NEW! 68030 SE FROM APPLE

MACWORLD
The Macintosh Magazine

March 1989 $3.95
Canada $4.95

SE/30
Apple’s New Macintosh

6 Fax Modems Compared

Do Color Separations on the Mac Save Time or Money?

19 Accelerator Boards: 68020/030 Test Results

The 21 Best Utilities for the Mac II
Fasten your seatbelts, Mac® fans. You’re about to enter the Microsoft Zone.

Earlier this week I witnessed a demo of Microsoft’s products that left me feeling as enlightened as the day I first set my eyes on a Macintosh®.

Here’s a company with a reputation for singularly superior products. But what they showed me pushed the envelope of software productivity:

A complete line of products for the Mac that all work together.

The significance of which hit me like a ton of bricks when I saw them in action.

For instance, I saw a chart in your very favorite spreadsheet and mine, Microsoft® Excel, updated from within Microsoft Word 4.0 using just a few keystrokes. And then pasted into PowerPoint® for an incredible looking presentation.

And with just as little effort, the ever-capable Microsoft Word 4.0 was merged with Microsoft’s database application, File, for a mass mailing.

As if that wasn’t enough, I saw their versatile integrated program Works share files with Microsoft Excel and Word.

What really blew me away is Microsoft Mail. You can send and receive information between members in your workgroup even if they’re on a PC. Nice.

But the real beauty is that you can access Microsoft Mail directly from the File menu when you’re in Microsoft Word 4.0. No other company can offer that kind of integration. Or this kind:

A product line that all works together.

With other applications on the Mac. And even with such PC standards like Lotus® 1-2-3®, Microsoft Word 5.0 and WordPerfect®.

What’s more, every product is supported by on-line help and a comprehensive manual. Or you can call one number for unlimited technical support.

Obviously, I’m impressed. So much so, that I’ve asked Microsoft to send copies of their Macintosh product line brochure in time for our next meeting. If you can’t make it, you can always get a free copy by calling (800) 541-1261, Dept. 192.

Fellow Macphiles, man your Macs. Because we’re entering a new age of compatibility—or at least Microsoft is.

And I don’t know about you, but I plan on going along for the ride.
enthusiasts use the board.

This workstation is running Microsoft Mail

MICROSOFT WORD SWEEPS THE NATION!

A person of great vision will come into your life.

SER GROUP MEETING
WED. 6:00 PM
RE: CUSTOMIZING MS EXCEL

Microsoft
Making it all make sense.

Microsoft Works

Microsoft Excel

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On the Cover
It may look essentially the same, but on the inside the SE/30 is a whole new machine—in fact, it may become the next Macintosh standard (p. 112). (Photo by Paul Franz-Moore.)

Departments

13 Mac Bulletin
   Late-breaking news.

19 Commentary/Jerry Borrell
   Reflections on software trends.

31 Letters

41 David Bunnell
   Examining the latest virus invasion.

45 Steven Levy
   Advice for Mac owners with CPU envy.

61 State of the Mac
   Thom Hogan
   Our new columnist wonders if the Mac II is showing signs of age.

75 How To/Insights on QuarkXpress 2.0
   Steve McKinstry
   Exploit the power of the press.

199 New Products
   A quick look at new Macintosh hardware, software, and accessories.

227 How To/Quick Tips
   Lon Poole
   Avoiding ImageWriter paper jams, indents and subheads in MacWrite, finding time zones, and more.

237 How To/Getting Started with Tax Software
   Jim Heid
   Proceed with caution if you decide to computerize your return.

249 Updates
   The latest software upgrade news.

253 Where to Buy
   Contact information for products in this issue.

292 Best-Sellers

85 Macworld News

- Better Color for the II New color printers from Tektronix.
- Hot Wires A modem that transmits at 19,200 bits per second.
- Let Milo Handle the Math Paracomp's Milo executes common math operations.
- LightningScan A low-cost, hand-held scanner.

Plus OS/2 1.1, micro-mainframe connectivity, Hayes modems, CAD/CAM, broadband LAN adapter for the II, and more.
Reviews

156 Studio/8 1.0
Color bitmap painting software.

158 OmniPage
Scanning software package.

160 G330-70 Color Thermal Transfer Printer
Thermal color printer.

163 Findswell 2.0
Utility for locating documents in folders.

165 Springboard Publisher 1.0
Page-layout program.

Features

112 The Mac SE Turns 030
Bruce F. Webster
Squeezing the Mac II's power into the SE.

118 Processors: Is Faster Better?
Bruce F. Webster
We put SE and II accelerator boards through their paces.

128 Selecting a Color Separator
Steve Roth
Strategies for becoming a color Mac publisher.

138 Mac Fax: Not Ready for Prime Time
Dave Kostur
Fax modems might sound appealing, but can they really deliver?

146 Mac II Utility Kit
Thom Hogan
A grab bag of Mac II utilities that handle problems ranging from color to compatibility.

Should you automate your tax return? See "Getting Started with Tax Software" (p. 237).


156 Tabulating opinion polls on the Mac, Macworld News (p. 85).

172 StandOut
Desktop presentation program with style sheets.

174 Desktop Printer and Printer Driver
Brother HL-8 Laser Printer and Printworks for the Mac/Laser Version.

179 FastPath 4
Gateway for connecting LocalTalk LANs and Ethernet networks.

181 BackFax
Fax software for AppleFax modem.

183 Animated Adventure Games
Space Quest II: Vohaul's Revenge 1.50 and Police Quest: In Pursuit of the Death Angel 1.50.

186 DTP Advisor
Desktop publishing tutorial and project-management HyperCard stack.

188 V.I.P. 2.51
Interactive Macintosh software development.

190 HyperCard Entertainment Stacks
Amanda Stories, Volume I and II, and The Manhole 1.2.

192 Mac II 19-inch Monochrome Displays
Nutmeg 19 and DualPage Display System.

195 Window Shopping
Icon Factory, scriptExpert, and more.
MacGolf Classic
The Premier Graphic Golf Simulation.

A premium edition of the best selling Macintosh game in the world.

MacGolf Classic puts you into a full perspective 3-D simulation of realistic golf action. You match your skills against fairways, roughs, sand traps, water hazards and trees.

MacGolf's two courses are together with the four MacCourses, for a total of 108 holes, all in vivid full screen color on the Macintosh II.

MacGolf Classic gives you a player's eye view and an aerial overview of each hole with close up options. You have complete control of your position, ball placement, ball speed and direction, and selection of all 14 clubs. Spectacular digitized graphics and sounds add to the excitement.

MacGolf Classic is so close to the real thing it will improve your golf game. Every challenge should be this spectacular.
It used to be a fact of life: as the size of your PhoneNet® or AppleTalk® network went up, its performance went down. But the Shiva NetBridge has changed that for good. Just plug one in every 10th node or so and you'll keep all the performance you paid for. Because the NetBridge maintains performance by reducing network congestion. You can plug in additional Net Bridges to build an expanded 'internetwork,' including hundreds of Macs and peripherals. It's as easy to manage as it is to set up. The NetBridge lets you define, add and delete internetwork 'zones' to match workflow or office layout. You can also control file and peripheral access privileges zone by zone. And even get a quick status report on your entire network or any part of it. You can see at a glance how many devices are connected and where they are along the internetwork. Get all the network performance you paid for with a Shiva NetBridge. Call 1-800-458-3550, or write Shiva, 155 Second St., Cambridge, MA 02141, for the name of your nearest Shiva dealer.

Use Daily To Prevent Network Decay.

"Best value in AppleTalk bridges"

— MacWEEK

NetBridge™ by Shiva

We’re Putting Networks To Work™
Now you can buy your Macintosh II with a powerful tool which will dramatically increase your productivity with every use. A Radius Display.

Radius offers displays for every type of Macintosh user and every Macintosh software application. If you're involved primarily in intensive word processing and database management, we heartily recommend our FPD.

The Radius Full Page Display™ shows you an entire 8½" x 11" paper-like page. With a refresh rate of 69 Hz, it is virtually flicker-free.

Our display is perfectly suited for working with software like Microsoft Word and 4th Dimension.

If you're incorporating your word processing into page layout and design, we suggest that the Radius Two Page Display™ is clearly the choice for you.

You have the same flicker-free resolution of the FPD with a full two-page horizontal layout. Ideal for viewing a magazine spread. Essential for creating architectural plans.

Or, if you're putting photographs into your Macintosh, our Radius Gray Scale Display™ lets you create and manipulate life-like images in 256 shades of gray across the same expansive TPD.

Scan your photographs, then do your own retouching using Image Studio or Digital Darkroom. When you're ready, just print out on a LaserWriter or download to a Linotronic. You'll get startlingly beautiful and gratifying results.
For professional publishers and engineering designers, the Radius Color Display offers you the latest in digital design, Radius innovation and Trinitron color technology.

You can work with 256 brilliant colors at one time from the Macintosh palette of 16.7 million hues.

Create dazzling layouts with color photos. Draw dynamic 3D color illustrations. Design a new circuit board. Or, simplify a complicated catalogue. All in vivid, living color.

And should you need it, our Color Display is more than willing to work instantly in gray scale. With sharp, crystal clear resolution.

Best of all, no matter which Radius display you do choose, you get the classic Radius firmware.

All of our displays offer you Tear-off Menus which can be positioned anywhere on the screen. And built-in screen savers, control panel access, as well as adjustable menu and menu bar type size.

Our Full Page and Two Page Displays allow you to create bitmap screen dumps. And our Gray Scale and Color Displays let you save any part of your screen in a PICT file.

So before you buy your Macintosh II anywhere else, call 1-408-434-1010 for a brochure and the name of your nearest Radius Authorized Dealer.

It's clearly the thing to do.
MasterJuggler™
Add applications, windows and sound play to the talents of the popular Font/DA Juggler Plus and you have the amazing MasterJuggler. Now, one utility has the expertise to provide comprehensive management of fonts, DA's, FKeys, sounds, applications, windows and sound play.

In addition to being first to compress sounds, MasterJuggler has an extensive list of exclusive features including the ability to:
• Open applications and documents without returning to the finder
• Open multiple applications or play multiple sounds with single commands
• Switch between open applications from a pop-up menu under MultFinder
• Hide the current application windows before switching under MultFinder
• Bring to the front any selectable window in the open application via a pop-up menu
• View font faces and sizes in a file before or after opening the file
• Display and print name or number conflicts among the available fonts, DA’s, FKeys and sounds
• Set the default application font
• Assign sounds to seven different Macintosh operations and assign application—and alert—specific sounds
• Play random sounds and continuous sound
• Convert digitized sound files into Macintosh and HyperCard sound resources

So, watch the amazing MasterJuggler at work and see how easily your Mac learns to juggle even the toughest situations.

Suggested Retail $89.95

MasterJuggler
Add applications, windows and sound play to the talents of the popular Font/DA Juggler Plus and you have the amazing MasterJuggler. Now, one utility has the expertise to provide comprehensive management of fonts, DA’s, FKeys, sounds, applications, windows and sound play.

In addition to being first to compress sounds, MasterJuggler has an extensive list of exclusive features including the ability to:
• Open applications and documents without returning to the finder
• Open multiple applications or play multiple sounds with single commands
• Switch between open applications from a pop-up menu under MultFinder
• Hide the current application windows before switching under MultFinder
• Bring to the front any selectable window in the open application via a pop-up menu
• View font faces and sizes in a file before or after opening the file
• Display and print name or number conflicts among the available fonts, DA’s, FKeys and sounds
• Set the default application font
• Assign sounds to seven different Macintosh operations and assign application—and alert—specific sounds
• Play random sounds and continuous sound
• Convert digitized sound files into Macintosh and HyperCard sound resources

So, watch the amazing MasterJuggler at work and see how easily your Mac learns to juggle even the toughest situations.

Suggested Retail $89.95

Font/DA Juggler™ Plus
Juggling fonts, desk accessories (DA's), FKeys and sounds may be a feat for some utilities—but not for Font/DA Juggler Plus.

With an agility that would amaze even the keenest eye, Font/DA Juggler Plus provides unlimited access to fonts, DA's, FKeys and sounds without having to install them in your system file and eat up valuable memory space. In fact, Font/DA Juggler Plus sets the pace that similar utilities follow. For example, DiVFont juggler was the first to:
• Provide 100% Multifinder compatibility
• Automatically reopen user-selected files
• Incorporate a view function to inspect files
• Display sample fonts in nine styles
• Display and print a font or list of fonts in hundreds of size and style combinations
• Copy and renumber Fonts, DA's, Fkeys and Sounds
• Merge screen font style variations into one family
• Convert fonts to the new type NM
• Font Compression

Font/DA Juggler Plus continues to surpass even the newest release of its nearest competitor (...

Still only $59.95
Symantec Utilities for Macintosh (SUM) is Corporate America's #1 choice for fail-safe hard disk protection. Because in addition to six other indispensable utilities, SUM features Guardian, the ultimate software for protecting your Mac's hard disk before a crash. Just like an air bag in a car, Guardian stays out of sight, loading automatically every time you turn on your Mac. It protects invisibly by updating a "map" of your hard disk data. So that, in a crash, your data is safe. Because Guardian uses the "map" to locate and recover it.

Seven smart utilities. 5 Mice, MacUser magazine's highest rating. Tens of thousands of satisfied customers in hundreds of companies. No wonder Corporate America is turning to SUM for hard disk safety... in numbers.

Seven smart utilities. 5 Mice, MacUser magazine's highest rating.

Guardian—protects and restores hard disk data and deleted files. Disk Clinic—easy-to-use troubleshooting interface. Restores hard disk data in case you have a crash before you can install Guardian. Virus Protection—protects systems against "viruses." HD TuneUp—optimizes hard disks. Symantec Tools—views and edits data and resource forks of a file or volume in HEX or ASCII. QuickCopy—makes fast floppy copies. HD Partition—separates hard disks into separate volumes which can be encrypted.

Fine Mice, MacUser Magazine's Highest Rating

SEEVEN INDISPENSABLE HARD DISK UTILITIES:

Symantec Corporation, 10201 Torre Avenue, Cupertino, CA 95014. 408/253-9600.

Current SUM users can upgrade to new Version 1.1 by sending your current SUM disk and check or money order for $10.00 to SUM Upgrade, Symantec Corporation, 10201 Torre Ave., Cupertino, CA 95014. MacZap users call 408/441-5994 for a low cost upgrade. HD TuneUp, QuickCopy, and Disk Clinic are all trademarks of Symantec Corporation. Other products are trademarks of their respective holders. © 1989 Symantec Corporation.

Circle 237 on reader service card
Imagine what you could do with an advanced drawing program that was actually easy to use.

A program that could give you the freedom to create more with your Macintosh® than any other drawing program; even work as sophisticated as the illustrations in this ad.

That's the power of Aldus® FreeHand™ 2.0. And here are some of the things you'll be able to do with it.

1. Achieve unequalled control over your type. Curve text on a path, create stroked and filled type, and mix sizes, styles, fonts and colors in the same type block.

2. Not only can you import PICT, EPS and TIFF images, you can actually work with them. There's no easier way to enhance existing artwork.

3. Choose graduated, radial and patterned fills from our extensive library, or create your own PostScript®-language fill patterns for special effects.

4. Now PANTONE® Colors are available in Aldus FreeHand 2.0. So it's easy to see and specify the colors you want.

5. Use the autotracing function to convert any PICT or
scanned TIFF image to instant line art. It'll both save time and expand your options. **6.** Our blend feature allows you to transform one shape into another and produce airbrush effects with colors. **7.** A built-in color separation capability for spot and process color makes it easy to output separated film—saving hours of production time. **8.** Make short work of technical drawings with the most comprehensive set of advanced PostScript-language tools available; plus a set of familiar Macintosh drawing tools.

To experience creative freedom first-hand visit an authorized Aldus dealer, or call 1-800-333-2538, Department C-2 to order a free self-running demo disk.†

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†Offer expires April 30, 1989 and is good in U.S. and Canada only. The demo disk requires a Macintosh Plus, SE or II.

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WHEN YOU'RE MORE PRODUCTIVE, IT SHOWS.

MORE II: PLANNING, WRITING AND DESKTOP PRESENTATIONS.

Being MORE productive means everything you plan, write, or present is MORE organized. And it shows in everything you do. MORE II's advanced outlining makes it easy to capture, plan, and organize ideas into clear, action-oriented information. Simply type in "To-Do" lists, project schedules, proposals, plans... everything. MORE II automatically creates the outline for you.

Once you have an outline, every idea you plan, write, or present is MORE your artwork is done. Because organized. And it shows in everything you do.

MORE II's advanced outlining makes it easy to capture, plan, and organize ideas into clear, action-oriented information. Simply type in "To-Do" lists, project schedules, proposals, plans... everything. MORE II automatically creates the outline for you.

THE OUTLINE MAKES THE SHOW.

Once you have an outline, your art work is done. Because with a double-click of the mouse, any outline becomes a perfectly spaced bullet or organization-type chart instantly. Complete with company logos or art pulled in from other programs. Print the charts and get overheads fast. Or turn them into 35mm slides overnight. For even more graphics, click again and get every art tool imaginable. And because of MORE II's outline, when you change the master slide, the rest change automatically. So making 1000 slides is as easy as making one.

Click on another outline, add a few paragraphs using MORE II's full-power word processing and bingo. You've got a memo. Or a letter. Or a proposal. Add pages, pull in some charts and there's a full-scale report or a board-room quality presentation... totally spell-checked, with text, graphics, fonts and styles to rival anything created on any other program.

Now go live. MORE II includes advanced, live-action meeting technology for slide shows (complete with video effects like dissolves, builds, wipes, and fades) on any MAC connected to virtually any projection device.

BE MORE PRODUCTIVE TODAY.

For planning, writing, and presentations, MORE II shows results. It's the only software that helps you master all three stages in the art of persuasion. Without becoming an artist.

For MORE II product and upgrade* information, call (800) 228-4122 Ext. 747G.

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SYMANTEC.

*MORE owners, upgrade to MORE II now, send $89 plus $10 for shipping/handling (check or money order only) to MORE II upgrade, Symantec Corp., 19029 Torre Ave., Cupertino, CA 95014 or call (408) 964-1449. Suggested retail price $395. MORE and MORE II are trademarks of Symantec Corp., 19029 Torre Ave., Cupertino, CA 95014 (800) 253-9690. ©1988

Circle 215 on reader service card
Wingz Flies at Last

Wingz, the long-awaited spreadsheet from Informix Software, began shipping in January. The program includes innovative cell-definition capabilities, 3-D charting, and a scripting language that replaces macros. In Learn mode Wingz displays mouse and keyboard commands within the scripting language on a split screen. Perhaps Wingz's most impressive feature, however, is its extremely powerful interface-definition capability, which enables users to write their own command bar and pull-down menus and save one or more interfaces for each application.

Wingz sells for $395. For more information, contact Informix Software, in Lenexa, Kansas, at 913/492-3800.

Barneyscan Ships Color-Retouching Software

Barneyscan Corporation has added Barneyscan XP, a powerful color-graphics software package, to its Barneyscan Mac II 35mm color slide scanner. The software, which runs in either 8-bit or 24-bit mode, is compatible with Apple's 32-bit version of QuickDraw. It adds photo enhancement, manipulation, and retouching capabilities to the Barneyscan Mac II, which has a hardware resolution of 1000 dots per inch, with built-in software down-bling to 2000 dpi. The scanner comes bundled with the new software and retails for $8995. Anyone who purchased the scanner before the software was included will receive the software free. For further information, contact Barneyscan, in Berkeley, California, at 415/524-6648.

What's Next from Lotus?

Software giant Lotus Development Corporation has reportedly agreed to acquire all the assets of PS Publishing, a developer of Macintosh applications. Lotus, which does not currently offer a text and graphics package for the Mac, will gain the rights to PS Composer, a typesetting package, and PS Collage, a sophisticated graphics program. Both products are in development.

PS Publishing president Robert Simon will remain on board and oversee expansion of the Sausalito, California-based company's staff. For further information, contact PS Publishing at 415/331-1285.

4MB SIMMs from Clearpoint

Clearpoint Research Corporation is currently testing its 4MB single inline memory module (SIMM), which the company expects to make available in the first quarter of 1989. The SIMMs will run in the Mac IIx or the Mac II with A/UX installed. In a few months when Apple releases system software with true (or "clean") 32-bit capability, Mac II users with the 4MB SIMMs installed will be able to access 32MB of memory. Sophisticated graphics applications, complex mathematical programs, and engineering workstations will all run much faster with 32MB of resident memory.

For more information, contact Clearpoint Research Corporation, in Hopkinton, Massachusetts, at 508/435-2000.

Enhancing Illustrator 88

Adobe Systems has developed two new tools to enhance Adobe Illustrator 88: Collector's Edition 2—Patterns and Textures, and Adobe Streamline. Collector's Edition 2 is a series of 400 standard U.S. Geological Survey and American Institute of Architects patterns and textures, divided into the following five categories: basic graphic patterns; classical geometrical; ornamental; geological and cartographic; topographic and weather patterns.

Adobe Streamline is the high-speed new generation of Adobe Illustrator's auto­trace tool for converting bitmap artwork into Illustrator files. It is designed for desktop publishers, graphic designers, and technical illustrators.

Adobe has also announced ten additions to the Adobe Type Library: Avantin, Sabon, ITC Bauhaus, Caslon Open, Face, Life, Frutiger, Linotype Centennial, Serifa, Stempel Garmond, and Garmond 3.

Collector's Edition 2—Patterns and Textures lists for $225; Adobe Streamline lists for $395. Each requires only a Mac Plus and Adobe Illustrator 88, but a 2MB SE, II, or IIx and a PostScript printer are recommended. For further information, contact Clearpoint Research Corporation, in Mountain View, California, at 415/961-4400.

Many Fonts, Many Printers

Bitstream, a major player in the font game, has announced that it will soon release its entire typeface library for use with Macintosh-driven PostScript page-description language typesetters, typically used in commercial print shops and service bureaus. The Bitstream fonts will work on any PostScript-controlled typesetter, such as the Linotronic, the Tegra/VariType VT600, and Compugraphic's CG-9400-PS, and will offer the same quality and func-

(continues)
Fast New Graphics Board from Matrox

Quebec-based Matrox Electronics Systems has announced the NG-1281, the first Mac II color graphics board that can display 1280 by 1024 pixels. Intended for applications including high-end CAD, simulations, and process control, the board is scheduled to ship in April and will cost about $5000. A Mac II with the NG-1281 board will be able to run major CAD packages such as VersaCad and AutoCAD at a speed comparable to that of a well-equipped Apollo workstation. The board runs under Apple's 32-bit QuickDraw, also slated for April release. Expected drawing performance is in the neighborhood of 12.5 million 8-bit pixels per second and 35,000 characters per second. For more information about the Matrox NG-1281, call Matrox, in Montreal, Quebec, Canada, at 514/685-2630.

Beware of Green Stripes

Beware of the Mega-ROM 1.1, a green-striped CD-ROM disk that contains over 355MB of public domain and shareware files, produced by Nimbus Information Systems of Charlottesville, Virginia, in cooperation with Quantum Leap Technologies of Coral Gables, Florida. The data-eating, hard disk-crashing nVIR virus infected the disks during duplication. You don't have to worry about the red-striped demo version 1.0 or the blue-striped version 2.0 that replaced the infected version.

