks and feels in their type library. 250 different faces, each with its own distinct character. Some you may never have seen before. And FontBank display faces can be easily manipulated with programs like TypeStyler, Adobe Illustrator, Aldus FreeHand and others. Combining FontBank's 250 faces with the capabilities of these programs offers the opportunity for an unlimited number of special effects. And FontBank display faces are compatible with all major page layout applications like Quark XPress, PageMaker, DesignStudio, Multi-Ad Creator and others.

BBG2425. . . . . **$79**

Expert Color Paint

It's hard to imagine that a paint program with true 32-bit color and a palette of 16.8 million colors, plus an extensive toolbox of creative features can sell for just $27. But a few minutes with Expert Color Paint and you'll know that it's true. Expert Color Paint brings professional-quality paint and photo preparation down to earth with one of the most feature-rich, easy-to-use products we've ever seen. This one is fast, fun and loaded with all the extras — including System 7 support. Compare Expert Color Paint to MacPaint (at $125), UltraPaint (at $199) and SuperPaint 3.0 ($199). Feature for feature, you simply can't beat this low-cost, high performance art attack! Throw in a free disk packed with quality clip art (a $24.95 value) and it's the most irresistible offer we've ever made!

Frankly, the high-priced paint products are a little embarrassed. They've been telling customers that a paint system has to be expensive to be good. And while that may have been true in the past, the wall has come down. Expert Color Paint is a powerful, yet simple-to-use product that produces great looking images, just like the pricey packages, and adds a studio-full of advanced toolbox features, such as lasso and magic wand, gradient tools, dropper, air brush, paint can, a host of patterns and more.

For image editing, there's blur and sharpen, distort, skew, brightness filters, contrast control, image scaling, paint dithering, antialiasing (smoothing), rotate, flip, stretch and slant. There's even a life-saving "multiple undo" feature. You can customize your tools, retouch photos for pro-quality results and create extraordinary gray scale images in no time.

When you're done, save your pictures in one of several popular formats, or easily publish them to other System 7 programs. And Expert Color Paint will use virtual memory, so massive color files (with as many colors as you want) are never a problem.

BBG2505. . . . . **$27**

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PixelPaint Professional

High-powered, graphics-oriented tools for the advanced user. Version 2.0 includes a broad array of paint capabilities along with extensive photo manipulation and enhancement features. Open dozens of individual windows and cut/paste images and elements between them, streamlining the design process. Move quickly to create new layouts — PixelPaint Professional can keep up with your fertile imagination! The tools are magnificent; create shapes, fine-tune location and boundaries. The brush and paint tools allow instantaneous changes in line width, angle adjustment, Bezier curves and scaling the overall size. Quick zooms give you precise image control, clone artwork with the advanced rubber stamp, define the colors you want—to create just the exact picture you had in mind.

The color features are unsurpassed, ideal for design. PixelPaint Professional's trademark is the ability to manipulate and enhance color — including the industry's most exact color blend and fill. Go beyond simply blending two colors. You can define multiple color definitions within the blend for previously impossible color effects. And you can create seamless color gradients with PixelPaint Professional's breakthrough Macintosh color control. Produce roughs of original concepts, tight comps and refine designs — right up to prepress. From scanned photographs and illustrations to the creation of beautiful originals, PixelPaint Professional provides all the tools you'll ever need. And you won't believe the results.

BBG Y7274..... **$465**

BBG Y7273 **Pixel Paint (regular)**..... **$139**

PLI Removable Cartridge Drives

Highly acclaimed, 100% reliable and backed by a solid warranty, the PLI line of removable cartridge drives is the most respected in the industry. When your files and applications grow to monumental size, when you want to perform fast backups or when you want to take

heavy megabytes on the road, nothing gives you the unlimited capabilities of the PLI Infinity 40 and 88mb drives. The PLI Cartridges carry a full 5-year warranty. Includes PLI's famous TurboWare utilities. One other note: The PLI drives and cartridges are thoroughly tested, far exceeding industry standards, so when you install a PLI, you're ready to go — with uninterrupted performance.

With much of the design and layout work done at TigerSoftware on Macs, our PLI cartridge drives are critical to a smooth operation. Without their reliable service and unmatched speed, getting our hands on files would be nearly impossible. Our choice: the PLI Infinity 88 Turbo drive. This remarkable instrument carries a 60,000 hour MTBF rating. It features the highest level of filtration, quality-engineered circuitry and is virtually impossible to damage by incorrect cartridge insertion (one of the leading causes of drive failure). Designed and engineered for rugged use, the PLI Infinity 88 Turbo has the industry's highest tolerance to non-operating shock (our 88 Turbo once survived a four-foot fall onto a tile floor).

The 88 Turbo also includes PLI's TurboCache, a disk drive accelerator program that dramatically increases the speed of all of your SCSI drives. TurboCache uses system memory to create the cache, boosting data throughput by a whopping 50% for many applications.

Of course, you'll get all the features that have made PLI the name asked for most when it comes to removable cartridge drives including external switches for termination and SCSI address, UL-approved, individually tested power supplies, long-life 50-pin Centronics SCSI connectors, an external fuse and (unlike other drives) you get the complete kit, with all necessary cables and accessories. The Infinity 88 Turbo beats Bernoulli hands down when it comes to price, performance and value.

Another PLI advantage: your Infinity removable cartridge drive comes complete with useful, easy-to-use software hand-picked by the experts at the renowned Berkeley Macintosh User's Group — over 15 megabytes! It also includes PLI's own TurboCache and TurboOptimizer software, with a combined retail value of $200.00. These tools add to the performance and flexibility of your Infinity 88 Turbo system. And only PLI provides them. PLI conducts 24-hour drive burn in, component level testing, self-diagnostic routines and a slew of other tests, many of which are proprietary to PLI.

BBG2460A **Infinity 88mb Removable Single External Drive** **$719**

BBG2460B **Infinity 40mb Removable Single External Drive** .. **$619.00**

BBG2465B **44mb Cartridge** (Unform., 1-yr. war.) **$75.00**

BBG2465D **44mb Cartridge** (Format., 5-yr. war.) **$85.00**

BBG2465C **88mb Cartridge** (Format., 5-yr. war.) **$135.00**

FirstThingsFirst

First Things First is an innovative new time manager that doesn't require hours of laborious setup to be incredibly useful — it's incredibly useful right out of the box. A unique Floating DeskClock Icon stays "on top" regardless of how crazy your desktop gets. Runs under System 7 in addition to System 6. Extremely fast. Non-obtrusive, with 30 action/task categories. There's even a built-in demo program for you to copy freely and share with other Mac users. We can't really manage time — it flows

on relentlessly — but we can do something about our priorities!

Even the most organized people have trouble keeping track of all the things they must (and want to) accomplish. Time-dependent tasks, appointments and deadlines simply don't care if you have enough time to organize them. And unless a time manager is fast and easy, it is of little use. First Things First is extremely easy to use, delivering instant access to your list of tasks and details. It allows you to organize your efforts by category or project, and keeps you in touch with the big picture even in the wake of interruptions and priority shifts.

You'll quickly create categories, establish reminders and things to do, view your lists, print your lists and have almost unlimited capabilities to customize First Things First to fit your personal style. That's important.

I was at first intrigued with the Floating DeskClock. It gives you the time and date in either expanded digital or analog form. There's a little "tear-off" calendar that helps you manage your schedule, review priorities and reminders. It's very cute, but also very powerful and can be moved wherever you like, reduced to just time or time and date.

BBG2403..... **$42**

Go Master Deluxe

While most of today's popular computer games feature eight-headed dragons, impenetrable Soviet tanks or playful green cosmic blobs, Go is a simplistic Japanese tradition that challenges the mind on the most basic level. It, indeed, mirrors the logic, philosophy and personality of the player, stirring the inner self and demanding intense concentration. Fascinating and addictive, you'll learn to play in minutes and spend the rest of your life mastering it.

Here's how you play Go: Two opponents alternately place black or white stones on the vacant intersections of a 19 by 19 grid-board, attempting to surround empty points and thwarting one another. The player with the most enclosed intersections wins.

Unlike chess, which requires superior technical mastery to defeat an opponent, Go requires players to combine vision and logic. And while both games demand a strategy, decisive attacks and a solid defense, Go allows weaker players to compete evenly with a unique handicapping system.

Go Master Deluxe assists your planning with battle maps revealing stones and groups needing defense, territorial control for each player, or even 10 recommended plays. It includes Nemesis Joseki Genius and Nemesis Tactical Wizard, two grand master tutors that guide you to the peak in Go skills. Joseki gives you sequences of moves culled from centuries of play by the masters. By learning strategies of organized moves, and using joseki techniques in your play (it aids both players equally), you'll quickly develop skills that will make you a dangerous opponent. Includes on-line introduction on the joseki theory. Nemesis Tactical Wizard is your advisor as you play, consulting you on what to do in life-and-death confrontations with the enemy. Also includes Nemesis Scribbler, the documentation utility for your Go matches.

BBG2405..... **$95**

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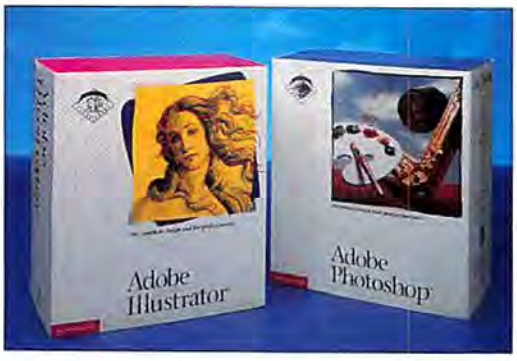
Adobe Illustrator

A slew of impressive industry awards grace the Illustrator box, a clue to the amazing capabilities you'll discover inside. Indeed, Adobe Illustrator is the most powerful drawing, page design and production tool in the world today, ideal for designers with a desire to elevate their work to a new vista of speed and creativity. It's the only system capable of precise illustrations, extensive text handling, fully automatic graphing and color separations. You can work from existing images if you like — just scan it and you're ready to begin. Or draw from scratch using Illustrator's magnificent set of drawing tools, the envy of the industry. It's as simple as moving the mouse.



Professional pages depend on the ability to handle text in a variety of ways. (This package includes free Adobe Type Manager and 13 type faces). Nothing allows more creative opportunities than Adobe Illustrator when it comes to integrating text with your designs, illustrations, line art, images and photos. Just enter your text on screen, or quickly import it from your word processor. Then take control of the kerning, tracking, word and letter spacing.

Create tight wraps around shapes (or any path, like circular type) and images, viewing your alterations on your screen as you work. Flow text from one column to the next, add unlimited numbers of characters and styles from any PostScript Type 1 font (including the entire Adobe Type Library). You can even convert the type to outline images, then create images from them.

Creating charts is a snap with Illustrator. Just type in your data, select a chart type and it's done. Customize your charts with your palette of creativity and revise them in seconds. Create top-notch ads, brochures and more, from concept to final production and color separations. In fact, the Adobe Illustrator box was completely created using the product. Color capabilities include smooth 24-bit screen reproduction (8-bit is supported for B&W).

BBG2502..... **$335**

Adobe Photoshop

The ultimate color-retouching/image processing system for the Mac. A great pre-press and production tool, Adobe Photoshop has garnered loyal users in all areas of graphic design and color reproduction. Using its extensive features, it's able to create anything you can imagine.

Full 32-bit color artwork with full control and flexibility to manipulate and combine photographic images, and the ability to create stunning video effects. Color separations are precise, meeting or exceeding even the strictest standards for reproduction. You can produce bit-mapped, grayscale or continuous-tone color, add color, change it or remove it completely. Produce intriguing duotones, tritones and quadtones. And you can use your existing Adobe Illustrator files in your Photoshop images. You've got a great selection of creative tools right at your fingertips.

When you've finished your creative frenzy, Photoshop switches instantly to production mode, allowing full PANTONE color matching, automatic trapping and full CYMK editing for true four-color process proofing. Scan your photographs on any scanner — from low end B&W to high end drums. A host of controls and image filters enhance your creativity, and the powerful paint tools are unparalleled.

BBG2501..... **$510**

Adobe Premiere

Become a movie maker — with the help of your Mac — and new Adobe Premiere. It's the newest creative tool from the leaders in precision graphics and photo manipulation. It's fast, easy and fun to use — just gather your clips and arrange them in the order you want them to play and Premiere handles the rest with blazing speed.

Premiere utilizes the Apple QuickTime extensions to store and import your video and audio files. You can arrange your clips to appear in progression with simple cuts, or overlap them to create dramatic transitions like dissolves, page turns and spins. You can isolate areas of your moving video or still images and superimpose them onto other clips to create a wide range of special effects that will grab your audience like nothing else they've ever seen.

You can use plug-in filters (including Adobe Photoshop-compatible filters) to produce tints, distortions and replications. Using Apple's QuickTime extensions, you get the enormous capabilities of true media integration — and now, you can produce digital movies at an affordable price, for a variety of uses. And with QuickTime, you can store video footage and accompanying audio on an ordinary disk drive. Copy clips over and over without distortion or loss of quality.

Premiere acts as the control room for your movie studio. From its intuitive interface, you'll see the tracks of your movie in "filmstrip" style. And if you need to make a change, multiple windows provide you with fast access to any editing function. Want to add an effect? Just click any one of the animated icons to select great digital effects. The video windows on your screen also enable a quick preview of source material, digital effects and assembled video. There's even a Timeline display with zoom-in and single-frame viewing. Quickly check your sequences with Premiere's push-button controls, move to any clip instantly. Click to rewind, play, fast forward, record and single-stop, slow-, or fast-motion. As you work, on-screen indicators display time, frame counts, audio levels and storage requirements.

Premiere is packed with special effects. Like transitions (graphic effects used when changing from one scene to another), choose from a band slide or band wipe, checkerboard, barn doors,

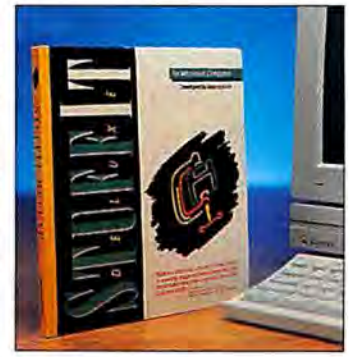
cross dissolve, funnel, dither dissolve, iris round, page turn, radial wipe, spiral boxes, roll aways and more — it's like having a state-of-the-art television editing suite right on your desktop! Adding sound is easy. Premiere automatically synchronizes the audio and video using cue points.

BBG2503..... **$285**

StuffIt Deluxe 2.0

StuffIt Deluxe 2.0 is the latest utility from the mind of famed programmer Raymond Lau, and is already an industry standard in compression and archiving. Many national (CompuServe and GEnie) bulletin board files are "Stuffed" and can be accessed through StuffIt Deluxe. It's faster, easier and more competent than any other compression utility we've tested, and includes a slew of state-of-the-art features: a new intelligent compression option, the ability to create self-UnStuffing archives and automatic launching of compressed application or documents.

You'll save serious disk space, while giving yourself complete file manipula-



tion control, the ability to open multiple windows, move, copy, sort, rename and delete archived files — even add password security! By compressing files, you also save modem transfer time. Put the Magic Menu Extension in your System Folder and watch a new menu appear in the Finder. Now Stuff and UnStuff files and folders from within the Finder. There's even built-in virus protection.

If you're not using a compression utility, you're leaving valuable disk space on the table. And if you're not using StuffIt Deluxe, you may be missing out on a wide range of helpful tools.

StuffIt Deluxe features a new QuickStuff command that brings up a dialog box — you simply choose the file or folder you want to stuff. StuffIt Deluxe then instantly creates an archive and stuffs your files. QuickUnStuff is just as easy — just select the files and it's done! There's also a Control Panel file — Magic Menu — that places a menu called Magic in the Finder. Just select the files or folders you want stuffed — right from your desktop, and without opening StuffIt Deluxe! Incidentally, Microsoft Mail and QuickMail users can stuff and send their E-mail files without actually using the E-mail software.

If you're like most users, you'll adopt StuffIt Deluxe as your main backup program. The extensive, Finder-like operation allows you to actually open multiple archives and move files between them. And an easy-to-use scripting language allows you to automate your archival procedure.

BBG2470..... **$55**

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AnimationWorks

This remarkable product allows you to animate — by just drawing lines; in effect, telling the system where to move the objects and how fast. That's it. Quickly defining what the objects, "actors" and backgrounds will look like. Animation Works allows you to create colorful movies for sales presentations, demonstrations, storyboards, video titling and production. It's easy enough for inexperienced users, yet has all the power and features for graphic designers, creative directors and video producers. They love how easy it is too. Great training and educational tool. To create a sequence illustrating how a piston works or how a bird achieves flight would take about twenty minutes.

Animation is high-impact communication. The ability to deliver messages to an audience, student or prospect with animated sequences along with sound and text is dynamic. Animation Works makes it simple; that's why it's become one of the most popular Mac multimedia products in the business. The concept of "path-based" animation makes moving an object as easy as drawing a line across the screen. Establish different paths for each object in your scene, or attach the motion of one object to that of another, for complex sequences. Animate text to create titles, scrolling credits and feature lists. Quickly add customizable wipes, fades and other intriguing transitions between scenes. Animated mattes allow you to enclose action within a shape for incredible video-like effects. Adding backgrounds, sound, special effects, color and mattes are a mouse click...

The Color Cycling capabilities allow your imagination to explode with animated color effects, giving you four independent color cycle ranges.

The sequence of three frames you see on this page have been taken from 25 frames that make up the entire animated sequence. Here's how we did it: We first assembled our background (we created the scene in Animation Works, but we could have done it in a paint program), using a variety of shapes, patterns colors and textures. The Film Player you see in the lower right-hand corner of the screen tells us which frame in our movie that we're currently editing.

BBG2702 ..... **$109**

Hyperglot Language Software

Learn Spanish, French, German, Japanese, Italian, Chinese or Russian with the foremost language tutoring system in the world: Hyperglot. If you've ever studied a language before (and want a fast, easy way to refresh), need to learn a new language for travel or business, or even if you've never attempted a second language, this series combines the power of your Mac with the most extensive materials available. Digitized voices of native speakers provide pronunciation lessons while grammar, vocabulary and phrases are at your fingertips. Hyperglot also offers the industry's most respected Japanese-language software.

Business today is setting its sights on global expansion as European and Asian markets explode. Communication is a critical aspect of success in these new territories. With Hyperglot's series of foreign language software, you can learn to speak and understand languages of the important countries of the world with less effort and almost instantaneous results. If you're a traveler or student, exploring a new language is fast and fun with Hyperglot's digitized speech and logical progression.

Pronunciation Tutor (Available for Spanish, French, German, and Chinese): The Pronunciation Tutor is packed with over 2 megabytes of high-quality, digitized sounds, consonants, words, phrases and full sentences. Just click on the syllables, words and sentences; a native speaker repeats them as many times as you need. The Pronunciation Tutor includes an extensive set of notes throughout the stacks — a great aid to understanding as you move through the lessons to expand what you're seeing on the screen. Just click at any time for more information, clarifications and examples. Unusual sounds, pronunciations and inflections are explained with easy-to-understand notes and digitized sounds are available at any time. And of course, translations are available with a mouse click.

Word Torture (Available for Spanish, French, German, Russian and Italian): A complete, automated vocabulary drill with up to 1600 words and their translations. You can type the answers to questions posed by the system or use the speedy flash card format for drills. Word Torture will automatically re-test you on missed answers, and you can create drills of any size for self-paced learning. Drill from Spanish, French, German, Italian, or Russian to English or vice versa. (Incidentally, these products are excellent as an aid to English as a second language.) Create your own drills, see the words in random order and create your own customized vocabulary sets.

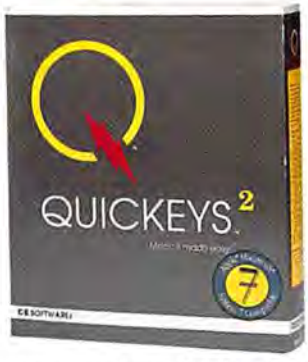
BBG2480S Spanish Pronunciation Tutor
BBG2482S Spanish Word Torture
BBG2480F French Pronunciation Tutor
BBG2482F French Word Torture
BBG2482I Italian Word Torture
BBG2482G German Word Torture

Please specify module **$29**

Memory requirements vary. Call for details. Other language teaching aids available.

QuicKeys²

Macros Made Easy! Squeeze 10 keystrokes and mouse movements into a single click. Do backups to another computer in the middle of the night. Automatically check your mail every hour. All this and much more is yours with QuicKeys 2 — the leading time-saver for every Mac.



Since its release, QuicKeys 2 has been highly regarded by the press, user groups and Mac users everywhere. Now, QuicKeys 2 is here and it's System 7 savvy. For starters, QuicKeys 2 is like an autopilot for your Mac. Record anything you do and create a macro to play back later. Press a key. Click a button. Close a window. Open a document. Anything you can do on the keyboard or on the screen — recorded and saved in a macro. Then you play it all back with the touch of a single key. Think of all the repetitive tasks you do and you'll see how this can save you time and make you more productive.

BBG2492 ..... **$85**

TrashMaster

We're not sure, but we think that this is the only true trash utility in world. And while trash has never seemed like a problem area, TrashMaster provides it with some amazingly helpful capabilities. One of the most important features is in the area of security. TrashMaster actually allows you to erase confidential files completely — with no chance of recovery using even the most sophisticated utilities, and conforming to the United States Department of Defense specifications for discarding files. TrashMaster allows you to automatically empty the trash with any number of "filters" that discard what you want, when you want. Empty trash hourly, daily, or at shutdown by date, size, type or name. Selectively empty trash by just selecting from the menu. Simple, fast and a great utility that you never may have considered. Just use it once and see what you've missed.

TrashMaster includes Incinerator, a new utility for System 7 trash management, along with a variety of useful trash-related tools. TrashMaster allows manual selection for emptying trash, building a hierarchical menu from the "Empty Trash" menu item in the Finder's "Special Menu." Selecting from the hierarchical menus will empty the selection. Or, you can make everything automatic! Define any number of "filters" to determine what trash will be emptied. Filters include size, age, file type, creator and name. Empty trash can be done immediately, hourly, daily or at specific events such as disk eject, startup and shutdown.

The Incinerator automatically erases confidential files — for good! TrashMaster gives you the ability to always erase files that are thrown in the Finder's trash and then emptied. There is absolutely no chance of accidentally deleting the file before incinerating.

About the confidential erase feature: Based on DOD government spec, actually erases the file 3 times. Instead of just writing zeros over the contents of the file once, the file is overwritten with zeros once, then written with ones, then with zeroes again. No chance of any recovery. Very simple to use, fast and easy to make better use of your trash.

BBG2504 ..... **$34**

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Circle 70 on reader service card

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Think of it as the Macintosh of fax.

Everything you imagined a fax modem could be
From the hardware to the human interface, everything about TelePort/FullFax™ is as easy to use and productive as your Macintosh. Our powerful GlobalFax™ software adds FAX to the menu bar of all your applications, so sending a fax is a snap. TelePort/FullFax plugs into an ADB port like the mouse, freeing up your serial port. And there are no batteries or power supplies. It also doubles as an MNP5 error-correcting data modem.

Wake up your Macintosh
On an incoming fax call, TelePort/FullFax powers up your Macintosh II family computer to receive a fax. And your icon flashes to inform you that a fax has been received. You can forward a fax to other destinations, and even have all incoming faxes automatically printed.

One line for voice and fax
TelePort/FullFax eliminates the hassle and expense of separate phone lines. A built-in phone/fax switch lets you share a single line for both voice and fax calls.

Sophisticated software that makes life simple
GlobalFax software lets you schedule a fax for an optimum time, reschedule or change a destination, and send to multiple or group destinations. Create custom cover sheets and let the Macintosh complete them for you each time you fax. You can even "envelope" documents from multiple applications and send them in one fax.

Welcome to the Global Village
We brought you TelePort, MacUser's "Best Communications Product of the Year." The tradition continues with TelePort/FullFax and GlobalFax software. For the name of your local TelePort dealer, call **1-800-736-4821** today, Pacific time.

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MACWORLD NEWS

THIS MONTH:
Excel 4.0 • Unix Emulates Mac • Apple Licenses Parts of Mac OS • Add-on Device Reduces ELF

BY DAN LITTMAN AND TOM MORAN

Excel Revised to Version 4

Microsoft Excel 4.0's robots and wizards can figure out many common tasks as you perform them, such as defining a range, and can complete them or guide you through them.

Worksheets can be bound together in workbooks that appear as one file. Though Excel lacks Lotus 1-2-3's 3-D worksheets, worksheets can consolidate into a sheet that reads row and column headings.

Version 4.0's 140 new high-end functions include 80 statistical functions; a modular design for dropping in new features (and an interface for C programmers to write them); and a Scenario Manager for experimenting with "what-if" questions by changing multiple variables.

Version 4.0 adds 3-D surface charts and polar charts, and with QuickTime support it can record a series of charts as a movie. Its price remains $495. Microsoft, 206/936-8080.—D.L.

EXCEL 4.0'S CROSS-TABULATE FEATURE MAKES IT EASIER TO SLICE AND DICE DATA IN YOUR WORKSHEETS.

THE KENNEDY STACK'S QUICKTIME WINDOW PLAYS THE FATAL BULLET SCENE FROM ZAPRUDER'S MOVIE.

HyperCard JFK

Conspiracy theorists have been quick to see QuickTime's potential. A new HyperCard stack uses QuickTime to play the famed Zapruder film of John F. Kennedy's assassination in living color. A movie-analysis palette allows manipulation of the film for closer scrutiny. Released at the same time as Oliver Stone's film *JFK*, the stack has a hypertext history of events allowing you to click your way from the grassy knoll to the "magic bullet" to Jack Ruby's mob connections, with many controversial details in between. It sells for $12 and requires HyperCard 2.1 and QuickTime. RiverText, P.O. Box 2517, Portland, OR 97208.—ANN GARRISON

All the Hits Fit on Optical Jukebox

Ricoh Corporation has introduced the HyperSpace Shuttle, an erasable optical drive that can hold and change up to five 650MB cartridges, for a total online capacity of 3.25GB.

The list price of the jukebox system is $7990, including the drive, its software, a five-cartridge magazine, and one cartridge. The single-user version of the HyperSpace Shuttle for the Mac began shipping in February. A network upgrade of the jukebox's software should be available in May. Ricoh, 415/962-0443.—T.M.

SCOTT PETERSON

THE RICOH HYPERSPACE SHUTTLE IS AN ERASABLE OPTICAL DRIVE THAT CAN CHANGE UP TO FIVE 650MB CARTRIDGES.

TRENDS

Virtual Reality Becomes More Nearly Real

Virtual reality took an (ominous?) step closer to your local sensorium recently when VPL Research introduced an external box and software that make a Quadra 900 into a relatively low-cost VR system. Called the MicroCosm, the system is intended mostly for engineers, artists, and public displays, but it could be used in other applications, such as game arcades. The MicroCosm comes with an EyePhone, a headset display that senses when you move your head and changes your view accordingly, and with a DataGlove, which lets you "touch" objects in the simulation.

THE MICROCOSM OF TODAY AND THE HUMAN OF THE FUTURE (RIGHT).

The MicroCosm lists for $58,000 including a Quadra 900—pretty steep for play, but much less expensive than existing professional systems with the same capacity. Expect VPL to keep driving the capability up and the cost down. Early shipments have begun. VPL, 415/361-1710.—T.M.

Backup. For people who don't.

Everyone who uses a Macintosh® ought to back up regularly. But most people don't back up at all.

In fact, if the people in your company are like those at most other companies, about the only way you're going to get regular backups out of them is to do it without them.

Guess what?

Now you can.

Now you can set up fully automatic, unattended backups for every Mac in the house.

Not to mention every DOS® and Windows®-based PC and Novell® network server.

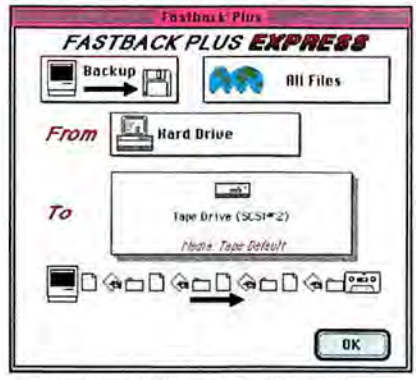
What's more, you can easily customize the nature and timing of each one to

suit *your* requirements.

And transform a simple, effective company-wide backup policy from fantasy into fact.

All you need is Fastback Plus.

The Macintosh version of the world's most popular backup software is also the Mac world's most flexible backup software.



If automated, unattended backups aren't your style, you can still enjoy unprecedented convenience with our Express Menu, which lets you perform a full backup with a couple of clicks of your mouse.

Along with being System 7 savvy—which means you get to enjoy Balloon Help and other wonderful things—Version 2.6 lets you back up to just about anything you can think of, from floppies and hard disks to direct access and streaming tape drives and any HFS device.

It also lets you back up in the background while you're using an application or two in the foreground.

It even formats floppies on the fly, so you don't have to bother.

And it comes complete with our unique Macro Editor.

What, you ask, makes our Macro Editor unique?

It uses plain English commands. Which means you can actually use it.

Using the Mac version of Fastback Plus is a lot like using the DOS version, the Windows version and the Network version—same look, same functionality.

Same backups, even.

That's right. You can actually restore a Mac file directly onto a PC, and vice versa.

Nobody else can do that.

But then, nobody else can back up 1MB per minute on a Mac.

No other DOS, Windows or Network backup program can run fast enough to see our tail lights.

And no other backup software is backed up by our

In addition to floppies, hard disks and other HFS devices, Fastback Plus for the Macintosh lets you back up to direct access and streaming tape drives.

vaunted 24-hour toll-free technical support. And our one-year money-back guarantee.

There's more. So pick up the phone. Dial 1-800-477-8212.

And tell everyone to stand back.

FIFTH GENERATION SYSTEMS, INC

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1 GB CAPACITY. 35 MS SEEK. ONE DRIVE. TWICE THE PERFORMANCE.

With a 1.25 MB per second transfer rate and a 35 ms average seek time, the 1 GB CY-2000 optical disk drive saves and restores files at hard disk speed. All on a removable media that protects your data from unpredictable head crashes. Once you lose your hard disk files, they're gone forever. But data stored on the CY-2000 remains secure – and quickly accessible.

We call it *nearline* storage, and it's perfect for data-intensive applications like desktop publishing, multimedia, digital video, CAD/CAM, medical imaging and more. It's also ideal for private databases and security-sensitive files because the disks can be removed and stored to prevent unauthorized access.

What's more, it's fully "plug and play" compatible with your personal computer, minicomputer, workstation or server.

With the CY-2000, each disk stores 1 GB, making it twice the capacity of competitive optical disk drives. The media are erasable, rewritable, and extremely durable. One platter can last over 40 years. And because the disks are small and lightweight, you'll enjoy reduced storage and shipping costs.

The CY-2000 is part of our family of data storage products that includes QIC streamers, magneto-optical disk drives, and 8mm tape drives and tape libraries.

If you want gigabyte capacity, fast file access, and the security of a removable media, the CY-2000 is a perfect fit. Call today for more information at (804) 873-9000.

TRUE "PLUG-AND-PLAY" COMPATIBILITY WITH:

Alliant	Macintosh
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Convergent	PC MS-DOS
DataGeneral	PC Xenix/Unix
DEC 3100/5000	Pertec
DEC BI-Bus	Plexus
DEC HSC	Prime
DEC Q-Bus	Pyramid
DEC TU/TA81	Sequent
DEC Unibus	Silicon Graphics
Gould/Encore	Stratus
HP	Sun
IBM AS/400	Texas Instruments
IBM Mainframe	Unisys
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IBM RT	*and more*
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Circle 188 on reader service card

News

Better Than a Mac Clone?

NuTek may yet make good on its year-old promise to create a legal Mac clone (see "Send In the Clones," *Macworld*, April 1991). But newcomer Quorum has announced software that could make clones obsolete. Quorum's Compatibility Engine runs Mac applications under Unix on high-speed RISC-based machines. Quorum plans to incorporate the Compatibility Engine in two products: Equal, an end-user package for running Mac software on Unix machines; and Latitude, a tool that lets Mac developers convert their software to native RISC code.

CAMBRIDGE SCIENTIFIC'S MAC-ONLY CHEMDRAW PLUS — RUNNING ON A SUN.

The Compatibility Engine maps all Mac toolbox calls to instructions that Unix can complete. The Compatibility Engine uses Motif or Open Look for its interface, and QuickDraw is converted to Display PostScript.

Companies supporting Quorum at its initial announcement include Unix box–makers Sun Microsystems and Silicon Graphics, and Mac software developers Quark and Aldus, among others. Pricing was not set at press time. Quorum, 415/323-3111.—D.L.

TREND

Motorola Shows Wireless Modem

Motorola's Wireless Enterprise Systems group recently demonstrated a version of its wireless cellular modem designed to work with Apple's PowerBook notebook systems. The modem will use Motorola's ARDIS wide-area network to allow near-instantaneous messaging and file transfer between remote PowerBooks or with networks that also have a wireless modem attached. Because the modem is wireless, PowerBook owners will not need to be near a telephone line to stay in constant contact with their organization or with other PowerBook users.

The Macintosh version of the company's WaveGuide software should be available in the second quarter of this year. The list price of the modem was not set at press time. Motorola, 708/576-1600.—T.M.

Apple Licenses Mac OS Module to Radius

Apple recently licensed parts of its Macintosh Operating System to Radius for use in the Radius Rocket 68040 accelerator for NuBus Macs, and for use in RocketShare (formerly called Saturn V), Radius's cooperative multiprocessing software for the Rocket. The agreement should make it possible to put multiple Rocket accelerators into a Mac, splitting computation-intensive tasks into smaller pieces to be worked on in parallel by the separate processors. That capability would mean that applications such as OCR, raster-image processing, computer-aided software engineering, and computer-aided design could be made significantly faster at a relatively low cost. RocketShare works with System 7's interapplication communication to make the multiprocessing transparent to the application.

Radius is also working on a version of the RocketShare software that would allow cooperative use of any Rocket in a group of networked Macs.

Apple declined to comment on which parts of its operating system were licensed, and noted that the arrangement with Radius was not exclusive. When asked if the agreement brought up the issue of access to the Mac Operating System by potential Mac-clone vendors, an Apple executive said the agreement pertained only to the Radius Rocket when operating inside a Mac. The agreement apparently lets Radius put parts of the operating system directly in ROM on the Rocket, eliminating the need to copy the Mac's ROM into RAM on the accelerator. Without a license, copying the ROM in that way might have violated Apple's copyright on its operating system code.

The basic Radius Rocket 24i lists for $1499, with RAM optional up to 128MB per Rocket. The single-Mac version of RocketShare is slated to ship in April. Its price was expected to be between $200 and $600. Radius, 408/434-1010.—T.M.

PETER HOEY

Remote-Control Household

"A nerd node" is what one engineer who worked on Radiant's Common Sense calls the everything-controller gizmo, but it has too many practical uses to appeal only to nerds. The $289 box plugs into an AppleTalk network and from there gives you control over any device that can attach to one of its eight binary in and eight binary out ports, four analog in and one analog out ports, and four 10-amp relays. Such devices include many instruments and electrically controlled household devices such as lights or yard sprinklers. With its timer and nonvolatile memory, the Common Sense can continue to perform the routine you've set, even if you remove the Macintosh. The unit ships with HyperCard stacks for sensing temperature and controlling security systems; Radiant is also developing HyperCard stacks to monitor and control lab instruments, industrial machinery, and electronic equipment. Radiant, 415/296-8040.—D.L.

BETA WAIT

Long-awaited products

Acius's 4D Server
Shown publicly January 1991. Current ship date projected: spring 1992 in France, three months later in United States.

FoxPro/Mac
Discussed publicly winter 1990/91; Fox says will go to beta soon, no ship date projected.

Interleaf 5
Discussed publicly October 1990. Current ship date projected: summer 1992.

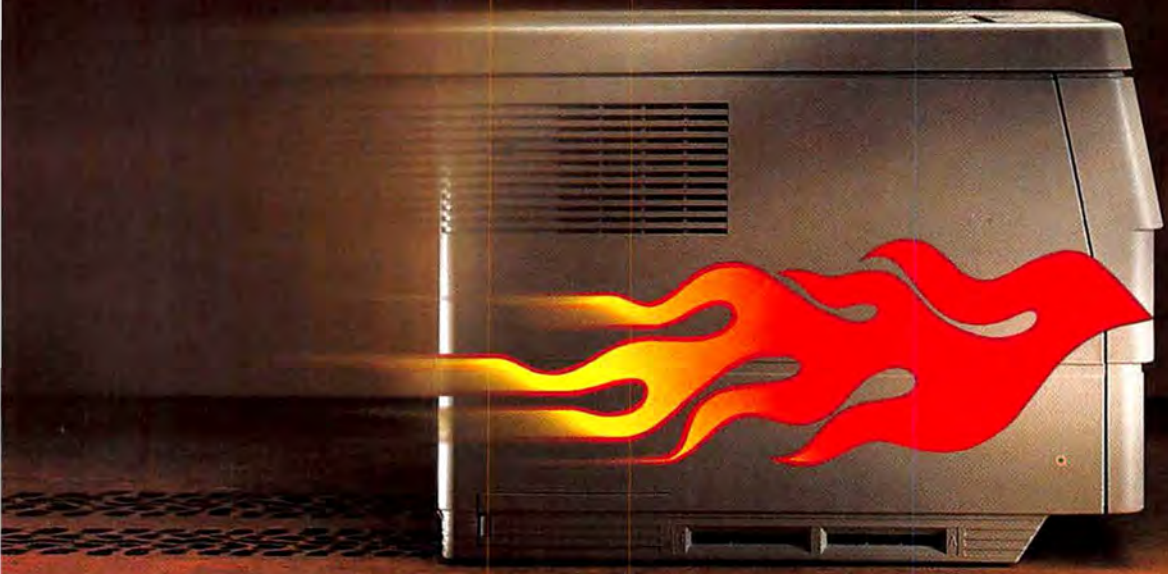
Claris's MacWrite Pro
Announced spring 1991. Current ship date projected: late spring 1992.

AEC's FilePower
Announced August 1991; planned to ship winter 1991/92. Current ship date projected: summer 1992.

Bimillennium's HiQ series
Announced winter 1990/91; planned to ship spring 1991. HiQ ship date projected: spring 1992. Graphics and compiler ship date projected: after Sun version ships (Sun version projected for late summer 1992).

Alysis's SuperDisk 2.0
Original ship date: September 1991. Current ship date projected: early spring 1992.

Get Turbo-Charged



and get your chance to win!

Register for hot prizes in the Get Turbo-Charged Value Sweepstakes.

The Grand Prize includes the incredible new TI microLaser™ Turbo. PLUS...

Grand Prize winner also gets a choice between the TI TravelMate™ 3000 WinSX™ or Apple Macintosh IIsi® PLUS...

Over $2,000 worth of publishing software: Adobe® Illustrator™, Corel Draw® and Aldus® PageMaker®!

Now between April 1, and June 30, 1992, when you see your TI dealer for a demo of the new microLaser Turbo or microLaser XL Turbo, you can register in the Get Turbo-Charged Value Sweepstakes. There's no purchase necessary.

The lucky Grand Prize winner drives off with a TI microLaser Turbo printer and a choice of the hottest computers on the market—the award-winning TI TravelMate 3000 WinSX or the Apple Macintosh IIsi—together with three of the most popular desktop publishing software packages, Aldus PageMaker, Adobe Illustrator and Corel Draw.

Coming in second looks pretty hot, too. The Second Prize winner can choose between the TI TravelMate 3000 WinSX or the Apple Macintosh IIsi.

After your test drive, if you buy a TI microLaser Turbo or microLaser XL Turbo loaded with PostScript® software from Adobe, you'll get a coupon for a free copy of Adobe Type Manager™ (ATM) software and Adobe Garamond Font Package! That's a total retail value of $346—you pay just a $7.50 shipping and handling charge. Proving that you're always a winner when you choose TI.

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POSTSCRIPT

TEXAS INSTRUMENTS

The Grand Prize has an approximate retail value of $8,350. Second Prize has an approximate retail value of $4,000. Promotion will be supported by all participating dealers in the U.S. and Canada. Void in Quebec. Canadian residents must correctly answer a skill-testing question to win. In Ohio or Michigan, you may also call 1-800-527-3500 for an entry form. microLaser, TravelMate and WinSX are trademarks of Texas Instruments Incorporated. Apple Macintosh IIsi is a registered trademark of Apple Computer, Inc. Adobe, PostScript and the PostScript logo are registered trademarks and Adobe Type Manager and Adobe Illustrator are trademarks of Adobe Systems Incorporated. Aldus and PageMaker are registered trademarks of Aldus Corporation. Corel Draw is a property of Corel Systems Corporation.

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71888

Circle 313 on reader service card

AT LAST, WRITENOW ADDS STYLE SHEETS—WITH A VENGEANCE. STYLES CAN BE SET BY THE PARAGRAPH OR THE CHARACTER.

Word Processor News

T/Maker's WriteNow is getting a major upgrade, and Paragon Concepts is launching a low-priced, RAM-conservative version of Nisus that doesn't skimp on powerful features.

WriteNow 3.0's key addition is true style sheets for both paragraph and character formatting, with control over how paragraph and character styles interact; version 3.0 includes a command to revert to the defined style after making changes to some text. Version 3.0 also includes color support, movable rulers, and high-speed scrolling. It lists for $249. T/Maker, 415/962-0195.

Nisus Compact has most of Nisus's features, including its GREP search-and-replace capability, plus some features not in Nisus, including file management and the ability to search for imprecisely defined text. Compact lacks Nisus's macro language and graphics tools. It lists for $150. Paragon Concepts, 619/481-1477.—D.L.

TREND

SuperMac Adds Sound to VideoSpigot

SuperMac Technology has announced Spigot & Sound and Spigot & Sound Pro, NuBus boards similar to SuperMac's existing full-motion VideoSpigot and VideoSpigot Pro boards, but with high-quality sound capability added. Both can capture real-time video from most standard video sources while simultaneously capturing sound. Like the existing Spigot products, the two new boards are compatible with QuickTime.

The Spigot & Sound board will list for $899, and the Spigot & Sound Pro board will list for $2299. SuperMac expected to begin shipping both products in April. SuperMac, 408/245-2202.—T.M.

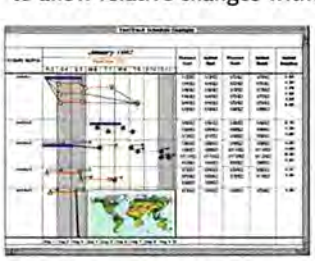
Microtech Unveils Fast Optical Drive

Microtech International has announced the OR650e, a 650MB, half-height, 5.25-inch erasable optical drive that the company says has an average access time of 45ms and a data-transfer rate of 1.5MB per second. A version for the Quadra 900, called the OR650i, will fit inside one of the Quadra's drive bays. Both drives should begin shipping in the second quarter. Prices for the two drives had not been set at press time.

Microtech has also begun shipping two 2.5-inch internal hard drives for Apple's PowerBook systems. The Roadrunner 40i is a 40MB drive, while the Roadrunner 80i stores 80MB. Both offer a 19ms average access time, according to the company. The Roadrunner 40i lists for $549, and the Roadrunner 80i goes for $779. Microtech, 203/468-6223.—T.M.

On the Inside Track

The Mac's most advanced Gantt chart program will soon add another layer of sophistication. AEC Software's FastTrack Schedule 2.0's most salient feature is the ability to link bars in a Gantt chart to reflect dependencies. Links can be *hard*, that is, maintaining the time between linked tasks when either task is moved, or *soft*, to allow relative changes without violating dependencies. Links can also be displayed with connecting lines, similar to the lines in a PERT chart. Version 2.0 will add time and duration fields in the database, and support user-defined date and numbering schemes—for example, it is possible to set up a reverse calendar as a sort of deadline countdown. Printing capability has also been enhanced. Version 2.0 will probably list for $279. AEC Software, 703/450-1980.—D.L



FASTTRACK SCHEDULE SUPPORTS RUNNING A DIFFERENT TIME SCALE ACROSS THE TOP AND BOTTOM OF A GANTT CHART.

News

All-Terrain Vehicle

Ontek's Information Access Vehicle (IAV) is an unusual new tool for forging links between Excel, 4th Dimension, or HyperCard and IMS or DB2 databases on IBM mainframes. Ontek says IAV can read the mainframe database's structure unassisted, which eliminates a time-consuming and error-prone step. An IAV package, or set of connections, is not application-specific, so a package that links HyperCard to DB2 will also link Excel. Finally, because the link to the mainframe is live and direct, events on the mainframe can trigger actions on the Mac—for example, when new records are added to the mainframe, the contents of a specified field could be delivered to the Mac. IAV costs $45,000 for the mainframe, $750 for Macintosh developer software, and $250 for a run-time version. Ontek, 714/768-0301.—D.L.

THIS EXAMPLE OF AN IAV APPLICATION MIXES DATA FROM AN IMS MAINFRAME DATABASE AND A MAC DATABASE.

BUG REPORT

System 7 Files sometimes do not appear in the Finder, though they still exist and can be accessed by applications. Apple is uncertain of the cause and has not projected a ship date for a bug fix.

Aldus Persuasion 2.0 Unable to proof-print charts correctly; Aldus says problem is fixed in version 2.1 (shipping). Printing files on an AppleShare server sometimes causes crashes, possible file corruption; Aldus was uncertain of cause or solution. Upgrade price depends on support plan.

MacWrite II version 1.1 v1 Displays TrueType fonts incorrectly. Claris says problem is fixed in v2, available free upon request.

Microsoft Word 5 Strips certain high ASCII characters (including em dashes and curly quotes) from a file when exporting to MacWrite format. Crashes may occur when checking grammar or during other memory-intensive activities on the Plus and SE (not the Classic), even with adequate memory available. Microsoft is not sure when a fix will be available.

QuarkXPress 3.0 and 3.1 Resets offset of paragraph rules to zero when importing Word files. Quark says this is not a bug.

MACWORLD WILL SEND YOU A BUG REPORT T-SHIRT IF YOU ARE THE FIRST PERSON TO INFORM US OF A SERIOUS, REPRODUCIBLE BUG THAT WE REPORT IN THIS COLUMN. SEE *HOW TO CONTACT MACWORLD*.

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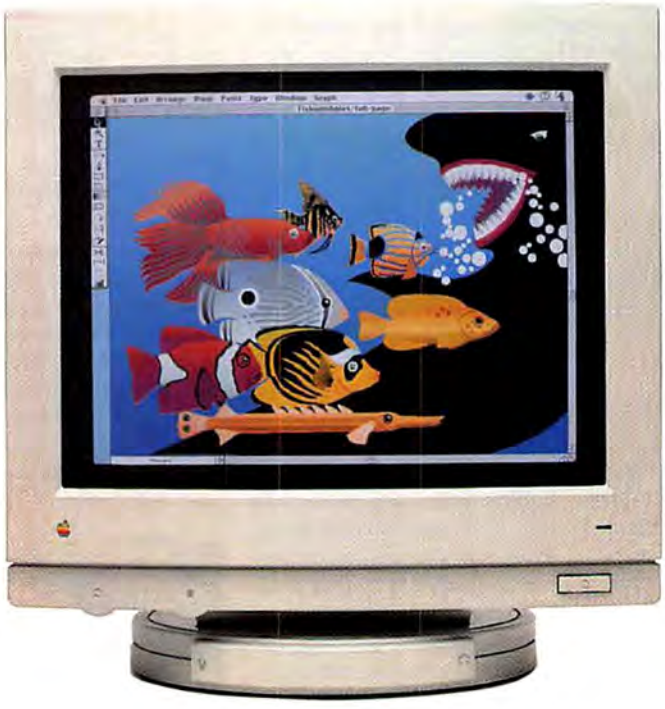
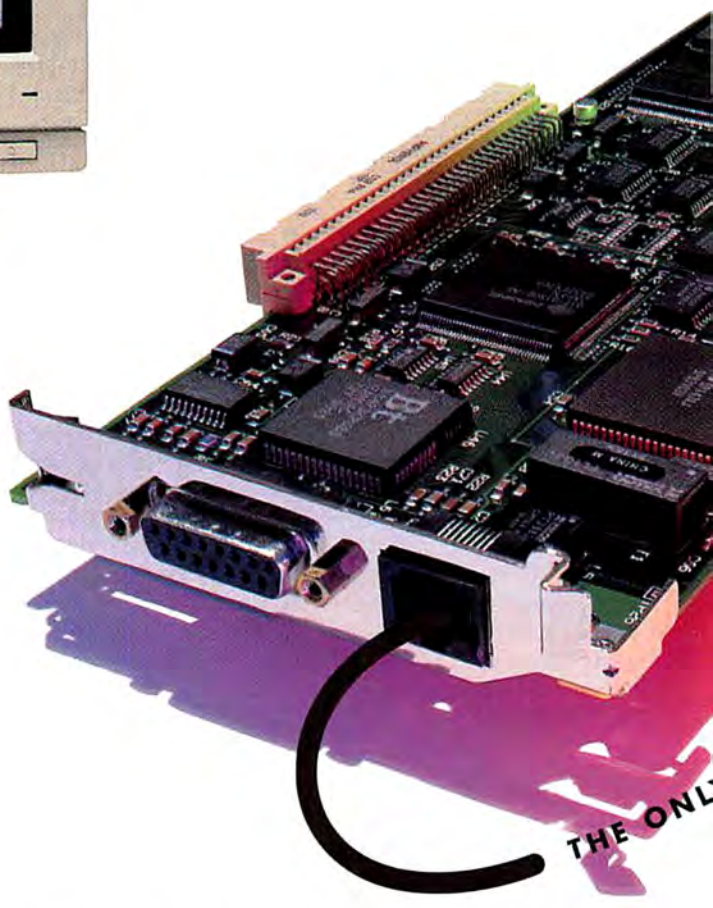


APPLE 16-INCH DISPLAY
One Choice: *One-Page*



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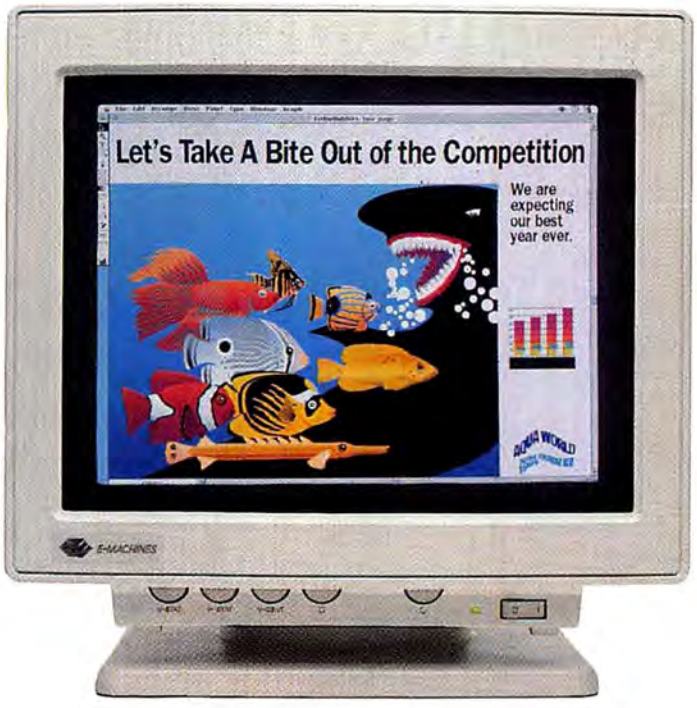

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Circle 303 on reader service card

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Think of our RAVEN·040 disk arrays when you need up to 4,260 MB of unbelievably fast hard disk storage. With 7.0 MB/sec sustained transfers and a significantly reduced access time of 5.5 ms, it's no wonder RAVEN·040 is the MacUser Eddy Award winner for the Best Storage Product of 1991.

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Think of our internal rewritable optical systems when you want removable storage for the Quadra 900. MicroNet's new 3.5" optical drive has a fast access time of 38 ms. And it lets you affordably store 128 MB of data on a shirt-pocket-size disk.

Think of MicroNet's single hard drive systems for the Quadra 700 and 900 when you need up to 2,130 MB of reliable SCSI data storage. And if it's removable cartridge drives or tape backup you're looking for, MicroNet offers 44 and 88 MB SyQuest cartridge systems, and streaming tape and DAT backup to 5.0 GB.

So when you need the most powerful hard disk and removable data storage systems for the Quadra 700 and 900, think MicroNet.

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Circle 113 on reader service card

DESKTOP LIBRARIAN

Books from BMUG

This month we look at the latest in Macintosh books from the famous user group.

° *The BMUG Newsletter for Spring, 1992* (1992; BMUG membership required, $25 for six months includes one newsletter and an account on the BMUG bulletin board and on the BMUG technical help line). Probably the biggest "newsletter" around, this 467-page tome is filled with practical articles by many authors. The eclectic mix includes hardware and software reviews with a hands-on approach, and articles that explain everything from starting out as a new Mac user to telecommunications. There's also a section on computers in society.

SCOTT PETERSON

TWO BOOKS FROM BMUG: THE NEWSLETTER GIVES REVIEWS, THE CATALOG OFFERS SHAREWARE.

° *The BMUG Shareware Disk Catalog, Third Edition* (1992; $15 for members, $20 for nonmembers, plus $4 shipping and handling). Lots of practically free and pretty cheap stuff. You can browse seemingly endlessly through this 668-page catalog of disks containing public-domain (free) and shareware (pay if you like it/use it) applications, fonts, games, clip art, icons, and so on. The section on clip art shows you every picture on each disk, so you know what you're getting into. BMUG charges $4 a disk, plus $4 shipping and handling. Order the newsletter or the catalog from BMUG, 510/549-2684.—T.M.

MANUELLO PAGANELLI

SPEECH THERAPIST LU ANN BROWN HELPING BESTMAN EFEJUKU OVERCOME STUTTERING.

Stuttering Therapy

Many psychologists believe stuttering indicates emotional disorder, but Ronald Webster, a psychology professor, treats it as a physical problem caused by distorted speech-muscle movements. His therapy includes a Mac tutor that helps clients build speech-muscle control.

Running custom software, the Mac "speaks," "listens" to clients' speech, and creates a detailed record for evaluation by a clinician. Webster also evaluates his clients' speech in real-life situations. With a Macintosh Classic, an FM radio receiver, and portable speech-processing equipment on a cart, he records his clients wearing tiny transmitters from 500 yards away. Hollins Communications Research Institute, 703/362-6663.—ANN GARRISON

GCC Adds Hard Drives

GCC Technologies has added five high-capacity models to its UltraDrive series of internal and external hard drives, including a 1.3GB internal drive for the Quadra 900. That model, the UltraDrive 1300Xi, has a list price of $5299. An external version, the UltraDrive 1300X, lists for $4999. Both 1.3GB drives have the same mechanism, with a maximum data-transfer rate of 3.1MB per second and an average access time of 11.5 milliseconds (ms), according to GCC.

The UltraDrive 240S is an external 240MB hard drive with an average access time of 16ms; its list price is $1229. The internal version, the UltraDrive 240Si, has the same drive mechanism and lists for $1129. The UltraDrive 420Si is an internal 420MB hard drive with an average access time of 14ms; it has a price tag of $1999.

All the drives are currently shipping. GCC also updated its included driver software for compatibility with the Quadras. The software, DriveManager 7.2, is available from the usual online services and from GCC. GCC Technologies, 617/890-0880.—T.M.

Macintosh Handwriting

If you'd like to combine the personal touch of handwriting with the convenience of word processing, you're in luck: the typographers at Lazy Dog Foundry can convert your handwriting into a Type 1 PostScript font. The basic price for a set of letters, numbers, and punctuation is $179; prices may be somewhat higher for complex jobs. Lazy Dog also converts artwork into PostScript format and offers a set of fonts based on advertising lettering of the 1920s and 1930s. Lazy Dog Foundry, 612/774-4717.—ERFERT FENTON

LUIS DELGADO

News

RasterOps Brings Out QuickTime Board

RasterOps Corporation has introduced VideoTime, a NuBus board for Mac II's and Quadras that provides a live video window and is compatible with any graphics adapter. Multiple VideoTime boards can be installed, each supporting its own video window with a separate live video source, if desired.

The VideoTime board displays 16 bits of color, and it can also be used as a frame buffer. It can accept the NTSC, PAL, and SECAM standard video formats. Available now, VideoTime has a suggested list price of $2499. RasterOps, 408/562-4200.—T.M.

TREND

The Real System 7

System 7 shipped almost a year ago, but its raison d'être—communication among applications—is just steaming out of the harbor.

PETER HOEY

The Apple Events Developers Association (AEDA) is coordinating software companies as they collaborate on writing the Apple events suites that allow their applications to share commands and data. For example, Shana and Softsync worked together to develop a set of database-specific Apple events so that Shana's InFormed forms package could do tricks like sending data from invoices to Softsync's Accountant Inc. The Apple events allow applications to understand each other's way of implementing fields, tables, and records; how data types are defined; how queries are structured; and so on. Most vendors whose products gather or store data are likely to support the database suite, though only Shana and Softsync are publicly committed so far. AEDA is finishing up several other suites, including telecommunications. Plans call for word services, desktop publishing, calendar manager, and spreadsheet suites.

The word-services suite, spearheaded by Working Software, could support such operations as hyphenating text in a database or checking the grammar of E-mail before it is sent. Though WordPerfect, T/Maker, Claris, and Aldus also participated in designing the suite, they have not announced plans to support it. To reach AEDA, call Apple Computer at 408/996-1010.—D.L.

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News

JUST FOR FUN

The Caves of Spelunx

"A fat toad hugged a lime tree . . ." What's this, the beginning of Koko the Mac-using gorilla's first novel? Nope, it's the creatures in Spelunx—a cave-exploration software package from Cyan—reciting a little ditty deep in the Caves of Mr. Seudo. The HyperCard-based game—written by those fabulous Miller brothers, who authored such freaky faves as Cosmic Osmo and The Manhole—is sure to interest anyone with a mind for exploration. For kids ages five and up, the color program comes with three caves and a promise of more in the future. Other attractions: a terrarium housing a hungry lizard; a tree-making machine; and a game called Yodel Toasters. So buy it for your kids ($49.95) or be brave and buy it for yourself (still $49.95) and don your headlamp for some serious caving. Brøderbund Software, 415/382-4400.—EVAN COOPER

JOHN WILLIAM LUND

THE COLORPAGE T16 II FROM E-MACHINES CAN QUICKLY CHANGE FROM ONE-PAGE RESOLUTION TO TWO-PAGE MODE.

16-Inch Monitor Makes Two Resolutions

E-Machines has introduced the ColorPage T16 II, a 16-inch color monitor that switches with one keystroke from single-page resolution to two-page mode. The resolution for one-page display is 832 by 624 pixels; the monitor shows two pages at 1024 by 768 pixels. The T16 II works with the built-in 24-bit display controller of the Quadras, but requires an E-Machines adapter for the dual-resolution capability.

The ColorPage T16 II has begun shipping at a list price of $2700. It meets the Swedish MPR guidelines for magnetic-field emissions. E-Machines, 503/646-6699.—T.M.

The Well-Tempered Hard Drive

The drive-maintenance package MacTools Deluxe has been upgraded. Version 2.0 focuses on data protection with a new antiviral module and tools for retrieving damaged files created by specific applications (2.0 will ship with Word and Excel file-retrieval capability, and a later version will support other applications). It has major improvements to the backup module, which can be set to back up to multiple destination volumes. Some tasks can be set to run at specified times.

Gone are Locate, the file-finding DA; the Partition utility; and Secure, the password-and-encryption DA. MacTools 2.0 lists for $149. Central Point Software, 503/690-8090.—D.L.

THE NEW MACTOOLS HAS A GRAPHIC DISPLAY SHOWING A DISK'S FRAGMENTATION.

HP Offers DAT Drive

Hewlett-Packard has introduced its first digital audiotape (DAT) drive for the Mac. The HP DAT Macintosh Backup Solution uses 4mm tapes and stores up to 2GB on a 90m Digital Data Storage cassette. HP is bundling its DAT drive with a ten-user version of Dantz Development's Retrospect Remote software for automatic and unattended backups. The HP DAT Macintosh Backup Solution is shipping now at a suggested list price of $3295. It works with Systems 6.0.5 through 7.0. Hewlett-Packard, 800/752-0900.—T.M.

KIDS AT THE ASIAN ART MUSEUM EXPLORING THE ELECTRONIC THANGKA.

The Electronic Thangka

The meanings of Tibetan thangka paintings are drawn from Tantric Buddhism, a complex religion unfamiliar to most Westerners—even those who've been introduced to teachings of the historical Buddha. To give viewers a sense of thangka's cultural context, the Asian Art Museum of San Francisco is displaying the Mac-based "Electronic Thangka: An Interactive Exploration of Tibetan Painting." Visitors make selections on a touch screen to view images of Tibetan painting, landscapes, people, temple architecture, and cultural and religious events. Also available are video recordings of conversations with a Tibetan painter at work, a lama explaining religious symbols, and the museum's curator. Asian Art Museum of San Francisco, 415/668-8921.—ANN GARRISON

Watching the Windows

ASD Software's new utility, WindoWatch, keeps track of everything you do on the Mac by recording when you open and close files and how long you keep them active. For time-billing purposes, multiple files can be grouped and tracked as a single item, and you can specify files and applications for WindoWatch to ignore. The recorded timing information can be collected from multiple users over a network. A single-user copy of WindoWatch lists for $149. ASD Software, 714/624-2594.—D.L.

RECORDS OF HOW SEVERAL PEOPLE HAVE SPENT THEIR DAY BEING CONSOLIDATED ACROSS A NETWORK.

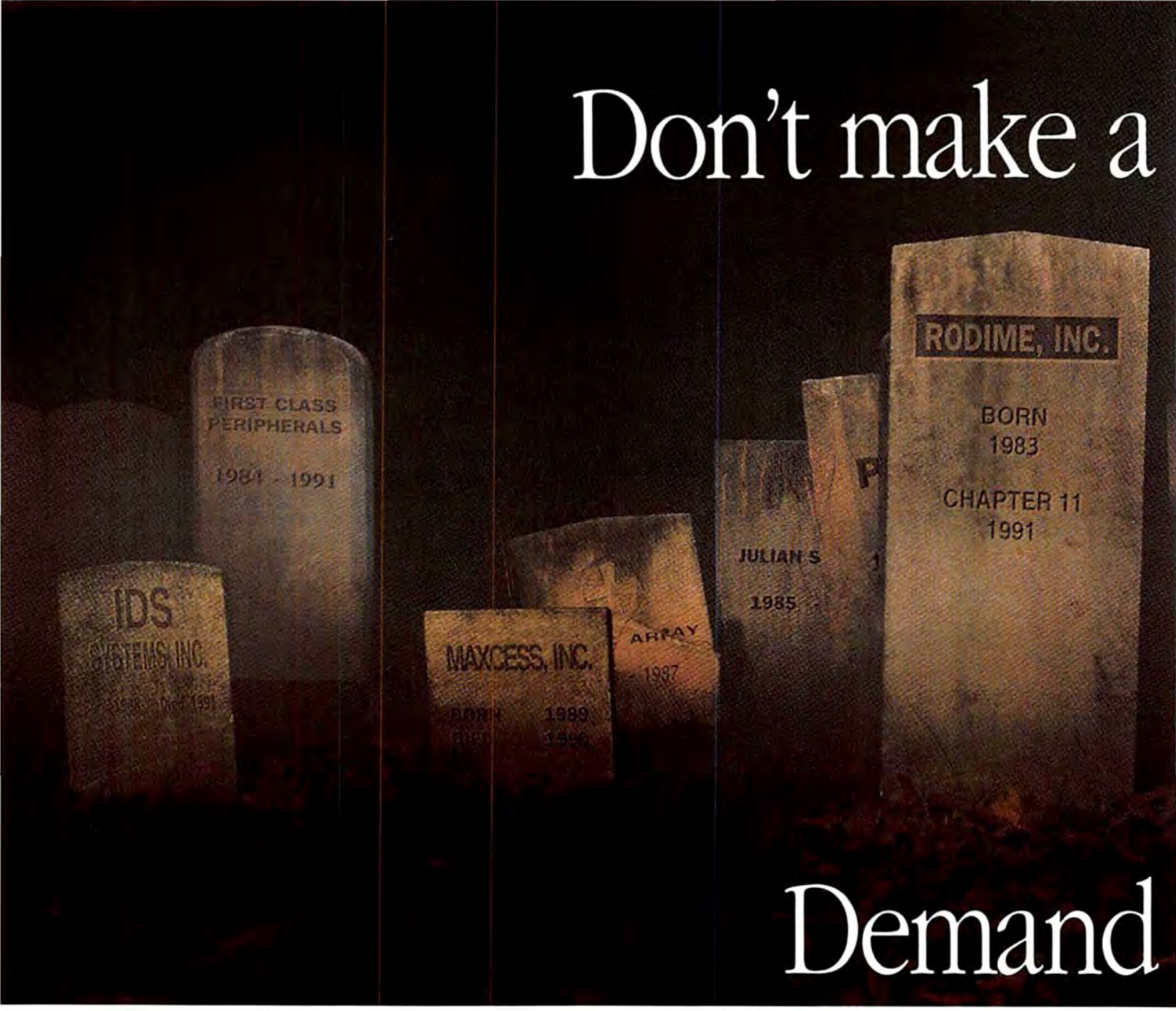
TREND

Hypertext Landscape

At Grand Valley State University in Michigan, natural resource management students explore questions like "can the land beneath this oil spill ever again support life?" Professor Mel Northup has students prepare their lab reports in Storyspace, a hypertext writing system. As students record numbers in Storyspace during soil-analysis experiments, they also add images recorded with a camcorder and imported to the Mac with a video-capture board. They also use Storyspace to diagram biogeochemical processes such as the uptake of minerals from the soil. Northup says that, besides producing a record of their experimental results, students also show great improvement in their writing skills. Storyspace lists for $160 for one copy, and $495 for ten. Eastgate Systems, 617/924-9044.—ANN GARRISON

A HYPERTEXT "NOTEBOOK" ON SOIL STRATA BEING COMPILED IN STORYSPACE.

Don't make a



Demand

Since the introduction of the Macintosh computer, dozens of hard drive manufacturers have been driving themselves into their graves. Their customers are left in mourning with obsolete relics; without service, technical support, a warranty or a growth path.

You can avoid making a grave mistake by demanding what the editorial reviews don't tell you . . . the whole story. The company story. Charts and graphs on mechanism performance and speed won't mean a thing if the editor's choice becomes the undertaker's choice.

Since 1985, Microtech has been dedicated to building a sound organization to effectively service and support our growing installed base, and meet the increasing demands of our valued customers. Microtech has been awarded contract manufacturing agreements from large computer manufacturers including Apple and NeXT – a testament to the strength of our operations.