Quantum Leap discovered the virus shortly after shipping on Friday, December 9, 1988. It quickly notified all customers and began replacing the infected disks on December 12. According to Quantum Leap, the virus had infected a utility program bundled with hard disks manufactured by CMS Enhancements. CMS says that it is not sure if the virus originated with its utilities, but that it has implemented six or seven procedures to eliminate future occurrences. The company is also providing free software that eliminates the virus.

For further information, contact Quantum Leap, in Coral Gables, Florida, at 305/446-2477.

Image Capture 2

Scion Corporation has introduced the Image Capture 2 Board for the Mac II. The board allows users to capture, crop, and automatically center black-and-white or 24-bit color images in real time, and it requires no additional monitor. It also translates and displays images as a bitmap in 256 levels of gray, and provides high-quality halftone images when used with high-resolution output devices such as the Linotronic 100 or 300.

The Image Capture 2 Board lists for $1195 including software, and comes with a cable and, for a limited time, a free color upgrade. For further information, contact Scion Corporation, in Walkersville, Maryland, at 301/845-4045.

RenderMan for the Mac II

Levco has ported the 1.0 version of Reyes, the renderer that uses Pixar's RenderMan protocol, to the Mac II. RenderMan is a machine-independent interface between programs that produce imaging information and programs that use that information to produce high-quality renderings.

The Mac II version of Reyes 1.0 makes use of Levco's TransLink, a transputer-based accelerator, to perform the rendering. The renderer is source-code identical to Pixar's renderer for the Sun and other computers, and it supports advanced techniques such as motion blur, programmable shading, and texture maps.

The program operates in two modes: an interactive mode for tweaking images, and a batch mode for producing large-scale animations. It reads and writes PICT, PICT II, and the new 32-bit QuickDraw formats, as well as Pixar-format image files such as PICIO and Texture. The program requires at least one 1MB T-800 module containing four transputers.

Reyes 1.0 for the Mac II is expected to list for $2000. A developer version is scheduled for release in March 1989, and an end-user version for the third quarter. For more information, contact Levco, in San Diego, California, at 619/457-2011, or Pixar, in San Rafael, California, at 415/258-8100.

Viking Files Chapter 11

Viking Technologies has filed for bankruptcy under Chapter 11 in an effort to clear its debts and start over. A company spokesperson stated that Viking is still accepting and filling orders and has not ceased to do so at any time. The company distributes games and desk accessories including Cyclops and Menu Clock. Its subsidiary, Uptime, distributes Ez-Typer DA.

For further information, contact Viking Technologies, in Newport, Rhode Island, at 800/437-1033.
PRESENTING THE WRITEMOVE PORTABLE PRINTER.

Most printers are sentenced by their own sheer bulk to lifelong confinement on a desktop.

But now GCC Technologies has created a printer for the Macintosh with considerably more freedom than that. It's called WriteMove: the "biggest" printer ever to come in an incredibly small package.

WriteMove weighs a scant three pounds. It measures just 2" x 6½" x 10½" (Any smaller and you couldn't get the paper in.)

But it's the only inkjet printer of any size that gives you almost unlimited freedom to reduce and enlarge type and documents. Because it's the only one with outline fonts—imaging software that provides functionality otherwise available only with laser printers.

As a result, you can use WriteMove to compose documents with word processing software like Microsoft Word or desktop publishing programs like PageMaker. And then silentlyprint them out a 192-DPI resolution. In other words, you get much higher print quality than the ImageWriter II, for not much more money. Which could bring a whole new meaning to the phrase 'Freedom of the press.'

To exercise that freedom, see your authorized GCC Technologies dealer for a WriteMove demonstration. For the one nearest you, call (617) 890-0880.*

INTRODUCING THE MOST INGENIOUS PORTABLE PRINTER SINCE THE PENCIL.
Macintosh owners have a reputation for being fanatical about their Macs. And rightfully so, when you consider the elegance of the Macintosh user interface.

So when Novell set out to network the Macintosh with PCs, it was with one clear caveat: preserve the Mac environment. Create network software that would feel right to the pickiest of all Macintosh users. And none are pickier than the ones at Apple.

**Full AppleTalk compatibility.** Working directly with Apple, Novell's programmers created a version of NetWare® that is compatible with the AppleTalk Filing Protocol (AFP). It's an achievement hailed by Apple President and CEO John Sculley as “a very significant event for the industry.” And it means that Mac users can now get all the power and flexibility of the number one local area network in the world, without sacrificing any Macintosh functionality.

AFP compatibility also means that NetWare for Macintosh will be fully compatible with future Macintosh hardware and operating system versions. So you can take advantage of new Macintosh product releases as soon as they become available.

**Freedom to choose.** NetWare for Macintosh lets you connect Macs with a
work made to satisfy Macintosh user.

myriad of PC, minicomputer and mainframe environments, including OS/2. So you can choose the workstation environment that best suits your needs while communicating easily between dissimilar operating systems and sharing files and peripherals.

You get all the performance, security, fault tolerance and functionality of NetWare without changing the way you work with your Macintosh. And you get the power to transparently connect to over two million NetWare users worldwide.

To satisfy your need for a powerful Macintosh network, plug into NetWare—the network that passed the ultimate Mac test drive. See your Gold Novell Authorized Reseller, or call 1-800-LANKIND.

For more information, call from your modem 1-800-444-4472 (8 bit, no parity, 1 stop bit) and enter the access code NVMC17.

For network solutions, you should be seeing red.
Compare and see how easy choosing a hard drive can be.

"Superlative performance with exceptional utility software."
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<table>
<thead>
<tr>
<th>CAPACITY</th>
<th>SPEED</th>
<th>PRICE</th>
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<tr>
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We use superior 3-1/2" SCSI drive technology with access times as low as 12ms. Drives include 2 SCSI ports, easy SCSI address selection, terminators and quiet, efficient half-speed fan. Drives measure just about 3 x 6 x 9 and weigh in at 4-1/2 lbs. Drives are available in our award winning external case shown here or in easily installed internal models for Mac SE and II.

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Circle 145 on reader service card
Software: Where's It All Going?
Reflections on software trends

After a year-long spate of vaporware, preannouncements, and consumer beta testing, Macintosh software has entered a new era of maturity. A lot of good products are being shipped. One of the most interesting aspects of the new software is the thinking behind it all, the corporate strategies.

In the "ole days," a software company could bring out a single product, then sit back and write printer drivers and new versions—and make a good deal of money doing it. End of story. But with the examples of Microsoft and Software Publishing, developers began to think that they needed a product family. The broader the product line, I suppose the thinking went, the more likely a person would be to own several products from a single company—particularly if the products were good, with good support, upgrades, and similar interface functions across several products.

At first software developers took the approach of producing a product for each of the major categories. Companies would strive to develop a word processor, a spreadsheet, a database. Such an approach means that precious retail shelf space is absorbed by the major developers' products, which the dealers often prefer. When a dealer works with only a few companies, training store staff is easier, paperwork is simpler, and there may be better volume discounts for dealer purchases. And it's often easier to sell products from a well-known company. If the products are respected and attractive, dealers want nothing more. So the shelves tend to fill up with multiple copies of software from the better-known developers.

Today, software is evolving beyond product families and the advantages they offer in training, distribution, and retail. Developers want to build products around core technology or around a central product. This idea somewhat resembles the approach to core code or development platform technologies espoused by Bill Gates and others. Gates promotes the concept of a common core of code that is adapted to different computers. He has two reasons: first, software developers need to amortize the cost of development over several platforms; and second, software companies cannot afford to maintain huge staffs of programmers for different machines.

In the future, 80 percent of applications code will be common and the remainder will relate to the unique interface of a given machine, says Gates. (Some suggest this smacks of programming by committee toward the lowest common denominator.)

Core Technology

The core technology concept is similar to the core code concept, but goes beyond it in focusing on how different applications should communicate with one another. Microsoft makes no bones about planning to accomplish this. At present, Microsoft's applications share very little underlying code. For instance, Microsoft Mail, PowerPoint, Word, Excel, and Works are each quite distinct.

Microsoft's goal is to ensure that a future version of Mail will allow users of the Microsoft product family to gain greater efficiency. Say you're working on a document in Word, and you want to incorporate the file or a portion of it in a message. Ideally, you could just select the text and send it as an E-mail message from within Word. Instead, you must quit your application in the Finder, launch another application, and paste or attach material. It's easier, of course, if you have MultiFinder. Then you can open multiple windows and copy and paste between applications. Still, going back and forth for operations, such as making changes to a graphic you want to incorporate into Word, is a real pain.

The basic concept of core technologies is that data flows between applications and documents—with minimal work on the user's part. This is where you say, "Yeah, Microsoft developed Hot Links some while ago, and they already do that." True, but only for some products, and the usefulness is quite limited.

The next step is the development of links that update other documents or applications automatically. Let's say you make a change in your organization chart. You want a copy sent to your printer, you want the employee manual updated, you want a copy sent via E-mail to all your employees.

Or let's use this column as an example. When I'm done I want to send it to my editor, Deborah Branscum. I want a notice sent to the managing editor to notify him that it's in to Deb. I want a copy sent to a PageMaker template and printed out in the production department so that its length can be determined. And I want the same printout sent to the art department so designers can consider layout alternatives. What's more, I want to push one button to do all that. Automatic links between programs will make (continues)
AutoCAD® on the Mac®. A new window of opportunity opens.
AutoCAD, the world-standard CAD software, now runs on your Macintosh. Your designs reflect the quality of your thinking. And your drawings reflect the quality of your designs. Put AutoCAD on your Mac II and nothing gets lost in the translation.

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AutoCAD has been refined through ten major upgrades. You get menus full of powerful, high-precision drawing and editing commands, numerous drawing entities, and a multitude of easy-to-use features. You can window, zoom, fillet, scale, layer, annotate and associatively dimension, hatch, stretch and scale. And a simple click can undo anything or everything.

AutoCAD on the Macintosh also supports the features that have made Apple the acknowledged leader in user interface design, offering pull-down, tear-off, and pop-up menus, complete support for MultiFinder and the Mac windowing system, along with file dialog boxes to make access to your drawing files quick and easy. Clipboard support allows the transfer of AutoCAD drawings to a wide variety of Macintosh applications software.

A Better Perspective. AutoCAD is an advanced three-dimensional molder that helps you solve design challenges on your Mac the way you would with physical prototypes. AutoCAD makes 3-D easy with user-defined construction planes, dynamic viewing and multiple viewports.

You can also model complex surfaces with AutoCAD using sophisticated tools such as tabulated cylinders, surfaces of revolution, ruled surfaces and Coons patches so you can represent surfaces accurately.

For even greater utility, AutoCAD provides entity handles that allow external applications to associate alphanumeric information, such as part numbers and capacity ratings, with graphical elements in the drawing. This associativity is creating an entirely new generation of useful third-party applications software.

A Reflection of You. AutoCAD is an open-architecture system including AutoLISP, an embedded programming language that lets you program AutoCAD to reflect your way of doing things. Add your own menus to enter your own commands, write macros, develop custom symbols and drawing functions, or program standard procedures for document production and management.

Hundreds of third-party programmers have used AutoLISP to develop entire systems that make AutoCAD perfect for applications ranging from chemical engineering to technical publishing. Many of these programs run on the Mac II and more are on their way.

Maintain Your Standards. AutoCAD is the most extensively used, most broadly supported, widely taught design software in the world. AutoCAD is backed by over 1400 highly-trained dealers and 150 Authorized Training Centers in 60 countries. We'll make sure you get what you expect from your CAD investment. That's what standards are all about.

Opportunity knocks just once. The CAD software you standardize on today will determine your productivity for years to come. To see a demonstration at the dealer nearest you, call Autodesk at 800/445-5415, extension 25, at your earliest opportunity.

AutoCAD makes Macintosh a standard player in CAD applications ranging from architecture to automated manufacturing. And AutoCAD is the standard for communication in the CAD world. AutoCAD's file portability allows seamless transfer of drawings and applications between different platforms and operating systems—without conversion to a generic format.

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Commentary/Jerry Borrell

that possible. No doubt I'll have to walk through all of those steps once to create a macro-like function that performs all the steps. But the point is that applications will talk to one another in many new and useful ways.

Several companies are obviously thinking about how to do this: Microsoft, Aldus, Cricket, Letraset, Lotus (yes, I said Lotus), Claris, and Ashton-Tate. True, not all of those companies have a word processor, a spreadsheet, and a database. But the core technologies approach is extending to all areas of software, from the big three of applications to areas such as desktop publishing, graphics, and communications. You should expect to see strategic alliances between companies whose products do not compete but who can benefit from easy transfer of data.

The motivation behind this evolution is the hope that companies can lock customers into their product families. A company's success will depend upon how well it manages to build integrated applications based on core technologies.

There are two possible results. Newer developers with innovative products may be frozen out of the market by the bigger companies. Or Mac software may be on the way to a new and higher level of performance and efficiency.

System 7.0

Additional advances will depend upon what Apple does next. More significant changes in how we use software will be based upon the evolution of system software. And Apple is not simply sitting by while these trends develop.

Despite the fact that Apple spun off its software division to form Claris, many developers believe that the company has merely changed its approach and is still in the business of applications software. For example, AFP, the AppleTalk Filing Protocol included with Apple system software, allows the Mac to translate files from one computer to another (PC to the Mac) and from one application to another (Lotus to Excel). Formerly these functions were provided by third-party products such as DataVis from Tangent Technologies. Macros once created by Affinity's Tempo can now be accomplished with MacroMaker in Apple's system software. Communications links once made through products from Alsia Systems or
To an architect, fine hairlines like ours are pure poetry.

Auto-tracing built this banana from a scanned-in produce ad. In split seconds.

Multi-point bezier curves make drawing a bunch easier. Colors are added in layers.

Auto-resizing helped this V.P. of Sales display the fruits of his labor, graphically.

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What are mere words compared to WYSIWYG text with special effects?

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Use our Bezier curves and smooth polygons to build any shape. Add or delete control points and join, split, open or close them at will.

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Like we said: go bananas.

But do it soon. While we’re still throwing in Canvas 2.0 DA for free. It’s a special desk accessory version that puts some 80% of these features right under your Apple menu.

And if all this hasn’t convinced you that Canvas 2.0 is the drawing program you’ve been waiting for, send us $9.95 to receive a fully featured Demo Copy. With which you can finish convincing yourself.

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These unretouched drawings were created in Canvas 2.0 and output to a Mirrus film printer.

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 Heck. Even Microsoft® believed him enough to include a copy with their popular word processor.

 Well.

 All we can say is "Sorry, Bill." And "Sorry, Microsoft," too. Apparently even smart guys like you get fooled sometimes.

 Because at 100,000 root words — and an utterly humongous 1.4 million combined synonyms, antonyms, related, compared and contrasted offerings — our BigThes weighs in at some 6 2/3 times the vocabulary power of that little program you're using.

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Commentary/Jerry Borrell

operators have room to innovate within a stable environment.

If Apple were able to advance the Finder by taking the concept of software modules and building hooks into system software so that applications could communicate or interact more easily, it would allow third-party developers to thrive and innovate while moving the Mac interface forward. Apple could spend its precious resources on advancing the underlying functions of system software rather than using staff and time in application development. It might also dissipate some of the fervor developers express toward advancing the interface along nonsanctioned paths (Silicon Beach's SuperCard is an example of this).

I think pragmatism will force Apple to limit the kinds of functions it can add to system software. But I'm often wrong, and in some ways it looks like Apple will continue to add application functions to system software such as graphics, E-mail, word processing, and spreadsheets.

Apple may need to create products that demonstrate the environment that it envisions just as MacPaint and MacWrite were considered (at times) to be demonstrations of the Macintosh approach for third-party developers.

Frankly, I don't know if an open software architecture approach is possible with existing operating system code, or whether this will require the complete rewrite of system software for 1990 already announced by John Sculley. As a new version of the Finder is said to be a couple of years away, it's possible.

I do know that Apple wants to take advantage of the built-in memory management unit of the Motorola 68030. I also believe that the 68030 will become the base level CPU chip for the Mac over the next several years and that the system architecture will more easily evolve from the 68030 toward future hardware and software architectures.

What's It All Mean?

Apple's next version of system software is all-important. It is such a complex release that there may have to be an interim release (forget the numbers), but the next one will determine how the Mac will fare in its battle with OS/2 and PS/2 machines. You can bet that we'll be looking closely when it comes out.
It's quite simple, really. All we're saying is that the limited scale spell checkers that come tacked onto today's word processing packages are, in a word, underpowered.

Oh, they work okay as long as everyone's content to use more or less the same words all the time. But then, sameness is not exactly a highly regarded concept amongst Macintosh users.

Thank goodness there's an alternative. A program designed to help you forge ahead into brave new worlds of verbal individuality, with Merriam-Webster at your side.

**Spelling Coach Professional.** A program applauded regularly over the years, by reviewers and users alike. Many felt Coach's powerful and cleverly interwoven spell checking, dictionary definition and thesaurus functions were unbeatable. Hypertext taken to the final frontier.

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55 fonts standard
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Optional disk for approx. 500 fonts

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Circle 327 on reader service card
Letters
A forum for Macworld readers

Tipping the Scales
In "The Great Write-Off" (November 1988), Jim Heid compared three word processing programs and eventually declared Microsoft Word to be the winner. Although Heid's comparisons are quite good as far as they go, he did not include symbolic referencing. If I have a 20-page report with 19 figures in it and I insert a new figure as the first figure in the document, I must go meticulously through the article and change all counting numbers referring to figures. Unless, of course, I am using FullWrite Professional. Then the program itself will do the updating. And figure counting is just one example of FullWrite's superior symbolic referencing ability. If Heid had considered this variable, then at least for users who have to create long and complex documents (such as scholarly articles), the scales would have come down resoundingly on the side of FullWrite.

Jon Sticklen
East Lansing, Michigan

Still Staggering
Many thanks for Jim Heid's superb review of the three leading word processors ("The Great Write-Off," November 1988). As a beta tester for FullWrite, I winced audibly throughout, but I can find no fault.

I upgraded my SE to 2MB so that I could use FullWrite. I recommended it to friends and was responsible for my department ordering it. However, what reviewers had little chance to test—and what a large number of users need—is the use of the word processor for large documents. Recently I had the gruesome experience of transferring a 317-page document to FullWrite. And I am still staggering.

FullWrite claims to be chapter-oriented; hence, I formatted a segment of the work into a document of 100 pages with 25-page chapters, but even so, in the

Corrections
The phone number for Spectral Software, maker of MacAuto (New Products, November 1988), is 415/964-9580.

MacNet provides access to Connect's PC/Mac network services (New Products, November 1988).


Everex and Tecmar tape drives do use write verification ("Why Say No to Back-up?" November 1988).

To enter a user ID and a password on the same line, you must separate them with a backslash, not a semicolon (Insights on CompuServe, January 1989).

The phone number for Advanced Logical Software, maker of Anatool 2.0 and BLUE/60 (Letters, January 1989), is 213/653-5786.

The phone number for Sicline Corporation, maker of the Si3033 accelerator board, is 408/734-9151.
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Letters

last chapter the application slowed to a crawl. I could type four letters before one of them showed on the screen. To move the cursor a few lines required at least five seconds, and to close the document, I waited five minutes! Ashton-Tate advises reducing chapters to 10–15 pages, which is ridiculous, and doesn’t change the end result. If I were to break up the book into a series of documents, I could use neither the Index Entry nor the Contents function.

Spurred by your review, I also tested WordPerfect (its manual recommends a maximum length of 70 pages per document), only to find that it took an eternity to get to a given page, even with a 67-page segment. On the other hand, Microsoft Word (which I hate) reacted instantly to the Go To and Close commands and kept up the same typing response speed at the end of the document as at the beginning, even when pushed to 167 pages. (Word 3.0’s manual recommends a maximum of 250 pages per document, but offers the opportunity to merge documents, thus affording the indexing and table-of-contents possibilities.)

Conclusions: It is impossible to write a full-length book with FullWrite and almost impossible with WordPerfect. With great regret, I am returning to Microsoft Word. I will miss the Posted Notes, the convenient pagination, the sidebars, and the ease of use of FullWrite, but its sluggishness and the impossibility of long documents give me no choice.

Blake Lee Spahr
Berkeley, California

A Prized Stack

I was disappointed that Steve Drazga’s Developer Stack did not win the grand prize in Macworld’s SuperStacks contest. Because his stack is a useful tool provided at such generous terms to the Mac community, I hope you will reconsider your decision. Steve Drazga deserves credit for opening up HyperCard development to the beginning user, as he has for me.

Daniel W. Collison
Detroit, Michigan

We certainly didn’t mean to damn with faint praise Developer Stack or the other applications that received Honorable Mention. We meant to honor them as the outstanding works they are. Although the judges had some reservations about the user interface of both Developer Stack (continues)
Now Macintosh And Wang Can Communicate And Nothing Gets Lost In The Translation

Transferring files from one system to another is somewhat pointless if you spend most of your time reformatting the data. Which is why we introduced MacLinkPlus for Wang. Whether you're running a Wang VS system, an OIS or a Wang PC, MacLinkPlus provides a complete solution for document transfer and file conversion.

MacLinkPlus includes the entire collection of more than 40 translators—the key to accurate conversion of file formats such as rulers, indents, bold and plain text styles, margins, tabs, underlines, superscripts, subscripts, paragraphs, and tabular tables. If it looks a certain way on a Wang, it will look the same way on a Mac. And, of course, vice-versa. No time-wasting and difficult pre-conversion to ASCII or print files is necessary.

MacLinkPlus doesn't stop there, however. It offers full Wang VS Workstation capabilities, allowing easy access to Wang word processing, data processing and electronic mail. All 32 Wang Workstation functions can be executed through familiar Macintosh menus or command keys, and you'll even be able to use the mouse on Wang displays.

Software for the Macintosh, software for the Wang (8" or 5.25"), software for the PC and a direct connect cable (you can use a Hayes or compatible modem if you prefer), is included in the MacLinkPlus package; everything you need to be up and running in minutes.

So call (203) 268-0030 for your nearest DataViz dealer, because no matter which Wang system you're using, there's a MacLinkPlus solution to connect it to the Mac.

Who says you can't have the best of both worlds.
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 Maarworld is a popular item around the office, and your copy may wind up on someone else’s bookshelf. But you can replace your “borrowed” copies of Maarworld easily. Back issues are available, postage-free, for just $6 each while supplies last.

Send your check or money order, payable to Maarworld, along with the issue date and number of copies desired to Maarworld, 144 Townsend Street, San Francisco, CA 94107.

Letters

and Robertson Reed Smith’s Stack Starter; both are valuable tools for stack builders. Developers like Draga and Smith have made exceptional contributions to the vast community of stack designers.—Ed.

The Beast Bytes Back

In response to your review of our TG-4000 tape backup unit (“40MB Tape Backups,” Reviews, November 1988), we at Tallgrass would like to suggest an alternative to the analogy of Beauty and the Beast: Form Follows Function.

We are in the systems business, and the 4000 was designed to provide systems flexibility to our customers. Although you can order it as a stand-alone tape backup unit or as a stand-alone disk product, the “Beast” was also designed to be field upgradable. That same functional cabinet can house a 40MB tape drive plus a 40MB or a 100MB hard disk, or dual disk drives, if you prefer. Additionally, the Tallgrass 4000 user has the option of beginning with any component and upgrading with any other at any time. That translates into an external SCSI disk tape combination with capacities from 40MB to 200MB.

We feel that, coupled with the best pricing and the only three-year warranty in the industry, the Beast is the best buy for your backup buck.