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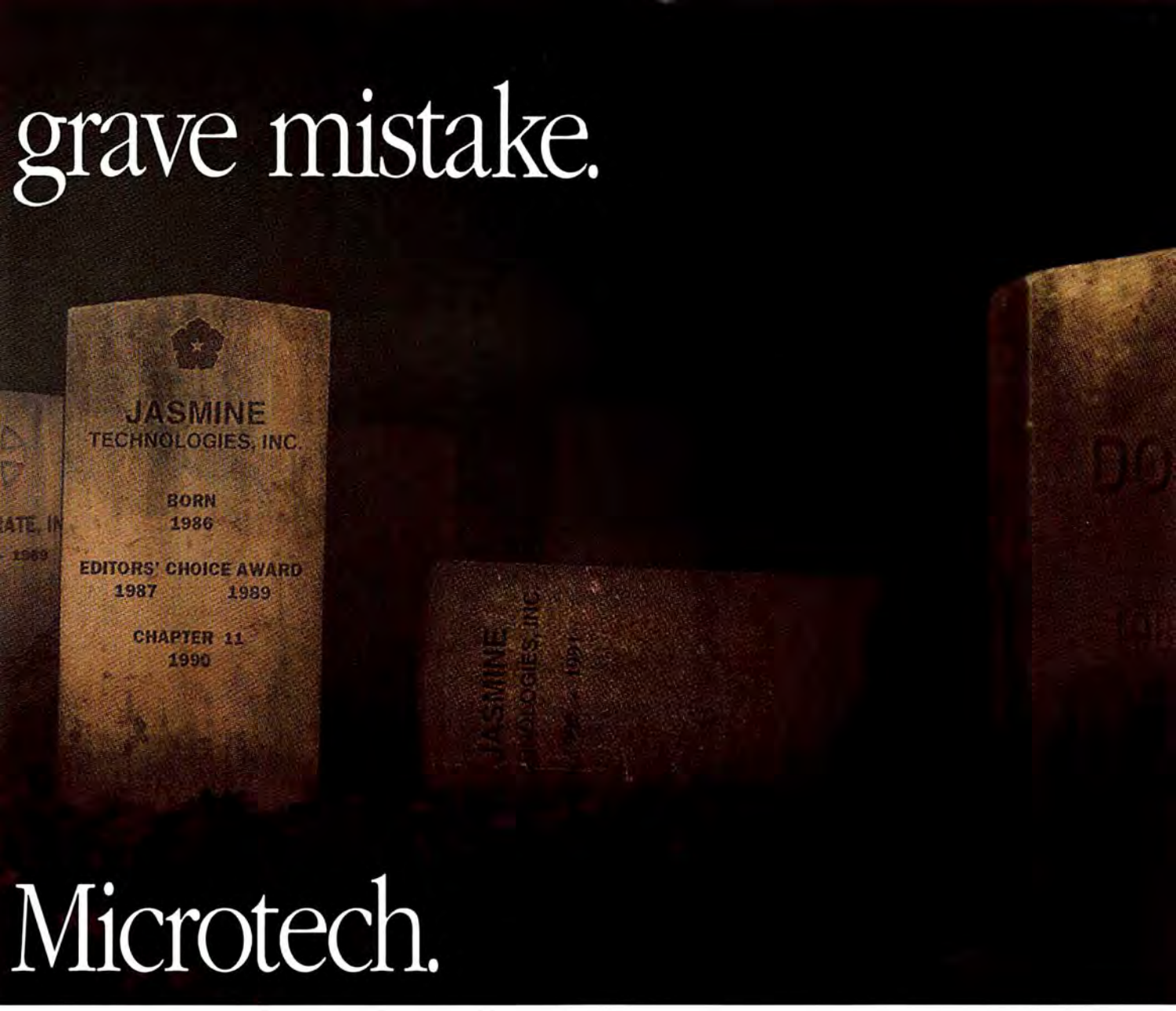
grave mistake.



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Many of our customers are experiencing the 5th year of our *Five Year Warranty,* and keeping pace with technology easily and economically with our *Step-Up Expansion Program.* Others are signing up for our *Drive-Up Service Extended Warranty* for drives purchased from Apple or other manufacturers. They know that their best buy is *not* the drive with the lowest cost.

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Circle 160 on reader service card

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If you need to do artistic illustration, it makes sense to look at one of the artistic programs shown here. But if you do technical illustration, MacDraft's the right tool for you.

MacDraft is designed specifically for architectural/engineering design & drafting and technical illustration. It provides you with a complete scaled drafting environment designed to respond quickly and accurately to the way you think and work. You can create multi-layered drawings and even assign a different scale to each layer to create details. As you switch between layers, MacDraft will automatically display the sizes of objects, dimension lines and area calculations in the units of that particular layer. You can also create custom line styles and store commonly used graphics in user-created symbol libraries.

When it's time to get your technical drawings done, you need a tool designed specifically for the task at hand. You'll find MacDraft's finely crafted drawing tools incredibly easy to use, powerful and amazingly accurate. In addition, most tools provide a number of options that will allow you to tailor the tool to meet your drawing needs. For example, with a simple click of the mouse, you can choose to draw arcs by their radius, any 3 points or even draw an elliptical arc.

So for your technical drawing needs, choose the tool that was designed specifically for the job. MacDraft. For your Macintosh® and now available for Windows.

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Circle 129 on reader service card

News

NEC Improves CD ROM Players

NEC Technologies (NECT) has introduced its Intersect line of CD ROM drives, which are much faster than the company's previous models. The portable CDR-36M, an improved version of the CDR-36, has an average access time of 450ms, according to NECT. The company says the larger CDR-73M external drive has an average access time of 280ms, among the fastest available. Both drives include a SCSI connector for connection to different personal computer platforms, and both are compatible with Apple's HFS file format and with High Sierra and ISO 9660 file formats.

The CDR-36M lists for $449, and the CDR-73M goes for $675. An optional battery pack for the CDR-36M lists for $99. All are available now. NECT, 708/860-9500.—T.M.

Shiva LanRover Fetches the Network

To help support PowerBook users away from the office, Shiva Corporation has devised LanRover/L, a communications server that provides transparent access to E-mail, databases, and groupware applications located on a remote network. Placed in the office and connected directly to the network, LanRover/L works with the AppleTalk Remote Access software that Apple includes in all the PowerBooks. Users in the field dial in via modem.

LanRover/L has call-back security features and provides audit trails. The suggested list price of the LanRover/L was expected to be less than $800. It should begin shipping in May. Shiva, 617/252-6300.—T.M.

VIRUS WATCH

CURRENT VIRUSES, TROJAN HORSES, AND WORMS

Zuc C

TYPE: Virus
FIRST LISTED IN VIRUS WATCH: 10/91
INFO: A Zuc clone
IMPACT: Nondestructive; infects applications and system files; renders cursor inoperable

HC

TYPE: Data Virus
FIRST LISTED IN VIRUS WATCH: 6/91
INFO: Infects HyperCard stacks
IMPACT: Causes the Mac to hum oddly

nCam

TYPE: Virus
FIRST LISTED IN VIRUS WATCH: 5/91
INFO: An nVIR clone
IMPACT: Nondestructive; infects applications and systems files; can cause crashes

TRENDS

Add-On Device Reduces ELF

NoRad Corporation has introduced a user-installed external device for monitors that the company says suppresses the magnetic fields suspected of being health hazards. Called the ELF ProTech, the device is made of an alloy that brings the levels of magnetic emissions below those suggested by the Swedish MPR guidelines, according to NoRad.

The list price varies (from $49 to $99) according to the size of the monitor and the number of ELF ProTech panels required. For a 12-inch to 15-inch monitor, three panels are needed and the list price is $74. The ELF ProTech is shipping now. NoRad, 310/395-0800.—T.M.

JOHN WILLIAM LUND

THE ELF PROTECH FROM NORAD IS MADE OF A SPECIAL ALLOY THAT REDUCES MAGNETIC EMISSIONS FROM MONITORS.

PostScript Fax for NEC Laser Printer

NEC Technologies (NECT) has announced a PostScript fax device that installs in the NEC Silentwriter Model 95 laser printer. The device, the PostScript Language Facsimile Option, is not compatible with standard Group III fax devices, but offers much higher quality, since the information transmitted is a PostScript file, not a rasterized image. Since the file is printed on a laser printer, the document is the same quality as an original. The process requires a Silentwriter Model 95 with the option installed at both ends of the transmission.

The fax upgrade is slated to ship this summer at a list price of $599. The printer is available now and lists for $1749. NECT, 508/264-8000.—T.M.

HANK OSUNA

A FREEHAND IMAGE EXTRUDED IN SATELLITE 3D AND RETURNED TO FREEHAND FOR FINISHING TOUCHES.

PostScript Goes 3-D?

Is your PostScript artwork looking a little flat? With Satellite 3D, you can create three-dimensional images from color graphics or text created in Adobe Illustrator or Aldus FreeHand. The program extrudes an image to add depth, and lets you move and rotate the object within 3-D space, position a light source, and vary the viewer's position. Graphics are saved in PICT, EPS, or editable Illustrator files. The program can be used to create 3-D illustrations, titles, maps, and charts, or as the basis for an animated presentation if various steps of an object's movement are saved. Satellite 3D lists for $199. Calliscope, 415/964-8550.—ERFERT FENTON

OPENING SCREEN FOR AN AIDS-EDUCATION KIOSK SLATED TO APPEAR SOON IN GAY BARS.

Hot, Horny & Healthy

What better place than a bar for a video game, and what better place than a gay men's bar for Hot, Horny & Healthy? Seeing a barroom on screen, players click on any one of six love-seekers to start a conversation, then click on responses to carry it on. All conversations lead to condoms and HIV status, and if anyone suggests unsafe sex, Rubberman arrives to explain why it's a bad idea.

Hot, Horny & Healthy was created by the Bay Area Video Coalition in San Francisco and the National Task Force on AIDS Prevention (NTFAP), which is seeking funding to place Mac-driven Hot, Horny & Healthy kiosks in bars. NTFAP, 415/749-6700.—ANN GARRISON

Radius Adapts Color Pivot for Quadras

Radius has improved its Soft Pivot display driver so that the company's dual-position Color Pivot monitor can take advantage of the 24-bit display capability built into the Mac Quadra. The 15-inch monitor, which can turn from landscape to portrait position, now supports 16.7 million colors.

The Color Pivot, already available, lists for $1549. It also works with the built-in video on the IIci or the IIsi or on other color Macintoshes with a Radius adapter. Radius, 408/434-1010.—T.M.

If We Don't Have It, You Don't Need It.

A new dimension in storage: a HitchHiker 40MB or 80MB that fits in your hand.

It's getting harder all the time to distinguish between technology that works and the flavor of the week. So it's tougher than ever to make a smart Mac® peripheral buy.

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Like the HitchHiker.™ A 10oz. drive that's big enough to reliably store 40 or 80MB without a power supply.

DiamondDrive Portables feature two sizes, a wide range of capacities (80 to 510MB) and are backed by a solid 2-year warranty.

Our DiamondDrive™ Portables boast three times the reliability of other drives, a wide range of capacities, and a choice of space-efficient 1-inch or 2-inch height models.

A Mass Micro technology breakthrough: DataPak MO/128's 3½-inch removable, rewritable optical storage.

There's also our DataPak™ MO/128. An ingenious drive that uses 3½-inch removable, *rewritable* optical cartridges. Engineered to make head crashes impossible.

Our tiny, full-featured MASS*fm*™ 24/96 personal fax modem powers up solely from your Macintosh, and even has the smarts to power down automatically when it's idle.

MASSfm 24/96 fax modem has a smaller footprint than a mouse and includes all the fax software you'll need.

The superior 19-inch Rival™ is one monochrome monitor you'll definitely be comfortable with because we took the extra time to pack in ergonomic features and extraordinary image quality. And if you're really into video, our QuickImage™ 24 capture card can grab color images from any video source.

Our 19-inch Rival monochrome monitor gives you the clearest picture in 2-page displays.

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REQUESTING THAT COLLEAGUES ATTEND A MEETING USING TEAMAGENDA ACROSS A NETWORK.

Complicated Agendas

Team Building Technologies (TBT) was a start-up with big plans. When it shipped AgentDA—a simple calendar DA—TBT also announced TeamSynchro, for group scheduling. But the TeamSynchro team left TBT, changed the product name to TeamAgenda, and will market it through MacVonk.

TeamAgenda hunts for times when people and facilities are available for a meeting; provides deadline management; and lets a surrogate, such as an assistant, manage your schedule.

AgentDA, just revised to version 2.0, still lacks some important features such as priority levels and item categories, but it adds support for recurring events. Unlike most calendars, which are tied to a week or month view, AgentDA lets you set how many days of the week and how many weeks to display.

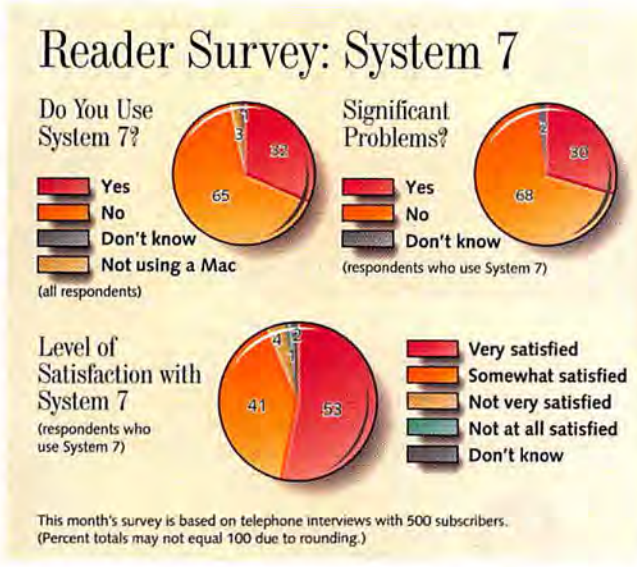
AgentDA lists for $149. TBT, 514/278-3010. TeamAgenda will probably have a list price of $995 for ten users. MacVonk, 215/660-0606.—D.L.

TREND

Those Gigabyte Phone Bills

Kodak has been demonstrating its PhotoCD technology at industry shows for a while now. The concept is simple: camera buffs will take film in to be developed at a Kodak shop, but instead of getting prints, they'll get a CD full of digital images that can be edited and combined on a computer. Some Kodak shops will also have dedicated Macs with special software for that purpose.

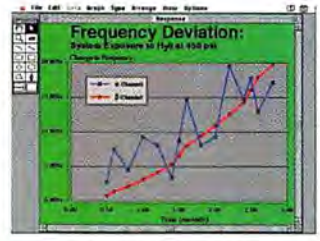
But the technology that Kodak developed to make PhotoCD possible—a quick, inexpensive way to generate single CDs—lends itself to surprising applications. For example, MCI Communications is planning to take advantage of Kodak's efforts by distributing phone bills to some large customers on CD. With bills in digital form instead of on paper, MCI customers will be able to turn to a spreadsheet or other software to analyze telephone use and look for ways to save money.—D.L.



Cricket Graph Returns

The original Cricket Graph was an impressive package in the days before math chips and color, but these days most spreadsheets could outgraph the old Cricket Graph. Now Computer Associates is about to launch Graph 2.0.

Graph 2.0 has 10 kinds of 2-D graphs, including polar graphs and something the company calls a quality control graph, which compares actual data with a range of user-defined values. Version 2.0 doesn't support Apple events, so quality-control graphs can't be used for observing real-time processes—this is promised for an upgrade. Graph 2.0 performs curve-fitting, displays error bars, and has a wide range of mathematical functions.



A CA-CRICKET GRAPH 2.0 IMAGE SHOWING USE OF COLOR AND SUPERIMPOSING TWO SEPARATE SERIES OF DATA POINTS.

Graphs can be generated from any combination of ranges in the program's 1000-row-by-32,000-column data sheet, and multiple graphs can be displayed side by side or superimposed. Version 2.0 supports 32-bit color (but only 64 colors per file) and has drawing and page-layout tools. It lists for $195. Computer Associates, 215/251-9890.—D.L.

News

Robots for the Rest of Us

Educators and robotics fans, take note. Two new products, Paradigm Software's Pearl Controller and Bots' Hyperbots, let Macs control robots made from Lego blocks, accepting input from touch and optical sensors and controlling motor-driven components. Both products include a serial device that connects the Mac to the Lego Technic Control System's Lego Interface box, as well as a HyperCard stack for manipulating robots. The Pearl Controller works with Object Logo software as well as HyperCard; Object Logo can emulate Lego Logo, allowing teachers to use existing course material.

The Pearl Controller lists for $195, including the stack ($300 including Object Logo); Hyperbots is $290, including a stack. Paradigm Software, 617/576-7675; Bots, 415/949-2126.—ERFERT FENTON

ROBERT HOLMGREN

AFTER CREATING ROBOTS FROM LEGO BLOCKS, THESE KIDS CAN CONTROL THEM FROM A MAC.

TURKEY SHOOT

DESIGN FLAWS NOTED

WordPerfect 2.1 Planning to use WordPerfect's powerful macros? Then prepare to shell out an extra $19.95 to order the macros manual, because it doesn't come in the box.

SuperPaint 3.0 Still fun for fooling around. But when it's time to do something serious like kerning your text, it's time to look around for something new.

Macworld will send you a Turkey Shoot T-shirt if we shoot your turkey in this column. See *How to Contact Macworld.*

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Workspace

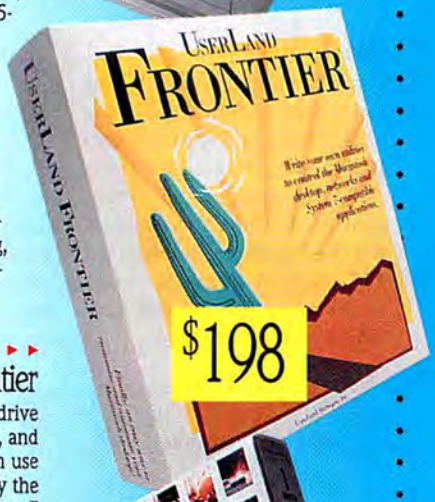
Ark 7 O Change your PERSPECTIVE ! A "real" working environment that simplifies and automatically organizes working on a computer. A visual project organizer, document manager and automatic time tracker. See a "snapshot" of each project document and access all your applications and projects from one "place"!

Bernoulli Transportable 90 Meg

IOMEGA 7 O Long known for reliability, IOMEGA now offers fast, 19 millisecond acces time, and affordable removable storage with a 5-year warranty. Durable in design and built for speed.

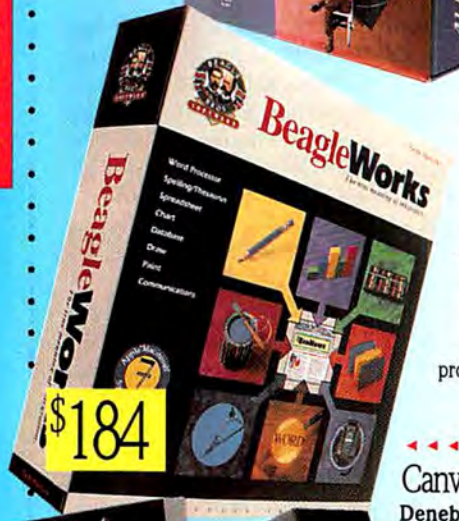
Gallery Effects/SuperPaint 3.0

Aldus 7 O MacEddy Award Winner Gallery Effects auto transforms grayscale and color bitmap images into stunning, sophisticated art, with 16 master effects, including Graphic Pen and WaterColor. Super new version of SuperPaint combines painting, drawing, and image enhancement. Includes 1 thru 24 bit color, textures, gradients, Bezier editing and EPS import.



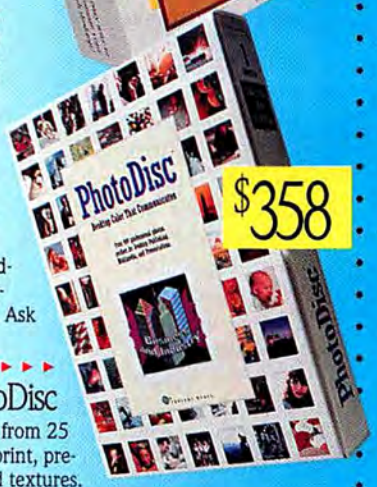
Frontier

UserLand Software 7 Now you can write scripts to drive graphics, page layout, file management, electronic mail, and utilities. You get over 100 sample scripts that you can use right away or modify. Customize, automate, and simplify the Mac operating system, file system, networks, and System 7 compatable applications.



BeagleWorks

Beagle Brothers 7 O The true meaning of integrated software has finally been defined. Includes seven modules so fully integrated you can easily access the Word Processor, Database, Spreadsheet, Chart, Paint, Draw and Communications modules from anywhere in the program using revolutionary In-Contexting Editing™. Ask about the competitive upgrade for $98.

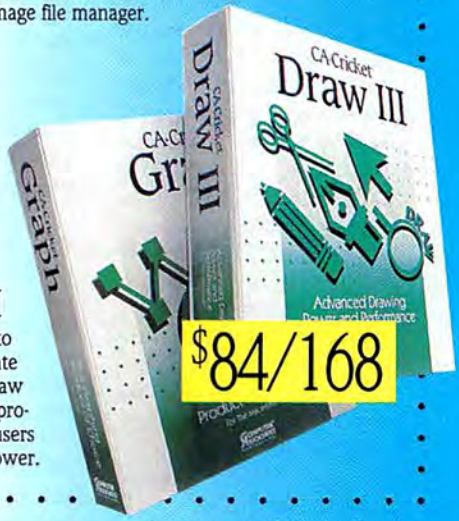


PhotoDisc

PhotoDisc, Inc. 7 O High quality and print resolution color stock from 25 professional photographers. Over 400 photos ready to instantly use in print, presentation and multimedia. Includes 50 Bonus backgrounds and textures. Features LightBox® Image file manager.

Canvas 3.0/Canvas 3.0: The Book

Deneba 7 O Supports Publish and Subscribe, Balloon Help, TrueType and custom Apple events. Also offers professional text handling features like character-to-character font scaling, font conversion to Bezier curves and much more. Too many extras to list here. Also for $14 more get Canvas 3.0: The Book from Peachpit Press.



Cricket Graph /Cricket Draw III

Computer Associates 7 Cricket Graph - Quick and easy to use charting application ideal for anyone who needs to create graphs for reports, presentations or data analysis. Cricket Draw III - intuitive, object-oriented drawing program, produces professional-quality graphics. Both entry level and skilled users will appreciate it's ease of use and power.

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* We understand Macintosh products better than anyone because we work on them every day. And since our sales consultants aren't paid on commission like other companies we know, we'll guide you to exactly the right products that will work best for you. Our only job is to make you happy. That's what customer service is all about. Right?

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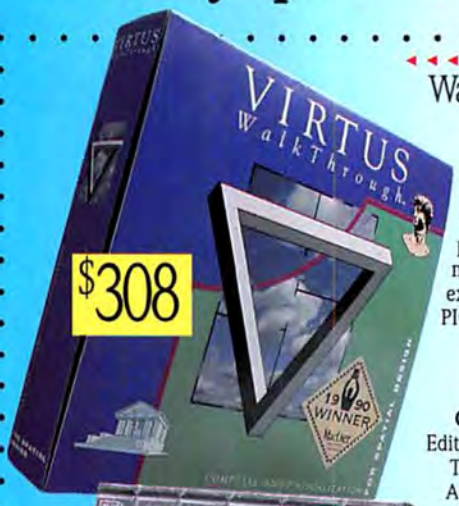

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WalkThrough 1.1

Virtus 7 Put your ideas into action. The latest version of this award winning 3-D drawing program provides everything you need to quickly capture and explore your ideas in 3-D. Version 1.1 includes real-time 3-D presentations, QuickTime® and PICS animated movies, and perspective pictures as well as data exchange capabilities for 2-D DXF, 3-DDXF, EPS, PICT, Claris® CAD and MacDraw.

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Chena 7O Winner of the 1991 MacUser Editors' Choice Award for Best Organizational Tool! It's an information spreadsheet. Create an outline. Add columns for numbers, formulas, text, pictures, dates. See a time chart with a single click. Sort, search, and save views for quick access to your information.

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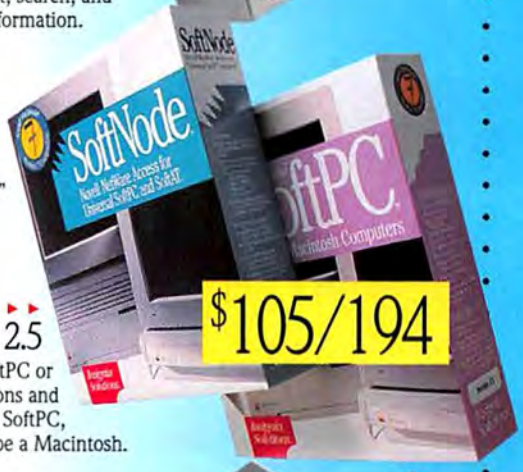
On Cue II

ICOM Simulations 7 Move from one program to another instantly, bypassing the desktop maze, eliminating "window buildup," and ending the frustrating wait for folders to open and close. Works smoothly, quickly, and efficiently.



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Soft Node 1.0/Universal SoftPC 2.5

Insignia 7 Add SoftNode to either Universal SoftPC or SoftAT and your Mac will run MS-DOS applications and share programs over a Novell PC Network! With SoftPC, your next IBM computer could be a Macintosh.

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ASD 7O A new transparent window tracking utility which operates in the background, automatically generating a timesheet as you work. Designed for groups who bill services by the hour, it enables timesheets to be collected over the network.

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dBASE Mac Users Upgrade to nuBASE!

New Era Software 7O For a limited time dBASE Mac users can upgrade to nuBASE for only **$128**. nuBASE is the most powerful relational database available and now takes full advantage of most of System 7's features. Runtime version also available. LAN Manager available in JunE 1992. Call Mac's Place for your upgrade now!

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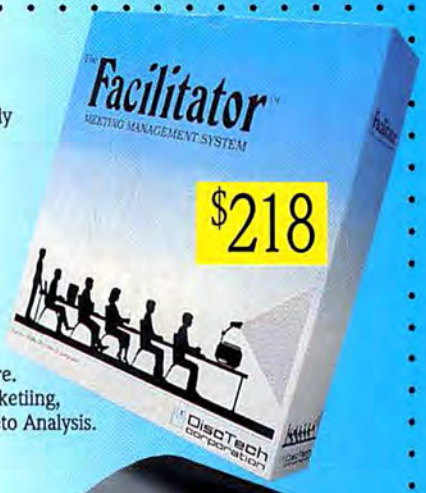

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Specular International ❼❍ Integrated 3D modeling, rendering, and animation with an interface so easy you'll create stunning photo-realistic graphics within hours. Includes 250 surface libraries, full tutorial, animation viewer. Free 1.1 upgrade supports System 7, 3D TrueType fonts.

Xeba-Fax Modem

Logicode Quicktel ❼ Fulfill your Mac's communication potential in style with this hot, new, quality built fax/modem. Send and receive faxes at 9600 bps. 2400 baud modem gives throughput up to 9600 with V.42bis data compression. Totally state-of-the-art!

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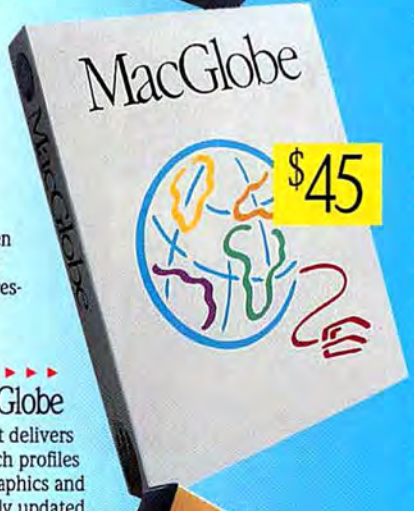
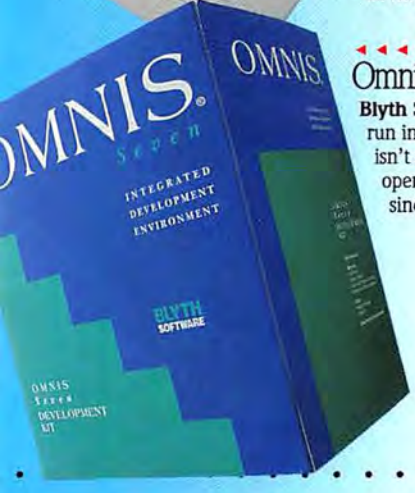
Fractal/Wacom ❼❍ Painter, the natural media painting program chosen by critics: MacUser Eddy 1991, 5 Mice,MacWeek's Target Award. The Wacom tablet has the premier pressure sensitive stylus. Now specially priced together.



MacGlobe

PC Globe ❼ New state-of-the-art electronic atlas program that delivers instant profiles of 190 countries. Ask about the new MacUSA which profiles all 50 states and Puerto Rico. Both programs packed with maps, graphics and annually updated.



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Blyth Software ❼ Create industrial strength client/server applications that run indentically on both Macs and PCs. Mac's Place agrees, there simply isn't a better tool available, "We use Omnis in every phase of our operation. It never let's us down and we've programmed with it since1986." Call 1-800-34-OMNIS for more information.

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Vividus ❼ Easily create interactive presentations with professional-quality animation, sound, and QuickTime video. Also animates PowerPoint and Persuasion presentations. Includes painting tools, the CinePlayer, a HC-XCMD to control movies, and 12-MB of animation, templates, and sound.

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Stingray Trackball

CoStar 7O Replace your mouse or trackball with the new Stingray Trackball. It's sleek, low profile design keeps your wrist at a comfortable angle. Extra buttons and a small ball make the Stingray easy to use regardless of hand size. Includes special sofware and a lifetime warranty. Limited time offer from Mac's Place.

SIMMs

Mac's Place 7O Expand the mind of your Mac! One Meg SIMM, 80 nanoseconds, only $37! Four Meg SIMM only $148! Includes the most complete installation manual available. Get your Mac ready for System 7. See Listings for IIfx prices.

SupraFAXModem V.32bis

Supra Corp. 7O Fax and data communications have never been easier... or faster! This modem's 14,400bps transmission rate means unprecedented savings in time and phone charges. Fax direct from your Mac as effortlessly as you print, and get started right away: the complete package includes FAXstf and MicroPhone 1.6 software.

The Miracle Piano Teaching System

Software Toolworks 7 The first keyboard that teaches you how to play it! Makes learning even the basics a pleasure. Professional keyboard with 49 standard-sized velocity-sensitive keys, 128 digitized instruments and sounds, with full MIDI-compatibility. Includes hundreds of songs and lessons, and full orchestral accompaniment.

Compu-Case for the PowerBook

InCom Specifically designed to fit the Macintosh PowerBooks. Features two zippered outside pockets for important documents and files and an inner pocket to hold your PowerBook and accessories. Plus executive style pouches to accommodate diskettes, pens, business cards, etc.

In Control

Attain Corporation 7O Are projects getting out of hand? Stay in control with this indispensable application that organizes, categorizes and prioritizes your "to do" list. You get the flexibility of an outline with the power of a row-and-column format.

SNOOPER

MAXA Corp. 7 Find problems fast with Snooper, the revolutionary suite of hardware diagnostic and testing tools. Snooper is easy-to-use, powerful and saves you time. No set of Mac utilities is complete without Snooper, the hardware diagnostic.

NightWatch II

Kent Marsh Ltd. 7O Provides ironclad hard disk protection while you're away and hot spot screen security while you work. Allows you to set user time-of-day or day-of-week restrictions, write protection and much, much more. Masterkey capability.

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Alysis 7O From the makers of SuperDisk!, a simple utility that will double your hard disk capacity. Throw out those awkward archivers and compression programs and double click on More Disk Space! Instant access to compressed files, zero decompression time! You won't even know it's there!

See listings under Hard Drives

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DataPlace 7O Available only at Mac's Place, these quality Quantum hard drives and Syquest Removable Cartridge drives come with DataWare formating software, Alysis Software's More Disk Space and Central Points MacTools Deluxe. Each drive features a selectable SCSI ID switch, two 50 pin SCSI connectors, an external fuse and two AC Plug-ins.

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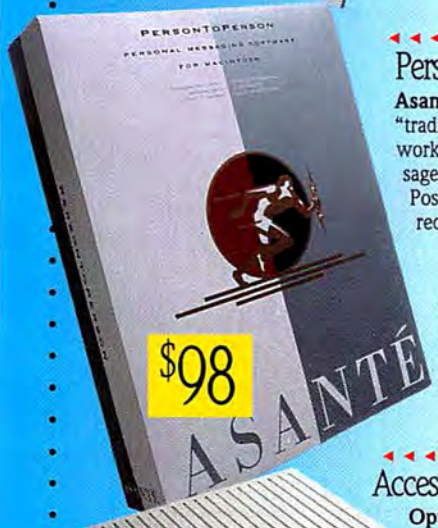
QMConcierge

Information Electronics 7 An indispensable tool for QuickMail networks. Forwards your mail to one person or a group of people while you're away! Generates notices automatically. Create net work groups. Licensed per QuickMail Server.

$308

QuickSilver IIsi w/FPU

Applied Engineering 7O 32k static RAM cache board w/68882-20Mhz FPU for the Mac IIsi. Provides a dramatic performance increase over the standard IIsi. Comes standard with an SE/30 slot extender, which allows SE/30 cards to be used in the IIsi.



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PersonToPerson (2-user)

Asanté 7O Mac communication software system that mirrors "traditional" office interactions. Instead of shouting across the workplace, PersonToPerson allows users to send voice messages across the network. Includes an In/Out Board and a Post-It™ Note Window. No file server or net-admin. required!

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Access RD/Aria™

Optical Access Intl. 7O 128 megabytes in your shirt pocket. This 3.5" optical drive is the cutting edge of technology, enhanced with SuperCache software for lightning fast operation. The ultimate data security and affordability. Includes: cable, and removable 3.5" media cartridge (ANSI compatible).

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Access CD Allegro

Optical Access Intl. 7O The fastest CD-ROM drive available with a 310 ms. access time. Includes SuperCache® software for lightning speed access to large amounts of information. Features headphone jack, stereo RCA type audio connectors, and deluxe desk accessory. Includes cable, sample CD, and one caddy.

See listings under Hardware

VideoSpigot

SuperMac 7O New! Make QuickTime movies on your Mac LC on up to the Quadra 900. Grab video from your VCR, camcorder or TV and pour it right onto your hard drive or optical cartridge. Import as high-image-quality digital data right into QuickTime applications and treat them just like text or graphics. Call for pricing and information today!

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- Toner/LaserWriter II ..... 105.

Articulate Systems ○
- Voice Navigator II ..... 548.

CoStar Corporation ○
- LabelWriter II 1" Head ..... 185.
- Stingray Trackball ..... 79.

DataDesk ○
- Mac 101E (All Macs) ..... 126.

Fellowes
- *Diskette Holder*
- Oak (Holds 45) ..... 19.
- Oak (Holds 120) ..... 31.

Golden Ribbons31
- ImageWriter Ribbons - Black .... 4.
- ImageWriter Multi Color ..... 9.

InCom ○
- Compu-Case - PowerBook ..... 78.

Kensington Microware ○
- 7' Long ADB Keyboard Cable .. 24.
- Turbo Mouse Adb ..... 107.

Key Tronic ○
- Mac Pro Plus ..... 143.

L B Innovators, Inc ○
- Table-Xtender ..... 12.
- *WristSaver*
- Red,Charcoal or Navy Blue ..... 12.
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- Mac's Place Speed Pad ..... 7.
- System 7 T-Shirt (M,L,XL) ..... 12.
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- 60-MB BU Tape CS600HD ..... 18.
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Sony
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- Double Sided-Bulk 50 Pak ..... 33.
- High Density 10 Pak ..... 15.
- High Density-Bulk 50 Pak. ..... 60.

Sophisticated Circuits ○
- PowerKey 2.0 w/QuicKeys Lite 75.

BUSINESS

ACIUS
- 4th Dimension V2.2 ..... 478.

AEC Management Systems
- FastTrack Schedule 1.5 ..... 135.

After Hours Software
- TouchBASE ..... 79.

Aldus ○
- Persuasion ..... 318.

Amaze!nc
- The Far Side Calendar ..... 45.

Ark Interface, Inc ○
- Workspace ..... 79.

Asanté ○
- PersonToPerson 2-User ..... 98.
- PersonToPerson 10-User ..... 262.
- PersonToPerson Zone Pack ... 458.

ASD Software
- Active Memory Single User .. 125.
- Active Memory 5 User ..... 314.

Attain Corp. ○
- In Control ..... 94.

Bananafish Software ○
- ThoughtPattern ..... 94.

Beagle Brothers Inc. ○
- BeagleWorks ..... 184.
- Competitive Upgrade ..... 98.

Caere
- OmniPage w/Spell & Draft .... 478.

CE Software ○
- Calendarmaker 3.0 ..... 31.
- Tiles ..... 59.
- *QuickMail 2.5*
- 5 Users ..... 239.
- 10 Users ..... 365.

Ceres Software ○
- Inspiration 3.0 ..... 158.

CheckMark Software ○
- MultiLedger 2.0 ..... 225.
- Payroll ..... 169.

Chena Software ○
- Fair Witness 1.1 ..... 315.

Chip Soft
- MacInTax 1040 Personal 1991 59.
- w/Quicken ..... 88.
- MacInTax Personal States ea. 42.

Claris
- Claris Works ..... Call.
- FileMaker Pro ..... 208.
- HyperCard V2.1 ..... 139.
- MacWrite II ..... 98.

CompuServe
- CompuServe Membership Kit . 21.
- CompuServe Navigator ..... 49.

DeltaPoint ○
- DeltaGraph Professional ..... 192.

Fox Software ○
- FoxBASE+/Mac ..... 289.
- FoxBASE+/Mac MultiUser .... 389.

Freesoft Company ○
- White Knight V11 ..... 85.

Information Electronics ○
- QMConcierge ..... 168.

IBS ○
- Data Club Classic 3 Pak ..... 179.
- Data Club Classic 10 Pak ..... 498.

Insignia Solutions
- *Soft PC*
- AccessPC ..... 59.
- SoftNode ..... 105.
- Entry Level V2.5 ..... 125.
- Universal V2.5 ..... 194.
- AT V2.5 ..... 298.

Intuit ○
- Quicken 3.0 ..... 39.

Lotus Development
- Lotus 1-2-3 ..... 288.

Micro Planning Intl.
- Micro Planner Manager ..... 378.

Microsoft ○
- Excel 3.0 ..... 298.
- Office V2.0 ..... 478.
- Word 5.0 ..... 298.
- Works ..... 159.

New Era Software ○
- nuBASE Pro 1.5 ..... 248.

Nolo Press ○
- For The Record ..... 30.
- Will Maker 4.0 ..... 35.

Now Software ○
- Up to Date (Single User) ..... 64.

Paragon Concepts
- Nisus 3.06 ..... 245.
- Nisus Compact ..... 98.

Pastel Development ○
- DayMaker ..... 58.

Portfolio Systems
- DynoDex 2.0 ..... 69.
- DynoPage 1.7 ..... 72.

Prescience
- Expressionist ..... 77.
- Theorist ..... 245.

Reality Technology ○
- Wealth Builder ..... 94.

SoftSync ○
- Accountant Inc. ..... 338.
- Accountant Inc. Multi-User ... 568.

Software Ventures ○
- MicroPhone II V4.0 ..... 208.

Spider Island Software ○
- TeleFinder Grp.- Unlimit.. ..... 272.

Symantec ○
- GreatWorks 2.0. ..... 198.
- More ..... 264.

T/Maker ○
- PowerBundle ..... 158.
- WriteNow 3.0 ..... Call.

Teleware ○
- M.Y.O.B. ..... 139.

Timeslips Corporation ○
- TimeSlips III V2.1 ..... 192.

Wolfram Research Inc. ○
- Mathematica Std. 2.0 ..... 498.
- Mathematica Enhanced 2.0 .. 788.

Wyoming Software ○
- Business Sense 1.5 ..... 124.

GRAPHICS

Adobe
- Illustrator 3.2 w/ATM 2.0 ..... 368.
- Photoshop 2.0 ..... 539.
- Premier ..... 308.
- Streamline 2.0 ..... 117.
- Type Manager ..... 59.

Aldus ○
- Freehand 3.1 ..... 388.
- Gallery Effects ..... 128.
- Pagemaker 4.2 ..... 489.
- Personal Press ..... 138.
- SuperPaint 3.0 ..... 128.

Altsys ○
- Fontographer ..... 262.

Ares Software ○
- FontMonger ..... 59.

Baseline Publishing ○
- Color MacCheese ..... 49.

Broderbund
- Print Shop ..... 35.
- TypeStyler 2.0 ..... 126.

Calliscope Software
- Satellite 3D ..... 128.

Claris
- Claris CAD ..... 598.
- MacDraw Pro ..... 278.

CoSA
- PACo Producer 2.0 ..... 158.
- XPlayPACo XCMD ..... 158.
- PACo Producer Bundle ..... 374.

D'Pix
- FOLIO 1 ..... 344.

Delta Tao Software ○
- Monet ..... 198.

Deneba ○
- Canvas V3.0 ..... 248.

Fractal Design ○
- Painter 1.2 ..... 248.

Frame Technology
- FrameMaker ..... 594.

MacroMind/Paracomp
- MacroMind Accelerator V3.0 128.
- MacroMind Director ..... 679.
- Model Shop V2.0 ..... 578.
- Magic ..... 248.
- Swivel 3D Professional ..... 429.

MicroFrontier ○
- Color It! ..... 75.

Motion Works
- ADDmotion ..... Call.
- ProMotion ..... Call.

Pixar
- Showplace/MacRenderMan . 629.

Postcraft International
- Effects Specialist ..... 93.
- Layouts ..... 78.

Quark Incorporated
- XPress 3.1 ..... 548.

Ray Dream ○
- JAG ..... 68.
- Ray Dream Designer ..... 589.

Specular International ○
- Infini-D ..... 647.
- Replicas Vol. 1 or 2 ..... 188.

Strata, Inc.
- StrataVision 3d 2.0 ..... 648.

Timeworks ○
- Publish It! Easy ..... 138.
- Competitive Upgrade ..... 99.

CD-ROM

Optical Access ○
- CD/Allegro (310 ms) ..... 648.
- CD/6-Pack ..... 1198.
- RD/Aria ..... 1598.

Cyan
- Cosmic Osmo CD ..... 39.

Discovery Systems
- Berkeley BMUG PD ROM ..... 65.
- Nautilus BackPac (1 or 2) ..... 44.
- Nautilus Starter Disc. ..... 20.
- Sherlock Holmes on Disc ..... 19.

FM Waves ○
- DTPro CD-ROM ..... 75.

HyperGlot Software ○
- Learning To Speak French ..... 59.
- Learning To Speak Spanish ..... 59.

ICOM Simulations
- Sher. Holmes Consult. Det. ..... 39.

Pixar
- Showplace/MacRenderMan . 448.

Quantum Leap
- CD-7 Super Library 2 Disk Set . 72.
- Giga-ROM 2.0-Super Library . 98.
- Macademic-Education Library . 73.

EDUCATIONAL

Broderbund
- Kid Pix V1.2 ..... 37.
- Type! ..... 18.

Davidson & Associates ○
- Alge-Blaster Plus ..... 34.
- Dinosaur Discovery Kit ..... 27.
- Math Blaster Plus ..... 34.
- SAT Personal Trainer ..... 34.

HyperGlot Software ○
- Easy Kana (Japan.) ..... 62.

Knowledge Revolution
- Interactive Physics ..... 156.

Learning Company ○
- Math Rabbit ..... 36.
- OutNumbered! ..... 36.
- Reader Rabbit 1 V3.0 ..... 35.
- The Writing Center ..... 50.

MECC ○
- Number Munchers ..... 28.
- Oregon Trail ..... 28.
- Word Munchers ..... 28.

Nordic Software ○
- *MacKids*
- Pre-Schoolpack ..... 35.
- Word Search Deluxe ..... 35.

Software Toolworks
- Mavis Beacon Typing ..... 29.

ENTERTAINMENT

Accolade ○
- Hardball II ..... 31.
- Ishido:The Way of Stones ..... 32.

Baseline Publishing ○
- Talking Moose ..... 22.

Broderbund
- Carmen San Diego? Europe, Time, USA World .. ea.29.
- Nigel's World ..... 36.
- Playmaker Football ..... 29.
- SimAnt ..... 35.
- SimCity ..... 29.
- SimCity Supreme ..... 47.
- SimEarth ..... 40.
- Spelunx ..... 29.
- The Playroom V2.0 ..... 29.

Casady & Greene ○
- Glider ..... 29.

Deadly Games ○
- Battle of Britain II ..... 31.
- Bomber (w/Headphones) ..... 31.

Delta Tao Software ○
- Spaceward Ho! 2.0 ..... 35.
- Strategic Conquest 3.0 ..... 35.

Electronic Arts
- PGA Tour Golf ..... 35.
- PGA Tour Golf: Tourn. Course . 16.

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- (7) Swamp Gas .... 29.
- (7) Tesserae .... 29.

Lucasfilm Games
- (7) Indiana Jones/Last Crusade .... 28.
- (7) Loom .... 29.

Mallard Software
Flight Simulator Add-Ons
- (7) Scenery Upgrade I-IV .... ea.30.

MicroProse
- (7) Railroad Tycoon .... 40.

Microsoft
- (7) Flight Simulator 4.0 .... 42.

Sierra On-Line
- (7) Space Quest IV .... 36.

Sir-Tech Software
- Wizardry .... 29.
- (7) Wizardry:Bane/Cosmic Forge .. 36.
- Wizardryll Knight of Diamonds 32.

Software Heaven
- (7) OIDS .... 25.

Software Toolworks
- (7) Life And Death .... 29.

Spectrum Holobyte
- (7) Tetris .... 23.
- (7) Vette .... 34.
- (7) WordTris .... 24.

Strategic Simulations, Inc.
- (7) AD&D: Silverblades .... 38.
- (7) AD&D:Curse of Azure Bonds ... 38.

Strategic Studies Group
- (7) American Civil War Vol 1 .... 30.
- (7) Gold of the Americas .... 30.
- (7) Panzer Battles .... 28.
- (7) Reach for the Stars .... 30.
- (7) Rommel Battles for N. Africa .. 28.
- (7) Warlords .... 38.

Three Sixty Pacific
- (7) Harpoon .... 39.
- (7) Harpoon BattleSet #2 or #3 .... 20.
- (7) Harpoon Scenario Editor .... 26.

Velocity
- (7) Spectre .... 38.

Virgin Games
- (7) Monopoly .... 30.
- (7) Scrabble Deluxe .... 30.

HARDWARE

Applied Engineering
- (7) AEHD Superdrive .... 219.
- (7) Cache-In 50 IIci w/68882 .... 1898.
- (7) FastMath LC(68882 16Mhz) .. 138.
- (7) Classic Memory Card 1-MB .. 108.
- (7) QuickSilver IIsi .... 239.

TransWarp Accelerators
- (7) LC 33Mhz w/FPU .... 998.
- (7) LC 40Mhz w/FPU .... 1378.
- (7) LC 50Mhz w/FPU .... 1498.
- (7) SE 25Mhz w/FPU .... 788.
- (7) SE 40Mhz w/FPU .... 1498.

Asanté
- (7) 10T Hub/12 .... 548.
- (7) 10T Hub/8 .... 268.
- (7) MacCon3 IIsi .... 218.
- (7) MacCon3 NB .... 218.
- (7) MacCon3 SE .... 218.
- (7) EN/SC .... 298.
- (7) EN/SC PowerBook .... 348.
- (7) EN/SC-10T .... 258.
- (7) EN/SC-10T PowerBook .... 288.

Caere
- (7) Typist + Graphics .... 468.

Cayman Systems
- (7) GatorBox .... 1949.

Dayna Communications
- (7) EtherPrint-T .... 338.
- (7) EtherPrint-T Plus .... 598.

DaynaPORT Ethernet Cards
- (7) E/30 .... 198.
- (7) E/II .... 228.
- (7) E/LC-T .... 208.

DayStar Digital
- (7) Fast Cache IIci 64K .... 259.

PowerCache(SE/30, all IIs, and LC)
- (7) 33Mhz .... 698.
- (7) 40Mhz .... 858.
- (7) 40Mhz w/FPU .... 1148.
- (7) 50Mhz .... 1358.
- (7) 50Mhz w/FPU .... 1589.

Dove
- (7) DoveFax Desktop Plus V2.0 ... 349.

E-Machines
Color Displays
- (7) ColorPage E16 .... 1045.
- (7) ColorPage T16 .... 1398.
- (7) ColorPage T16II .... 1698.

Color Interface Cards
- (7) DoubleColor .... 328.
- (7) DoubleColor LC .... 395.
- (7) Futura EX .... 568.
- (7) Futura MX .... 1298.
- (7) Futura SX .... 878.
- (7) Futura SX/8 .... 698.

EthernetVideo Cards
- (7) ColorLink EX/T .... 658.
- (7) ColorLink SX/T .... 998.

Everex
- (7) EMAC 150-MB Tape BU .... 678.

Farallon
- (7) MacRecorder 2.0.5 .... 172.

PhoneNET
- (7) Connectors .... 29.
- (7) Connector (10Pk) .... 195.

Global Village
TelePort
- (7) Fax 9600 (Send Only) .... 179.
- (7) Full Fax (S/R) .... 248.
- (7) PowerPort/V.32 .... 498.

Harris Labs
Performer
- (7) 16 Mhz Accel. .... 239.
- (7) 16 Mhz Accel.w/FPU .... 318.

Logicode
Quicktel Fax Modems
- (7) 9624 Send/Receive .... 148.
- (7) 9624 V.42bis Send/Receive .. 198.
- (7) 9696 S/R V.42bis .... 398.

Quicktel Modems
- (7) 9600 V.32/V.42bis .... 498.

Micron
- (7) XCEED Color 30 .... 279.

Microtek
- (7) ScanMaker 600GS .... 1098.
- (7) ScanMaker 600ZS .... 1398.
- (7) TrueLaser Printer .... 1398.

Monster Design
- MacSpeaker .... 169.

Nuvotech
- (7) Turbo Net - Din-8 .... 19.

RasterOps
Color Monitors
- (7) 16" .... 1288.
- (7) 19" Hitachi .... 1698.

Color Video Boards 13",19",21"
- (7) 4Mx .... 1288.
- (7) 24MxO .... 1288.
- (7) 24Sx .... 688.
- (7) 24XLi .... 2148.
- (7) PaintBoard 24 .... 1698.

Monochrome/Grayscale Monitors
- (7) 19" Mono/Gray-Scale .... 858.

Video Boards-Monochrome
- (7) ClearVue/XL .... 348.

Video & Multi Media
- (7) Expresso Pers.Slide Scan. .... 728.
- (7) RasterOps 24STV .... 868.
- (7) RasterOps MediaTime .... 1698.
- (7) RasterOps VideoTime .... 1288.
- (7) Video Expand. (NTSC or PAL) 498.

Shiva
- (7) Ethergate .... 1289.
- (7) FastPath 5 .... 1795.
- (7) NetBridge .... 398.

SIMM
Single Inline Memory Modules
- (7) SIMM 1-MB 80ns .... 37.
- (7) SIMM 2-MB 80ns .... 88.
- (7) SIMM 4-MB 80ns .... 148.
- (7) SIMM FX 4-MB 80ns .... 158.
- (7) SIMM FX/NTX 1-MB 80ns .... 45.

SuperMac
- (7) Monochrome Card .... 358.
- (7) PowerBook Display Expander 538.
- (7) SuperMatch Display Calib. .... 538.

24 Bit Display Cards
- (7) ColorCard/24 .... 538.
- (7) Spectrum/24 .... 1078.
- (7) Spectrum/8•24 PDQ .... 898.
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8 Bit Display Cards
- (7) Spectrum/8 LC .... 538.
- (7) Spectrum/8 Series III .... 538.
- (7) Spectrum/8 si .... 538.

Accelerators
- (7) ColorCard Accelerator .... 358.
- (7) Spectrum/24 Accelerator .... 448.

SuperMatch Color Monitors
- (7) 17" Multimode Color .... 1138.
- (7) 20" Color .... 1898.
- (7) 20" Dual-Mode Trinitron .... 2698.

Monochrome/Greyscale Monitors
- (7) Platinum 19" .... 1044.
- (7) Platinum 21" Two-Page .... 1138.

Video Capture/Multimedia
- (7) Spigot & Sound NuBus .... 798.
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- (7) SuperSqueeze .... 798.
- (7) VideoSpigot NuBus .... 538.
- (7) VideoSpigot LC .... 448.
- (7) VideoSpigot Pro NuBus .... 1438.
- (7) VideoSpigot Pro si .... 1348.
- (7) VideoSpigot si .... 448.

Supra Corp.
Supra FAXModem
- (7) FaxModem Plus MacPac .... 198.
- (7) FaxModem V.32 .... 328.
- (7) FaxModem V.32bis .... 378.

Supra Modem
- (7) 2400 .... 109.

Thunderware
- (7) LightningScan Pro 256 .... 489.

Wacom
12X12 Digitizers Cordless Stylus
- (7) Electro Static .... 836.
- (7) Standard .... 758.

6 X 9 Digitizers Cordless Stylus
- (7) Standard .... 518.

HARD DRIVES

CRU
- Case Opener/Torx Kit .... 8.
- Mounting Bracket (IIcx/IIci) .... 15.
- Mounting Bracket (SE/II) .... 19.

DataPlace
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- (7) DP+ 52-MB Quantum .... 318.
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Internal Hard Drives
- (7) DP+ 52-MB Quantum .... 268.
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Removable Syquest Hard Drives
- (7) DP+ 44-MB w/cartridge .... 488.
- (7) DP+ 88-MB w/cartridge .... 648.

FWB Software
PocketHammer
- (7) 50-MB. .... 599.
- (7) 100-MB. .... 798.
- (7) 200-MB. .... 1198.

Iomega
Bernoulli
- (7) Transportable 90-MB .... 788.
- (7) Kit w/MacTools Deluxe .... 38.
- (7) Kit w/Retrospect .... 98.
- (7) Single 90-MB Cartridge .... 139.
- (7) Tri-Pack 90-MB .... 408.

Seagate Technology
Full Height Drive
- (7) WrenRunner II 676 MB .... 2088.

Syquest
- (7) 44-MB Cartridges .... 68.
- (7) 88-MB Cartridges .... 107.

MUSIC

Ars Nova
- (7) Practica Musica 2.3 .... 66.

Opcode Systems
- (7) Book Of MIDI .... 28.
- (7) EZ Music Starter Kit .... 155.
- (7) EZVision .... 98.
- (7) Galaxy Universal Librarian .... 188.
- (7) MIDI Translator .... 42.
- (7) Studio 3 MIDI/Smpte Intfc. .... 288.
- (7) Vision .... 368.

Passport Designs
- (7) Audio Trax .... 197.
- (7) MIDI Interface .... 78.

PG Music
- (7) Band In A Box .... 56..

PROGRAMMING

Bowers Development
- (7) AppMaker 1.5 .... 214.

Microsoft
- QuickBASIC 1.0 .... 68.

Symantec
- (7) Just Enough Pascal .... 49.
- (7) Think C 5.0 .... 198.
- (7) THINK Pascal 4.0 .... 159.
- (7) Think Reference .... 69.

TGS Systems
- (7) Prograph V2.5 .... 298.

UserLand Software
- (7) Frontier 1.0 .... 198.

Zedcor Inc
- (7) ZBasic 5.0 .... 95.

BOOKS

Addison Wesley
- Guide to Mac Family HW .... 21.
- Mac C Programming (1or 2) .... 19.
- Mac Pascal Prog. Vol 1 .... 19.
- Macintosh Program Secrets .... 18.

Inside Macintosh Series
- Vol.1, 2, 4 or 5 .... 18.
- Vol.3 .... 17.
- Vol.6 .... 38.
- X-REF for Vol. 1-6 .... 9.

Inside Out Series
- Complete Book of HyperTalk 2 19.
- (7) Learn C w/Thin C Lite .... 28.
- Mac Prog Guide MPW Vol 1 .... 19.
- ResEdit Complete w/ResEdit .. 23.
- System 7 Revealed .... 18.

Bantam Books
- HyperCard Handbook .... 21.

Microsoft Press
- MS Excel 3 Companion .... 20.

Peachpit Press
- Canned Art 2 ed.:Clip Art/Mac 24.
- Canvas 3.0: The Book .... 17.
- DataBase 101 W/ Demo Disk . 14.
- DTP Survival Kit .... 18.
- Little Mac Book, 2nd ed. .... 12.
- Little QuicKeys Book .... 12.
- Little System 7 Book .... 10.
- Macintosh Font Book .... 18.
- PM 4:An Easy Desk Ref. .... 24.
- QuarkXpress Book .... 20.
- Real World Freehand .... 22.

Ventana Press
- (7) System 7 Book .... 18.
- (7) System 7 Companion Disks .... 10.

UTILITIES

Abbott Systems
- (7) Calc+ .... 40.
- (7) CanOpener 2.0 .... 61.

Aladdin Systems
- (7) StuffIt Deluxe 2.0 .... 59.

Alsoft
- (7) DiskExpress II .... 49.

Alysis Software Corp.
- (7) More Disk Space .... 48.

ASD Software
- (7) FileGuard 2.7 .... 129.

Berkeley Systems
- (7) After Dark & M.A.D. Bundle .... 41.
- (7) After Dark 2.0 .... 28.
- (7) More After Dark (M.A.D.) .... 25.

Casady & Greene
- (7) Crash Barrier .... 45.

CE Software
- (7) Disktop 4.0 + Gofer & Util .... 62.
- (7) QuicKeys 2.1 .... 89.

Connectix
- (7) HandOff II 2.2 .... 55.

Custom Applications
- (7) Freedom of Press Lite .... 55.

Dantz Development
- (7) DiskFit Pro .... 67.
- (7) Retrospect .... 145.

Dayna Communications
- (7) Dos Mounter V2.0 .... 49.

Essential Software
- (7) Easy Alarms .... 29.

Fifth Generation
- (7) FastBack Plus .... 118.
- (7) Suitcase V2.0 .... 49.
- (7) SuperLaserSpool .... 98.

FWB Software
- (7) Hard Disk Toolkit .... 126.

Kent Marsh
- (7) FolderBolt .... 69.
- (7) MacSafe II .... 105.
- (7) NightWatch II .... 89.
- (7) QuickLock .... 34.

MAXA Corp.
- (7) Snooper SW .... 148.
- (7) Snooper Kit w/board .... 188.

Microcom
- (7) Virex .... 59.

MicroMat
- (7) MacEKG .... Call.

Now Software
- (7) Now Utilities V 3.0 .... 83.

ON Technology
- (7) On Location 2.0 .... 74.

Sabastian Software
- (7) Image Grabber 3.0 .... 35.

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- (7) AutoDoubler .... 48.
- (7) DiskDoubler .... 48.

Software Architects Inc.
- (7) Hard Drive Tune-Up .... 59.

Sound Source Unlimited
SoundWare
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Symantec
- (7) Norton Utilities .... 82.
- (7) S.A.M.III .... 59.

Teknosys
- (7) Help! .... 89.

Thought I Could
- (7) WallPaper .... 36.

Utilitron
- (7) TrashMaster .... 36.

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APPLE KEEPS THE VALUE UP AND THE PRICES DOWN WITH THE MACINTOSH LC II AND THE PERSONAL LASERWRITER NTR

More for Less: An Updated LC and LaserWriter Duo

BY JIM HEID

Add value without raising prices: it's smart business these days, and it's the philosophy behind Apple's newest products, the Macintosh LC II and the Personal LaserWriter NTR. ✧ The LC II is a modest enhancement of the LC, Apple's least expensive color Macintosh. The main difference: Apple replaced the LC's aging Motorola 68020 processor with a 68030—the same chip that drives most other Macs. But to keep costs down and bring the LC II to market quickly, Apple elected not to improve the rest of the LC II's hardware to take advantage of its new processor. As a result, the LC II is no faster than the LC. The only benefit of the LC II's 68030 is that it allows the machine to support System 7's virtual memory feature. ✧ The LC II differs from the LC in a few other ways, but by and large, Apple followed the adage, If it's not broken, don't fix it—or raise its price. The LC II costs exactly what its predecessor did after last February's price cuts and even includes more memory:

PHOTOGRAPHS BY MARK JOHANN

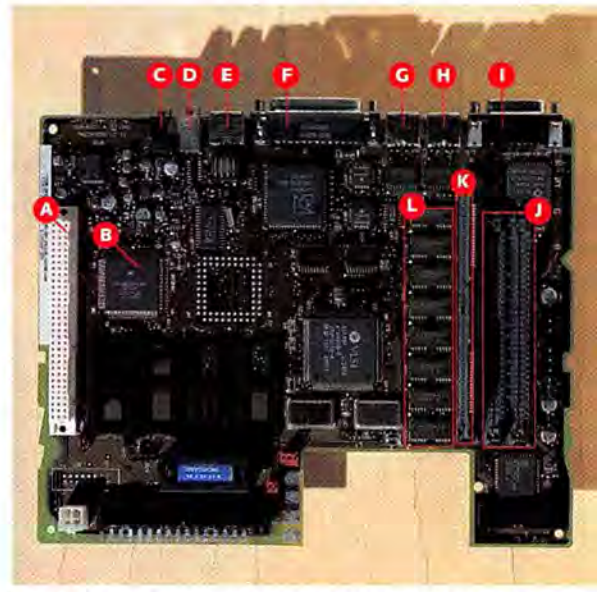
$1699 for a 4MB LC II with a 40MB hard drive (the LC II 4/40), and $2049 for a 4MB machine with an 80MB drive (the LC II 4/80). Most dealers will discount these retail prices by 10 to 20 percent. An upgrade for existing LCs will be available, but Apple had not set its price at press time. The original LC will no longer be sold in the United States but will remain available in Europe, where the LC II will be sold as a "high-end" LC, Apple says.

The Personal LaserWriter NTR may be the bigger milestone. It uses the same Canon LX print mechanism as that of the Personal LaserWriter NT, but it replaces the controller board with a faster, more sophisticated one. The NTR also sports Adobe PostScript Level 2 and built-in support for TrueType fonts. The result is one of the fastest printers in its class. Its list price: only $2199, $400 less than the Personal LaserWriter NT, and comparable to that of other personal PostScript printers. An upgrade will be available for the Personal LaserWriter NT, SC, and LS, but its price was unavailable at press time. Like the Mac LC, the Personal LaserWriter NT has been discontinued in the United States but will still be sold in Europe.

Where did Apple cut corners to deliver an upgraded LC without raising the price? How does the LC II compare to the Mac IIsi, which uses the same processor? And how does the Personal LaserWriter NTR stack up against other low-cost PostScript printers? The following previews and performance results are based on an advance press briefing and on tests conducted with prototypes.

A New Microprocessor

SINCE BECOMING WIDELY AVAILABLE last March, the Mac LC has become Apple's best-selling computer—in part because Mac Classic sales leveled off after an initial surge. Of the 560,000 LCs sold to date, more than half have gone to the home and education markets. (By comparison, Apple has sold 1.2 million Classics to date.) Many LCs have replaced the Apple IIGS's in schools. Indeed, Apple credits the LC with the company's renewed popularity in schools—a popularity that had been eroded by low-cost IBM clones. One key to the LC's success in education has been Apple's IIe Card, which enables the LC to run Apple IIe software. Roughly half the LCs sold to schools are equipped with the IIe Card.



The LC II Logic Board **(A)** PDS slot, **(B)** 68030, **(C)** Sound-in port, **(D)** Sound-out port, **(E)** ADB port, **(F)** SCSI port, **(G)** Modem port, **(H)** Printer port, **(I)** Video-out port, **(J)** RAM expansion, **(K)** VRAM, **(L)** 4MB RAM.

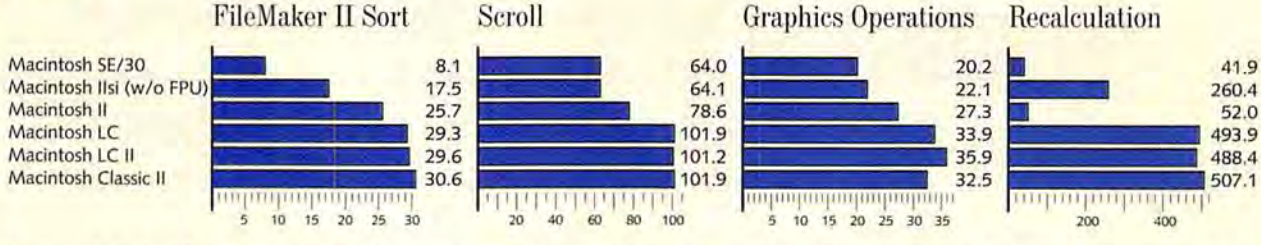
Apple says a 68030 processor topped LC owners' wish lists. The 68030 allows the LC II to support System 7's virtual memory feature, which lets the machine treat part of a hard drive as memory, allowing you to run more programs than would otherwise fit into memory at once. (The LC II ships with System 7.0.1, but it's also compatible with System 6.0.8.) Macworld Lab tested the LC II's virtual-memory speed by switching between ten open applications. We also performed the same test on a Classic II and an SE/30. The Classic II and the LC II performed the same, while the SE/30 was about 2 percent faster, thanks to a wider, 32-bit data path.

Many people erroneously believe you can't take full advantage of System 7 without virtual memory. The fact is, virtual memory is one of the least significant aspects of System 7. Besides being significantly slower than real memory, virtual memory takes a big bite out of your available hard drive space. Adding real memory is a better way to enhance System 7's multitasking features—on any Mac.

The LC II's 68030 runs at the same 16MHz clock speed as the LC's 68020 (and the 030 in the Classic II). By keeping the clock speed the same, Apple has ensured that users won't encounter software incompatibilities. Performance, however, will not improve. Although the 68030 is a 32-bit processor, the LC II moves data between the processor and memory in 16-bit chunks—as did the original LC. This is why the LC II is no faster than its predecessor (see "Testing the LC II"). Apple says 32-bit data pathways would have boosted perfor-

MW LAB Testing the LC II

Times are in seconds.



In various tests, the LC II performed tasks as fast as the original LC and the Classic II. The key difference in these Macs is the processor used—the LC II has a 68030 chip while the LC has a 68020 chip—proving that upgrading a Mac with the next higher processor does not necessarily mean that you'll see a speed increase. Speed increases often occur when other parts of the system—such as the SCSI controller, the bus, and the clock speed of the processor—are also enhanced. For instance, the Macintosh II has a 68020 chip but runs faster than the LC II because it has a 32-bit data path. On the recalculation test, the Macs with an FPU (the Mac II and the SE/30) were far faster than the other Macs. The Mac IIsi's faster processor, however, helped it make a better showing than the LC, LC II, or Classic II.

mance by up to 30 percent, but would have required a time-consuming and costly logic board redesign.

Logic Board Details

THE LC II'S LOGIC BOARD IS VERY SIMILAR to the LC's (see "The LC II Logic Board"). One noteworthy change is the absence of a connector for a second floppy disk drive. Unlike the LC, the LC II can accommodate only one floppy drive. Apple estimates that fewer than 5 percent of all LCs were sold with two floppy drives and no hard drive—a configuration that was offered only to schools through Apple's education sales channel. Schools will be able to buy an LC II with one floppy drive and no hard drive.

The original LC included 2MB of memory and had two SIMM slots to accommodate expansion to a total of 10MB. The LC II includes 4MB of memory but unfortunately still can't accommodate more than 10MB. The LC II's memory-upgrade increments are 6MB, 8MB, and 10MB. To reach 10MB, you must supplement the built-in 4MB by installing 8MB in the form of two 4MB SIMMs. But doesn't 4MB plus 8MB equal 12MB? Not to an LC II. Its memory-controller chip can't recognize more than 10MB, so the extra 2MB are wasted. Fixing this would have required a new memory-controller chip, and that would have delayed the release of the machine and raised its cost—score another for economics over innovation. The LC II's product manager said it's unlikely any third-party products would let the machine recognize the wasted 2MB.

Expansion Opportunities

THE LC II RETAINS THE SAME SINGLE expansion slot found in its predecessor, although because the LC II doesn't use the 68020 processor, the slot is no longer called the 020 Direct Slot. Its new moniker is the LC Slot, and Apple says it will be the standard expansion slot design for its low-end, high-volume computers.