David E. Horton
Tallgrass Technologies
Overland Park, Kansas

Scanners Revealed

I want to commend Jim Heid for his clear and accurate article on scanners in the November issue of Maarworld (“Getting Started with Scanners”). Subjects such as scanned images and halftones are becoming increasingly important, yet are difficult for most people to grasp. This article should go a long way toward demystifying the subject.

Steve Carlsen
Aldus Corporation
Seattle, Washington

Who Keeps the Books?

Your article “Who Keeps the Books?” (September 1988) was excellent. It shows that you did your homework quite well. (I write accounting packages for the MS-DOS world.)

What interests me is the address and phone number of P. G. Backhelpers, whose reclining chair you featured so promi...
Are Your Files Stacked Against You?

Stack them in your favor with XTreeMac™,
The Complete Disk Management Environment.

With the Macintosh® it's so easy to organize files in folders...within other folders. But climbing through stacks of windows to get to the right file takes time. Opening, Closing, Resizing, Rearranging.

With XTreeMac™ you can perform your disk management tasks from a single window. No matter where files are located — on hard disks or floppies. Disk management has never been easier.

XTreeMac's unique Directory Tree™ lets you see your disk organization at a glance.

XTreeMac's Deskpad™ provides a convenient surface for gathering files, folders and applications from multiple disks.

XTreeMac is an integrated disk management application that enhances Finder®. Using familiar Finder commands, you can copy, move, rename, or delete files right on the Directory Tree or Deskpad. And you can find and launch applications directly from XTreeMac. You'll save stacks of time.

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Circle 470 on reader service card
Letters

Currently in your article. All my years of sitting at my computer have led to a back problem that just might be helped by this company's products.

William McDonald
Leeds, New York

P.G. Backhelpers is a retail store in Fairfield, New Jersey; that caters to its own geographical area because the owners feel they can properly serve customers only through personal consultation. They suggest that those outside the area consult a physical therapy practice, orthopedic surgeon, or chiropractor to find a local source of similar products.—Ed.

Plastic Fantastic

What happened to the plastic mailing cover to which we have become accustomed? *Macworld* used to arrive in mint condition. The October 1988 issue, however, looked like it had been in a dentist's reception office for a few months. The cover was scratched beyond recognition.

I have every issue from your premier issue in 1984, all in perfect condition. Please bring back the plastic bag.

Oriam Watts
Sidney, Montana

We apologize for the inconvenience. Your copies should once again be arriving safely wrapped in plastic.—Ed.

Prolix Charm

Since reading the words gormless sycophant in Jerry Borrell's column in the October 1988 issue (my spell checker didn't choke on either word), I haven't been able to watch the *Tonight Show* without doubling up with laughter. Thanks very much for the bit of joy those words inspired.

Gordon Snyder
Sacramento, California

Letters should be mailed to Letters, *Macworld*, 501 Second St., San Francisco, CA 94107, or sent electronically to CompuServe (70370, 702) or MCI Mail (addressed to Macworld). Include a return address. We regret that, due to the high volume of mail received, we're unable to respond personally to each letter. We reserve the right to edit all letters. All published letters become the property of *Macworld.*
Put a Seagate drive at the core of your computer

If you’re one of the millions of people who have adopted computers with an SCSI interface, then you should be one of the millions who can use a drive from Seagate, the world’s largest manufacturer of SCSI disc drives. These drives come in a wide variety of sizes, capacities and access times, making them ideal for every application.

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Try Full Impact and See Why Excel Doesn’t.

A recent tracking study performed by Numerical Understanding Methods Bureau, Inc. has determined that constant and prolonged exposure to spreadsheet output may result in cases of extreme drowsiness and lethargy. Contributing factors have been numbers with no context, lack of graphic elements, and limited abilities in the treatment of text, among other issues.

### Spreadsheet Output

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### Excitement Level

- **Brain:** 27.6%
- **Agitated:** 11.2%
- **Intoxicated:** 10.3%
- **Drowsy:** 12.6%
- **Indifferent:** 8.9%

### Are Spreadsheets Effective?

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</table>

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It's the difference between merely analyzing something, and actually seeing what it means.

Introducing Full Impact, from Ashton-Tate.

Full Impact is a spreadsheet program designed expressly for the Macintosh that goes beyond the basic number-crunching capabilities of Microsoft Excel: it gives you the ability to easily turn your work into clean, crisp—and understandable—documents.

How? By letting you take full advantage of the way you're already used to working on the Macintosh.

Start by simply entering your data. Then, select all or part of it, and instantly create a chart using those values—simply by clicking on the appropriate chart icon from the icon bar.

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But lest you get the impression that Full Impact is merely a presentation program disguised as a spreadsheet, consider this: with over half a million usable cells (far more than any other Macintosh spreadsheet), Full Impact gives you more than enough room to handle even the largest projects. And more than enough speed to recalculate them quickly.

You can work with as many as eight spreadsheets simultaneously. And then link them all together. Or create powerful, time-saving macros, and even customizable icons to tie them to.

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We'd like to make it easy for you to get the full impact of Full Impact. Just call 800 437-4329, ext. 3501, and we'll send you a full-capability product sampler.

What could be more impactful?
If you don't back up data, you can throw your entire office into reverse. That's the most eloquent argument for backing everything up very carefully. And for using Jasmine DirectTape™ to do so.

DirectTape is different from most Mac backup systems. The reason? It's fully Apple compatible. So we work with the data on any Apple-originated tape, regardless of the software that put the data there. We also have full support for the major applications that will soon be packaged on software cartridges. Which means besides data transfer, DirectTape also expertly handles software distribution.

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David Bunnell

Safety Last?

Is Robert Morris guilty as charged, or shall we let him off with a slap on the wrist?

It had to happen. Someone was bound to write a virus that would invade a large number of computers and gain national attention. Even though this invasion occurred last fall, it's worth discussing now, because any computer virus raises issues beyond the immediate havoc it creates.

The news coverage about Robert T. Morris, a graduate student at Cornell University, and the virus he wrote, was so pervasive for a time that you'd think he had perpetrated something akin to a nuclear meltdown. But although it created many headaches and much embarrassment, Morris's virus, which invaded some 6000 university and defense computers linked to ARPANET, did not cause any lasting damage.

I had to laugh at much of the hysterical tone (and inaccurate information) of the news coverage of this story. The reporter on one of my local TV stations kept using worm and virus interchangeably. Had he read the November issue of Macworld, he'd have known that a worm is a piece of code that eats into a program's memory but does not travel, while a virus replicates itself, often in order to rewrite code, erase sectors, or even bomb whole programs.

It seems to me that Morris has done us a big favor by exposing the vulnerability of many of our computer systems, which too often are like houses with doors and windows that don't lock. They invite mischief. And mischievous is how we should describe this incident, rather than malevolent. Just as vandalism is mischievous, I think letting a virus loose is destructive, but it doesn't call for life imprisonment.

What Morris has done is a variation on the story we've gotten accustomed to hearing, that security bloops most often happen in mundane, hands-on situations rather than at the conceptual, "top brass" level. Remember The China Syndrome? It was a stuck valve, not a geopolitical shoving match, that caused the destructive cycle to kick in. Same with a virus. By and large, creating one is intended to be more of a nose tweak than a punch to the solar plexus.

One aspect of this newest postvirus debate revolves around Morris himself. Should he be severely punished so that other hackers will think twice before attempting similar feats, or should he be put on a high-tech work furlough to use his considerable skills in making computer systems more secure?

Unlike some hackers, I don't see Morris as a hero, the D. B. Cooper of computerdom. The old hacker ethic that encourages invasion and tampering with computer systems evolved at a time when mainframe computers were controlled entirely by large institutions. Hackers believed that they had a certain moral imperative to liberate computer power. Although my experience has been solely on the personal computer side, I was sympathetic to these early mainframe hackers. The computer priesthood had to be infiltrated, and hackers were the first to recognize that unless computer power was in more hands, computing in general could all too easily become an oppressive institution in its own right. Now, years after that political struggle began, the computer world is completely transformed, and the hacker ethic needs to be updated. Considering the lip service they have given to computer democracy, hackers themselves have created an elite, and the kind of computer power they have espoused is still not in enough hands. What Morris and other adept hackers have done in the realm of breaking into systems is still outside the ken of most users. It's not so much that power is still synonymous with break-in, but that the skill to program, customize, and spread certain functions throughout computer systems can be put to some good uses.

But I don't think Robert Morris should be tarred and feathered, either. It seems clear from his public statements that he never intended his virus to cause massive havoc. It was simply more clever (and traveled further) than he expected. Apparently he is remorseful about the chaos he caused, and I doubt that he will go this far again. It turns out that Morris is a super-talented programmer, and it's unlikely that many other programmers have the skill to create similar viruses. He has the potential to make major contributions to software development and computer security. Directing his skill to these more positive (and lucrative) pursuits seems to be the best course of action. I've always liked the fact that some reformed burglars go into the business of advising us on how to secure our valuables. It makes sense to me that they would have the best advice. So could Morris.

Meanwhile, we all need to take precautionary measures to ensure the integrity of our systems. A more malevolent hacker might strike next time. Don't forget to install locks on your doors and windows, and then use them. □
THIS IS WAY TOO EASY. UNSURPASSED NUMBER-CRUNCHING POWER. CHARTS SO GRAPHIC, THEY JUMP OFF THE SCREEN INTO PAGE PERFECT PRESENTATIONS. YOU'RE ACTUALLY LOOKING FORWARD TO YOUR NEXT MEETING. BECAUSE YOU'RE NOT JUST GOING TO SHOW THEM NUMBERS. YOU'RE GOING TO WIN THEM OVER WITH WINGZ™.
### The First Graphic Spreadsheet

Circle 360 on reader service card

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For a limited time only, the instructional video, "Learn To Fly," is yours free when you buy Wings. You'll learn about the basic spreadsheet, advanced graphics capabilities and HyperScript™ programmability. And it's absolutely free. But you must hurry. Call now for the location of your nearest Wings dealer, 1-800-331-1763 ext. 3800. In Kansas, Alaska or Canada, call (913) 492-3800.
Our new Mac II modem has great inner strength.

From the moment you slip Ven-Tel's new Mac2400E™ internal modem into your Mac II, you'll see that it's quite a bright performer.

Using MNP Level 5 data compression to send and receive at a sharp 4800 bps, the Mac2400E greatly reduces telephone time. Which, of course, nicely reduces telephone bills.

Plus, the Mac2400E supports both X.PC and MNP Level 5 error correction protocols. So you can rest assured that the integrity of your data won't be dimmed.

In the unlikely event the Mac2400E doesn't perform, it's covered by our free, five-year warranty. However, before it comes to that, just call our 800 Help Line. Ven-Tel's technical staff can probably shine a little light on the problem and get you going again quickly.

So don't just put any modem in your Mac II. Go with the one that outshines all the rest.
On the day after, I found myself in a room with two objects of desire. Black cubes stuffed with unspeakably wondrous digital mojo. Machines that had Silicon Valley squirming with ecstasy. (Maybe the whole country squirming with ecstasy.) These were prototypes of the Next computer, which had been introduced the previous day.

You have heard news of this event perhaps? It was described as a computer Woodstock, though in reality it bore little resemblance to that serendipitous outburst that became cultural history. It was more like the computer industry’s version of the ultimate film premiere, the difference being that no one seemed to mind that, save for a few well-crafted scenes, the movie wasn’t exhibited. It was like Steven Spielberg renting an opera house in October and describing his sequel to E.T., planned for release next summer. And then stepping out of the way so he wouldn’t be flattened by the herd of theater operators stampeding to reserve their prints.

Now, after months of speculation, I and some fellow writers were alone with the machines, which, significantly, were not turned on. That was no surprise: after all, there won’t be crash-proof versions of the software until well into 1989. Still, the computer was impressive, especially in light of what we had learned about it yesterday: the power of a mainframe in a 12-inch cube. A visual display crisper than Melba toast. More storage than Allied Van Lines. A sound system that will make Dolby look like a piker. All in all, the litany went, this would be the hottest machine in creation, the one the dead would rise up for, the computer that was so cool that the upcoming decade had inked it in as its steady date. But we weren’t looking at the computers. Journalists all, the seven of us in the room were looking at the door. Because that was where the real story was going to appear. And sure enough, before we could fully savor the aroma of the coffee poured in mugs emblazoned with the $100,000 Next logo, the story appeared, in the form of a trim, slickly dressed, neatly coiffed 33-year-old who looked like the cat who just swallowed the computer industry.

Guess who.

Heeee’s Back
You don’t have to guess, do you? You know this man. He was the force behind the Macintosh. The former chairman of the board at Apple Computer. Known to MBAs as “Mr. Entrepreneur.” Known to IBM as “partner” (Big Blue has licensed NextStep, a software-development system; for this privilege they reportedly gave jobs a $10 million fee and respectability worth several times that figure). Known to his employees as a cross between Simon Legree, Preston Tucker, and George Gipper, Steve Jobs, blazing onto the comeback trail, on the covers of Business Week and Newsweek; the visionary behind the Next computer.

(continues)
“Well,” he asks us, still with that grin. “What do you think?”

There is some ambivalent mumbling from the peanut gallery. After all, as journalists, we have to be, uh, objective, don’t we?

We don’t. More to the point, we aren’t. Though to our credit we did not sink to the bait and blare out the words that Steve Jobs longed to hear (Ob Steve your machine is marvelous, Apple is a gone, you’ve done it again!), we did just as good—we gave Jobs and the unveiling coverage as if it were the event of the decade. How much of this was due to the man, and not the technology? Just about all of it. It was a rare chance for business reporters to practice gut celebrity journalism, and since the nation at large cares more about celebrity than it does about computers, editors regarded too much coverage of Next as just about the right amount. Steve Jobs was smart enough to go with the flow; indeed, he was canny enough to direct it, so he and his company could get maximum impact from the long-postponed introduction.

Make no mistake about it: the press, and the computer press in particular, wanted Jobs’s machine to be a hit. That way, our coverage would be justified, and we’d have the colorful CEO to write about for the next few years. Never before in the computer field has the line between journalism and public relations been so blurred.

But it would be unfair to say that the accolades bestowed upon the Next computer were groundless. On first impression the Next machine looks like a winner. It is a well-conceived computing engine for the 1990s. It also benefits from the same je ne sais quoi! with which the Macintosh brimmed upon its introduction.

It incorporates several state-of-the-art innovations (most notably a rewritable optical disk drive that cheaply stores enough information to fill a small library), and unveils a daring new architecture centered around a virtual "mainframe-on-two-chips." It includes a development system that allows even novice programmers to dramatically cut the time it takes to create software for the machine. Its audio capabilities enable it not only to synthesize music, but to carry on the practical work of voice-mail and other digital-sound tasks.

At $8500 for a machine and printer, Next delivers the power and features of technology that costs more than twice that price. It also looks hot, with its hardware stuffed in a black cube that could have been salvaged from a George Lucas film. All this and cursor keys! Is it any wonder that I want one? Because, although I did not reply to Steve Jobs that day, I was thinking exactly what he wanted me to think.

Pain in the Next

But first impressions aren’t everything. Now that I’ve had some time to mull over the Next computer, I think I can safely assure my fellow Macintosh owners that we have no cause to junk our machines anytime soon. Of course, this early reevaluation is largely speculative, since there are no Next computers available for hands-on testing. But I can see several obstacles on the path to Next’s goal—to be the “computer of the nineties”—and Jobs, celebrity or not, will have to address them before his company fulfills its considerable potential.

First of all, he will have to figure out some way to deal with the problem of software distribution. Though one of the nicest features of the Next machine is the brand-new optical disk technology, the computer is handicapped by the lack of any other built-in storage medium. No floppy disk, for instance. I suspect that this choice was motivated by "religion," the same Jobs-inspired perfectionism that dictated five years ago just what the Macintosh would and would not have. As a result, the Mac appeared with brand-new 3½-inch disk technology but no external storage, and users got sore wrists swapping disks back and forth. With the Next machine users look forward to the ultimate disk swap: backing up a 256-megabyte optical disk.

Jobs himself suggested ways to get around that problem (users can plug in SCSI storage devices for backup, for instance). But his response was weak when someone asked him how commercial software would be distributed. Those optical disks will cost about $50 each, and few developers see them as a good medium for distribution. Jobs said that developers could save money by putting documentation on the disk and not printing it. (This suggestion ignores the fact that hard-copy documentation is the best hedge against piracy.) Jobs’s other suggestions ranged from "getting programs from the network" (good for shareware, not good for commercial software) to the idea of a Next-

(continues)
Yes! Please rush me your free 1989 Buick Dimensions Disk package, in the following format:

- IBM 5-1/4"
- IBM 3-1/2"
- Apple Macintosh 800K

Name: ____________________________

Street Address: ____________________________

City: ______________ State: ___________ Zip: ___________

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distributed disk loaded with hundreds of intentionally disabled programs that could be activated by getting (for a price) the code that unleashes the program. Developers are not wild about that idea, either. Eventually, Jobs mumbled something about site licensing on campus. Software distribution is an issue that Next must work out more carefully.

The second big problem is the machine's price. It is very low for a powerful workstation, but high for a personal computer. Most college students can get Mac SE–ImageWriter combinations at a third of the cost of the Next line. Jobs points out that since Next technology is brand-new, the component prices are at their peak and will eventually come down considerably. (This statement, though, is at odds with his boasting about the allegedly huge price breaks he has gotten from suppliers.) In any case, the price had better come down, because right now the Next machine is too costly for students.

Jobs concedes this, but says that his initial market will be the universities themselves, and some faculty. But what good is it to put easy-to-program Next boxes in the hands of professors if the courseware they produce can't run on the students' own computers? It is a huge step backward if Next is proposing a series of computing centers on campuses where students will have to wait in line to use the machines. We've all fought long and hard for the 'one person, one machine' concept. Why give it up for multipixel graphics and Shakespeare online? (I have heard that books are a low-cost and user-friendly medium, ideal for students.) I don't think Jobs wants us to give up the personal computing ideal—he'd prefer a price closer to the $3000 he originally shot for, but he can't do it now.

Strange-Attractor Processing

Finally, I think that as people get accustomed to what the Next machine can and can't do, Jobs will have to cope with an increasingly vocal 'so-what' factor. While the Next technology is truly amazing, until we see conceptual breakthroughs in software applications, the machine really won't do more for most people than a plain old SE will. The Macintosh popularized a revolutionary form of computing clearly visible in every application. The Next machine provides a clear advantage only to those who are attempting the kinds of tasks that a Macintosh can't easily perform.

For instance, I hear that WriteNow's performance on the Next machine is not significantly better than it is on the Mac. Keep in mind that most computer users stick to simple applications like word-processing, spreadsheets, page layout, and databases. When Jobs demonstrated the Next machine, he didn't use any of those programs—he had some wirehead professor from Reed College come onstage and use the Next machine to visually plot the mathematically challenging problem of strange attractors. A certain percentage of computer users on campuses will find this useful, but I suspect that, like myself, most folks have relatively little need to plot strange attractors during the course of a day. Nor are we constantly performing the other kinds of simulations that the Next machine seems to specialize in, stuff like rotating pictures of complex molecules.

Right now, Jobs's answer to the practicality question is that the Next machine is directed at a special audience—those involved in higher education, who do have reasons to rotate molecules and explore other esoteric pursuits. But this disclaimer

If you missed MacUser Labs' color

If E-Machines told you the T16™ color Macintosh monitor set the standard to which all others aspire, you'd probably think we were tooting our own horn.

But what would you think if we told you MacUser Labs made the T16 the standard bearer? It's true. Of the 25 color monitors they tested, MacUser Labs scaled their ratings of all the monitors against the best monitor—the T16.

Nearly two Apples for the price of one.

With a T16, you'll have almost twice the working space of Apple's 13" monitor. Yet your color display won't cost any more than your Macintosh II.

For instance, we told you the T16™ bearer? It's true. Of the 25 color monitors they tested, MacUser Labs made the T16 the standard to which all others aspire.

If you missed MacUser Labs' color

As our top-ranked monitor, the T16 wins the MacUser Labs Seal of Approval.

This is the value you've been demanding. Actual size 72 dpi, with a palette of 16.7 million brilliant colors on a Sony Trinitron modified to E-Machines' exacting specs.

You can put a little color in the cheeks of your company president next time you produce the newsletter. Or use color to distinguish multiple layers and objects in CAD drawings. Or create charts to transform complex numbers into easily understood color graphs.

Whatever you do on your Macintosh, you'll do it more productively with a T16.
T19 are the only color monitors certified to comply with ANSI Human Factors Specification 100.

The T19 has the fastest available refresh rate of 72 Hz. Now that’s refreshing.

Even more refreshing, the T16 and T19 are the only color monitors certified to comply with ANSI Human Factors Specification 100.

We’d like to color your thinking.

Of course we would—but you should decide for yourself if the T16 and T19 are as good as MacUser thinks. Go see one and conduct your own review. For details, write E-Machines at 9305 SW Gemini Drive, Beaverton, OR 97005 or call us direct for your nearest dealer: 1-503-646-6699.

E-MACHINES
We make room for your ideas.

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**InnerDrive 100**
For Mac II
Was $1199, now $999

**InnerDrive 100 SE**
For Mac SE
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For Mac Plus, SE and Mac II
Was $1249, now $1099

**BackPac 100**
For Mac Plus and SE
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We’ve taken the bite out of moving up to a 100 megabyte hard disk drive.

It’s never been more affordable to drive safely. If you thought you’d have to settle for less storage and power than you really want or need, surprise! We’ve cut our already low prices on 100 megabyte hard disk drives. This means you can save an additional $150 to $350 on the most reliable, most talked about, most desirable 100 megabyte hard disk drives in the industry.

And, yes, we’ve included the revolutionary BackPac 100 that can turn a Plus or an SE into a take-along powerhouse!

More bytes for your buck than ever. Whether your Mac is a Plus, SE or II, Jasmine’s 100 MB hard disk drives are loaded with power and performance that’s just right for you. And are now more affordable than ever.

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Was $1249, now $1099

InnerDrive 100/SE
For Mac SE
Was $1349, now $999

InnerDrive 100/II
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BackPac 100
For Mac Plus and SE
Was $1479, now $1199

Every Jasmine 100 megabyte hard disk drive comes to your door loaded with these extras:

- DriveWare: true SCSI partitioning, password protection, AUX support, and exclusive control panel access.
- Symantec: Utilities for Macintosh insures against data loss and keep the hard disk operating at optimum level.
- Redux: from Microseeds. Arguably the best backup software ever written for the Mac.
- DEScryptor: our proprietary encryption utility that follows the federal government's super-secure Data Encryption Standard.

Demoware: A collection of demonstration versions of some of the most popular programs available.

Worldwide doorstep delivery is just a phone call away. It’s easy to order a Jasmine 100 megabyte hard disk drive.

Our knowledgeable sales staff is on duty Monday through Friday from 8am to 6pm (Pacific Standard Time).

We welcome your MasterCard, Visa, and American Express.


Jasmine
We’ve taken the bite out of buying hard disk drives.
Send us your best stackware by March 15, 1989. We'll award prizes to the most outstanding HyperCard applications and describe the winning SuperStacks in a feature article in the November 1989 issue of Macworld. Judging criteria will include creative and appropriate use of HyperCard, interface design (including use of graphics and sound), programming elegance, and success in meeting the goal of the program for the intended audience. We reserve the right to change an entry's category, if appropriate. Judges may elect not to make an award in each category.

Categories

COMMERCIAL Stacks distributed for a fee.

CUSTOM Stacks custom-made for a business, government agency, or non-profit organization.

EDUCATIONAL Curriculum, teacher-training, and teacher/administrator productivity materials, as well as training or self-instruction stacks for the general public.

NONCOMMERCIAL HyperCard applications available through noncommercial channels (shareware, freeware), plus stacks designed for personal use and not distributed at all.

How to Enter

Entries are due in our office on March 15, 1989. No more than two (2) entries per contestant. Each entry must include disks (clearly labeled with the stack name, your name, address, and phone numbers); documentation (if necessary); a $5 entry fee; and a one-page summary headed with the stack name, contest category (commercial, noncommercial, educational, or custom), and K-count, as well as your name, address, and phone numbers. In the summary, state the purpose and intended audience of your entry and note if it requires any special hardware (CD ROM drive, for example). Mention the list price or suggested shareware fee and explain how the stack is being distributed. You may also mention any special features you want to call to the attention of the judges. Sorry, disks will not be returned. Employees of the sponsors are not eligible to enter. Winning stacks from the 1988 SuperStacks contest are not eligible. Make your check or money order payable to PCW Communications. Send entries to SuperStacks, Macworld, 501 Second St., San Francisco, CA 94107; Attn.: Macworld Editorial.

FIRST PRIZE IN EACH CATEGORY: MACINTOSH SE

RUNNERS-UP PRIZE: JASMINE DIRECTDRIVE 45

Plus, a special award of a 4MB memory upgrade from National Semiconductor for best HyperCard interface design, best HyperCard multimedia application, best HyperCard development tool, and best stack available for under $20.
Smart, too. The desktop film recorder you've been waiting for. ProColor® From Matrix.
Super-sharp, artist-quality graphics on 35mm slides or Polaroid® instant prints.
Millions of colors. For the most stunning presentations you've ever seen ... or shown.
Compatibility? Total. **1-800-852-8533**
In NY: 1-914-365-0190
Popular graphics software. Plus every Matrix film recorder, thermal printer and presentation system.
And if you've been printing on a laser printer or a plotter, you can output to a ProColor just as easily.
All for about six grand.
How do we do it? Easily. We've been at it a long time.
Ask anyone who uses our recorders. Such as Allstate.
AT&T. Lotus Development Corp. And GM.
They're pretty smart cookies themselves.
Guess it takes one to know one.

**WHEN YOUR IMAGE IS ON THE LINE.**

MATRIX

Circle 460 on reader service card
Win a Mac II, a Truevision 32-bit color board, or a Tektronix color printer!

Macintosh Masters II

Art Contest

Categories

Fine Arts
Illustration
Graphic Design
Animation/Video
Technical Illustration
3-D/Image Synthesis
Architectural Rendering/Elevations
Business/Informational Graphics
Wild Card*

* Projects that don’t fit into any of the other categories. Try us.

Prizes

Three grand-prize winners will take away a Macintosh II, a 32-bit NoVista color capture and display board, or a Tektronix color image printer. Winners in each contest category will choose one product from a selection of top programs, including Adobe Illustrator, Aldus FreeHand, PageMaker 3.0, ImageStudio, ReadySetGo, VideoWorks II, PowerPoint, SuperPaint, Digital Darkroom, and PixelPaint Professional. In addition, winners’ work will be published in a Macworld feature article and in our 1990 graphics calendar. Grand-prize winners will also receive an expenses-paid trip to Macworld Expo Boston to claim their prizes.

Rules

Entries must be received no later than March 10, 1989, and must be accompanied by an entry form. Please send hard and disk copies of each piece (disks may be omitted when pieces run more than 800K). Slides are acceptable hard copy for color graphics and for mixed-media or sculptural pieces. For judging purposes, however, originals are preferable; these will be returned if you include return postage and packaging. Animated entries may be on disk or half-inch videotape, as appropriate. Since work will be judged on technical innovation as well as aesthetic value, each piece should be accompanied by a detailed description of how it was produced. Please submit no more than four works (include an entry form for each). Macworld reserves the right to reproduce winning entries.

Entry Form:
Send one entry form with each submission to Macintosh Masters, Macworld, 501 Second Street, San Francisco, CA 94107.

Name ____________________________________________
Phone #(s) _______________________________________
Address _________________________________________

Title of work ____________________________
Contest category ____________________________

Submission format(s):
____ On disk ______ Hard copy ______ Slide _______ VHS video ______ Beta video

Required to view disk copy:
Software _______________________________________
Hardware ______________________________________

All submissions must be received by March 10, 1989.

[art credits]
Dick Rodgers (vessel, ConceptExhibit brochure), Brian L. Pez (dog), David C. Dickinson (mountain), Gutter Burke-Wolf (camera)
When presenting business information, it is important to portray a professional and consistent image. Business forms are no exception.

Fast Forms gives you the power and freedom to create, customize, and use professional forms on your Apple® Macintosh® computer.

You can use Fast Forms for tasks ranging from simple office memos to order forms, packing slips, complex invoices or even annual tax forms.

All with the flexibility to match the look of your most familiar forms.

And once you've drawn or scanned your forms, use the Fast Forms desk accessory (also included) to fill in and print while using any other program.

At last you can quickly address an envelope or print an invoice without interrupting your more important work.

Design features such as gray screens, hairlines, variable type sizes, text editing, customizable grids, and printing and non-printing drawing planes have made Fast Forms the drawing program of choice by thousands of users.

Place data entry fields on your form where information is filled in. Fast Forms will format fields and even perform calculations for you automatically.

Since version 1.2 now supports both import and export, Fast Forms works even better with your other Macintosh programs.

Now you can import information from your database to fill in and print any form, or export information while using Fast Forms as an effective data entry tool.

For offices with more than one Macintosh, additional desk accessories can be purchased separately.

And yes, for those of you who want some help getting started, Fast Forms still comes with a free template disk filled with forms ready to use.

Since Fast Forms is still only $149, you're guaranteed great value for your money.

Plus, if you buy Fast Forms today, we'll refund your money tomorrow (early 1989) when you purchase INFORM,™ the next generation of forms management solutions.

For more information on Fast Forms, please call or write:

Shana Corporation
Advanced Technology Center
105, 9650 - 20 Avenue
Edmonton, Alberta Canada T6N 1G1
(403) 463 - 3330

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Circle 297 on reader service card
MacKids Educational Programs by Nordic Software

MacKids is a complete series of twelve quality educational software products for the Mac specifically designed to teach and entertain kids. Whether your children are preschoolers or young adults, there's a MacKids package that will give them the learning edge.

Preschool Disk 1 (3-7), Preschool Disk 2 (3-7), CoinWorks (4-12), ClockWorks (4-10), Early Elementary 1 (6-9), Lemonade Stand (6-15), FlashWorks (6-11), Battle (6-12), Word Search (6-12). Alphabetizer (7-13), EarthWorks (10-14), or BodyWorks (10-14).

Each Program

Spelling & Grammar Checkers

Electronic Arts Thesaurus 1.2 30.
MicroTypist, Inc.
Word Finder (Synonym Finder) 33.
Sensible Software Sensible Grammar 54.
Working Software Spellwell 2.0 45.
LookUp (Makes Spelling Suggestions) 30.

Accounting Packages

Aegis Software Axtrix TimeMinder 109.
Astrax Payroll Plus 159.
Bedford Software Simply Accounting 219.
A.L.P. Systems MacProof 3.0
Deneba Software Spelling Coach 3.0
 beyer's Medical/Legal/Hyphenation
Coach Merriam Webster's Thesaurus 2.0
Spelling Coach 3.0 Professional

Macinware SE Ext. Carrying Case by I/O Design

The Macinware SE Ext. Carrying Case protects your Mac SE, Plus, or SE/2 keyboard in safety and style. It's made of rugged 1000 Denier Dupont Cordura nylon, and surrounds your machine with a full half-inch of high-density foam padding. There's room for an external hard drive, a mouse, cords, and disks, so your complete system travels with you in one compact unit. All stress points are cross-box stitched for added safety. A convenient shoulder strap is included, and you can choose platinum grey or navy blue colors.

SE Carrying Case

Visit us in the Electronic Mall™ on CompuServe - GO PP
to Polish Up Your Mac

Game Software

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| 4th & Inches | MSFL Pro League Football |
| Activision Shanghai or Jinxiar | or 550 Great Teams |
| Corruption | Miles Computing Inc. Down hill Racer |
| Universal Military Simulator or Manhole | Harrier Strike Mission II |
| Might and Magic | or The Fool's Errand |
| Sky Travel | Mindscape Balance of Power 1990, |
| Armored Bridge 5.0 | Crossword Magic or Clutch |
| Avon Hill Mac Pro Football | Deja Vu: A Nightmare Comes True |
| Broderbund Ancient Art of War or At Sea | King of Chicago, Shadowgate or |
| ShuffePuck Cafe or Ultima III | Joker Poker |
| Poster Maker Plus | Defender of the Crown, Colony |

Bullseye Software

| FS| Mustang or Ferrari Grand Prix |
| Cassady & Greene, Inc. Crystal Quest | Primero Smash Hit Racquetball II |
| Crystal Quest w/Critter Editor | Sierra On-Line Leisure Suit Lary |
| Centron Chessmaster | Space Quest or Space Quest II |
| Roulettemaster or BlackJack Ace | Police Quest |
| Discovery Software Arknoi | Red Racer |
| Electronic Arts ChessMaster 2000 | Mad Golf Classics |
| Chuck Yeager Flight Simulator | Mac Golf Classics |
| or Life & Death | Systeme de Jeux |
| Starfilet I | Tecmac 21 |
| Screable | Tetris |
| One-On-One, Pinball Construction Set, | Electronic Arts ChessMaster 2000 |
| Seven Cities of Gold, SkyFax, or | or Lunar Hunting |
| Patton vs Rommel | MicroCourses |
| EPX Sub Battle Simulator (Mac or MacII) | Centron Crapsmaster, StreetGames or |
| Haydon Software Sargon IV | Bullseye Software by SuperMac Software |
| Infinity Software, LTD. | Go or GrandSlam Tennis |
| or Grand Slam Tennis | Infocom Leather Goddesses of Phobos |
| or Life & Death | or Mythmaker's Guide |
| Beyond Zork, Zork Trilogy or QuestStaff | Beyond Dark Castle |
| Zork Zero | Beyond Dark Castle |

SuperSpool, SuperLaserSpool, DiskFit & Sentinel by SuperMac Software

SuperSpool 5.0 SuperLaserSpool 2.0 DiskFit 1.4 Sentinel 2.0

Sooner or later you'll find that you have to spool-up, back-up or lock-up your data and it's a safe bet that SuperMac has just the programs you'll be looking for. SuperSpool and SuperLaserSpool return control of your Mac to YOU while your printer is busy printing. DiskFit is a utility that lets you quickly backup your hard disk so you don't run out of disk space. Sentinel is a utility that lets you quickly backup your hard disk so you don't run out of disk space. Sentinel also allow you to lock up your private documents by encrypting the data, keeping it safe from prying eyes!

Specials good through March 31, 1989.

Customer Service (203) 378-3662 • FAX (203) 381-9043
Monday thru Friday 9 A.M. to 9 P.M. Saturdays 10 A.M. to 6 P.M. (Eastern Time)

OUR POLICIES
• We accept MASTERCARD and VISA with no added surcharge.
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• If you are ordering by mail, we accept private and company checks. With MASTERCARD and VISA orders include card number and expiration date. Connecticut residents add 7.5% sales tax.
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• Defective software will be replaced immediately by the same item. Defective hardware will be replaced by our own discretion. Call customer service at (203) 378-3662 to obtain a Return Authorization Number before returning goods for replacement. Products purchased in error subject to a 20% restocking fee. Items subject to availability. Prices subject to change without notice. (203) 378-3662

Mail-in orders (especially from foreign countries), please furnish telephone number.

Positively A Plus

75 Research Drive, Stratford, CT 06697
800/832-3201
Circle 44 on reader service card
Utility Software

<table>
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<th>Product</th>
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<td>Oldvul (Software)</td>
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<td>Icon-It or MultiClip</td>
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<tr>
<td>Read-It 1S (For Thunderscan)</td>
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<td>Read-It O.C.R. 2.0 (For Image Scanners)</td>
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<td>PCPC HFS Back-Up 3.0</td>
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<td>Softworks</td>
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<td>Stack Cleaner</td>
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<td>HyperTools 1 or 2</td>
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<td>SuperMac Software</td>
<td>Special 54</td>
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<td>SuperMailer 2.0</td>
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<td>Delphi 1.4</td>
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<td>Symantec MACSOI</td>
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<tr>
<td>Symantec Utilities for Mac (5.5)</td>
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<tr>
<td>MSE 1 (16 Mhz)</td>
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<td>MSE 2 (16 Mhz w/ 1MB)</td>
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<td>MSE 3 (16 Mhz w/ Math Co-processor)</td>
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<td>MSE 4 (16 Mhz w/ 1MB &amp; Math Chip)</td>
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<td>MacSnap 524E (12E to 2MB)</td>
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<td>MacSnap 524S (12E to 2MB)</td>
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<td>MacSnap 524B (524B to 2MB)</td>
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<tr>
<td>Laser 80Kc External Drive</td>
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Printers & Digitizers

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<td>Seikohsa SP1000 (ImageWriter Comp.)</td>
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<td>ThunderWare</td>
<td>42</td>
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<td>ThunderScan V40</td>
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<tr>
<td>Mac II Power Accessory</td>
<td>12</td>
</tr>
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</table>

Stepping Out II by Berkeley System Design, Inc.

Stepping Out II is a program designed to expand the capabilities of any standard Macintosh display to give it the same feel and features as a full-page display. Now you can choose the screen size which is most comfortable for you. Working with large spreadsheets and full-page layouts becomes easy since you are no longer limited by small windows and slow scrolling. For detailed work on small areas you can enlarge any portion of the big screen up to sixteen times. Handy features and ease of use makes Stepping Out II the ultimate viewing tool for any Mac.

Disk Drives/Hard Disks/Upgrades

<table>
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<tr>
<th>Product</th>
<th>Price</th>
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<tr>
<td>MacSnap 548S (512E to 2MB w/SCSI)</td>
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<td>MacSnap Plus 2 (MacPlus to 2MB Non Expandable)</td>
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<tr>
<td>MacSnap 7SE or 900 Option (1MB or MacII Memory Exp.)</td>
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<td>SCSI Interface/Port</td>
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<td>MacSnap Toolkit (box driver, open &amp; grounding set)</td>
<td>15</td>
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<td>Emac 200 (40MB Hard Disk)</td>
<td>520</td>
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<td>Emac 20 Deluxe</td>
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<td>Personal Computer Peripherals</td>
<td>Special 175</td>
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<td>Built-In Moderns Available (MHz)</td>
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<td>MacII 1 (16 MHz)</td>
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<td>MacII 1.8 MHz with Co-processor</td>
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<td>MacII 1.6 MHz with 1MB &amp; Math Chip</td>
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<td>MacSnap 524 (524E to 2MB)</td>
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<td>MacSnap 524B (524B to 2MB)</td>
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<tr>
<td>Laser 80Kc External Drive</td>
<td>185</td>
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</tbody>
</table>

Quicken by Intuit

Quicken is the fastest, easiest way to cut through personal and small business paperwork. In minutes you’ll get a handle on your finances without having to bother with any of the burdensome terminology and repetitive entry that most accounting packages require. Quicken is flexible; it lets you enter an unlimited number of transactions, expense and income categories, and checking accounts. Quicken lets you write checks, make and track budgets, manage cash flow, and even reconcile unbalanced accounts. Now Quicken links directly with MacinTax to save you even more time at tax time.

Quicken: Special.

DataStore Management

<table>
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<td>4D Runtime</td>
<td>239</td>
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<tr>
<td>Activision Reports for Hypercard</td>
<td>75</td>
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<td>Focal Point &amp; Business Class Bundle</td>
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<td>City To City</td>
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<td>Super Studio</td>
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<td>Bright Star Technology Alphabet Blocks</td>
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<td>EMAC 20 20 Plus</td>
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<td>Bythle Software Omnis 3 Plus/Express</td>
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<td>Bonard software</td>
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<td>Desktop Point/II</td>
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Educational/Creative Software

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<td>Ars Nova Practice Musica</td>
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<td>Bible Research The Word (KJV or NIV)</td>
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<td>Bogus Productions Studio Session</td>
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<td>Bright Star Technology Alphabet Blocks</td>
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<td>Breakthrough C++ Sound Cards</td>
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<td>Speed Reader II</td>
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<td>Where in the World is Carmen Sandiego?</td>
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<td>Mac II Musicals</td>
<td>Special 28</td>
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<td>Davidson &amp; Associates</td>
<td>Special 28</td>
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<td>Speed Reader II</td>
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<td>Math Blaster or Word Attack!</td>
<td>27</td>
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</table>

Studio/8 by Electronic Arts

Professional artists and amateurs alike will enjoy the power that Studio/8 reveals in the Mac II. Studio/8 is the first full-color, full-feature user friendly paint program designed specifically for artists. It features versatile airbrush, paintbrush, icon-based drawing tools, and color routines that you can customize. You’ll be rid of hassles with custom typesetting because Studio/8 supports full text-editing features in the same text box and allows you to dynamically resize and redefine blocks of type, plus shear, rotate, and skew text. Studio/8 comes bundled with on-line help, a slide show program with built-in production features, a free font disk, and a library of backgrounds and textures.

Studio/8: Special 319.
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Cutting Edge 800K External Disk Drive...

Graphics Software

3G Graphics Images With Impact
3G Graphics Images With Impact
75

Adobe Systems Adobe Illustrator
Adobe Font (Various volumes)
Call

Artwork

3D Software MacSpin 2.0
125

Individual 101 Macros For Excel
369

Legalsoft WillMaker 3.0
34

Macro Software Further
89

Print Shop or ClipCharts
36

Cricket Print or Pictograph
28

Cricket Graph
119

Claris MacPaint II
105

Clarity's Ultimate Painter
28

SuperPaint 2.0
109

Canvas 2.0
109

WetPaint Various Vol. 1-16
8

CAT Contacts/ActivityTime
229

Claris MacProject II
335

Cognition Technology MacSMARTS
135

Individual 101 Macros For Excel
34

Lundeen & Associates
59

WorksPlus Commands
59

Mainstay Mainstay
42

Capture
42

Mac Flow 2.0 or Mac Schedule
119

Meta Software MetaDesign
199

MetaFlow 2.0 or MetaFlow
119

Micro Planning Software
199

Mac Planner 6.0
325

Microsoft Office Works 2.0
183

Microsoft Excel 1.5
255

Satori Software
369

Bulk Maker 3.2
195

Bulk Maker Plus
195

Components GL
369

Select Micro Systems, Inc.
219

ExaStax or ExpMaker
219

Shana Corporation
389

Fast Forms
89

Softworks Client
289

Syncra Mac Envelope 4.0
59

Manual Envelope 56
39

Systal Systal 3.2
172

(Specify MacPlus, SE or Mac II)
459

Business Software

Abacus Concepts Abacus Concepts
229

StatView SE or StatView
229

Meta Software MetaDesign
199

Access Technology Access Technology
159

Trapeze 2.1
159

MetaPlan 6.0
325

Bravo Technologies Bravo Technologies
79

Future Software
144

Vault Professional
144

Bravo Technologies
79

DataScan
37

DataMaster
34

DataScan
79

DataMaster
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DataMaster
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"Although this category, unlike spreadsheets and word processors, had a lot of new players this year, one seemed to us to be the clear leader.

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MacUser, February 1988

"Congratulations! InfoWorld's readers have chosen 4th Dimension as the Product of the Year in the Macintosh Database Systems category."

Jonathan Sacks, InfoWorld, April 1988

"I can't imagine a data-management problem that you won't be able to solve with 4th Dimension."

Steve Mann, Macintosh Today August 11, 1987

"Users with no experience or interest in programming can build a barebones database in 4D's 'Design Environment' just by pointing, clicking, and naming files and fields.

"For searches and sorts - database operations that are performed interactively - 4D's performance curve is probably the best of the four programs (Omnis 3 Plus, Double Helix II, dBASE Mac, and 4th Dimension)."

David Brandt, MacWEEK, January 19, 1988

"It will do everything you need, and then some, and will prove itself well worth the cost."

Jan L. Harrington, MacUser, November 1987

"I'm convinced that many users of other Mac databases and even PC databases will want to switch over to 4th Dimension."

Adam Green, Macworld, July 1987

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Don Crabb, InfoWorld, January 11, 1988

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This column is about the state of the art in the Macintosh world. I'll give you insight into what's happening on the leading edge of development, both inside and outside Apple.

When I received a preproduction Macintosh from Apple in late 1983, I thought the machine was nirvana incarnate. I spent the next two days filling up a 400K disk by drawing pictures one bit at a time. It didn't matter to me that drawing pixel by pixel was an inefficient way to work—until the Mac came around, I didn't have any way of doing the same thing, especially if my goal was to place a picture into something I was writing.

Like all early Mac worshippers, I ignored the slow scrolling, the agonizingly slow disk I/O, the long wait for a crude printed copy of my work, the incessant disk swapping, and so on. But it didn't take long before speed became critical to me. And so I continued to use my IBM AT to do most of the work around the office.

In 1987 the introduction of the Macintosh II changed all that. Here was a machine that used all the Mac's graphics-oriented software and peripherals, but it astounded me with its speed, huge amounts of memory, large-capacity hard disks, detailed color displays, and more. Suddenly, doing my work on the Mac seemed a reasonable choice. With a crop of new software, a Mac II, a LaserWriter, MultiFinder, and 8 megabytes of RAM, I could load up my workspace, cut and paste things between applications, and create masterpiece documents to my heart's content. Once again I fell in love and experienced a technology-induced high.

But now the Mac II may be showing signs of old age. What was once the speed demon of Macdom is now outrun by mere accelerator-equipped SEs. The Next computer uses many of the same

(continues)
components as a Mac II but runs so much faster that those of us who require performance computers are trying to figure out how to get one without reenrolling in college. Was the Mac II a two-year performance patch on the aging Mac architecture? Does the introduction of superfast personal machines like the Next cube mean the end of the Mac II?

In this first column I want to tackle the very questions I just posed about the Mac II's architecture. What we all want to know is this: Has Apple left enough room in the current Mac II design for performance improvements that might restore the II's stature as a leading-edge machine? By the end of this column, I hope you'll be able to make an informed guess at the answer.

Beyond the Marketing Hype

Those of us who've used Mac IIs for any length of time will never be able to go back to an unaccelerated Plus or SE. But few of us have stopped to determine just what it was that gave the Mac II its apparent speed advantage over a standard Macintosh. For the most part, we've simply believed Apple's marketing hype.

Apple told us that the speed of the Mac II came from the 32-bit abilities of the 68020 processor, the presence of a floating-point processor (the 68881), and the NuBus video solution (which relieved the processor of having to handle screen updates). When the Mac IIx was introduced last October, Apple's public relations machine refocused around the 68030 and the 68882, new generations of the chips used in the Mac II. At one time I, too, tacitly accepted Apple's explanations about the Mac II's generally fast performance. But the fact that the IIx only improved performance 10 to 15 percent over the II bothered me just enough to make me start looking deeper.