Supposedly, the slot's name is all that has changed. Apple claims most boards designed for the original LC will work without modification in the LC II (see "Boards Compatible with the LC II"). Still, some boards—including Apple's own Ethernet LC Card and Apple IIe Card—will require updated ROM chips or driver software. If your LC has an expansion board, verify the board's compatibility before upgrading to the LC II.

Apple modified the LC II's built-in video circuitry slightly to provide a video signal that is more compatible with the low-cost, multisync monitors that have been so popular for DOS PCs and that are now being sold for the Mac (see "Color Display Bargains," *Macworld*, March 1992). That aside, the LC II's built-in video features are the same as its predecessor's. But our tests on a prototype with a Sony CPD-1302 monitor show that the LC II's video remains incompatible with at least some multisync monitors that work with the Mac II's video.

The LC II 4/40 includes 256K of separate video memory (VRAM), which allows the LC II to display 256 colors on Apple's low-cost Macintosh 12-inch RGB Monitor, 16 colors on the 13-inch AppleColor High-Resolution RGB Monitor, and 16 gray shades on the Macintosh 12-inch Monochrome Monitor. You can upgrade the LC II's VRAM to 512K, which allows for the display of 32,000 colors on the 12-inch monitor, 256 colors on the 13-inch monitor, and 256 grays on the monochrome display. The LC II 4/80 includes 512K of VRAM.

Like the LC, the LC II lacks a math coprocessor chip, which speeds calculations in some programs, including spreadsheets, statistical software, and 3-D graphics programs. Unlike even the Mac Classic II, the LC II does not have a socket for an optional math chip. Many LC expansion boards provide a math chip, however.

If you upgrade an LC to an LC II, you get a new logic board and a new upper case cover. (Those rare two-floppy LCs will have to part with the second floppy.) The LC II logic board contains 256K of VRAM; if your LC contained 512K, you can install its VRAM SIMM in the LC II.

LC II or IIsi?

NOW APPLE HAS TWO 68030-BASED, single-slot color Macs: the LC II and the IIsi. How do they compare? The IIsi is faster, and it can accept a NuBus expansion board, of which there are considerably more than there are LC boards. Other factors help make the IIsi the best single-slot Mac (see "IIsi versus LC II"). The IIsi can accommodate more memory and provides stereo sound to the LC II's mono. The IIsi's built-in video circuitry supports the Apple Portrait Display. The IIsi supports soft power—the ability to be switched on from the keyboard and switched off with the Shut Down command. The IIsi also offers superior performance because it moves data between the memory and the processor in 32-bit portions instead of 16-bit as the LC II does.

But it is costlier: a IIsi 3/40 retails for $2499, $800 more than the LC II 4/40; a 5/80 lists for $2999, $950 more than the LC II 4/80. If you can't afford a IIsi or you don't need NuBus or the IIsi's other advantages, buy the LC II. You'll get color, System 7 virtual memory, and performance roughly equivalent to that of the original Mac II—in a compact package.

More Personal Printing Power

IF YOU THINK COMPUTER PRICES have fallen in recent years, look at laser

BOARDS COMPATIBLE WITH THE LC II

Company	Expansion Board	LC II–Compatible Version
Andrew Corporation	MacTwin	Rev F.
	NetAxcess	Rev F.
Apple Computer	Apple Ethernet LC Card	*
	Apple IIe Card	2.1
Applied Engineering	DataLink LC	A
	TransWarp LC	A
Asanté Technologies	FriendlyNet LC/10T	4.0
	FriendlyNet LC/TN	4.0
	MacCon LC/10T	4.0
	MacCon LC/PN	4.0
	MacCon+ LC	4.0
Avatar Corporation	MacMainframe Coax Workstation for the LC	5.0
	ADV.3270 A/G	1.1b8
	ADV.3270A	1.1b8
	Netway 3287	1.1b8
Cayman Systems	GatorCard	1.1.2
Dayna Communications	DaynaPort Ethernet LC	7.12
	DaynaPort Ethernet LC-12	7.12
	DaynaPort Ethernet LC-A	7.12
	Transceiver TRX	1.0
	Transceiver TRX-T	1.0
DCA	IRMA WorkStation for Macintosh	2.1.0
	MacIRMA API	1.3.1
	MacIRMA DAL	1.1
	MacIRMA Entry Emulator	1.2.8
	MacIRMA Graphics	2.0.1
	MacIRMA WorkStation	2.0.1
E-Machines	DoubleColor LC	1108-LCI6
Fusion Data Systems	TokaMacLC	1.4
Lapis Technologies	ColorServer LC-21	1.1
	DisplayServer LC	1.1
	DisplayServer LC-21	1.1
National Instruments	LC-GPIB	4.0.1
Radius	ColorPivot	2.3
RasterOps Corporation	8LC	1.1
	ClearVue/GSLC	1.1
	ClearVue/LC	1.0
Second Wave	Apex LC	AL162
SuperMac Technology	Spectrum/8 Series III LC	1.0.2
	Spigot for the Macintosh LC	1.1
Technology Works	Ethernet 10T/THIN	1.2
	LC FPU	**

** Requires Apple Ethernet LC Card with marketing number M0443LL/B or M0443Z/B.*

*** Contact vendor for any necessary updates.*

This list was compiled by Apple Computer based on recommendations from hardware developers. The list does not include all LC-compatible boards. For questions about products that are not on this list, contact the products' vendors.

printers. Two years ago, the Personal LaserWriter NT debuted for $3299. Its successor, the Personal LaserWriter NTR, retails for $2199—and it's faster and flashier (see "Testing the Personal LaserWriter NTR").

There is one catch. To cut the Personal LaserWriter NTR's cost, Apple did away with the paper-cassette base and 250-sheet tray that were standard on the Personal LaserWriter NT. As a result, the NTR's only paper source is its multipurpose tray, which holds a scant 70 sheets. Apple says its research showed most NT users print only 25 pages per week, and that the average document length is 2 pages. If you plan to work your NTR harder than that, you'll need to buy the cassette base for $199 and a paper tray for an additional $79.

The NTR owes its speed to a 16MHz American Micro Devices Am29005 processor, an enhanced version of the chip that drives Apple's high-end color video board, the Macintosh Display Card 8•24GC. The 29005 is a RISC (reduced instruction set computer) processor—its internal instruction set has been streamlined for fast performance. You'll hear more about RISC processors, an area in which Apple and IBM are collaborating. The Personal LaserWriter NTR is the first Apple printer to take a RISC; Apple's other PostScript printers use various members of the Motorola 68000 family. The Personal LaserWriter NT uses a 68000 running at 12MHz.

The Personal LaserWriter NTR The new NTR is much faster than the printer it replaces, and it provides PostScript Level 2 and built-in support for TrueType fonts. The new printer's only step backward is a smaller paper-tray capacity of 70 sheets instead of 250.

NTR Printer Ports The NTR provides more flexible attachment to computers. From left to right, the Centronics parallel port, thumbwheel setting for specifying emulation modes to ports, serial port, and LocalTalk port.

The Personal LaserWriter NTR is also the first Apple printer to provide a Centronics parallel connector for attaching to DOS PCs (see "NTR Printer Ports"). LaserWriters have always been able to talk to PCs through the serial port, but serial communication is slow, and locating or making a PC-to-LaserWriter cable isn't easy. Most PostScript printer vendors provide a parallel port; Apple has finally joined them.

All the Personal LaserWriter NTR's ports are active simultaneously, as are the ports in Apple's LaserWriter IIf and IIg. You can connect a Mac to the NTR's LocalTalk connector and a PC to its parallel port, and print from a Mac or PC without having to flick a switch—kind of. The Personal LaserWriter NTR does not automatically switch between its PostScript mode and its HP LaserJet emulation mode (it supports the latest version of HP's PCL 4 printer language but not the more capable PCL 5), depending on the data it's receiving.

You must use a rear-panel switch to manually set up the printer's operating modes—assigning, for example, the parallel port to HP emulation and the LocalTalk port to PostScript operation. By contrast, some printers—most notably the QMS line—examine incoming data and automatically switch to the proper operating mode. If you need this kind of printing flexibility (and generally, only offices using older IBM PC software do), you must graft it onto the Personal LaserWriter NTR using a utility called Printer Control Panel, from LaserTools.

Like the LaserWriter IIf and IIg, the Personal LaserWriter NTR uses Adobe PostScript Level 2, the latest and fastest version of the PostScript language. (Alas, a Level 2–aware version of Apple's LaserWriter printer driver, which would boost performance even more, is still some months away. Apple now has three printers that include PostScript Level 2, and no driver in sight.) And like its senior siblings, the NTR's controller contains software for scaling TrueType fonts (converting the font outlines into the sizes needed for a given page). Having the scaler in the printer means the LaserWriter driver doesn't have to download it before a print job, as it does for most other PostScript printers. The result is faster performance when printing documents containing TrueType. In Macworld Lab tests, the LaserWriter NTR printed a TrueType document as quickly as the LaserWriter IIg does.

The Personal LaserWriter NTR ships with 3MB of memory; you can add 1MB to boost downloadable font capacity and overall performance. The Personal LaserWriter NTR includes version 7.1.1 of the LaserWriter driver. Don't use the NTR with version 7.1 of the LaserWriter driver, which shipped last January as part of the System 7 Tune-Up package; Apple says version 7.1 contains bugs that make it incompatible with the Personal LaserWriter NTR. Version 7.1.1 contains the same performance enhancements as 7.1's, most of which deal with how TrueType fonts are scaled on a PostScript printer. In a nutshell, LaserWriter 7.1 and 7.1.1 interrogate the printer at the beginning of a print job to determine the best way to print TrueType fonts on that printer. By contrast, LaserWriter 7.0 simply transmitted a mélange of PostScript code to the printer and let the printer choose the best scaling method.

The new method speeds printing by reducing the amount of data sent over LocalTalk. You'll want the new driver if you use TrueType fonts extensively. If you have more than one Mac, be sure to

update each machine's driver; don't mix and match versions.

Paper and Performance

THE PERSONAL LASERWRITER NTR USES the same 4-pages-per-minute Canon LX engine as does the rest of the Personal LaserWriter family. The combination of a high-speed RISC processor and a slow engine may sound like an odd couple, but it isn't. Most people who use a personal PostScript printer print relatively short documents and want to see those pages as quickly as possible. In this kind of scenario, the weak link in the chain is the printer's controller, not its engine. This is why you'll also find RISC processors in personal PostScript printers from Epson, Texas Instruments, NEC, Dataproducts, NewGen Systems, and Qume, as well as in controller upgrade boards from Xante.

Setting up the Personal LaserWriter NTR is as simple as removing some packing material and then sliding the disposable toner cartridge into place. If you're loath to litter the landfill with spent toner cartridges, take heart: Apple's cartridges now include a prepaid shipping label you can use to return used ones for recycling. Apple still recommends against using cartridge remanufacturing services, saying that some companies' shoddy remanufacturing techniques can cause toner to spill inside the printer, damaging its engine.

Although the Personal LaserWriter NTR is faster and less expensive than its predecessor, its output quality is the same. Apple didn't endow the NTR with its new output-improvement technologies: FinePrint, which smooths the jagged edges of text and line art; and PhotoGrade, which dramatically improves the appearance of scanned images (see "High-Performance Printing," *Macworld*, December 1991). Omitting PhotoGrade makes sense: it requires 5MB of printer memory, and that would have boosted the NTR's cost. But I'm disappointed that the NTR doesn't include FinePrint. The NTR's product manager hinted that future Apple personal printers will include some form of output enhancement. Until then, for enhanced output at a bargain price, your only choice is Hewlett-Packard's sluggish LaserJet IIIP Printer (see *Macworld*, *Reviews*, January 1992).

Redefining the Low End

THERE'S NO QUESTION THAT THE LC II and Personal LaserWriter NTR strengthen the low end of Apple's product line. Customers whose needs aren't met by the bare-bones Mac Classic and StyleWriter printer now have a selection of more-capable but still affordable machines: the Classic II, the LC II, and the Personal LaserWriter LS and NTR. (The Personal LaserWriter LS has also improved of late: last January Apple released a faster version of its driver and expanded its font set to 39 fonts. The LS's retail price has also been cut by $100, to $1199.)

In some ways, the LC II redefines the low end of Apple's product line. Although the 68000-based Classic and PowerBook 100 remain available, it's clear that the 68030 is becoming the baseline processor in the Macintosh line. And by putting 4MB in even the cheapest LC II, Apple finally seems to be acknowledging what the rest of us have known all along: in the world of System 7 and QuickTime, 2MB isn't enough.

But the LC II also illustrates the cost pressures Apple faces in developing products that are competitive with DOS PCs. During the *Macworld* briefing, the LC II's product manager pointed out the cost-cutting measures: the elimination of a plastic fan bracket, SIMM socket, and second-floppy connector. You can also see where Apple chose economy over innovation: the 16-bit data paths, the power supply that doesn't permit soft power and provides only 4 watts to expansion boards, the memory-controller chip that wastes 2MB in fully expanded machines. And in the new printer, there's the missing paper tray and no resolution enhancement.

Still, these shortcuts don't detract from the overall value of the LC II or Personal LaserWriter NTR—especially since they cost the same as, or less than, the gear they replace. If a few shortcuts enable Apple to offer faster or more-capable products for the same or less money, who's to argue? We'll still see technical breakthroughs in new, higher-priced Macs, but at the low end, it may be time to adjust our expectations. In some ways that's regrettable, but remember that the guiding philosophy behind low-cost, high-volume computing isn't "dare to innovate." It's "a penny saved is a penny earned." **m**

See *Where to Buy* for contact information for Apple products.

IIsi VERSUS LC II

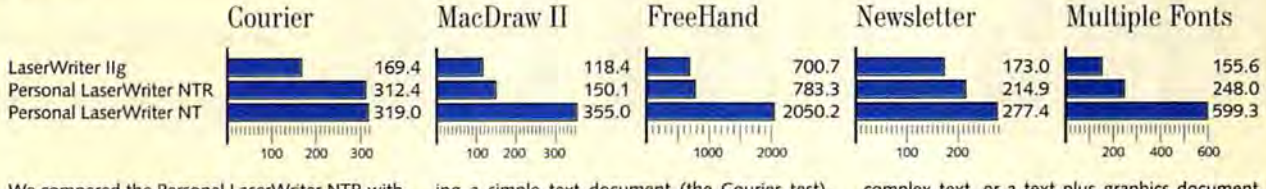
	Mac IIsi	Mac LC II
Processor	68030 at 20MHz	68030 at 16MHz
Math coprocessor	provided by slot adapter boards	none; provided by some third-party expansion boards
Data paths	32-bit	16-bit
Expansion slot	NuBus or 030 Direct Slot; both are 32-bit	no NuBus support; 16-bit LC Slot
Memory expansion	to 17MB	to 10MB
Built-in video supports Apple Portrait Display	yes	no
Soft power support	yes	no
Sound	stereo	mono
Price	$2499 (3/40) $2999 (5/80)	$1699 (4/40) $2049 (4/80)

Contributing editor JIM HEID has been writing about the Mac since its introduction. His latest books are *Macworld Guide to Microsoft Word 5* and *Macworld Complete Mac Handbook*, both published by IDG Books Worldwide.

Macworld Lab testing supervised by MARK HURLOW and DANNY LEE.

MW LAB Testing the Personal LaserWriter NTR

Times are in seconds.



We compared the Personal LaserWriter NTR with its predecessor, the Personal LaserWriter NT, and its high-end brother, the LaserWriter IIg. In printing a simple text document (the Courier test), the LaserWriter NTR showed no speed improvement over the NT. But in printing graphics, complex text, or a text plus graphics document (the Newsletter test), the LaserWriter NTR's speed nearly equaled that of the LaserWriter IIg.

How to Keep Your Mac Current

A Step-by-Step Guide for Adding Memory

All Macs running System 7 have one thing in common: at least 2 megabytes of RAM are needed on the logic board to accommodate System 7's hunger for memory. Even if you haven't made the big move to System 7, chances are that your Mac's appetite for memory has grown recently. Most major commercial applications demand many megabytes of memory, and anyone who has used MultiFinder—an option for pre–System 7 users and the status quo for the rest of us—can tell you that it takes lots of memory to juggle multiple programs. ❖ System 7 will not run in less than 2MB of RAM, and realistically it demands at least 4MB. Today, even word processors have difficulty functioning in 1MB of memory. Of course, if you use the Mac for desktop publishing, multimedia, image processing, or any of the other tasks at which the Mac excels, larger memory configurations are mandatory. ❖ How much memory do you need? It depends on the applications you use. Graphics-oriented programs, such as Adobe Photoshop, Deneba Software's Canvas, and Aldus PageMaker, require at least 1.5MB and thrive with more than 2MB. Data-oriented programs like Microsoft Word and Claris's FileMaker Pro get by with 1MB. ❖ Software makers often

by Shelly Brisbin

PHOTOGRAPHS BY JOHN WILLIAM LUND

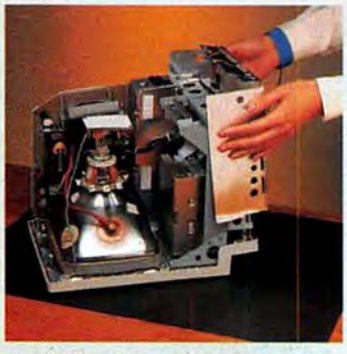
TECHNOLOGY WORKS
MADE IN USA

STEP ONE: How to Prepare Your Mac for an Upgrade

Compact Macs

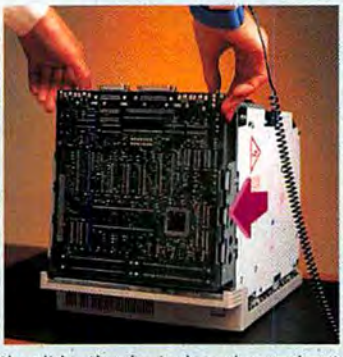
1 Turn off the Mac and unplug it. Then remove the mouse, keyboard, and any other peripherals. Lay the computer on its front, screen side down, on a clean, flat table. Use the Torx screwdriver to remove the screws from the back of the Mac's case, including the two under the handle, and on the Plus, the one located under the door to the battery compartment.

2 Use a spreading tool (available from specialty Mac and electronics stores) to separate the back cover of the case. It will be stiff the first time you do this. Remove the back cover of the machine and set it aside. Minimize the static electricity that is generated by your clothing, the carpet, or other charged objects—static can harm SIMMs. Touch the computer's chassis with your hand or use a grounding strap to discharge any static electricity.



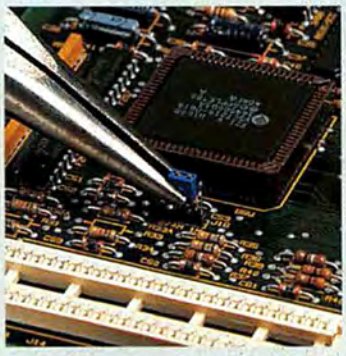
3 On a Mac Plus or early SE, lift up and remove the foil shield that sits under and around the logic board on the bottom of the computer.

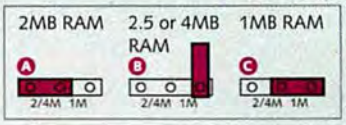
4 Disconnect the power video (A) and disk-drive cables (B) from the logic board. (You have to press the power cable's clips to remove the board.) Be careful not to touch the monitor's yoke (C) (it is very fragile), the white card attached to it (D), or the red discharge cable (E) (it has a very high voltage even when the Mac is unplugged). Disconnect the speaker wire. For an SE/30, remove any boards in the Processor Direct Slot (PDS).



5 Gently slide the logic board up about an inch and lift it toward you, out of the machine. (For a Plus, slide it up all the way.) You can now set the computer aside.

6A Mac Pluses and early SEs have a small resistor, which must be clipped for the machine to use extra memory. On a Plus the resistor is labeled R8; on an SE it is R35. On the Plus the resistor is located near the printer port; on the SE it is near the memory banks. Clip one wire of the resistor with a small pair of scissors or wire cutters and bend the wire aside. Don't remove the resistor.

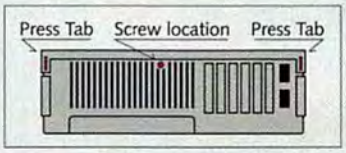




6B Later SEs use a memory jumper, instead of a resistor. There are three positions. Set the jumper to 2/4M (A) if you will have a total of 2MB installed after adding memory, as illustrated above. If you will have 2.5MB or 4MB after upgrading, set the jumper to the off position (B). (The third position [C] is used if you have 1MB of RAM total.)

To determine what memory configurations your Mac supports, see "Step Two: How to Configure Memory."

Modular Macs



Turn off the Mac and unplug it. Then remove the mouse, keyboard, and any other peripherals. Some modular Macs have tops that simply lift off; with others you must press a button to disengage the top before lifting it off. The illustration above shows the type with the buttons. Some Macs also have a screw to be removed, located as shown above.

To determine what memory configurations your Mac supports, see "Step Two: How to Configure Memory."

WARNING

Upgrading memory yourself may void your warranty, cause damage to your Mac, or expose you to serious injury.

advise users to double these standard allocations to get good performance. You can allocate how much RAM a program gets by clicking once on the application icon, choosing Get Info from the File menu, and entering the amount of memory you want to reserve for the program. But don't allocate very large amounts of RAM to each application—the law of diminishing returns definitely applies to RAM allocation. Plus you'd be denying yourself access to excess memory that would come in handy for using MultiFinder under System 6 or launching multiple applications under System 7.

When figuring how much memory you need, don't forget about INITs, system extensions, control panels, and fonts—they all gobble memory. So do electronic mail, macro utilities, and networking software. Use the About This Macintosh menu (for System 7) or the About the Finder (for System 6) item on the Finder's Apple menu to assess your memory load. If you're using most of your memory with only the Finder running, it's time for an upgrade.

Generally speaking, 4MB to 8MB is a good range. The more graphics-oriented applications you use, the more reason to get a larger amount of RAM.

Recognizing this need for more memory, Apple now sells Macs with configurations from 2MB to 8MB, and most Macs can be expanded further. Many third-party vendors will sell you as much memory as your Mac can hold, at prices that are 1/10 what they were a couple of years ago.

Fortunately, adding RAM to most Macs is a relatively simple and inexpensive undertaking, once you understand the rules for configuration and installation.

All Macintoshes except the Mac Portable and the PowerBooks use what is called *dynamic* RAM (DRAM), which is sold in sizes ranging from 256K to 16MB. This RAM is "dynamic" because information is periodically refreshed to prevent data from disappearing. Memory chips are mounted onto a rectangular circuit board with connectors on the bottom. This unit is called a SIMM (Single In-line Memory Module), and it fits into slots on the Mac's logic board. A few newer Macs like the Quadras come with RAM chips soldered onto the logic board and have additional SIMM slots for memory expansion.

The Portable and The PowerBooks use *static* RAM, which needs no refreshing to retain its contents. A plus is its lower power consumption. But static RAM's high cost makes it too expensive for desktop computers.

The most common DRAM SIMM sizes are 256K and 1MB, although 2MB, 4MB, and 16MB varieties are becoming less expensive and more popular. A variant of the 16MB SIMM, called a composite SIMM, is more affordable than a true SIMM because instead of eight 16Mbit chips, it uses more of the cheaper, lower-capacity chips (for example, thirty-two 4Mbit chips) and a controller chip (called a PAL, or programmable array logic, chip) to simulate true 16MB SIMMs, which are made of eight 16-megabit chips.

Memory Limits by Mac Model

Each Macintosh model has constraints—of both supported hardware and addressable memory—peculiar to its design, even those based on identical CPUs. Special considerations for installation are described in "Step Two: How to Configure Memory."

Mac Classic Expansion board required to add memory. Can upgrade to a Classic II.

Mac Classic II Memory limited to 8MB in 24-bit mode.

Mac II SIMMs greater than 1MB cannot be used in Bank A; 4MB and 16MB SIMMs must be PAL SIMMs. Cannot effectively run 16MB SIMMs. Memory limited to 8MB in 24-bit mode.

Mac IIci Because Bank A shares memory addresses with the built-in video RAM, using SIMMs of 2MB or greater can slow the IIci when the built-in video is used.

Mac Classic IIcx Memory limited to 8MB in 24-bit mode. Can be upgraded to a IIci or Quadra 700.

Mac IIfx Uses special 64-pin SIMMs.

Mac IIsi Under System 7 virtual memory only 12MB may be accessed.

Mac IIx Memory limited to 8MB in 24-bit mode. 4MB and 16MB SIMMs must be PAL SIMMs. Cannot effectively run 16MB SIMMs.

Mac LC and LC II Lack of PMMU option prevents expansion past 10MB.

Mac Plus Does not support virtual memory. An accelerator will let more than 4MB of RAM be addressed.

Mac Portable RAM expansion is limited to 5MB if the Processor Direct Slot (PDS) is used for peripherals. RAM boards for the RAM and PDS must be compatible with each other. Does not support virtual memory.

Mac PowerBook 100, 140, and 170 RAM expansion requires special pseudostatic-RAM boards.

Mac Quadra 700 16MB SIMMs must be low-profile.

Mac SE Does not support virtual memory.

MacSE/30 Memory limited to 8MB in 24-bit mode. Can't use 16MB composite SIMMs.

A Question of Speed

FAST MACS—THE IIFX, IICI, AND QUADras—need faster SIMMs (80 nanoseconds or better), since the hardware in these Macs can communicate fast enough to benefit from these faster memory chips. The LC, IIsi, and Portable need at least 100ns RAM, while the SE/30, II, IIx, and IIcx need at least 120ns RAM. Old Macs—the Plus, Classic, and SE—use at least 150ns RAM.

Using fast RAM in a slow machine won't cause any problems (though it won't make the Mac run faster), and it usually isn't any more expensive. But using slow RAM in a fast machine can hinder performance. If you have an older machine and know you will eventually trade up to a faster model or buy an accelerator, you might as well purchase fast memory in the first place. But do make sure that the fast memory you buy for your current Mac will work with the Mac you intend to upgrade to later. (See "Step Two: How to Configure Memory" for Mac memory configuration guidelines).

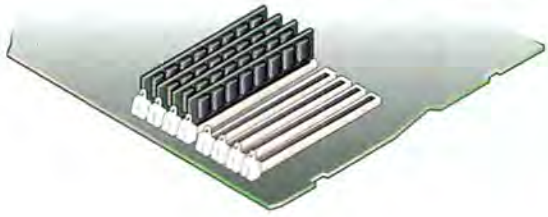
It is possible to mix and match memory speeds in the same machine, or even in the same bank, as long as the slowest SIMM is no slower than the speed recommended by Apple.

Knowing Your Address

MAC MEMORY CAPACITY ISN'T INFINITE. The primary limiting factor on memory is a Mac's CPU, which can process only a certain number of bits at once. That number determines the CPU's number of *addresses* (one for each byte of memory), which tell the CPU where to find and record information. A Motorola 68000 CPU, like that used in a Classic or SE, can process data in 24-bit chunks internally (although only in 16-bit chunks when talking to devices like drives and monitors), which means it can theoretically have 2^{24} addresses, or 16MB. But on most 68000-based Macs, 12MB are taken up by the ROM, SCSI bus, and other internal hardware, leaving just 4MB of RAM for pro-

STEP TWO: How to Configure Memory

Each Macintosh has different permissible memory configurations, as well as different positions for memory banks. The illustrations on this page show the location of memory banks for all desktop Macs but the Classic, which uses a board for memory expansion. Boards are oriented so their backs are at the top. We show all SIMM capacities supported by each machine, except for configurations using 8MB and 16MB SIMMs, which are not readily available.



The following installation rules apply to all Macs:

1) Each slot requires one SIMM. All slots in a bank must be filled, but banks may be left completely empty (as shown to the left in the closeup of an SE/30's banks configured for 4MB).

2) Do not mix SIMMs of different capacities in the same bank.

3) Unless otherwise noted, if you fill only one bank, fill bank A.

4) Unless otherwise noted, if you use SIMMs of different capacities in each bank, put the higher-capacity SIMMs in Bank A.

Classic II

The Classic II has one expansion bank with two slots. 2MB is soldered onto the logic board.

RAM	Bank A
2.5MB	256K
4MB	1MB
6MB	2MB
10MB	4MB

Plus

SE

The Plus and SE have two banks with two slots per bank.

For SEs that have a memory jumper, if you use SIMMs of different capacities in each bank, put the higher-capacity SIMMs in Bank B. For these SEs, if you fill only one bank, it must be Bank B.

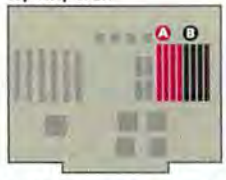
RAM	Bank A	Bank B
1MB	256K	256K
2 MB	none	1MB
2.5MB	256K	1MB
4MB	1MB	1MB

SE/30

The SE/30 has two banks with four slots per bank. Total RAM possible with 16MB SIMMs is 128MB.

RAM	Bank A	Bank B
1MB	256K	empty
2MB	256K	256K
4MB	1MB	empty
5MB	1MB	256K
8MB	1MB	1MB
16MB	4MB	empty
17MB	4MB	256K
20MB	4MB	1MB
32MB	4MB	4MB

II, IIx, IIcx



The II, IIx, and IIcx have two banks with four slots per bank. Total RAM possible with 16MB SIMMs is 128MB, except for the Mac II, which ignores any memory above 68MB.

For the II and IIx, if you use SIMMs of different capacities in each bank and you are using SIMMs of 2MB or greater capacity, put the higher-capacity SIMMs in Bank B.

RAM	Bank A	Bank B
1MB	256K	empty
2MB	256K	256K
4MB	1MB	empty
5MB	1MB	256K
8MB	1MB	1MB
16MB	4MB	empty
17MB	4MB	256K
20MB	4MB	1MB
32MB	4MB	4MB

IIci

The IIci has two banks with four slots per bank. Total RAM possible with 16MB SIMMs is 128MB.

If you use SIMMs of different capacities in each bank and you use the on-board video, put the higher-capacity SIMMs in Bank B.

RAM	Bank A	Bank B
1MB	256K	empty
2MB	256K	256K
4MB	1MB	empty
5MB	1MB	256K
8MB	1MB	1MB
8MB	2MB	empty
12MB	2MB	1MB
16MB	2MB	2MB
16MB	4MB	empty
17MB	4MB	256K
20MB	4MB	1MB
24MB	4MB	2MB
32MB	4MB	4MB

IIfx

The IIfx has two banks with four slots per bank. Total RAM possible with 16MB SIMMs is 128MB.

RAM	Bank A	Bank B
4MB	1MB	empty
8MB	1MB	1MB
16MB	4MB	empty
20MB	4MB	1MB
32MB	4MB	4MB

IIsi

The IIsi has one expansion bank with four slots. 1MB of RAM is soldered onto the logic board. Maximum RAM with 16MB SIMMs is 65MB.

RAM	Bank A
2MB	256K
3MB	512K
5MB	1MB
9MB	2MB
17MB	4MB

LC, LC II

The LC and LC II each have one expansion bank with two slots. The LC has 2MB of RAM soldered onto the logic board; the LC II has 4MB.

LC RAM	LC Bank A	LC II RAM	LC II Bank A
2.5MB	256K	4.5MB	256K
4MB	1MB	6MB	1MB
6MB	2MB	8MB	2MB
10MB	4MB	10MB *	4MB

*Although this configuration puts 12MB of SIMMs on the logic board, the LC II will use only 10MB of it.

Quadra 700

The Quadra 700 has one expansion bank with four slots. 4MB of RAM is soldered onto the logic board. Maximum RAM with 16MB SIMMs is 64MB on the Quadra 700; adding the four 16MB SIMMs to do this brings total RAM to 68MB, but the Quadra 700 can address only 64MB of it.

RAM	Bank A
8MB	1MB
20MB	4MB

Quadra 900

The Quadra 900 has four banks with four slots per bank. Maximum memory possible with 16MB SIMMs is 256MB.

RAM	Bank A	Bank B	Bank C	Bank D
4MB	1MB	empty	empty	empty
8MB	1MB	1MB	empty	empty
12MB	1MB	1MB	1MB	empty
16MB	1MB	1MB	1MB	1MB
16MB	4MB	empty	empty	empty
20MB	4MB	1MB	empty	empty
24MB	4MB	1MB	1MB	empty
28MB	4MB	1MB	1MB	1MB
32MB	4MB	4MB	empty	empty
36MB	4MB	4MB	1MB	empty
40MB	4MB	4MB	1MB	1MB
48MB	4MB	4MB	4MB	empty
52MB	4MB	4MB	4MB	1MB
64MB	4MB	4MB	4MB	4MB

See "Step Three: How to Install Memory" for instructions on placing SIMMs.

How to Shop for Memory

Following the rapidly changing cost of Macintosh memory is as simple as looking in the back section of any Mac magazine. Lots of vendors sell SIMMs, and prices have declined to 10 percent of what they were a few years ago. The most common size found in all Mac models—1MB SIMMs—sells for between $35 and $50 apiece. The 2MB SIMMs cost about $70 each (or $35 per megabyte). And the 4MB variety no longer comes at a price penalty; it sells for $120 to $150 per chip ($30 to $38 per megabyte). The new 16MB SIMMs are still very expensive, but prices are projected to decline; if you need to use such large-capacity SIMMs, look at a cheaper variety called a composite SIMM, which is a SIMM with four layers of 4MB chips that provide 16MB of total RAM.

Plenty of dealers also upgrade RAM, although their SIMM prices are a bit higher, and they charge for labor.

There are only a few caveats for memory buyers. Be sure to get memory that's shipped in antistatic containers and comes with either an installation video or a well-illustrated instruction booklet. Look for a vendor that offers toll-free technical support. SIMMs are made up of memory chips soldered onto layered circuit boards. The number of layers has a lot to do with the quality of memory. Some experts advise that you choose SIMMs composed of four, rather than two, layers, since a thinner board generates electrical noise between the memory chips. But Apple's tests show that well-designed two-layer SIMMs perform as well as do well-designed four-layer ones. Most SIMM boards are composed of four layers. You should also choose SIMMs that are fast-page memory, since Macs based on the 68030 and 040 processors were designed for this type of SIMM. Do not use static-column or nibble-mode SIMMs.

Another factor affecting SIMM quality is the method of manufacture. While handmade goods may be preferable in other circumstances, the best SIMMs are produced by pick-and-place machines, which closely regulate the position and alignment of memory chips. A few manufacturers save the cost of equipment by assembling SIMMs by hand, which can lead to inconsistent quality. Because most SIMM manufacturers sell in high volume, their products are usually produced by machine. But if a price seems too good to be true, ask about materials used and method of assembly.

Regular SIMMs use eight RAM chips, since there are eight bits in a byte—eight 1-megabit chips allow 8MB of RAM. Composite SIMMs, like the one at top from TechWorks, use more chips—sixteen 1-megabit chips allow 16MB of RAM.

SIMMs are not particularly susceptible to failure. If you install a memory module and it works, chances are that it will continue to function for several years. Some manufacturers and vendors offer lifetime warranties, and most of them will replace defective SIMMs with new ones.

You may notice when shopping for memory that Mac SIMMs are usually composed of eight chips per SIMM, while those for DOS and Unix computers usually have nine chips per SIMM. The extra chip handles parity, which checks for and corrects any data errors in the other chips. Memory chips are so reliable that Apple has never required parity RAM in its systems, but computers designed earlier—when reliability was less known—did require them. Some Mac IIci's were designed to use parity RAM to meet the federal government's procurement requirements, and you can use SIMMs with parity chips on any Mac with no ill effects—but with no technical benefits, either. The only advantages are that you may find such parity SIMMs for less (unlikely with today's low SIMM prices) and that in a mixed-platform environment it may be convenient to use SIMMs from other machines.

grams. (The Mac Portable and PowerBook 100 use newer ROMs, so they have more memory available for programs.)

The 68020, 030, and 040 are 32-bit CPUs, so they theoretically can handle 2^{32} addresses, or 4 gigabytes. But most use only 24 bits (to be compatible with the 68000-based Macs), limiting the memory to 16MB. Of that 16MB, half is reserved for internal functions, leaving 8MB for programs. Under System 7 and with newer ROMs, Macs using the 68020, 030, and 040 could use all 32 bits, theoretically giving them access to all 4GB. But in reality, they are limited to 1GB, since 3GB are reserved for internal functions.

There are two more considerations for how much memory a Mac can actually use. First, the ROMs, operating system, and applications must support 32-bit addressing—called being *32-bit clean*—to access the maximum amount of memory. Second, you need chips with very high capacity or a Mac with lots of slots in which to place lower-capacity memory chips to give you that much memory. Today, there are neither chips with that much capacity nor Macs with that many slots. The result is that memory addressable by programs is limited to 256MB on the Quadra 900 and 128MB on the other 32-bit machines. (The limited number of RAM slots on the IIsi and PowerBooks means you can't install that much memory on them. See "Memory Limits by Mac Model," for other such constraints.)

If you use System 7 on an 020-, 030-, or 040-based Mac, you can choose 32-bit addressing from the Memory control panel. Using the guidelines in "Step Two: How to Configure Memory," you can determine how much memory is available to you under this setup. The major drawback of 32-bit addressing is that not all Mac applications support it. If you intend to use an older application—one that has not been updated since System 7 was released—chances are that it will not be 32-bit clean. And even new software is not guaranteed to support 32-bit addressing. To use 24-bit software, you need to turn off 32-bit addressing, thus losing access to memory above the first 8MB.

There's one final catch to taking advantage of large amounts of memory: 68030-based Macs that predate the IIci (the SE/30, IIcx, and IIx) have what are known as *dirty* ROMs. The 68020 Macs (the II and LC) have the same limit. Put simply, these Macs lack the ability to run in 32-bit mode, so they cannot recognize and address large amounts of RAM and virtual memory. (Virtual memory is a portion of a hard drive that acts as if it were RAM.) Even if you install more RAM, Macs with dirty ROMs are limited to ad-

dressing 8MB. While Apple's newer machines correct the dirty-ROM problem, owners of the others can opt to use Connectix Corporation's Mode32, an INIT (under System 7, an extension) that emulates the newer, 32-bit clean ROMs. Since fall of 1991, Apple has licensed Mode32 from Connectix and will make it available in future versions of its operating system. If you have an accelerator board, however, you may be able to address more than 8MB of RAM; check the documentation for your particular board.

Check Your Memory Banks

IN ALL MACS THE SLOTS THAT HOLD SIMMs are organized into *banks*, which are groups of slots that the Mac treats as one large memory repository. Small Macs like the Plus, SE, and Classic generally have two banks with two slots each, while most other Macs use two banks with four slots each. There are exceptions: Macs with RAM soldered onto the logic board, like the IIsi and Quadra 700, which have one bank of four slots. The Quadra 900 is the only four-bank Mac, with four slots in each bank. The Classic II and LC each have a single, two-slot bank, and the Classic's memory expansion board includes a two-slot bank.

The importance of knowing how many banks there are—and which bank you are using—becomes apparent when you try to install SIMMs of different sizes and speeds.

There are four basic rules for memory installation.

- Each SIMM bank must be either completely full or completely empty.

On 32-bit Macs (the Mac II and all 68030 and 040 machines, except the Classic II) memory must be added in groups of four SIMMs. This corresponds to the bank structure of these machines: four SIMM slots per bank. For example, in an SE/30, you have to completely fill Bank A's four slots.

All 68000-based Macs are 16-bit machines, for which memory can be added in pairs. In a Mac SE, for example, you can fill the two SIMM slots in one bank with 1MB SIMMs, leaving the other two slots in the other bank empty.

- Each SIMM bank must be filled with SIMMs of the same capacity.

In the Mac II series, the LC, and the Quadras, it is impossible to mix SIMM capacities within the same bank. Therefore, in a Mac IIsi (which has only one bank), you must use four 1MB SIMMs or four 2MB SIMMs, for example. In a Mac IIcx, you could fill one bank with all 1MB or all 4MB SIMMs and place the 256K SIMMs shipped with the machine in the other bank.

- If you fill just one bank with SIMMs, use Bank A.

There is only one exception to this rule: If you fill only two slots (one bank) in later versions of the Mac SE, those with memory jumpers rather than an R35 resistor (see "Step One: How to Prepare Your Mac for an Upgrade"), use Bank B, not Bank A.

- The SIMMs with the greatest capacity should be placed in Bank A.

There are two exceptions. First, the version of the SE that uses a memory jumper instead of a resistor requires that the highest-capacity SIMMs reside in Bank B. Second, if you use SIMMs of 2MB or greater capacity on a Mac II or Mac IIx, or if you use such SIMMs on a Mac IIci that's using the on-board video, put the greatest capacity SIMMs in Bank B.

Installing Memory

MACS AND THEIR MEMORY CONFIGURATIONS can be divided into three categories: compact (the Mac Plus, SE, Classic, Classic II, and SE/30), modular (the Mac LC, II, IIx, IIcx, IIsi, IIci, IIfx, and Quadra 700 and 900), and portable (the Mac Portable and PowerBook). In general, compact Macs have four slots, or room for 4MB of memory using 1MB SIMMs. Most of their modular cousins have at least eight slots. The Mac Portable and PowerBooks do not use SIMMs and present a unique set of memory-installation issues.

Before you decide to upgrade a Mac's memory yourself, take note: memory installation by unauthorized individuals voids the Mac's warranty. This is true of the Mac II line, the LC, and the Quadras, not just the hard-to-open compact Macs. Apple believes that the memory components and the slots they plug into are too fragile to be handled by the typical user, even in the modular Macs designed to be opened easily. (The only exception is the Macintosh Portable, which was designed for user-performed memory upgrades.)

More important, if you install memory, you risk damaging internal components or injuring yourself through electrical shock (particularly on a compact Macintosh). You are fully responsible for the decision of whether to work on a compact Mac yourself or to hire a certified technician.

The Compacts Adding memory does not require a degree in engineering, but some users may feel that it's worth the extra expense to have a dealer do the job and avoid the risks of damaging internal components. For those who intend to install their own memory, it is important to take care in opening the computer and placing the memory. The steps are detailed in "Step One: How to Prepare Your Mac for an Upgrade" and "Step Three: How to Install Memory." Make sure you follow the installation instructions that come with your RAM as well.

You will need a #6 Torx screwdriver (a 1/32-inch drive with a 9-inch shaft) and a spreading tool. Some memory upgrades include them; such tools are also available at hardware stores and some computer dealers. Do not use a flat-blade screwdriver, knife, or other such instrument in place of a spreading tool—you will damage the Mac's case.

Modular Macs A major advantage of modular Macs is that they support a wider variety of memory configurations, and usually have more SIMM slots than the compacts do. All use 68020, 030, or 040 processors, which have wider address buses and thus can access more memory. "Step Three: How to Install Memory" details the procedure. As with the compact Macs, follow the instructions that come with your RAM.

Portables The new PowerBooks were not designed for field upgrading. Memory upgrades should be performed by your Apple dealer or authorized service technician. The Mac Portable is easily upgradable by following the instructions in the manual or that come with Portable memory upgrades.

Video RAM

ORDINARY RAM LETS YOU RUN MORE software or scan larger photographs, among other things, but a special kind of memory is needed to enhance the display capabilities of some Macs. This memory, called VRAM (video RAM), comes only in the form of 68-pin 256K SIMMs. The Mac LC and Quadras come with VRAM soldered onto the logic board.

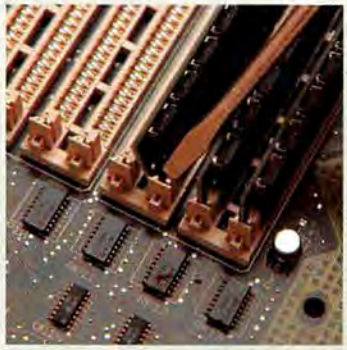
The LC comes with one VRAM SIMM, which lets it support 4-bit color (16 colors simultaneously) on a 13-inch RGB monitor. A dealer can replace the 256K SIMM with a 512K that lets the LC support 8-bit color (256 colors simultaneously) on a 13-inch monitor.

The Quadra 700 comes with two VRAM SIMMs on the logic board and six empty slots for more VRAM (in addition to the slots for regular RAM). If you add no VRAM, the Quadra can support 8-bit color on a 13-inch monitor; if you add two more SIMMs (which brings memory to 1MB), the Quadra can support 24-bit color (16.7 million simultaneous colors) on a 13-inch monitor.

The Quadra 900 comes with 1MB of VRAM and has four slots for additional VRAM SIMMs. This number of VRAM slots may seem like overkill until you realize that larger monitors require more VRAM because they display more pixels.

STEP THREE: How to Install Memory

Position the Mac's logic board so the RAM banks are nearest you. If you are upgrading a Mac with its original memory complement installed, you may need to remove the existing SIMMs.



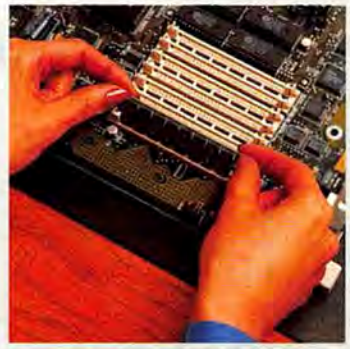
All Macs

To remove existing RAM, gently bend the plastic clips that hold the SIMMs with a ballpoint pen or nonmagnetized screwdriver. Start with one side and pull the SIMM out on that side. Then do the other side. Don't apply extreme force to the clips, since they break easily.

Now you're ready to install new memory. Be sure to start with the slot farthest back so you'll have enough room for your hands when installing the other SIMMs. Remove a SIMM from the static-free bag in which you received it.

Compact Macs

Hold the SIMM at both ends, with the connector side down and the chips facing you, and place it in an empty SIMM slot. With two fingers on the left and right edges of the SIMM, gently lean it back into the plastic clips. Push the SIMM down into the slot. You may hear a slight crack or click. That's normal. Once the SIMMs are installed, rock the SIMMs back and forth and then lean them back to make sure they are seated snugly. Repeat the process until all of the new RAM has been installed.



Modular Macs

Hold the SIMM at both ends, with the connector side down and the chips facing you, and place it in an empty SIMM slot. With two fingers on each edge of the SIMM, gently lean it back into the plastic clips. Push the SIMM down into the slot at a 45-degree angle to the slot. It's normal to hear a slight crack or click. Once they are installed, rock the SIMMs back and forth and then lean them back so they are seated snugly (at a 90-degree angle). Repeat the process until all of the new RAM has been installed.

To see 24-bit color on a 19-inch monitor requires filling all the Quadra 900's VRAM slots, for example.

For other Macs, you have to add VRAM to the display board, and the types of chips used vary with the board.

Virtual Memory

ONCE YOU HAVE BOOSTED THE MAC'S memory, you can take advantage of one of System 7's important additions to the Mac owner's tool chest: virtual memory. With it, a portion of a hard drive can be accessed like physical RAM. This is the opposite of a RAM disk (which some vendors call a silicon disk), which allocates a part of RAM for temporary storage of files and programs.

Virtual memory does have some drawbacks. Real memory is noticeably faster than virtual memory; when accessed, virtual memory runs at about the speed of the hard drive it's running on (that is, relatively slowly). To make the penalty of using virtual RAM less dramatic, use the fastest hard drive available.

But virtual memory, long a staple in the workstation world, does provide an escape valve for those who find themselves in memory bottlenecks. If you are unable to run an application in available RAM, virtual memory could solve your problem. It is a great way to get a temporary memory boost when an application needs it, without having to buy RAM that is not needed most of the time.

If your modular Mac, Classic II, or SE/30 has a built-in PMMU (Paged Memory Management Unit), accessing virtual memory is as simple as opening the Memory control panel, reserving some hard drive space, and restarting the Mac. Alone among modular Macs, the 68020-based Mac LC cannot use virtual memory because there is no facility for a PMMU. The Mac II, which also uses the 68020 processor, can use virtual memory if PMMU is installed. The 68030 and 68040 CPUs have built-in PMMUs, so all Macs based on them support virtual memory.

If you are using a 68000-based compact Mac, virtual memory is not available unless you purchase a CPU accelerator. These devices essentially replace the old processor with a faster, more capable one. Connectix Corporation sells Virtual 3.0 also, a software program that lets a compact Mac use virtual RAM.

Although the PowerBook 140 and 170 support virtual memory, Apple doesn't recommend using it with these machines because accessing the hard drive for use as virtual memory takes a fair amount of power, and the PowerBooks have only about two hours under typical usage as it is. Despite this potential for increased battery usage, it makes sense to use virtual memory occasionally, for times when an application demands more memory than your PowerBook has.

Good Time to Upgrade

BOOSTING YOUR MAC'S MEMORY IS A good idea. To take advantage of System 7 and more-powerful versions of popular programs, increased memory is a must: 4MB to 8MB is no longer more than most people can use. The benefits of more RAM will be obvious the first time you boot with System 7 installed. And today's low prices for memory put RAM expansion in the reach of most Mac users. There has never been a better time to increase memory. **m**

See *Where to Buy* under "Memory Upgrades" for a list of vendors who sell nationally.

SHELLY BRISBIN, a free-lance writer based in Austin, Texas, has worked as a Macintosh consultant and system administrator in state government and business. She occasionally installs memory for friends and colleagues, and has never broken anything expensive.

Macworld

Lab tests 15

twisted-pair

MOVING UP TO Ether

Ethernet

boards and

recommends

the best bets

by Dave Kosiur

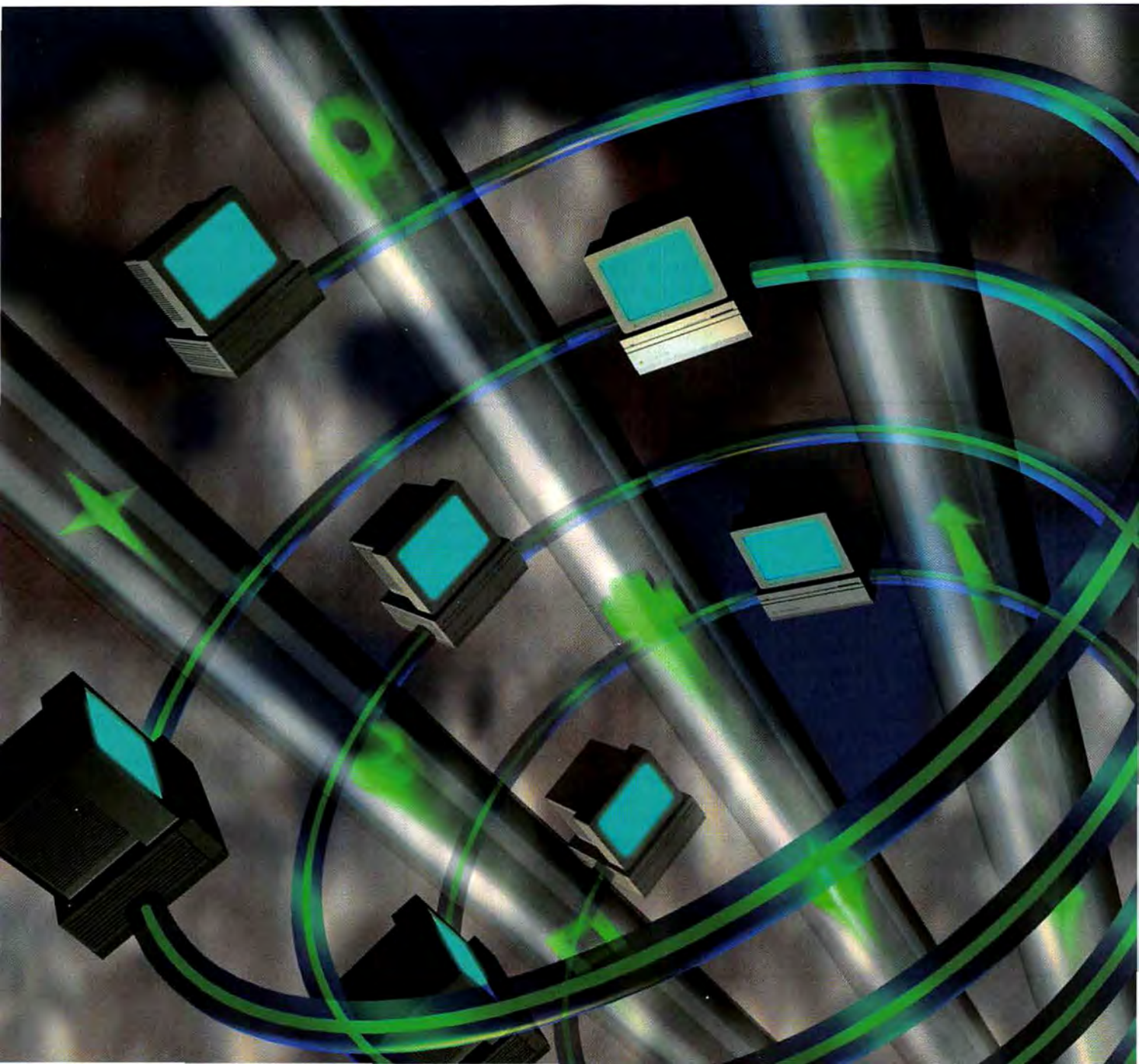
WHEN THE MAC'S BUILT-IN NETWORK SYSTEM, LOCALTALK, starts to run too slow, you should take a long, hard look at Ethernet. If you're transferring large image files or desktop publishing files, running a multiuser database, adding more users to a network, or just printing, the 10-megabits-per-second (Mbps) speed of Ethernet can be mighty appealing. But be careful—just because Ethernet transmits data at 44 times the speed of LocalTalk (which runs at 230 kilobits per second [Kbps]), file transfers between two Macs won't get accomplished at 40 times the speed—most Macs cannot send or receive data that quickly.

You can improve speeds by installing an Ethernet network. To connect a Mac to Ethernet, you need to install an Ethernet board or attach an external Ethernet box to the Mac's SCSI port. The board or box connectors for one of three types of Ethernet wiring—thick, thin, or twisted-pair. Currently, twisted-pair is the most popular because it costs less than other types and is easy to install. To find the best buys, Macworld Lab tested 15 Ethernet NuBus boards that support twisted-pair wiring: 3Com's EtherLink/NB, Apple's Ethernet NB Card, Asanté's MacCon3 for NuBus, Avatar's LanWay Ethernet, Cabletron System's E6000 DNI, Compatible Systems' Ether2, Dayna's DaynaPort E/II-T, Dove's FastNet IIIN, Farallon's PhoneNet Card for Ethernet, National Semiconductor's EtherNode 16 NB, Network Resources' Mac1000, Racal-Datacom's MacConnect Ethernet Card, Shiva's EtherPort II, Sonic Systems' Sonic Ethernet Series, and Technology Works' Ethernet Kit.

Ethernet is a series of standards that governs two parts of a network: the physical cabling and the electrical signals. These standards have been set by the IEEE (Institute of Electrical and Electronics Engineers) and have also been adopted by the international network standards committee, the International Standards Organization (ISO).

Some of the Ethernet standards define how data is transmitted on a network. Networks must be able to keep two computers' data from interfering, or colliding, with each other—otherwise, data would get jumbled and the computers would not be able to communicate. Ethernet uses what's known as CSMA/CD, or Carrier-Sensing Multiple Access with Collision Detection. The Mac listens to the network to determine if there's a signal on the network from another computer that is transmitting data—if there are no other computers transmitting data, the Mac starts transmitting data. If there is a signal already on the network, the Mac waits a few microseconds before trying to send the data. Should two computers start transmitting data at the same time, both computers sense the other's signal and the signals collide. Each computer then waits a random number of microseconds and sends the data again. Although this method doesn't prevent signals from colliding, it ensures that data is not corrupted.

Ethernet standards also govern the type of wiring that can be used. When Ethernet was first invented, a thick coaxial cable resembling the cable from a cable television feed was used. This wiring is



still in use; it goes by the name 10Base5, or more commonly, thick-wire Ethernet. Thick-wire Ethernet can be installed for distances of up to 500 meters between devices because its thick shielding helps prevent line noise.

There's another, thinner coaxial cable that has the official moniker of 10Base2 and goes by the name of thin-wire Ethernet (catchy, isn't it?). Thin-wire Ethernet has less shielding than thick-wire Ethernet and can be used over short distances, up to 200m. Because it is thinner and therefore easier to bend than thick-wire Ethernet, it's easier to install; it's also cheaper. If you use thick-wire or thin-wire Ethernet and want to connect two or more cables (or segments), you need to install a terminating resistor at the point where the cables connect.

The latest type of cabling adopted for Ethernet is unshielded twisted-pair wiring, or 10BaseT. Twisted-pair wiring is similar to the wiring used for phone lines. The cabling for 10BaseT is less expensive than either thick-wire or thin-wire Ethernet, but it requires an additional piece of network hardware—a concentrator. (A concentrator amplifies the electrical signals that Ethernet sends to each network device.) These days, you can get a good concentrator for about $450. Products such as Farallon's StarController and Nuvotech's Turbostar perform the same function as does a concentrator for LocalTalk networks.

Alternatively, you can use fiber-optic cabling or wireless devices to create an Ethernet network. Unlike the other cabling methods, fiber-optic cable is immune to electrical interference, thereby making the network more efficient and reliable. Fiber-optic cable also provides more network security, since no one can tap into the line to intercept confidential data. On the down side, you pay about five times more for fiber-optic cabling than for any other type.

Ethernet boards with fiber-optic sockets are just beginning to show up, partly because Ethernet on fiber has not been standardized by the IEEE yet. Currently, only Codenoll Technology's CodeNet board supports fiber-optic cabling. To install wireless Ethernet in an office, install any Ethernet board into a Mac and attach the Mac to Motorola's Altair Wireless Ethernet system.

Although so far I've discussed only internal Ethernet boards, you aren't out in the cold if your Mac has no slots or if the slots are full. You can still connect to Ethernet by using a SCSI adapter—a box that plugs into the Mac's SCSI port with a standard SCSI cable. These SCSI adapters can be daisy-chained with other SCSI devices. However, as shown in "On the Ethernet Highway" (*Macworld*, March 1990), external SCSI boxes are not as fast as internal Ethernet boards. These SCSI boxes are particularly useful, however, if you want to connect a Mac Classic or a PowerBook to Ethernet.

JEANNE STACK

Ethernet Options Clockwise from lower left: Apple's Ethernet Twisted-Pair Transceiver, Asanté's EN/SC SCSI-to-Ethernet Adapter, and Shiva's EtherPort II NuBus Card

Matching Up a Transceiver

TO USE AN ETHERNET NETWORK, you need a physical connection to the cabling as well as the electronics to send and receive the network's signals. Although most of the electronics are contained on the Ethernet board, one part—the transceiver—is frequently sold as a separate option for $150 to $200. Since the transceiver is responsible for translating the signals on the Ethernet cable to digital signals that the interface board can process, there's a different transceiver for each type of Ethernet cable.

Thick-wire Ethernet requires a transceiver; therefore, thick-wire Ethernet boards include a 15-pin connector for the cable used to connect the board to an external transceiver. Thin-wire and twisted-pair Ethernet transceivers are often built into the Ethernet board. Ethernet boards include support for at least two, and occasionally all three, of the Ethernet cable types—thick, thin, or twisted-pair.

Apple offers a different scheme for connecting Macs to Ethernet—Apple's Ethernet LC Card and Ethernet NB Card have no transceivers on board, but include a special socket, the Apple Attachment Unit Interface (AAUI). To use Apple's boards with Ethernet, you purchase a separate component that contains the transceiver and a cable connector, which you plug into the AAUI. Each cable connector works with only one type of wiring. Vendors other than Apple also offer external transceivers for use with the AAUI (see "Ethernet Boards and Boxes").

Apple's approach has a few advantages. First, since Apple includes Ethernet and the AAUI in some Macs and LaserWriters, you can connect these devices to Ethernet without worrying if the right connection is built in—all you have to do is buy the right external transceiver to match the Ethernet cabling.

Second, if you switch network cabling from, say, thick-wire to twisted-pair, you don't have to purchase new boards—you

Keeping Your Phases Straight

Apple introduced AppleTalk Phase 2 network protocols almost two years ago. Although Phase 2 networks make it easier to install more than 254 devices on Ethernet, not all network managers have switched from the older Phase 1 protocols. If you're contemplating such a change, here are a few things to keep in mind.

- Ethernet running under Phase 1 protocols uses a different packet format than does Ethernet under Phase 2; a Mac running Phase 1 cannot communicate with a Mac running Phase 2 because of these differences.
- If you want to run both AppleTalk Phase 1 and AppleTalk Phase 2 on Ethernet, you need to install an AppleTalk transitional router (which converts Phase 1 packets to Phase 2 packets and vice versa); all manufacturers' AppleTalk routers can be configured as transitional routers.
- Always use only one vendor's router as a transitional router. Since Apple released only guidelines, not rules, each vendor has implemented transitional routing differently. As a result, using different routers may cause oddities such as network zones that are available one second and gone from the network the next.
- A Mac running System 7 is automatically set to Phase 2 protocols. If some Macs on an Ethernet network are running System 7 and others are running an older version of the System, you'll need to install a transitional router. The older Ethernet drivers for Phase 1 can be used with System 7, but they're not recommended if you want to use System 7's virtual memory feature.
- Apple phased out support for AppleTalk Phase 1 at the end of 1991; all new developments will support only AppleTalk Phase 2.

only need to buy a new transceiver. But if you really think you'll want to switch cabling, you're better off choosing an Ethernet board that includes built-in support for thick-wire, thin-wire, and twisted-pair cabling. Finally, since Apple's thin-wire transceivers are self-terminating, you don't have to worry about installing terminating resistors at each end of the cable.

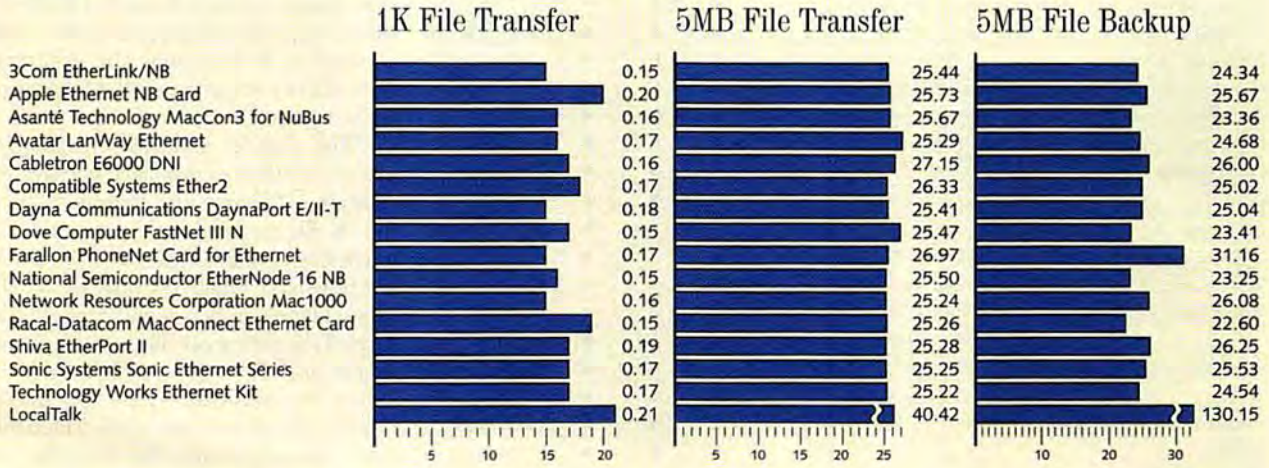
Understanding Bandwidth

IT'S TIME TO SAY A FEW WORDS ABOUT the meaning of a network's bandwidth. Ethernet's bandwidth of 10 megabits per second (Mbps) means that, once data moves from the Macintosh onto the Ethernet cable, the data flows to its destination at 10 Mbps. In most cases, a Macintosh cannot continuously transmit data to the Ethernet cable at a rate of 10 Mbps—in those instances, the data is processed by the computer and the network interface board at some rate lower than 10 Mbps, but when the data begins traveling on the Ethernet cabling, it's transmitted at 10 Mbps.

All Macintoshes currently sold by Apple can send data to a network at rates faster than the LocalTalk bandwidth of 230 kilobits per second (Kbps), which means that these Macs' performance is limited by the network. If you switch to an Ethernet network, these Macs will be able to complete their tasks at the maximum possible rate and not be hampered by the network's bandwidth.

MW LAB Simple File Transfer

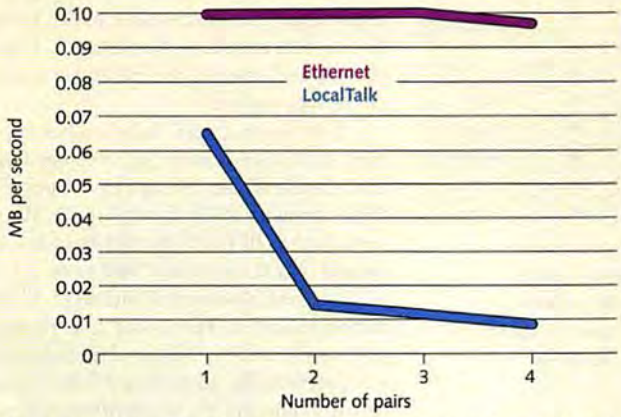
Times are in seconds.



To test the speed of Ethernet adapter boards, we set up pairs of Macs with identical boards installed, and transferred a 1K file and a 5MB file over Ethernet from one Mac to the other; then, using Retrospect Remote, we backed up a 5MB file over Ethernet from a client to a server. There was no significant variation in performance among the boards we tested. (As a point of comparison, we also tested LocalTalk.)

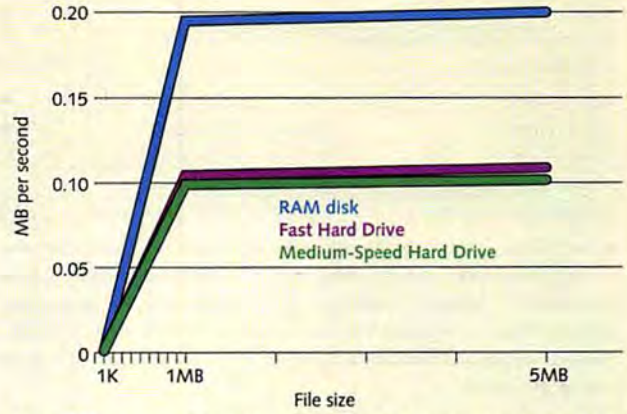
File-Transfer Rates Compared

LocalTalk versus Ethernet



As more users are added to a network, the network slows down. Ethernet, however, doesn't slow down nearly as quickly as LocalTalk. For this test, we transferred a file ten times between a pair of Macs on a network. We then began adding more Macs to the network, one pair at a time, transferring the same file ten times after each pair of Macs was added. By the time we had four pairs of Macs transferring files on the network, LocalTalk had bogged down considerably, while Ethernet kept running smoothly.

Hard Drive Speed



A hard drive acts as a bottleneck in Ethernet file transfers. We set up a pair of Macs three ways: with medium-speed hard drives; with fast hard drives; and with RAM disks to eliminate the hard-drive bottleneck. We tested each configuration by transferring a 1K file 300 times, a 1MB file 30 times, and a 5MB file 30 times. As shown, faster hard drives and RAM disks provide better Ethernet performance.