A finite number of things can affect system processing speed (see "Macintosh Features"). The most important factors for the Macintosh lineup are

---

**Macintosh Features**

<table>
<thead>
<tr>
<th>Macintosh model</th>
<th>128K/512K</th>
<th>Plus</th>
<th>SE</th>
<th>II</th>
<th>IIx*</th>
<th>Future</th>
</tr>
</thead>
<tbody>
<tr>
<td>Processor speed</td>
<td>8MHz</td>
<td>8MHz</td>
<td>8MHz</td>
<td>16MHz</td>
<td>16MHz</td>
<td>25-33MHz</td>
</tr>
<tr>
<td>Internal/external bus width</td>
<td>32/16</td>
<td>32/16</td>
<td>32/16</td>
<td>32/32</td>
<td>32/32</td>
<td>32/32</td>
</tr>
<tr>
<td>Memory speed</td>
<td>150ns</td>
<td>150ns</td>
<td>120ns</td>
<td>120ns</td>
<td>120ns</td>
<td>60-100ns</td>
</tr>
<tr>
<td>Coprocessors</td>
<td>none</td>
<td>none</td>
<td>none</td>
<td>none</td>
<td>68881</td>
<td>68882/68851</td>
</tr>
<tr>
<td>Additional tasks</td>
<td>video/sound</td>
<td>video/sound</td>
<td>none</td>
<td>none</td>
<td>none</td>
<td>none</td>
</tr>
</tbody>
</table>

*The 68030-based SE introduced in January is virtually identical in features to the IIx.
How Features Enhance System Performance

<table>
<thead>
<tr>
<th>Feature</th>
<th>128K/512K</th>
<th>Plus</th>
<th>SE</th>
<th>IIF</th>
<th>IIx*</th>
<th>Future**</th>
</tr>
</thead>
<tbody>
<tr>
<td>Processor speed</td>
<td>0%</td>
<td>0%</td>
<td>80%</td>
<td>0%</td>
<td></td>
<td>50–100%</td>
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<tr>
<td>Internal/External bus width</td>
<td>0%</td>
<td>0%</td>
<td>&lt;5%</td>
<td>0%</td>
<td>0%</td>
<td></td>
</tr>
<tr>
<td>Memory speed</td>
<td>0%</td>
<td>&lt;1%</td>
<td>0%</td>
<td>10–15%</td>
<td>25–50%</td>
<td></td>
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<tr>
<td>Coprocessors</td>
<td>0%</td>
<td>0%</td>
<td>15–25%</td>
<td>0%</td>
<td>0%</td>
<td></td>
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<tr>
<td>Additional tasks</td>
<td>0%</td>
<td>7–10%</td>
<td>0%</td>
<td>0%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overall Increase</td>
<td>0%</td>
<td>10%</td>
<td>80–100%</td>
<td>10–15%</td>
<td>100%</td>
<td></td>
</tr>
</tbody>
</table>

*The 68030-based SE introduced in January shares the same performance characteristics as the IIx.

** The performance increases for future models are estimates. The 0 percent figure for additional tasks could be changed dramatically by dedicated SCSI, I/O, and bus controllers; you can speed up hard disk I/O 50 percent or more by adding a dedicated, caching SCSI controller that performs direct memory access, for example. Such a change would also affect any overall increase, of course.

The numbers here show the improvement in performance for each feature over the earlier model (for example, the SE’s lack of additional task load improves performance about 7 to 10 percent over the Plus and 128K/512K models).

- the clock speed of the processor—faster processors mean faster computing;
- the number of bits of data a processor can handle internally and externally at one time—the more bits the machine can handle at once, the more information it can pass through the processor;
- the speed with which memory responds to processor requests—the processor shouldn’t have to wait for any component in the machine, especially the memory, which is accessed almost continuously;
- the presence or absence of coprocessing chips that perform tasks faster or more efficiently than the central processor—in the Motorola chip family, coprocessing chips can perform critical numerical or memory-intensive work while the main processor goes on to the next task;
- additional system tasks, like sound, video, or disk manipulation performed by the processor (instead of by subsystems)—every additional task the CPU has to perform cuts into the amount of time it can devote to your application.

Since each element in “Macintosh Features” affects the overall performance of the Macintosh, you’re probably wondering how each of them contributes to or steals from the overall speed of the machine. “How Features Enhance Performance” has the same feature matrix, but now shows what kind of improvement each item makes. These numbers are based on tests I conducted in an
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Playing the Numbers
But the tables don't tell the whole story. Note that the 68881 numeric processor in the II seems to give only a marginal (less than 25 percent) improvement on system speed. The 68882 in the IIX can achieve up to 30 percent improvement on some instructions but generally averages only a 10 to 15 percent improvement over the 68881. Yet Apple has claimed from day one that the presence of a 68881 or 68882 floating-point coprocessor means that numeric calculations really fly on the II compared to previous models. And all computers are constantly working with numbers, right? Wrong.

The 68881 doesn't seem to contribute much to the Mac II's performance because it isn't used very often. The trouble, it seems, is Apple's SANE (Standard Apple Numerics Environment) routines in ROM. SANE is a set of numeric floating-point calculation routines that Apple designed many years ago. Float-
takes many forms.

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In fact, you can do everything on a Macintosh that a professional forms designer does on a drafting table. Only faster, easier and without paper cuts.

But you won’t have to redraw the forms you’re currently using. Just scan them in.

ing-point calculation is one of the trickier chores facing a software designer. By placing these routines in ROM, Apple solved the need for placing similar code in every application it or other companies might write in the future. Today almost any Macintosh software that needs to make a calculation involving noninteger numbers does so by calling SANE to do the work.

Unfortunately, SANE is not so proudly designed. First, it uses much higher precision than that specified by the Institute of Electrical and Electronics Engineers (IEEE) standard used by most other personal computers. Second, SANE doesn’t always call the numeric coprocessor to do the work, even when the 68881 chip is present and could handle the task. Third, even when SANE does use the 68881, SANE adds another level of handling to the whole operation and adds additional error checking, all of which slows down the actual calculation. With the Mac II, a programmer would get better performance by simply calling the 68881 directly for most floating-point tasks.

The real scandal, however, is that programs that claim to be using the math chip—as Microsoft Excel does in its About Microsoft Excel dialog box—don’t actually use the 68881 directly, except in a few special situations (transcendental functions, for example, use the math chip). Instead, the programmers of the world leave the compiler defaults in place, and almost every compiler defaults to calling SANE for floating-point numeric calculations. Thus, one reason for the Mac II’s relative slowness is that it underutilizes the components built into it. Try this experiment: find a friend with an SE that has a Radius accelerator board. Get a copy of the file named Radius SANE. Stick this file in the System Folder of a Mac II and reboot. You’ll now get, on average, about a 28 percent improvement in performance over the standard Mac II for numeric work that calls SANE routines. (You’ll also get a higher error magnitude on round-offs, but still lower than the IEEE standard.)

I’ve always admired Radius’s engineering efforts, and here again it appears that the little company has managed to do something Apple can’t.

Memory Like an Elephant

SANE routines aren’t alone in holding down speed. The Mac II’s memory is as lumbering as an elephant.

A 33MHz 68030, which is currently the state of the art in Motorola, expects to get data it requests from the bus in about 25 nanoseconds (ns). The processors in the II and IIX run at half this speed, and each requires about 50ns to 60ns to do the same thing. In other words, from the time the processor says, “I want the data at such-and-such an address,” to the time it expects to be able to find that data takes all of 60ns in a standard Mac II.

Probably for reasons of supply and price, Apple chose to use the same 120ns

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State of the Mac

memory SIMMs (Single Inline Memory Modules) in the Mac II as it used in the SE. Comparing the numbers is telling: 120ns memory cannot possibly keep up with the 16MHz CPU in the Mac II, since the CPU wants everything in about 60ns. (Indeed, Mac SIMMs can’t even keep up with the 8MHz CPU in the Mac SE.) In order to get all the components talking at the same time, Apple imposes a penalty of two wait states on the processor in the II (one wait state in the Plus and SE). In the IIX, the presence of the built-in 68851 reduces this to one wait state. The numbers don’t quite seem to add up because of an added factor—memory refresh, a process required to recharge every memory location at periodic intervals. We’ll ignore the refreshing of the Mac’s dynamic RAM because virtually all personal computers currently pay this small performance penalty. What’s important is those two cycles the CPU waits every time it needs a piece of data or a new instruction.

I’ve mentioned that the 68030 chip has built-in data and instruction caches. Caching is the process of keeping a small amount of often used information available for high-speed access. The built-in caches in the IIX’s 68030 are 128 bits in size. That’s not very big, and that’s one of the reasons why the on-chip caching doesn’t make a lot of difference in the IIX’s overall speed. The original II has only 128 bits of instruction cache (and no data cache).

Computer design theory says that a well-designed, memory-based cache of between 32K and 128K should improve general memory access enough to improve performance by some 60 percent. Does design theory come close to predicting what happens in the real world of computer applications?

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According to Ron Garrett, Daystar Digital’s director of engineering, the

(continues)
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highest percentage of "hits" on data in the cache attainable in a standard Mac work session would be in the 70 to 80 percent range. With the right size cache, then, about 75 percent of the time the cache would contain the data the CPU was requesting. The rest of the time, the data would have to be loaded from regular memory. Overall, then, cached memory accesses data in about 66 percent of the time it takes noncached memory to access the same information, for the average performance gain of slightly more than 60 percent.

Garrett took a careful look at the code the CPU in a Mac was executing and how much of it, on average, was repetitions of the same items. Fortunately, in the Mac design, repetition is high because all applications are constantly calling pieces of the Macintosh Toolbox (the ROM). As it turns out, sections of the ROM code are called so often by most programs that most of the data that ends up in a well-designed cache is actually ROM code, and thus the speed improvement from using a memory cache applies about equally to software. There are exceptions to this rule, however (HyperCard doesn't like other caches—it uses its own), so you may find that some programs do a little better than 60 percent, some a little worse.

Indeed, caching is exactly the task taken by the Radius 25MHz accelerator for the SE. Despite its use of the Mac's slow memory and the lack of a true 32-bit bus, it still outperforms the standard Mac II by a significant margin on CPU-only tests (see "Processors: Is Faster Better?" in this issue). When disk I/O, specifically write-to-disk, is a significant factor in a test, the Radius Accelerator 25 loses its advantage over the standard Mac II. (The recompile test is an example. Compiling is a sequential task, and the cache becomes a disadvantage at that point.)

DayStar Digital's Mac 20MX-25 accelerator board also uses memory caching. At the CPU-intensive tasks, the caching is so effective that this board easily outperforms the unenhanced Mac II—it manages to cut times for CPU-intensive work by 30 to 40 percent. But the Mac 20MX-25 slows down the minute it has to perform writes to disk. Obviously,

(continues)
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State of the Mac

ly, caching can improve performance. Has Apple gotten around to caching? No. Will it? Let’s hope so. Memory caching is about the only way to offset the high price of memory upgrades. If Apple would couple caching with direct memory access disk I/O, a technique in which data is moved to and from memory without the CPU’s intervention, the overall result would be a spectacular improvement in performance.

The Bottom Line

I haven’t begun to exhaust the subject of how Apple could improve the performance of the Mac II. (In fact, any discussion of the Mac II’s performance has to get around to the video display. Next month I’ll tackle Apple’s new 24/32-bit QuickDraw color standards in depth.) Yet one thing should be clear from the discussion so far: the Mac II is faster mostly because the CPU runs at a higher speed. I find that quite ironic. If that had been known back in 1987, many of us might have waited and bought an accelerator card for our SEs. True, the Mac II has other attractive features, and speed isn’t the only attribute that made us pull out our wallets and contribute to Apple’s rise in the Fortune 500. But now that the speed high has worn off, I can only question what Apple is spending its $65 million R&D budget on—it certainly isn’t in building a state-of-the-art machine.

I’m about out of room, and I’ve wandered a bit from where I started. But I do hope that you’ve gotten an idea of things to come. The Macintosh II is a near state-of-the-art machine. As such, it is driving Apple’s development teams to test the limits of what is possible. I’ll be tackling tough, technology-related issues in upcoming columns, issues that you’ll need to be aware of to take best advantage of the Mac II.

In the meantime, some of you may have specific questions or comments about the Macintosh II. I try to answer as much of my mail as possible; a question with a self-addressed stamped envelope almost always gets a reply. But a better way is to leave me an electronic mail query. I can be reached as THOGAN on GEnie, minniefloppy on Bix, or as THOGAN on MacNET. □
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Insights on QuarkXpress 2.0

Find the freedom of the press at your fingertips

by Steve McKinstry

If freedom of the press belongs only to the individual who owns one, then anyone with QuarkXpress 2.0 and a Macintosh can raise a little Citizen Kane. The newest and most important features in Xpress 2.0 are tools that manage style, color, and imaging. Styles in Xpress 2.0 allow complex formats to be applied quickly and easily. Using the new color enhancements, process CMYK (cyan, magenta, yellow, and black) separations can be printed directly to film. And imaging controls offer special contrast and color effects. What follows are some tips on applying these new tricks to your own documents.

Between a Rock and a Hard Space

Each style sheet is designed with its own leading (the space between lines), which can create awkward spacing between paragraphs and can throw baseline alignment off in parallel columns. To reduce or increase the carriage return space between paragraphs, you can choose various leading increments by selecting Size under the Style menu; for custom spacing between paragraphs, you can create a style for hard spaces (see "Hard Spaces").

Select Show Invisibles under the View menu to see where carriage returns and other punctuation marks fall. To create this hard-space style, go to the Edit menu and select Style Sheets. Choose New and give the style a name (Hspace-spt, for example). Now choose Character; for this example, set a Helvetica Bold type style at 2 points. (Xpress doesn't allow font point sizes below 2 points, and making the type style bold will make the carriage returns wider and easier to see with Invisibles turned on.) Close Character; select Formats, and set the leading to 2 points. Alignment should be on the left side for easy viewing. Highlight the carriage return between paragraphs and choose the Hspace-2pt style you created. The spacing between paragraphs will shrink to 2 points, and each additional carriage return will add another two points of leading. You can now adjust the alignment of text until it's where you want it.

You can base other hard-space styles on this one by renaming the style and changing the leading and point size to 3, 6, 9, or 12 points. You can also "cheat" a 1-point hard space based on the 2-point style by changing the leading to 1 point under Formats when altering the style.

Adding Bullets to Your Arsenal

Although QuarkXpress 2.0 has no programmed bullet-creation function, here are two methods for producing bullets.

The first method produces indented text with standard fill-character bullets. After creating style attributes for font, size (use 10 point for this example), style, and leading, choose Formats from the Style Sheets dialog box. For this example, set the
13 IS NOW YOUR LUCKY NUMBER

How To/Insights

Simple Bullets

Simple bullets can be created by setting tab stops and using a fill character, such as the round bullet selected when choosing Option-8.

right indent to 2 picas. Set the first line indent to −2 picas. And set the space below each paragraph to 1 pica. Next choose Tabs to set one left alignment tab at 6 points (see "Simple Bullets"). Click inside the Fill Character box and press Option-8 to create a circular bullet. This allows just enough space for one solid leader dot to show before the first tab. If you allow too much space, several dots will show; if you allow too little space, no dots will show. Now place a second left alignment tab at 2 picas. Save the changes and apply the style to each paragraph you wish to begin with a standard bullet.

This style will indent each paragraph of bulleted items 2 picas, with 1 pica between each item. The first line of each item will be flush left. At the beginning of each first line, manually tab twice. One solid leader dot will appear in the first 6 points. (10-point type was used for this example.) The first tab will need to be set wider when using larger point sizes.)

Use the style above as a basis for the second method, which produces indented text with a custom bullet. Set Tabs for one, and only one, left alignment tab at 2 picas. Delete any fill characters. Save and tag each paragraph you wish to begin with a bullet with this new style. Manually tab once in front of each first line.

Now highlight all paragraphs tagged with this style. Go to the Edit menu and choose Find/Change (§-F). Click off Ignore Attributes to expand the Find/Change dialog box. Under Find What, enter \t to insert a lowercase n in front of the tab (see "Sophisticated Bullets"). Click on Font and choose Zapf Dingbats. Click on Point Size and choose a desired size. Click on Find Next, then on the Change and Find button. This will replace the tab with a square bullet (the equivalent of a lowercase n). To choose other Zapf Dingbats, substitute their keyboard equivalents for the n in the above example.

Sophisticated Bullets

More sophisticated formatting can be done on bulleted items by using Xpress's Find/Change box. Here a special character and tab stop are searched and replaced with a bullet of a different font and size.
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**Rules that Go with the Flow**

Rules placed within a paragraph will not move with the text. Although Xpress doesn't address this problem directly, there is a solution, and it is much like the one for creating a style for hard spaces. But instead of replacing a carriage return with a hard space, you replace it with the underscore feature of the keyboard. Here's how it works. Begin by selecting Style Sheets from the Edit menu. In this example, you will create a style that places a 1-point rule under a 10-point, all caps, subhead style. First create the subhead style in Franklin Gothic Bold (or similar face) with the following attributes: 9 points, all caps, Alignment Left, 9-point leading, and 6 points of space above. Name it HedSubBlk-9.

Next create the rule style. Name the style RuleBlk-1 for 1-point black rule. Click on Character, choose a light typeface such as Helvetica Light, and enter 3 points for size. When you choose the underscore key, this will produce a line weight close to 1 point. If you set the horizontal scaling to 300 percent, you will need fewer key-strokes to create a line based on 3 points. Click OK, and then Formats. Set the leading to +0 and the alignment to Left.

Tag the subhead text with the style HedSubBlk-9. Add another paragraph return and highlight it. Tag it with the style RuleBlk-1. Using the underscore key, create a rule under the subhead. When the line begins to wrap under the first line, use the Backspace key to return the line to the end of the first line. If the line has a bad fit with the column width, use \textsuperscript{\textdagger} to widen or \textdaggerdbl to shorten the line. You now have a 1-point line 6 points under the subhead that will move with the type.

With a little experimentation, you can also create 3-point rules and 6-point rules by substantially increasing the rule's point size and decreasing the scaling and leading. Choosing an extrabold type works best for creating thicker rules.

**Forced Justification**

The last line in a paragraph of justified text is usually flush with the left-hand margin. You can force that line, or any line, to justify across the column measure. This is particularly useful when you must cut a story in the middle of a paragraph and send the remainder as a text file to someone working on a separate page on another computer. Click the text insertion tool at the end of the last paragraph line and press Shift-Return. Paragraphs must be in justified text. This feature can also be used to stretch headlines across columns.

**Showing Off Your Best Attributes**

You don't need style sheets to carry over the alignment, leading, and indent attributes of one paragraph to another. You can use one formatted paragraph to format others.

Make sure the text is in the same text frame, or linked. Format one paragraph, then highlight the others you wish to change to the same style. Position the cursor arrow over the formatted paragraph and use Option-Shift-click. The highlighted paragraphs will change to the formatted style.

**Mixing Type Styles**

You can change a word or words in a paragraph to another style by highlighting it and changing the attributes one by one under the Style menu. But highlighting a single word in a paragraph and tagging it with a new style converts the entire paragraph to that style. To spread up the process of changing attributes, or to use formatted style sheets, insert a carriage return before and after the word to make it a separate paragraph. Tag the word with a style and delete the carriage returns. Make sure the paragraph is set for absolute leading so spacing from baseline to baseline is the same.

**Style Sheet Libraries**

A lot of time and effort are invested in creating text and color styles for a publication. Currently, QuarkXPress is unable to export individual styles, although it can copy a document's complete set of styles.

You can create specific libraries of style sheets, however, and here's how: Open a new document and append styles from existing documents to its style sheets. Delete unwanted styles from the list and save the new document, as Style Library Features Section, for example. Do this for each library needed. This will organize your styles on a more selective basis and minimize the number of style lists.

Because you can export styles to word processing programs, you can speed up the production cycle by having writers use only the styles you want them to use when (continues)
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How To / Insights

preparing a document. This encourages consistency in formatting and helps writers organize their information. It also saves paragraph tagging during pagination.

To make your styles part of the default system, use the menu selections available after launching Xpress (before opening a document on the desktop) to append styles and colors.

Using PageMaker Style Sheets
You can use Microsoft Word to import PageMaker style sheets into Xpress. In PageMaker, use the Export command under the File menu to export selected document text using the Microsoft Word 3.0 file format. Do not select the Export Tags option. The file, with its text and tagged styles, can be opened in Xpress using the Get Text command in the File menu. Click on Include Style Sheets when selecting the text file to be placed. Most of the style attributes (font, size, indents, leading, tabs, and so on) are carried over as new styles in Xpress. Attributes (color, for one) that are not supported by style sheets in Microsoft Word cannot be carried over. Xpress style sheets can be imported into PageMaker by opening them in Microsoft Word and saving them as Word files.

Tempting Templates
Creating templates saves time. They can include positioned-picture frames and text frames with all the style attributes of color, shading, rules, spacing, tabs, indents, font, and size. When you open a saved template and enter type in the formatted text frame, the style attributes assigned to that frame automatically apply to the typed text.

This also works when you’re placing text from a document, but there’s a hitch. If the text is placed from a word processor, the style attributes of the word processor file override the formatted text frame’s style attributes and you will have to format all over again. However, if you save the text from the word processor in ASCII format first and then place it, the style attributes of the formatted text frame will apply to the placed text.

Mini templates can be created as a library of formatted elements. Because Xpress can open more than one document at a time, separate documents of elements such as jump lines, quotes, and drop caps can be created in library documents (see “Format Libraries”). You can open this document as a second window while working on a page and copy the items into position as needed.

You can design, store, and position quote styles, logos, and photographs as needed. Remember to design their elements within their own parent box so they can be moved together. Here are a few more examples:

A customized dummy initial cap (T, for example) can be stored within a small text frame in a variety of line depths, point sizes, font styles, and colors. When you need a drop cap, go to your library of formatted elements and copy and position the cap into a text paragraph for an automatic wrap. Delete the first text character in the paragraph and retype it or paste it in place of the dummy initial cap. Adjust the width of the text box as needed.

Jump lines can be stored with their automatic page-numbering information. Then they can be copied from the library and positioned for instant numbering of jump lines to the next page. Real keywords (or story slugs) typed over these dummy positions will pick up the underlying style attributes.

(continues)
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Color Kudos

Xpress offers separation features for spot colors or combined four-color plates made up of CMYK values. Unfortunately, you can't see Illustrator images in color because Illustrator does not save and load a color bitmap image of the file. You can see FreeHand illustrations in color, but they don't separate out with the Xpress colors in CMYK.

Mixing colors in Xpress is similar to creating style sheets. According to Xpress's manual, you can mix colors by dragging the cursor through a color wheel. This feature does not work in Xpress 2.0, however, and you must enter CMYK percentages numerically, creating a small color swatch along with the color. Name the new color and it, as well as the swatch, becomes part of your permanent color style for that document.

For accurate color percentages, mix your colors according to a printer's color guide, not according to the colors appearing on the screen. You will have a better chance of getting the correct screen values for the final printing. Like the style sheets, colors can be appended and managed through custom libraries. The same percentages of color mixed in Illustrator and QuarkXpress will print differently. Quark is planning to fix this problem in a future release.

Xpress offers a complete list of Pantone colors that are true to their on-screen representation than CMYK colors because they were created with their RGB (red-green-blue) counterparts. Pantone colors can be selected by color or number. You can separate the colors into CMYK values by selecting CMYK after selecting the Pantone color and turning on the separation process.

Changing Your Image

QuarkXpress's imaging features now offer expanded controls over modifying color images. Achieve special contrast effects on color images by manipulating the contrast line (see "Contrast Control"). You can alter individual color contrast on imported color images for HSB (hue, saturation and brightness), CMYK, CMY (cyan, magenta, and yellow), and RGB values.

Although Xpress's black-and-white controls can't compete with the editing features of stand-alone programs like ImageStudio and Digital Darkroom, they do have their uses. For example, you can change the screen pattern from dot to line. (Note, however, that you won't see these changes until printed.) You can change black-and-white bitmapped, TIFF, and other image formats supported by Xpress by adding a color or screen tint in addition to the special contrast effects.

Other Tips?

If you've found a shortcut or undocumented trick that's not mentioned here, share it with other Macworld readers by sending it to Quick Tips, Macworld, 501 Second St., San Francisco, CA 94107. See Where to Buy for contact information.

Contrast Control

These two images illustrate Xpress's ability to alter the contrast curves in all four colors for special effects.

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Convert your PC or PS/2® into an AppleShare™ compatible file server with the DayStar FS100 File Server System. It works just like a dedicated AppleShare server, allowing Macs and PC's to share storage space and exchange files on the server. The FS100 is the most cost-effective server available. Take advantage of inexpensive PC, XT and AT clones, or bring your old surplus machines back into service. It's simple to install and offers remote administration from both Macs and PC's.

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Macworld 81
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Customize color palettes by changing RGB and/or HLS wave forms — or use the standard Macintosh color picker.

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Install Timbuktu on each Macintosh, and everyone on the network can access other Macintoshes, share screens, and control the operation of each other’s computers. In fact, you can access your own computer from another computer on the network. (Our companion product, Timbuktu/Remote, works the same way over modems.)

So, if you’re the one who’s always fixing things on the network, helping solve computer puzzles, and other office heroics, then leave your running shoes at home.

Now, you can identify problems on any Macintosh, reconfigure or update software, teach people new applications, or manage servers and other shared resources. Right from your own Macintosh. Or any other Macintosh, for that matter.

For those pressured with meeting the demand for more computing power, while justifying the cost to management, Timbuktu offers a profitable solution. And relief.

Timbuktu lets everyone access any workstation and its databases, FAX modems, print spoolers, servers, and mainframe connections. If you’re concerned about security, the password protection feature will limit access to any device. You can also use Macintosh IIs as servers without buying keyboards, monitors, or video cards.

Timbuktu. What we’re talking about is people working together, sharing resources, and helping each other get the job done. Only now you can do it over the network, with united stations. To find out more about Timbuktu and the rest of the PhoneNET System, call (415) 849-2331 for the Farallon dealer nearest you.
Tektronix Color Printer

In answer to the Macintosh II world's clamor for a better color printer, Tektronix has rolled out a color ink-jet printer and an upgraded version of its existing 4693D, a 300-dpi thermal transfer printer. In addition, Tektronix introduced a three-part family of phaser printers. One part, the printer controller, drives the other two parts—a PostScript-compatible, thermal color printer, and a monochrome laser printer.

The heart of the Phaser family is a Mac II–size box called the Phaser PrintStation. The box contains a printer controller with 8MB of memory (expandable to 11MB), a 40MB hard disk, and an AppleTalk connector. A color interpreter supports both PostScript and HPGL (the language that drives most pen plotters), and you can reprogram the interpreter to work with any Tektronix color printer (only one at a time, however). The 40MB hard disk contains the same 35 fonts available on an Apple LaserWriter, and it can spool images. PrintStation software lets users on a network check the spooler in order to see what jobs are there and to control their own print jobs.

The Phaser PrintStation, bundled with the PostScript color printer engine, costs under $16,000—$6000 less than the equivalent QMS PostScript thermal printer. The laser printer costs another $3000, still keeping the cost below that of the QMS printer. You can attach an Apple LaserWriter to the PrintStation through a serial port, and use the LaserWriter as a spool server. In addition, you can purchase a second controller board so you can have two color printers, two black-and-white printers, and a LaserWriter, all attached to a network at once.

Even though the Phaser family's price is comparatively low and the set-up flexible, you may well question whether the output you get from any PostScript color thermal printer is worth the cost. In order to produce a large palette of colors, the printer dithers seven basic colors. (Dithering involves alternating the dots of different colors to produce a new color.) Thus the apparent resolution dips far below the actual 300 dots per inch (dpi), making the output unsuitable for camera-ready art. In addition, it's nearly impossible to match colors on the Mac II's screen with colors on the printout.

On the other hand, Tektronix has given users an inexpensive way to get reasonable color printouts from a Mac II. The new ColorQuick Ink-jet Printer, which costs less than $3000, is the first color ink-jet printer specifically designed for the Macintosh. Others, such as Hewlett-Packard's PaintJet (which was originally designed to work with IBM PCs), require special third-party drivers, making them incompatible with much of the available software. The ColorQuick, however, uses a Chooser-level QuickDraw driver that works with all QuickDraw applications and supports bitmap fonts.

Even better, the ColorQuick can produce 4096 colors at 216 dpi, by manual dithering—you create colors by making patterns of dots. In comparison, both the PaintJet and the Sharp JX-730 print at only 180 dpi. Also unlike the PaintJet and the Sharp, the ColorQuick can be ordered with a SCSI port for faster printing speeds. The printer can print on plain or coated paper, or on transparency film at one minute per

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Identity Online

Wolff Olins, one of Europe's oldest and largest design firms, has gone all-Mac. The London-based company, known for its pioneering work in the field of corporate identity, has 30 Macs in place, six of them Mac IIs. It uses the machines to design total corporate-image packages—everything from offices to office forms to vehicles to products. The company's directors believe that the Mac offers unique design solutions and makes design modification more efficient.

Workstation-Class CAD/CAM for the Mac II

Apple has always touted the Mac II as a good computer for CAD/CAM. Now the fourth-largest mechanical CAD/CAM software company in the world—The Schlumberger Technologies CAD/CAM Division of Ann Arbor, Michigan—is making its existing Bravo3 CAD/CAM software available on the Macintosh. Called MacBravo, this product line uses source code that is the same as that of Schlumberger's VAX mainframe version.

MacBravo consists of three very Mac-like elements: MacBravo Modeler, a $1,995 3-D wireframe and surface modeler package; MacBravo Detailer, a $1,995 drafting package; and a $495 IGES translator. The three may also be obtained together for $3,295.

MacBravo Modeler supports warped, swept, ruled, and offset surfaces, as well as surface intersections. It provides extensive geometric construction capability and lets you work in 2-D work planes, which are then combined to form precise 3-D models. These models incorporate IEEE standard double-precision floating point calculations, which is important for machining accuracy. The software allows up to eight model viewports to be simultaneously displayed; each can be saved, zoomed, and rotated. MacBravo Detailer also references the 3-D models.

In addition to doing 2-D mechanical detail drafting, MacBravo Detailer also operates in conjunction with MacBravo Modeler for detailing 3-D models. It conforms with ANSI, ISO, and DIN dimensioning standards, and has extensive geometric construction, dimensioning, text, and labeling facilities. You can display 3-D models in a 3-D viewport while 2-D views are being created.
Built to scale

If you design on a Mac II, a screen that's too small will cramp your style. That's why you should be looking into a SilverView from Sigma Designs.

At 21", this landscape monitor offers the biggest viewing area anywhere. A full 16" x 12" 2-page spread including rulers and margins.

Which means you can finally work in actual size. A fact that's also made possible by SilverView's 72 dots per inch typesetting standard.

Something else should weigh in our favor. The gray scale.

Besides black and white, there are SilverView models offering 16 or all 256 different shades of gray. So what you used to leave up to the imagination can now be in all your work. Like subtle halftones or delicate shadings.

SilverView's also remarkably comfortable to work with. Its high contrast flat screen virtually eliminates glare and distortion. And its unusually high refresh rate delivers rock solid images that never flicker.

To find out just how much better your work can look, call Sigma Designs at (415) 770-0100 today.

Then never scale down your ideas.
Hey Milo, Can You Help Me with My Math?

Got the concept of step-functions, but too tired to calculate another step? Paracomp's Milo, the first WYSIWYG mathematical problem solver for the Macintosh, helps execute common math operations quickly and easily. Milo includes a technical word-processing capability, graphics tools, and a symbolic algebra program.

"Milo is like an intelligent piece of paper," according to Ron Avitzur, who developed the program as a student at Stanford University. "The user guides the mathematics, but Milo does all the work." The program lets you manipulate complicated math expressions by clicking the mouse, and create scientific documents with the word processor while performing algebraic computations. Another first for Milo is that the documents can contain mathematical expressions combined with normal text and graphics. Milo has a suggested retail price of $249.95 and is available from Paracomp or from distributors including Softsel and Bonsu.

Adding credence to the notion that the Mac is becoming a complete CAD machine, Paracomp is also introducing MacVLSI, a software package for designing and laying out Very Large Scale Integrated (VLSI) chips. MacVLSI will cost about $3000 when it becomes available in March (a less expensive academic version with fewer features will also be offered). For more information call Paracomp in San Francisco, at 415/543-3848.

Cactus Slices Up Broadband

Cactus Computer has introduced the BroadTalk adapter board for connecting the Mac II to a broadband network.

A broadband network, unlike other LANs such as LocalTalk and Ethernet, divides the transmission capacity on the wire into segments, in much the same way that a cable TV transmission supports multiple channels on one cable. (In fact, some broadband networks also carry closed-circuit video.) Each channel transmits at a different frequency, and you adjust the boards on your computer to receive that frequency.

The BroadTalk board allows the user to choose among four frequencies, one of which is used by the IBM PC Network, meaning that Mac users can communicate with PCs on that kind of LAN. The board includes a plug-in, 2-megabit-per-second broadband modem module that you can easily replace to change frequencies.

With an Ethernet Adaptor Module, the board can also be used as a standard Mac II Ethernet adapter, transmitting at 10 megabits per second.

Cactus also offers a BroadTalk-Ethernet gateway, which allows users on a broadband network to communicate with users on an Ethernet network. The BroadTalk Adaptor Board with a Broadband Module costs $895, while an adapter with an Ethernet Adaptor Module costs $745. The Broadband Module and the Ethernet Adaptor Module are also available separately for $350 and $200, respectively. The BroadTalk-Ethernet Gateway costs $3550. For further information, contact Cactus Computer, in Carrollton, Texas, at 214/416-0525. —Sharon Fisher

A Mac's Brain in a PC Body?

In a continuing attempt to make the IBM PC look more like a Macintosh, IBM and Microsoft have shipped version 1.1 of Operating System/2 (OS/2) with the Presentation Manager graphical user interface—a multitasking, single-user operating system that uses the protected-mode operation of PCs based on 80286 and 80386 microprocessors. It allows users to tap up to 16MB of memory or up to 1GB of virtual memory.

Other features new in OS/2 1.1 include allowance for a single file to be larger than 32MB, as well as support for the named-pipes interface, a method for communicating between processes and programs that is easier and faster than existing methods on the PC.

It's recommended that PCs running OS/2 have at least 2MB of memory, or 2.5 MB if they re...
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<td>Microsoft</td>
<td>Quick Basic</td>
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<td>Symantec</td>
<td>Lightspeed C</td>
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<td>Lightspeed Pascal 2.0</td>
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<td>Just Enough Pascal</td>
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<td>TNL Systems</td>
<td>TML Pascal II</td>
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<td>True Basic</td>
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<td>3-D Graphics Toolkit</td>
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<td>Scientific Graphics Toolkit</td>
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<td>Super Studio Session</td>
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<td>Studio Session</td>
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<td>Country &amp; String Quartet</td>
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<td>ThreeD Graphics Construction Set 2.0</td>
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What's Your Opinion?

Can public opinion polls predict the outcome of major elections? Students in Austin, Texas, set out to find the answer last November with a major national opinion poll of nearly 30,000 voters—a sample size larger than that of any other poll surveying the 1988 presidential election. Students in the 5th, 8th, 11th, and 12th grades conducted the survey with the help of ten networked Mac Pluses, SEs, and IIs donated by Apple Computer, and an easy-to-learn data-entry application based on Omnis 3 Plus from Blyth Software. In all, 4500 students participated in the project, part of the Eanes Independent School District's "Learning Today . . . Leading Tomorrow" program, designed to help students learn by experience about politics and leadership.

Dan Hampton, a consultant and developer with Strata Systems in Austin, chose the multi-user version of Omnis 3 Plus version 3.3 as a platform for creating the data-entry and reporting application for the poll. Using Omnis's basic push-button screen, Hampton created a straightforward three-button interface: Dukakis, Bush, and Undecided. It took 20 students six minutes to learn the system, a simple matter of clicking the mouse button on the appropriate choice.

On the evenings of November 2 and 3, students placed calls from a phone bank of 100 phones on stage at the school auditorium. Twenty-five runners brought results from the phone bank to the students at the Macs, who entered the data instantly and produced tally sheets every half-hour.

The results? In the national poll, 46 percent were for Bush, 33 percent chose Dukakis, and 19 percent were undecided. In Texas it was 51 percent Bush, 40 percent Dukakis, and 9 percent undecided. These results proved accurate in predicting the actual outcome of the election. But the main winners here were the students, who learned first-hand about the political process as a real event, not a canned TV production.

—Felicity O'Meara

Me, My Mac, and My Mainframe

Avatar and Digital Communications Associates have each announced micro-to-mainframe products that make it easier for Macintoshes to communicate with IBM mainframes.

Avatar's MacMainFrame II/DFT (Distributed Function Terminal) software allows the Mac II to emulate an IBM 3270 terminal.

MacIRMA TLPM is bundled with Apple's MacWorkStation software and is licensed to corporations for $2500. MacIRMA TLPM requires MacIRMA, a Macintosh-to-IBM mainframe hardware/software connectivity product that lists for $195.

For further information, contact Avatar Corporation in Hopkinton, Massachusetts, at 508/435-6872, or Digital Communications Associates in Alpharetta, Georgia, at 404/442-4000.

—Sharon Fisher

Movement Music

We all dance to the music, right? But we can't easily jitterbug to Tchaikovsky, pirouette en pointe to the Pointer Sisters, waltz to Led Zeppelin, or bomp and grind to Mantovani. Our limbs may know how they want to move, but we still have to spin the right record and then

(continues)
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Circle 87 on reader service card
Mark Coniglio, a student at California Institute of the Arts, has created a system that translates a dancer's movements directly into music.

Coniglio, a student at California Institute of the Arts' (CalArts) music school in Valencia, California, attaches position sensors to a dancer's joints, such as the elbows and knees, and connects the sensors to a small radio transmitter worn by the dancer. As the dancer moves, the transmitter sends signals to a Macintosh computer running Coniglio's Interactor software. The Mac converts those signals into MIDI information and routes it to synthesizers that play it as music.

The program responds intelligently to music as well as to movement, and can thus provide a live musician with interactive accompaniment.

For further information, write to Mark Coniglio, 24700 McBean Pkwy, Valencia, CA 91355. —Ann Garrison

Real-World Computing

Speeches, chorales, and landscapes may set the tone for the next generation of personal computer software. With the addition of a device called a digital signal processor (DSP) to the Macintosh, Mac software could take a giant step forward.

Two boards, DigiDesign's Sound Accelerator and Spectral Innovations' MacDSP, both shipping for the Mac, anticipate the coming of real-life interfaces. Both boards contain digital signal processors that let them manipulate data at speeds up to ten times faster than the Mac II's 8-megahertz 68020.

DigiDesign's Sound Accelerator contains a digital signal processor that lets it manipulate data ten times as fast as the II's 68020.

The boards foreshadow the arrival of realistic sounds and striking scenes that can be incorporated into software applications.

Spectral Innovations' MacDSP is a more general-purpose processor board containing a 16- or 24-megahertz DSP32 chip from AT&T. The DSP32 is capable of 12 million floating-point operations per second, providing greater accuracy and access to a wider range of data than the Motorola 68001.

The board, in its $2249 standard configuration, accepts add-on piggyback boards; the 16-bit analog-to-digital and digital-to-analog option lists for $486. A version of the board that uses AT&T's next-generation DSP32C chip will operate at over twice the speed (50MHz) of the DSP32 board and will be able to address over 16MB of data, letting the board process true color 24-bit images on the fly. To simplify application development, Spectral Innovations offers an MPW-compatible C compiler that compiles DSP code.

(continues)
45 MB Removable Cartridge SCSI Hard Disk Drive

Micro/Removable Cartridge Hard Disk Drive
The Micro/Removable, 25 ms, 45 MB winchester hard disk is faster than some fixed hard disks. They are excellent for organizing related data or for fast back-up of fixed hard disk drives. The cartridges can be locked away for security or safely mailed to remote locations and have the reliability of a floppy diskette. You can boot from the removable, if needed, and the system is compatible with the Macintosh Plus, SE or Macintosh II. Utility includes password protection and a DA to mount volume.

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MicroNet offers 30, 46, 62, 91, 173 MB, fast access hard disk drives, as well as a 150 and 300 MB streaming tape backup system in a stackable cabinet. Internal brackets available for the Macintosh SE or II. Great care was taken in the design of these systems to ensure reliability. 150, 300, 600 MB, 16.5 ms, Wren III, IV and V Systems. MicroNet specializes in Control Data drives that are industry known for their reliability and speed. Internal and external systems with tape combinations available.

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Where There's Thunder...

Looking for a low-cost scanner, but don't have an ImageWriter to latch it onto? You might want to take a look at ThunderScan's successor, due to ship in December 1988.

LightningScan, Thunderware's new $495 handheld scanner, will capture a 4½-inch-wide strip at up to 400 dpi, in either line-art mode or any of three half-tone/dither modes. The device connects to the Mac's SCSI port through an interface box, and you adjust scanning mode and brightness on the scanning unit itself. You set it up, start the software, then roll the scanner over the image you want to capture.

LightningScan comes with the latest incarnation of Thunderware's software, ThunderScan version 5.0, which lets you control an image's contrast and brightness after it's been scanned, even though the handheld scanner itself can't capture gray-scale images. The software works this magic by deducing gray values from the dithered bitmap provided by the scanner. What results is a lower-resolution image that includes gray scales. You can save the image as a flat, dithered bitmap or as a gray-scale image in TIFF, EPS, PICT, or Paint format, or in ThunderScan's native format.

The prerelease version 1 looked at required a steady hand for high-resolution scanning (it beeps at you if you move too fast), but more speed is top on the list of improvements for the release version. In addition, the software will include a DA that lets you use the scanner from within an application while retaining most of the application's capabilities, including cutting, copying, rotating, and saving selections. For further information, contact Thunderware in Orinda, California, at 415/254-6581.

—Steve Roth

Macs and IBM PCs Share Backup

Macs and IBM PCs keep moving in together, and developers keep working to make sure that the two systems learn to talk things out. Now Tecmar offers an adapter board that allows Mac IIs and IBM PCs and PS/2s to share cartridge tape drives.

Tecmar's NuLink System allows Mac IIs and IBM PCs and PS/2s to share cartridge tape drives.

Tecmar's NuLink System allows Mac IIs and IBM PCs and PS/2s to share cartridge tape drives.

The NuLink System lists for $395, the QT-Mac80 for $1795, and the QT-Mac150 for $2795. For further information, contact Tecmar in Solon, Ohio, at 216/349-0600.

—Ann Garrison

Gentlemen, Choose Your Modems

Hayes Microcomputer Products has introduced the Smartmodem 2400M, a 2400-baud modem, and version 3.1 of its Smartcom II communications software. The Smartcom II V3.1 utility lets a Mac II support up to five Smartmodem 2400Ms, which Mac users on an AppleTalk network can access via HayesConnect, a utility included with each modem. HayesConnect reportedly lets you access the modems while still using your existing communi-

(continues)
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With the Smartmodem 2400M and Smartcom II V3.1, you can now work with a modem server. Here's how:

**Talking Networks**

With the software and multiple modems on the Mac II, the computer becomes a modem server, eliminating the need to dedicate a phone line to every system. "You can click on HayesConnect, see the status of the modems, then choose a modem and configure the software to work with that modem," said Dennis Hayes, president of the company.

The Smartmodem 2400M and Smartcom II V3.1 began shipping in January. The estimated retail price is $549 for the modem alone, $599 bundled with the new version of Smartcom II. For more information, contact Hayes Microcomputer Products in Atlanta, at 404/449-8791.

## Combating Computer Phobias

If you're reading this, chances are you're a Macintosh enthusiast—and maybe you think computerphobia is a thing of the past. But according to Bonnie Meltzer, an artist in Portland, Oregon, it's very common for artists (and university art departments) to fear and distrust computers. All computers, even the friendly, icon-based Mac—graphical interface notwithstanding. Meltzer uses the Macintosh in every aspect of her art, from sketching and drawing basic ideas to creating the final designs for her large-scale sculptures—and also for grant proposals, mailing lists, and invitations to openings. She compares the computer's reception among artists to that of past innovations like oil paint, stretched canvas, and the mechanical loom: all were mistrusted at first.

To help clear up this misunderstanding, Meltzer gives workshops and lectures on the Macintosh as an artist's tool. She introduces her students to basic Mac concepts and techniques, then guides them through hands-on sessions with draw and paint programs. The workshops culminate in the students' making a collaborative, large-scale work of art using the computer along with traditional art materials.

### Zipperpillar Park

Zipperpillar Park, a popular, interactive sculpture environment at the Portland Children's Museum, is a high-visibility example of Meltzer's recent Mac-assisted work. Creatures like the 8-foot-long Silvergater, with its flipprable hinged scales, and the imposing Chameleon, whose colors children can change, were created in MacDraw and printed out in sections in actual size.

"We are going to see an explosion of Macintosh-generated art in the near future," Meltzer says. And thanks to her efforts, some of that art will be created by people who used to be scared of computers. For information on Meltzer's workshops, call her at 503/285-3131 in Portland, Oregon. —Felicity O'Meara

## OSI for the Rest of Us

In a move that should help integrate Macintoshes with heterogeneous networks, Touch Communications has announced Open Systems Interconnect (OSI) client software for the Mac.

Client software runs on the user's machine and communicates with a server machine, such as a DEC VAX (standard Macintosh network access is mapped onto VMS security mechanisms to protect the VAX's files). The software is also designed to communicate with OSI server implementations from other vendors, such as SunLink OSI from Sun Microsystems.

With this software, users can also redirect print requests to remote network printers; store and gain access to files on remote Touch OSI servers using Macintosh commands; and communicate with Touch OSI servers by emulating a terminal, so that existing terminal-emulation applications can continue to work.

OSI is a set of internationally standard communications protocols that is supported by a
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number of vendors. Because the Touch OSI software supports OSI profiles such as Technical and Office Protocol 3.0 (TOP 3.0), Manufacturing Automation Protocol 3.0 (MAP 3.0), and Government OSI Profile (GOSIP), a Macintosh running Touch OSI can communicate with other vendors’ implementations of those protocols.

The Touch OSI client software costs $395 ($940 if bundled with Ethernet network controller hardware). Touch OSI VMS server software for the VAX starts at $3000.

For further information, contact Touch Communications in Scotts Valley, California, at 408/438-4800.—Sharon Fisher

Reader Survey:
Desktop Presentations

We mailed our reader’s survey on desktop presentations to 1000 randomly selected Macworld readers, and received 450 responses. Of those respondents, 218 (48 percent) use a personal computer to prepare desktop presentations. Among those 218, 72 percent use word processing software, 56 percent use specialized desktop presentation packages, 42 percent use spreadsheet software, and 33 percent use other software.