ETHERNET BOARDS AND BOXES

Company	Product Line	Type of Connection: Thick-Wire	Thin-Wire	Twisted-Pair	Prices [1]
BOARDS					
3Com	EtherLink/NB	●	●	●	$595
	EtherLink/NB TPX	●	●	●	$670
Apple Computer	Apple Ethernet LC Card [2]	●	●	●	$199
	Apple Ethernet NB Card [2]	●	●	●	$424
Asanté Technologies	MacCon+	●	●	●	$249
	MacCon3 for NuBus	●	●	●	$329
	FriendlyNet Card	○	●	●	$329
Avatar	LanWay Ethernet	●	●	●	$345
Cabletron Systems	E4010–E6020	●	●	●	$595
Cayman Systems	GatorCards/E	●	●	●	$449–$599
Chesapeake Systems	GeoLink Card Series	●	●	●	$329–$449
Codenoll Technologies	CodeNet [3]	○	○	○	$895
Compatible Systems Corporation	Ether2/Ether DS	●	●	●	$295
Dayna Communications	DaynaPort E	●	●	●	$299
Dove Computer Corporation	FastNet	●	●	●	$279–$299
EMac	EMac SpeedLink	●	●	●	$449
E-Machines	ColorLink [4]	○	○	●	$995–$1495
Farallon Computing	PhoneNet Card for Ethernet	●	○	●	$249
MacProducts USA	Magic Ethernet II	●	●	●	$199
Mobius Technologies	One Page Ethernet Display [5]	●	●	●	$995
	Two Page Ethernet Display [5]	●	●	●	$1195
National Semiconductor Corporation	EtherNode 16	●	●	●	$449–$495
	EtherNode 32	●	●	●	$595
Network Resources Corporation	Mac1000	●	●	●	$295–$445
Nuvotech	NuvoLink II	●	●	●	$395
Racal-Datacom	MacConnect	●	●	●	$299–$329
Shiva Corporation	EtherPort	●	●	●	$399–$499
Sonic Systems	Sonic Ethernet Series	●	●	●	$199–$299
Technology Works	Ethernet Kit	○	●	●	$329–$459
SCSI BOXES					
Asanté Technologies	Asanté EN/SC	●	●	●	$399–$549
Compatible Systems Corporation	Ether+	●	●	●	$495
Dayna Communications	DaynaPort E/Z	●	●	●	$399
	DaynaPort SCSI/Link	●	●	●	$399–$499
LRU Systems	Nodem	●	●	●	$495
Nuvotech	NuvoLink SC	●	●	●	$549
ADAPTERS FOR APPLE ETHERNET CABLING SYSTEM					
Apple Computer	Apple Ethernet AUI Adapter	●	●	●	$175
Asanté Technologies	FriendlyNet 10T Adapter	○	●	●	$129
Farallon Computing	PhoneNet StarConnector EN	○	○	●	$149
Network Resources Corporation	MAU1000	○	○	●	$145
SynOptics Communications	Model 518 10Base-T Transceiver	○	○	●	$135

● = yes; ○ = no. [1] Price ranges are specified because boards for different Macs differ in price. Prices also vary depending on the number of cabling standards a single board supports. [2] Apple boards require an AAUI adapter. [3] Codenoll's CodeNet board offers connections for fiber-optic cabling. [4] The ColorLink series includes 24-bit graphics support. The price of the board varies depending on the size of monitor it supports. [5] Mobius One Page and Two Page Display boards include a video interface. Price differences are for different Mac models.

If an Ethernet network can transmit data faster than the Mac can process it, then what good is Ethernet's larger bandwidth? It lets a computer complete a network session (transferring that large image file, printing, or sending E-mail, for instance) faster, making the network available for the next person sooner. Thus, even though your computer might not be able to process data at the full 10-Mbps speed, Ethernet permits users to run more network sessions in a given amount of time. It also helps ease traffic by allowing users to finish work faster.

The Lab Tests

MACWORLD LAB CONDUCTED FOUR SETS of tests to determine how Macs perform on Ethernet networks. The first test measures the maximum throughput for each board. We connected two Mac IIci's via Ethernet—one Mac IIci acted as an AppleShare server, the other as an AppleShare client. Then we timed the speed of transferring for 1K, 1MB, and 5MB files, both from server to client and client to server. We used a RAM disk instead of a hard drive to store files. This allowed us to focus our attention on only the processor and the interface board, rather than involving variables such as the hard drive and the Mac's SCSI Manager, in the tests. Few, if any, readers will install a RAM disk for an AppleShare server, but this setup allowed us to determine the maximum throughput you can expect for AppleShare on Ethernet.

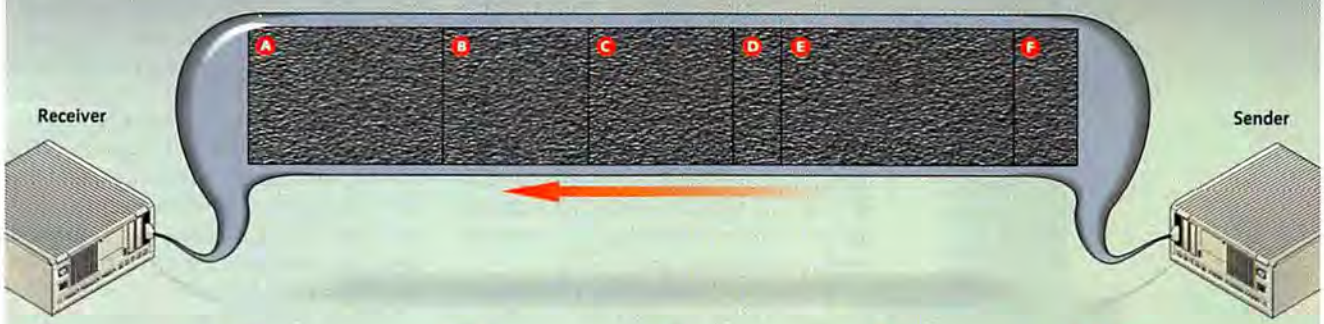
The transfer tests for two Macintoshes on Ethernet produced two striking results (see "Simple File Transfer"). First, the 1K file transfers were proportionally much slower than either the 1MB or 5MB file transfers. That's because 1K of data requires only a few data packets (the AppleTalk protocols allow a maximum packet size of 600 bytes) to be transferred across the network. With the 1K file transfer, the control packets—which mediate communications between the two Macintoshes—make up a larger percentage of the data being transferred.

The second striking result is even more important—there's very little difference in performance between the boards. All the boards provide transfer rates of about 193 Kbps, which is only 1.5 Mbps, or about a seventh of the bandwidth of Ethernet. The slower transfer rate, however, is not due to the Ethernet specifications. Ethernet introduces many pauses during data transfer—for instance, Ethernet pauses between receipt and transmittal of data packets.

The second test shows what effect hard drive speeds have on Ethernet-based data transfers (see "Hard Drive Speed" in "File-Transfer Rates Compared"). We selected three of the Ethernet boards—the Asanté MacCon3 for NuBus (a 32-bit board), the Cabletron DNI(E6112-X) (the fastest board in Macworld Lab preliminary tests), and the National Semiconductor EtherNode 16 NB (a 16-bit board) boards—and ran the same file transfers as above, but with three different disk configurations—a RAM disk (to gauge maximum throughput), a medium-speed Quantum 80 LPS internal hard drive, and a fast MicroNet 643/NP hard drive. Our results showed no differences in the speeds of the boards. We did discover,

The Parts of a Packet

Information is transmitted over an Ethernet network in packets. There are two basic packet types: Ethernet and 802.3. Ethernet corresponds to Phase 1, and 802.3 corresponds to Phase 2 (see "Keeping Your Phases Straight). A packet consists of six main parts—the preamble, destination address, source address, packet-type field (Ethernet) or length field (802.3), data field, and checksum field.



A The preamble has two key purposes. First, it tries to avoid a collision with other senders by asking other nodes not to send out packets. Second, it identifies the starting point of valid packet data for the receiver.

B The destination address identifies the physical address of the network device that is to receive the packet. All nodes on the network read the destination address to determine if they should read the rest of the packet.

C The source address is the physical address of the device that is sending the packet. The source address identifies the sender so that the receiver can respond or ask for more information if needed.

D This field varies depending on packet type. In 802.3 packets a length field indicates the number of bytes contained in the data portion of the packet. In Ethernet packets a packet-type field identifies the network software such as IP, Netware, or EtherTalk.

E The data field consists of anywhere from 46 to 1500 bytes and contains the actual data being sent. Messages longer than 1500 bytes must be broken into multiple packets. Messages shorter than 46 bytes must be padded.

F The checksum field contains a number initially calculated by the sending board at transmission. When the packet reaches its destination, the receiving board recalculates the checksum and compares it with the original. If the two differ an error has occurred during transmission and the packet is dropped.

however, that accessing a hard drive slows down file transfers. With the fast hard drive, file transfers take 28 percent more time than with a RAM disk; with the medium-speed hard drive, file transfers take 42 percent more time than with a RAM disk. What do the numbers mean in real life? Transferring a 1MB file using the standard drive takes about 10 seconds. With the faster drive, the same file transfer takes about 9 seconds. Using a RAM disk makes the file transfer even faster—about 5.5 seconds.

The third test shows how LocalTalk and Ethernet networks behave when more than one user is heavily using the network. We set up four pairs of Mac IIci's as AppleShare clients and servers (one client per server) and then transferred a 5MB file from one member of a pair to the other ten times. We transferred files in both directions—from client to server and from server to client.

Our results show that you can expect much longer times for transferring a file when you're using LocalTalk as compared to Ethernet. That's no surprise. But the results also show that it takes much more network traffic to saturate Ethernet than LocalTalk (see "LocalTalk versus Ethernet" in "File-Transfer Rates Compared"). For example, four users transferring 5MB files on Ethernet would notice a 26-minute slowdown over the time it would take to perform the file transfer if there were no other network traffic. On the other hand, four users transferring the same size files on a LocalTalk network would wait an additional *359 minutes* to get the job done.

To gauge other differences between LocalTalk and Ethernet, we also tested how long it took to back up a 5MB file from one IIci to another using Dantz's Retrospect Remote 1.3. There were very few performance differences among the Ethernet boards. In general, however, we could back up the test file in ⅓ the time over Ethernet than over LocalTalk.

How to Choose a Board

SINCE THERE ARE SUCH SMALL DIFFERences in performance among the twisted-pair Ethernet boards, your major concern when buying one of these boards is the reputation and reliability of the vendor as well as the price. Apple and 3Com were the first vendors to produce Ethernet boards, and they have maintained a reputation for reliability and fair pricing. Asanté Technologies and Shiva Corporation are newer to the market, but their boards have sold well and are reputed by users to be reliable. Farallon Computing, a company that is noted for solid products, does not have the installed base of some of the other companies mainly because its products were overpriced until recently. Technology Works is a new entrant to the Ethernet arena, but its boards are quickly gaining in popularity because of good pricing and flexible options. Other companies, such as Compatible Systems, Dove Computer, Racal-Datacom, and Sonic Systems, are producing inexpensive boards that worked well in our tests.

Some companies that are newer to the Ethernet market are distinguishing their boards by adding extra functionality. For instance, Mobius and E-Machines include Ethernet support on a video board. Other companies, such as Sonic Systems and Network Resources Corporation, include a math coprocessor. But none of the boards we tested pose any special advantages over the others, especially for ordinary tasks, such as small and large file transfers. **m**

See *Where to Buy* under "Ethernet" for contact information.

Contributing editor DAVE KOSIUR covers Macintosh networking. He is coauthor of the *Macworld Complete Networking Handbook* (IDG Books Worldwide, 1992).

Macworld Lab testing supervised by TIM WARNER.

High-Capacity

Macworld Lab tests 69 hard drives from 300MB to 2GB

FOR SOME JOBS, EVEN A 220MB HARD drive is cramped. Color publishing pros routinely work with 10MB and 20MB files, and a six-minute QuickTime video takes up 50MB. Multimedia developers and electronic publishers use high-end hard drives to create prototypes for CD ROMs. And businesses using network file servers require drives that can meet the storage needs of an entire office.

But before leaping ahead to the performance tables, consider this: most people don't need a drive that stores 300MB or more. If you work primarily with text files, spreadsheets, and moderate-size databases, your storage needs can probably be met by a hard drive that stores between 40MB and 220MB.

The 69 drives reviewed here span the spectrum from common stock to cutting edge. In the 300MB-to-600MB range, you'll find plenty of drives for less than $1500. As you climb the capacity ladder, the choices and the bargains become fewer, with the best multigigabyte drives costing $5000 or more.

But for speed and technical innovation, the high end is where the action is. High-end hard drives are fast; most can transfer data faster than any Mac's SCSI port—except the Quadras'—can accept it. (And some drives will soon break the Quadra barrier.) To ease this bottleneck, several firms have introduced *SCSI accelerator boards* that plug into the Mac and provide SCSI ports that support the latest, fastest version of the SCSI specification, called *SCSI-2* (see "Speeding Up SCSI"). And exotic *disk arrays* combine multiple hard drive mechanisms to improve speed and, in some cases, provide superior reliability (see "Strength in Numbers: Disk Arrays").

When shopping for a high-end hard drive, of course you need to address the usual variables: price, quality of construction, documentation, and bundled software. Prices in this group vary at least as much as in others—for example, Third Wave's 425MB drive and FWB's PocketHammer425 each use the same Quantum drive mechanism, but the former lists for $1399, and the latter for $3149.

And because a drive that stores more can lose more, assess each vendor's warranty, service, and support policies (see "Hard Drive Details"). Long warranties, optional service agreements, fast repair turnaround times, and data-recovery services are comforting safety nets for any hard drive, but they're especially important for high-capacity drives.

Technologies and Trends

HOW DO HIGH-CAPACITY HARD DRIVES store so much? They often use big disk platters and plenty of them. Most drive mechanisms in the 40MB-to-220MB range contain three to five 3.5-inch disk platters, but most high-capacity drives use 5.25-inch platters, and 1GB or larger drives can use as many as 11 of them. As a result, among the drives tested, only a few 300MB-to-500MB models—from La Cie, Optima Technology Corporation, FWB, Mass Microsystems, and Liberty Systems—could be considered portable.

BY JIM HEID

Hard Drives

Fast performers included, from top, Storage Dimensions' MacinStor 1.3 GB, PLI's PL 1.3 Gig Turbo, FWB's hammer1400FMF, and CMS's Platinum 1.3GB.

But new technologies are gradually shrinking these drives. One trend is toward *zone-bit recording*, a technique that exploits the fact that tracks at the outer edges of a platter can hold more data than can tracks closer to the center. A related development is tighter *bit densities*. Today's hard drives cram their bits closer together than their predecessors do, allowing more data to fit on each disk. Zone-bit recording and tighter bit densities make for faster drives, since both techniques allow more bits to pass beneath the drive heads each second.

Another way to boost performance is by increasing the speed at which the disk platters spin. Most hard drives have *spindle speeds* of 3600 revolutions per minute, but the trend is toward speeds of 4500 and 5400 rpm. And drives with 7200-rpm spindle speeds should surface within a year. A high spindle speed reduces *latency*—the time it takes for the required data on a disk platter to initially rotate into position beneath the drive's heads.

These trends are improving the speed and capacity of 5.25-inch drives, and they're allowing 3.5 drives to infiltrate the high-end storage market. Quantum Corporation's 400MB ProDrive 425S mechanism, for example, is used in several of the drives we tested. Quantum's forthcoming ProDrive 1050 mechanism, with zone-bit recording and a 4500-rpm spindle speed, will be among the first 3.5-inch 1GB-plus drives. Drives using this mechanism may be available by the end of 1992.

The Major Mechanisms

A DRIVE'S MECHANISM IS OBVIOUSLY its most important component, but the name on a case doesn't tell you who built the mechanism. Hard drive vendors purchase drive assemblies from a handful of manufacturers, then install the assemblies, into cases with power supplies, fans, status lights, and switches.

The drives tested for this review contain mechanisms built by Seagate, Maxtor, Micropolis, Fujitsu, Quantum, Microscience, and a relatively new Taiwanese firm, Orca Technologies. Almost all 600MB-to-1.3GB drives use Seagate assemblies.

Within the Seagate family are several lines, the latest of which is the Elite series. All of the fastest drives tested use the Elite-1 or Elite-2 mechanism, both of

Speeding Up SCSI

SCSI *accelerators* (or *coprocessors*, as some vendors prefer to call them) add an express lane to a Mac's SCSI bus—a faster, more sophisticated SCSI port that can better keep up with today's fastest drive mechanisms. They do this by supporting the faster SCSI communications possible with the *fast* and *wide* aspects of the SCSI-2 specification. Fast allows speedier data transfers; wide allows transfers in 16- or 32-bit chunks, versus standard SCSI's 8-bit chunks. In theory, a SCSI accelerator that supports fast and wide SCSI will allow data-transfer rates of up to 20MB per second when the accelerator is paired with a drive mechanism that also supports fast and wide SCSI-2, such as Seagate's forthcoming Elite-3.

Macworld Lab tested three SCSI accelerators on a Mac IIci: Storage Dimensions' Data Cannon ($895), PLI's QuickSCSI ($599, $399 when purchased with a PLI drive), and MicroNet's NuPort ($600). Each accelerator was tested with a drive mechanism supplied by the accelerator vendor: a Storage Dimensions 1.3GB MacinStor with the Data Cannon, a PLI 1.3GB with the QuickSCSI (both Seagate Elite-1's), and a MicroNet 2.1GB Micro/Max with the MicroNet NuPort (Seagate Elite-2).

All three accelerators turned in similarly speedy times (see "SCSI Accelerator Speed Tests"), with PLI's QuickSCSI the fastest overall. As measured by a SCSI Analyzer—hardware that measures all activity along the SCSI bus, made by Adaptek, 408/945-8600—the PLI product delivered sustained data-transfer rates of 3.5MB per second. This rate is almost as fast as the Seagate-based Optima Concorde 2100, which was the fastest drive in our standard tests running on a Quadra 900, and roughly twice as fast as a IIci without an accelerator.

All three accelerators performed reliably during testing, but we did encounter a problem with Storage Dimensions' Data Cannon: it performed poorly when the Mac IIci contained Apple's cache card. That's a serious problem, given that Apple has been bundling the cache card with the IIci for some time now. Unless Storage Dimensions fixes the problem, think twice about the Data Cannon if you use a Mac IIci.

We tested the NuBus version of each accelerator; the Data Cannon is also available for installation in the Processor Direct Slot (PDS) of a Mac IIfx. (A Quadra version of the Data Cannon is in the works that Storage Dimensions says will push the Quadras' transfer rates to 10MB per second and more.) Each vendor says its PDS-based accelerator delivers even better performance by avoiding NuBus, which can be a bottleneck for data-transfer-intensive hardware.

Other SCSI accelerators are available or on the way from these and other companies. FWB's SCSI JackHammer ($999) should be shipping by the time you read this. Storage Dimensions' forthcoming 2FAST line will comprise the Data Cannon NuBus 2 ($999) and Data Cannon's PDS/Quadra and PDS/FX (both $1099). The JackHammer and the 2FAST line will support fast and wide SCSI-2.

A SCSI accelerator won't speed up every drive; it simply allows the Mac to keep up with the fastest drives. But if you've spent several thousand dollars on a high-performance drive, it may not be a bad idea to spend a bit more to see what it's really capable of.

MW LAB SCSI Accelerator Speed Tests

		Duplicate (in seconds)	Open (in seconds)	Save (in seconds)	Search (in seconds)	Compile (in seconds)	SCSI Evaluator Read (in MBps)	SCSI Evaluator Write (in MBps)
1.00	PLI Quick SCSI /1.3GB Turbo	78.55	50.41	41.44	27.78	22.21	3.53	3.65
0.98	MicroNet NuPort Card/SB-2130	78.74	51.06	41.80	28.09	22.78	3.62	3.05
0.88	Storage Dimensions Data Cannon/Mac1-1335SI-2	98.51	65.96	50.47	35.02	28.40	4.72	3.18

Percent slower than fastest: Fastest; Up to10%; 11%–20%; 21%–29%; 30% or more

which use zone-bit recording and have 5400-rpm spindle speeds. Slower Seagate-based drives generally use a member of the less expensive but older, 3600-rpm Wren family. The lesson here is to look at the mechanism model as well as the manufacturer name when shopping.

That all drive vendors buy from a few manufacturers might lead you to believe that all drives containing a given mechanism are identical. Vendors of premium-price drives, such as Storage Dimensions and FWB, say they put better engineering, more stringent quality control, and superior components into their wares. Bargain-price mail-order vendors, such as APS and MacDirect, insist that it is possible to get a solid drive without paying top dollar.

Both are right. Hard drive innovators —FWB, Optima Technology, PLI, Storage Dimensions, MicroNet Technology, GCC Technologies, and La Cie, to name a few—charge more, but generally offer more rugged construction, easier formatting and diagnostic software, and extra conveniences, such as rear-panel power outlets. Each firm also touts its quality-assurance programs, which test and often torture mechanisms to weed out the weaklings.

Nonetheless, bargain drives we tested did perform well. Their generic-looking cases tend to be flimsier, and their documentation and formatting software aren't as polished, but their prices sure are ap-

MW LAB Hard Drive Speed Tests 300MB to 700MB

Color Key

Fastest

Percent slower than fastest

Up to10%

11%–20%

21%–29%

30% or more

The drives are listed from best overall performance (top) to worst overall performance (bottom), based on both application and low-level SCSI tests. To determine rankings, we indexed overall performance numbers against the fastest drive. Thus, the MicroNet Micro/Stack 515 gets a 1.00, and the MacTel Technology Index 330MB gets a 0.58. Index numbers are listed to the left of the product name.

For application tests, we measured each drive's ability to duplicate a 3.2MB file and a 10MB folder and search a database for a specific record. We also averaged the drive's speeds for opening and saving files from several applications, including PageMaker and Excel.

F = Fujitsu
M = Maxtor
MC = Micropolis
MS = Microscience
OR = Orca
Q = Quantum
S = Seagate
U = undisclosed

		Duplicate (in seconds)	Open (in seconds)	Save (in seconds)	Search (in seconds)	Compile (in seconds)	SCSI Evaluator Read (in MBps)	SCSI Evaluator Write (in MBps)
Overall Fastest	1.00	MicroNet Micro/Stack-515 (S)	67.5	37.3	37.8	17.59	16.5	2.88	2.87
	0.89	PLI PL 415MB (S)	74.9	39.2	39.3	19.15	17.2	2.21	2.22
	0.89	Liberty Systems Liberty 520MB (F)	70.9	38.9	38.3	19.07	17.1	2.08	2.09
	0.89	MacDirect 425MB (F)	71.2	38.6	38.9	19.03	17.0	2.06	2.06
	0.89	MacDirect 520MB (F)	71.1	38.6	39.5	19.39	16.9	2.07	2.09
	0.89	PLI PL 635MB (S)	72.3	39.5	41.6	18.74	17.3	2.17	2.20
	0.88	Rodime Systems Cobra 650MB (S)	71.7	39.5	42.1	19.42	16.9	2.18	2.20
	0.88	MacDirect 330MB (F)	71.0	39.0	38.8	18.50	17.8	2.04	2.03
	0.88	FWB hammer600FMF 600MB (S)	72.7	39.4	42.2	19.73	17.2	2.19	2.22
	0.88	Storage Dimensions MacinStor 635MB (S)	72.8	39.6	42.7	19.81	17.2	2.18	2.21
	0.87	CMS Enhancements Platinum 400MB (S)	74.8	41.1	37.1	22.41	18.1	2.29	2.30
	0.87	Peripheral Vision PV 520MB (F)	70.4	38.2	38.9	18.98	16.3	1.81	1.76
	0.87	Mirror Technologies Mirror 330MB (S)	75.1	39.6	39.8	19.48	17.8	2.25	1.89
	0.86	Cutting Edge 676MB (S)	72.4	39.6	42.9	19.88	17.1	2.19	1.88
	0.86	Ehman 676MB (S)	72.7	39.8	42.2	19.85	17.4	2.17	1.89
	0.83	Third Wave 425MB (Q)	75.2	39.0	39.8	22.22	17.4	1.87	1.87
	0.83	MacTel Technology Index 425 (Q)	75.0	39.0	39.4	22.08	17.2	1.88	1.64
	0.83	FWB PocketHammer 425MB (Q)	75.2	39.6	40.5	22.29	17.6	1.85	1.85
	0.83	Mirror Technologies Mirror 425 (Q)	74.8	39.9	39.7	21.92	17.1	1.87	1.64
	0.82	La Cie Tsunami 426MB (Q)	75.5	40.3	41.6	22.43	17.6	1.87	1.87
	0.82	Relax Technology Vista 660MB (S)	72.7	39.6	42.1	20.07	17.2	1.81	1.48
	0.82	La Cie Cirrus 425MB (Q)	75.8	40.4	41.2	22.47	17.8	1.87	1.88
	0.81	Liberty Systems Liberty 425MB (Q)	75.0	40.1	41.2	22.54	17.8	1.85	1.62
	0.79	APS 510MB (M)	78.0	40.5	42.6	26.93	19.6	1.93	1.94
	0.78	FWB hammer300FMF 300MB (S)	81.2	41.7	46.2	24.12	20.3	1.98	1.98
	0.78	Mass Microsystems DiamondDrive 320 (M)	77.9	40.3	42.3	26.53	18.9	1.94	1.62
	0.78	GCC UltraDrive S 430MB (S)	81.2	42.1	46.8	24.14	20.1	1.98	1.98
	0.78	PLI PL 320MB (S)	80.3	39.5	42.6	21.39	18.8	1.54	1.55
	0.78	Total Peripherals Q 425MB (Q)	80.2	43.0	42.1	22.81	17.6	1.33	1.88
	0.77	Storage Dimensions MacinStor ZFP 325 (M)	80.7	40.3	41.4	27.53	21.3	1.85	1.87
	0.76	HDI PowerDrive 340MB (M)	81.1	41.2	45.5	27.57	21.8	1.89	1.93
	0.75	GCC UltraDrive X 650MB (S)	82.9	40.4	43.9	21.63	19.3	1.45	1.46
	0.75	APS 320MB (M)	83.4	43.0	48.7	21.08	19.7	1.84	1.38
	0.75	MacTel Technology Index 640MB (S)	82.7	40.5	44.0	21.76	18.7	1.46	1.27
	0.74	CMS Enhancements Platinum 650MB (MC)	83.8	44.7	43.2	24.18	19.7	1.48	1.76
	0.74	HDI PowerDrive 660MC (MC)	85.7	42.4	47.3	23.99	19.9	1.48	1.76
	0.73	Relax Technology Vista 330MB (S)	81.5	40.0	43.6	21.67	19.3	1.55	0.89
	0.73	Optima Technology MiniPak 325MB (U)	85.9	43.7	48.3	24.07	20.4	1.84	1.40
	0.73	Optima Technology DisKovery 325MB (M)	86.5	43.6	49.0	24.04	20.7	1.84	1.44
	0.72	Liberty Systems Liberty 340MB (M)	80.8	43.3	51.8	27.93	20.8	1.84	1.55
	0.70	Relax Technology Vista 700MB (MS)	88.1	42.4	48.3	22.30	19.7	1.24	1.29
	0.68	HDI PowerDrive 320MB (MC)	88.9	43.5	49.3	23.54	21.2	1.31	1.20
	0.68	Optima Technology MiniPak 511MB (U)	77.4	39.9	41.6	26.46	20.0	0.89	0.74
	0.60	Mirror Technologies Mirror 595MB (S)	108.7	51.6	49.3	35.42	25.4	1.34	1.34
	0.59	FWB hammer300FMF 300MB (S)	108.2	51.4	48.7	35.39	25.4	1.54	0.93
	0.59	Rodime Systems Cobra 330MB (S)	108.5	51.3	48.8	35.41	26.1	1.54	0.90
Overall Slowest	0.58	MacTel Technology Index 330 (S)	108.8	51.0	48.7	35.40	25.5	1.33	0.88

HARD DRIVE DETAILS

Company	Product Line	300MB–450MB Drive Capacity/ Mechanism/Price	451MB–700MB Drive Capacity/ Mechanism/Price	701MB and Up Drive Capacity/ Mechanism/Price	Method of Sale	Dimensions (in inches)	Termination	Connectors	Universal Mac Support
APS	APS	320MB/M/$1099; 330MB/S/$1499; 328MB/S/$1299; 425MB/S/$1599	510MB/M/$1649; 587MB/S/$1549; 638MB/S/$1649; 642MB/S/$1799; 652MB/M/$1799	1.2GB/M/$2499; 1.2GB/S/$2099	direct	10.75 × 10.375 × 10.5 or 6 × 8 × 2 (under 600MB); 7 × 6 × 11.5 (600MB and up)	external	50	●
Club Mac	Club Mac	330MB/F/$1179; 330MB/M/$999; 425MB/F/$1239; 425MB/Q/$1239	520MB/F/$1309; 535MB/M/$1429; 645MB/F/$1359; 645MB/M/$1479; 663MB/H/$1529	1GB/H/$2209; 1GB/M/$1919; 1.2GB/F/$2019; 1.4GB/M/$2529	direct	10 × 10 × 2 or 8 × 7 × 2 (under 600MB); 10 × 10 × 4 (aboe 600MB)	internal	50	●
CMS Enhancements	Platinum	320MB/M/$2599; 400MB/S/$2999	650MB/M/$3299	1GB/S/$4599; 1.3GB/S/$6999	dealer	5 × 10 × 10	external	50	●
Cutting Edge	Cutting Edge	330MB/S/$1999	600MB/S/$2719; 676MB/S/$3199	1GB/S/$3519	direct	4.25 × 9.75 × 10	switchable	50	●
Deltaic Systems	Server	320MB/S/$1499; 420MB/F/$1599	520MB/F/$1699; 645MB/S/$2199	1GB/MC/$2599	direct, dealer	2.5 × 9.7 × 9.7 (320MB–520MB); 5 × 9.7 × 9.7 (600MB+)	external	50	●
DJK Development	MS	330MB/M/$1199; 410MB/M/$1349	520MB/M/$1799; 640MB/M/$1819	990MB/M/$2549	direct	3.75 × 10 × 10	external	50	●
Ehman	Ehman	330MB/S/$1249	600MB/S/$1699; 676MB/S/$1999	1GB/S/$2199	direct	4.25 × 9.75 × 10	switchable	50	●
FWB	hammer	300MB/S[1]/$2699; 300MB/S[1]/$3299	600MB/S[1]/$3499; 600MB/S[1]/$4299	1GB/S/$5099; 1.4GB/S[1]/$6199; 1.4GB/S[1]/$7599; 2GB/S/$9699	dealer	2.25 × 9.5 × 9.75 (300); 4.5 × 9.5 × 9.75 (others)	external	50	●
	PocketHammer	425MB/Q/$3149	none	none	dealer	6.5 × 3 × 9	external	50	●
GCC Technologies	UltraDrive S	430MB/S/$1949	none	none	direct, dealer	2.75 × 9.5 × 10.75	external	50	●
	UltraDrive X	none	650MB/S/$2799	1GB/S/$3649	direct, dealer	6.5 × 4.5 × 14.25	switchable	50	●
Hard Drives International	PowerDrive	320MB/M/$1049; 320MB/MC/$1199	660MB/MC/$1599	1050MB/S/$2199; 1050MB/MC/$2199; 1.3GB/MC/$2699	direct	2.25 × 9.75 × 10.625 (320MB); 4 × 9.75 × 9.75 (660MB+)	internal	50	●
La Cie	Cirrus	425MB/Q/$1699	none	none	direct (in U.S.); dealer (international)	3 × 6 × 9	switchable	25	●
	Tsunami	426MB/Q/$1649	none	none	direct (in U.S.); dealer (international)	6 × 2.75 × 8	switchable	25	●
	ZFP	425MB/Q/$1499	none	none	direct (in U.S.); dealer (international)	9.75 × 9.75 × 2.4	switchable	25	●
	ZFP+	none	640MB/S/$2099	1.2GB/S/$2899; 1.6GB/S/$4199	direct (in U.S.); dealer (international)	9.75 × 9.75 × 4.75	internal	50	●
Liberty Systems	Liberty	340MB/M/$1699; 425MB/Q/$1999	520MB/F/$2299	1GB/T/$2699	direct	5 × 2 × 7	internal	25	optiona
MacDirect	MacDirect	330MB/F/$1238; 425MB/F/$1288	520MB/F/$1358	1.2GB/F/$2018	direct	2.375 × 9.75 × 9.875 (under 1.2GB); 4.25 × 9.75 × 9.625 (1.2GB)	switchable	50	●
MacLand	MacLand	400MB/Q/$1299	520MB/F/$1299	none	direct	9.825 × 10 × 2.25	internal	50	●
MacProducts USA	MagicDrive	300MB/S/$1299; 330MB/S/$1399; 425MB/Q/$1299	600MB/S/$1499; 660MB/S/$1599	1.2GB/S/$1999; 1.5GB/S/$2499	direct, dealer	10 × 10 × 4	external	50	●
MacTel Technology Corporation	Index	320MB/S/$1225; 330MB/S/$1481; 425MB/Q/$1449	640MB/S/1642; 650MB/S/$1849	1.2GB/S/$2099	direct, dealer	10.25 × 10.25 × 5	external (425); internal (all others)[3]	50	●
Mass Microsystems	DiamondDrive	320MB/M/$2549	510MB/M/$3599	none	dealer	2.7 × 9.75 × 10	external	50	●
	DiamondDrive Portable	320MB/M/$2299	510MB/M/$3199	none	dealer	2.0 × 4.7 × 7.9	external	50	●
Mega Drive Systems	Mercury	340MB/S/$3499; 425MB/S/$3899	535MB/F/$3999	1GB/U/$5999	dealer	4.6 × 7 × 10.5	external	50	●
MicroNet Technology	Micro/Max[4]	312MB/S/$2560; 321MB/S/$2965; 423MB/S/$2830	644MB/S/$3640; 660MB/S/$3190	1GB/S/$4045; 1.3GB/S/$5935; 1.3GB/S/$5485; 2.1GB/S/$8905	dealer	6.5 × 7.75 × 12 or 5 × 7.75 × 12	external	50	●

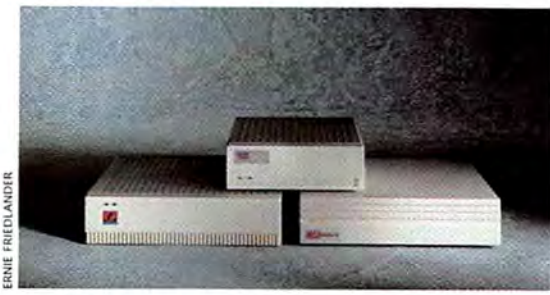
● = yes;
○ = no, none.

F = Fujitsu; H = Hewlett-Packard; M = Maxtor; MC = Micropolis; MS = Microscience; OR = Orca Technologies; Q = Quantum; S = Seagate; T = Toshiba; U = undisclosed; V = variable.

[1] *More expensive model uses faster Seagate mechanism.* [2] *Liberty Systems extends warranty to two years if carrying case is purchased at time of drive*

Backup Software	Other Bundled Software	Partitioning	Password Protection	A/UX Partitioning	Warranty (in months)	Extended Warranty	Toll-free Tech Support	Repair Turnaround Time (in days)	Data Recovery on Request	Online Tech Support
○	Alliance Power Tools, shareware	●	●	●	MX,Q: 24, S:12	○	●	2	for a fee	○
○	SCSI Director	●	●	●	12–60	●	○	3–4	○	○
●	SUM II	●	●	●	12	●	○	3	○	AppleLink, CMS BBS
●	MacTree	○	○	○	12	○	●	2–3	for a fee	○
○	○	○	○	○	12	●	●	3	for a fee	AppleLink
●	SCSI Director Professional	●	●	●	24	●	○	7–10	free	○
●	MacTree	○	○	○	12	○	●	2–3	for a fee	○
○	Hard Disk Toolkit	●	●	●	24	○	○	2	free	AppleLink, CompuServe
○	Hard Disk Toolkit	●	●	●	24	●	○	2	free	AppleLink, CompuServe
●	MacTools Deluxe, QuickSpool II, QuickEnvelope	●	●	●	24	●	●	3	for a fee	AppleLink, America Online, GEnie, CompuServe
●	MacTools Deluxe, QuickSpool II, QuickEnvelope	●	●	●	24	●	●	3	for a fee	AppleLink, America Online, GEnie, CompuServe
○	○	●	●	●	12	●	●	2	○	○
○	SilverLining, shareware	●	●	●	24	●	●	3	for a fee	○
○	SilverLining, shareware	●	●	●	24	●	●	3	for a fee	○
○	SilverLining, shareware	●	●	●	24	●	●	3	for a fee	○
○	SilverLining, shareware	●	●	●	12	●	●	3	for a fee	○
○	○	●	●	○	12[2]	○[2]	○	2–3	for a fee	AppleLink
○	○	●	●	●	60	○	○	2	free	○
○	○	●	○	●	24	○	●	1	free	○
●	shareware	●	●	●	12	●	○	2	free, when in warranty	○
●	shareware	●	●	●	12	○	○	2	free	○
○	○	●	●	○	24	○	●	1 exchange; 5 repair	for a fee	○
○	○	●	●	○	24	○	●	1 exchange; 5 repair	for a fee	○
●	Steadfast	●	●	●	12	●	●	2	for a fee	○
○	○	●	●	●	12	●	○	2	○	○

purchase. [1] External available for $10 extra. [4] For Mac II and Quadra families only. [5] With NuPort SCSI-2 host adapter, $3545. [6] Warranty depends on mechanism.



ERNIE FRIEDLANDER

Among the fastest smaller drives were, from left, MicroNet's Micro/Stack 515, Peripheral Vision's PV520, and MacDirect's 425.

pealing. In the end, balance economy with the need for a solid, reliable drive. You may end up looking to firms such as GCC, Mirror Technologies, and La Cie —companies known for both quality and value.

Also keep in mind that dealers often knock 25 percent or more off the suggested retail price; the price gap between mail-order and premium drives may not be as large as it seems.

The SCSI Side

ALL EXTERNAL HARD DRIVES ATTACH to the Mac's SCSI connector. That means wrestling with SCSI's annoyances: address settings and termination. (See *Getting Started* in this issue for background on these and other basic SCSI concepts.)

A high-end hard drive is likely to share the Mac's SCSI bus with devices such as scanners and tape drives. Features that simplify changing SCSI addressing and termination are more important in this capacity range than in others. Most of the drives tested let you change SCSI addresses using rear-panel rotary or thumb switches—nothing new there. But GCC Technologies' UltraDrive 650X and 1000X series earns big points by providing a front-panel display that shows the drive's current SCSI address. It means one less peripheral to bend over and squint at when your Mac won't start up.

Then there's termination. Internal termination is never desirable—venturing inside a case to unplug terminators is time-consuming and, if you're not careful, dangerous to you and the drive. Most of the drives tested include an external terminator, but some vendors ship internally terminated drives. Offenders include Liberty Systems, Hard Drives International, Third Wave, Total Peripherals, Club Mac, and MacLand. Drives from MacDirect, PLI, Cutting Edge, Ehman, and La Cie have rear-panel switches that let you enable or disable termination.

The manuals for Total Peripherals' and APS's drives contain contradictory or vague information on termination. APS's manual says the firm's drives are internally terminated, but a shipping checklist within the box we received said they

HARD DRIVE DETAILS (continued)

Company	Product Line	300MB–450MB Drive Capacity/ Mechanism/Price	451MB–700MB Drive Capacity/ Mechanism/Price	701MB and Up Drive Capacity/ Mechanism/Price	Method of Sale	Dimensions (in inches)	Termination	Connectors	Universal Supp
MicroNet Technology	Micro/Stack	414MB/S/$2945[3]	515MB/S/$3095	1GB/S/$4295	dealer	2.75 × 10 × 10.375	external	50	●
	Micro/Sync[4]	423MB/S/$3370	512MB/S/$3100; 644MB/S/$4180	1GB/S/$4585; 1.3GB/S/$6475; 1.3GB/S/$6025; 2.1GB/S/$9445	dealer	6.5 × 7.75 × 12 or 5 × 7.75 × 12	external	50	●
Microtech International	Nova	320MB/V/$2299; 400MB/V/$2599	500MB/V/$3099; 650MB/V/$3999	1GB/V/$4899; 1.3GB/V/$5999; 1.6GB/V/$7199	direct	2.5 × 9.7 × 10.5 or 4 × 10.9 × 11.1	external	50/ 25	●
Mirror Technologies	Mirror	330MB/S/$1199; 425MB/Q/$1399	595MB/S/$1599	1GB/S/$2199	direct	2.5 × 9.7 × 10.85 (330MB–425MB); 9 × 7.8 × 12 (595MB+)	external	50	●
Optima Technology Corporation	Concorde	none	635MB/U/$3795	1050MB/S/$4795; 1.3GB/U/$5995; 2.1GB/S/$9995; 3GB/U/$11,995	dealer	4.2 × 11.4 × 10.2	external	50	●
	DisKovery	325MB/M/$2695	none	none	dealer	2.4 × 11.4 × 10.1	external	50	●
	MiniPak	325MB/U/$2595	511MB/U/$3295	none	dealer	2.4 × 6.2 × 7.8	external	50	●
Peripheral Vision Storage	PV	350MB/F/$1465; 425MB/F/$1545	520MB/F/$1635; 660MB/OR/$1595	1.2GB/OR/$1995	direct, dealer	2.25 × 6 × 8.25 (300MB–600MB); 6 × 7.5 × 11.75 (600MB+)	external	50	●
PLI	PL	320MB/S/$2199; 330MB/S[1]/$2499; 330MB/S[1]/$2099; 400MB/$2399; 415MB/S/$2299	635MB/S/$3499; 645MB/S/$2799	1.2GB/S/$3599; 1.3GB/S/$6099	direct, dealer	2.4 × 9.89 × 9.8 (300MB–600MB); 9.75 × 9.8 × 11.5 (600MB+)	switchable	50	optiona
Procom Technology	GigaTower II	none	none	1.3GB/S/$7025; 2GB/S/$8975; 2.8GB/S/$11,575	dealer	10.8 × 7.5 × 12	external	50	●
	MD	320MB/S/$3079; 420MB/S/$3079	none	none	dealer	2.25 × 9.7 × 10.25	external	50	●
	MTD	320MB/S/$3329	650MB/S/$3599	1GB/S/$4529; 1.3GB/S/$5095	dealer	6.25 × 7.5 × 12	external	50	●
Relax Technology	Vista	300MB/S/$1159; 330MB/S/$1359; 520MB/F/$1559	600MB/S/$1499; 660MB/S/$1799; 700MB/MS/$1399	1GB/S/$1999; 1.6GB/S/$2759	direct	3.8 × 10.2 × 10.8	external	50	●
Rodime Systems	Cobra	330MB/S/$2159	650MB/S/$2999	none	dealer	4 × 7 × 14	external	50	●
Storage Dimensions	MacinStor ZFP	323MB/M/$2699; 419MB/S/$3359	none	none	dealer	2.25 × 9.7 × 10.5	external	50	●
	MacinStor Single	none	635MB/S/$4749; 650MB/M/$4349	1020MB/S/$5949; 1.3GB/S/$8419	dealer	7.7 × 5.7 × 14.75	external	50	●
	2FAST Single	none	none	1.3GB/S/$8419; 2GB/S/$9999	dealer	7.7 × 5.7 × 14.75	external	50	●
	2FAST Bullet	none	510MB/S/$3579	1GB/S/$6199	dealer	5.75 × 4.5 × 8	external	50	●
Third Wave Computing	Third Wave	320MB/S/$1099; 425MB/Q/$1399	650MB/MC/$1499	1GB/MC/$2099	direct, dealer	2 × 9.5 × 10	internal	50	●
Total Peripherals	Q	425MB/Q/$1799	none	none	dealer	3 × 10 × 10	internal	50	●

● = yes; ○ = no, none.

F = Fujitsu; H = Hewlett-Packard; M = Maxtor; MC = Micropolis; MS = Microscience; OR = Orca Technologies; Q = Quantum; S = Seagate; T = Toshiba; U = undisclosed; V = variable.

[1] More expensive model uses faster Seagate mechanism.

[2] Liberty Systems extends warranty to two years if carrying

aren't. Total Peripherals takes the ignorance-is-bliss route: its manual says the drive's termination is "preset at the factory." Preset to what?

In general, hard drive vendors will not go down in history for having advanced the art of documentation. Most drive manuals use generic formats designed to cover a wide range of drives, mechanisms, and termination schemes. Drive vendors that ship myriad models should at least provide a booklet detailing the specifics of a given configuration.

In contrast, you get solid information from the manuals supplied by Ehman, GCC, Optima, La Cie, Storage Dimensions, and Third Wave. And give APS credit for the most improvement over last year's effort, despite the contradictory termination information.

Quadra Concerns

A HIGH-END HARD DRIVE IS AN IDEAL complement to a Mac Quadra 700 or 900—if the drive is compatible. Some aren't. The formatting and diagnostic software that accompanied eight drives wouldn't run properly unless we disabled the cache on the Quadras' 68040 central processor. None of the problem drives included errata sheets warning of the problem—in some cases, the vendors seemed surprised when told about it.

GCC's UltraDrive 1000X was one victim, but Macworld Lab tested a prerelease update of its formatting software that worked properly. The same happy ending applies to Relax Technology's Vista 700, APS's 1 Gig drive, and Mirror

Backup Software	Other Bundled Software	Partitioning	Password Protection	A/UX Partitioning	Warranty (in months)	Extended Warranty	Toll-free Tech Support	Repair Turnaround Time (in days)	Data Recovery on Request	Online Tech Support
○	○	●	●	●	12	●	○	2	○	○
○	○	●	●	●	12	●	○	2	○	○
●	Norton Utilities, Lifeguard	●	●	●	60	○	●	48	●	AppleLink
●	Gofer, Inside Information, shareware	●	●	●	24	●	○	2	for a fee	America Online, AppleLink, GEnie, CompuServe
○	DiskMount	●	●	●	12	●	○	1	free	AppleLink
○	DiskMount	●	●	●	12	●	○	1	free	AppleLink
○	DiskMount	●	●	●	12	●	○	1	free	AppleLink
●	Norton Utilities for the Macintosh	●	●	●	60+[6]	○	●	2–3	free	America Online, AppleLink
○	Turbo Optimizer, StuffIt Classic, shareware	●	○	●	60	●	●	2	free	○
○	○	●	●	●	12	●	●	2	○	○
○	○	●	●	●	12	●	●	2	○	○
○	○	●	●	●	12	●	●	2	○	○
○	○	○	○	○	12–36[4]	●	○	2	○	○
●	MacTools Deluxe, Virex, DiskDoubler	●	●	●	60	○	●	3	free	AppleLink
●	MacTools Deluxe, MacinStore	●	●	●	12	●	○	2	○	AppleLink, InterNet
●	MacTools Deluxe, MacinStore	●	●	●	12	●	○	2	○	AppleLink, InterNet
●	MacTools Deluxe MacinStore	●	●	●	12	●	○	2	○	AppleLink, InterNet
●	MacTools Deluxe	●	●	●	12	●	○	2	○	AppleLink, Internet
○	System 7, Disinfectant	●	●	●	24–60[6]	○	●	2	for a fee	○
○	○	○	○	○	24	○	○	3	free	AppleLink

case is purchased at time of drive purchase. [3] External available for $10 extra. [4] For Mac II and Quadra families only. [5] With NuPort SCSI-2 host adapter, $3545. [6] Warranty depends on mechanism.

Technologies' Mirror333. The updated versions of these drives' formatters should be available by the time you read this.

Deltaic Systems's Server 645 and MacTel Technology Corporation's Index 330 wouldn't format on a Quadra (although they did on a Mac IIci), and neither firm had a fix at this writing. Quadra owners should avoid these drives until the compatibility wrinkles are ironed out. (Even then, the Index 330 is one to pass up; when we tested it after formatting it on a IIci, it brought up the rear.)

The Meaning of Speed

AS EXPECTED, THE HIGHEST-CAPACITY drives delivered the best performance—the 1.3GB drives built around Seagate mechanisms were nearly twice as fast as the 330MB machines (see "Hard Drive Speed Tests 1 Gig and Up"). To take full advantage of the drives' speed, we tested on a Quadra because 68000-based Macs, such as Classics, have a maximum sustained data-transfer rate of less than 1MB per second; and 68030 Macs such as the IIci can transfer a maximum of about

ERNIE FRIEDLANDER

Mirror Technologies' Mirror 1.0GB, top; the APS 1.2GB, left; and GCC's UltraDrive 1000X.

1.5MB per second. A Quadra's SCSI bus, however, can handle 3MB to 5MB per second—a pace none of the drives we tested could keep up with (although the top performers came close). If you don't have a Quadra, and you want the top speed these drives can offer, you need a SCSI accelerator board.

Sizzling transfer rates are less important for some storage scenarios. Speed is significant for disk-intensive tasks—if a production artist gains several seconds every time a scanned color image is opened or saved, it won't take long to justify the extra money spent on a fast drive. But for jobs that involve small files, a slower drive would show no significant performance penalty but would save you money.

But if top speed is what you need, here's where to look.

- In the 1GB-and-up range, first prize goes to Optima's Concorde 2100 and PLI's PL 1.3GB. Other top finishers include FWB, CMS Enhancements, Storage Dimensions, and MicroNet.
- In the 600MB-to-700MB range, drives built around Seagate's Wren-Runner 2 mechanism performed best (see "Hard Drive Speed Tests 300MB to 700MB"). The top three are PLI's PL 635, Rodime System's Cobra 650e, and FWB's hammer600FMF.
- Between 300MB and 600MB, the champ was MicroNet's Seagate-based 515MB Micro/Stack 515. Numerous drives built around Fujitsu mechanisms turned in second-best times, including models from Liberty Systems, MacDirect, and PLI.

Software and Conveniences

ALL HARD DRIVES INCLUDE SOME SOFTware for formatting and testing the drive. Most formatting utilities also allow you to divide, or partition, the drive into a number of separate *logical volumes*, each of which appears as its own icon on the desktop. Partitioning can be especially useful for high-capacity drives. For one thing, you can assign passwords to partitions to restrict access to parts of the hard drive.

Equally important, you can ensure that you'll be using the drive's space effi-

Strength in Numbers: Disk Arrays

A disk array ties together multiple drive assemblies to deliver better performance or reliability than a single drive does. The array's controller hardware and software tricks the Mac into thinking it's talking to a single drive.

Disk arrays are structured and described according to a framework called RAID—redundant array of inexpensive disks. The RAID framework currently has six levels, numbered 0 through 5, although Levels 2 and 4 are not available on the Macintosh platform. Each level provides a different degree of performance improvement and/or reliability over a SLED—single large expensive disk.

MicroNet's $7731 Raven 040—the only disk-array hardware shipping at the time of our tests—implements the simplest RAID level, Level 0. Macworld Lab tested a Raven 040 in a Quadra 900. This system uses two Seagate Elite-1 mechanisms that connect to the Quadra 900's two SCSI buses. It is *fast;* Macworld Lab used a SCSI Analyzer, which times all activity along the SCSI bus, to measure sustained transfer rates. The Raven 040 showed rates of up to 5.5MB per second—nearly twice as fast as Optima's Concorde 2100 (the fastest single drive tested). The MicroNet system also showed faster performance than any single drive in all categories, particularly disk-intensive operations such as duplication of files and saves. (The Raven 040 is also available for the Quadra 700 in capacities ranging from 624MB to 4.2GB; prices range from $6111 to $18,801. The Micro/Raven 030 series works with 68030-based NuBus Macs; capacities run from 660MB to 2.6GB, with prices from $6651 to $13,401.)

But the Raven 040's performance comes at some risk: if one drive mechanism fails, you lose the data, with little hope of recovering it. And a breakdown is twice as likely as with a single drive—an inherent drawback of Level 0.

Another forthcoming Level 0 array is PLI's MiniArray, which provides sustained transfer rates of up to 4.4MB per second, according to the company. MiniArray will be available in capacities ranging from 200MB to 2GB.

The superior reliability of RAID begins after Level 0, when two or more drives combine in a way that ensures that no data is lost, even if one drive breaks. RAID Level 1, *mirroring,* involves simply writing the same data to two drives simultaneously. The Optima and Storage Dimensions drives come with software that allows mirroring. MicroNet's Micro/Max series is available in dual-drive mirroring configurations.

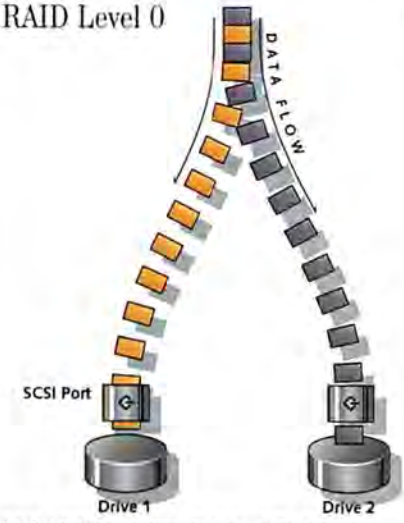
RAID Level 3 and Level 5 provide superior reliability through more complex data-recording methods. These RAID levels even allow for *hot pluggability*—a sloppy buzzword that means you can replace a defective drive within the array without shutting down the system. FWB, Storage Dimensions, and Core International (407/997-6033) are developing RAID Level 3 and Level 5 systems that should be shipping by the time you read this. As this article went to press, Loviél Computer Corporation just began shipping its R1 RAID system, which supports RAID Levels 0, 1, 3, and 5. RAID Levels 6 and 7, not yet available on the Mac, will add elaborate caching systems to improve performance without sacrificing reliability.

But RAID isn't cheap. With no drives, Loviél's R1 sells for $10,000; drive-mechanism prices range from $1800 for 300MB units to $6000 for 2GB drives—and you need a minimum of three mechanisms for RAID Level 3 or Level 5. Similarly, the 1.2GB configuration of FWB's SledgeHammerFT (which was not yet shipping as we went to press) will cost $19,999.

Storage Dimensions also offers a variety of two- and four-drive systems that provide between 635MB and 8GB of storage and range in price from $5499 to $36,999—drives for the rich among us. The MacinStor Dual and MacinStor Quad drives include software that lets you mirror one drive to another and tie drives together so that they appear on the desktop as one drive.

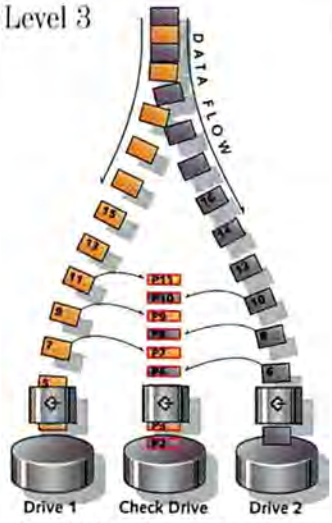
The MicroNet Raven-040 does indeed deliver top performance from a Quadra 900, and unlike a SCSI accelerator–based product, it doesn't require you to use an expansion slot. But keep in mind its dual-drive design makes a faithful backup routine all the more prudent. As for more ambitious and costly RAID systems, they're fine for the small segment of the market that can use and afford them, but the rest of us will have to ride SLEDs—and hope they don't crash.

RAID Level 0



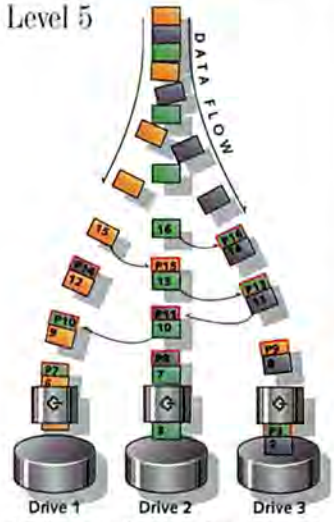
RAID Level 0, or *data striping,* splits data evenly across two drives. A Level 0 system performs much faster than a single drive because reads and writes occur simultaneously on the two drives. But Level 0 is only half as reliable as a single drive because if either drive fails, all data can be lost.

RAID Level 3



RAID Level 3 distributes data across two or more drives. The computer assigns error-checking codes, known as *parity information* (designated P1, P2, and so on, above), to each byte of data. The computer stores this parity information as well as compressed portions of the data files on a separate *check drive.* If a drive fails, information from remaining drives can reconstruct lost data. Level 3 reads are fast, but writes can be slower than with a single drive, due to error-checking overhead.

RAID Level 5



RAID Level 5 divides parity information among all the drives in the array, eliminating the need for a check drive. This speeds up write times over Level 3, but cannot completely eliminate error-checking overhead. Level 5 systems can also reconstruct data held on any failed drive.—*Charles Piller*

MW LAB Hard Drive Speed Tests 1 Gig and Up

Color Key
Fastest
Percent slower than fastest
Up to10%
11%–20%
21%–29%
30% or more

The drives are listed from best overall performance (top) to worst overall performance (bottom), based on both application and low-level SCSI tests on a Quadra. To determine rankings, we indexed overall performance numbers against the fastest drive. Thus, the Optima Technology Concorde 2.1GB gets a 1.00, and the Peripheral Vision Storage 1.2GB gets a 0.55. Index numbers are listed to the left of the product name. (For testing details and mechanism legend, see "Hard Drive Speed Tests 300MB to 700MB.")

Overall Fastest		Duplicate (in seconds)	Open (in seconds)	Save (in seconds)	Search (in seconds)	Compile (in seconds)	SCSI Evaluator Read (in MBps)	SCSI Evaluator Write (in MBps)
1.00	Optima Technology Concorde 2.1GB (S)	65.6	35.8	33.6	19.88	15.0	3.93	3.48
1.00	PLI PL 1.3GB (S)	64.0	35.7	33.1	19.69	15.3	3.54	3.64
0.98	CMS Enhancements Platinum 1.3GB (S)	65.0	37.2	31.4	20.11	15.3	3.30	3.64
0.98	FWB hammer1400FMF 1.4GB (S)	64.6	35.9	33.7	20.03	15.6	3.30	3.64
0.96	MicroNet Technology Micro/Max 1300 (S)	64.9	36.0	33.9	20.02	15.5	3.22	3.28
0.96	MicroNet Technology Micro/Max 2130 (S)	65.9	35.9	33.7	19.89	15.0	3.32	2.69
0.96	Storage Dimensions MacinStor 1335 (S)	64.6	35.9	34.8	20.02	15.6	3.20	3.44
0.85	La Cie ZFP+ 1.6GB (S)	80.9	40.0	41.1	18.76	17.9	2.90	2.90
0.83	Relax Technology 1.6GB (S)	79.7	38.8	42.2	18.71	17.5	2.81	2.18
0.82	MacDirect 1.2GB (F)	82.1	39.7	36.9	18.31	17.5	2.18	2.19
0.73	APS 1 Gig Wren 1.2GB (S)	82.8	41.6	44.5	25.29	20.0	2.11	2.14
0.73	PLI PL 1.2GB (S)	81.2	41.0	44.3	25.03	19.6	1.99	2.02
0.72	La Cie ZFP+ 1.2GB (S)	83.1	41.8	46.1	25.21	19.6	2.09	2.13
0.72	Optima Technology Concorde 1050MB (S)	84.6	41.2	45.9	25.32	20.2	2.09	2.14
0.73	CMS Enhancements Platinum 1GB (S)	82.4	43.1	43.4	23.99	20.2	2.10	2.13
0.72	GCC Technologies UltraDrive X 1GB (S)	82.7	41.4	46.5	25.01	20.5	2.09	2.13
0.71	Mirror Technologies Mirror 1GB (S)	81.7	41.2	45.5	25.71	19.0	1.93	1.74
0.71	MacTel Index 1.2GB (S)	83.2	41.6	46.1	25.16	19.4	2.04	1.75
0.71	Relax Technology 1.2GB (S)	82.5	41.8	44.9	24.95	19.8	1.94	1.74
0.70	HDI PowerDrive 1530MC (MC)	87.9	43.9	49.2	25.72	20.4	2.14	2.17
0.68	HDI PowerDrive 1050MC (MC)	87.0	44.3	46.9	25.48	21.7	1.83	1.84
0.55	Peripheral Vision Storage 1.2GB (OR)	109.4	53.6	52.6	36.13	25.6	1.51	1.51

MW EDITORS' CHOICE

Concorde 2100 The Concorde 2100, which tied for fastest drive in our tests, includes first-rate software and documentation. It's the one to buy if you can afford the best. **Company:** Optima Technology Corporation. **List price:** $9995.

Mirror 1000 If you need a gigabyte but can't afford a premium price, look into the Mirror. Includes excellent software. **Company:** Mirror Technologies. **List price:** $2199.

UltraDrive 650X, UltraDrive 1000X They aren't the fastest, but they are the friendliest. Front-panel SCSI address displays, termination switches, and other touches show exceptional attention to detail. **Company:** GCC Technologies. **List price:** 650X $2799; 1000X $3649.

MacDirect F425 A fast Fujitsu mechanism, switchable termination, and a five-year warranty make this one the best buy in the under-500MB set. **Company:** MacDirect. **List price:** $1288.

ciently. Here's why: When you save a file, the Mac's system software allocates disk space in chunks called *blocks*. The larger the drive, the larger each block. On a 150MB drive, a block is 2.5K; on a 600MB drive, it's 9.5K. Even if a file contains only one character, it takes up an entire block. If you store many small files on a high-capacity drive, you waste a lot of disk space. Creating smaller partitions that use smaller block sizes solves this problem.

Besides formatting and partitioning software, some drives also include a potpourri of utilities, games, fonts, and shareware. Overall, the best software bundles come from FWB, La Cie, GCC, Storage Dimensions, and Mirror Technologies.

Software bundles give you more for your money, but it's the little conveniences a drive provides that can make the difference between its being a pleasure or a pain to use. GCC's UltraDrive X series earns special recognition. Besides a front-panel SCSI-address readout and termination switch, the UltraDrive 1000X has a switch that lets you write-protect the drive—ideal for CD ROM developers and for use as a file server whose contents you don't want changed. All UltraDrive X models also have an Apple Desktop Bus (ADB) port and two rear-panel power outlets that are attached to the drive's power switch. Plug your keyboard into the drive's ADB port and plug the Mac into the drive's power outlets, and you can start your entire system by pressing the keyboard's power key. Little innovations like these simplify computing life. They also help atone for the UltraDrives' middle-of-the-pack performance. (Expect faster performance from GCC's latest UltraDrive, the Seagate Elite–based 1300X, due to ship by the time you read this.)

Drive to the Finish

IF YOU CAN AFFORD THE BEST, THE top picks among gigabyte drives include Optima's Concorde 2100, FWB's hammer1400FMF, PLI's PL 1.3GB, Storage Dimensions' MacinStor 1335, and CMS's 1.3GB Platinum. If your budget balks at these drives, consider the slower but cheaper gigabyte drives from APS, MacDirect, GCC, Mirror, and MacTel.

In the 300MB-to-600MB range, MicroNet's 515MB Micro/Stack 515 is the fastest, but its $3095 price is steep. The MacDirect F425 and the Peripheral Vision PV-520 are better buys. Liberty Systems' 520MB drive performed well and is pleasantly portable, but it costs $2299 and is internally terminated.

What's ahead? Beyond SCSI accelerators and disk arrays, look for higher capacities, smaller drives, and still more speed. But system software will have to evolve to keep pace. The Mac's SCSI Manager, the portion of its system software that handles SCSI devices, is due for an overhaul that will enable fast Macs to take better advantage of the latest, fastest SCSI-2 drives (see *Getting Started*, in this issue). The Mac's SCSI capabilities are adequate for most Macs and most users, but at the high end, the Mac's system software is becoming the weak link in the chain. **m**

See *Where to Buy* under "Hard Drives" for contact information.

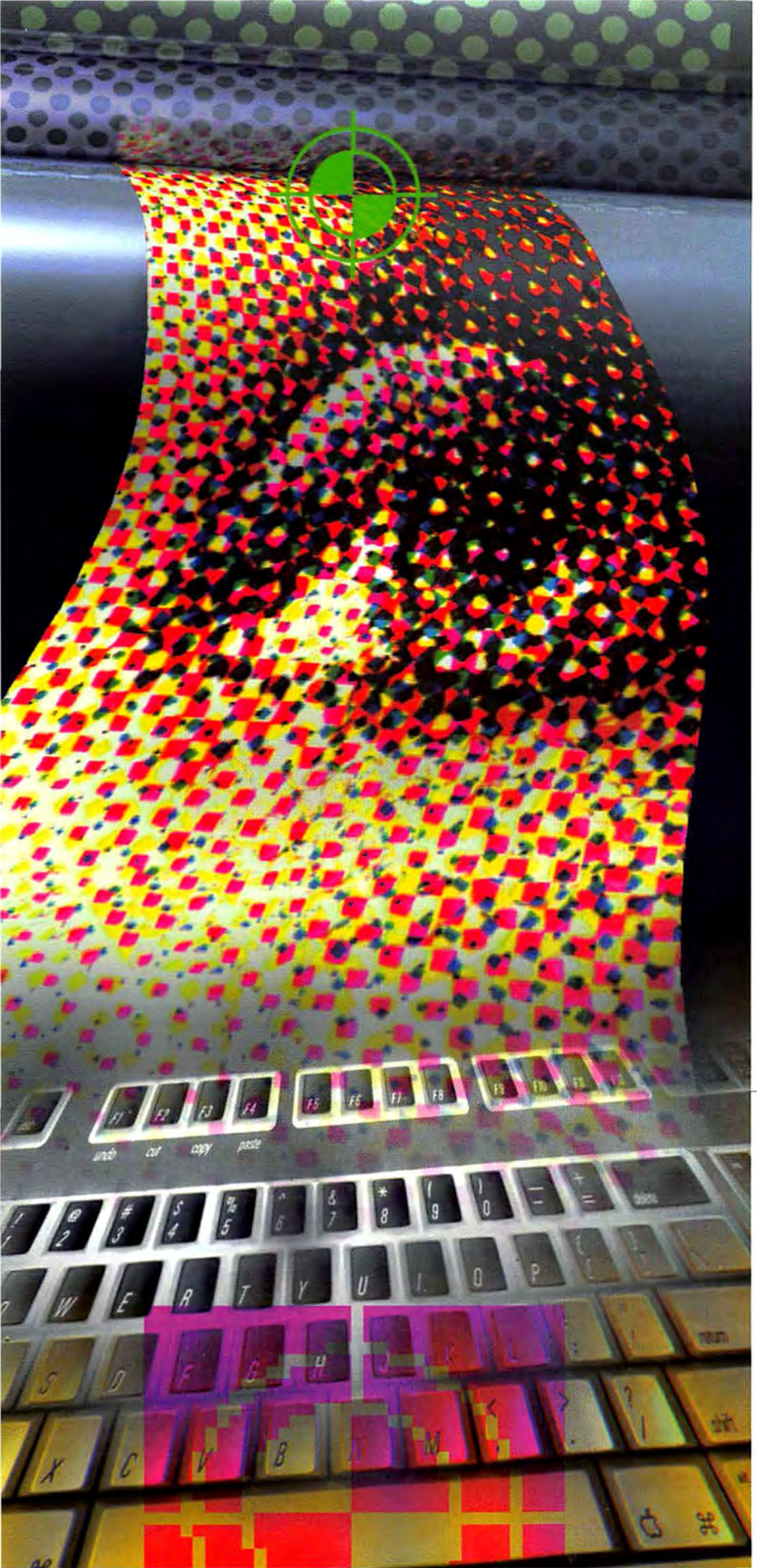
Contributing editor and *Getting Started* columnist JIM HEID has been working with Mac hard drives since 1984. His latest book, *Macworld Guide to Microsoft Word 5*, was published this spring by IDG Books Worldwide.

Macworld Lab testing supervised by DANNY LEE.

CORRECT Color

by Sanjay Sakhuja

MUCH CRITICISM IS GIVEN TO THE film separations generated by desktop publishing tools. The criticism comes mostly from printers who complain that these separations cannot be used for printing because the film density is inconsistent, the colors are not trapped, the registration is off, the film has moirés, or the separations are not adjusted for dot gain. Anyone who does desktop publishing encounters these problems at one time or another. ✣ The problems, however, stem from a user's lack of experience—not from the tools. Traditionally, prepress work has been a highly specialized craft passed from master to apprentice through a lengthy training process. The accumulated expertise became essential to creating high-quality prepress work. Today's computer tools, however, do not provide this type of expertise. For example, Adobe Illustrator has all the features necessary to trap an illustration, but unless the person using Illustrator has a full working knowledge of where to apply the traps and how much trap to apply, it is impossible to create a file that matches the quality of traditionally created separations. ✣ Thus your results depend largely on your ability to master these tools. You need to develop skills that parallel those of the craftspeople in traditional prepress work. This article outlines some common problems associated with desktop publishing separations and some solutions available through popular programs.



A guide

to solving

your major

prepress

printing

problems

ERIK ADIGARD/MAD

Trapping

AS PAPER MOVES THROUGH A multicolor press it can shift, causing the misregistration of colors. As a result there are oddities such as white gaps between a letter and a color background or an overlap between two areas of color. The degree of misregistration depends on the type of press that is used.

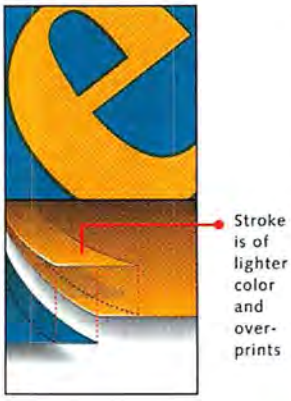
A technique to account for the imperfection in the press is called *trapping*. To create a trap, you basically overlap adjoining colors by adjusting the *stroke*, or external outline, of an object. The biggest challenge of this technique is to determine where the trap should be applied and how much trap should be applied (see "How Much Trap to Apply").

No Trap

IN PRINTING, PAPER MUST roll through a press four times—once for each color. Each time the paper goes through, its position may shift slightly from the last time. If no provision (no trap) is made for the shifting, the white of the paper may show around the edges of objects.

Trapping with Uncommon Colors

FOR TRAPPING TWO DISSIMILAR colors, you assign a stroke to an object and give it whichever color is lighter—that of the object or the background. Half the width of the stroke will fall outside the edge of the object and blend with the adjoining color. When the stroke is specified to overprint, the adjoining color prints under the outside half of the stroke to create a trap.

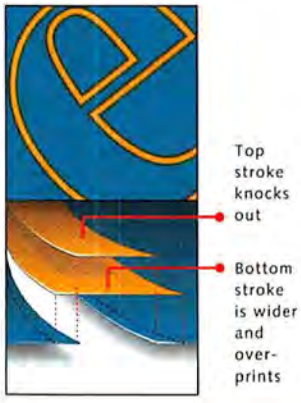


Trapping Bitmap Images

PHOTOSHOP ALLOWS YOU TO trap bitmap images. Other programs such as ColorStudio, however, do not. To create the effect of trapping, these programs let you use a technique called *antialiasing* to blend objects into other bitmap images. Antialiasing creates a fuzzy border where elements from each object merge, eliminating the jagged edges normally associated with bitmap images. Without jagged edges, images look sharper, and the common border acts as a trap. Be forewarned, however, that antialiasing does not always work. For instance, straight lines have no jagged edges and cannot be blended into other objects effectively.

Trapping Lines

TO TRAP A LINE OF ANY thickness into a background of a different color, create two lines and lay one directly over the other. Make the first line (the trap line) wider than it needs to be and overprint the background. Then create a duplicate line on top of the first line. Make the duplicate line thinner than the first one and have it knock out of the background. The extra width of the first line creates an evenly distributed trap.



How Much Trap to Apply

THE AMOUNT OF TRAP YOU apply depends on the size of the image, the kind of paper, and other variables. Printers often suggest measurements in thousandths of an inch, which you may have to convert to points. (There are approximately 72 points to an inch.) Here are examples of how traps of different sizes will affect type of various point sizes.

Scanning Images

THE WORDS *DESKTOP PUBlishing* mean different things to different people. For most people it implies using equipment that is relatively cheap and accessible, but that is not always true. *Macworld*, for example, is desktop published—the design and illustrations were created on Macintoshes and the photographs were scanned in with a desktop scanner. The scanner, however, costs about $100,000. The images could have been scanned on a $2000 scanner or a $30,000 scanner, but the results would have been different. The choice of scanner is perhaps even more important than the output device, since the "garbage in, garbage out" epithet holds true.

The following are examples of the same image scanned on various types of scanners.

Traditional prepress scanner

Barneyscan CIS 4520

Scitex Smart Scanner

Sharp JX-600

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Where to Place Traps in Illustrator Files

This technique allows you to take an Adobe Illustrator file and process it in Adobe Photoshop to determine where traps are needed.

Step 1: Save the Illustrator file as an EPS file.

Step 2: Open the file in Photoshop at 72 dpi in CMYK mode.

Step 3: Duplicate the file using the Calculate command.

Step 4: Under the Image menu choose Trap and specify 2 pixels. (The amount is not important, since we are not putting the trap here, only isolating the areas where the trap should be placed.)

RON CHAN

Step 5: Calculate the difference between the four channels of the original and the four channels of the trapped files. This difference appears as a selection on the original file.

Step 6: Combine these four channels into one and threshold to exaggerate the areas that require traps. Paste this file into the original file as a selection.

Step 7: Fill this selection with a bright color and print a copy on a color printer. The bright-color lines on this print are the areas where the traps should be set in Illustrator.

Screen Angles and Moiré Patterns

THE BIGGEST COMPLAINT with desktop published film is the presence of *moirés*, or visible dot patterns, in color separations. Whenever two or more halftone screens are overlaid there is a possibility of creating a moiré. When the screens are overlaid at certain angles, the moirés do not appear. In traditional prepress methods, combinations of line-frequency and screen-angle settings have been perfected so that moirés do not appear. (Line frequency is the number of halftone dots per linear inch in a halftone screen. Generally this ranges from 55 to 200, and more halftone dots yield greater resolution.) Traditionally, screen angles are set at four angles—45 degrees (black), 75 degrees (magenta), 90 degrees (yellow), and 105 degrees (cyan) (or their complements). In early PostScript systems, however, certain computational restrictions meant that screen angles could not be set at exactly 45, 75, 90, or 105 degrees, thereby causing moirés. Now, however, Adobe's Accurate Screens feature in combination with PostScript Level 2 can compute angles with greater precision and thus create angles that are close to the traditional angles.

For digital systems, screen angles of 45 degrees and 90 degrees do not cause moiré problems because each halftone cell intersects the imagesetter's grid consistently—all halftone cells are identically shaped and contain the same number of pixels. During screening, therefore, a single master halftone dot is calculated and then replicated by the imagesetter at the correct screen angle. Fewer computations are needed and printing speed is improved. These angles are called *rational tangent angles.*

At 75 degrees and 105 degrees, however, halftone cells do not intersect the imagesetter's grid consistently and are not identically shaped. These angles are called *irrational tangent angles.* Different PostScript screening technologies handle these angles differently, producing different visual results (see examples).

High-end proprietary scanner-recorder systems have enough horsepower to use the traditional, irrational tangent angles of 75 degrees and 105 degrees and calculate the appearance of each halftone dot individually. The PostScript systems, however, which are

Scitex Dolev Screening

At 133 lines per inch

At 150 lines per inch

At 175 lines per inch

At 200 lines per inch

Agfa Balanced Screening

At 133 lines per inch

At 150 lines per inch

At 175 lines per inch

At 200 lines per inch

Linotype-Hell HQS Screening

At 120 lines per inch

At 133 lines per inch

At 150 lines per inch

At 199 lines per inch

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less powerful, use some form of rational tangent screening. Under this approach, irrational tangent angles are rounded up or down to the nearest rational tangent angle so that a single master halftone dot can be used to create halftone dots in all four screens. This process is efficient, but it can adversely affect the accuracy of angles and line frequency and can cause moiré patterns.

Some PostScript screening technologies, such as Agfa Balanced Screening Technology, achieve greater angle accuracy by setting halftone screens composed of supercells at rational tangent angles. A *supercell* is a matrix of halftone cells—for example, a 3-by-3 supercell consists of nine halftone cells. As long as each supercell intersects the imagesetter's grid consistently, all supercells are identical. Because a supercell is larger than a standard halftone cell relative to the imagesetter's grid, there are many more angles at which the supercell will intersect the grid consistently. Thus the system can approximate traditional angles and frequencies with greater precision.

Shown on the page opposite are comparisons of the screening options available.

Registration and Film Problems

THE ORIGINAL IMAGESETTERS used for making four-color separations on PostScript systems were actually typesetting machines and were never designed to provide correct registration of the separations. (Misregistration can cause color shifts, moirés, and trapping problems.) These machines have proliferated throughout the industry and even today far outnumber the machines designed specifically for separations. Film generated on original capstan-based typesetting equipment has a greater probability of misregistering than does film generated on a newer, drum-based imagesetter.

Another common problem with film is inconsistent density or low density (density describes how dark the dark areas are). Film has to have a certain minimum density for it to be used effectively in making plates for printing. Inconsistent or low density is usually related to the film processing equipment that is used to process the film from the imagesetters. Once again the vast majority of imagesetters use processors designed for typesetting, not for film work.

Misregistration problems are further aggravated by the fact that film produced by many service centers is never proofed and is supplied directly to the printer, who discovers the film's problems either on press or while plating the film. The cardinal rule of traditional color-separation houses is that no film is ever sent out without first making a proof. Don't try to save money by skipping the proof—the cost of the proof is minor compared with the overall cost of the project. The proof will forewarn you about a number of problems, including misregistration, color shifts, moirés, and trapping. Furthermore, the proof is an insurance policy that protects you from potential problems at the printer—if the proof has been signed off, then it is the responsibility of the printer to ensure, before putting the job on the press, that the results will match the proof. m

ROBIN GINSBERG

Moiré Patterns If, during printing, one of the four color plates shifts, the image will contain moiré patterns.

Color Shift The image on the left is a neutral gray. If a plate shifts, the color balance is disturbed and the gray takes on a biased shade (right).

SANJAY SAKHUJA is president of Digital Pre-Press International, a PostScript-based color-separation house in San Francisco.

Reviews

IN THIS ISSUE: Adobe Premiere, VideoSpigot, Aldus PageMaker, CA-CricketDraw III, GraphMaster, Tiles, DeltaGraph Professional, ScanMatch, Wallpaper, Shanghai II, and more

Digital Video Editor and Video-Capture Board and Software

Adobe Premiere

PROS: Great user interface; variety of special effects. **CONS:** None. **COMPANY:** Adobe Systems (415/961-4400). **REQUIRES:** Mac II; 4MB of RAM; hard drive; System 6.0.7; QuickTime. Recommended: 8MB of RAM; 80MB or larger hard drive; video-capture board. **LIST PRICE:** $495.

MW ★★★★★

VideoSpigot

PROS: Speedy video capture and compression. **CONS:** Can't save trimmed clips with SuperMac's compression. **COMPANY:** SuperMac Technology (408/245-2202). **REQUIRES:** Mac II; color graphics board; 4MB of RAM; hard drive; System 6.0.7; QuickTime; video source. Recommended: 8MB of RAM; 80MB or larger hard drive. **LIST PRICE:** VideoSpigot (NuBus) $599; VideoSpigot (IIsi or LC) $499; VideoSpigot Pro (includes 8/24-bit accelerated color graphics board) $1599.

MW ★★★★

ONLY A CENTURY AFTER THE birth of film (give or take a few years), you can make your own digital movies on the Mac. Two new products let you capture video clips and assemble them into a QuickTime movie.

VideoSpigot/ScreenPlay

A NEW VERB HAS HIT THE MACINtosh lexicon—*to spigot*—as in "I must have spigoted at least 80 megs of video today." The term derives from SuperMac's new VideoSpigot, a $500 board that lets you grab video from a variety of sources—camcorder, video deck, TV, or monitor—and save it as a 24-bit QuickTime movie. VideoSpigot includes an application called ScreenPlay, which lets you view video on the Mac's screen, adjust the beginning and ending frames (in and out points) of a recorded clip (see "Captured Live"), and save clips using any available compression scheme. (Version 1.0 of ScreenPlay offers two compression/decompression options, or *codecs*—SuperMac's own compressor or Apple's Video Compressor; thanks to QuickTime's modular architecture, others can be plugged in. According to a SuperMac representative, a SuperMac codec with greater compression capabilities will be available for VideoSpigot users soon.) If you have a Mac with built-in sound-recording capabilities (such as a IIsi, LC, or Quadra), ScreenPlay will automatically record audio along with the video; to record sound using other Macs, you must install an audio digitizer such as MacroMind/Paracomp's MacRecorder. (SuperMac recently announced Spigot & Sound, an $899 package that includes MacRecorder and the SoundEdit Pro application.)

ScreenPlay lets you set a number of preferences, including the codec used and the amount of compression, frame-rate limit for recording, and window size (160 by 120 pixels, 240 by 180 pixels, or 320 by 240 pixels for NTSC video). After a few experiments, I decided to capture clips at the smallest window size, even though the 160-by-120-pixel window is smaller than a playing card; the playback speed on my Mac IIcx (with 8MB of RAM) was too slow for my liking at the larger window sizes. VideoSpigot automatically records at the fastest frame rate a Mac can support; if you want to limit the frame rate (to keep down file size or to optimize playback on slower Macs), you can set the maximum frames per second (fps) for recording. According to SuperMac, a typical Mac LC plays QuickTime movies at about 10 fps, and a IIsi at about 15 fps.

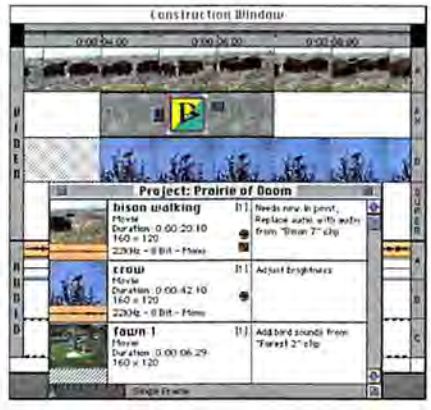
In general, I was happy with the performance of VideoSpigot and ScreenPlay. The hardware-and-software team is easy to install (you need your own cable to connect your Mac and video source, however), and the manual is clearly written and informative. My main complaints about ScreenPlay are the small size of the preview window when you're recording and the program's inability to save trimmed clips in SuperMac's compression format (you can adjust a clip's in and out points, but with SuperMac's compression the entire clip is saved; whereas with Apple's compression chosen, just the part you want is saved). The latter problem is no big deal if you intend to edit a clip in another program, but is inconvenient if you want to simply save it and play it as a stand-alone QuickTime movie.

Adobe Premiere

WHILE YOU CAN USE SCREENPLAY'S controls to adjust a clip's color and hue or change its in and out points, to do any real editing you need a digital video-editing program like Adobe Premiere. VideoSpigot and Premiere were made for each other—literally. Premiere was originally developed at SuperMac under the name ReelTime. You can import QuickTime clips from ScreenPlay (or other sources) into Premiere and put them together into a QuickTime movie, complete with sound track and special effects. Besides, QuickTime clips, Premiere can import animation in PICS format, still images in PICT or Photoshop format, and sounds in AIFF, SND, or SoundEdit format.

You create a movie in Premiere's five windows. Imported QuickTime video clips and sound appear in the Project window, where you can view information about a clip's file type, duration, window size, and audio portion. You can also add your own comments next to a thumbnail picture of the scene's first frame (see "Making Movies"). Double-clicking on the thumbnail opens the Clip window, where you can set a video or audio clip's in and out points, moving through the clip frame by frame if necessary. Once you've trimmed the scenes, you assemble them into a sequence in the Construction window (you can also trim scenes from within this window with a handy razor-blade tool). The Construction window has two video tracks and three audio tracks; you can create transitions between the two video tracks by dragging special-effects icons from the Effects window. Effects include a variety of fades, wipes, and dissolves, from a simple cross dissolve to a fancy effect that slurps one scene into a funnel and replaces it with another. The Construction window also offers a superimpose track, which lets you, for example, place titles over a scene. As you construct a movie, you can preview all or part of it in the Preview window.

Captured Live ScreenPlay, the program that comes with SuperMac's VideoSpigot video-capture board, lets you view a clip as it's being recorded, set the in and out points, and save it as a QuickTime movie.



Making Movies You use Premiere's Project window (foreground) to view information on imported video and audio clips. Drag a clip's icon into the Construction window to place it in your movie.

Once you've assembled your movie in the Construction window, you select Make Movie and take a break while it compiles. I found that, even with the Preview window, I usually had to go back to a project file and make a few adjustments before I was satisfied with the final movie. And satisfied I was, on the whole. Sure, my work wasn't TV-quality video, but it wasn't bad for a homemade movie.

Once I got the hang of basic moviemaking, I tried some of Premiere's filters, which include antialias, invert, posterize, tile, pointillize, and motion blur, and the ever-psychedelic twirl, wave, and zigzag. You can also apply filters from Adobe Photoshop or Aldus Gallery Effects. As if that's not enough, audio filters let you add echoes or play sound backward (I used the latter filter to check some of my Slim Whitman CDs for hidden satanic messages; happily, the results were negative).

After several modest experiments, I created my magnum opus, an 18MB film made up of 12 video clips, 10 special effects, and a musical sound track taken from a CD with MacRecorder. How long does an 18MB movie last? In this case, just 1 minute and 20 seconds (granted, I added to its bulk by saving at 15 fps at the high-quality compression setting). Time to buy some more removable cartridges.

My complaints about Premiere are minimal; on the whole, I found the program well designed and easy to learn. I was disappointed by the small size of the Preview window, and the tiny audio fader control was a bit hard to manipulate. Also, I'd like to be able to select and move several tracks simultaneously when working in the Construction window. But the main flaw with digital moviemaking has to do perhaps more with QuickTime than with VideoSpigot or Premiere: despite using a relatively high playback rate, low compression setting, and small playback window, some of my movies exhibited noticeable skips and stutters in both video and audio. Experimenting with different capture, playback, and compression settings helped, but anyone who expects flawless digital video is likely to be disappointed. Another problem can occur when you transfer a QuickTime movie from one Mac II model to another; depending on factors such as CPU speed, memory, and hard drive fragmentation (periodically using a disk-optimization utility is highly recommended for QuickTime moviemakers), a movie that plays fine on one Mac may appear jerky or slow on another.

But I don't care. As a camcorder aficionado and confessed QuickTime fan, I'm thrilled to have a video-editing system on my desk. And if you want to make business presentations, product demos, advertising comps, educational clips, or just digital home movies, I think you'll find VideoSpigot and Adobe Premiere a winning combination.—ERFERT FENTON

Page-Layout Software

Aldus PageMaker 4.2

PROS: Interruptible screen redraw; Control palette; Aldus Additions; robust System 7 support; Aldus PrePrint included; baseline leading; smart quotes while typing. **CONS:** Several features still missing; Control palette doesn't handle text formatting; nudge works only in screen pixels; Aldus Additions not well implemented. **COMPANY:** Aldus Corporation (206/622-5500). **REQUIRES:** Mac Plus; 2MB of RAM; hard drive. **LIST PRICE:** $795.

MW ★★★

PAGEMAKER 4.2 IS A MAJOR UPgrade, but as the version number implies, this is not the QuarkXPress-killer that PageMaker users have been hoping

continues

for. The most significant new features are Aldus Additions, a technology that lets users add new features to PageMaker, and a user scripting language; robust System 7 support; interruptible screen redraw; a Control palette for numeric positioning, cropping, and scaling; baseline-to-baseline leading; Aldus PrePrint, a powerhouse color-separation application; the ability to load fonts without closing a publication; step-and-repeat duplication; a dictionary editor; smart-quotes conversion while typing; support for Desktop Color Separation (DCS) files; and dozens of other features in preferences, typography, long documents, linking, and printing. That's a lot for an "incremental" upgrade.

What's Still Missing

THERE'S A LONG LIST OF MISSING FEATURES, however. You still can't open more than one publication at a time; group, align, or distribute objects; specify custom line widths or tint percentages; apply spot-color tints to type and lines; rotate objects (aside from stand-alone text blocks in 90-degree increments); specify kerning numerically; use codes to format text to be imported; or specify baseline shifts explicitly. (Some of these problems may be addressed with Additions in the near future.)

Less important omissions include multiple master pages; multipage spreads; the ability to insert text blocks and multiple objects as in-line elements in text; automatic or computer-aided trapping; and spot-color knockouts under EPS graphics (this last does work if you color-separate using PrePrint).

What's Hot

THE BEST NEW FEATURE—ITSELF worth the $85 upgrade price—is the interruptible screen redraw. You can stop the screen redraw at any time (to select a menu item, delete a text block, or do whatever) with a mouse click or keystroke. This is a perfectly implemented feature that every Mac program (including QuarkXPress) should adopt.

The second-best new feature is the Control palette. It beats QuarkXPress for moving, cropping, and scaling objects, allowing you to select a point of origin for the adjustments (you can even scale PageMaker objects proportionally now—hallelujah!). You can do simple arithmetic in the Control palette (to move an object 1 inch to the right you type +1 next to the *X* coordinate), but for some reason you can't mix measurement systems (1p3+1i, for instance). The new nudge feature is great, but it works in screen pixels, so the nudge increments change whenever you change the page view or measurement system—fine for nudging visually, but frustrating for numeric adjustments. The Control palette's greatest failing, however, is its inability to alter or even display any text formatting whatsoever.

PageMaker 4.2 adds another long-awaited feature: baseline-to-baseline leading. Unfortunately, it exacerbates PageMaker's screen redraw difficulties; pieces of type tend to extend outside text blocks and get cut off.

In addition to support for virtual memory, 32-bit addressing, and balloon help, PageMaker 4.2 offers some of the best support I've seen for System 7's Apple events and publish and subscribe features. You can subscribe to published editions; and with a subscribed-edition graphic selected, you can launch the source application by using the Edit Original command or by option–double-clicking. When you finish editing, the new version replaces the old. A similar technique allows you to edit the original FreeHand file for a placed FreeHand EPS file—a real step-saver. PageMaker's most impressive System 7 support, however, is scripting via Apple events—creating your own additions using PageMaker commands and queries with HyperCard, Userland's Frontier, or the like.

Aldus provides six loadable Additions, but they lack the polish I expect in Aldus products (see "Aldus Additions"). Balance Columns does a respectable job of aligning the tops and bottoms of selected columns of text. Display Pub Info shows limited information—the fonts used in a publication and installed in the system, styles (only including information on their Based On and Next Style attributes), and the locations of linked files. To make up for this paucity of information, PageMaker 4.2 includes ElseWare's shareware application CheckList 1.0, which offers more Style info (you need to upgrade to the commercial version 2.0 for $79.95 to get its full functionality [see *Reviews*, February 1992]). In a clunky attempt to imitate QuarkXPress's drop cap feature, the Drop Cap Addition uses the old subscript, tabs, and line-ends technique, ignoring discretionary hyphens at the ends of lines (among other things). Make Booklet puts pages in order for two-up, double-sided, saddle-stitched printing, but has an irritating habit of misplacing page elements. Sort Pages lets you rearrange pages in a publication by dragging (with a well-implemented interface), but falls short in its handling of master-page items and objects that span a spread.

Aldus Additions Developers can add new features to PageMaker using Additions. These six Additions are included with version 4.2.

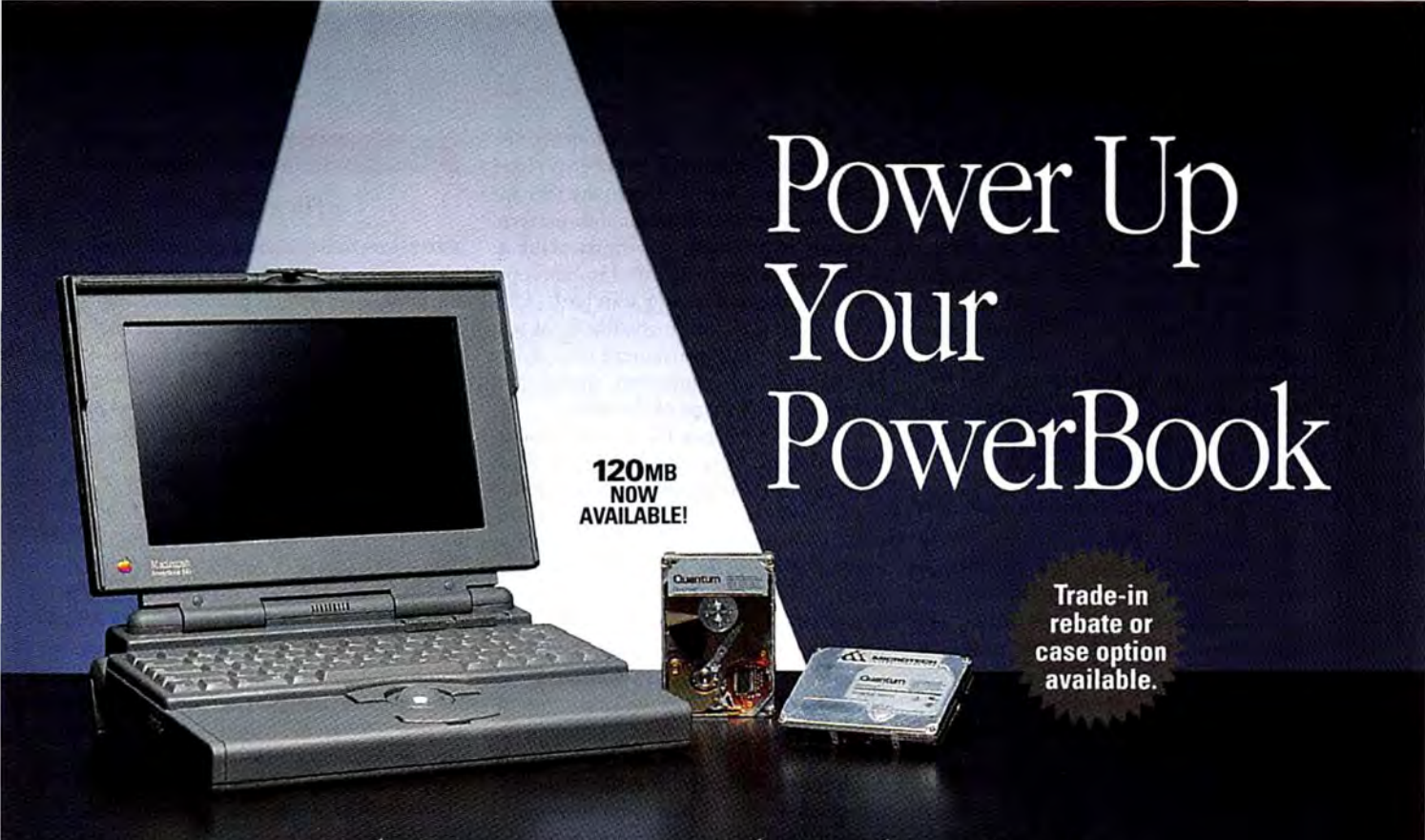
Run Script lets you write and run your own scripts, but with at least six limitations. You have to pay $30 extra for Aldus's scripting guide; it's not included with the product. Run Script does not work with Story Editor (arguably the place you need it most), or any Story Editor commands like Find, Change, or Spelling. Whenever you invoke Run Script, it deselects any selected text or text blocks, so you can't run a script that affects selected text. Text entered with a script run from a disk file can only contain characters that can be saved in the Mac's Text Only format—that excludes line breaks, em spaces, and other PageMaker-specific characters. And Run Script has no programming control—no conditionals, loops, calculations, or variables. The greatest limitation of Run Script, however, is that you can't use queries (for instance, "What type of graphic is this?"). To use the PageMaker query language, you have to resort to Apple events scripts from HyperCard or the like. You can do amazing things with these scripts, but only Aldus developers are provided with documentation for the query language.

FreePrint

WITH THE INCLUSION OF ALDUS PrePrint, version 4.2 answers critics who complain of PageMaker's missing color-separation abilities. PrePrint requires that you print a publication to disk as PostScript, then separate the file with PrePrint, but it has top-notch separation capabilities—including color-correction and -separation of color bitmaps in TIFF and EPS (but not PICT) formats. PrePrint even separates (or creates) DCS files.

PageMaker 4.2 offers disparate new features but still lacks some of the features that users need most. And in the case of Additions, the new features lack smooth, seamless integration. Version 4.2 is more than worth the upgrade price, and it may keep PageMaker users off the QuarkXPress bandwagon (read juggernaut), but it falls short for devoted, longtime PageMaker users.—STEVE ROTH

Power Up Your PowerBook



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Circle 127 on reader service card

Draw Program

CA-Cricket Draw III 1.0

PROS: A complete rewrite; nice Bézier curve tool; unique alignment options; superior approach to automated gradations. **CONS:** Text on a curve does not display accurately on screen; irregular interface; some bugs. **COMPANY:** Computer Associates (516/342-6000). **REQUIRES:** Mac Plus; 2MB of RAM; System 6.0.7; hard drive. **LIST PRICE:** $249.

MW ★★★

IN TERMS OF LOOK AND FEEL, THE new CA-Cricket Draw borrows heavily from Adobe Illustrator. In addition to similar commands and identical keyboard equivalents—⌘-spacebar, for example, gets you the zoom tool—CA-Cricket Draw's Bézier tool operates almost identically to Illustrator's model, which is the best interpretation available. In fact, CA-Cricket Draw improves on Adobe's model by letting you convert points in a shape without switching tools. Also as with Illustrator, you can use the freehand tool to extend an existing line. CA-Cricket Draw is a more precise program for creating and editing shapes than most of its rivals, including SuperPaint and Canvas.

Like Canvas and MacDraw Pro, CA-Cricket Draw offers a collection of word processing tools, including a tab ruler, paragraph spacing, and kerning controls. (There's no spelling checker, but for $150 less than Canvas or MacDraw Pro, I can accept that.) CA-Cricket Draw resembles Canvas in its interpretation of masking and hole-cutting. By selecting multiple paths and one of two menu commands, you can combine paths into Clipping Groups, a simplified response to the more complex masks and composite paths found in Illustrator and FreeHand.

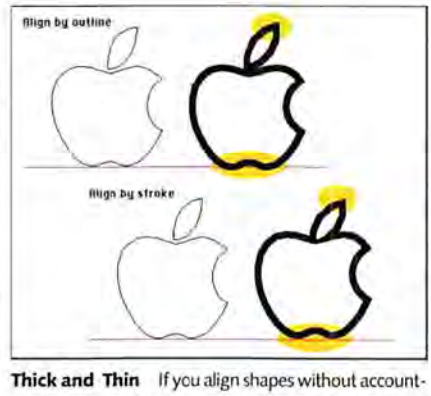
But CA-Cricket Draw III has some original implementations. For one, when aligning objects, you can compensate for line weights. In addition to aligning objects by extreme points on their outlines, you can align objects by the edges of their strokes. Another original feature is the Fountain Editor, which lets you edit custom gradations according to a Bézier curve model. You can create logarithmic gradations, double gradations, double logarithmic gradations, and so on, all to your exact specifications, and see the results on the fly. In fact, CA-Cricket Draw's easy-to-use automatic gradations are the best I've seen in any draw program.

Cricket Draw introduced Mac users to gradations, and CA-Cricket Draw III has dramatically improved them. Unfortunately, the same cannot be said for text on a curve, the other feature pioneered by the original Cricket Draw. Once you have bound a line of text to a path, the text appears on screen as a crosshatch pattern. To view it properly, you must print it. While this display constraint is unacceptable by modern drawing standards, CA-Cricket Draw III automatically kerns text on a curve—an improvement over FreeHand, in which characters spread and cramp with the shape of the path.

CA-Cricket Draw III also has its oddities and bugs. Oddities include the Snap to Arrow Tool preference setting, which has nothing to do with snapping as defined by many other draw programs, but instead reselects the arrow tool after any other tool is used. In fact, snapping—in which an object in motion gravitates toward a stationary object or guideline—is only half supported by CA-Cricket Draw III. Objects snap to guides, but not to other objects. This greatly reduces the utility of the Grate and Starburst tools. Each tool is designed to create guideline objects, but since objects don't snap to objects, they serve as visual references only.

Concerning bugs, if you try to import a sufficiently large bitmapped PICT file, the program displays an out-of-memory error, asks if you want to save your changes, and then promptly crashes. At least it lets you save before it crashes, but I think a better out-of-memory handler is in order. A Computer Associates representative claims that the company is aware of other faults in the product—most of which are related to printing imported EPS graphics—and will remedy these problems in a future release.

CA-Cricket Draw III might not be the most revolutionary program you've ever used, but for the money, reliability is better than flash. If you're shopping around for a straightforward program with moderate capabilities, CA-Cricket Draw III fits the bill.—DEKE McCLELLAND



Thick and Thin If you align shapes without accounting for their strokes, the extreme edges of one aligned shape may extend farther than those of another (top). Presently, CA-Cricket Draw III is the only program that compensates for line weight (bottom).

Desktop Organizer and File Launcher

Tiles 1.0.1

PROS: Icons for file-launching and QuicKeys macros; automatically creates tiles for the files you use; provides project tiles for organizing and automating complex tasks. **CONS:** Requires too much RAM; slow screen redraw; poorly designed interface and manual. **COMPANY:** CE Software (515/224-1995). **REQUIRES:** Mac Plus; 2MB of RAM; hard drive; System 6.0.4. **LIST PRICE:** $99.95.

MW ★★★

IF YOU WERE TO TAKE PIECES OF HAM, QuicKeys², DiskTop, OnCue II, or HandOff II, and the Finder, put them in a blender, and flip the switch, you might end up with something like Tiles.

Like OnCue and HandOff, Tiles is—in part, anyway—an application and document launcher. Instead of a launch menu, however, Tiles creates colorful icons called, logically enough, tiles. Double-click on a tile and you launch an application or open a document (à la System 7's aliases); invoke a QuicKeys macro (for QuicKeys owners who want a point-and-click interface); or initiate a complex combination of QuicKeys macros, application launches, and file openings, much like a QuicKeys sequence (except that a tile can string several sequences together).

You can create document tiles, application tiles, project tiles, and QuicKeys tiles yourself; or you can have Tiles watch you work and create tiles for the programs and documents you use (in much the same way HAM creates its Recent Items listings in the Apple menu; see *Reviews*, April 1992). You create multistep (project) tiles simply by dragging existing tiles into a project window, or you can ask the program to create a project containing the currently open applications and documents. Tiles in a project are executed in the order they appear in the window, so QuicKeys owners can "program" relatively complex tasks with project tiles.

When the program creates tiles automatically, it can save all tiles, a specified number of tiles, or only tiles that have been used within a specified time period.

Tiles are organized in application, document, and project windows, each of which contains a control bar with mini-icons for manipulating and managing tiles and specifying the window view (Finder-style lists or tiles). You can drag tiles out of a window onto Tiles' transparent desktop to line them up on screen for quick access. An optional snap-to grid that you can customize and a Clean Up command help keep all the tiles neat and orderly.

Tiles can be large or small. The program automatically emblazons a tile with the icon of the file on which it's based, but you can select an icon from Tiles' comprehensive icon library (or any other icon source) or choose a Tiles-generated bite-size piece of any PICT graphic. Plus there's a paint program–like editor for reworking tile faces. Tiles also automatically gives a tile the name of the file on which it's based, but you can change tile names, and they can appear—in any font or size—on or below the tile. You also can forgo names altogether and rely on the tile image alone.

Tiles has a few file-management functions reminiscent of DiskTop. Select an application or document tile and you can copy, move, rename, and delete (or if you use QuickMail, mail) the actual file. If the file to which a tile refers is no longer where Tiles expects it to be, Tiles can find it for you. In addition, like HAM, Tiles can remember which applications and documents were open at shutdown and reopen them the next time you turn on the Macintosh.

To work properly, Tiles requires three separate system extensions (plus QuicKeys' system extension, if you want to create QuicKeys tiles). For most functions, the Tiles application, which requires a memory partition of at least 500K, also must be running.

But the bad news doesn't stop there. Tiles' menus are illogically organized (there are two Clean Up commands in two different menus, for example); the control bar icons do not work in a single, consistent fashion; some functions aren't where you'd expect them to be (the tile face editor, for one, is reached via the Get Info control bar icon, not the Face icon); some tiles fail to highlight when you select them; cleaned-up (reorganized) desktop tiles cover up Finder icons; screen redraw is much too slow, especially if the tiles have full-size custom faces; the program has memory problems when miniaturizing large, color PICT files for tile faces; and the manual is poorly organized.

Tiles has clearly improved on several good ideas, though. Visually oriented people might want to create a button for virtually any task. System 6 users who covet System 7 aliases, and QuicKeys owners who want to be able to string sequences together or display QuicKeys as icons might like Tiles. But, until Tiles goes through at least one major revision, almost everyone else would be better served by purchasing one or two of the single-serving utilities whose flavors the program combines, and skipping Tiles' not-so-smoothly-blended concoction.

—ROBERT C. ECKHARDT

Charting and Graphing Software

GraphMaster

PROS: Permits 360-degree rotation of graphs; can create pictographs; can ungroup and regroup graph objects; superb implementation of balloon help. **CONS:** Too many "Can't Undo" messages; easy to overload memory partition. **COMPANY:** Visual Business Systems (404/956-0325). **REQUIRES:** Mac Plus; System 6.0; hard drive. **LIST PRICE:** $295.

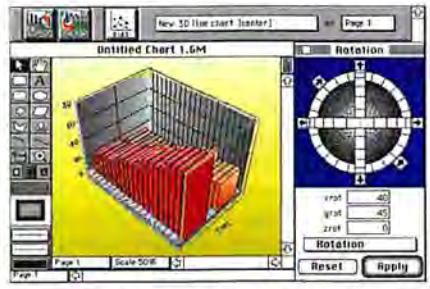
MW ★★★★

GRAPHMASTER FROM VISUAL BUSiness Systems is an excellent general-purpose charting and graphing program for business and technical users. GraphMaster offers a number of unique features, including pictographs and 360-degree free rotation, and it may be DeltaGraph Professional's strongest challenger (see the DeltaGraph review in this issue).

GraphMaster does not support quite the range of chart types and features that DeltaGraph Professional does: GraphMaster lacks ternary, bubble, and true *x*-*y*-*z* charting; support for QuickTime; and the ability to create presentations. On the other hand, its well-designed interface makes GraphMaster relatively easy to learn and appealing to work with.

To make a chart, you follow the same basic steps as in other programs—create a data sheet, select a chart type, and plot the data—but GraphMaster offers an unusual set of capabilities and tools. Most remarkable is a tool that looks something like a flattened trackball, which permits the user to rotate three-dimensional charts and graphs 360 degrees. There's also a useful pop-up menu tool that lets you click on a chart element to display a context-sensitive menu of formatting commands at the cursor's location.

GraphMaster supports the creation of graphs with pictographs—EPS- or PICT-format artwork that is stacked or stretched to represent numerical values in place of plain rectangular bars in a bar graph—a nice feature for presentations. (Pictograph charts cannot be rotated three-dimensionally.) The program also gives the user substantial control over color, including the ability to create CMY (but not CMYK) custom colors, the ability to automatically assign colors to objects representing different data series in a single graph, and the ability to control blended fills.



GraphMaster Interface This three-dimensional column chart was positioned using the 360-degree rotation tool (right). The tool depicts a sphere surrounded by three adjustment wheels that correspond to the *x*-, *y*-, and *z*-axes of the chart.

GraphMaster makes it easy to create elaborate 3-D charts. In fact, it's easy to make charts that are far flashier than their data warrants. (Users who are tempted to do so ought to invest in a copy of Edward Tufte's classic book on informational graphics, *The Visual Display of Quantitative Information* [Graphics Press, 1983], to learn how to avoid "chartjunk.")

GraphMaster cannot constrain fitted curves to the actual range of data points, but instead runs them the length of the *x*-axis, resulting in odd artifacts at the beginning and end of the curve. On the other hand, it can apply different curve-fitting formulas to a given data series, which DeltaGraph, for one, cannot do. GraphMaster does not support user-defined curve fitting as DeltaGraph does. GraphMaster's frequent inability to undo actions is a real irritation. If you're not happy with a complex rotation of a 3-D chart, your only recourse is to close the file, not saving changes, and open the file again—a cumbersome workaround.

You can save the formatting information of finished graphs and their backgrounds as templates and then reapply the formatting to charts with the same type of data sheet. GraphMaster also exports in EPS, PICT, and Adobe Illustrator 88 formats. Charts that are to be opened and trapped in later versions of Illustrator may not open properly in FreeHand; EPS files exported from GraphMaster separate perfectly in QuarkXPress 3.0.

GraphMaster permits more than one document to be open at once, which is convenient but can also play havoc with memory. Once, after opening a number of documents, I tried to save and was presented with a message telling me to save and close some files; trying again resulted in a cascade of messages warning me to save before the program quit, and finally a "program unexpectedly quit" notification. (I never was able to save the document I tried to save in the first place.) In such instances, Visual Business Systems technical support suggests increasing GraphMaster's memory allotment. I recommend opening no more than two charts at a time.

The program supports System 7's

continues

publish and subscribe, Apple events, and warm links to Excel; according to Visual Business Systems, it is 32-bit clean. Furthermore, GraphMaster sports the best implementation of System 7 Balloon Help I've seen. It's an extremely useful, informative aid to even an experienced user trying to navigate a rich interface. Documentation is straightforward and generally quite adequate. Visual Business Systems technical support was pleasant and helpful, though a promised maintenance upgrade never arrived.

Anyone in the market for a general-purpose charting and graphing program that delivers dependable, high-quality slide output should consider GraphMaster. Although it lacks support for QuickTime, the ability to incorporate pictographs and to freely rotate three-dimensional graphs makes GraphMaster a powerful and versatile program for presentations and publications.—BILL JUSTIN

Charting and Graphing Software

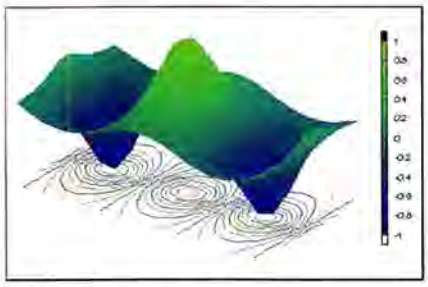
DeltaGraph Professional 2.0

PROS: Excellent feature set; smooth interface; good tutorial and documentation; outstanding technical support; permits user-defined curve-fitting. **CONS:** Limited rotation of 3-D graphs; unattractive color shifts in presentations. **COMPANY:** DeltaPoint(408/ 648-4000, 800/367-4334). **REQUIRES:** Mac Plus; 2MB of RAM (4MB recommended for large files); hard drive; System 6.0.2. **LIST PRICE:** $295.

MW ★★★★

FEATURE FOR FEATURE, DELTAGraph Professional is the best general-purpose business and technical charting program available for the Macintosh. A major upgrade to the highly regarded DeltaGraph 1.5, DeltaGraph Professional supports 13 new chart types and adds many of the presentation capabilities found in programs like Aldus Persuasion and Symantec's More.

Users familiar with DeltaGraph 1.5 should find it easy to migrate to DeltaGraph Professional. The new software builds on the earlier interface, and the steps to create a chart are the same: entering numbers in or importing numbers to a built-in spreadsheet (called a data sheet), selecting a chart type, and plotting the data. What changes have been made to the interface are helpful. For example, one dialog box now controls both ticks and grids; a Preferences setting lets users double-click on the various chart components to access dialog boxes for Labels, Axis, and Ticks and Grids; and creating



3-D Color Surface-Fill Chart Formatting options on this chart (created from sample data) include contour lines projected onto its base and hidden back planes, resulting in a publication-quality image.

bullet and organizational charts is a simple matter of entering information in a new Text window, clicking on the Plot button, and then choosing the format you like.

Like its predecessor, DeltaGraph Professional can rotate three-dimensional charts no more than 90 degrees on either the *x*- or *y*- axis. Compare this with Claris Resolve's 360 degrees around the vertical axis and 90 degrees around the horizontal, Microsoft Excel 3.0's 360 degrees around the vertical and 180 degrees around the horizontal, and Visual Business Systems' GraphMaster's 360-degree rotation around the *x*-, *y*-, and *z*- axes (see the GraphMaster review in this issue). In practice, 90-degree rotation is often sufficient, and you can plot data in reverse order to flip a chart 180 degrees around the vertical, but this is still limited. DeltaPoint promises to improve rotational capabilities in future versions.

DeltaGraph Professional includes eight new two-dimensional charts, including bubble, spider, time-line, and ternary (triangle); three new three-dimensional charts, including true *x*-*y*-*z*; and two new text charts—bullet and organizational. DeltaGraph Professional appears to be the only general-purpose charting program to offer ternary and true *x*-*y*-*z* charts (the latter in two dimensions as well as three). Both of these are useful in technical applications, such as, in the case of *x*-*y*-*z* graphs, visualizing land-survey data. DeltaGraph Professional also gives users the new capability to define their own curve-fitting formulas. One feature that's lacking, however, is the ability to click on a line graph and get the *x*-*y* coordinates.

Library palettes are a useful addition to DeltaGraph Pro. You simply drag charts into a library window, and they are accessible whenever you want to apply the same formatting to a new graph whose data sheet has the same layout. Another nice feature is the ability to place charts in libraries with their data sheets intact; then, dragging the chart's icon from the library into an empty window automatically brings up the appropriate data sheet, saving you from having to remember how to lay out the data sheet. You can also use the libraries to store backgrounds, which are kept separate from chart and data sheets.

The new Slide Show mode enables you to create freestanding presentations complete with sound and visual transitions, and even to print handouts with thumbnails of the images (although a bug in the program requires that background printing be turned off). There is a hitch: in 24-bit color, the images draw far too slowly on screen, even on a IIci with a cache card, while 8-bit color sometimes produces unattractive color shifts from one slide to the next, making it a little rough for professional applications. The ability to incorporate QuickTime movies in presentations adds sophistication to DeltaGraph Professional presentations.

DeltaGraph Pro supports System 7's publish and subscribe, Apple events, and links to Excel. (But double-clicking on a subscriber fails to bring up a Subscriber Options dialog box—an interface flaw, as far as I'm concerned.) According to DeltaPoint, DeltaGraph Pro is 32-bit clean.

DeltaGraph Professional exports charts in PICT, EPS, and Illustrator 1.1 formats; the last is useful for trapping and modifying charts in a PostScript draw program. Charts exported in Illustrator 1.1 format usually open glitch-free in Illustrator 3.2, although in my tests text shadows failed to export, and a scattergraph fitted with a squeezed curve had a recurring problem: data-point symbols clumped along the edge of the page. Re-exporting the file from DeltaGraph eventually produced a file with symbols intact.

I ran into a few other snags. Some SYLK files imported with misaligned text in cells. Printing to an Apple Personal LaserWriter NT from chart windows (but strangely, not from Slide Show mode) resulted in all colors except white printing as black, instead of varying grays, with the System 7 LaserWriter driver set to black and white. (DeltaPoint suggests choosing the LaserWriter driver's Color/Grayscale option when printing color images from the chart window.) Finally, Adobe Type Reunion users may get garbled font menu selections, a problem DeltaPoint is addressing as this goes to press.

DeltaPoint's technical support is among the nicest and most helpful I've encountered. The company will send the latest maintenance upgrade free of charge to registered users who request it or who call in with problems the upgrade will remedy. Perhaps by the time you read this, the last remaining problems will have been solved and no further maintenance upgrades will be necessary.—BILL JUSTIN

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Font Utility

MenuFonts 4.0.1

PROS: Groups typefaces in families; permits customizing of font menus; ships with three other utilities. **CONS:** Incompatible with several popular applications and DAs; slows menu pop-up; doesn't group families by weight. **COMPANY:** Dubl-Click Software (818/700-9525). **REQUIRES:** Mac Plus; System 6.0.5. **LIST PRICE:** $69.95.

MW ★★

ALTHOUGH THERE ARE NOW thousands of typefaces available for the Macintosh and plenty of utilities for making, tweaking, and juggling fonts, only a few vendors have attempted to disentangle the ungainly Font menu. Dubl-Click's MenuFonts is a Control Panel device that approaches that task by grouping type styles in families and displaying font names in their own typefaces. It also readily shows font information (type, ID number, suitcase name, and printer file). MenuFonts enables the user to customize how each font's name is displayed in the menu by, for example, changing its style, color, size, or making dingbat font names readable.

These options are appealing, but unfortunately MenuFonts is both slow and buggy. Also, some of its configuration options are overkill, considering that the Font menu's simple purpose is to list typefaces so you can choose one and get back to work.

MenuFonts' most useful feature is its ability to change font names for grouping purposes. Renaming Chicago, Monaco, and Geneva as System Chicago, System Monaco, and System Geneva brings them all together in a family called System. Within families MenuFonts sorts fonts alphabetically rather than by weight from lightest to boldest. Adobe Type Reunion and WYSIWYG Menus (part of Now Utilities) sort fonts by weight, which makes more sense.

MenuFonts' ability to display font names in their own typefaces is most valuable as a quick on-screen reference. The subtle distinctions between similar typefaces cannot be appreciated in a pull-down menu, however. If you want to know what a font really looks like, make a printed reference of your type library (FontCharter, packaged with MenuFonts, does this well).

Dubl-Click claims that MenuFonts "helps spot frustrating font ID conflicts," but it gives no clues about how to correct such problems. Plus, it seems to create its own conflicts. When I customized my menu, some font names appeared in the wrong face, a problem that was strangely fixed by changing the name's color a few times. Other fonts reverted to their standard names (without attributes) and moved to the top of the menu, where they were inaccessible.

The MenuFonts interface is far from seamless. The program is incompatible with more than half the applications I tried. Microsoft Excel, Adobe Photoshop, and Aapps's Vantage run normally with MenuFonts installed, but MenuFonts doesn't show up at all. Other applications have more serious problems: with Adobe Illustrator, MenuFonts works on about half the menu. It causes serious memory-management problems in HyperCard, with large stack windows not displaying at their full size regardless of the amount of memory made available. Dubl-Click does provide patches to fix incompatibilities, but the patch program alters the structures of those applications, it doesn't alter MenuFont. The prospect of something tampering with your workhorse applications might justifiably make you nervous.

Along with MenuFonts' useful features are many that are nonessential, and this version has too many incompatibilities to make it worthwhile. Users who want to get the most out of their type library would be better off using a printed reference of fonts and organizing them on screen with a simple utility like Adobe Type Reunion or WYSIWYG Menus.—KURT CARLSON

Network Arcade Game

Spectre 1.0

PROS: Easy to learn; highly involving; good performance; great network play. **CONS:** Incompatible with ATM; single-player mode lacks depth; limited technical support. **COMPANY:** Velocity Development (415/776-8000). **REQUIRES:** Mac Plus; 1MB of RAM (at least 750K free); System 6.0.3. Recommended: 2MB of RAM (at least 1350K free) for color and sound. **LIST PRICE:** $59.95.

MW ★★★★

INITIALLY, SPECTRE DIDN'T LOOK like a game that would keep my interest. It's visually appealing but lacks dimension. It reminds me of an old stand-up arcade game called BattleZone. In both games you fight your way through a 3-D world while enemy tanks approach and attack. Brilliant, huh? But hours later, I'm still playing.

Players start by choosing a vehicle based on speed, shield strength, and ammo capacity. As you improve, you should bump up the vehicle's speed and reduce its ammo.

With a crash, you tumble onto a level playing field peppered with 3-D obstacles including pyramids, windmills, and walls. The color graphics are nice, with highly responsive performance on a IIsi or greater. Forgo the filled objects on slower machines or play in black and white. Enemy tanks (looking like evil Dustbusters) soon confront you with cannon fire. Players must run and fight back, while continually replenishing ammunition stores and shield strength. You can survive by learning how to back up while turning and firing on advancing enemies. Keep one eye on your radar at all times. In single-player mode, you complete a level by gathering up all the flags on the field. On each new level the enemy tanks are progressively more challenging.

I don't think I would have kept playing Spectre if this were all there was to it. Playing the game on a network against other people is what makes this game great. The simplicity of the game's basic mechanics permits people to get involved right away. The action takes off, and before you know it, players are glued to their screens. Up to six people play. Players find themselves developing and adapting to new tactics and experimenting with settings to get an edge.

The game operates on most networks, including networks with multiple zones (play is confined to a single zone). Due to the addictive nature of the game, I somehow found the time for prolonged testing on several different networks, playing with three to six people. The program is quite efficient; it sends small packets and uses little of Ethernet's bandwidth. Spectre appeared to be equally fast on Ethernet and LocalTalk. Occasional protocol errors meant affected individuals were dropped off the network, but other players could generally continue without interruption. Substantial network traffic outside of Spectre can result in occasional screen-update delays. I tried to check this out with Velocity's technical-support people (not toll free and only from 1 p.m. to 3 p.m. Monday through Thursday), but they couldn't answer my questions. Overall, the network design and performance is very good as multiplayer games go.

Mass Attack As you try to capture flags, enemy tanks confront your every move.

As a single-player game Spectre is pretty good but nothing to write home about. However, it is the best network arcade game I've ever played, and I highly recommend it as one of the great antiproductivity tools of all time.—ADRIAN MELLO

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Document Manager

VersionMaster 1.0.7

PROS: Automatically archives revisions; built-in file compression. **CONS:** Confusing manual; obtrusive interface; RAM-hungry. **COMPANY:** Astar Technologies (508/486-8532). **REQUIRES:** Mac Plus; hard drive; System 6.0.4. Recommended: 2MB of RAM. **LIST PRICE:** $199.95; five-user pack $799.95; ten-user pack $1199.95.

MW ★★

IF I HAD A DIME FOR EVERY TIME I'VE gotten a manuscript back with requests for revisions I thought I'd already made, I'd be writing this on a portable and faxing it in from my yacht. I hoped that VersionMaster, from Astar Technologies, would help me get a handle on the situation, but unfortunately it falls short of a solution.

VersionMaster's premise is simple: it creates a document file in which it stores all the versions of a given document, say, Software Review. It starts with a reference copy, Software Review v. 1, and then builds an archive containing subsequent versions. Why not, you might ask, simply use the Save As command to do this? First, VersionMaster allows you to use the normal Save command while making revisions, to guard against loss in a power failure or a system crash. Second, it provides the option of storing revisions in compressed format to conserve disk space.

VersionMaster stores files in its own format, so they are accessible only through the program. To work with a file stored in the document file, you first check out the version you want either from the VersionMaster DA or through the Open and Save dialog boxes, to which the VersionMaster extension appends check-in and checkout radio buttons. After making revisions, you check the document back into the document file, optionally attaching comments as to what changes were made and why.

While a user has a document checked out from the Document File, no one else can modify it or even have access to that version. This feature helps ward off confusion when several networked users are working on the same project, and can be a lifesaver in any group projects where small but significant changes can be difficult to track.

Even after getting used to the check-in and checkout procedure, I'm still wary of having my precious work trapped in a foreign format. In the event of a system crash, or if VersionMaster were to be lost, documents might be recoverable with a resource editor or another utility, but Astar's technical support couldn't guarantee it.

People who use keyboard commands and arrow keys to navigate the File menu will find VersionMaster's mouse-intensive interface inconvenient. The DA's main menu has ten buttons, but the program has many steps and options, resulting in a thick hierarchy of commands. A simple checkout requires selecting the project folder, then the document file, and then the version you want to open; controlling access and selecting compression add more steps. In practice it's a hassle to make small revisions.

Other headaches abound, too. The manual is riddled with corrections and typos and much too long. The tutorial touches on the main features of the program but is inadequate and doesn't make me confident about using the application. VersionMaster requires 250K just to be there. Astar recommends running it on a system with a minimum of 2MB of RAM, but 4MB is better. Opening too many files at once causes the program to hang or crash. The online help is context-sensitive but has a bug that on a Mac Plus crops all the subject headings.

VersionMaster doesn't feel like a fully mature program. It needs fewer diagrams in the manual, real tutorial files, System 7 implementation, and some streamlining of the interface. Astar is retooling the program from the top down for future release. Given that, my advice is to wait. For now, VersionMaster is generally more trouble than it's worth.—GEORGE L. REYNOLDS

Portable CD ROM Reader

NEC Intersect CDR-36M

PROS: Compact, lightweight CD unit; includes Music Box desk accessory for playing audio CDs; well-organized support. **CONS:** Slow access time compared with standard desktop units. **COMPANY:** NEC Technologies (708/860-9500). **REQUIRES:** Mac Plus; System 6.0.4. **LIST PRICE:** $485.

MW ★★★★

THERE ARE DOZENS OF VALID reasons to buy a CD ROM reader—access to libraries of fonts and graphics, a vast assortment of reference works, and even a few games, is just a part of the draw. Nonetheless, the CD's arrival on the Mac and other platforms has been more like a seepage than a deluge. Early on CD ROMs were expensive and had problems with file formats and compatibility. Some CD ROM readers are still big enough to make an uncomfortable contribution to the clutter on already-crowded desks.

What the world needs, of course, is a CD ROM reader that's modestly priced, reads anything you can stick into it, and takes up almost as little space as a CD itself. The Intersect CDR-36M from NEC Technologies costs $300 to $400 less than units from Apple or other competitors, reads all data formats, provides an audio-output jack, and compares in size to a stack of three or four CD boxes. In fact, the 2.2-pound unit qualifies for an adjective seldom heard in peripheral reviews: as you can see from the photo, it's adorable.

The Intersect uses Apple's Foreign File Access software to read ISO-9660, High Sierra, and audio disks; its driver is by Trantor Systems, the clear industry leader in CD ROM driver software. Like the data-transfer rate of most larger CD units, the Intersect's quoted 150K per second (KBps) works out to 80 KBps on real files being copied under System 7 or System 6.X (the system-related speed differences are only a few percent). This is comparable to the rate for Apple's own CDSC and most other units. File access, however, is about 20 percent slower, making the Intersect better for such operations as transferring large blocks from a graphics CD than for looking up lots of words in a CD thesaurus.

STEVEN BARATZ

The Intersect CDR-36M CD ROM Reader from NEC Technologies

NEC Technologies provides a tiny headset for audio output; the Music Box desk accessory gives you an on-screen control panel that looks like a standard CD player, including a digital music-program timer. With audiophile earphones, sound quality is exactly that of a standard audio-CD player. And if you want true portability for your lightweight system, NEC Technologies offers an optional 0.8-pound battery pack ($99) that fits unobtrusively alongside the player and runs for one to two hours, depending on use.

There are only a few possible complaints about the Intersect CDR-36M. For one, a SCSI address button would be an improvement on the tiny DIP switches offered. And since the unit packs some fairly current-hungry components in a tiny package, its bottom surface gets too hot to touch. But NEC Technologies provides good phone support and a convenient fax line to answer questions about drivers, formats, and SCSI mechanics. All in all, the Intersect is a relatively inexpensive and convenient way to add CD capability to any Mac.
—CHARLES SEITER

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Version 3.0. Suggested list, $99

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Swivel 3D Professional 2.0

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Version 2.0. Suggested list, $695. Upgrade for just $75. See order form.

SwivelMan A special version of Swivel 3D Professional 2.0 that includes Pixar MacRenderman, 1.1. Documentation and tutorials are included to present the applications as one integrated solution. Users can create 3D models and render those models by applying photorealistic textures and shaders in one application.

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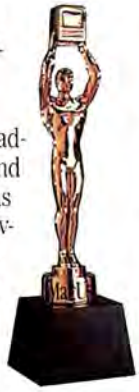

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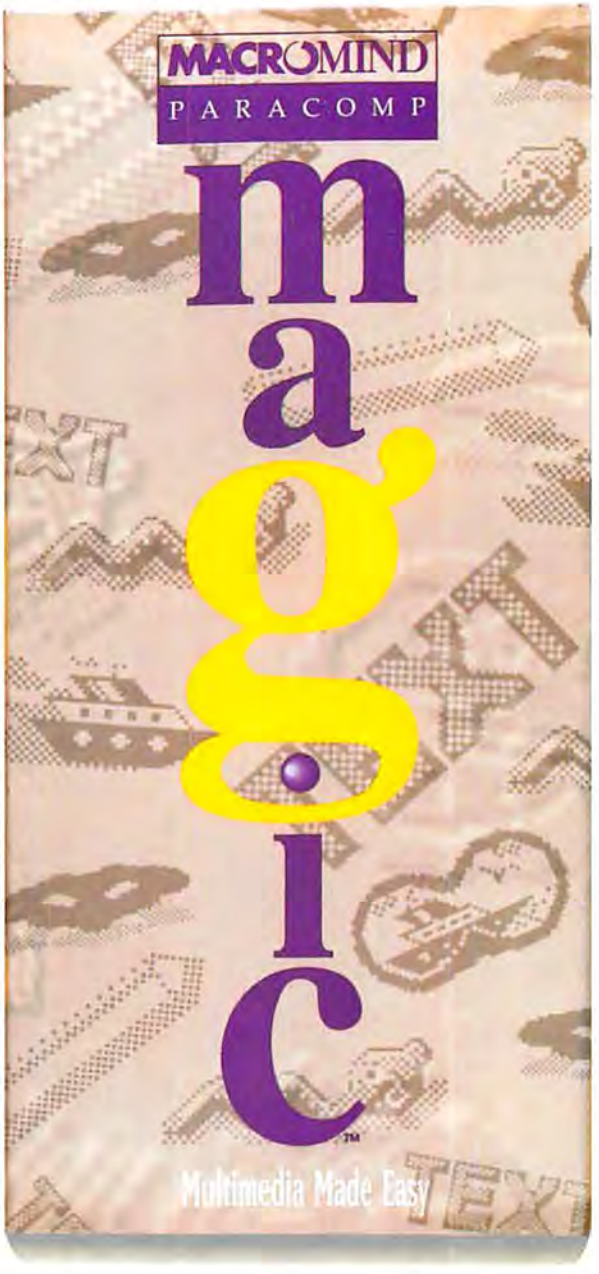


Welcome to multimedia.

Report Generator

DataPivot 1.02

PROS: Fast formatting; automatic import; tools cleverly arranged. **CONS:** Undo not implemented. **COMPANY:** Brio Technology (415/961-4110). **REQUIRES:** Mac Plus; 2MB of RAM, 3MB of RAM for System 7; System 6.0.2. **LIST PRICE:** $299.

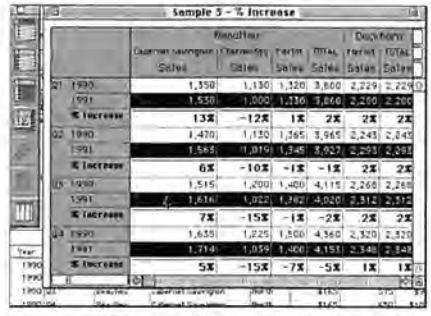
MW ★★★★

ALTHOUGH SPREADSHEETS FORCE data into table form, and every commercial database claims to have a convenient report generator, the process of getting a report table into exactly the form you want is quite annoying, even in programs like Excel or 4th Dimension.

DataPivot implements just about every item on the wish lists of users who need to make report tables that emphasize cross-tabulation. If you need to report such things as school attendance by district, by school, and by funding category, or profits on each item in a product line by year and by sales region, DataPivot is one of the best investments you can make.

You can copy any SYLK, BIFF (Excel 3.0), WKS, or text (tab- or comma-delimited) file into DataPivot through the Import command, and it appears in a Source window at the bottom of the screen. You will also see a palette of tool icons—Top Label, Side Label, Report Data, Total, Group Data, Trash, and Source Window—for selecting data elements for the Report. If you select a data column in your source and click on the Side Label icon, for example, DataPivot makes a side label in the report. Unremarkable enough, except that the labels include tabs at the end of the row or column.

After you have selected your categories and have filled the report with data by selecting columns and clicking on the Report Data icon, you can change all your original category placement simply by dragging the tabs associated with the categories from the top to the side or vice versa. You can pick two categories and group them by clicking on the Group Data icon, change type formatting with a few clicks in the floating Typeset palette, perform math on data rows or columns with the Formulas palette, or make subtotals or other subcomputations with a single click. The intelligence built into the program keeps track of all these changes so that your subtotals and data summaries always mean what you expect them to mean. It's so easy to make complex changes that it would be unusually helpful if the program had an Undo command.



Vin du Table The tabs at the end of each column or row containing headings let you move that whole section of data from horizontal to vertical entries and vice versa.

What's really amazing is that all these operations are nearly instantaneous, even on a Mac Plus. If you try this row-for-column data swapping using the Transpose command in Excel, the response is irritatingly languid. If you have to produce a similar report, say, once a month, you could set up your primary data gathering in a spreadsheet or database, and publish the data into DataPivot with the System 7 Publish/Subscribe option. In an office environment with a sharp systems administrator, a Mac copy of DataPivot could consolidate Mac and Windows DataPivot reports for cross-platform information summaries across a network.

If reports are part of your work, it should be easy to justify the cost of DataPivot. There's just nothing else like it for convenience and flexibility.—CHARLES SEITER

Telephone-Line–Manager Device

Ringo LM 1.0

PROS: Auto-wake-up feature; supports fax modems, fax machines, answering machines, and telephones; transparent operation. **CONS:** Ringo DA options are confusing. **COMPANY:** MacSema (503/757-1520, 800/344-7228). **REQUIRES:** Any Mac with ADB port; System 6.0. **LIST PRICE:** $189.95.

MW ★★★★

TRYING TO USE A FAX MODEM IN an office with only one telephone line is tricky. The fax modem, answering machine, and telephone share the same line—how can you make everything work in harmony? The object is to transparently handle incoming calls, routing them to the appropriate device without either blasting callers' ears with a fax signal or losing faxes by incorrectly transferring them to the answering machine.

Although I have tested several phone-line managers in the past two years, there's always been a catch. They didn't work with my answering machine, they required my phone lines to be rewired, or fax senders had to be instructed to press certain keys on their phone to signal that a transmission was on the way. The Ringo LM is different, and it works.

Enclosed in a small plastic case, the Ringo LM has four RJ-11 jacks that allow you to connect it to the telephone line, a telephone, an answering machine, and a fax modem or stand-alone fax machine. The Ringo LM also has a built-in ADB cable that hooks into the Mac. Ringo software consists of an INIT; a start-up program that activates the INIT (and lets the user shut off the INIT for a current computing session); a desk accessory; and Ringo Editor, which is for specifying what Ringo should do if someone tries to send you a fax when the Mac is off.

During normal business hours when the Mac is on, Ringo answers every call on the first ring. The program then sends a dummy ring back to the caller while it analyzes the call. If it detects a fax-transmission tone, Ringo routes the call to the fax modem. If there's no fax tone, Ringo assumes the incoming call is a voice call and transfers it to your telephone or answering machine.

If the Mac is off when a fax tone is detected, Ringo sends a wake-up signal over the ADB cable, causing the Mac to power up. Once the Mac's start-up sequence has been completed, the fax modem takes over and receives the fax. A lengthy power-up sequence, due to a slow machine or a lot of INITs, can cause the fax modem to miss the call. But since most faxes have an autoredial facility, the fax will invariably be caught on the next transmission. After the fax modem receives the fax, Ringo checks the data in the Ringo Alarm List, and if the current time coincides with one of the times that you have set in Ringo Editor, Ringo follows the shutdown procedure that you specified. If Ringo detects no further activity after a user-specified period of time, it shuts off the Macintosh. Optionally, you can instruct the device to issue a special keystroke and have a macro program, such as MacroMaker or QuicKeys, choose Shut Down from the Finder's Special menu. The DA lets you override Ringo's shutdown settings for one session.