When actually giving presentations, 59 percent use overhead transparencies, 19 percent use the Mac screen, 13 percent use slides, 4 percent combine overhead transparencies and slides, and 4 percent combine overhead transparencies and the Mac screen. Not surprisingly, only 15 percent said that connection to a slide-making service was very important.

New Hard Disks

There are some new external, internal, magnetic, optical, 32-megabyte to 1.2-gigabyte, $999 to $2095 hard disk options for you data savers.

The Ehman Engineering HDD32 is a 32MB external hard disk that connects to the SCSI port and has an access time of 12 milliseconds. Automatic head parking protects your data, and an external SCSI address switch means you don’t have to open your drive and go to the back and get out your tweezers to move plastic jumpers around on pins: the address comes up in a window and you change it by pressing a button. The $499 HDD32 is preformatted, so you can take the hard disk out of the box, hook up two cables, and get back to work.

Ehman’s hard disk was designed in the tradition of the Mac as an easy computer to use, and the company claims that its price is also easy to pay—at least $100 less than anything comparable.

Next is the Wren family of internal 3/4-inch hard drives from Imprimis Technologies, a subsidiary of Control Data Corporation. The new Wren drives range from 383MB before formatting to 1.2GB before formatting. Access times range from 10 to 16 1/2 milliseconds, and data transfer rates range from 15 to 21 megabits per second. Standard features include 40,000 hours mean time between failures, balanced rotary voice-coil actuator, automatic head parking, and a dedicated head landing zone.

The 1.2GB Wren V11 is made possible by zoned-bit recording technology; it is designed for office equipment manufacturing and for building systems for high-performance 3-D visualization, high-end text retrieval, and voice messaging. Wren drives are available through value-added resellers, including Relax, Jasmine, MicroNet Technology, CMS Enhancements, FWB Software, and GCC Technologies.

Then there are the MacinStor products, a whole gang of 45MB to 800MB optical and hard disks from Storage Dimensions. The 800MB product is the LaserStor, a write-once, read-many (WORM) optical drive for data-intensive applications such as desktop publishing, CAD/CAM, image processing, database distribution, and document storage and retrieval.

Internal MacinStor hard disks for the SE range from 45MB ($1249) to 90MB ($1649), internal hard disks for the II and IIx range from 45MB ($1249) to 630MB ($7799), and external hard disks for the Plus and up range from 45MB ($1449) to 180MB ($3199). The hard disks have an average access time of 14 ms and data transfer rates of up to 15 megabits per second. Their standard features include automatic head parking, dual 50-pin SCSI connectors, external termination, and power and access indicators.

For further information, contact Ehman Engineering in Evanston, Wyoming, at 307/789-3830; Storage Dimensions in San Jose, California, at 408/879-0300; or Imprimis Technologies in Minneapolis, at 612/936-6271.—Ann Garrison

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4482 StatView SE + Graphics 1.03 ............................... 329
4481 StatView II 1.03 ............................................ 349

**Access Technology ... NCP**
3959 MindWrite 2.0 ............................................. 95
4109 MindWriteExpress 2.0 ................................. 145

**4024 4th Dimension Runtime** ................................. 235

**4109 4th Dimension 1.0.6** .................................... 469

**4567 58 OCR A, OCR B, MICR** ............................... 97

**4568 58 OCR A, OCR B, MICR** ............................... 97

**4566 58 OCR A, OCR B, MICR** ............................... 97

**4566 58 OCR A, OCR B, MICR** ............................... 97

**4575 57 ITC Kabel** ........................................ 127

**4571 57 ITC Kabel** ........................................ 127

**4572 60 Helvetica #2** ..................................... 187

**4573 60 Helvetica #2** ..................................... 187

**4574 60 Helvetica #2** ..................................... 187

**4575 60 Helvetica #2** ..................................... 187

**5142 Newsletters/Publishing Pack 1** ....................... 255

**5143 Adobe Illustrator '88 1.6** ............................... 309

**5144 Adobe Illustrator '88 1.6** ............................... 309

**5145 Adobe Illustrator '88 1.6** ............................... 309

**5146 Practica Musica 2.07** ................................ 75

**5147 Turbo Pascal Tutor 1.0** ................................ 46

**5148 Turbo Pascal Tutor 1.0** ................................ 46

**5149 Heavy Metal Disk** .................................... 15

**5150 String Quartet Disk** .................................. 15

**5151 Berkeley System Design ... NCP**...................... 52

**5153 MathView Professional 1.0** ............................ 144

**5154 StatView 512+ 1.2** .................................. 175

**5155 ArchiText 1.03** ..................................... 182

**5156 The Analyzer Bundle** (includes DataScan, DesignScope, and StatView 512+) .................. 325

**5157 Bravo Technologies ... NCP** ............................. 79

**5158 Bright Star Technology ... NCP** ......................... 109

**5159 HyperAnimator 1.5 (includes Stax, a MacConnection exclusive)** ................................. 79

**5160 Broderbund Software ... NCP** ......................... 20

**5161 Jam Session 1.1 (CP)** .................................. 30

**5162 PosterMaker Plus 2.5** .................................. 36

**5163 DTP Advisor 1.0** .................................... 47

**5164 Geometry 1.0 (CP)** .................................... 59

**5165 Physics 1.1 (CP)** ..................................... 59

**5166 Calculus 1.0 (CP)** ..................................... 59

**5167 Drawing Table 1.0** ................................... 78

**5168 Clip Animations** ...................................... 36

**5169 Clip Sounds (sound effects/music)** .................. 36

**5170 VideoWorks II HyperCard Driver 1.2** .............. 60

**5171 VideoWorks II Accelerator 1.1** ....................... 118

**5172 VideoWorks II 1.2** ................................... 118

**5173 Videorecorder ... NCP** ................................ 20

**5174 OmniPage 1.0** ........................................ 65

**5175 CMDE ... NCP** ........................................ 65

**5176 Nutri-Calcul Plus 1.1** ................................ 169

**5177 Casady & Greene ... NCP** ................................. 32

**5178 QuickDEX 1.4A** ...................................... 27

**5179 Fluent Fontsp 2.0** .................................. 27

**5180 FLUENT LASER FONTS** .............................. 27

**5181 Bodoni (V1) ........................................... 46

**5182 San Serif (V2) .......................................... 46

**5183 Ritz/Right Bank (V3) .................................. 46

**5184 Monterey (V4) .......................................... 46

**5185 Regency Script/Calligraphy (V5)** .................... 46

**5186 Prelude Script (V6)** .................................. 46

**5187 Coventry Script/Zephyr (V7)** ....................... 46

**5188 Gregorian/Doiroyar (V8)** .................. 46

**5189 Cyrillic (V9)** .......................................... 46

**5190 Bodoni Ultra (V10)** .................................. 46

**5191 Sans Serif Bold (V11)** ................................ 46

**5192 Sans Serif Extra Bold (V12)** ...................... 46

**5193 Gatsby Light (V13)** .................................. 46

**5194 Micro (V14)** .......................................... 46

**5195 Micro Extended (V15)** ................................ 46

**5196 MacTrox ... NCP** ..................................... 65

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<th>Code</th>
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3324 Project Billing...1.5...409.

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Sallie Evans
North Middletown, KY
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3462 PT-109 …………. 26.
3461 Orbiter 1.1. . . . . . . . . . . . . . . . . . . 26.
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From ’most anywhere.
The Mac SE Turns 030

Apple squeezes 68030 power into a small box. Now you can have your 030 and travel with it too.

Anyone who has lugged around a Mac II can attest to its size and weight. Powerful it is; portable it’s not. Since Apple introduced the Macintosh SE and the Macintosh II two years ago, there’s been a large gap in the product line. The descendant of the classic Macintosh—the SE—was small, transportable, somewhat expandable, and slightly faster than its predecessors. By contrast, the Mac II offers a tremendous boost over the SE in computing power, full support for color, and a wide-open architecture; but it also eats up more desk space than a typical MS-DOS computer.

After two years, Apple is finally taking the first step toward bridging that chasm. The newest version of the Mac SE transplants the Mac IIx’s architecture—and power—to an SE box.

The IIx Reduced

On the outside, the new machine looks pretty much like an SE, with just a few minor differences. The ports along the back are identical to the SE’s, but since there’s no space for a second internal floppy drive, the case no longer sports a pop-out cover for a second drive. The new models come with an internal hard disk—40 or 80 megabytes.

The internal floppy drive has also changed: it’s a Floppy Drive High Density (FDHD), the same kind that’s in the Mac IIx. This drive formats, reads, and writes to 400K, 800K, and 1.2MB Macintosh floppy disks. It can also read from and write to MS-DOS disks formatted at 720K and 1.44MB (with help from Apple File Exchange software). It does this thanks to the SWIM (Super Wozniak Integrated Machine) disk controller chip. A revised (and improved) version of the Apple File Exchange utility, which transfers data between Mac and MS-DOS formats, is included with the new machine’s System (version 6.0.3).

There are other major changes inside. Like the Mac IIx, the Macintosh SE/30 uses a 16-MHz 68030 chip as its central processing unit (CPU), as well as a 16-MHz 68882 chip for doing floating-point math. By contrast, the Mac SE’s CPU is an 8-MHz 68000, and it has no floating-point chip. The result: a five-fold improvement in general performance over the SE, and a much greater speed-up for math-intensive applications. Also, the 68030 (unlike the 68020 and 68000) has a built-in Paged Memory Management Unit (PMMU), aiding support of a true multitasking operating system. However, until Apple ships System 7 later this year, the Mac operating system will be un-

by Bruce F. Webster

Bruce F. Webster is a free-lance writer and software engineer living out amongst the redwoods near Soquel, California.
able to utilize the PMMU. Ironically, Apple is not offering A/UX, its multitasking UNIX software, on the new machine.

Memory is another area where the Mac SE/30 differs from the SE. The number of SIMM slots doubles from 4 to 8. This means that you can expand an SE/30 to 8MB of RAM with no difficulty (other than paying for the RAM). Apple says that the slots are designed to accommodate higher-density SIMMs; this means that when 4MB SIMMs become available, you'll be able to expand the Mac SE/30 to 32MB of RAM. Note that RAM access times are the same as on the Mac II and IIX: 120 nanoseconds (or faster).

The Macintosh SE/30 also uses a 256K ROM SIMM that is essentially identical to the Mac IIX's. In other words, the ROM used by the SE/30 isn't soldered in place or even socketed; instead, it's on a module, just like the RAM. This makes ROM upgrades very easy—snap out the old ROM SIMM and snap in the new one.

A/UX Version 1.1

The latest revision of A/UX grants well-behaved Macintosh applications and desk accessories exit visas from the land of the Finder and work permits in the land of UNIX. A/UX version 1.1 can run one Macintosh-compatible application and multiple UNIX background tasks at the same time.

Program developers and users can transfer Mac applications and documents from the Mac operating system to A/UX using a file-exchange application called HFX. You launch applications under A/UX using the standard UNIX shell. There is still no Finder-like interface for starting A/UX applications and managing A/UX files.

For a standard Mac application to work in A/UX 1.1, it must be 32-bit clean, a requirement that concerns its program code. Basically, an immigrant application must not make assumptions about its environment and must not take shortcuts (Apple publishes detailed compatibility guidelines for software developers). Many popular applications and desk accessories are compatible, including the Chooser and the Control Panel. This degree of compatibility is possible because the new version of A/UX supports most of the Mac User Interface Toolbox, the standard software all Mac applications use to communicate with the Mac and with the outside world (see "UNIX and the Toolbox").

A/UX version 1.1 supports direct and spooled printing on LaserWriters and other LocalTalk network printers, so UNIX users can share printers with standard Mac operating system users. A/UX still does not recognize AppleShare file servers on a LocalTalk network, however.

Tape and CD ROM support are also new in A/UX 1.1. For the first time, Apple is distributing A/UX software on 40MB tape cartridges, and standard UNIX tape backup commands can now be used with the Apple Tape Backup 40SC tape drive. In addition, A/UX 1.1 recognizes the Apple CD ROM drive as a 500MB read-only disk drive. The new release thereby enables developers or publishers to distribute large numbers of A/UX files for less than $2 per disk—the current CD ROM duplication price.

Apple remains uncommitted in the battles for UNIX-standard supremacy that are being fought by UNIX-founder AT&T and its partner Sun Microsystems on one side, and OSF (the Open Software Foundation—a coalition of computer makers including Digital Equipment Corporation, Apollo, Hewlett-Packard, and IBM) on the other side. The new version of A/UX conforms to the POSIX Draft 12 set of standards, which positions Apple to be able to sell Mac IIs to the federal government as UNIX workstations. It also includes the X Window System version X11.3, the current de facto standard low-level window communication system for UNIX. —Lon Poole
As for sound, the SE/30 comes with the Apple Sound Chip, also the same as the Mac II’s and Mac IIX’s. This chip is capable of synthesizing up to four voices, and it outputs sound in true stereo. To accommodate these sound capabilities, the SE/30 has a stereo jack on the back, instead of an SE-type sound port.

Like the SE, the SE/30 offers a single expansion port, but the similarity ends there. The port, called the 030 Direct Port, uses a 120-pin connector, instead of the 96-pin connector on the Mac SE. The new connector gives boards direct access to all the 68030 signals. It also has full 32-bit address and data lines, and works with existing NuBus software drivers. So far, developers who are announcing expansion boards for the Macintosh SE/30 include Avatar, Kinetics, SuperMac, and Digidesign. Avatar will ship a 3270 mainframe communications board. Kinetics is producing a new version of its EtherPort series of Ethernet boards. SuperMac will ship an 8-bit gray-scale and color video board. And Digidesign will ship its Sound Accelerator digital signal processing board.

One result of cramming the equivalent of a Mac IIX into such a small box is a loss of space. The expansion boards no longer sit on top of the system board. Instead, the chassis has been redesigned so that the boards stand straight up along one side. The new design allows for better cooling and avoids the problem of trying to squeeze the expansion board in between the system board and the bottom of the chassis.

Price Tags Compared
The Macintosh SE/30 should be shipping even as you read this. Apple is offering two configurations. The low-end system comes with 1MB of RAM and a 40MB hard disk and will sell for $4869 without the keyboard. By comparison, a somewhat slower Mac II with 1MB of RAM, a 40MB hard disk, and a 4-bit monochrome display lists for around $6457. The more powerful version of the SE/30 comes with 4MB of RAM and an 80MB hard disk—essentially the same configuration as a Mac IIX—and will list for $6569 without the keyboard, as opposed to just under $9700 for a similarly equipped Mac IIX. See State of the Mac, in this issue.

If you have a Mac SE, you haven’t been left out. Apple plans to offer a logic-board-and-chassis upgrade starting in March; pricing information was unavailable at press time. The upgrade will provide a new board-mounting scheme that solves the expansion board problem. Apple will also sell an internal version of the FDHD drive, so that you can upgrade your disk drive if you want; if not, your old 800K drive will work just fine.

The Mac SE/30 will ship with System 6.0.3, which offers some minor revisions specific to the SE/30, and will include an improved Apple File Exchange utility. Apple has stressed that only two groups of people need 6.0.3: SE/30 users, who will get it with the machine, and users of the Apple File Exchange program.

Which Road to Take
Apple sees the Mac SE/30 addressing the same markets as the Mac SE, but with a higher price tag. The overall market is...
Macintosh SE/30 Specifications

Here are the Macintosh SE/30's technical specifications according to Apple at the time of the product preview:

- **Processor:** Motorola MC68030 (32-bit data and address paths, built-in Paged Memory Management Unit), running at 15.6672 MHz.
- **Coprocessor:** Motorola MC68882, running at 15.6672 MHz.
- **RAM:** Holds up to 8MB (using 1MB SIMMs) on system board; supports memory expansion via 030 Direct Slot. System board SIMM slots also support higher density SIMMs (4MB, 16MB). Has 256K bytes of battery-backed parameter RAM.
- **ROM:** Has 256K of ROM; ROM code almost identical to that of the Mac IIx, including full support of color and gray-scale graphics and video. Mounted via a SIMM socket, allowing easy ROM upgrades.
- **Mass storage:** Comes standard with both an internal Floppy Drive High Density (FDHD), supporting formats of up to 1.4MB, and with an internal SCSI hard disk (either 40MB or 80MB); can also support an external floppy drive and one or more external SCSI hard disks.
- **Video display:** Standard Macintosh display (9-inch diagonal tube, 512-by-342-pixel resolution, monochrome); can support external monochrome, gray-scale, or color monitor via the 030 Direct Slot.
- **Sound:** Apple Sound Chip capable of synthesizing four voices using wave-tables and playing back sampled sounds in stereo. Internal monaural speaker and external stereo output jack.
- **Clock/calendar:** CMOS custom chip with long-life lithium battery.
- **Internal expansion:** Internal 030 Direct Slot (120-pin Euro-DIN connector), giving full 68030 signals and 32-bit address and data lines.
- **Ports:** Floppy drive port, capable of supporting either a regular or an FDHD.
- **Power:** Autoconfiguring power supply (120/240 volts, frequency from 48Hz to 62Hz); produces up to 75 watts for internal use.
- **Fan:** 10 CFM Radial.
- **Size:** 13.6 inches high by 9.6 inches wide by 10.9 inches deep (standard Mac SE case).
- **Weight:** 21 1/2 pounds.

what Apple terms general productivity—meaning anyone who wants to work on a Mac and who can afford the system. The company is targeting a number of specific markets, though, most notably higher education, consultants, accountants, business, and government.

It looks as though the Next computer has highly influenced the marketing plans at Apple. The higher-education marketplace was mentioned repeatedly during the recent Macintosh SE/30 preview as was the concept of the SE/30 as a music workstation. The Apple marketing team put a lot of emphasis on the machine's sound and music capabilities and referred repeatedly to third-party expansion boards containing digital signal processor (DSP) chips. Digital design plans to announce an SE/30 version of its Sound Accelerator board containing the Motorola 560001 DSP chip, the same chip used in the Next machine.

At university pricing levels—typically 50 percent of list price—the SE/30 could be a very enticing workstation when compared with the Next, with its $6500 price tag. On the other hand, in the university market, Apple's current lack of support for A/UX on the Macintosh SE/30 is curious.

**Fight or Switch**

For those of us already stung by the Mac price increases in the fall, the economics of the Macintosh SE/30 are a bit more questionable, especially given the 9-inch screen. If you don't have a computer at all, you may want to consider buying a Mac II instead; it's somewhat slower, but it's far more flexible and expandable. Or, if you like the portability of the smaller Macs, you
might find it cheaper and easier to get an SE and one of the high-end accelerator boards (see "Processors: Is Faster Better?" in this issue). A number of accelerators offer performance close to or even better than that of the Macintosh SE/30, and if Apple's history is any guide, the SE/30 upgrade will be at a premium price.

So, why would you want to buy a Mac SE/30, instead of, say, a Mac SE or even a Mac II? Aside from the boost in computing power, and the compatibility with the leading edge of Mac architecture, there are a few reasons (see "A/UX Version 1.1").

One obvious reason would be if you could run A/UX. But A/UX on the Macintosh SE/30 remains a question mark; at the product preview, Apple officials stated that the SE/30 would not support A/UX. This is curious, since there are probably lots of power users out there who would welcome a self-contained, transportable UNIX workstation—and they may see one in the future.

Another reason is the fact that the Mac SE/30 uses the same ROM as the Mac IIx. This means that the Macintosh SE/30 has full support for Color QuickDraw in ROM, unlike the Mac SE. Because of the Mac SE/30's 030 Direct Slot, expect to see third-party video boards allowing you to hook up color and gray-scale monitors to the Macintosh SE/30. In fact SuperMac, the first company to announce such a board, will offer an 8-bit color and gray-scale video board that works with an external color or monochrome monitor.

The most compelling reason to buy a Mac SE/30, though, might be to avoid obsolescence. It's interesting to note that Apple went straight to the 68030/68882, bypassing the original Mac II architecture (68020/68881/68851). It looks as though Apple has chosen the 68030 as the new standard for the Macintosh line. The 8-MHz 68000 in the Mac Plus and Mac SE is getting a bit dated, and even the 16-MHz 68020 in the Mac II is no longer a performance standout. Using the 68030 in the Mac SE/30 bodes well for the machine's long-term prospects. Add to that the completeness of the 030 Direct Slot, and you have a machine that will probably survive longer than its predecessors, most of which have been discontinued within about three years of their introductions.

The announcement of the Macintosh SE/30 is not earthshaking, nor does it break new ground. It does, however, establish Apple's commitment to the classic Mac product line, and it provides users with an Apple-supported alternative to either a small, slow Mac or a large, powerful one. Most important, it fills a gap in the Macintosh family, which has threatened to split into two separate product lines. And in doing so, the SE/30 offers a new level of portability for the Macintosh community.

See Where to Buy for contact information.

### SE/30 Circuit Card

The SE/30's circuit card contains SIMM slots for up to 8MB of RAM (top left). The 256K ROM now plugs into a SIMM socket (lower left) like on the Mac IIx. The 120-pin expansion connector is on the bottom edge of the board, below the 68030 CPU (lower center) and the lithium battery (lower left). The 68882 is located just below the RAM SIMM sockets. Note the extensive use of VLSI chips to reduce the overall parts count.
Processors: Is Faster Better?

by Bruce F. Webster

You can speed up an SE and a Mac II by adding an accelerator board. But just how powerful is that boost?

The fates can be cruel at times. When Apple announced the Macintosh SE and II, the SE was something of an improvement over the Plus, but the Mac II had all the horsepower: a 16-MHz 68020, 68881 floating-point processor, 32-bit data bus, and so on. Unfortunately, the II also had a high price. Even worse, just when you finally had the money together for a Mac II, Apple went and raised the price of an entry-level system by $1100, or nearly 30 percent. And, of course, you also learned that a Mac II was no longer the top-of-the-line system; the Mac IIx with its 68030 processor was taking top honors.
Dove's MaraThon 030 contains a 68030 processor on a small piggyback board, providing a quick and simple upgrade.

Well, cheer up, pilgrim—there are some options available to you. For about $1000–$2000, you can turn a Mac SE into a system that outperforms a Mac II in many areas. And if you've got a Mac II, you can boost its power beyond that of a Mac IIx.

You can boost a Mac SE's or II's power by adding an accelerator board—a circuit board containing a high-speed processor (68000, 68020, 68030) most often running at a higher rate of speed than your current system. These boards usually have an optional floating-point processor (68881/882) and sockets for high-speed RAM. The result: higher performance for your system.

A number of boards are currently available, with more cropping up all the time. For this article, I looked at ten 68020 boards for the SE. For comparison I also looked at one high-speed 68000 board, the Turbo SE from Sielone (see "Accelerator Features").

All the SE boards are designed to plug into the Mac SE's system board, using the expansion slot. All offer an optional 68881 floating-point chip; if you wish, you can substitute the 68882 chip instead—it's pin compatible (you just plug it into the same socket the 68881 would use) and runs about twice as fast as the 68881. Each board accepts a varying amount of memory and some can also use memory on the SE system board. A few boards offer a connector for a large-screen display, usually from a specific vendor (the same company, in at least one case). And each board comes with some software to help you get the most speed from that board, as well as to give you some control over its features.