If you have external drives or run the Mac from a power strip, you may have to modify the way you leave your equipment at the end of the day. Because external drives must be warmed up before powering up the Mac, you have to leave them on if you want to use the auto-wake-up feature. Similarly, if the Mac is connected to a power strip or universal power source (UPS) rather than directly to a wall outlet, you have to leave the power strip or UPS on, too. Other than that, Ringo shouldn't affect your normal telephone routine. If your sole phone line is doing double duty (fax and voice), the Ringo LM is the answer to your prayers.—STEVEN A. SCHWARTZ

Network-Management Software

Status Mac 2.0.2

PROS: User can delay profile generation; administrator can customize messages and reports; old data can be archived and merged with new data; data can be exported as tab-delimited or SYLK file. **CONS:** Screen savers can prevent profile gathering. **COMPANY:** On Technology (617/876-0900). **REQUIRES:** Mac Plus; System 6; AppleTalk network. **LIST PRICE:** 25-Mac version $499; unlimited version $1199.

MW ★★★

ARE YOU STILL RUNNING AROUND, trying to find out which person's Mac has an old version of Laser Prep? Or maybe you're trying to migrate to System 7, but you don't know if everyone's Mac has enough RAM? Well thanks to Status Mac, you can track all of this from your desktop. Status Mac 2.0.2 provides better network reporting facilities than before, as well as less hassle for users.

Status Mac inventories each Macintosh on a network and determines what hardware is available, what fonts and DAs are being used, and so on. All of this information is stored in individual user profiles, which can be combined to create a fairly complete inventory of your company's microcomputer resources.

Profiling a Mac that has a large hard drive and many applications and fonts can take more than five minutes. Asking for such lengthy profiles on a regular basis can be irritating to users, so Status Mac provides an option that allows the user to delay the profile, rescheduling it for just before the Mac shuts down, for example.

To make profiling more convenient for both the administrator and the user, Status Mac has its own store-and-forward architecture. The administrator's Macintosh stores profile requests until the targeted Macintoshes are reachable on the network; the user's Macintosh stores the completed profile until the administrator's Mac can be reached over the network.

To keep the administrator informed of the profile-gathering process, Status Mac keeps track of whether the request for a profile has been sent (pending), the request has been received by the Macintosh to be profiled, the profile has been returned, or the profile has been imported into the Status Mac database. These status indicators appear next to each Mac's name in the Browse window of Status Mac.

Once profiles have been returned to the administrator's Mac and imported into the Status Mac database, the administrator can double-click on any Mac in the database to view a full profile of its hardware and software. This profile includes information on ADB devices, applications, the CPU, DAs, drivers, fonts, INITs, monitors, NuBus boards, SCSI devices, System files, and other system info. Or you can generate filters to select Macintoshes that meet specified criteria, such as all Macs with Laser Prep version 6.0.2 and less than 4MB of RAM. Any of these filters can be saved and used to generate custom reports. You can archive old Status Mac data and then remerge it with new data to compare old profiles to newer ones.

Status Mac also lets each user add data about his or her Mac in the Profiler cdev. This data can include information such as hardware serial numbers. When the administrator requests a profile, this information is sent along with the profile. And if the user allows the Status Mac administrator to make changes in the Profiler, the administrator can change the cdev information from within the Status Mac application.

Status Mac allows users to keep profile collecting from interfering with their normal routine. By including personal messages with profile requests, allowing user-specified delays of profile gathering, and incorporating its own store-and-forward architecture, On Technology has made Status Mac one of the easiest-to-use inventorying applications for Mac networks.—DAVE KOSIUR

Symbolic Math Software

Maple V

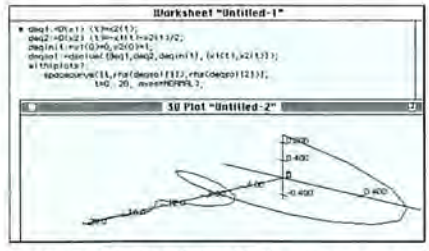
PROS: Complete symbolic/numeric mathematics system; huge set of functions; runs comfortably on low-end Macs. **CONS:** Less capable than Mathematica in graphics and complex programming. **COMPANY:** Brooks/Cole Publishing (408/373-0728). **REQUIRES:** Mac Plus; hard drive; System 6.0.4. **LIST PRICE:** $450; student version $132.

MW ★★★★

MAPLE, NOW IN VERSION V, IS THE leading, albeit underpublicized, rival to Mathematica. While Mathematica has been praised to the skies, Maple—which can tackle most of the same problems as Mathematica and is easier to use on a Classic—has received much less attention.

Toiling away at the University of Waterloo in Canada, Maple's developers have continually expanded on the program's original symbolic core. The 1800 distinct functions Maple provides include: standard symbolic and numeric capabilities in engineering math, including differential equations and integrals (and operations with differential forms and exterior calculus); operations of group theory; linear algebra and routines for linear optimization; basic statistics; a programming language resembling Pascal; special functions of mathematical physics; operations for manipulation of series; combinatorics (what the heck is that?) and number theory; and geometric and projective geometric operations. Maple V also includes 3-D graphics, expanded integration and series-handling capabilities, and a few hundred additional library functions and packages of functions. An interesting new feature translates programs written in Maple into standard C for inclusion in other programs.

Since Maple's function range is similar to Mathematica's, some feature comparisons are necessary. In the Maple strategy, a small main program is invoked and special routines are called as needed; that's how the program can operate, with a few unobtrusive delays, on a Mac Plus. This characteristic, and the program's relative simplicity of operation, has endeared Maple to educators faced with lots of calculus students and modestly funded Mac labs. Mathematica assumes that you want the full armament of computer math available instantly at all times, and thus encounters memory problems at 5MB or less. Maple provides a simple programming language; Mathematica offers the range of commands found in C, Prolog, LISP, and FORTRAN, with a compiler and advanced debugger besides.



Learning Curve Here Maple solves a pair of coupled linear differential equations and plots the results. A manual included with Student Maple shows how to solve math and physics problems such as this one.

While Maple only now includes 3-D graphics, Mathematica is the most elaborate 3-D graphing program commercially available. Student Maple includes the standard Maple function library, a special student-oriented handbook, and both coprocessor and standard versions; Student Mathematica ($129) is non–coprocessor-only but includes Stephen Wolfram's brilliant guide to the program. You can put on quite a display of math power using Maple on a 2MB Mac SE; Mathematica needs a 68030 Mac (or a Sun workstation) to really shine.

Maple yields to its rival Mathematica in institutional acceptance, in quality and quantity of third-party materials, and in several advanced-user areas. On basic Macs, however, it has no competitors for functional scope or ease of use.—CHARLES SEITER

Mathematics Education Games

Math Shop, Math Shop Jr., Advanced Math Shop

PROS: Low price. **CONS:** Stultifying to play; unimaginative graphics and interface. **COMPANY:** Scholastic (800/325-6149). **REQUIRES:** Mac Plus; System 6.0.2. **LIST PRICE:** $49.95 each; school version $79.95.

MW ★★

ANY GOOD TEACHER KNOWS THAT the first order of business is to grab and then retain the students' attention. The Math Shop series (a reworking of IBM PC and Apple II versions) scores low in this regard; and with its underutilization of the power of Macintosh graphics, it adds very little to the old-fashioned workbook and pencil.

All three programs look and operate much the same; the differences are the level of the problems and the names of the "shops." Each game opens to a "mall" with ten shops; clicking on a shop takes you to the set of problems associated with it. Scholastic calls the shops games, but that stretches the definition of the word. There are no extraneous bells and whistles here, but neither are there useful or entertaining ones. Basically, the problems involve such service-related tasks as filling orders, selling things, working in the stockroom, and making change. Here and there, such as in Advanced Math Shop's Equations shop, the designers were unable to come up with a suitable entry-level job skill.

Playing the games consists of simply filling in blank boxes with numbers. For example, in Math Shop's Donuts Shop the student might be given an order for four glazed and four plain doughnuts and asked to determine how many doughnuts make up the total order and what fraction is to be glazed. Once the fields have been filled in correctly, hitting the return key or clicking on the cash register icon completes the problem, and one of several voices thanks you. Unfortunately, the cursor does not automatically advance to the next field once a number has been entered; instead, movement from field to field is a matter of clicking or tabbing, and can get a bit tedious, especially in problems involving fractions (which are represented by two boxes separated by a /).

Two into Eight Goes . . . The Gizmo Shop from Math Shop Jr. tests multiplication skills.

Math Shop Jr. is aimed at children ages 6 to 9; Math Shop, ages 9 to 14; and Advanced Math Shop at 12- to 18-year-olds. Although the mathematical operations being reinforced are appropriate, these ranges seem too broad and the problems too heavily weighted to the younger end of each range, even given the discouraging level of math literacy in this country. Each level has a few shops in which the student's task is obscure, requiring an explanation from the teacher or a look at the manual. A teacher can't modify the programs, and identical problems sometimes appear twice in a row.

Scholastic's desire to make mathematical concepts "intriguing and gamelike in and of themselves" is laudable, but the goal is not realized. Though the graphics are quite acceptable, they are essentially static background; the sounds are fine but ultimately repetitious. There is little here to capture a student's interest or to justify the use of expensive, and often scarce, equipment. The Math Shop series is little more than the normal, humdrum workbook format converted to bits and bytes. An imaginative pedagogical tool it is not.—LOUISE KOHL

Scanner Calibration Software

ScanMatch 1.01

PROS: Quickly and easily corrects scan color. **CONS:** Calibrates scanner to screen only; uneven results. **COMPANY:** Savitar (415/243-3030). **REQUIRES:** Mac II; 8-bit color (24-bit recommended); 4MB of RAM; hard drive; 24-bit color scanner; System 6.0.5. **LIST PRICE:** $199.

MW ★★★

SCANMATCH IS BASICALLY ONLY half a color-calibration system. It doesn't concern itself with printed output but focuses instead on the first leg of the color-calibration circuit—scanner to screen. ScanMatch's sole purpose is to adjust color scan files so that they look right when displayed on the Mac. The package serves two types of users: those for whom the screen is final output (people who make on-screen presentations), and people who've already used other means to calibrate their printer so that the output matches their screen.

ScanMatch has three main components: a printed color-swatch chart, a set of characterization files that describe the color response of various monitors, and the ScanMatch application software. To calibrate your scanner, you scan the color chart and then use the ScanMatch software to measure the values your scanner captured. The software calculates the difference between the captured values and the predefined values it knows should be present, and then factors in the peculiarities of your monitor as described in your monitor's characterization file. The result is the Transform file, which you can use to correct images until your scanner bulb degrades or you change your scanning settings.

Once you've built the Transform file, you can use a variety of approaches to correct scans. If you have Adobe Photoshop or Letraset's ColorStudio, you can install the ScanMatch Transform as a plug-in filter. If your scanner comes with a Photoshop plug-in scanning module, you can scan from within ScanMatch and then apply the Transform. Or you can scan using a separate scanning application, save the file, and then open it and correct the scan in ScanMatch. In any case, correcting a file is easy and takes less than a minute.

How good are the results? The answer is a little hard to give. For one thing, the fidelity of ScanMatch's corrections varies considerably depending on the scanner (the truer the scanner's colors are to begin with, the more pleasing the corrections), the medium you're scanning (results I got when scanning magazines were definitely on the psychedelic side; the system assumes it's working with the dye sets in photographic prints), and the monitor (it needs to be a Trinitron-type display; ideally, it should be one of the seven models for which Savitar provides characterization files).

But ScanMatch produces uneven results. Sometimes the software does a great job of removing color cast and adjusting contrast so that the image comes out looking bright and clean. But, just as some critics disapprove of the restored Sistine frescoes, some users will find the colors in ScanMatch's corrected files to be overly saturated. Files can also end up skewed somewhat toward the warm, or red, end of the spectrum. Often, these peculiarities of the Transform formula produce a pleasing image with bright, warm colors. But other times, the bright and red effect can be unflattering, particularly in portraits. Pictures can also suffer a loss of detail and end up looking cartoonlike.

Most people will use ScanMatch for some images; ignore it with others; and for still other images, use it and then tweak the results. According to Savitar, the new version will improve the fidelity of ScanMatch's corrections. You might find that ScanMatch saves you a lot of time and trouble. Or you might decide that a street price of $150 is too much to pay for something that gets you only halfway to where you're going.
—JOE MATAZZONI

Word Processor with Page Layout

Taste 1.0β2

PROS: Combines word processor, page-layout, drawing, address book, and mail merge features at an excellent price. **CONS:** Slow; some redraw and translator bugs. **COMPANY:** DeltaPoint (408/648-4000). **REQUIRES:** Mac Plus; 2MB of RAM; hard drive; System 6.0.2. **LIST PRICE:** $149.

MW ★★

THE MAC MARKET'S WORD PROcessor glut (nine at last count) makes it hard for a newcomer to distinguish itself. DeltaPoint (maker of DeltaGraph) has developed a word processor that combines page-layout, graphics, Rolodex, and mail merge features, all for $149.

Taste requires 4.1MB of hard drive space to install (throwing away the installer files after installation regains 1.5MB); the program uses Claris XTND's import and export translators (for MacWrite, Word, Works, WordPerfect, and WriteNow), which can be removed to save space. Taste's page-view orientation offers WYSIWYG document processing, but is considerably slower than text-oriented word processors.

You format text by changing text attributes (font, size, style, and color) and text ruler settings (tabs, margins, and line and paragraph spacing). In addition Taste offers custom text styles (for specific combinations of style attributes) and custom paragraph styles (specific paragraph-level formats). Normally, applying paragraph styles overrides any character-based formatting, but you can set Taste's preferences to retain any custom text styles that currently exist in the document. You can assign custom text and paragraph styles via menus, and you can save paragraph styles (and the text styles they contain) with a document and copy them to other documents, as well as save them as a stationery document. Headers and footers can have their own style sheets, as can footnotes and endnotes (which are automatically numbered and change when updated). Time and date markers can have a range of formats. And Taste's sophisticated Find/Replace function searches and replaces text by font, size, style, color, and other text attributes.

Taste includes a 117,000-word dictionary, user-defined dictionaries, and a 1.4-million-entry thesaurus. The spelling checker can replace or skip all instances of a word, or offer suggestions for replacing a word (as can the thesaurus).

Taste's layout mode is useful for formatting newsletters and business forms. The easy-to-use Layout dialog box lets you set page and paragraph margins, gutter and column boundaries, and the number of columns, for any range of pages. You can set different layouts for even and odd pages. You can't adjust the flow of a document for precise horizontal alignment by guides (as in PageMaker), but you can insert a page or column break to begin a new section. Page numbering, however, applies to the whole document, not to ranges.

Taste's draw layer provides tools for Bézier curves, arcs, lines, arrows, text, ovals, rounded rectangles, rectangles, polygons, and fills, with palettes for changing line widths, backgrounds, and colors. Objects in the draw layer can be edited, moved, resized, flipped, rotated, layered, grouped, snapped to a grid, attached to paragraphs, and pasted behind the text layer. Taste wraps text around irregularly shaped graphics if they have been created in Taste. You can import PICT, PICT2, and EPS graphics into Taste; however, text doesn't automatically wrap around imported graphics, only around their selection box. You can easily work around this limitation by tracing the object with a drawing tool and having text wrap around the outline.

Despite the program's modal approach to text and graphics, and despite some bugs (it froze, for example, while importing a large Word 4.0 file), I found most of Taste clearly designed, easy to use, and generally reliable.—MICHAEL MILEY

High-Speed Modem

QBlazer

PROS: Compact design; data compression gives 38,400-bps capability. **CONS:** Expensive; includes no Mac software; has no send-fax feature. **COMPANY:** Telebit Corporation (408/734-4333). **REQUIRES:** Mac Plus. **LIST PRICE:** $745.

MW ★★★

TELEBIT'S TINY QBLAZER MODEM looks more like a jet-black Rubik's Cube than some wonder of telecommunications. Its compact design (roughly 2½ inches on each edge) means you can carry it with you and scarcely notice it. Even with its AC power adapter, the QBlazer fits into a small vinyl case that slips neatly into a briefcase, travel bag, or PowerBook carrying case (another portability plus: you can forgo the AC adapter for a 9-volt battery that powers the QBlazer for about two hours).

True to its name, this little modem is as fast as they come, shooting information across the phone line at 9600 bps. The savings in time and telephone charges from BBS and online transfers can be substantial —assuming, of course, that the modem on the other end of the line can also send and receive information at 9600 bps. Today most modems still run at 2400 bps, but they're being replaced by faster modems.

What makes the QBlazer a real speed demon is its built-in support for the V.42bis and MNP Class 5 data-compression protocols. Depending on the type of file you're sending, these protocols can squeeze computer data to about one-fourth its original size, which gives the 9600-bps QBlazer an effective speed of 38,400 bps. Once again, though, the modem on the other end must also support V.42bis and MNP Class 5 compression. In my own informal tests using Aldus PageMaker, QuarkXPress, and EPS graphics files, the QBlazer turned in speeds of between 32,000 and 34,000 bps—very respectable however you cut it.

It's important to remember that high-speed modems are more susceptible to telephone line noise than are slower modems. The QBlazer has V.42 and MNP error correction (which is standard among high-speed modems) built in, a feature that helps maintain data integrity.

Still, at nearly $750, the QBlazer is no bargain; Logicode Technology, Computer Peripherals, and Hayes all sell high-speed modems for less, although none are as compact as the QBlazer. It also seems odd that the QBlazer has no send-fax feature, a tremendously handy feature that many low-end and high-end modems incorporate.

A final gripe is that although the box advertises free telecommunications software to get you up and running immediately, Macintosh users will find themselves out of luck. For us, there's a coupon entitling us to order Software Ventures' popular MicroPhone II for $99. The QBlazer also works with White Knight and with other Mac telecommunications packages.

TOM GIBSON

Telebit Corporation's QBlazer

If portability is an important issue for you, then the QBlazer's pint size and battery power make it a very attractive choice. Otherwise, its high-end price, absent send-fax feature, and lack of Mac software all work against the little modem. Though the QBlazer's speed is impressive, you'd be wise to consider other high-speed modems as well.—HELMUT KOBLER

Zip Code Verification Software

ZP4 7.0

PROS: Standardizes addresses; reduces postage costs; avoids undeliverable mail; supports Apple events; sample source code provided. **CONS:** Clunky interface; no printed documentation. **COMPANY:** Semaphore Corporation (408/688-9200). **REQUIRES:** Mac Plus; CD ROM drive; System 6. **LIST PRICE:** $125 per quarter.

MW ★★★★

ZP4 IS A CD ROM THAT CONTAINS AN application for standardizing mailing lists using a licensed version of the U.S. Postal Service's official database of all 28 million valid postal addresses in America. The benefits of cleaning up your lists with ZP4 include reducing postage costs, avoiding undeliverable mail, and standardizing addresses. ZP4 does not print mailing labels or generate PostNet bar codes on envelopes, but it is an invaluable complement to database or mailing-list software designed for those tasks.

To check an address, double-click on the ZP4 application and enter the state, city, street, and street number in the appropriate windows (see "Check an Address"). Zip+4 codes pinpoint the destination more accurately than do standard five-digit zip codes and are necessary for generating precise PostNet bar codes. Carrier routes identify the route each mail carrier follows when delivering mail. This information, along with the CASS (Coding Accuracy Support System) Postal Form 3553 that ZP4 generates after processing a mailing list, is necessary to take advantage of low bulk-mail rates.

Looking up an address takes only seconds, but if you must check hundreds or thousands of addresses, batch mode is best. As long as your mailing-list software imports and exports tab-delimited text files, ZP4's batch-processing mode can be used with ZP4. Incomplete and incorrect addresses are corrected on the fly and returned in a format that meets current U.S.P.S. guidelines. When it encounters incorrect data, ZP4 generates an error code and message, which can be displayed as encountered or exported along with the problem record.

Check an Address ZP4 displays the nine-digit zip+4 code, the carrier route number, and sometimes even the name of the company at that address (names of individual occupants are not available).

Batch processing is extremely useful, once you figure out how it operates. No printed documentation is included, the import/export user interface is somewhat clunky, and each output record is limited to 255 characters. Overall processing time depends on the number of records in your database and the speed of your computer and CD ROM drive. Semaphore claims you can expect to process anywhere from 2500 to 30,000 records per hour. If you have enough free space for the necessary data files, ZP4 can be run from a hard drive for the best performance.

Finally, ZP4 supports Apple events, so custom applications can be written to look up a particular address and return the standardized information on file. Semaphore includes complete source code to write this kind of stand-alone application.

The U.S.P.S. regularly makes wholesale changes to its zip+4 database, so to guarantee that customers are using the most current data, all licensed zip+4 products must contain built-in expiration dates. Quarterly updates for ZP4 are available for an additional $125 each.—OWEN W. LINZMAYER

Desktop-Design Software

Wallpaper 1.0.1

PROS: Slick; easy-to-use; comes with disk of patterns. **CONS:** You might neglect your work for a while; some problems with E-Machines accelerator. **COMPANY:** Thought I Could (212/673-9724). **REQUIRES:** Mac SE/30; System 6.0.5. **LIST PRICE:** $59.99.

MW ★★★★

PESSIMISTS HAVE PREDICTED THAT corporate acceptance of the Mac means the death of new software and new software companies. Not only has this not come to pass, but there's evidence that the number of small start-ups with terrific products may be on the rise.

A case in point is Wallpaper—a program creative in concept, realization, and purpose. Wallpaper probably won't increase productivity or necessarily make you a better person or a power user, but it's a great creative outlet and a slick piece of work.

Wallpaper is a Control Panel device that lets you design, edit, import, and display repeating patterns on the Mac's desktop. This may not sound very exciting, but trust me, it is. It's practically a full paint program under the Apple, and just in case you don't feel up to drawing (or scanning) on your Mac, Wallpaper ships with a disk of patterns designed by the Thought I Could staff and beta testers. (Another disk of patterns is available when you send in your registration card, for a total of 520 patterns.)

Wallpaper is easily installed via the installer, and comes complete with everything you need. There are two utilities on the Wallpaper disk: Wallpaper Hanger, which allows you to preview patterns, and Customiz-O-Matic, which lets you create multiple-pattern icons. Both can be put anywhere on your hard drive; Customiz-O-Matic runs only under System 7. (In order for Wallpaper itself to use all the features, it needs to be in the Control Panels folder.)

Everything you need except the pattern files is available in the main Wallpaper window: an editor or design window, spaces to store and view patterns, a menu under the window title (including zoom, brush selection, and autoscrolling), and a pop-up paintbox. Menu items are accessible using the keyboard as well as the mouse.

The program employs a drag-and-drop technique that's a joy to use: click on a stored pattern, drag it to the tiny Mac, and drop it; the pattern instantly appears on the desktop. The Grab Pattern command lets you grab anything you see on screen—in virtually any format—pull it into Wallpaper, edit it, and make a pattern of it.

For example, I grabbed clip art from Aldus PageMaker and Microsoft Word documents, the desktop, and the Scrapbook by positioning a marquee over each image. The pattern immediately appeared in the editor window, and I added a color background by clicking on a standard color wheel. You move the new pattern to the desktop by dragging the image and dropping it onto the tiny Mac's screen. This took under five minutes, including changing the pattern size twice (choices are 8 patterns by 8 patterns, 16 by 16, 32 by 32, 64 by 64, and 128 by 128).

Importing patterns from pattern files is also quick and painless. Wallpaper automatically adjusts to fill the screen size, and changes direction if you have a swivel monitor, without grabbing more RAM. A randomization feature changes patterns at set intervals or every time you start up the Mac.

The documentation is easy to understand. Each section includes tips and caveats, as well as clear information on using the features and tools. On-screen help is detailed and equally useful, and you can trade patterns and get online support on CompuServe and America Online.

Those who frequent electronic services, as a matter of fact, have been hearing tantalizing hints of this program for quite some time. Wallpaper appears to have been well worth the wait; hang it on your Mac and see for yourself.—LOUISE KOHL

Tile Game

Shanghai II: Dragon's Eye

PROS: Still one of the best games. **CONS:** None. **COMPANY:** Activision (310/207-4500). **REQUIRES:** Mac Plus; second disk drive. **LIST PRICE:** $49.95.

MW ★★★★

SHANGHAI IS A SUPERB GAME. THE new ultra-deluxe version, Shanghai II: Dragon's Eye, comes on four floppies and takes up a colossal 4MB—a far cry from the original, which required neither color nor sound to hold game players' interest.

Just to recap, for the reader who has never encountered Shanghai: At game's start, you see a top view of a pyramidal stack that contains 144 patterned tiles. You remove matching pairs (some tiles are free, others are blocked) to clear the board. That's it. There's strategy, but not much complexity. It's one of those solid, classic, addictive games. You can play it in Solitaire, Challenge, or Tournament mode.

Shanghai's big advance came with version 2.0 a few years ago, when the tile layout was elegantly redesigned to add a 3-D effect that visually clarified which tiles were free. Shanghai II's improvements, though impressive, are largely cosmetic. You get a wide assortment of tile types—the familiar mah-jongg set plus playing cards, flags, fantasy images (dungeon-and-dragon stuff), sports images, alphabet blocks, Japanese flower cards, and animals. All are splendid in color. In most of the tile sets, when you click on certain pairs, tiny animations appear within the tiles: fish disappear with a splash, royal personages become crowned frogs, and UN flags disappear to reveal Planet Earth spinning in deep blue space. Many of the tiles also make sounds when you match them correctly; flags say "thank you" in the appropriate language, for example.

You can choose from several tile layouts or easily create custom layouts. The layouts provided (some of which are extremely challenging) correspond to the 12 animals of the Chinese "zodiac"; and the manual has a lengthy, elaborate section called "The Twelve Animals of Time," replete with gratuitous factoids. Thanks, but I didn't really need to know that "Beer Barrel Polka" became popular in the Year of the Rabbit and that bingo was developed in Italy in the Year of the Dragon. Overall, the manual is long on production value and short on salience. Only about 13 of its 64 pages deal with game play and strategy; the rest is taken up with illustrations of the tiles, legends about emperors and the like, and 24 pages devoted to the rat, ox, tiger, and so on. I hope it's printed on recycled paper (I couldn't find that info in it, though).

Year of the Monkey A difficult layout. But Monkey is considered only Advanced; the Master layouts are Rabbit, Ox, Horse, and Tiger.

A new game, Dragon's Eye, comes with Shanghai II. You play against the computer or a human opponent; the Dragon Master tries to build the Dragon (a formation of tiles), while the Dragon Slayer tries to dismantle it. The instructions are confusing, but if you just dive in and start playing, perhaps referring to the manual to see what you're doing, you'll get it. It's a good game, a worthy addition to the Shanghai package.

Are the flashy new enhancements reason enough to buy Shanghai II if you already have Shanghai? Maybe yes, maybe no. But if you don't already have Shanghai, go for it.—FELICITY O'MEARA

Prerecorded Macro Package

Hot Keys 1.0

PROS: Provides a variety of prerecorded keyboard macros. **CONS:** More hindrance than help; precludes using QuicKeys and other macro programs. **COMPANY:** Go Technology (800/468-5391). **REQUIRES:** Mac 512KE; hard drive; extended keyboard; System 6.0.2. Recommended: 1MB of RAM. **LIST PRICE:** $59.95 per package; System 7 Finder package $29.95.

MW ★★

BE FOREWARNED: GO TECHNOLogy's Hot Keys is not what the package may lead you to believe it is. Although labeled "pre-defined F-key macros for the Macintosh," Hot Keys is not a collection of F-keys, at least not in the customary Macintosh sense. That is to say, these are not System-linked keyboard functions that activate events such as a screen shot or a floppy-disk ejection.

So what is Hot Keys? Remember MacroMaker? Go Technology has licensed rights to revive and revise Apple's anemic macro INIT, has made it System 7–compatible, added color icons, and bundled it with predefined macros for various applications—Microsoft Word 4, Microsoft Works 2, Aldus PageMaker 4, MacWrite II, Aldus Personal Press 1, and System 7 Finder. (A Universal Program version contains macros for MacWrite II, Word 4, Write, Works 2, WriteNow, MindWrite, Nisus, and FullWrite Professional.) The basis for Go Technology's F-key claim is that these macros are triggered by the numbered function keys on extended keyboards. Hot Keys requires an extended keyboard—a fact the package fails to make sufficiently clear.

Each Hot Keys package includes a keyboard template, which is necessary for knowing which function keys to press. The System 7 Finder package also ships with Super7, a HyperCard-like desk accessory that offers System 7 guidance. I tested both the System 7 Finder and Universal Program packages. (My copy of the Aldus PageMaker 4 package contained the wrong keyboard template, and the service used by Go Technology for technical support did not follow through on its promise to send a new keyboard template and let me know if Hot Keys is 32-bit clean.)

In general the macros I tested performed well, but I encountered a number of glitches. The documentation is confusing. File and folder icons are unprofessionally scattered on the distribution disks, and some windows are barely visible on a Macintosh Classic-size screen. The Word Settings (4) file on the System 7 Finder disk (required to adjust Word's command set to work with Hot Keys) was not compatible with Word 4 macros on the Universal Program disk. The MacroMover utility that comes with the Universal version is not System 7–compatible; joining two sets of macros requires cutting and pasting. Using the templates and function keys reminded me of WordPerfect for DOS machines—only worse, since you have to shuffle templates every time you switch from an application to the Finder. The Super7 DA, which can be helpful to new System 7 users, displays Sharing Files information under the Using Stationery Pads topic, and tosses a jarring advertisement for Hot Keys among the help screens.

Keystroke-oriented users who don't demand high performance may find these templates and macros useful. MacroMaker loyalists should also note: the Hot Keys Finder package is your only source for a System 7–compatible version of MacroMaker. Personally, I'm satisfied with the keyboard equivalents that Apple built into Finder 7.0 and Macintosh applications. If I needed to create a few additional key commands, I would turn to ResEdit or the shareware program Finder 7 Menus. If I need macros, I'll buy QuicKeys.—BILL JUSTIN

Digital Audio and MIDI Recording

AudioTrax

PROS: Integrates digitized audio and MIDI; can be triggered from other programs. **CONS:** Limited set of editing tools. **COMPANY:** Passport Designs (415/726-0280). **REQUIRES:** Any Mac with an Apple Sound Chip; 2MB of RAM; hard drive; built-in sound-input device or MacRecorder for audio; MIDI interface; System 6.0.7. **LIST PRICE:** $249.

MW ★★★

AUDIOTRAX IS PASSPORT DESIGNS' entry into the audio side of media-integration tools. It's unique among Mac programs in that it synchronizes 8-bit audio with multiple tracks of MIDI (Musical Instrument Digital Interface) data at a low cost, making it well suited for multimedia producers and budget-minded musicians.

AudioTrax works with the 8-bit sound data that the Mac digitizes and should not be confused with higher-priced packages, such as Opcode Systems' StudioVision, which provide 16-bit digitized audio at compact disc sampling rates but require a plug-in board. Users accustomed to such high-end programs will also find AudioTrax's controls and editing features Spartan in comparison.

The program supports standard MIDI files, as well as Apple's MIDI Manager for real-time communication between programs. Multimedia producers can use AudioTrax to easily incorporate sequences from high-end MIDI systems into presentations. AudioTrax's external start feature can trigger the playing of those sequences from MacroMind Director or HyperCard, or from another computer that sends out MIDI start and stop signals—a capability most high-end MIDI systems lack.

AudioTrax provides several windows for manipulating MIDI data. The most detailed, the Step Editor, shows individual MIDI notes. Unfortunately, this editor displays only one track at a time. From here you can edit note values, pitches, and volume numerically, via a pop-up window. However, you can't select a range of pitches, say, to change every C-sharp to B-sharp. Track Sheet shows which of the 64 available tracks you have recorded. Here you can set a starting MIDI program change (voice), a MIDI channel, looping, and volume for each track. You can play or mute individual tracks. The Song Editor window shows which measures contain MIDI information. Here you can set up place markers in the score and tab from marker to marker.

The Audio Track feature lets you record two channels of 8-bit audio directly to a hard drive and supports a basic set of volume-control operations (Noise Gate and Normalize are especially important for eliminating the background noise that is characteristic in 8-bit audio). You can also import sounds from standard 8-bit AIFF (Audio Interchange File Format) files.

Other windows control playback of all the recorded tracks by means of tape recorder–type controls. Additional buttons let you do punch-in/out recording, control some elements of MIDI routing, and set up a click track, though for some reason the countdown is restricted to just one measure.

In some situations Undo is not implemented. For example, to move a MIDI note directly in the Step Editor window, you need to click on it with the note-insertion tool. Unfortunately, if you're off by a few pixels, you'll insert an unwanted note and have to switch over to the eraser tool to zap it. Similarly, some deletion can't be undone. If you're about to do a risky operation to an audio track, it's up to you to make backups of the files.

If you just need a way to trigger MIDI sequences from within another program, you can buy a hardware box for around $100 that will do the trick. But for people who aren't fazed by the limitations of Mac's built-in audio, AudioTrax provides a simple, compact way to combine synchronized digital audio with MIDI sequences.

—BOB GONSALVES

Interactive Preschool Game

A Silly Noisy House

PROS: Colorful animated graphics; imaginative CD sound and music; requires no reading. **CONS:** Hefty hardware requirements; slow response time. **COMPANY:** The Voyager Company (310/451-1383). **REQUIRES:** Mac LC or II; 2MB of RAM; System 6.0.5; CD ROM drive; hard drive with 6MB free space; speakers or headphones. **LIST PRICE:** $59.95.

MW ★★★★

ONE OUTGROWTH OF HYPERCard has been interactive fiction for preschoolers. Voyager's Amanda Stories and Mediagenic's The Manhole and Cosmic Osmo all presented imaginative graphical worlds that could be explored by anyone old enough to master a mouse. These black-and-white stacks captivate youngsters, charm adults, and inspire imitators.

A Silly Noisy House, billed by Voyager as a CD ROM "animated audio toybox," follows in this tradition. But unlike the earlier efforts, it uses full-featured multimedia software and high-end Mac hardware to create a brightly colored animated world with CD-quality sound effects. The results are impressive—especially if you're under eight.

A Silly Noisy House was created with MacroMind Director but works like a HyperCard stack. Each screen is a scene littered with colorful objects and hidden buttons that respond to a mouse click by producing sound, music, animation, or a new picture to explore. From the cross section of the house, you can click on any room for a close-up view. To keep things interesting, some objects respond to clicks in several ways. Opening the oven might one time reveal a roasting chicken, with the soundtrack playing an enthusiastic *Mmmm!* The next time, you might trigger birds rising from a pie to the tune of "four-and-twenty blackbirds."

The songs in A Silly Noisy House are plain-vanilla vocal arrangements of kiddy classics like "The Itsy-Bitsy Spider," but they're not the usual digitized Mac sounds. They're stored as high-fidelity musical data on the CD. The sound quality throughout the disc is superb, but you need to use headphones or hook up a CD ROM drive to a stereo or other sound system to hear it.

While the CD is used as a musical medium, the graphical part of A Silly Noisy House has to be stored on a hard drive, where it takes a whopping 6MB of space. Even running from a hard drive, however, the program has the kind of delays that are typical of CD ROM–based software.

The youngest kids in my testing team loved A Silly Noisy House. The older ones, many of whom are beyond the target three-to-eight-year age range, had fun the first time through but were quick to point out that it was really "for little kids" (which they never said about The Manhole or Cosmic Osmo). The syrupy songs and simple scenes are perfect for younger kids but won't interest most preteens, teens, and adults.

Enchanted Bedroom The bedroom is full of toys, critters, and familiar objects, most of which come to life with a click of the mouse.

But then, that's not the point. Like "Mr. Rogers' Neighborhood," A Silly Noisy House doesn't try to be cool—it speaks to the very young in terms they can understand. And in that sense, it succeeds. I just wonder how many preschoolers have color Macs with large hard drives, CD ROM players, and external audio systems.—GEORGE BEEKMAN AND THE SHOOBEDOOBOP SOFTWARE TESTING TEAM

To-Do-List Manager

In Control 1.0

PROS: Flexible layouts; powerful sorting and matching capabilities; short learning curve. **CONS:** No archiving features; no discontiguous select. **COMPANY:** Attain Corporation (617/547-2188). **REQUIRES:** Mac Plus; second disk drive; System 6.0.7. **LIST PRICE:** $129.95.

MW ★★★★

WITHOUT A HANDFUL OF TO-DO lists, my life runs out of control. Back in college, I fell victim to a practical joke when a roommate hid all my lists and I missed two exams and a date. In Control is for people like me.

In Control works something like a cross between an outliner and a spreadsheet. It lets the user create lists in the familiar fashion—from the top of the page down—but it also works in indented outline form. You can collapse an immense list down to a bare skeleton and expand it again to get the full sense of all you need to do.

In addition, In Control lets you create columns. You can expand your to-do lists outward to attach comments, note task assignments, establish priorities—there are plenty of options. The collapsible row-and-column format alone is definitely worth the $129.95 list price.

The advantages of an electronic to-do list over the paper variety become immediately apparent when you cut and paste or simply drag items to rearrange their order. However, In Control's powerful sorting and matching capabilities give you much more flexibility for organizing lists. For example, you can sort by priority (high, medium, and low) and send all the high-priority items to the top of the list. That's straightforward enough, but In Control can sort according to any data in any column. The Match function finds data equal to (or not equal to, less than, or greater than) the value you enter. So you could find all project tasks assigned to John with due dates sooner than October 1, and then print out two versions of a to-do list—an expanded, detailed one for him and an outline for yourself.

Outliner-Spreadsheet Hybrid In Control uses a row-and-column format to organize to-do lists.

In Control provides customizable data-entry helpers (pop-up menus and auto-type) that you can use to enter text and numerical data in any column. With support for 32-bit color, the program also lets you custom colorize a list. I've found a fire-engine red that keeps urgent items in plain view.

In Control comes with an excellent, easy-to-follow manual and a selection of sample files. Together, these enabled me to begin using nearly all the program's features within minutes of pulling it from the box. Technical support is available for registered users in need of a little hand-holding.

The program imports and exports data through XTND technology and supports System 7 balloon help, Apple events, and TrueType fonts. Printing options include custom headers and footers. I'd like to see the next version add an archiving feature to let me clean out completed items while saving outdated to-do lists for reference. I'd also like the ability to select discontinguous text for editing, deleting, moving, and so on.

Still, In Control is a first-rate to-do list manager—flexible and easy to use, with a clean interface and plenty of power. Without combining all the functions of either a dedicated outliner or a calendar program, it manages to incorporate some of the most useful features of both. If you make lists—and mercy on you if you don't—get this program.—GEORGE L. REYNOLDS

Flat-File Database

Panorama II 2.0

PROS: Expansive macro capabilities; numerous data-entry shortcuts; fast sorting and searching; can open forms in multiple windows. **CONS:** Database size limited by available RAM; only eight colors available in graphics mode; sluggish pop-up input box. **COMPANY:** Provue Development Corporation (714/892-8199). **REQUIRES:** Mac Plus. **LIST PRICE:** $395.

MW ★★★★

PANORAMA 2.0 IS PACKED WITH new features, is disarmingly easy to learn, is powerful for heavy-duty jobs, and—yes, I'll say it—is a formidable rival even to best-selling FileMaker Pro.

Panorama is full of labor-saving data-entry features: Smart Dates lets you enter expressions like "yesterday" or "next Friday" into a field to automatically calculate the date. Clairvoyance memorizes previously entered names, expressions, and so on, and will finish typing them for you. Space Bar Tab lets you move from cell to cell by pressing the spacebar instead of using the tab key—a godsend to your left pinkie.

The program is fast at sorting and searching. The unique Sounds Like feature lets you find an entry based on pronunciation instead of spelling. To sort records, you simply click on the desired field and issue the Sort command. (FileMaker requires a separate dialog box to sort records.) Using the Crosstabs feature, you can instantly rearrange data into spreadsheet-style tables.

In my tests, Panorama sorted a five-field database of 750 records in less than a third of the time it took FileMaker. Panorama copies its entire database file into RAM. ProVue says 1MB of RAM will hold about 6000 records in a typical database of business contacts; 2MB, about 20,000 records.

There's only one new feature that will slow you down. In version 2.0, you enter data in an expandable input box that pops up on each cell as it becomes active. The scrollable boxes are great for long entries within a cell (up to 32,767 characters), but they also make the program sluggish. If you tab quickly, you have to wait as Panorama opens and activates each input box.

Panorama's graphics mode provides a full palette of MacDraw-type tools to create an unlimited number of layouts. Unlike FileMaker, Panorama allows you to open several layouts at once, in multiple windows. The windows can be opened with or without scroll bars, a drag bar, or a tool palette, giving you tremendous control over the look of the database. You can use some 40 different "tiles" to create headers, footers, and summary titles, and to precisely adjust margins and spacing on forms.

Panorama offers bar, line, area, pie, and scatterplot charts. The QuickReport and QuickLabel functions can produce simple columnar reports or print mailing labels using one of 27 Avery label templates.

Another great feature is Formula Merge, which lets you combine data fields and even formulas with text in any layout. Typing the name of a field or a formula into a paragraph automatically merges that field's contents or the formula's result seamlessly into the text.

Panorama's impressive macro functions let you record and play back almost any series of database routines, including complex calculations and formulas. You can create keyboard-activated macros and assign them any ⌘-*key* combination. Best of all, you can set macros to trigger automatically at a specified point, such as whenever data is entered into a particular field.

Panorama is extremely easy to use. The incredibly well-illustrated manual, despite its typos, goes to great lengths to be unintimidating. Four database templates are included with the program to help you get started.

Panorama lacks FileMaker's rich palette of lines, patterns, and colors (8 colors instead of 81), and it is priced slightly higher—generally by $35 street price. But feature for feature, Panorama outshines its gargantuan rival.—JOSEPH SCHORR

Geography Game

American Discovery 3.0

PROS: Excellent drill in U.S. geography and state facts; easy-to-use interface requires little typing. **CONS:** Some maps difficult to read; player can run out of questions before reaching preset points goal. **COMPANY:** Great Wave Software (408/438-1990). **REQUIRES:** Mac 512KE. **LIST PRICE:** $49.95.

MW ★★★

GREAT WAVE SOFTWARE HAS been turning out excellent learning games for kids since 1986—all capable of running on any Macintosh from a 512KE on up. American Discovery, a U.S. geography and history package, lives up to its distinguished pedigree.

American Discovery is clearly intended mainly for classroom use; it includes Discovery Maker, a separate application that allows teachers to easily customize the drills. The number of points needed to win—from 50 to 500—can be changed in the Set Game Options box in Discovery Maker or under the Options menu in the main program. The game can also be customized by setting regional limits from within the game.

The game element is less emphatic in American Discovery than in some other learning programs. There's nothing to shoot at (or with), no maze to traverse, no friendly elves or wicked trolls. Recommended for ages eight through adult (the program presupposes a minimal knowledge of U.S. geography and abbreviations), American Discovery provides an excellent drill in geography, state capitals, and state facts.

The game opens to the Find the States section, accompanied by a jaunty rendition of "Yankee Doodle." The speed at which questions appear is adjustable. Several times during testing, players ran out of questions before reaching the goal of 100 points. The program can be set to repeat questions, and the teacher (or parent) can add questions, but this may still present problems, especially if the goal is increased to the maximum 500 points.

Nine game sections make up American Discovery. (Two other sections, Explore and Show Order, provide information without drills.) Students have two chances to respond correctly to a question before the game provides the answer, and they earn bonus points for six consecutive right answers. This works fine, except in sections such as Neighbors, where the answer may comprise several states. If the player uses up two tries picking out the first state, the program takes over and gives the correct answer.

Locations asks students to click on dots on a map to locate well-known cities. The map in this section and the one in Rivers and Lakes are among the few minuses in the game. The Locations map is much smaller than others and is full of dots. The Rivers and Lakes map is grayed out, making it difficult to distinguish boundaries, especially in the northeast. Even on the larger, clearer maps, Rhode Island and Delaware are difficult to locate; on the small and grayed-out maps they are virtually invisible.

Most of American Discovery's drills and games are quickly accessible to children. Only two sections, Spell the States and Spell the Capitals, call for typing, although all the sections require reading skills. With the necessary reading ability—or someone to help with the questions—the program is suitable for young children. One of the program's major positive features is that the element of competition is minimalized. Even when two players are involved, it displays only one score at a time. The challenge is in mastering knowledge, not in racking up points.

American Discovery has no fancy graphics (color is used to some extent) or sounds. It does have an easy-to-use interface and a solid database structure; it does what it sets out to do and does it well. And even without anything to shoot at, it beats standing in front of the class with a pointer and a window-shade map.—LOUISE KOHL

Arcade Game

HardBall II

PROS: Excellent graphics; realistic play. **CONS:** Copy protected; no limit to aggregate team skills. **COMPANY:** Accolade (408/985-1700). **REQUIRES:** Mac Plus; 2MB of RAM for color. Recommended: Hard drive; color monitor. **LIST PRICE:** $54.95.

MW ★★★★

HOW DO YOU IMPROVE ON THE best-selling baseball game of all time? Easy, just add more teams, more stadiums, instant replay, and the ability to create your own league. Where the original HardBall offered two preselected teams and one stadium, HardBall II features ten ready-made teams and seven ballparks. My main complaint is the off-disk copy protection. The code wheel you must use to answer a question is easy to decipher, but lose it and you're out of the game until you replace it.

HardBall II puts you in control of your team's destiny by simulating two fundamental experiences of running a major league team: first, selecting players and developing them in the Team Editor mode, and then coaching a game by calling for a hit-and-run play, say, or by bringing in a right-handed relief pitcher. If you tire of using the ready-made teams, you can create your own. You have 41 statistical categories to analyze and complete for each player—22 pertaining to all players, and 19 pertaining to pitchers only. The attributes range from running speed to batting average and arm strength. Unfortunately, HardBall II puts no limit on the total number of ability points, making it possible to create a Superman team, which of course I did. But that takes away from the challenge of the game and I don't recommend it. You can go on to create your own league and play against the computer or friends, or play both teams yourself. HardBall II creates and updates the schedule and keeps up with standings and individual statistics for a season as long as 99 games.

To control your players, you can use the keyboard, a joystick, or the mouse. I find the keyboard to be most responsive, especially on defense. With the others I tend to overrun the ball in the outfield, and I can't maneuver my bat quickly enough to catch up with certain pitches.

Overhead View Fenway's "friendly confines" were not so friendly for the Charleston All Stars.

From the pitcher's windup to the batter's swing, HardBall II comes astonishingly close to natural human motion. Each pitcher has a repertoire of five pitches, from a fastball to a change-up. The defensive player selects a pitch, places it exactly by positioning the pound sign (#) at the bottom of the screen, and hits the return key to start the action. (Tip: When playing against the computer, try throwing low and away. The batter usually swings and misses.) Hitting is controlled in essentially the same manner, but getting your timing down can take a while. Batters have five swings to pick from, ranging from a grounder to a full swing.

HardBall II offers four different perspectives for watching the game. The only way to hit the ball effectively is to play from the batter's view; but I also advise playing defense from the batter's view because it's the easiest way to tell which way the ball is being hit. I really love the instant-replay option, especially after blasting a home run.

HardBall II has some of the most realistic graphics of any sports game, making it one of the most entertaining sports games for the Macintosh.—ANDREW MILLER

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C&C Computers and Communications

Circle 124 on reader service card

Peel-n-Stick Nirvana

BY DAVID POGUE

LABELS? OH, SURE. ABOUT AS much fun as a tax audit, right? Heck, everybody knows making labels on the Mac is a nightmare. They jam in the ImageWriter. The LaserWriter chops them off at the left side. You waste a sheet of 30 just to get 1 decent label for a videocassette.

But for the last couple of years, label zealots have hunched in front of glowing screens, toiling late at night, sweating in silence to help us get our stickers straight. It's time they get a little limelight.

Of course, Microsoft Word, Panorama II, and FileMaker Pro come with template files already formatted to print onto standard labels. And some of the best label-printing programs are sold as address-book software: DynoDex, Address Book Plus, TouchBase, and so on. But using a tailor-made labeling product has some advantages: the software is cheaper and simpler to use than a real database, and you gain features like automatic postal–bar-code generation (bar-coded mail gets delivered faster). And the hardware (desktop label printers) reduces the teeth-gnashing quotient of trying to feed labels through a regular printer.

LabelWriter II

THIS TRIANGULAR, 6-INCH-TALL DESKtop label printer from CoStar Corporation looks like Picasso's idea of a Rolodex. It comes with a roll of 130 labels; depending on the quantity you buy, additional labels cost around 4 cents apiece. A thermal-printed, 1-by-3½-inch label silently slithers out the front slot about 15 seconds after you click on the Print button, looking great at 138 jet-black dots per inch. At that point, you just peel the thing off the waxed paper and slap it on the nearest envelope, box, or grocery item.

You get your labels into the software, a special edition of MacEnvelope, by typing, pasting, or importing a text-file list. If you're clever (the manual's a little evasive on this point), you can change the text style of any line, for all labels or just one (see "Label Software Features").

Like all desktop labelers, the LabelWriter II is Chooser-selectable. Those of us who are not independently wealthy immediately recognize what that means: if you've already got a printer, and there's something in the modem port (like a modem), you have to spring another $50 for an A/B switch box so that this additional device can share one of the ports. On the other hand, Chooser-selectability means that, if you want, you can print directly from any program, provided there's something worth printing in the upper-left corner of your document.

Exclusive insider info: Don't tag your attic trunks or tax-record shoeboxes with these labels; particularly if the labels are on something warmish, like an appliance, the printing fades to white over time. Otherwise, this $249 machine is slick, fast, and flexible; and it makes an ideal partner with online card-file programs like QuickDex or InTouch. Package shippers and floppy lovers, rejoice: by the time you read this, CoStar will be selling a new model that prints wider (2½-by-3½-inch) labels (and costs $150 more).

Smart Label Printer Plus

IT'S ANOTHER TRIANGULAR DESKTOP label printer ($199.95). History buffs might want to note that the Seiko Instruments USA device is the same as the now-discontinued original CoStar LabelWriter I; Seiko used to manufacture the machines for both companies.

Unfortunately, the Seiko uses a bizarrely asymmetrical resolution (75 by 105 dpi), so the printing on every label looks like somebody stepped on it (see "FastLabel 3.1.4"). The clarity suffers, too, because the print head darts back and forth across the label, instead of remaining fixed. (Rival CoStar's marketing staff would have you believe there's a speed issue, too, claiming that its LabelWriter II whups the Seiko in speed. True enough, CoStar labels move through the printer much faster. But the Seiko software doesn't sit and think as long before printing, so the times even out.)

The Smart Label Printer Plus's hardware weaknesses are a shame, because the included software (a desk accessory), while far less ambitious than the LabelWriter II's, is easier to use. Its clean interface makes it immediately clear how you format, rotate, or change the darkness of your labels. Unfortunately, the software does nothing to rescue you from mailing-list hell. It lets you print a list start to finish, but won't let you start partway down the list—something that Murphy's Law of Jammed Labels and Undiscovered Typos dictates you'll occasionally want to do. Nor can you print only one label from the list. And you can't paste in graphics. Label this machine "maybe not."

Reaching gummed heaven with label-making products

Personal Label Printer

AVERY'S RECIPE FOR A LABELING PACKage: (1) Acquire a certain Picasso-esque desktop label printer from another company. (2) Stir in labeling software from somebody else; search for and replace all references to the original developer in the manual. (3) Change the company name to Avery Dennison and bake at $279.

The new logo notwithstanding, the hardware in this package is actually CoStar's LabelWriter II. The software is Williams & Macias's StickyBusiness Plus, masquerading under the new name MacLabelPro. Avery's sole tangible contribution to the package is label rolls themselves (which it also makes for CoStar).

Of course, there's nothing inherently wrong with tossing a good printer and a so-so labeling program into a box and selling it as a package. It would have been nice, however, if somebody had checked to make sure they worked together. The MacLabelPro manual's tutorial walks you through the design of a disk label that you couldn't possibly print on the Avery Personal Label Printer (whose labels are only an inch wide). As a matter of fact, the jury-rigged combo manual doesn't get around to telling you how you *do* print labels that fit the printer until page 142. And for this they want $30 more than the CoStar machine?

StickyBusiness 1.5.2

STICKYBUSINESS ($100, WILliams & Macias) looks like a MacDraw for labels. (For $80

continues

LABEL SOFTWARE FEATURES

	LabelWriter II (MacEnvelope 1.0)	Smart Label Printer Plus (Smart Labels Plus)	Personal Label Printer (MacLabelPro)	FastLabel 3.1.4	StickyBusiness 1.5.2	MyAdvanced-LabelMaker 1.0.0
Displays WYSIWYG label	●	●	●	●	●	●
Displays all names in imported list	●	○	●	●	●	●
Drawing tools	○	○	●	●	●	[1]
Accepts pasted graphics	●	○	●	●	●	○
Generates postal bar codes	●	●	●	●	[2]	○
Generates serial numbers	●	○	●	●	●	●
Line-by-line formatting	●	●	●	●	●	●
Printer nudge for misalignments	NA	NA	●	●	●	●
Start printing from middle of list	●	○	●	●	●	●
Print selected names from list	●	○	[3]	●	[3]	[3]
Flexible format for imported lists	●	●	○	●	○	○

● = yes; ○ = no. [1] *Limited bitmap editor.* [2] *StickyBusiness Plus version only.* [3] *Consecutive labels only.*

more, you can get the Plus version, which can generate postal bar codes.) Apart from its name, StickyBusiness's greatest strength is that it comes with ready-to-go templates for over a hundred tags, labels, and envelopes. Practically the entire Avery laser label line is there, plus Rolodex cards and labels from a bunch of companies I've never heard of (Blueline, Moore, and Nebs, among others). There's even a template for the CoStar LabelWriter I (that is, the Seiko label printer).

The drawing tools are good. But believe me, you don't want to print more than one label at a time. To import a text-file mailing list, you're required to put «doohickeys» «like» «these» around each field—a Stone Age mail-merge interface I'd hoped was becoming extinct in the Mac world. I suppose the mail merge method has some advantages: you can give each field a different font, for example, or insert nonvarying words (like "My name is") among the other fields, just as you would when writing a form letter.

But first of all, that kind of interface means you never get to see your labels before they print (and therefore you invite unhappy surprises when they hit the output tray). And second, you can use a word processor for mail merges. A labeling program should make life *less* complicated.

TOM GIBSON

Seiko Smart Label Printer Plus (left), CoStar LabelWriter (identical to the Avery Personal Label Printer) on the right.

Beanhead Software
12778 Canterbury La.
Chagrin, OH 44129

Beanhead Software
12778 Canterbury La.
Chagrin, OH 44129

The Seiko Smart Label Printer's asymmetrical resolution makes text look squashed, especially compared with an identically formatted label from CoStar LabelWriter II.

FastLabel 3.1.4

TAKE THE CANNED-TEMPLATE CONCEPT of StickyBusiness, solve the mailing-list problem, replace the drawing-tool icons with English words, and you get FastLabel (Vertical Solutions; $79.95, $29.95 with an on-disk manual). It doesn't have as many ready-made formats, although it has templates for the basic Avery laser labels, and it's simple to design your own.

But the fun begins when you have to print a mailing list. FastLabel imports your text file with jaw-dropping speed, and—unlike other labeling software—it's completely unfussy about the formatting. Some addresses have only two lines, others six? No problem. The imported addresses fly into a separate window; click on any address to see it, and what you see is what you get, laid out on a sample on-screen label, with whatever fonts, graphic accents, and imported art you like. Vertical Solutions promises to have eradicated the buglets I found in version 3.1.4 by the time you read this. (A demonstration version is available on America Online.)

MyAdvancedLabelMaker 1.0.0

MYADVANCEDLABELMAKER ($49.95) walks away with two awards: most infantile title and most obvious adaptation of a DOS program. Although it sports some truly useful features, they're buried behind an interface that has little to do with the Macintosh; a laundry list follows.

There's no Undo command. Text appears in the crude Monaco font. The painting mode has no brush, pencil, eraser, or rectangle tool. The scroll bars don't respond until you *release* the mouse button. And there's a dialog box that outhorrors Stephen King: instead of OK and Cancel, the only two buttons say Quit and Overwrite.

The publisher of this program—called, inevitably, MySoftware Company—plans to release a drastically rewritten program by the time you read this, called MyLabelDesigner. The prototype I looked at has better drawing tools and a closer approximation of a Mac interface. (The upgrade will cost $20.) The new program, though, still makes you build your addresses field by field ("1st Name," "Last Name," and so on). Otherwise, the new version looks promising, in MyHumbleOpinion.

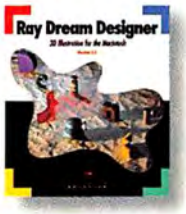
The Upshot

IF YOU CAN SPEND $250 ON A LABEL printer, CoStar's LabelWriter II is the one to get. If you want to use your existing printer, FastLabel should be your choice. In fact, those two products in combination make the best possible hedge against sticky situations. **m**

See *Where to Buy* for contact information.

During his exhaustive label testing, New York writer DAVID POGUE inadvertently discovered that adhesive labels are also excellent for hair removal.

Columbus Was Right.



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◀ This image was produced on a Macintosh using Ray Dream Designer 2.0.

Artist: Tom Cushwa, Cushwa Studio, New York.

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Circle 159 on reader service card

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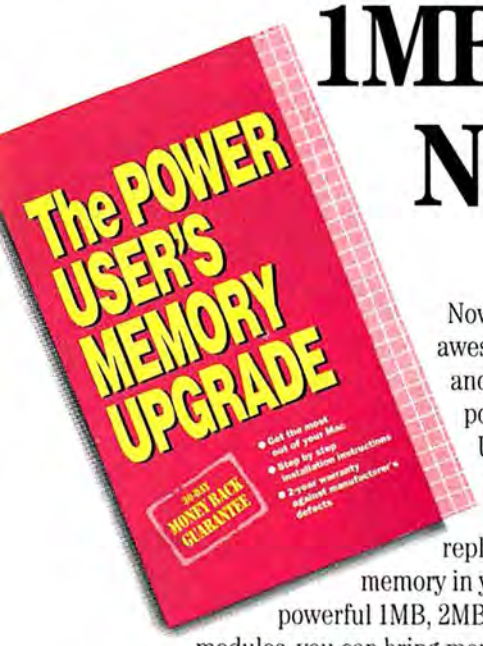

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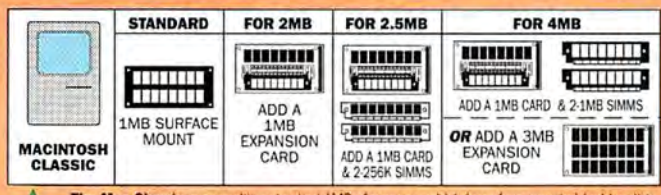
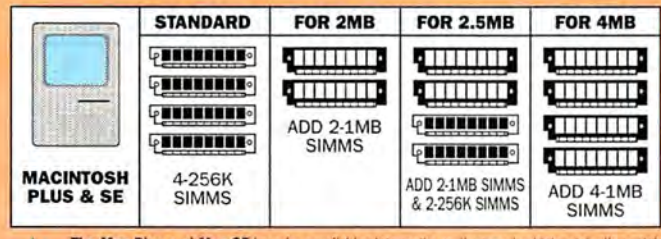
Fast, Faster, Fastest

SIMMs come in different speeds, and are calibrated in nanoseconds (ns) from 70ns (fastest) to 150ns (normal). The Mac Plus, SE and Mac II, IIx, and IIcx operate well with SIMMs rated at 120ns or faster. The Mac IIsi and LC require 100ns SIMMs or faster and the IIci needs 80ns or faster SIMMs. Mac Classic upgrades are provided via an Expansion Board, which is included in your Memory Upgrade Kit. To get the full benefit of 4MB SIMMs (with Mac IIcx, IIci, IIsi or LC) you may need a memory management program.

HERE'S HOW TO UPGRADE *YOUR* MAC!

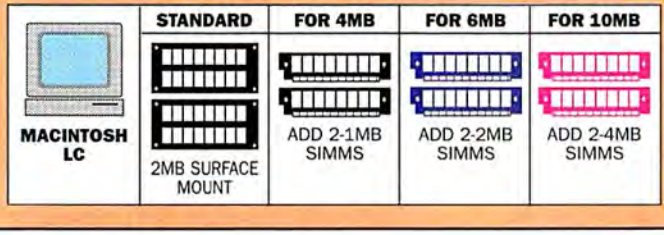


The Mac Classic comes with a standard 1MB of memory, which is surface mounted (soldered) to the motherboard. Additional memory for your Mac Classic is provided by an Expansion Board, which slides into a slot on the Classic's motherboard. The Expansion Board can be purchased with 1MB of memory (for a total of 2MB), and then two 1MB SIMMs can be added to the Expansion Board later, for a total of 4MB. Or, you can install a 3MB Expansion Board, which brings your Mac Classic up to its full 4MB.

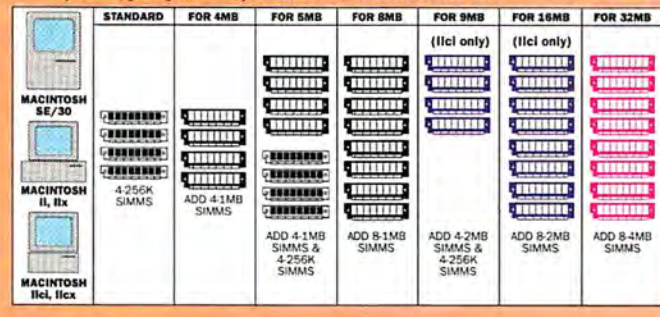


The Mac Plus and Mac SE have four available slots on the motherboard, which originally contain four 256K SIMMs modules—totalling 1 megabyte (1MB) of memory. To upgrade, you can replace each 256K module with a 1MB module, but you must do this in pairs.

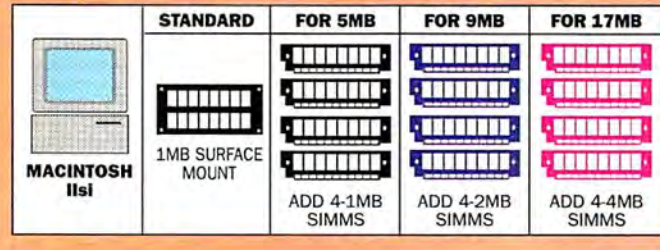
Replace two 256K modules and you will have a total of 2.5MB of memory. (That's the two new 1MB modules plus the original two 256K modules.) Replace all four modules and you'll have 4MB. (You should save the 256K modules for later use if you want to pass your Mac on to someone else.)



The Mac SE/30, II, IIx, IIcx, and IIci each come with a total of eight slots. The standard configuration has four 256K SIMMs modules, or a total of 1 MB. Here, memory must be upgraded in multiples of four. This allows for expansion from 1MB to 4, 5 or 8MB on the II and IIx, and up to 32MB on the SE/30. IIcx and IIci, depending on whether you are using 1MB, 2MB or 4MB SIMMs. If you are upgrading a Mac IIci, you must use SIMMs rated at 80ns or faster.



The Mac IIsi comes with a standard 1MB of memory, which is surface mounted (soldered) to the motherboard. Four slots are available for additional memory, and you must upgrade your Mac IIsi in multiples of four. The Mac IIsi is expandable to 5, 9 or 17MB, depending on whether you are using 1, 2 or 4MB SIMMs, and the SIMMs modules must be rated at 100ns or faster.



The Mac LC comes with a standard 2MB of memory, surface mounted (soldered) to the motherboard, with two slots available for additional memory. The Mac LC can be upgraded to 4, 6, or 10 MB, depending on whether you are installing 1, 2 or 4MB SIMMs.

Quality Control

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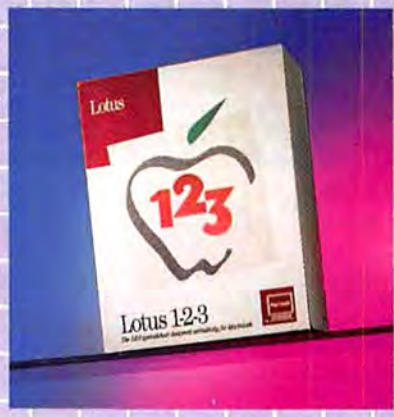
NightWatch II assures you of the most rigorous, yet friendly hard disk protection in the industry. When it's locked, it's locked! No disk recovery tool or SCSI probe may access your data unless you allow it to do so. With three different hard disk protection options: Diskless, Key Disk and Classic Token Disk. The choice is yours! Share your computer with only those users you desire. Assign them a myrid of hard disk access privileges or restrictions. It's simple to set up, and just as easy to change. **Publisher: Kent Marsh Ltd. UTI0262**

$95



Lotus 1-2-3 For Macintosh

At last, a 1-2-3 spreadsheet that is designed exclusively for the Macintosh computer. 1-2-3 for Macintosh takes full advantage of the rich graphical environment of Macintosh while delivering significant new spreadsheet features. And of course it's compatible with other new versions of 1-2-3 and Excel. A whole new kind of 1-2-3 created expressly for Macintosh. The result is a rich design that makes even the most complex spreadsheet tasks easy. 1-2-3 for Macintosh sets a new standard for what a Macintosh spreadsheet should be. System requirements, any Macintosh with a hard disk. 2MB RAM under System 6 or later. 3 MB RAM under 7. **Publisher: Lotus Development BUS0188**

$349

TAL or Timeslips III 2.1

TAL-Timeslips Accounting Link extends Timeslips III with or without general ledger accounting software. Generates customized income reports; links the billing and payment data from Timeslips III to accounting programs. **FIN0129 $55.**

Timeslips III 2.1 is complete time keeping and billing package for people whose stock in trade is their time. You gather time data with TS timer DA. When the time comes to send the bill, TS Report will extract the data and generate invoices and reports in a wide variety of formats. Handles the big jobs: 250 users, 250 different activities, and over 3,000 clients, with up to 128 projects per client. **Publisher: Timeslips Corporation BUS0043**

$195

WriteNow 3.0 with FREE Grammatik Mac 2.0

NEW VERSION! WriteNow 3.0 is one of the *fastest* Macintosh word processor and has long been considered by the industry experts to be one of the *easiest* to use. A two-time winner of MacUser's Best New Word Processor Award, WriteNow, includes a lightning-fast 135,000-word spelling checker, a 1.4 million-word thesaurus DA, one of the most powerful paragraph and character style sheets of any Mac word processor, a robust print preview, System 7 compatibility, a FREE full version of Grammatik™ Mac 2.0, one of the best selling grammar/style checkers (a $99 value). Completely compatible with, Microsoft Word, Works, MacWrite II, PC WordPerfect and other popular formats. **Publisher: T/Maker WRD0051**

$159

WristSaver/ WristSaver MousePad

The WristSaver cradles your wrist with a contoured neoprene rubber pad and a nylon covering. It's ergonomically designed to support your wrist at the proper angle to help avoid the pain associated with Carpal Tunnel Syndrome. The WristSaver MousePad provides a comfortable rest for your wrist, plus a conventional mouse pad. Simple finger movements replace sliding the entire arm or hand.

Manufacturer: LB Innovators
WristSaverMousePad **ACC0635 $15.**
WristSaver **ACC0560 $15.**
Bundle **BND0033**
(Available in Gray, Black, Red or Navy)

$25

NEW

WindoWatch

Track the hours you spend on a project with WindoWatch. It's a must for professionals who bill their services by the hour (or minute). WindoWatch operates in the background, automatically generating a timesheet as you work. Use WindoWatch to collect and merge timesheets from team members over the network or export timesheet information to a spreadsheet. Don't miss any opportunity to accurately bill your clients. After all, time is money. **Publisher: ASD Software UTI0264**

Single User

$89

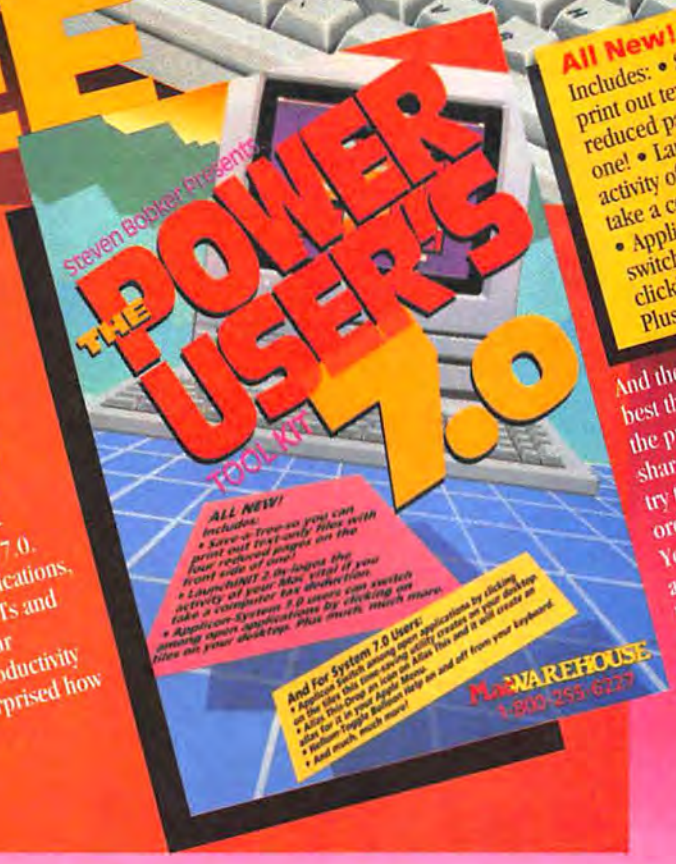
Ray Dream Designer 2.0

You don't have to settle for flat illustrations and designs any longer. Ray Dream Designer's drawing and text tools, for creating lines, circles, ellipses, polygons, Beziers, colors and shadings, are virtually the same as those in most 2D illustration programs. The only difference is, now your objects have the realistic look of three dimensions. Wrap them around an object or text for instant dimension. Comes with a library of 3D solid textures you can use as-is or customize. Lightning, shadows, transparency, reflections and, best of all, perspective are all handled automatically. Requires: Mac II family with coprocessor, 32-bit QuickDraw; 4MB RAM and hard drive. **Publisher: Ray Dream GRA0292**

$589

FREE POWER USERS TOOL KIT 7.0

If you're not already a collector of Steven Bobker's highly successful Power User's Tool Kit -compiled exclusively for MacWAREHOUSE- you'll want to start with version 7.0. It's stuffed with ten useful applications, utilities, desk accessories, INITs and System 7.0 extensions for your Macintosh. They're great productivity enhancers and you'll be surprised how easy they are to use.



All New!
Includes: • Save-a-Tree- so you can print out text-only files with four reduced pages on the front side of one! • LaunchINIT 2.0s - logs the activity of your Mac - vital if you take a computer tax deduction. • Applicon - System 7.0 users can switch among open applications by clicking on tiles on your desktop. Plus much, much more.

And the best thing is, the programs are shareware so you can try them FREE when you order from MacWAREHOUSE. You pay only $1.50 shipping and handling if you want the disk. If you wish to continue using the software, some authors ask that you pay a small fee ($5-$25). All the details are explained on the disk, which is yours to keep. Please remember to ask for item # AAA 0013 when you order.

White Knight V.11

❼ The perfect low-cost solution to almost any Mac telecommunicator's needs. Offers the kind of power associated with products costing hundreds of dollars more, but is easier to learn and more flexible. 270+ page user manual is geared to all levels of experience. Winner of 11 awards including MacWorld's World Class Software Award 1987-1991.
Publisher: FreeSoft
COM0060

$85

WordScan or WordScan Plus*

❼ **WordScan** offers the most accurate OCR with a wealth of conveniences. WordScan reads all documents-even dot matrix and fax files. Standard features include preview scan, Deferred Processing and the Verifier-features you can't find on OCR costing hundreds of dollars more. **UTI0215 $249.**
WordScan Plus is the new #1 Macintosh OCR and winner of the 1991 MacUser Eddy award for Best New Word-Processing Tool. WordScan Plus includes multi-zone templates, the Pop-Up Verifier, AutoClipping and style sheets.
Publisher: Calera Recognition Systems
UTI0216

$699*

Aldus SuperPaint or Aldus Gallery Effects*

Aldus SuperPaint 3.0
❼ Five time winner of MacWorld magazine's World Class Award, new Aldus SuperPaint combines painting, drawing, and image enhancement, and includes 1 thru 24 bit color, textures, gradients, and EPS graphics. **GRA0112 $133.**
Aldus Gallery Effects ❼ **1991 MacUser's Editors' Choice Award for Best Visual Resource.** Aldus Gallery Effects automatically transforms greyscale and color bitmap images into stunning, sophisticated art, with 16 master effects including Graphic Pen, Watercolor, and Charcoal. Works directly within programs like SuperPaint and PhotoShop, or as an application or DA.
Publisher: Aldus
GRA0279

$129*

MacKids Preschool Pack

❼ The MacKids Preschool Pack consists of six color programs that are entertaining, simple to use and easy to understand. AlphaWorks teaches letter recognition and keyboard layout. Bar Math teaches the basic concepts of numbers using blocks. Concentration develops short term memory skills as players try to match picture cards. Connect the Dots teaches number and letter sequence. Counting 1,2,3 develops counting skills, and ShapeWorks teaches shape, color and size recognition.
Publisher: Nordic Software
EDU0142

$35

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The UnMouse

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. **Manufacturer: Microtouch INP0084**

$159

More After Dark

It's M.A.D.! It's More After Dark—Over 25 incredible new displays for After Dark, the Ultimate Screen Saver. Features contest winners Mowin' Man, Tunnel, GraphStat, and many beautiful new fish! Kittens, Art Museum, and Lunatic Fringe game module help save your screen from phosphor burn-in. (Requires After Dark software.) **UTI0230 $25.**

After Dark 2.0

After Dark 2.0 displays over 35 screen savers including classics Flying Toasters and Fish! Includes sound, password protection, logo and message display. **Publisher: Berkeley Systems UTI0119 $29.**

More After Dark Bundle

Buy both and save. **UTI0231**

$45

Vocabulearn/ce

Vocabulearn is now available in Level III and Compact Disc. Expand your vocabulary base with thousands of new words and phrases! ***Vocabulearn/ce*** **$35 ea.** ***Compact Disc*** **$69 ea.** Full line available.

PICTURE IT!

Penton Overseas has developed a stimulating way to break the global language barrier... **PICTURE IT!** offers a highly interactive "bilingual" approach to a foreign language dictionary...complete with more than 500 high resolution graphics, native pronunciation, and expandable resource file. **Publisher: Penton Overseas** Full line available.

$42 ea.

DayStar FastCache™

RATED MacUser 1/2 DECEMBER 1991

Give a boost to everything you do. DayStar's family of highly rated Cache cards are available for the Macintosh IIci, IIsi, and the Quadras 700 or 900. You'll see performance gains up to 45%. Quadra gains of 4-39%, depending on the application. Includes PowerMath software. The FastCache IIsi includes the DualPort IIsi adapter which doubles the expansion capability of the PDS slot... the optional 20 MHz math chip really accelerates recalcs and scientific tasks. All FastCache products are upgradable to DayStar's PowerCache. 100% compatible. 3-year warranty. See listings for pricing. **Manufacturer: DayStar Digital DRI0224 FastCache IIci**

$269

IN CONTROL

Get organized instantly with IN CONTROL, the To-Do List Manager that combines outlining and easy-to-use database features. Create an outline of your activities, then create new columns to track priorities, deadlines, people responsible, or anything else. Quickly select and sort to see just the activities you want, in any order. Collapse or expand the outline to see any level of detail. From the creators of FileMaker. **Publisher: Attain BUS0211**

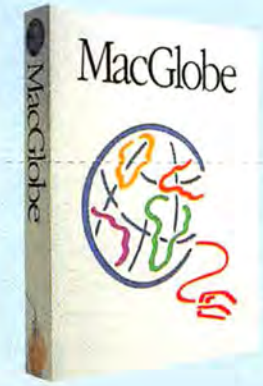
$95

Notify! 1.1

Recieve messages in your pocket while away from your desk, with Notify!, the revolutionary software extension for System 7. Notify! adds the power of remote wireless messaging to dozens of exsisting applications. Working in the background, it dials into any paging system to deliver full text messages to any pocket pager. Supports unlimited pagers, groups and services. Network version enables wireless messaging on all machines from a single server. Requires modem, pager and service. **Manufacturer: Ex Machina, Inc.**

Network Version **COM0112 $279.**
Personal Edition **COM0111**

$109



MacGlobe

MacGlobe, the extraordinary geography tool for the Macintosh, provides vibrant maps, extensive graphs and an annually updated database for 190 countries and dependencies all at your fingertips. It delivers a variety of maps, including each country's major cities, topography and major geographical features as well as regional maps. MacGlobe's maps and graphics can be exported as PICT files to other popular programs, making it the perfect tool for preparing reports, overheads and presentations. The database provides details about demographics, health statistics, major cities, and economics. Learn about populations, ethnic groups, birth and death rates, literacy rates, schools, medical facilities, and more. **Publisher: PC Globe GRA0245**

$45

NEW

ExpertColor Paint™

ExpertColor Paint is a simple to use yet powerful color paint program with many extras including 32-bit color, image editing and multiple undo's. By using a vast array of painting tools, you can create great looking art. You won't believe how easy the customizable tools make painting. There are multiple adjustable paint brushes, spray paint, paint cans and more to help create sophisticated art or touch up existing pictures. It's like having a fully equipped art studio at your disposal. Offers advanced image editing features like blur and sharpening filters and includes a free bonus clip art disk ($24.95 value). **Publisher: Softsync, Inc. GRA0318**

$29

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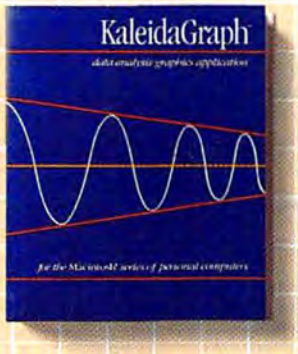
MacPrint 1.3

Use a Macintosh with non-Apple printers. Print Mac applications on HP Laserjet, Deskjet or compatible printers including all Series IIs, IIIs and the Deskjet 500. Prints text and graphics at the printer's maximum resolution. Does not require PostScript. Cable is included. **Publisher: Insight Development UTI0098**

$95



KaleidaGraph 2.1

KaleidaGraph is the easy way to analyze and present complex data. It simplifies the process of analyzing and presenting statistical information. Provides 16 different graph structures, including scatter, histogram, probability plot, polar, as well as more common types, such as line, bar, pie. You can crunch large amounts of data (up to 32,000 points per column), and plot up to 20 variables at once. Supports both the LaserWriter and the ImageWriter (and color on the ImageWriter II). Requires: Mac Plus or higher. **Publisher: Synergy Software STA0018**

$149

Active Memory 2.0

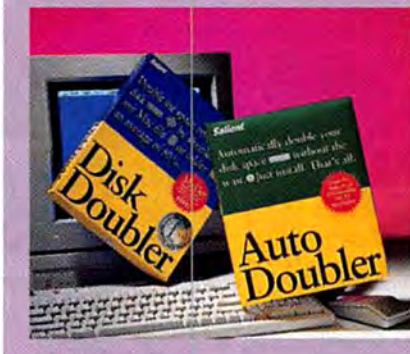
Turn your PowerBook into a power organizer with Active Memory! When traveling, manage info like sales leads, field results or travel expenses. Enter data your way in a free-form Info field. Once back at headquarters, remind networked co-workers about upcoming deadlines. Import contact lists and setup reminders to call them. For daytimers, use Active Memory to print your things-to-do list or travel itinerary. Make it easier to manage your data in the office or on the road. **Publisher: ASD Software BUS0207**

$125

Virtus WalkThrough 1.1

The latest version of this award winning program provides everything you need to quickly capture and explore your ideas in 3-D. Virtus WalkThrough's intuitive interface and complete set of drawing and presentation tools make it ideally suited for designers of all types. Version 1.1 includes: real-time 3-D presentations, QuickTime® and PICS animated movies, perspective pictures, enhanced data exchange capabilities for 2D DXF, 3D DXF, PICT, EPS, Claris®CAD and MacDraw. Winner of MacUser's Breakthrough Product of the Year Award 1990. **Publisher: Virtus Corporation GRA0278**

$249



AutoDoubler

AutoDoubler is the easiest way to increase your hard disk capacity. It works in the background to automatically keep your hard disk compressed. It's lightning quick and completely transparent, so it won't interrupt your work. In fact, AutoDoubler's new patent-pending technique lets your Macintosh use files and applications while they are still compressed! It's 100% compatible with all applications, desk accessories, and system extensions. **UTI0254 $49.**

DiskDoubler 3.7

DiskDoubler gives you total control of file compression-archiving for modem transfer, compressed backups, self-expanding files, and fast copying of files. AutoDoubler and DiskDoubler combined give you the ultimate in speed, convenience, and control. System 7 Savvy! **Publisher: Salient UTI0179**

$49

Fair Witness

1991 MacUser Editors' Choice Award for Best Organizational Tool! This *information* spreadsheet is a powerful new way to organize your work. Fair Witness lets you to create an outline, add columns for text, numbers, dates, pictures, sound, and much more. A click of the mouse allows you to include formulas for the numbers, show the dates on a time charts, add checkmarks and other stylizing. Prioritize, sort, and search using any column to see just the information you need to see. Save views for instant access to specific information. Fair Witness is said to be one of the best programs used for planning. **Publisher: Chena Software, Inc. BUS0208**

$315

Design Your Own Home:

Design Your Own Home: Architecture, Interiors, or Landscape. Create floor plans and building plans with structural details. Do individual room plans and kitchen/bath design. Then complete your dream house with graphic landscape plans. Interiors and Landscape programs generate 4 side views from top-view perspective. Sample plans included. **Publisher: Abracadata**

$65ea.

Accountant, Inc. 3.0

"BEST ACCOUNTING PACKAGE" 1991 MacUser's Editors' Choice Award. More Features, more power, more flexibility. It's easy to use and gives you exceptional streamlining power. You only have to enter information once. Every transaction is automatically posted to your General Ledger. Accountant, Inc.'s new revolutionary System 7 design gives you the advantage of customizing your forms, screens and reports by hot linking with your favorite forms design, spreadsheet and database programs. You get Invoicing, Accounts Receivable, Inventory, Accounts payable, Check Writing, integrated General Ledger and Payroll. Accountant, Inc. is now available in single and multiuser versions. **Publisher: Softsync, Inc. FIN0048**

$335

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I/O Design, Inc.
ACC0440 Ultimate Classic/SE Ext. Carrying Case 79
ACC0528 Ultimate Classic SE Carrying Case 65
ACC0665 PowerBook Carrying Case 75
LB Innovators
BND0033 WristSaver/MousePad Bundle-Red 25
Targus, Ltd.
ACC0252 MacPlus/SE Carry Case (black) 59
ACC0250 MacPlus/SE-Ext Keyboard Carry Case 75
ACC0675 Universal Notebook Case 69

BUSINESS & PRESENTATION

ASD
❶BUS0207 Active Memory 2.0 125
After Hours Software
❶DAT0076 TouchBASE 2.0 79
A Lasting Impression
❶ResumExpert! Word 30/4.0 version, Cover Letters, Manager, Sales & Marketing, Students, Computer Science & Engineering, Financing & Banking ..... 49 ea
Aldus
❶BUS0066 Persuasion 2.1 325
Attain
❶BUS0211 IN CONTROL 1.0 95
CE Software
❶GRA0070 CalendarMaker 3.0 31
Chena Software
❶BUS0208 Fair Witness 1.1 315
ChipSoft
❶FIN0132 MacInTax '91 58
❶FIN0135 MacInTax CT State Supplements'91 42
Claris
❶BUS0201 ClarisWorks 149
❶DAT0064 FileMaker Pro 205
❶UPG0005 FileMaker Pro Upgrade 99
❶BUS0058 MacProject II 2.5 345
❶BUS0178 Resolve 175
❶BUS0065 SmartForm Designer 289
JAM Software
❶DAC0033 Smart Alarms 3.1(1-4 users) 125
❶DAC0034 Smart Alarms 3.1-(5-8 users) 189
Lotus Development Corporation
❶BUS0188 Lotus 1-2-3 for Macintosh 349
Meca
❶FIN0039 A. Tobias' Managing Your Money 4.0 99
Microsoft
❶BUS0167 Microsoft Excel 3.0 295
❶UPG0002 Microsoft Excel 3.0 Upgrade 119
❶BUS0008 Microsoft PowerPoint 2.01 245
❶BUS0181 Microsoft Project 1.1 445
❶BUS0186 Microsoft Schedule+ 5 Pack 125
❶BUS0014 Microsoft Works 2.0 155
❶BUS0068 The Microsoft Office 2.0 475
Now Software
❶BUS0212 Now Up to Date-single 65
❶BUS0213 Now Up to Date-5 user 269
Pastel Development
❶BUS0199 DayMaker 65
Power Up
❶BUS0153 Address Book Plus 2.0 63
❶BUS0073 Calendar Creator 44
Reality Technologies
❶FIN0068 WealthBuilder (Mac) 95
Round Lake Publishing
❶BOK0026 Legal LetterWorks 45
❶BOK0007 LetterWorks 45
❶BOK0016 Sales LetterWorks 45
Softsync Publishing
❶FIN0048 Accountant, Inc. 3.0 335
Symantec Corporation
❶BUS0217 GreatWorks 2.0 199
❶BUS0055 More 3.1 265
Synergy
❶STA0018 Kaleidagraph 2.1 149
Teleware, Inc.
❶FIN0087 M.Y.O.B. 3.0 139
Timeslips
❶BUS0043 Timeslips III 2.1 195
T/Maker
❶BUS0193 The PowerBundle 159
Visionary Software
❶BUS0190 First Things First 2.0 45
Wyoming Software
❶FIN0013 Business Sense 1.5 129

COMMUNICATIONS & NETWORKING

Argosy
❶COM0098 RunPC/Network 279
❶COM0103 RunPC/Remote 139
CE Software
❶COM0101 QuickMail 2.5 (1-5 users) 249
❶COM0100 QuickMail 2.5 (1 - 10 users) 375
Dayna
❶NET0125 DaynaPORT E/Z 275
❶NET0076 DaynaPORT E/SE 179
Ex Machina
❶COM0111Notify! 1.1 Personal Edition 109
❶Farallon™ Computing
NET0210 PhoneNET EtherMac II/10T cardMacII 165
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NET0007 PhoneNET® Plus, SE & II 31
NET0019 PhoneNET StarController® 879
NET0122 Timbuktu® 4.0 129
NET0034 Timbuktu/Remote® 3.0 129
FreeSoft
❶COM0060 White Knight V.11 85
Insignia
❶COM0107 Soft PC Universal 2.5 195
Hayes
❶COM0095HayesConnect 3.0 89
❶COM0015Smartcom II 3.3 84
Microcom
❶NET0131 Carbon Copy Mac 2.0-Single 59
Pacer Software
❶NET0167 PacerForum-5 Client 349
❶COM0106PacerTerm 159
Sitka
❶NET0049 MacTOPS 3.1 187
Synergy
❶COM0003VersaTerm Pro 3.6 177
❶COM0002VersaTerm 4.6 90
TechWorks
❶NET0133 GraceLAN 2.0 50-user 289

DESKTOP PUBLISHING

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❶DTP0072 PageMaker 4.2 495
❶UPG0003 PageMaker 4.2 Upgrade 150
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❶DRI0440 Spectrum/8si 539
❶DRI0442 Spectrum/8 SeriesIII 539

EDUCATIONAL & ENTERTAINMENT

AmazeInc
❶ENT0400 The Far Side Computer Calendar 45
Artworx
❶ENT0303 Bridge 6.0 29
❶ENT0417 Kaleidokubes 19
Baseline
❶ENT0403 Talking Moose/Cartoon Carnival 4.0 23
Broderbund
❶GRA0268 Kid Pix 1.2 35
Where is Carmen Sandiego? ..... ea 29
❶ENT0284 SimCity 29
EDU0291 The Playroom-Color 29
Centron Software, Inc.
❶ENT0329 BlackJack Strategy Tester/ BlackJack Ace 65
❶ENT0384 Canis 27
❶ENT0277 Casino Master Standard Version 40
❶ENT0289 Casino Master Deluxe Color Version 45
❶ENT0383 PuzzleMaster 29
MECC
❶ENT0381 The Oregon Trail 29
❶EDU0190 Number Munchers 29
❶EDU0191 Word Munchers 29
Nordic Software
❶EDU0276 Word Search Deluxe 35
❶EDU0142 Preschool Pack 35
Penton Overseas (Full line available)
❶Picture It! Level I Spanish, German, French, Italian ... ea 42
❶VocabuLearn/ca Level I, II or III: French,German, Hebrew, Italian, Japanese, Russian or Spanish ..... ea. 35
Personal Training Systems
❶Macintosh, HyperCard, FileMaker Pro, Microsoft Excel, Microsoft Word, Aldus PageMaker 4.0, Aldus FreeHand, Aldus Persuasion, Quark XPress 3.0 ..... ea. 59
❶EDU0277 Converting to System 7-part 1 59
❶EDU0278 Converting to System 7-part 2 59
Sir Tech Software, Inc.
ENT0346 Bane of the Cosmic Forge 35
Sound Source
❶Star Trek Vol. 1 or II SPECIAL ..... ea. 29
Velocity
❶ENT0409 Spectre-Battle Action (Single) 37
Zondervan Publishing House
❶BOK0022 MacBible-Greek 79
❶BOK0021 MacBible - King James Version 79
❶BOK0033 MacBible NRS w/Apocrypha 79
❶BOK0020 MacBible - New International Version 79

FONTS & APPLICATIONS

Adobe Systems, Inc.
❶DAC0026 Adobe TypeAlign 62
❶FON0264 Adobe Type Manager 2.03 59
❶FON0351 Adobe Type On Call 59
❶FON0295 Adobe Type Reunion 41
Altsys
❶FON0014 Fontographer 3.4 265
❶FON0284 Metamorphosis Pro 2.03 89
Ares
❶FON0361 FontMonger 62
Broderbund
❶FON0439 TypeStyler 2.0 w/ATM 127

GRAPHICS & MULTIMEDIA

Abracadata
CAD0032 Design Your Own Home-Architecture 65
CAD0033 Design Your Own Home-Interiors 65
CAD0034 Design Your Own Home-Landscapes 65
Adobe Systems, Inc.
❶GRA0304 Adobe Premiere 305
❶DTP0054 Illustrator 3.2 (w/ ATM 2.0) 369
❶GRA0125 Streamline 2.0 122
❶GRA0191 PhotoShop 2.0 549
Aldus
❶GRA0092 Digital Darkroom 2.0 259
❶GRA0305 FreeHand 3.1 395
❶GRA0279 Gallery Effects Vol. I 129
❶GRA0131 Super 3D 2.5 325
❶HYP0027 SuperCard 1.6 195
❶GRA0112 SuperPaint 3.0 133
Claris
❶CAD0029 ClarisCAD 2.0 625
❶GRA0271 MacDraw Pro 275
❶UPG0004 MacDraw Pro Upgrade 99
❶GRA0117 MacPaint 2.0 89
Deneba
❶GRA0280 Canvas 3.0 249
Dream Maker
❶GRA0105 Cliptures Vol. 1 Business Images 69
Graphsoft
❶CAD0024 Blueprint 2.1 219
Innovative Data Design
❶CAD0039 MacDraft 2.1 279
PC Globe
❶GRA0245 MacGlobe 45
Metro Image Base (Full line available)
❶GRA0277 Metro-ImageBasics 35
Pixar
❶GRA0288 MacRenderMan & Showplace Bundle 619
Praxitel
❶UTI0211 Read My Lips 75
Ray Dream
❶GRA0292 Ray Dream Designer 2.0 589
Softsync
❶GRA0318 ExpertColor Paint 29
Virtus
❶GRA0278 Virtus WalkThrough 249

PERIPHERALS

Caere
❶INP0205 Typist Plus Graphics 475
Microtek
❶INP0180 Microtek ScanMaker 600ZS 1449
Sharp
COMP023 Wizard Oz 8200 (128KRam) 399
SuperMac
MON0224 20" SuperMatch Color Display 1799
ThunderWare
INP0116 LightningScan 400 369
INP0189 LightningScan Pro 256 499

INPUT & OUTPUT

Articulate Systems
❶INP0100 Voice Navigator II 599
❶INP0205 Voice Impact Pro 199
❶INP0207 Voice Impact 79
❶INP0208 Voice Record 2.1 59
Canon
❶INP0184 Still Video Camera Computer Imaging Kit Color 899
❶INP0186 Still Video Black Standalone Camera 499
CoStar
❶INP0196 AddressWriter Envelope Printer 479
❶INP0194 Stringray 89
Kensington
INP0060 Turbo Mouse ADB (SE or II) 109
Key Tronic
❶INP0156 MacPro Plus 145
Microtouch
❶INP0084 The UnMouse 159
Mouse Systems
❶INP0132 Little Mouse ADB 74
❶INP0163 A3 Mouse 85
❶INP0199 A3 Trackball 75
Sophisticated Circuits
ACC0535 Power Key w/Quickeys Lite 2.0 75
Wacom
❶INP0179 Digitizing Tablet 6" x 9" 589

UPGRADES & ACCELERATORS

DayStar Digital
❶PowerCache 33 MHz 749
❶PowerCache 33 MHz w/882 979
❶PowerCache 40 MHz 949
❶PowerCache 40 MHz w/882 1199
❶PowerCache 50 MHz 1459
❶PowerCache 50 MHz w/882 1799
❶DRI0224 FastCache IIci 269
❶DRI0421 FastCache IIsi 299
❶DRI0500 FastCache 040 for Quadra 700/900 379

MODEMS & FAX

Dove
❶MOD0053 Dove Fax Plus w/ VOICE Mail 389
Hayes
❶MOD0065 Bundle 9600 ULTRA SmartModem 749
PowerUser™
❶MOD0062 24/96 Mini Send/ Receive Fax Modem 199
❶MOD0043 2400 Mini Modem 99
❶MOD0047 Mini Send Fax 2400/9600 149
❶MOD0071 9600 bps/ V.32&V.42bis Modem 399
❶MOD0070 2400 bps/V.42bis Mini Modem 149
Prometheus
❶MOD0084 Home Office 269
❶MOD0085 Ultimate Home Office 499

UTILITIES & PROGRAMMING

Abbott Systems, Inc.
❶UTI0236 Calc+ 39
❶UTI0113 CanOpener 2 59
Altsys
UTI0224 EPS Exchange 2.0 89
Alysis
❶UTI0232 SuperDisk! 2.0 49
ASD Software, Inc.
❶UTI0135 FileGuard 2.7 139
❶UTI0130 FileGuard 2.7 - Office Pack 5 479
❶UTI0264 WindoWatch 1.52-Single 89
Baseline Publishing
❶UTI0183 ScreenShot 1.2 34
Berkeley System Design
❶UTI0119 After Dark 2.0 29
❶UTI0231 More After Dark/ After Dark 2.0 Bundle 45
CE Software
❶UTI0188 Quickeys 2 v2.1 94
Dantz
❶UTI0227 Retrospect 1.3 147
Insight Developement
❶UTI0098 MacPrint 1.3 95
Kensington
PassProof ..... ea 65
Kent Marsh
❶UTI0262 NightWatch II 95
Microcom
❶UTI0191 911 Utilities 89
❶UTI0093 Virex 3.5 59
Now Software
❶UTI0167 Now Utilities 3.0 85
Salient
❶AutoDoubler or DiskDoubler 3.7 ..... 49. ea
Symantec Corporation
❶UTI0151 Norton Utilities for the Mac 1.1 85
❶UTI0214 Symantec Antivirus for Mac 3.0 (SAM) 65
❶UTI0241 Symantec Utilities for Mac 2.1 (SUM) 99
❶LNG0051 THINK C 5.0 199

WORD PROCESSING

Caere
❶UTI0237 OmniPage 3.0 475
❶UTI0202 OmniPage Professional 669
Calera
❶UTI0215 WordScan 249
❶UTI0216 WordScan Plus 699
Claris
❶WRD0026 MacWrite II 1.1 89
Microsoft
❶WRD0050Word 5.0 295
❶UPG0001 Word 5.0 Upgrade 125
Sensible Software
SPL0018 Sensible Grammar 2.0 55
T/Maker Co.
❶WRD0051WriteNow 3.0 159
❶WRD0036WriteNow 3.0 (3-Pack) 359
❶WRD0037WriteNow 3.0 (5-Pack) 569
❶UPG0007 WriteNow 3.0 Upgrade 49
WordPerfect
❶WRD0041WordPerfect 2.1 295
❶UPG0006 WordPerfect 2.1 Upgrade 99
Writing Tools Group
❶SPL0028 Correct Grammar 3.0 49
❶SPL0030 American Heritage Electronic Dictionary 55

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New Products

The Latest Macintosh Releases

EDITED BY EVAN COOPER

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

Accel-a-Writer Upgrades

A family of PostScript-compatible upgrade controllers that let users allocate memory to increase printer resolution, increase processing speed, and allow more virtual memory to download fonts. Available in three versions: Accel-a-Writer V upgrades the HP LaserJet series IIP, Accel-a-Writer VI is for the series III printers, and Accel-a-Writer VII upgrades the series IIIP. 300-dpi controllers $1295; 600-dpi controllers $1695. Xante Corp., 205/990-8189; fax 205/476-8189.

BlackFoot

JPEG-compliant image-compression accelerator, with a pixel throughput that the company claims exceeds 1MB per second. The board's compression and decompression algorithms are implemented through an on-board digital signal processor. Comes with a compression application and Adobe Photoshop plug-ins. Supports input of virtual images, interpolated zooms, rapid compression preview, thumbnails, and the JFIF file format; also can export images to the Clipboard. $495. Arroyo Technologies, 510/795-1623; fax 510/795-1623.

C2FP

A math coprocessor board for the Classic II that plugs into the ROM/FPU slot on the main logic board. User has a choice of standard Motorola math coprocessors—either the 68881 or 68882 at clock speeds of 16MHz, 20MHz, or 25MHz—and the chip is socketed so that it can be upgraded later. Includes a one-year warranty. $79 to $200, depending on FPU chosen. StarTech, 619/457-0781; fax 619/457-1099.

DiamondDrive Portables

Line of 1- and 2-inch portable, high-capacity hard drives that are powered through the Mac's floppy disk port using an included cable; drives all weigh under 3 pounds. The company's literature states that the drives have average access times of 12ms to 17ms and data-transfer rates of up to 6MB per second. The 2-inch drives have capacities of 80MB, 120MB, 210MB, 320MB, and 510MB, and the 1-inch drives come in 80MB and 120MB sizes. 80P $649; 120P $879; 210P $1499; 320P $2299; 510P $3199. Mass Microsystems, 408/522-1200; fax 408/733-5499.

DoveFax LAN

Fax modem for use over a network; includes software support for ten users. The fax modem transmits at 9600 bps, and the data modem, at 2400 bps. Users can schedule faxes to be sent at any time of day, make custom cover pages, send faxes to groups of fax numbers, and save phone books and groups. The fax modem does not require a dedicated server. External version $749; NuBus version $799; support for one additional user $39, five users $149, ten users $249. Dove Computer Corp., 919/762-7600; fax 919/251-9441.

F-920A

A pencil and pen plotter with an automatic feed for 260 pencil leads and an 8-pen carousel for producing archival ink plots. The plotter uses two 68000 microprocessors, a 1MB buffer, and a digital servo drive to speed plotting; the company claims that the plotter has a maximum speed of 44.53 inches per second. The addressable resolution is 0.0039 inches. $8900. Mutoh America, 708/952-8880; fax 708/952-8808.

FastMath Classic II

A math coprocessor board for the Classic II that adds a 16MHz 68882 FPU to the Mac

FastMath Classic II

Classic II. The board fits into the expansion slot on the Classic II and comes with a tool kit and instructions on how to install it. Product meets Apple's requirements for size and power consumption. $199. Applied Engineering, 214/241-0055, 800/554-6227; fax 214/484-1365.

HitchHiker Hard Drives

A line of 2.5-inch pocket-size hard drives that come in 40MB or 80MB capacities and weigh less than 10 ounces. Units connect through the Mac's SCSI port and draw power through a connection to an ADB port. Drives can be connected to a PowerBook using company's optional HDI adapter

HitchHiker Hard Drives

cable. Company says average access times are 25ms and 16ms for the 40MB and 80MB drives, respectively, and data-transfer rates are 1.25MB per second and 1.5MB per second. 40MB $749; 80MB $999. Mass Microsystems, 408/522-1200; fax 408/733-5499.

HP DAT

DAT drive with capacity of up to 2GB when using a 90m tape. Ships with ten-user version of Retrospect Remote from Dantz Development for unattended and automatic backup, archiving, and restoring over a network. Company claims that the 3½-inch drive can store 300MB of data in 30 minutes. $3295. Hewlett-Packard, 415/857-1501, 800/752-0900; fax 208/344-4809.

HP LaserJet IIISi

EtherTalk-compatible, 17-ppm PostScript laser printer with 5MB of RAM and 35 internal Adobe typefaces. A RISC-based formatter enables the printer to scale type and produce graphics and text mixed on a single page while maintaining the printer's rated engine speed. The product comes with two 500-sheet, letter-size paper input trays. $6995. Hewlett-Packard, 415/857-1501, 800/752-0900; fax 208/344-4809.

JukeStor10

A desktop optical jukebox drive that holds up to 10 optical cartridges, for a capacity of up to 6.5GB. Uses a SCSI-2 interface for direct connection to Macs, DOS-based PCs, and Sun and DEC computer systems. Robotics inside the unit take care of inserting and extracting cartridges, and users can insert a single cartridge directly through a separate slot. The company says that the drive has a data-transfer rate of 7Mbit per second and a burst transfer rate of 1.2MB per second. $14,995. Unbound, 714/843-1895, 800/862-6863; fax 714/843-0627.

M21PMAX

Monochrome portrait display with brightness level of 65 nominal foot-lamberts designed for use in medical applications, desktop publishing, and industrial imaging. Resolutions range from 768 by 1024 pixels to 1280 by 1664 pixels, and scan frequencies adjust automatically, ranging from 48kHz to 108kHz horizontally and 60kHz to 80kHz vertically. $2500. Image Systems, 612/935-1171; fax 612/935-1386.

M21PMAX

MacFG 8X and MacFG 24X

QuickDraw-accelerated 8-bit and 24-bit display boards for use with Multi-Synch FG monitors. User can change the screen dpi on the fly without restarting, through a cdev. The AccuColor color-control system lets user adjust on-screen colors to match the colors from any output device. 8X $899; 24X $1899. NEC, 708/860-9500, 800/388-8888; fax 800/366-0476.

MacinStor Tape 2000

A small-footprint, 2GB DAT drive that ships with Retrospect Remote for unattended backup over a network. Also comes with one 2GB, 90-minute tape cartridge. Drive is available as an internal unit for the Quadra 900 or as an external drive for the rest of the Macintosh family. $2999. Storage Dimensions, 408/954-0710; fax 408/954-0517.

Massfm 24/96

External 2400-bps data and 9600-bps fax modem that supports the AT command set and the Group 3 fax standard. Unit is powered through the Mac's serial port and has a sleep feature that lowers the modem's power consumption when it is not receiving any data. The included software lets the user send a short fax note from within another application, rotate text, and substitute fonts. $299. Mass Microsystems, 408/522-1200; fax 408/733-5499.

MEOD128

Erasable optical 3½-inch drive that supports the ISA/ANSI standard, allowing cartridge interchange between compatible mechanisms. Offers external SCSI termination and ID-selection switch, and plugs directly into a Procom Enabler SCSI host adapter on an IBM PS/2, *continues*

XT, or AT system without modification. Company claims that drive has an average access time of 40ms and a sustained data-transfer rate of 500Kbps. $1995. Procom, 714/549-9449; fax 714/549-0527.

Montage FR2
A digital, 36-bit color film recorder for use with Macs or DOS-based PCs. Company says product can record 30 slides in less than an hour. Device uses SpeedBuffer, a 2MB video RAM buffer that allows the recorder to regulate the rate at which data is received from the CPU. Transparencies can also be created using an optional Montage TC1 color transparency camera kit. $6995. Presentation Technologies, 408/730-3700, 800/782-2543; fax 408/749-0746.

Power-Page
A portrait monochrome display with built-in video board for use through SCSI port on PowerBooks without any modifications to computer. Granite-colored to match PowerBooks, the 15-inch monitor has multiple resolutions of 72, 80, and 88 dpi, and a 97Hz refresh rate at 72 dpi. Hardware panning provides a two-page virtual display; complies with Swedish MPR II guidelines for ELF and VLF emissions. $1095. Sigma Designs, 510/770-0100, 800/845-8086; fax 510/770-2640.

ProPort Model 656
Digital audio interface that connects to the serial port and provides 2 channels of 20-bit, 8X oversampling digital-to-analog conversion. The sample rate is selectable from 5kHz to 96kHz, and the device's tracking input filters prevent aliasing. The product offers surge protection, continuous gain controls, and balanced microphones; it also has line-level inputs and peak reading-level indicators. $1595. Ariel Corp., 908/249-2900; fax 908/249-2123.

ProPort Model 656

RealTech Travler 880
Notebook computer system based on a 25MHz Motorola 68030E processor, with 8MB of RAM, an 80MB hard drive, one SCSI port, two serial ports, and an ADB port. The computer can be connected to a Macintosh through the SCSI port, allowing the notebook's hard drive and any inserted floppy disk to be accessed from the Mac's desktop. The unit weighs 6¼ pounds, and it runs on a lead-acid camcorder-type battery. 8/80 configuration $3495; 14/80 configuration $3995. Micro Business Solutions, 409/539-3959, 800/972-3018; fax 409/539-4141.

Rocket 25i
An accelerator based on the Motorola 68LC040 processor that performs like the Radius Rocket but does not include an FPU. Company claims the board can process 20 MIPS. Includes Radius RocketWare 1.3 software, allowing the board to operate as a second CPU. $1499. Radius, 408/434-1010; fax 408/434-0770.

Silentwriter 95
A PostScript Level 2 laser printer that prints 6 ppm at 300 by 300 dpi and provides HP PCL V emulation. Comes with 2MB of RAM (expandable to 5MB) and has an envelope feeder and a 250-sheet paper cassette. Provides standard parallel, RS-232 serial, and AppleTalk/RS-422 interfaces and automatic emulation switching, which detects PostScript files from Macs and PCL files from PCs and then configures the printer accordingly. $1749. NEC Technologies, 508/264-8000, 800/366-3632; fax 800/366-0476; faxes from Canada 708/860-9500 ext. 2621.

SpectraPoint
A desktop flatbed color scanner, with a resolution of 400 by 800 dpi; uses hardware-based color matching and image compression. The built-in JPEG-compatible image-compression and-decompression software can be enhanced with an optional NuBus accelerator board. The product ships with Adobe Photoshop,

SpectraPoint

and the company provides plug-in modules for compression, decompression, and direct scanner access from within Adobe Photoshop. Under $2300. Seiko Instruments USA, 408/922-5950; fax 408/922-5840.

SOFTWARE

Ascend
Personal information management system that creates a prioritized daily task list, tracks and schedules appointments, stores and dials phone numbers, and prints information in a variety of forms designed to fit in the company's line of organizers. Calendars and other data can be shared across a network, and a journal lets users list and track important events. The program can display data in day, week, or month views; also displays the user's choice of quotes from a customizable list. 1MB min. memory. $299. Newquest Technologies, 801/476-9269; fax 801/476-9267.

Ascend

Beyond Cyberpunk
A comprehensive HyperCard stack guide to cyberpunk science fiction and the cyberculture that it has inspired. The interactive database of information, essays, and resources covers books, movies, comics, magazines, art, and culture, including pieces on postmodern San Francisco and do-it-yourself publishing. A 58-word, linked glossary stores a digitized pronunciation of each entry. 1.5MB min. memory. $29.95. The Computer Lab, 703/527-6032; fax 703/527-6207.

Creepy Castle
An action-and-adventure, arcade-style game based on characters and scenarios from horror movies from the 1930s and '40s, with four levels of difficulty and four different scenarios. Players must battle werewolves, bats, rats, disembodied hands, vultures, and other creatures in a quest to rescue a woman held captive in the castle. Program features original music, digitized sound effects, and 3-D graphics and animation. 1MB min. memory. $49.95. Reactor, 312/573-0800; fax 312/573-0891.

Creepy Castle

FastComm
Communications package that supports modem speeds up to 57,600 bps and contains a memo editor, a floating tool bar, and an address book; supports Xmodem and text-file transfers. Also features an in-box and an out-box for use with electronic-mail services. 512K min. memory. $79.95. Vertical Solutions, 503/524-7402, 800/942-4008; fax 503/524-4100.

Lasso
Program for capturing QuickDraw objects directly from a screen and then editing them with popular draw programs. Captured images are fully scalable, and text is output as PostScript or TrueType fonts, rather than as bitmapped images, making for reduced file sizes and print times. Program includes tools for quickly selecting full screens, menus, windows, and other areas of the screen. 1MB min. memory. $129.95. Reata Software, 813/526-1229; fax 813/521-1715.

MacFolia
Interactive tree-leaf analysis program that calculates blade length, petiole length, and various widths, and that can zoom in and out or enhance an image's contrast to aid in measuring the length of leaf teeth. Data can be output in ASCII format; product requires an optical scanner to create leaf images. 2MB min. memory. $5000 to $7000. Régent Instruments, 418/849-0244; fax 418/849-0244.

MacFolia

MovieWorks
Software package with four applications—a text editor, a sound mixer, a paint application, and a composer—used to create stand-alone interactive presentations or QuickTime movies. The applications are interlinked using System 7's IAC technology. The composer application is used to tie all the elements together, and can generate complex path segments, resize and rotate objects over time, vary the speed of objects, and incorporate special effects and transitions. 4MB min. memory. $195. Interactive Solutions, 408/986-8228; fax 408/986-8659.

MovieWorks

MSI Access
A development tool for creating multiuser applications in HyperCard, 4th Dimension, Pascal, or C. Provides client-server access to 4th Dimension databases and allows applications created in other development environments to access 4th Dimension data. Supports up to 100 users simultaneously, can be used with AppleTalk Remote Access, and allows client applications to connect to multiple servers at the same time. 1MB min. memory. $495 per server; development version $95. Metropolis Software, 415/322-2001; fax 415/327-5579.

Muse
A programmable database tool that imports data in a variety of forms, including text files. Information is organized into DataBooks that are joined to each other so that many files can be referenced at once. Queries are recorded in scripts that can be saved and attached to DataBooks for one-step access to data. The program also can display data in 2-D, 3-D, or animated graphs. 5MB min. memory. $695. Occam Research Corp., 617/923-3545; fax 617/926-3262.

Nisus Compact
A compact version of Nisus, designed for PowerBook users. Minimizes disk access, thereby saving power consumption, and displays the state of the PowerBook's battery. All files created in Nisus Compact are compatible with Nisus, and the program contains organization and search tools for easy file management. It also features unlimited undos, support for pasting graphics into documents, and automatic saving. 1MB min. memory. $150. Paragon Concepts, 619/481-1477, 800/922-2993; fax 619/481-6154.

PACo Producer
A compression and playback system for presenting digital videos, animations, images, and sounds on all Macs, PCs running Windows 3.0, and SPARCstations. The program compresses and plays any PICS, PICT, QuickTime-movie, or 8-bit–audio file; has sound synchronization capabilities; and includes an XCMD for including PACo files in HyperCard stacks and MacroMind Director presentations. Player programs for platforms other than the Mac must be purchased separately and are required to play files in these environments. 1MB min. memory. $199. CoSA, 401/831-2672; fax 401/274-7517.

PACo Producer

Picture It Series One
Program that teaches vocabulary, spelling, and pronunciation for Spanish, French, German, or Italian; lists more than 500

words with a corresponding picture and plays both a foreign and an English pronunciation. The language in which the button labels and the descriptive text are displayed can be set to either English or the foreign language, and an editing module allows users to add their own pictures, definitions, pronunciations, and words. 1MB min. memory. $69.95. Penton Overseas, 619/431-0060, 800/872-8823; fax 619/431-8110.

Plots Unlimited
A program that helps fiction writers generate story plots using a database containing more than 200,000 story suggestions. The user creates a story or plot outline in the form of a standard text file by using ideas in the database; program's notepad word processor allows the user to append random notes or thoughts to a story in progress. 1MB min. memory. $399. Ashley-wilde Publishers, 310/456-1277, 800/833-7568; fax 310/456-8586.

Power Utilities
A package that includes the following seven utilities: DiskExpress II 2.11, a disk optimizer; MasterJuggler 1.57, a font-suitcase and applications manager; MultiDisk 1.27, a disk partitioner; MenuExtend 1.0, an Apple-menu enhancer; DiskCheck 1.07, a utility that diagnoses disks and directories; ScreenEclipse 1.0, a screen saver; and DiskFlash 1.0, a disk-activity indicator. 1MB min. memory. $129. ALSoft, 713/353-4090, 800/257-6381; fax 713/353-9868.

Shipping Handler
Shipping-manifest system that can be used as a stand-alone system or integrated directly into an accounting package. Company will customize application to link to user's accounting package at no additional charge. The application allows the user to trace any logged shipment; automates COD tag printing; and computes package weight, proper shipping zone, and shipping charges. Hardware that comes with the package includes a COD label printer, a manifest printer, and a scale that is connected directly to the Macintosh. It also prints UPS manifests and summaries, which eliminates the need for a handwritten UPS logbook. 512K min. memory. $4995. CEI, 612/425-1167, 800/333-5234; fax 612/424-9528.

Silver Cloud
An enhanced version of the Macintosh Chooser that allows users to organize zones hierarchically, to click and drag device icons to place aliases of frequently used devices into local zones, and to manipulate zones in a Finder-like environment. Program enables an administrator to manage zone structures centrally and hide zones, services, and objects from certain users. 512K min. memory. 25-user pack $495; 50-user pack $895; 100-user pack $1595; 250-user pack $3095. AG Group, 510/937-7900; fax 510/937-2479.

Surpass
Multimedia business-presentation software with an integrated outline editor and slide sorter, text and drawing tools, special effects, and presentation templates. A Timeline window synchronizes custom slides, sound, video and animation, and allows the user to edit the duration and chronology of the presentation. QuickTime movies can be played from within presentations, and the package ships with a run-time version of the program that can be distributed for playback. 4MB min. memory. $395. Gold Disk, 416/602-4000; fax 416/602-4001.

Total Collections
HyperCard-based collections software that keeps track of debtor data, logs phone calls, generates a variety of reports, and produces various form letters. The letters, interface, and other parts of the program can be modified for a company's needs. 2MB min. memory. $1995. Capital Transactions, 315/348-8551.

Zephyr Palettes
Set of custom palettes that integrate seemlessly into Aldus PageMaker or FreeHand. Pop-up palettes organize fonts and families and allow the user to adjust leading, tracking, and pen widths, and change type styles, faces, and sizes on the fly. 512K min. memory. Each version $79.95. Zephyr Designs, 206/324-0292; fax 206/324-0995.

Zephyr Palettes

CD ROMS

Anatomist
Customizable human-anatomy reference source in HyperCard 2.1 format, geared toward allied health students in post-secondary schools and life-science students grades K to 12. Lets students explore the details of human anatomy through diagrams, illustrations, and accompanying text. The package is based on material from *The Anatomy Coloring Book*, by Wynn Kapit and Lawrence M. Elson (HarperCollins, 1977), and is designed to complement the lessons in the book. The application gives audible pronunciations of anatomical terms and contains windows where students can add notes to the existing diagrams. 2.5MB min. memory. $295. Folkstone Design, 604/886-4502; fax 604/886-4513.

Hawaii CD
Compilation of 168 images of Hawaiian residents, flora, fauna, and scenery scanned on a Nikon LS-3500 scanner as 24-bit color TIFF files and retouched in Adobe Photoshop. Packaged with sample version of Photoshop. $99.95. Pacific CD, 808/949-4594.

Proclaim
The first in a series of five CD ROMs containing video clip art for use with Apple's QuickTime tech-

continues

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MacWeek & MacUser's 1991 Utility Product of the Year!

What did it take to get the editors at *MacWeek* and *MacUser* to agree on the best Macintosh utility product?

Unprecedented performance, compatibility, and value. In this case, a collection of 10 utilities that does for System 7 what products like SUM and Norton do for hard disks — only more so. As *MacUser* put it, "Now Utilities will make your Macintosh faster, easier, and more fun to use." For example:

- ***StartUp Manager***™ provides complete extension management
- ***Super Boomerang***™ finds files and folders instantly
- ***WYSIWYG Menus***™ groups fonts in their own typefaces
- ***NowMenus***™ makes the Apple Menu hierarchical
- ***AlarmsClock***™ displays the time & reminders in the menubar
- ***NowSave***™ automatically saves files to prevent data loss
- ***Screen Locker***™ keeps confidential information confidential
- ***MultiMaster***™ launches applications and files
- ***Profiler***™ analyzes system configurations
- ***DeskPicture***™ puts color and B&W pictures on the Desktop

In fact, every utility in the collection is the best of its kind. All of the utilities in the collection are also designed, tested, and guaranteed to work together — and with anything else your customers may have...even System 6. No wonder *MacUser* gave it a perfect five mouse rating and called it "a must-have for experienced users and novices alike."

NowMenus saves you a lot of mousing around by creating submenus up to 5 levels deep for anything you put in your Apple Menu items folder — even aliases and other folders. It also pops up the menubar wherever you click your mouse

Super Boomerang lists your most frequently used files and folders in all Open and Save dialog boxes and in the Apple menu. It also lets you find files by name or content...even if they've been compressed (a file name search on a 100MB hard disk can take only 3 seconds — without requiring an index)

MacWeek & MacUser's 1992 Network Product of the Year?

What will it take to get the editors at *MacWeek* and *MacUser* to agree on the best Macintosh network product?

Perhaps Now Up-to-Date™: the only Macintosh application that keeps your appointments and your associates up-to-date — whether you're in the office, at home, or on the road.

Organize Your Appointments Now Up-to-Date can schedule a meeting to occur at 9:00AM on the first Tuesday of every month and have it automatically appear on your associates' calendars. Scheduled events can be private, shared, or restricted (i.e., only available to people with the correct password.)

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With all this attention from the press it's not surprising that Now Utilities is already one of the best-selling products on the Macintosh. Now Up-to-Date looks to be just as popular. Call Now at **1-800-237-3611** to learn more about both of these great products, and how they can help you get more out of your Macintosh.

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Now Software, Inc. 520 S.W. Harrison Street, Suite 435 Portland, Oregon 97201 Telephone: (503) 274-2800 Toll-Free: (800) 237-3611 Facsimile: (503) 274-0670

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nology. The product includes a color HyperCard stack that functions as a visual directory to the clips. The video content is designed for inclusion in business presentations. 4MB min. memory. $399. Compact Designs, 301/869-3919; fax 301/869-3919.

ACCESSORIES

Ergopads
Colored pads that stick onto the sides and top of a mouse, designed to cushion the hand during use. Pads come in a variety of colors, and there are separate designs for use with the Macintosh

Ergopads

Mouse, Microsoft Mouse, and Logitech Mouseman $9.95. Chappell Computer Systems, 415/969-7546, 800/374-6723; fax 415/969-7546.

Microview
A device, similar in design to a periscope, that fits on the front of a variety of monitors and, using a series of reflective surfaces, directs the screen image onto a viewing area that can be adjusted to several different positions so user can find a more comfortable viewing angle. Attaches to the monitor with Velcro strips, and is also designed to reduce monitor emissions and glare. $69.95. Argyle Design, 510/658-7577.

NoteBook Traveler
Black, Cordura nylon carrying cases for the PowerBooks with Velcro fasteners, a shoulder strap, and handles. The Compact model can hold a computer, papers, and floppy disks, while the Deluxe model can house the computer, extra batteries, a power adapter, a modem, and an external floppy drive. Compact model $79.95; Deluxe model $129.95. Kensington Microware, 415/572-2700, 800/535-4242; fax 415/572-9675.

NoteBook Traveler

Statx
Nonabrasive, antistatic spray cleaner designed for use on computers, monitors, copiers, fax machines, and many household appliances. Spray is citrus-scented and contains no CFCs. 3-ounce can $2.69; 6-ounce can $4.99. RTW International Corp., 708/520-0007; fax 708/520-1951.

VersaGrip
Fasteners that implement industrial-strength Velcro to secure computer equipment to a work surface to prevent damage during an earthquake. Each kit includes four fasteners that attach to the equipment and a work surface with adhesive. Equipment can be moved by undoing Velcro pads. $7.99 or $9.99, depending on size of fastener. Q-Safety, 818/449-1590; fax 818/449-6866.

VersaGrip

BOOKS & VIDEOS

1-2-3 for the Macintosh Made Easy
Introductory guide to using Lotus 1-2-3 on the Mac with step-by-step instructions on spreadsheet basics such as entering and editing data, defining calculations, and using @functions and other formula options. Also covers creating graphs, using the Backsolve, building macros, and sharing DOS files. Written by Mary Campbell. $19.95. Osborne/McGraw-Hill, 510/548-2805, 800/227-0900; fax 510/549-6603.

Dvorak's Inside Track to the Mac
Book and disk package with insights, tricks, and programs for the Macintosh; sections cover Macintosh components, System 7, multimedia, and desktop publishing, among other topics. Disk includes the best of the BMUG shareware library. Written by John C. Dvorak, Mimi Smith-Dvorak, Bernard J. David, and John A. Murphy. $39.95. Osborne/McGraw-Hill, 510/548-2805, 800/227-0900; fax 510/549-6603.

The Macworld Read Me First Book
A guide to hardware and software with evaluations and purchase recommendations for word processors, printers, monitors,

The Macworld Read Me First Book

utilities, and other products. Written by the editors of *Macworld* and edited by Jerry Borrell. $22.95. IDG Books Worldwide, 415/358-1250, 800/762-2974; fax 415/358-1260.

VideoPedia
Collection of broadcast-quality, indexed video clips on videotape for use in multimedia or QuickTime movies; subject matter ranges from nature and communication to technology and society. Purchase price includes licensing of production rights. VHS format $195; S-VHS, Hi8, and ¾-inch tape $295; Betacam $395. Film/Audio Services, 212/645-2112; fax 212/691-8347. **m**

To have your product considered for inclusion in *New Products*, send an announcement with product name, description, minimum memory, peripherals required, pricing, company name, and phone number to New Products Editor, *Macworld*, 501 Second St., San Francisco, CA 94107. *Macworld* reserves the right to edit all product announcements.

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QuickTime™

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A two-day celebration and tutorial on QuickTime for end users and developers.

Featuring Bruce Leak and the QuickTime team from Apple, plus speakers from Adobe, Authorware, CD Technology, Commotion, Compact Designs, Data Translation, Deneba, Digidesign, Digital F/X, DiVA, Interactive Solutions, Letraset, Light Source, MacroMind/Paracomp, Optical Media, Radius, RasterOps, Spectral Innovations, Storm Technology, SuperMac, Vividus, Voyager, Wings, and Word Perfect.

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For entry forms and additional information on how to submit your films, please contact the Events and Conferences Department.

Conference registration is $295 and includes all sessions, conference materials, and breaks. Checks should be made payable to Macworld Communications and sent to: Sandy Butler, Events Manager, Macworld Communications, 501 Second St., #500, San Francisco, CA 94107.

For additional information, contact the Events and Conferences Department: 415/267-1745; fax 415/442-0766.

Questions and Tips from Macworld Readers

BY LON POOLE

A TIP IN THE JANUARY ISSUE suggests organizing items in the Apple menu under System 7 using name prefixes and dummy items in the Apple Menu Items folder. Neil Irwin of Spartanburg, South Carolina, says these suggestions are great if you have a large screen. But limited by the 9-inch screen of a compact Mac, he finds it very irritating to have to scroll through dozens of items on the Apple menu. To streamline his Apple menu, Irwin puts items he rarely uses yet wants to have readily available (such as the Key Caps and Puzzle desk accessories) in a folder in the Apple Menu Items folder. If you want to spend some money, you can add submenus to the Apple menu with software such as HAM (Microseeds Publishing, 813/882-8635), Now Utilities 3.0 (Now Software, 503/274-2800), and BeHierarchic (available from user groups and online services).

About This Easter Egg

If you chose the first item from the Apple menu—About the Finder—while using the 1984 version of the Finder, you would get a dialog box with a picture of a mountain range instead of the memory usage chart you get with today's Finder. With System 7 you can return to those thrilling days of yesteryear and see author credits by pressing the option key while choosing that first menu item. (The option key changes the first item in the Finder 7 Apple menu from About This Macintosh to About the Finder.) Then wait about ten seconds, and the credits start scrolling across the bottom of the window. If you hold down ⌘-option while choosing About the Finder, the pointer becomes a wacky smiley face.

Drive Crazy

Q. Can I convert an 800K floppy disk drive to a 1.4MB SuperDrive? Also, I've read that CD ROM drives can play music CDs. Can an audio CD player be adapted for use as a CD ROM drive?

Anthony Santarosa
Niagara Falls, New York

A. The SuperDrive has been standard equipment on all Macintosh models except the Mac Plus for a long time. If you have an old Mac SE or a Mac II with an 800K internal floppy drive, an Apple dealer can install a $449 SuperDrive Upgrade Kit (part M6052 for an SE, part M6051 for a Mac II). The kit includes replacement ROM chips and a SuperDrive. Apple makes no upgrade kit for the Mac Plus.

Instead of upgrading your internal 800K drive, you can plug a Rapport adapter from Kennect Technology (800/552-1232 or 408/370-2866) into the floppy drive port of any Macintosh. The Rapport lists for $295 but is commonly discounted to about $190. It lets you use an external Apple SuperDrive (about $400) or Kennect's external Drive 2.4 (about $300) with a Mac Plus, SE, II, or older Mac model. On a Mac II, which has no external floppy drive port, you need Kennect's $69 adapter cable to attach the external Rapport to one of the two internal floppy drive connectors (eliminating one of the two internal floppy drives).

To my knowledge, no one makes a conversion kit that allows an 800K drive to read or write 1.4MB high-density disks. If the conversion were technically possible, it wouldn't be economically feasible. Likewise there's no inexpensive way to make an audio CD player into a CD ROM drive.

Air Raid

Q. I am talking to a friend in Baltimore over the phone and sort of aimlessly puttering around on the keyboard, when I start rapidly pressing the shift key. I hear this strange "air raid" sound coming from my speaker and then a single beep each time I press the shift key slowly. Also, little icons appear in the right corner of the menu bar. The funny thing is, my friend in Baltimore starts telling me about this strange thing he is observing on his Mac, namely the same sounds and icons I am experiencing. What is this, clairvoyance? We're both running System 7, he on a IIfx and I on an SE/30.

Noah Name
Fremont, California

Sharing files by phone, resolving extension (INIT) conflicts, squeezing and stretching type, and more

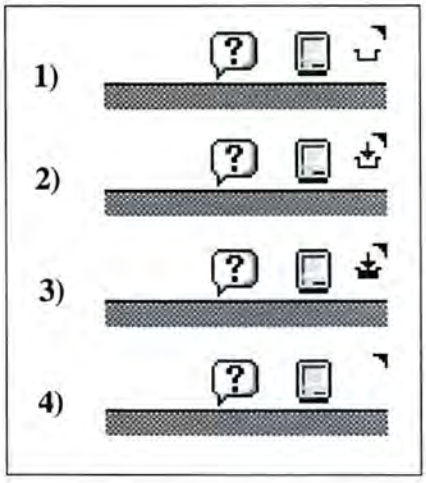
A. You stumbled onto Sticky Keys, which lets you type combination keystrokes such as ⌘-shift-3 one key at a time or lock down a modifier key for repeated use. See "Helping Hand" for an explanation. Sticky Keys is part of Easy Access, a control panel in System 7 and an INIT in System 6.

Easy Access also includes Mouse Keys, which lets you use the numeric keypad in place of the mouse. You can move the pointer, click, drag, and so forth, all very precisely from the keyboard. To turn on Mouse Keys, press ⌘-shift-clear or use System 7's Easy Access control panel. The 5 key then acts just like the mouse button. Press it once to click, twice quickly to double-click, or press and hold for dragging. Pressing the 0 key once keeps the mouse button down for pulling down menus, dragging, and so on. To unlock the mouse button, press the period key (.) on the keypad. Shift-click by pressing shift-5. You move the pointer up, down, sideways, or diagonally using the number keys around the 5 key. For very fine pointer movements, lightly tap the appropriate number key. To cover distance rapidly, press and hold the key. The longer you press these keys, the faster the pointer moves. You can adjust the speed by changing the Mouse Tracking setting in the Mouse control panel. To turn off Mouse Keys, press the clear key once or use the Easy Access control panel.

Remote File Sharing

Q. I have a Mac IIci at my office and an SE/30 at home. I use System 6.0.7

continues



Helping Hand Sticky Keys gives you another hand to press or hold down modifier keys—shift, option, ⌘, or control. When you activate Sticky Keys by pressing the shift key five times quickly or by using System 7's Easy Access control panel, an icon appears at the right end of the menu bar (1). The icon changes when you press a modifier key you want held down, or press additional modifier keys and then a letter or number key for a combination keystroke (2). If you press the same modifier key twice in succession, pausing slightly between presses, you lock down that key, and the icon changes again (3). The icon goes away (4) when you turn off Sticky Keys by pressing shift five times again, by pressing any two modifier keys simultaneously, or by using the Easy Access control panel. In addition to displaying the menu bar icons, System 7 gives you audio feedback.

now but plan to upgrade to System 7 soon. When I want to take work home from the office, I have to transfer my files on floppies. How can I link the machines via modem and have access to both hard drives? What would it take in hardware and software to network the two Macs? Is there a system that would let me turn off the Macs with a phone call?

Joseph R. Buoscio
Lansing, Illinois

A. Each Mac needs a modem, a phone line, and some software. A 2400-bps modem is fast enough if you plan to copy files between the two Macs and open the copied files from the local hard drive. If you want to open documents or programs directly from a remote hard drive, you need a 9600-bps modem. These modems use ordinary voice phone lines. For transferring multimegabyte files, consider ISDN or other switched digital phone lines and digital modems—which transfer data at 19,200 bps to 64,000 bps—at each location (see "Digital Data on Demand," February 1992).

To manage the connection, each Mac needs screen-sharing or remote-network-access software. Timbuktu/Remote from Farallon (510/596-9000) lets you view the screen of a remote Mac on your local Mac and control the remote Mac with your keyboard and mouse. In other words, you can work on your office Mac from your home Mac (and vice versa). Timbuktu/Remote includes efficient file-transfer capability, works with both System 6 and System 7, and costs $195 per computer.

AppleTalk Remote Access software creates a one-way network connection over the phone lines between the Mac you're using and a remote Mac. Once connected, you can use System 7's file sharing to access files on any hard drives connected to the remote Mac. If the remote Mac is connected to another network, you'll also have access to all its services, such as electronic mail, AppleShare file servers, and networked printers. You'll still have full access to network services on your local Mac's network, if any. For example, you could open a document located on the remote Mac (or on a file server to which it's connected and to which you have access) and print the document on a networked printer connected to your local Mac. AppleTalk Remote Access requires System 7. It comes with Macintosh PowerBook computers and is available separately from Apple dealers for $199, which includes a license to use it on three computers. Remote-network-access software is also included with the $499 NetModem V2400 from Shiva (800/458-3550 or 617/252-6300).

You can turn on any Mac II or Quadra model with a phone call using Ringo or Ringo ET ($129.95 and $69.95, respectively, from MacSema, 800/344-7228 or 503/757-1520) or PowerKey Remote ($49 from Sophisticated Circuits, 800/827-4669 or 206/485-7979). However, these products do not turn on external devices such as hard drives. For that, or to remotely turn on a Mac Classic, Classic II, LC, SE, or SE/30, you also need Sophisticated Circuits' $99 PowerKey. You can program the PowerKey to turn the computer system on and shut it down at preselected times. In addition, the PowerKey lets you turn on a Classic, Classic II, LC, SE, or SE/30 by pressing the Power On key on the keyboard, and lets you turn off those models by choosing Shut Down from the Finder's Special menu.

Conflict Resolution

TIP The usual advice for finding conflicting extensions and control panels (also known as INITs and cdevs) is to remove them all and then replace them one at a time until the offending item turns up. In general, the binary search method is more efficient. To use it, drag only half the extensions and control panels to the desktop and restart. If this solves the problem, the offending item is among the half you removed to the desktop; if not, it is among the other half. In either case, leave only half the group containing the offending item (one quarter of all extensions and control panels) on the desktop and restart. If the problem occurs, the offender is among the group you just put back; if not, it is among the group on the desktop. Continue halving the offending group until you reduce it to a single item (the troublemaker). If you have 32 control panels and extensions, for example, the binary method takes 5 steps to find the villain, whereas the one-at-a-time method takes up to 32 steps.

Instead of dragging control panels and extensions to and from the desktop, you can drag them to and from a new folder you create for that purpose. Alternatively, you can use an extension manager to turn them on and off individually.

Alan M. Winslow
Pleasanton, California

The binary method won't isolate an extension or control panel that conflicts with another one if both happen to be in the group you remove (or the group you leave). For best results, group extensions and control panels according to the order in which they are loaded during start-up. System 6 loads all INITs and cdevs in alphabetical order from the System Folder. System 7 loads items alphabetically from the Extensions folder (inside the System Folder), next alphabetically from the Control Panels folder (also inside the System Folder), and then alphabetically from the System Folder itself.

You can often resolve conflicts by changing the order in which the system loads these items. After identifying a troublesome item, try making it load earlier by prefixing its name with blank spaces, or later by prefixing with tildes (~). In System 7, you may also have to move the offending item to a different folder. For example, you must move a control panel into the Extensions folder if you want it to load before extensions as well as control panels. (For convenient access to control panels you've removed from the Control Panels folder, make aliases of them with the Finder's Make Alias command and put the aliases in the Control Panels folder.)

The Extension Manager utility lets you activate and deactivate extensions and control panels without dragging them in and out of folders. It is available for the cost of distribution from user groups, CompuServe (file EXTMGR.SIT in library 4 of the MACSYS forum), and America Online (Extensions Manager 1.6.sit in the Computing & Software department's software libraries).—L.P.

Sick of the Same Old Faces

TIP The only fonts I have for my Hewlett-Packard DeskWriter are the standard LaserWriter 13—Helvetica, *continues*

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MB's	Mechanism	Access	Internal	External
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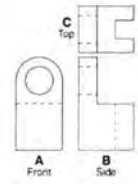
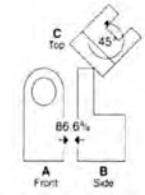
Ortho to Iso

Although some CAD programs help illustrators produce three-dimensional drawings, those programs are expensive and often better suited for drafting than illustration. Bill Jennings of Placentia, California, has developed a technique for quickly transforming scaled 2-D orthographic projections to a precise 3-D isometric projection with Aldus FreeHand. (An orthographic projection depicts a three-dimensional object with separate representations of the object's planes or surfaces, which are often called front, side, and top views. An isometric projection depicts a three-dimensional object with one representation in which dimensions are foreshortened equally and surfaces are skewed [x-axis surfaces by 30 degrees, y-axis surfaces by –30 degrees, and z-axis surfaces by 30 degrees and –30 degrees].)

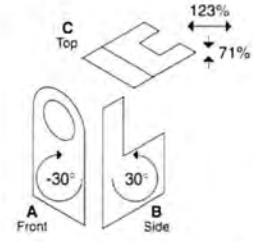
Jennings recommends recording some macros to avoid rug burn on your mouse hand. For example, you can create QuicKeys sequences to switch to 0-degree, 30-degree, or –30-degree constraint angles for precise drawing of connecting lines and movement of cloned paths.



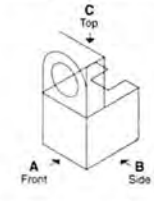
1. Start with at least two orthographic views. (Three views are shown here.)



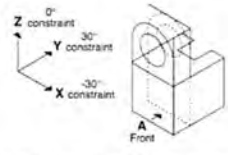
2. Reduce the front and side views 86.6 percent (the cosine of 30 degrees) horizontally using the scaling tool, and rotate the top view 45 degrees using the rotating tool.



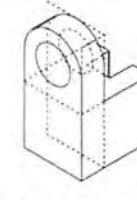
3. Skew the front view –30 degrees and skew the side view 30 degrees using the skewing tool. Scale the top view 123 percent horizontally and 71 percent vertically.



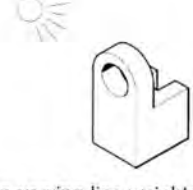
4. Align the common edges of each view, and the 3-D drawing starts to take shape.



5. Clone and move objects as required to form tangent surfaces. Objects moved along the x-axis are constrained at –30 degrees, those moved along the y-axis at 30 degrees, and along the z-axis at 0 degrees.



6. With all objects ungrouped, cut paths and remove lines hidden by forward surfaces. Also add lines to connect surfaces.



7a. Assign varying line weights based on a light source from the upper left. Select lines not directly illuminated by the imaginary light source and use the Fill and Line command to set heavier weights.

7b. Instead of assigning varying line weights (as in Step 7a), you can give the illustration a more three-dimensional appearance with surface shading.

Making Faces Text copied from a draw program becomes a PICT graphic when you paste it into PageMaker or Microsoft Word. Dragging the graphic's handles reshapes the text, giving it a new look. (Press shift while dragging the handles in Word.)

Times, Symbol, Avant Garde, Zapf Chancery, and so on. I get sick of looking at the same old typefaces but I can't afford any more. Here's how I put new expressions on those old faces with PageMaker 4.01 (or 3.0) and SuperPaint 1.0.

1. In PageMaker, set the font and size and adjust leading, small cap size, superscript, and so on.
2. Copy the text from PageMaker and paste it into SuperPaint's drawing layer.
3. Copy the text from SuperPaint and paste it back into PageMaker.
4. PageMaker sees the pasted text as a PICT graphic. Dragging the graphic's handles stretches and squeezes the text without affecting its printed resolution (see "Making Faces").

Monty Graves
Hugo, Oklahoma

One LaserWriter, One Mac

TIP Every manual, bible, encyclopedia, and big book for the Mac gives the impression that you must use network connectors and cables to connect a LaserWriter to a Mac. This is not true. You only have to buy all that stuff if you're hooking more than one Mac to the printer—in other words, setting up a network. Those of us whose network consists of one Mac and one LaserWriter can use a $10 serial or null modem cable, such as the one used to connect an ImageWriter II to the Mac. Network connectors cost $20 to $50 each, and you would have to buy two.

Howard Adkins
Gilbert, Arizona

Start-Up Sound

TIP With System 7, you can put a sound file in the Startup Items folder (inside the System Folder) and it will play when you start up your Mac. If your Mac has a microphone, you can use the Sound control panel to record a message for the next person who uses the Mac or just for fun.

Stefan Bracke
Deurne, Belgium

You can't record your own sounds without a microphone. Don't despair if your Mac doesn't have a microphone; there are other sources: Voice Impact from Articulate Systems (617/935-5656) and MacRecorder Voice Digitizer from MacroMind-Paracomp (415/442-0200). You can also get prerecorded sound files from online information services and user groups.—L.P. **m**

We pay from $25 to $100 for tips published here. Send tips or questions (include your address and phone number) to *Quick Tips, Macworld,* 501 Second St., San Francisco, CA 94107. Send electronic mail to CompuServe (70370,702) or MCI Mail (294-8078). All published submissions become the property of *Macworld.* Due to the high volume of mail received, we're unable to provide personal responses.

LON POOLE answers readers' questions and selects their tips for this monthly column. His two most recent books are *Amazing Mac Facts* (Microsoft Press, 1991), a collection of the best published tips; and *Macworld Guide to System 7* (IDG Books Worldwide, 1991).

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SCSI

BY JIM HEID

ANY COMPUTER CAN BENEFIT from the speed and capacity of a hard drive, yet the Macintosh entered the world barely able to communicate with one. The Mac that Steve Jobs unveiled in 1984 lacked a connector for attaching hard drives. The few pioneering hard drives that were available for the Mac attached to the Mac's modem port, which was far too slow to handle the speeds the hard drives were capable of. It was worse than a bottleneck—it was the skinny part of an hourglass.

The Mac languished until early 1986, when Apple introduced the Mac Plus. Besides offering faster performance and more memory, the Plus introduced a new rear-panel connector designed specifically for hard drives and other fast add-ons. This new connector used a high-speed communications scheme called the *small computer systems interface*, or *SCSI* for short. SCSI saved the Mac by enabling it to communicate with high-speed peripherals at a reasonable speed. Hard drives, image scanners, personal laser printers, CD ROM drives, tape backup devices, SyQuest and Bernoulli cartridge drives—none of these add-ons would be as popular as they are today without SCSI.

That's the sweet side of SCSI. There's also a bitter side, and it surfaces when you connect several SCSI devices to a Mac—and are suddenly unable to start it. What follows is often a bad dream filled with cable juggling, switch flicking, and head scratching. There's a quirkiness to SCSI, and it's no wonder the acronym is usually pronounced as the word *scuzzy*. This month I explore the bittersweet world of SCSI and pass along some survival tips. I also spotlight some recent SCSI developments that promise to deliver fewer headaches and even faster performance.

Public Data Transportation

IN COMPUTER TERMS, SCSI IS A *BUS*—A set of common wires upon which data and instructions flow. A Mac contains several buses. Some allow information to move between the Mac's memory and other internal components; others are designed to allow you to attach additional hardware to the Mac. The SCSI bus falls into the latter category, as do the various internal expansion slots in Mac II's, Quadras, the SE and SE/30, and the LC.

But expansion slots are inside the case. The SCSI connector is on the outside, so it can attach to external devices. In this regard, SCSI is similar to another bus: the Apple Desktop Bus (ADB), which is the connection scheme the Mac's keyboard and mouse use. (Every Mac from the SE on also has an internal SCSI connector that attaches to an internal hard drive.)

The Mac's SCSI port has two basic strengths. First, it's fast. A Mac Classic's SCSI bus transfers up to roughly 650,000 characters (650K) per second; a Quadra 900's SCSI bus shuttles up to 5 million characters (5MB) per second. One reason SCSI is speedy is that it transfers the 8 bits that make up a byte in *parallel mode*—the bits travel alongside each other, each in its own wire, like parade marchers striding eight abreast. By contrast, the Mac's slower modem, printer, and ADB ports transfer data in *serial mode*—bits must travel in single file, one after another.

But whether data actually travels as quickly as the SCSI bus can carry it depends on the device that you attach to the Mac. A German freeway might have a speed limit of 100 miles per hour, but not every car can sustain that pace. If you connect a hard drive that delivers "only" a megabyte per second to a Quadra, you aren't taking full advantage of the Quadra's SCSI capabilities. The lesson: If you're buying a hard drive, look for one that can keep up with your Macintosh. But don't overbuy: if you attach a 1MB-per-second hard drive to the slower SCSI port on a Mac Classic, you won't fully exploit the drive's speed.

The SCSI port's other strength is that it accommodates up to seven devices. How can seven devices connect to one port? Through a technique called *daisy-chaining*—you connect one device to the Mac, and then connect other devices to each other. Almost every SCSI add-on has two SCSI connectors on its back panel—one connector accepts the cable that attaches to the Mac or the previous SCSI device, and the other accepts the cable that attaches to the next device in the chain. By the way, before making these connections, turn off the Mac and any external SCSI devices attached to it. Changing any SCSI connection when a device is on is asking for sizzled circuits.

SCSI's speed and ability to accommodate numerous external devices help explain why Apple adopted the bus back in 1986: it let the company introduce an expandable Mac without designing a new case and adding costly expansion slots. But as we'll see, its versatility is also responsible for the scuzzier aspects of SCSI.

How to ride, and survive, the Mac world's most popular expansion bus

SCSI Addressing

IF ONE SCSI PORT CAN ACCOMMODATE several add-ons, how does a device know when information coming from the Mac is intended for it? What keeps a hard drive from responding to commands for a scanner, and vice versa?

Every device attached to a SCSI port must have its own electronic ID number, called a SCSI *address*. When the Mac transmits information to a device, it sends the device's address along with the information. All the devices on the SCSI chain—including the Mac—constantly monitor the bus for activity, but only the device the information is addressed to responds. The first device to transmit a signal gets control of the SCSI bus—just as the first person in a house who picks up the phone gets control of the line.

And if two devices transmit a signal at the same time? The SCSI ID helps there, too, by assigning priority to each device. On the SCSI totem pole, the higher a device's address, or ID number, the higher the device's priority. If, say, a hard drive with an address of 5 and a scanner with an address of 4 both try to access the bus at the same time, the hard drive will win. This is called *bus arbitration*.

SCSI address numbers run from 0 through 6. The Mac it-

continues

self has an address of 7. If a Mac has an internal hard drive, that drive's address is always 0. External SCSI devices such as hard drives and scanners have rear-panel switches that let you change their IDs (see "A Guide to SCSI Components").

Two houses can't have the same address, nor can two SCSI devices. If you connect a device whose ID matches that of a device already on the chain, disk errors may occur or the Mac may not start up at all. When that happens, shut everything off and follow the troubleshooting tips in "Surviving with SCSI."

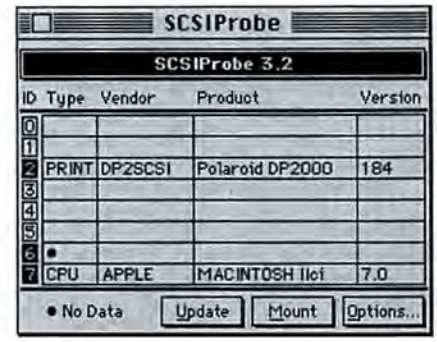
SCSI Termination

FOR THE MAC TO KNOW WHERE THE SCSI bus begins and ends, the bus needs small electronic components called *terminators*. Terminators are the bumpers on the front and back of the SCSI bus: they absorb colliding SCSI signals, preventing these signals from interfering with reliable data transmission. If you attach more than one SCSI device to a Mac, you'll need to grapple with terminators. Improper termination is another common source of SCSI woes.

As "A Guide to SCSI Components" shows, terminators can be *internal* or *external*. The former are usually installed directly on a device's circuit board; the latter attach to a device's rear-panel SCSI connector. Some devices also provide convenient termination switches that let you activate or deactivate internal termination.

In theory, termination is simple: two is company, three is a crowd. Specifically, the first and last device in the SCSI chain must each have a terminator connected to it. If your Mac contains an internal hard drive, the drive has an internal terminator. If you have one external SCSI device attached, it needs a terminator. If you have two or more external SCSI devices, those in between the first and last device must *not* be terminated. Having more than two terminators on the SCSI bus can cause start-up problems, data errors, and even hardware damage.

How do you know whether your new SCSI gizmo is internally terminated? It isn't always easy to tell, which is why Apple recommends that hardware manufacturers not use internal terminators in external devices. (An external terminator is easy to spot—it dangles off the back of the box.) Still, some companies use internal termination, perhaps because including an external terminator would add expense. Generally, a device's manual should state whether or not the device is internally terminated, although hard drive vendors have been known to contradict their own manuals.



Probing SCSI Robert Polic's SCSI Probe control panel, available through user groups and online services, lets you examine the SCSI bus to determine the address and model of each device. You can also use SCSI Probe to access a hard drive that you turned on after starting the Mac.

All This and SCSI-2

A QUADRA'S 5MB-PER-SECOND TRANSFER rate sounds (and is) fast, but SCSI doesn't stop there. A new version of the SCSI specification, *SCSI-2*, makes possible data-transfer rates of 10MB to 40MB per second—essential for high-end color applications, where 100MB files are common. The key performance-enhancing aspects of SCSI-2 are *fast SCSI* and *wide SCSI*. Fast SCSI doubles the bus's transfer rate to 10MB. Wide SCSI adds lanes to the bus's freeway, expanding SCSI's parallel data path from 8 bits wide to 16 bits and eventually 32 bits.

Surviving with SCSI

Here are some tips to help you avoid SCSI problems—and some steps to try when it's too late.

- *Buy quality cables* The best SCSI cables are *double-shielded*—the wires that carry the SCSI signals are wrapped with two layers of metal shielding to trap electrical interference that can cause data errors, especially in long SCSI chains or on fast Macs such as the IIci. Apple's SCSI cables are first-rate but costly, retailing for $40 to $50, depending on the cable; GCC Technologies sells double-shielded cables for $29.
- *Keep the cable length down* In theory, the total length of all the SCSI cables in a chain can be up to 7 meters (about 23 feet). If you have a loud hard drive, you can attach one or two 3-foot peripheral interface cables together to move the drive farther away from your desk. But don't go overboard. Long cable runs can cause data errors, especially if you use cheap SCSI cables or if a cable's shielding is damaged. Avoid cable runs of more than 6 feet between devices, and keep the total length of the SCSI cabling below 15 feet. With SCSI cabling, less is better.
- *Clip those cables* The little wire clips on SCSI connectors help ensure a tight connection. But when you're in a hurry to connect a device or reorganize the order of devices, it's tempting to not use the clips. Use them.
- *Demand external termination* Try to avoid buying internally terminated devices. If you're torn between two otherwise identical external hard drives, for example, buy the one that isn't internally terminated. You'll have one less device to worry about in future termination travails.
- *Check those addresses* Before installing a new device, examine its SCSI address switch and make sure it won't conflict with a device already on the chain. Consider writing a device's address on a label and then attaching it to the front panel. When SCSI problems occur, you won't have to bend over each device to determine its address. When changing a device's address, keep in mind that the address determines the device's priority. If you're working with two external hard drives and you want the Mac to start up from a specific one, be sure to give that drive the higher address. (You can also use the Startup Device control panel to override this start-up order.) You can assign addresses in any order—for example, you can use ID numbers 3 and 5, skipping over 4.
- *Power up properly* In general, you should always turn on external SCSI devices first, and then switch on the Mac. Also, Apple recommends that all SCSI devices be switched on while the Mac is on, even if you aren't using some of them. Neither rule seems carved in stone, however. Many people (myself included) turn all their devices on and off from a single power switch without problems. I usually have no trouble leaving one or more devices off, too, although now and then I encounter a device that must be on in order for the Mac to start up.
- *Keep some SCSI tools on hand* A shareware control panel called SCSI Probe lets you examine the devices on the bus and mount a hard drive that was turned on after the Mac started up (see "Probing SCSI"). FWB's terrific Hard Disk Toolkit contains a similar control panel. Hard Disk Toolkit also lets you test a hard drive and fine-tune it for best performance (see *Reviews, Macworld*, February 1992).

Troubleshooting SCSI

You've added a SCSI device and now your Mac is acting up. What to do? First, turn off the Mac and all devices attached to it. Then check for the following.

- *Address conflicts* Two devices can't have the same address.
- *Termination problems* Too few or too many terminators on the bus can cause errors. See "A Guide to SCSI Components" for some sample termination schemes.
- *Bad cable connections* Be sure connections are tight. Also examine cables for kinks, dents, and other signs of potential damage.

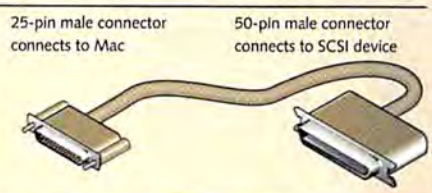
After checking these items, power up the SCSI devices and then the Mac. If you're still having trouble, try either or both of the following.

- *Reorganize the chain* Change the physical order of the devices on the chain. For example, if you have an external hard drive connected to the Mac and a scanner connected to the hard drive, switch them so that the scanner is connected to the Mac and the hard drive is connected to the scanner. Reorganizing the chain may also help if the Mac won't start up when one or more devices are turned off.
- *Try different cables and terminators* A SCSI cable or its connector or an external terminator can be damaged in ways that aren't visually apparent. Borrow some cables and external terminators and try them. And remember, turn off all devices as well as the Mac before changing SCSI connections.

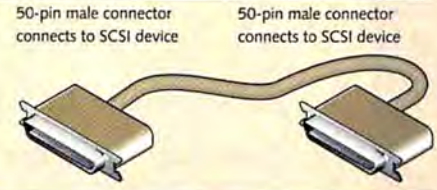
If these steps don't work, it's possible that the device itself may be defective. For example, its address switch may be broken, causing the device to have an address other than what appears on the switch. At this stage of the game, you may want to consult a knowledgeable dealer, tech-support representative, or user-group buddy.

A Guide to SCSI Components

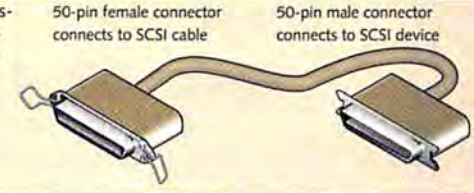
SCSI System Cable Connects the Mac to any external SCSI device that uses a 50-pin connector. Some SCSI devices use 25-pin connectors, requiring special system cables that have 25-pin plugs on both ends.



Peripheral Interface Cable Connects one external SCSI device to another. It's used for daisy-chaining multiple devices to a Mac.

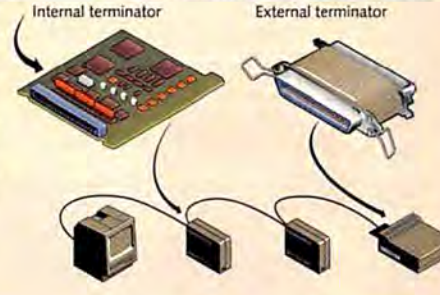


Cable Extender A SCSI extension cord, usually about 3 feet long, that connects between a device and the 50-pin connector on a peripheral interface cable or SCSI system cable.



Address Switch Changes a device's SCSI ID number, enabling it to respond to the correct signal from the Mac, and determining its priority in the chain.

Terminator Absorbs SCSI signals at the beginning and end of the SCSI chain, preventing interference with data transmission. Regardless of how many devices you have daisy-chained together, you should have only two terminators—for the first and last device in the chain. Shown here is a Mac connected to three SCSI devices: two hard drives and a scanner. The first drive is internally terminated and the scanner is externally terminated; the second drive needs no termination.



A few high-end hard drives support fast and wide SCSI (see "High-Capacity Hard Drives," in this issue). But to exploit such drives with a Macintosh, you need a *SCSI accelerator* board such as MicroNet's NuPort series, Storage Dimensions' Data Cannon series, or PLI's QuickSCSI. These boards plug into a NuBus slot of any Mac II or into the Processor Direct Slot of a Quadra or IIfx, and provide a SCSI-2 port. A SCSI accelerator will make a Mac IIcx or IIci transfer data like a Quadra, and will boost a Quadra's rates even higher.

But keep in mind only a few costly high-capacity hard drives can approach the transfer rates these boards are capable of. As a rule, the lower a hard drive's capacity, the less likely it is to benefit from a SCSI accelerator.

But the advent of SCSI-2 may create the potential for even more SCSI headaches. SCSI-2's fast transfer rates will make high-quality cables and correct termination more essential than ever.

SCSI is also evolving within the Mac family. The Quadra 900 is the first Mac to contain two electrically separate SCSI buses. In theory, this could allow the connection of up to 14 devices. However, the Mac's current system software treats the 900's two buses as one, retaining the 7-device limit. And the Mac PowerBook 100 offers a unique *SCSI disk* mode that enables you to attach the 100 to another Mac's SCSI port as though it were an external hard drive. Once connected, the PowerBook 100's hard drive appears on the other Mac's desktop. It's an ideal way to transfer files created on the road.

In short, SCSI remains as useful to the Mac family today as it was in 1986. It's the bus that saved the Mac, helped lower the cost of hard drives, and still allows even low-end Macs to tap into a variety of powerful add-ons. Some occasional scuzziness is a small price to pay for all that. **m**

See *Where to Buy* for contact information.

Contributing editor JIM HEID looks at a different aspect of Mac fundamentals each month. His latest books are *Macworld Guide to Microsoft Word 5* and *Macworld Complete Mac Handbook*, both published by IDG Books Worldwide.

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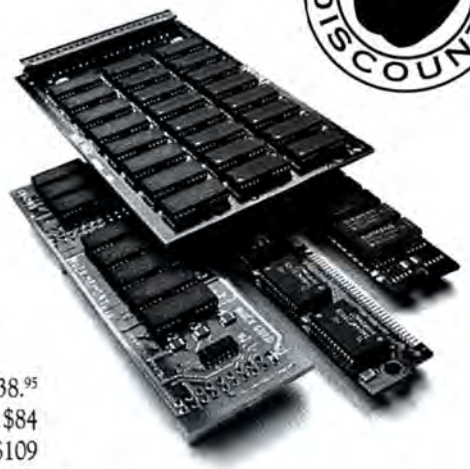

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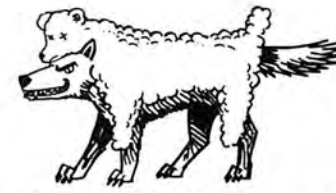

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Page No.	Advertiser	Reader Svc. No.	Phone
215	Abacus Concepts	50	800/666-STAT
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14	AEC Software	38	800/346-9413
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11	Asante	24	800/662-9686
51	Attain Software	178	617/547-2188
250-251	BottomLine Distribution	—	900/420-3636
IFC-01	Caere Corporation	73	800/535-SCAN
39	Canon USA	110	800/OKCANON
36	Casady & Greene	32	800/359-4920
12-13	Compuserve	319	800/848-8199
112	Contemporary Cybernetics	188	804/873-0900
22	CoStar	205	800/4-COSTAR
20	Curtis Manufacturing	20	603/532-4123
10	Dantz Development	26	510/849-0293
231	Data Desk	95	607/257-1000
7	Deneba Software	57	800/6CANVAS
59	Design CAD	336/337	918/825-4848
234	DGR Technologies	81	800/235-9748
263	DGR Technologies	153	800/235-9748
213	Dow Jones News Retreival	—	800/522-3567
247-249	Dr. Mac	147	800/825-6227
116-117	E-Machines	303	800/34GRAPH
221	Educational Resources	28	800/624-2926
287	Educorp	157	800/843-9497
22	Engineered Software	12	919/299-4843
242-243	Express Direct	—	800/535-3252
244-245	Express Direct	—	800/535-3252
65	Fifth Generation Systems	151	800/477-8212
110-111	Fifth Generation Systems	130	800/477-8212
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108	Global Village	9	800/736-4821
219	Hard Drives International	—	800/776-DISK
82-83	IDG Books	19	—
179	Image Club	—	—
124	Innovative Data Design	129	510/680-6818
15	Insignia Solutions	72	800/848-7677
BC	Kensington Microware	—	800-535-4242
31	Kiwi Software	—	800/321-5494
23-30	La Cie	—	800/999-0143
35	Lapis	202/204	800/43-LAPIS
118A-118	Logicode Technology, Inc.	—	800/735-6442
246	Mac and More	85	800/MAC0052
233	Macs By Mail	192	—
68-75	Mac Zone,The	70	800/248-0800
128-135	Mac's Place	—	800/367-4222
84	MacAcademy	106	800/527-1914
232	MacBest	98	800/530-5050
262	MacCenter	—	800/950-3726
40-49	MacConnection	—	800/800-3333
235	MacDepot	144	800/222-2808
236-237	MacDirect	140	800/621-8467
32	MacFriends	8	800/622-8804
52	MacFriends	258	800/622-8804
76	MacFriends	58	800/622-8804
85	MacFriends	118	800/622-8804
256-259	MacLand	40	800/888-8779
226-227	MacNews	—	800/234-9383
254-255	MacProducts USA	175	800/622-3475
261	MacProducts USA	197	800/622-3475
183-188	Macromind/ Paracomp	—	800/248-4477
233	Macs Now	171	800/766-2313
260	MacSource	48	800/685-2622
228-229	MacTel Technologies	105	800/950-8411
202-209	Macwarehouse	270	800/255-6227
126	Mass Microsystems	207	800/522-7979
80	Mathsoft, Inc.	34	800/577-1017
118	MicroNet Technology, Inc.	113	714/837-6033
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2-3	Microsoft	—	800/541-1261
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175	Microtech Int'l.	127	800/3251895
IBC	Mirror Technologies	125	800/654-5294
50	Mobius Technologies	89	800/523-7933
10	Multi-Ad Services	115	800/447-1950
198	NEC	124	800/NEC-INFO
34	Nest Software	177	800/524-3315
86	Newer Technology	146	800/678-3726
56	NoRad	133	800/262-3260
214	Now Software	13	800/237-3611
77	O.C.E.A.N. Microsystems	131	800/2-OCEAN1
285	ON Technology	195	617/876-0900
62	Outbound Systems	30	800/444-4607
58	Paragon Concepts	253	800/922-2993
38	Personal Training Systems	44	800/832-2499
81	Pinnacle Micro	266	800/553-7070
286	Printer Connection	—	714/758-8832
285	Quantum Leap Technologies	136	800/762-2877
216	Quicktime Conference	—	—
8-9	Radius	158	800/227-2795
18-19	RasterOps	—	800/729-2656
201	Ray Dream	159	800/846-0111
78-79	Salient	39	415/321-5375
64	Secure-It	239	800/451-7592
67	Sigma Desgins	176	800/845-8086
87	Softsync Inc.	194	305/444-0080
57	Statsoft	99	918/583-4149
53	Supermac Technology	88	800/334-3005
210	Supra Corporaiton	—	800/967-8772
54	Symantec	96	800/228-4122
37	Systat	29	708/864-5670
181	Tektronix	143	800/835-6100
33	Teleware	76	800/237-8400
114	Texas Instruments	313	800/527-3500
252-253	Thirdwave	156	800/284-0486
215	Thought I Could	173	212/673-9724
88-107	Tiger Software	114	800/888-4437
60-61	WordPerfect	—	800/526-2252
284	World Expo	—	—
220	Zedcor	161	800/482-4567

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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

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Free Macworld Shopper Info

401	402	403	404	405	406	407	408	409	410
411	412	413	414	415	416	417	418	419	420
421	422	423	424	425	426	427	428	429	430
431	432	433	434	435	436	437	438	439	440
441	442	443	444	445	446	447	448	449	450
451	452	453	454	455	456	457	458	459	460
461	462	463	464	465	466	467	468	469	470
471	472	473	474	475	476	477	478	479	480
481	482	483	484	485	486	487	488	489	490
491	492	493	494	495	496	497	498	499	500
501	502	503	504	505	506	507	508	509	510
511	512	513	514	515	516	517	518	519	520
521	522	523	524	525	526	527	528	529	530
531	532	533	534	535	536	537	538	539	540
541	542	543	544	545	546	547	548	549	550
551	552	553	554	555	556	557	558	559	560
561	562	563	564	565	566	567	568	569	570
571	572	573	574	575	576	577	578	579	580
581	582	583	584	585	586	587	588	589	590
591	592	593	594	595	596	597	598	599	600

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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

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Free Macworld Shopper Info

401	402	403	404	405	406	407	408	409	410
411	412	413	414	415	416	417	418	419	420
421	422	423	424	425	426	427	428	429	430
431	432	433	434	435	436	437	438	439	440
441	442	443	444	445	446	447	448	449	450
451	452	453	454	455	456	457	458	459	460
461	462	463	464	465	466	467	468	469	470
471	472	473	474	475	476	477	478	479	480
481	482	483	484	485	486	487	488	489	490
491	492	493	494	495	496	497	498	499	500
501	502	503	504	505	506	507	508	509	510
511	512	513	514	515	516	517	518	519	520
521	522	523	524	525	526	527	528	529	530
531	532	533	534	535	536	537	538	539	540
541	542	543	544	545	546	547	548	549	550
551	552	553	554	555	556	557	558	559	560
561	562	563	564	565	566	567	568	569	570
571	572	573	574	575	576	577	578	579	580
581	582	583	584	585	586	587	588	589	590
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SOFTWARE

BUSINESS

Page No.	Advertiser	Reader Svc. No.
14	AEC Software	38
51	Attain Software	178
C2-1	Caere Corporation	73
231	Data Desk	95
31	Kiwi Software	—
80	Mathsoft, Inc.	34
120	Microsoft	—
2-3	Microsoft	—
285	ON Technology	195
38	Personal Training Systems	44
87	Softsync Inc.	194
57	Statsoft	99
54	Symantec	96
37	Systat	29
33	Teleware	76
220	Zedcor	161

CAD/CAM

Page No.	Advertiser	Reader Svc. No.
59	Design CAD	336/337
22	Engineered Software	12
124	Innovative Data Design	129
80	Mathsoft, Inc.	34

CD ROM

Page No.	Advertiser	Reader Svc. No.
285	Quantum Leap Technologies	136

DATA MANAGEMENT

Page No.	Advertiser	Reader Svc. No.
220	Zedcor	161

EDUCATIONAL

Page No.	Advertiser	Reader Svc. No.
221	Educational Resources	28
38	Personal Training Systems	44

FONTS

Page No.	Advertiser	Reader Svc. No.
179	Image Club	—

GRAPHICS/DTP

Page No.	Advertiser	Reader Svc. No.
16	Aldus	—
7	Deneba Software	57
179	Image Club	—
124	Innovative Data Design	129
10	Multi-Ad Services	115
34	Nest Software	177
201	Ray Dream	159

NETWORKING

Page No.	Advertiser	Reader Svc. No.
15	Insignia Solutions	72

PERSONAL

Page No.	Advertiser	Reader Svc. No.
85	MacFriends	118
32	MacFriends	8
52	MacFriends	258
76	MacFriends	58

SECURITY

Page No.	Advertiser	Reader Svc. No.
36	Casady & Greene	32
64	Secure-It	239

STATISTICAL

Page No.	Advertiser	Reader Svc. No.
215	Abacus Concepts	50
57	Statsoft	99
37	Systat	29

UTILITIES

Page No.	Advertiser	Reader Svc. No.
10	Dantz Development	26
110-111	Fifth Generation Systems	130
289	Fifth Generation Systems	135
65	Fifth Generation Systems	151
31	Kiwi Software	—
10	Multi-Ad Services	115
214	Now Software	13
78-79	Salient	39
215	Thought I Could	173

WORD PROCESSING

Page No.	Advertiser	Reader Svc. No.
34	Nest Software	177
58	Paragon Concepts	253
60-61	WordPerfect	—

HARDWARE

BOARDS

Page No.	Advertiser	Reader Svc. No.
35	Lapis	202/204
8-9	Radius	158
53	Supermac Technology	88

COMPUTER SYSTEMS

Page No.	Advertiser	Reader Svc. No.
250-251	BottomLine Distribution	—
242-243	Express Direct	—
233	Mac By Mail	192
232	MacBest	98
85	MacFriends	118
32	MacFriends	8
52	MacFriends	258
76	MacFriends	58
226-227	MacNews	—
233	Macs Now	171
260	MacSource	48
228-229	MacTel Technologies	105
62	Outbound Systems	30

DIGITIZERS/SCANNERS

Page No.	Advertiser	Reader Svc. No.
IFC-01	Caere Corporation	73

DISPLAY

Page No.	Advertiser	Reader Svc. No.
116-117	E-Machines	303
242-243	Express Direct	—
35	Lapis	202/204
226-227	MacNews	—
IBC	Mirror Technologies	125
50	Mobius Technologies	89
18-19	RasterOps	—
67	Sigma Desgins	176

EXPANSIONS/UPGRADES

Page No.	Advertiser	Reader Svc. No.
86	Newer Technology	146

HARD DISKS/STORAGE

Page No.	Advertiser	Reader Svc. No.
222	APS	15
112	Contemporary Cybernetics	188
263	DGR Technologies	153
234	DGR Technologies	81
219	Hard Drives International	—
23-30	La Cie	—
236-237	MacDirect	140
256-259	MacLand	40
254-255	MacProducts USA	175
261	MacProducts USA	197
126	Mass Microsystems	207
118	MicroNet Technology, Inc.	113
175	Microtech Int'l.	127
122-123	Microtech Int'l.	160
IBC	Mirror Technologies	125
86	Newer Technology	146
77	O.C.E.A.N. Microsystems	131
81	Pinnacle Micro	266

INPUT DEVICES

Page No.	Advertiser	Reader Svc. No.
39	Canon USA	110
20	Curtis Manufacturing	20

MODEMS

Page No.	Advertiser	Reader Svc. No.
108	Global Village	9
210	Supra Corporaiton	—

NETWORKING

Page No.	Advertiser	Reader Svc. No.
11	Asante	24

PRINTERS

Page No.	Advertiser	Reader Svc. No.
244-245	Express Direct	—
198	NEC	124
18-19	RasterOps	—
181	Tektronix	143
114	Texas Instruments	313

VIDEO

Page No.	Advertiser	Reader Svc. No.
8-9	Radius	158
53	Supermac Technology	88

MISCELLANEOUS

Page No.	Advertiser	Reader Svc. No.
263	DGR Technologies	153
234	DGR Technologies	81
287	Educorp	157
BC	Kensington Microware	—

SERVICES

ON-LINE

Page No.	Advertiser	Reader Svc. No.
12-13	Compuserve	319
213	Dow Jones New Retreival	—

TRADESHOWS/CONFERENCES

Page No.	Advertiser	Reader Svc. No.
216	Quicktime Conference	—
284	World Expo	—

TRAINING

Page No.	Advertiser	Reader Svc. No.
84	MacAcademy	106

ACCESSORIES

MISCELLANEOUS

Page No.	Advertiser	Reader Svc. No.
39	Canon USA	110
20	Curtis Manufacturing	20
BC	Kensington Microware	—
56	NoRad	133

MAIL ORDER

Page No.	Advertiser	Reader Svc. No.
230	Advanced Business Center	227
64	Agfa	—
222	APS	15
250-251	BottomLine Distribution	—
247-249	Dr. Mac	147
221	Educational Resources	28
287	Educorp	157
244-245	Express Direct	—
219	Hard Drives International	—
246	Mac and More	85
233	Macs By Mail	192
68-75	Mac Zone,The	70
128-135	Mac's Place	—
232	MacBest	98
262	MacCenter	—
40-49	MacConnection	—
235	MacDepot	144
236-237	MacDirect	140
256-259	MacLand	40
254-255	MacProducts USA	175
261	MacProducts USA	197
233	Macs Now	171
260	MacSource	48
228-229	MacTel Technologies	105
202-209	Macwarehouse	270
286	Printer Connection	—
252-253	Thirdwave	156
88-107	Tiger Software	114

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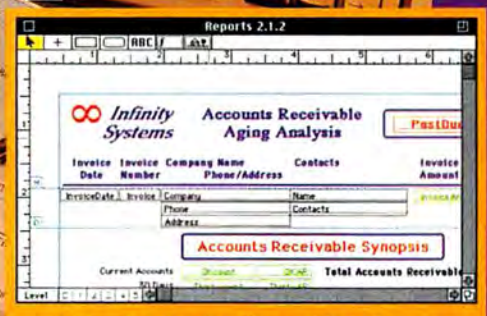

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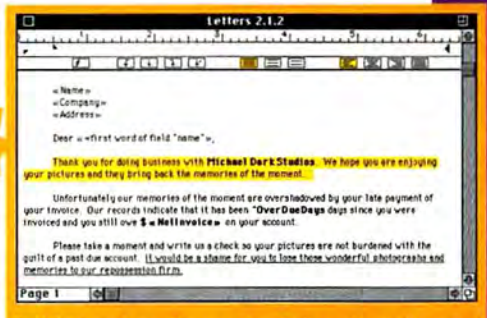

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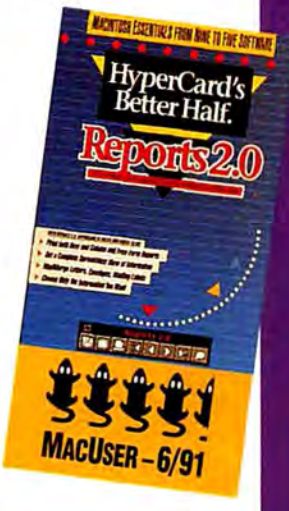

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- SMARTCOM 3.3 82
- HAYES CONNECT 3.0 46

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CHIPSOFT
- MACINTAX 56
- STATES When available 42

DELTAPOINT
- DELTA GRAPH PRO 186

DESIGNCAD
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- IDEA FISHER 384

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- NISUS COMPACT 3.3 96

SENSIBLE SOFTWARE
- SENSIBILE GRAMMAR 54

SAS INSTITUTE
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TGS
- PROGRAPH 289

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- ILLUSTRATOR 3.2 WITH ATM 338
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- TYPE SET 1 OR 2 62
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- PAGEMAKER 4.2 489
- PERSUASION 2.0 319

ALTSYS
- FONTOGRAPHER 265
- METAMOPHISIS PROFESSIONAL 88

CLARIS
- MACDRAW PRO 275

DENEBA
- CANVAS 3.0 246

DYNAWARE
- DYNAPERSPECTIVE 2.3.1 new version 534

FRAME
- FRAMEMAKER 589

GOLD DISK
- ANIMATION WORKS 119

MICROFRONTIER
- ENHANCE 199
- COLOR IT 69

MONOTYPE
- TRUETYPE IMPRINTS 21
- DESIGNING REPORTS & Presentations 115

MOTION WORKS
- ADDMOTION 177

MULTI AD SERVICES
- MULTI-AD CREATOR 498

PARACOMP
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- SOFTAT 295

MICROCOM
- CARBON COPY MAC 57

NUVOTECH
- TURBONET DIN-8 or DB9 24
- TURBONET ST DIN-8 or DB9 32

SITKA
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ALYSIS
- MORE DISK SPACE 65
- SUPER DISK 58

BERKELEY
- AFTER DARK 33
- MORE AFTER DARK 28
- AFTER DARK/MORE AFTER DARK BDL 48

CD TECHNOLOGY
- AMERICA ALIVE(CD) 69

CE SOFTWARE
- DISKTOP 4.0 62
- QUICKEYS 2 2.1 92
- TILES 62

CHENA SOFTWARE
- FAIR WITNESS 1.1 299

ESSENTIAL SOFTWARE
- EASY ALARMS 29

FWB
- HARD DISK TOOLKIT 134

ICOM SIMULATIONS
- ON CUE II 56
- SHERLOCK HOLMES CD 39

IMAGEN
- ULTRASCRIPT PLUS 285

INSIGHT DEVELOPMENT
- MACPRINT 89

JEDDAK
- SOFTLIBRARIAN 79

MICROCOM
- VIREX 3.0 59
- VIREX 3.0 10 PACK 345

MICROSPOT
- MACPALETTE II 55

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NINE TO FIVE SOFTWARE
- REPORTS 2.1 93
- RESCUE 58

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SOFTWARE COMPATABILITY
- SOFTWARE BRIDGE 59

SOFTWARE PUBLISHERS
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SYMANTEC
- NORTON UTILITIES 1.1 86
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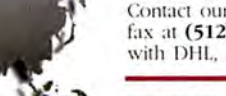

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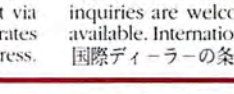

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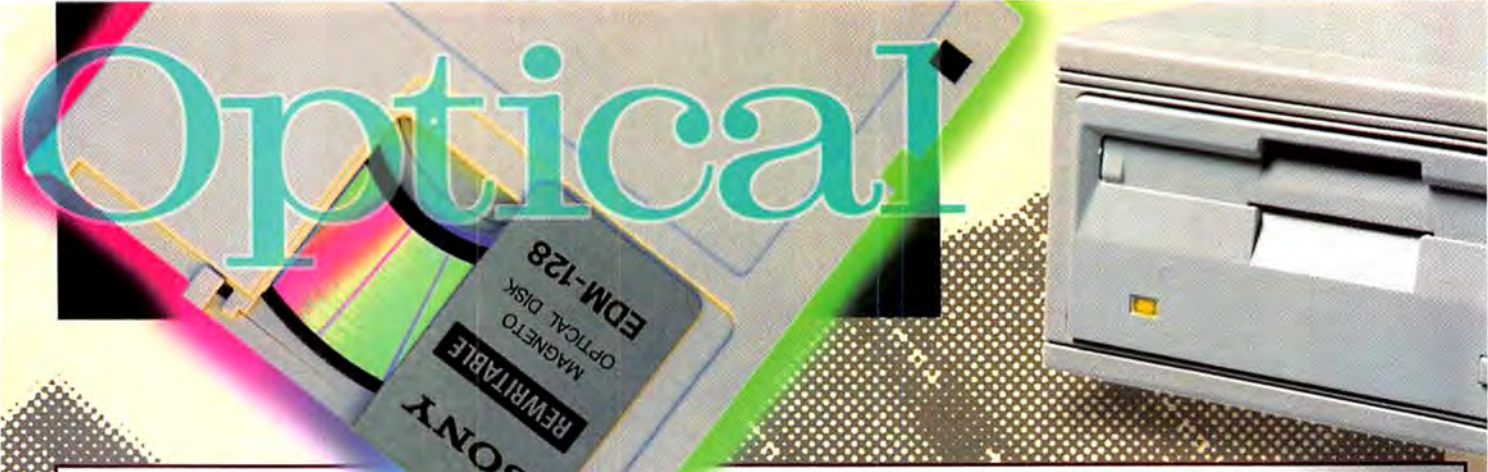

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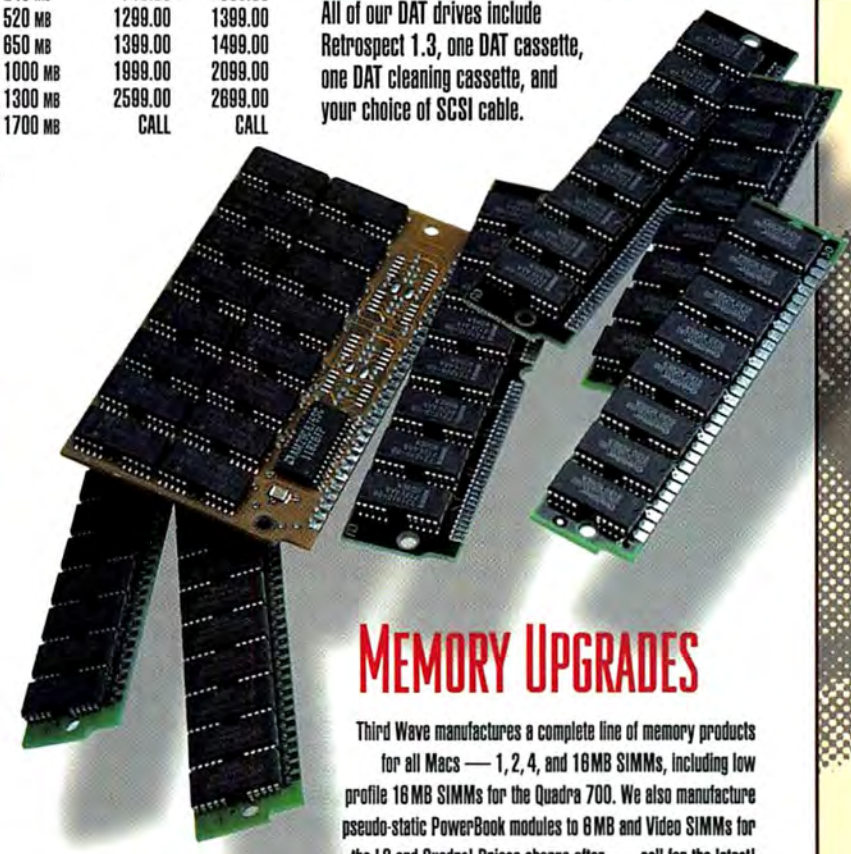

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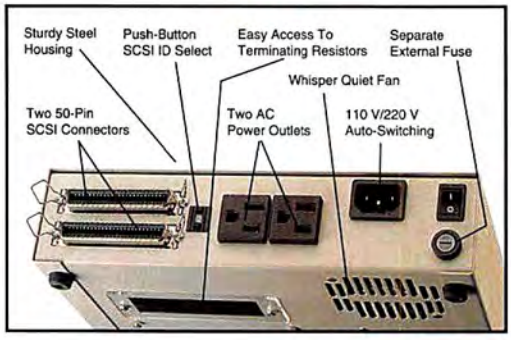

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CD/ROM
Photos on Disk
916.933.1260 267

Memory Upgrades
Athena Computers
800.580.9269 267

Networking
JAM Software
203.630.0055 267

Catalog Product Index

Hardware

Bar Code 268
Computer Systems 268
Memory Upgrade 272
Peripherals 274
Power Protection 276
Printers 276

Software

Astrology 276
Bar Code 276
Business 276
CD/ROM 276
Clip Art 277
Communications 277
Computer Shopping 277
Dental 277
Desktop Publishing 277
Educational 277
Engineering 278
Entertainment 278
Fonts 278
Genealogy 278
Graphic Translators 278
Hyper Card Stacks 279
Import/Export 279
Languages 279
Lottery 279
Medical 279
Music/Midi 279
Nutrition 280
Programming Tools 280
Property Management 280
Public Domain 280
Religion 281
Sales/Marketing 281
Scientific 281

Services

Computer Insurance 28
Computer Repair 28
Data Conversion 28
Data Recovery 28
Desktop Publishing 28
Disk Duplication 28
Laser Recharge 28

Accessories

Cases 28
Covers 28
Furniture 28

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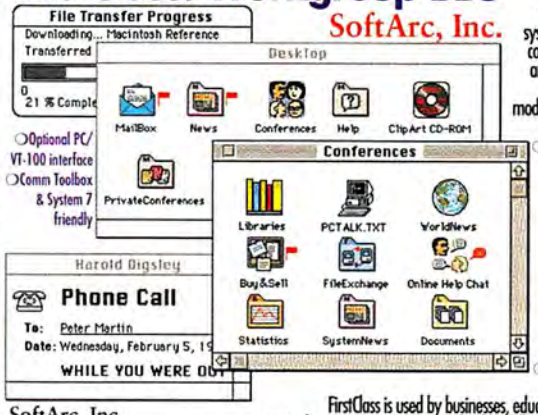

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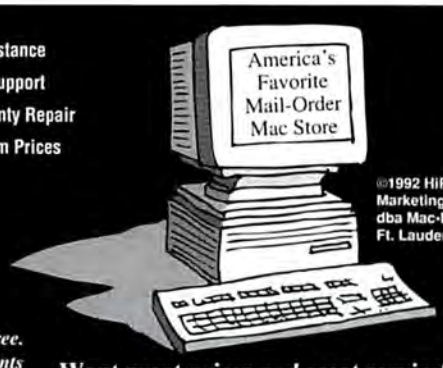

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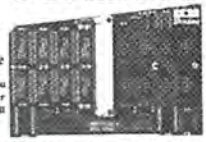

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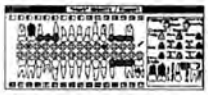

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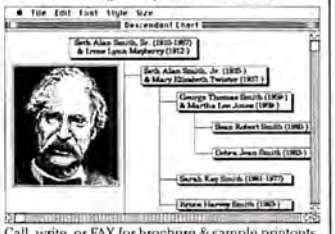

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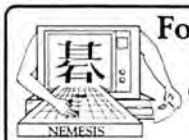

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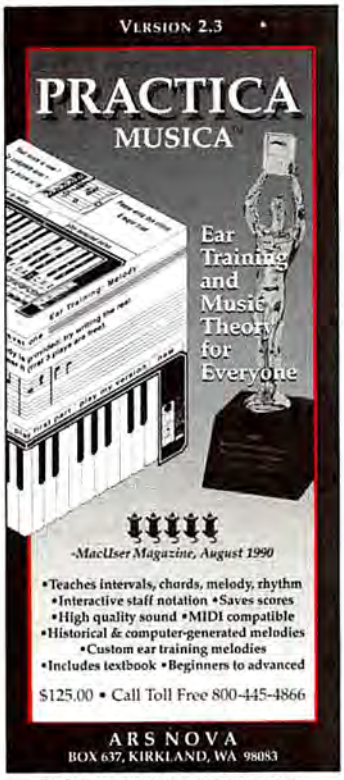

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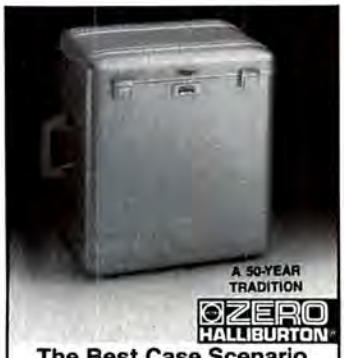

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1590	Desert Storm	33.00
1691	FindIT Webster	69.95
1605	Jap. for Everyone	279.00
1261	Learn/Speak Spanish	79.95
1204	Learn/Speak French	79.95
1772	Silly Noisy House	49.95

Desktop Publishing

1389	DTP CD 2.0	99.95
1587	Donatelli: Lingerie	129.95
1680	GraphTec Graphic Designs	49.95
1585	Ocean Imagery	99.00
1594	Photos On Disk	179.95
1730	Pre-SEPS v.1:	199.95
1697	Sky v.1	99.95
1595	SwimSuit CD	199.00
1653	Wraptures One	95.00

Entertainment & Consumer

1771	Baseball's Greatest Hits	69.95
1339	Cosmic Osmo	59.95
1300	EDUCORP Shareware 6.0	199.00
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Profile

INVENTING SPACESHIPS

SCOGIN MAYO

Lloyd Walker

JOHN FRASSANITO & ASSOCIATES

HOUSTON, TEXAS

I HAVE ALWAYS WANTED TO BE AN inventor," says Lloyd Walker, who uses a Mac to help shape the spaceships astronauts will fly in 10 to 15 years.

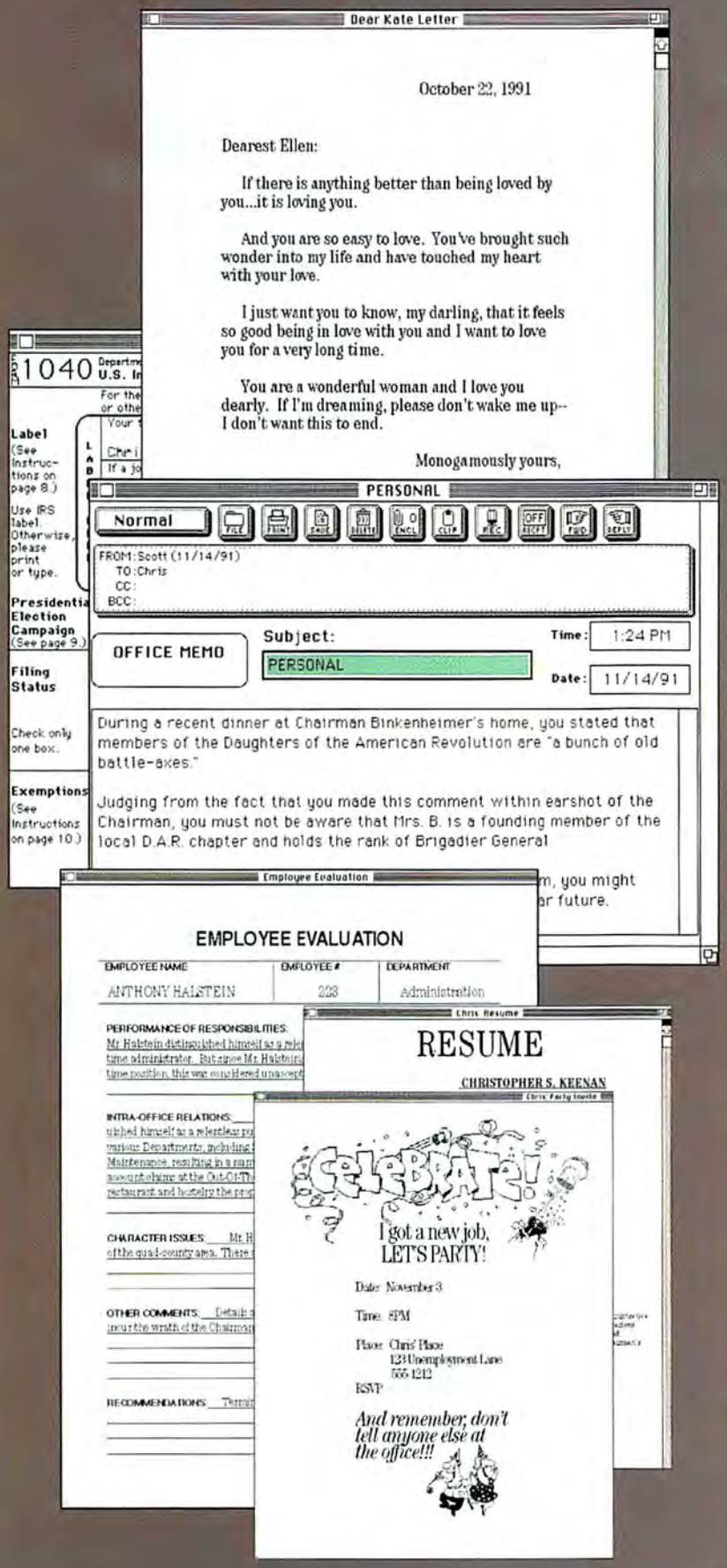
An industrial designer in Houston, Walker works with NASA engineers to build three-dimensional computer models of spacecraft and transportation systems. NASA's plans to build a space station that will orbit 220 miles above Earth, for example, create a problem. Existing space shuttles are large and expensive. Could there be a better way to get crew members to the space station?

Armed with data from NASA, Walker is helping to answer that question with designs for small vehicles called personnel launch systems (PLSs). One design uses a modified 747 jet to carry a PLS and its six-member crew to 50,000 feet. There the PLS is launched from the jet to the station.

Significantly, Walker uses a CAD program, VIDI's Presenter Professional, as a design tool, not simply as an illustration tool. Once the project team comes to a consensus, he has a database of 3-D models that can be rendered as high-resolution images. Walker's IIci uses 32MB of RAM, a DayStar PowerCache 50MHz accelerator, and a YARC Systems VIDIxpress board. The 16MB RISC-based board has cut Walker's rendering time from 60 hours to 6.

That gives Walker more time to do what he does best—to dream of space and systems. One project is a lunar spaceship that would be assembled in Earth's orbit and then launched from a shuttle. In this design, huge tanks that hold hydrogen for the voyage are modified into living quarters once the vehicle has landed on the Moon.

Will such projects fly? Only NASA knows for sure. But thanks to Walker's high-quality renderings, officials can make an intelligent assessment of the best design.—CAROLYN BICKFORD



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If somebody sat down at your Mac and started snooping around your disk, which would embarrass you more?

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Best-Sellers

MAY 1992

Business Software

Months on chart	Last month	This month	
84	2	1	**Microsoft Word** *Microsoft Corporation*
75	1	2	**Microsoft Excel** *Microsoft Corporation*
25	—	3	**Adobe Illustrator** *Adobe Systems*
6	3	4	**Microsoft Office** *Microsoft Corporation*
71	13	5	**Aldus PageMaker** *Aldus Corporation*
62	4	6	**Microsoft Works** *Microsoft Corporation*
36	14	7	**FileMaker Pro** *Claris Corporation*
36	5	8	**WordPerfect for the Macintosh** *WordPerfect Corporation*
17	—	9	**Aldus FreeHand** *Aldus Corporation*
60	8	10	**MacWrite II** *Claris Corporation*
5	10	11	**MacDraw Pro** *Claris Corporation*
22	6	12	**Quicken** *Intuit*
60	15	13	**MacDraw II** *Claris Corporation*
5	9	14	**Aldus Persuasion** *Aldus Corporation*
6	12	15	**Microsoft PowerPoint** *Microsoft Corporation*

Education Software

Months on chart	Last month	This month	
18	3	1	**Where in Time Is Carmen Sandiego?** *Broderbund Software*
37	1	2	**Where in the World Is Carmen Sandiego?** *Broderbund Software*
51	2	3	**Reader Rabbit** *The Learning Company*
23	4	4	**Where in the USA Is Carmen Sandiego?** *Broderbund Software*
62	5	5	**Math Blaster** *Davidson & Associates*

Entertainment Software

Months on chart	Last month	This month	
49	1	1	**Microsoft Flight Simulator** *Microsoft Corporation*
24	4	2	**Tetris** *Spectrum HoloByte*
28	2	3	**SimCity** *Maxis*
14	3	4	**SimEarth** *Maxis*
14	—	5	**Crystal Quest** *Casady & Greene*

Network/Data Communications

Months on chart	Last month	This month	
30	1	1	**PhoneNet** *Farallon Computing*
63	3	2	**TOPS** *Sitka Corporation*
16	2	3	**MacLink Plus** *DataViz*
18	5	4	**Timbuktu** *Farallon Computing*
53	—	5	**AppleShare** *Apple Computer*

Add-In Boards

Months on chart	Last month	This month	
13	1	1	**Macintosh IIsi NuBus Adapter Card** *Apple Computer*
4	2	2	**MacCon+ 30i Ethernet Card** *Asanté Technologies*
17	3	3	**Macintosh Display Card 8•24** *Apple Computer*
4	5	4	**Macintosh IIci Cache Card** *Apple Computer*
14	—	5	**Pivot** *Radius*

Utility Software

Months on chart	Last month	This month	
12	1	1	**After Dark** *Berkeley Systems*
23	5	2	**SAM** *Symantec Corporation*
19	2	3	**The Norton Utilities for the Macintosh** *Symantec Corporation*
5	3	4	**Suitcase II** *Fifth Generation Systems*
13	5	5	**Virex** *Microcom*

The AmCoEx Index of Used Mac Prices

Machine/RAM/ Hard Drive	Average Sale Price	Monthly Change
Mac Plus/1MB/none	$450	–50
Mac Plus/2MB/20MB	$725	–25
Mac SE/2MB/20MB	$850	0
Mac Portable/1MB/40MB	$1300	0
Mac Classic/2MB/40MB	$825	+25
Mac SE/30/2MB/40MB	$1750	+50
Mac LC/2MB/40MB	$1100	0
Mac II/4MB/40MB	$1750	+50
Mac IIsi/3MB/40MB	$1825	—
Mac IIcx/4MB/80MB	$2100	0
Mac IIci/4MB/80MB	$2850	+50
Mac IIfx/4MB/80MB	$4200	0
Apple 12-inch B&W display/board	$275	–50
Apple 13-inch RGB display/board	$625	0
LaserWriter Plus	$1150	–50
LaserWriter IINT	$1800	–50

Index provided by the American Computer Exchange of Atlanta, Georgia. It reflects sales during the week of February 20. Configurations include keyboard and exclude monitor and display board for noncompact models.

Source: Exclusive Audits & Surveys research from more than 250 Macintosh retailers and selected mail-order vendors. Covers sales during January 1992.

"Tim Says, If There's A Better Value In Peripherals Than Mirror's New 16-inch Color Display, Show Me...

Mirror 16-inch Color Display
$899 for built-in video,
with 8-bit $1299, 16-bit $1499,
24-bit $1699.

Tim Garcia, President
Gateway Area Macintosh Users Group
St. Louis, Missouri

To Screen The Full ror Products."

-Members,
Gateway Area Macintosh Users Group
St. Louis, Missouri

COLOR DISPLAYS

14-inch Color Display	$399*
• 16-inch Color Display	$899*
w/ 8-bit video card	$1,299
w/ 16-bit video card	$1,499
w/ 24-bit video card	$1,699
16-inch Trinitron® Display	$1,199*
w/ 8-bit video card	$1,599
w/ 16-bit video card	$1,799
w/ 24-bit video card	$1,999
• 20-inch ProView V	
w/ 8-bit video card	$1,799
w/ 24-bit video card	$2,299
20-inch ProView (Trinitron)	
w/ 8-bit video card	$2,499
w/ 24-bit video card ‡‡‡‡½	$2,999

MONOCHROME DISPLAYS

15-inch Analog Portrait Display	$449*
w/ monochrome video card	$599
15-inch Standard Portrait Display	
w/ monochrome video card	$499
19-inch Two-page Display	
w/ monochrome video card	$799
21-inch Two-page Display	$799*
w/ monochrome video card	$999

COLOR SCANNER

Mirror's top-rated 600 Color Scanner offers true 600 dpi scanning resolution, 24-bit color and a great price. Comes complete with Adobe Photoshop 2.0. $1,299 ‡‡‡‡

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• Automatic Document Feeder for scanning multiple pages automatically $549

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• 60 MB	$279	$339
105 MB (Q) ‡‡‡‡	$419	$479
210 MB (Q) ‡‡‡‡	$739	$799
330 MB	$1,139	$1,199
425 MB (Q)	$1,339	$1,399
425 MB (Q)	$1,339	$1,399
595 MB	N/A	$1,599
1 GB	N/A	$2,199
• 60 MB Portable	N/A	$299
• 105 MB (Q) Portable	N/A	$449

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88 MB SyQuest Drive	$649
1.3 GB DAT Drive	$1,599
CD-ROM Drive ‡‡‡‡½	$599
• Mirror CD Information Library (with drive purchase)	$189

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600 MB Optical Cartridge	$249
44 MB SyQuest Cartridge	$63
88 MB SyQuest Cartridge	$99

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All prices subject to change. Prices are quoted F.O.B. origin. *For built-in video ports. †You pay shipping costs. ® Trinitron is a registered trademark of Sony Corporation.

...So We Told Him Line Of Mirr

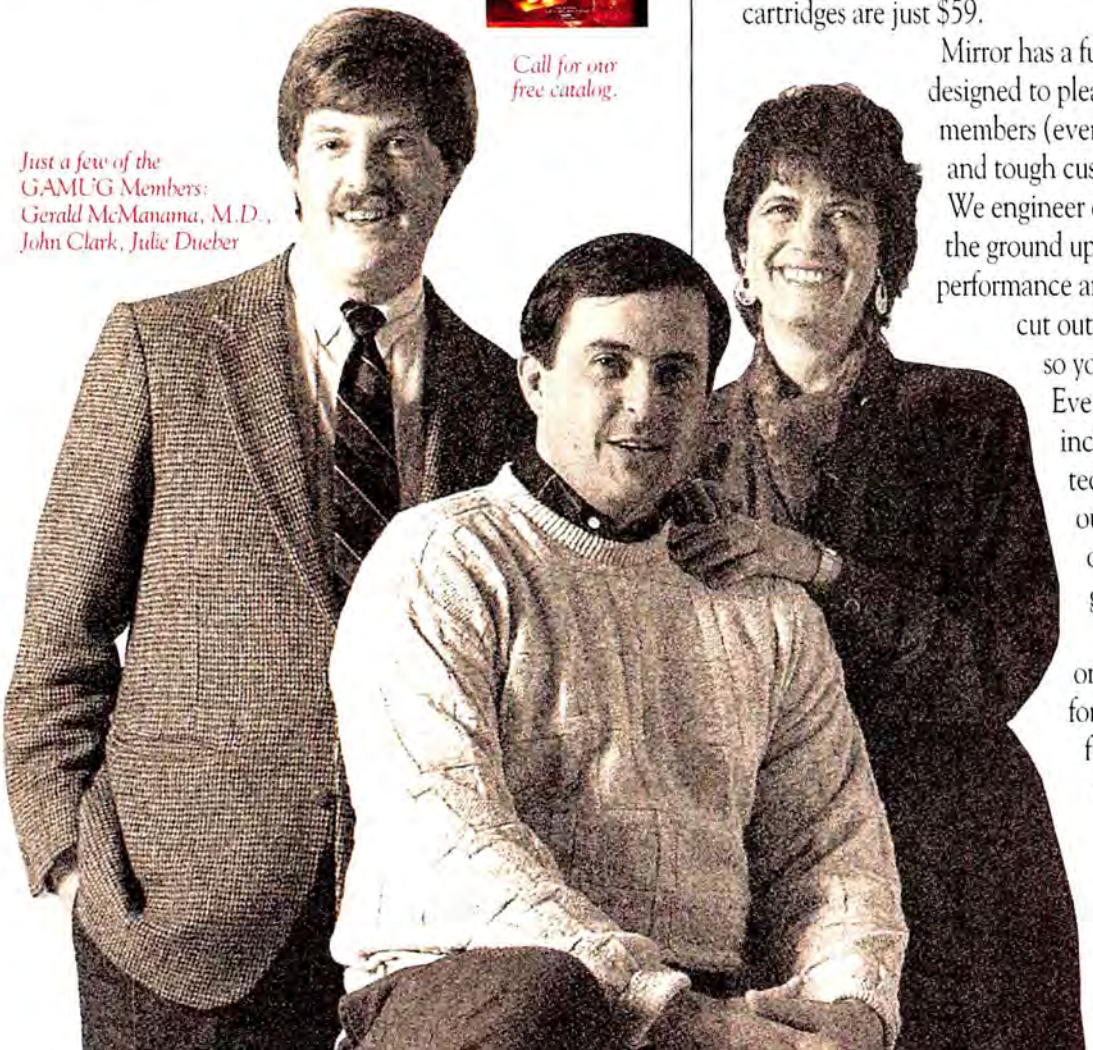
Impressing the members of a Mac user group is never easy, and if that group happens to be from Missouri, the task is all the more difficult. So we were particularly pleased to have the members of Missouri's largest user group tell us they were impressed by Mirror Macintosh peripherals.

It's easy to see why Tim Garcia thinks the new Mirror 16-inch Color Display is so exciting. Never before could you get the productivity and convenience of a 16-inch display and Mirror quality at such an attractive price. At only $899*, the Mirror 16-inch Color Display is perfect for publishing, illustration and scanning. Plug it right into the video port on a Quadra or add one of our high performance video boards (available in 8-, 16-, or 24-bit models) and you've got a hard working system that won't break your budget.

Call for our free catalog.

Another addition to the Mirror product line that's bound to build a strong following is the Mirror 128 MB Optical Drive. It gives you 128 MB of fast, reliable storage on a rugged removable cartridge that fits in your pocket. Priced at only $1,449, the 128 MB Optical drive is perfect for storing large graphics, database files or backups. Additional cartridges are just $59.

Just a few of the GAMUG Members: Gerald McManama, M.D., John Clark, Julie Dueber



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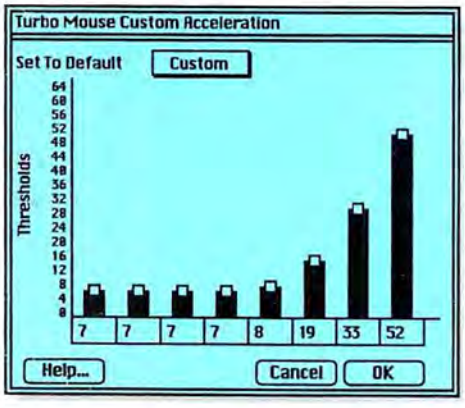

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