I also looked at three 68030 accelerator boards for the Mac II. Because of bus and timing considerations, these boards don't plug into one of the Mac II slots; instead, they replace the 68020 processor on the Mac II system board. MaraThon 030 from Dove and the Over 030 from Computer System Associates have no RAM and, in fact, contain little more than the 68030 processor and a few control chips. The Accelerator 33/030 from DayStar Digital is a larger, more complex board that includes a 32K static RAM cache; a 68882 floating-point chip is optional.

'020 Questions
Why do these various accelerator boards (and the Mac II) get work done so fast? There are four major reasons:

- high clock speed
Think of a complex mechanical device, sitting in a barn somewhere. To perform a particular function, you push a given button and crank a handle so many times. To do the next function, you push another button and again crank the handle some number of times. Each type of operation requires a certain number of cranks; some require more cranks, others less. But the time it takes for a given function to be completed depends not just on the number of cranks required, but on how fast you turn the crank.

A microprocessor is something like that mechanical device. Each instruction that the processor executes requires a certain number of cranks, known as clock cycles (or simply cycles). The clock speed of a microprocessor tells you how many cycles that unit runs in a second. The M68000 chip that serves as the CPU (central processing unit) of the Mac SE runs at 7.8536 MHz, or roughly 7,853,600 cycles per second. This means that if the average CPU instruction takes 7 cycles to run, then the M68000 is performing about one million instructions each second.

All of these accelerator boards gain part of their speed by increasing the clock rate of the 68020 by anywhere from 16 MHz to 33 MHz, making the CPU two to four times faster than the SE's CPU. This doesn't mean that every application or operation will run two to three times faster, though, since various elements of the system (such as the disk drives, memory, and the design of the board itself) can slow a task down, regardless of how fast the CPU runs.

The speed of transmitting data and instructions has two components: the width of the data path and the speed of the memory. The M68000 has a 16-bit data bus, which means that it can only fetch two bytes (16 bits) at a time. By contrast, the M68020 has a 32-bit data bus, so that it can read four bytes at a time (and it does so faster than the M68000 reads two bytes, due to the higher clock speed).

The Mac SE usually comes with 150-nanosecond dynamic RAM (150-ns DRAM). This means that it takes 150 ns—150 billionths of a second, or about half the time it takes light to travel the length of a football field—to complete a memory access. This is pretty fast, but accelerator boards that can hold additional memory usually require 120-ns (or faster) DRAM, because the processor on them runs at such a high speed.

A third factor, the presence of a floating-point unit (FPU), can make an enormous difference in situations where lots of floating-point (real-number) calculations are going on. You'll often hear claims of performance improvement by a factor upwards of 100; a more realistic figure would be 2 to 25 times faster, depending on the application and how much calculation it's actually doing.

A fourth, minor factor involves the 68020's instruction cache. This tiny piece of memory on the 68020 holds a copy of the last 64 instructions that the 68020 executed, along with their addresses. When the 68020 goes to fetch the next instruction, it first checks to see if that instruction is already in the cache; if so, then the 68020 loads the instruction from the cache, eliminating the entire process of fetching that data from memory.

## Selecting an Accelerator

Once you've decided to supercharge your Mac SE with an accelerator, you need to figure out what factors are important to you. Let's look at some possibilities.

- **Specific performance** You might expect that boards with identical configurations (processors, clock speed, memory) would yield identical results, but that is not the case. For example, the HyperCharger 020 and the Mac 20MX-16 both have 16-MHz 68020 CPUs and 16-MHz 68881 FPUs. I tested both with 4 MB of 100-ns DRAM. They were run on the same Mac SE, using the same programs and files, under the same version of the operating system. And yet the Mac 20MX-16 was an average of 50 percent faster in "Pure Tests." A closer analysis, however, shows that most of the speed differences occurred in the General, Floating-Point, and Graphical benchmarks, and that the HyperCharger held its own in the Application Load test, even beating the Mac 20MX-16 in one. Note also the wide variation in times for the floating-point benchmarks; the Radius boards came out faster than just about anything else. These are not comprehensive benchmarks, but they do show that each board has its own strengths and weaknesses.

- **Clock speed** A few of the boards offer 20-MHz or 25-MHz versions in addition to the regular 16-MHz version; on the Mac II the chips go up to 33 MHz. So you can buy 20-MHz versions of the Orion and Gemini boards, and 25-MHz versions of the Radius and Mac 20MX boards. However, with the higher megahertz boards the speed increase usually isn't that dramatic. For example, the Radius 25-MHz board was only about 15 percent faster than the Radius 16-MHz board, but it costs 70 percent more. The Mac 20MX showed more improvement—the 25-MHz version was about 30 percent faster than the 16-MHz board—but the price difference was even greater, almost 90 percent.
Accelerator Features

<table>
<thead>
<tr>
<th>Accelerator Boards for Mac SE</th>
<th>Manufacturer</th>
<th>Base Price</th>
<th>Processors</th>
<th>68851 PMMU</th>
<th>RAM Configurations</th>
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<tbody>
<tr>
<td>Excelerator XL 20</td>
<td>Irwin Magnetics</td>
<td>$995</td>
<td>20-MHz 68020</td>
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<td>1MB, 2MB, 4MB, 5MB, 8MB</td>
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<tr>
<td>Excelerator XL 25</td>
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<td>16-MHz 68020</td>
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<td>0MB, 1MB, 4MB</td>
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<td>20-MHz 68020</td>
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<td>Mac 20MX-25</td>
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<td>Levo</td>
<td>$1499 (w/1MB and 881)</td>
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<td>Radius Accelerator 16</td>
<td>Radius</td>
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<td>32K static RAM cache</td>
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<tr>
<td>Radius Accelerator 25</td>
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<td>25-MHz 68020</td>
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<td>32K static RAM cache</td>
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<td>Turbo SE</td>
<td>Siclo Sales &amp; Engineering</td>
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<td>16-MHz 68000</td>
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68030 Boards for Mac II

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<tr>
<th>33-030 Accelerator II</th>
<th>DayStar Digital</th>
<th>$6000 ($7000 w/882)</th>
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<th>32K cache</th>
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<tr>
<td>Marathon 030</td>
<td>Dove Computer</td>
<td>25-MHz 68030</td>
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<td>Marathon 030</td>
<td>Dove Computer</td>
<td>33-MHz 68030</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Over 030</td>
<td>CSA</td>
<td>25-MHz 68030</td>
<td></td>
<td></td>
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</tbody>
</table>

- **Floating point processor support** All the SE accelerator boards I surveyed have a socket for a 68881 floating-point chip. Motorola's newer chip, the 68882, is pin compatible and (according to Motorola) works about twice as fast; Motorola plans to discontinue the 68881 completely sometime in the future. All the board manufacturers will sell you a 68881, but you might want to shop around or consider mail order for a better deal. And if you can't afford a floating-point chip right away, you can always buy it later and plug it in.

  More important, you should know that there are some dramatic variations in how the various accelerators support 68881 for existing applications via the SANE (Standard Apple Numerics Environment) library, which SANE handles itself for greater precision. Most of the manufacturers let applications access the 68881 directly; Radius even offers its own highly optimized SANE package, which probably accounts for them beating the pants off everyone else in the floating-point benchmark.

- **Control software** Each board comes with software that lets you control its features, such as turning the accelerator off or disabling the 68020 cache, usually from within the Control Panel. Some boards offer a lot of options. For example, the Orion software lets you set clock speed for both processors, memory speed, 68881 usage, whether or not to copy the ROM to high-speed RAM at startup, and whether or not to recognize more than 4MB of memory.

  Most of the boards let you enable or disable the accelerator. However, they usually have you do it via a
programmer's switch, which Apple does not ship with the Mac SE. If you buy an accelerator board, check to see if it requires a programmer's switch; if so, have your dealer stick one on for you.

- **Flexibility** This is a combination of factors, most of which have to do with the ability to upgrade and enhance the board. Some boards don't give you a lot of options. For example, the Prodigy SE comes with a 68881 chip and you have to purchase some memory (1MB, 2MB, or 4MB). Furthermore, the Prodigy doesn't use the standard SIMM modules, so you can upgrade only through Leveco. By contrast, the Gemini 020/030 lets you start out with a 16-MHz 68020 and no memory, and then upgrade through various configurations to a 20-MHz 68030, 20-MHz 68882, and 4MB of RAM. And

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<table>
<thead>
<tr>
<th>System Board RAM Used</th>
<th>Expansion Ports</th>
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<tr>
<td>512K (for video, sound)</td>
<td>proprietary bus</td>
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<tr>
<td>512K (for video, sound)</td>
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<tr>
<td>1-4MB (depends on board RAM)</td>
<td>SCSI, 68000 bus signals</td>
</tr>
<tr>
<td>1-4MB (depends on board RAM)</td>
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<td>1-4MB (depends on board RAM)</td>
<td>SCSI, 68000 bus signals</td>
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<tr>
<td>1-4MB (as memory and/or disk cache)</td>
<td>SCSI port</td>
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<td>0-4MB (depends on board, user)</td>
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<tr>
<td>0-4MB (depends on board, user)</td>
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<td>1-4MB (depends on board RAM)</td>
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<td>512K (for video, sound)</td>
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<tr>
<td>512K (for video, sound)</td>
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<td>part to all (as RAM disk)</td>
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<td>any amount up to 4MB</td>
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<tr>
<td>any amount up to 4MB</td>
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<td>128K (for video, sound)</td>
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<td>any amount</td>
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<td>any amount</td>
<td>none</td>
</tr>
<tr>
<td>any amount</td>
<td>none</td>
</tr>
</tbody>
</table>

you can use the same board in a Mac 512KE, Mac Plus, or Mac SE.

- **Price** This may be the major factor for many of you. No matter how nifty a given board is, if you can't afford it, you'll have to get something less expensive. The prices listed in "Accelerator Features" can be misleading, since most boards won't perform at their peak without high-speed RAM on them. The major exceptions are the Radius boards, which perform at top speed with no additional RAM, because they have a built-in 32K cache. Of course, if you compare them to a Mac II with 4MB of RAM, all of the accelerator boards are inexpensive.

**Memory Trade-Offs**

This is such a major topic for accelerator boards that it deserves a section all to itself. When you buy and install an accelerator board, you have to think a lot about memory. Specifically, you have to think about the following:

- How much memory do you have in your SE currently?
- What kind of memory is it?
- How much memory do you have on your accelerator board?
- How much memory can you actually use?

The Mac SE can have one of four memory configurations: 1MB, 2MB, 2.5MB, and 4MB. Likewise, most accelerator boards accept a variety of configurations, ranging from no memory at all to 8MB, depending on the board. It is possible, with the right board and enough memory modules, to stick 12MB into a Mac SE, but you can't use it all.

Each board has limitations on its use of system board RAM. Some boards, such as the Orion, won't
use it at all, except for low-level video and sound. The Orion Accelerator requires only that two 256K SIMMs be installed on the system board.

Other boards accept certain combinations of accelerator- and system-board RAM. For example, you don't have to have any memory at all on the Mac 20MX, HyperCharger 020, MaraThon 020, or Gemini 020/030 boards. However, without their own memory, these boards run at less than full speed, since they must use the slower memory on the SE system board.

Once you start adding memory, certain restrictions apply, depending on the board. Dove's MaraThon 020 comes with software modules for one of six or so configurations; other setups aren't allowed. Along the same lines, I had to do some minor soldering, reconnecting a clipped resistor on the SE system board, because the Gemini 020/030 wouldn't work with the 2.5MB configuration that the SE had.

Some boards will use leftover system board RAM as a disk cache or RAM disk, even if the accelerator board is fully loaded with memory. For example, the Prodigy SE lets you use all of system board RAM as a recoverable RAM disk that can survive a system crash or restart (though not, obviously, a power failure). Likewise, the HyperCharger 020 can use portions of system board RAM as a disk cache (to help improve disk-access speed).

Once you start talking about system board and accelerator RAM, you run into the issue of RAM speed, mentioned earlier. The Mac SE is quite content with 150-ns DRAM, but such memory would slow down most accelerator boards. Some boards won't even work with 150-ns DRAM, which means that you'll have to buy additional (and more expensive) memory to get full performance out of your system. All the boards except the Prodigy SE (from Levco) and the Radius boards accept regular SIMM modules, like those used in the Macintosh SE itself.

The bottom line is: look before you leap. Memory is a very expensive commodity right now and may be for some time to come. It could be frustrating to spend $1000–$2000 on an accelerator board, only to find out that you need to spend another $1000–$2000 on high-speed RAM to get any performance out of it.

The Radius boards take a different approach from the others. There is no RAM expansion on the board itself; instead, each board uses 32K of high-speed static RAM, along with special circuitry, as a code-and-data write-through cache. This cache works like the instruction cache on the 68020, but on a grander scale, since it stores both code and data in the cache. It's called a write-through cache because whenever the 68020 writes data back out to memory, it actually writes to the cache, which then (independent of the CPU) transfers the data down to the system board RAM. Radius claims a 98 percent hit rate, which means that during a typical period of usage, the 68020 finds what it needs in the cache 98 percent of the time.

Installation

If you buy one of these boards, how are you going to get it in? The safest way is to have your dealer install it; then if anything goes wrong, it's the dealer's fault, and the dealer has to fix it, presumably at no extra cost.

You might, however, decide to buy a board via mail order and install it yourself. Having received a dozen or so different accelerator boards, and having put each one in several times, I got very good at installing and taking them out. However, as the commercials say, we're professional dummies, and you shouldn't try this at home.

WARNING: High-voltage components may cause physical harm to you as well as to the machine. In addition, you may void the Apple warranty the minute you open the machine.—Ed.

Once you have installed the accelerator board in the Mac, you need to install the accompanying software. Most of the accelerator companies have kept up with the times, and installing their software consists of dropping an INIT file into the System Folder on the start-up device. When you restart, the System loads the
Is the '030 Something?

If the 68020 is good, the 68030 must be better, right? After all, Apple has included it in their top-end Mac IIx. Well, yes, the 68030 is better, but the question is: how much better? The major difference between the two processors is that the 68030 has memory management logic built-in. You may be aware that the Mac II and a few of the accelerator boards have a socket for a 68851 Paged Memory Management Unit (PMMU). This chip is designed to simplify implementation of a multitasking, multuser operating system, such as A/UX. With the 68030 you no longer need the extra chip; the 68030 does everything for you. Also the 68030 has a data cache that keeps track of up to 16 long-words (8 bytes each) of data and the addresses that go with them.

How much performance difference is there between the 68020 and the 68030? Some, but not a large amount. Note, for example, the difference between the Mac II and the Mac IIx in the benchmarks "Testing for Speed." The Mac IIx, which has a 68030 running at the same clock speed (16 MHz) as the 68020 in the Mac II, does perform better, but not by a great amount: only by about 20 percent overall.

The Gemini 020/030 board lets you put a 68030 into a Mac SE. You can also upgrade a Mac II with one of three products. Two of the products, the Over 030 from Computer System Associates and the Marath0n 030 from Dove, provide quick and simple upgrades. Both are just a 68030 on a small piggyback board, with the minimal logic required to interface with the regular 68020 socket on the Mac II system board, both products provide improvement, though not as dramatic as you might want.

The 33/050 Accelerator II from DayStar Digital, does provide a significant performance improvement, but at a price. That board has a 33-MHz 68030, a 33-MHz 68882, and a 32K static RAM cache (much like that on the Radius boards); the resulting improvement in speed is just under 100 percent (twice as fast as a Mac II) for most tests. The price is steep: $6000 for a regular board, $7000 for one with a 68882 floating-point unit.

In short, most 68030 upgrades aren't worth the cost, unless you have a lot of money to spend and really, really need that last 20 percent of speed. As the price comes down and the clock speeds go up, though, these boards will provide yet another way to increase the performance of the Macintosh.

System Configuration

Most of the accelerators run faster with the Macintosh disk cache enabled. The cache reduces the impact of the biggest bottleneck remaining on a system: the disk drives. For example, the Turbo SE performed the Recompile benchmark in 121 seconds with a 256K cache enabled, as opposed to 192 seconds with no cache enabled. By assigning some of the SE system board's “slow” RAM to the disk cache, you force applications to load into the faster RAM on the accelerator board.

Next, be sure that the accelerator and the floating-point processor are both enabled. You do that via whatever control software comes with the board. You should also enable the 68020 instruction cache, unless you come across a program that can't run with it on because of self-modifying code. This problem is increasingly rare, since such programs also crash on the Mac II, and Apple doesn't provide software control of the 68020 instruction cache on that system.
Testing for Speed

To paraphrase Disraeli, there are three types of dishonesty: lies, damned lies, and benchmarks. Or that's how it seems in an industry where competitors and fans throw conflicting figures back and forth. Still, benchmarks (like IQ tests) measure whatever they measure, and we gain some benefit by looking at them.

I used eight different benchmarks to test the accelerator boards. I selected these benchmarks to test both pure and real-world performance. All benchmarks were run under the following configuration:
- System release 5.0 (System 4.2/Finder 6.0)
- Disk cache disabled
- QuickerGraf 1.1 installed
- 1 bit per pixel (the Mac II)
- Finder for Pure Tests, MultiFinder (without other applications loaded) for all others
- All files residing on the internal Mac SE hard disk
- 68881 chip installed; 68882 chip installed; the unenhanced SE did not have a math coprocessor.

"Pure Tests" shows the results from three sets of tests.
- **Graphical** adds the results of two benchmarks; the first puts up 200 circles with a radius of 100 pixels, alternating black and white; the second puts up 2000 rectangles that are 200 pixels by 200 pixels, alternating black and white.
- "Real World" shows the accelerated speed of some everyday activities on an Excel 1.5 spreadsheet with 26 columns and 300 rows. Several timings were made for each test and the results were averaged.

<table>
<thead>
<tr>
<th>Pure Tests</th>
<th>Real-World Tests</th>
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<tbody>
<tr>
<td>DayStar 33/030</td>
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<td>Excelektor XT 25</td>
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<td>Mac 20MX 25</td>
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<td>Radius 15</td>
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<td>Gemini (030/16 MHz)</td>
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<td>Orion Accelerator</td>
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<td>Mac 20MX-16</td>
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<td>Turbo SE</td>
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<td>Unenhanced Mac SE</td>
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<th>Recompile</th>
<th>Totals</th>
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Recompile measures the time it takes for TML Pascal II, running under the Macintosh Programmer's Workshop (MPW), to recompile all its unit interfaces (some 20 files). "Totals" adds up the times displayed in the other three graphs. You can clearly see which boards excel at which tests, and which boards come out overall. You'll need to refer to "Accelerator Features" to choose a price/performance trade-off you can live with.
Third, if you want to, and if you can, set up a RAM disk. The Prodigy SE and both Mac 20MX boards come with RAM disk software. The Prodigy RAM disk is great; it uses leftover RAM on the SE system board and preserves its contents in case the system crashes or you accidently restart. The Mac 20MX boards come with two RAM disk programs; one of them, RAMStart 1.4, doesn't work properly under System 5.0, but the other one does work and makes for some significant improvements.

**Performance**

The benchmarks provide a simple review of the relative performance of the accelerator boards. While they were done carefully and rigorously, they still shouldn't be construed as anything more than simple comparisons; they certainly don't establish the superiority or inferiority of a given board. “Testing for Speed” discusses the benchmarks and how they were set up.

The closest thing to a clear winner in this less-than-stiff competition is Irwin’s Excelerator board. The 20-MHz 68020 version was faster than any of the other Mac SE boards and the 25-MHz version was even faster than that. Since the Excelerator is almost identical to the Orion Accelerator, I can chalk the performance difference up to one major factor: the ability to load the contents of the 256K Mac SE ROM in the high-speed memory on the board. The Orion software had this option, but I was never able to get it to work; nor did this feature work in the software that accompanied the 20-MHz Irwin board which, consequently, gave a decent but unspectacular performance. When I tried the software for the 25-MHz Irwin board, it loaded ROM into RAM just fine. That same software also worked with the 20-MHz board. The performance for both boards increased dramatically when I loaded their ROM into RAM.

The Radius Accelerator 25 and DayStar’s Mac 20MX-25 were close behind the Irwin boards; no big surprise, since they also had fast clock speeds. The Radius had an edge on instruction execution, while the DayStar had the best disk-access times. Use of a RAM disk on the DayStar makes performance really sing: the Recompile result dropped from 138 seconds to 27 seconds, which is an amazing improvement over the 247-second time for a regular Mac SE (running off the hard disk, no less).

The Recompile benchmark also reflects the difference in hard disk access times for the Mac SE and Mac II. This suggests another source of improvement: a faster SE hard disk, either from Apple or from a third party.

Floating-point performance varied significantly among the boards, though even the slowest was a great improvement—five times faster than the unenhanced Mac SE. The fastest SE board (the Radius 25) was another five-fold improvement over the slowest board (the Turbo SE), making it about 25 times faster than a regular Mac SE. The differences have to do with how well the software supplied with the board patches in the SANE (Standard Apple Numerics Environment) routines to the M68881 floating-point processor.

**A Real Boost**

If the Macintosh SE seems slow to you, there are definitely ways to perk it up. Accelerator boards are one answer, provided you can afford one of them. On the other hand, compared with the cost of a Mac II, most of these boards look pretty good. And besides: it’s hard to carry a Mac II with a monitor onto a plane.

The best performance was by the two boards from Irwin, and since the 25-MHz board is only marginally faster than the 20-MHz board, you’re best off buying the 20-MHz board and using the extra $700 toward high-speed RAM. The price/performance winners, though, are the Radius boards. All the other Mac SE boards require high-speed RAM (100-ns or faster) to achieve highest performance. And while RAM prices may finally be on the way down, RAM’s still going to cost a fair amount. The Radius boards achieve their performance without any additional RAM costs.

Accelerating a Mac SE can increase productivity and provide a psychological boost as well. An accelerator helps bring you to the point where you’re not waiting for the Mac to finish a task, it’s waiting for you. Just be sure that it’s going to do what you need it to do, at a price you’re willing to pay.

See Where to Buy for contact information.

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Selecting a Color Separator

The ABCs of CMYK:
part two in our series
on color separation

by Steve Roth

Screen frequencies, traps, overlays, UCR, GCR, overprinting, knockouts, tints, Pantone palettes.

Hoopla.

The buzzwords of color separation are everywhere in the Macintosh world these days. But in fact only a handful of programs and services for producing four-color process separations from Mac files actually exist, and none of them offer everything you might dream of. Some programs create separations only from their own files, for instance. Some handle only objects, others only bitmaps. Some give you a finished page, while others require that you separate graphics and then have your printer strip (assemble) the film into final pages.

The capabilities of your separation tool directly affect the publishing process—who does what and when, how much it costs, and how long it takes—so if you decide to pursue color desktop publishing, you’ll obviously need to take a close look at program features when you plan your system. On the other hand, before you plunge into feature comparisons, it’s a good idea to stand back and consider which overall approach to color separation suits your operation best. The prospective color publisher has four basic strategies to choose among.
Strategies

The first approach is to do your color traditionally: print black-and-white pages, mark the areas where you want color, have professional separations made of any color art, and then send the entire package to the printer's, where it can be assembled by hand.

The next possibility is to turn to a service that will produce separations for you from your electronic files. There's only one full-service bureau right now: Image South's Color Cutter service, which separates Page-Maker files that contain Adobe Illustrator and Aldus FreeHand images.

If you use color photographs and have deep pockets, you can consider a hybrid desktop/workstation arrangement. Such systems cost tens of thousands of dollars and employ a high-end scanner and dedicated image-processing software. The Mac handles type and page design and uses low-resolution color scans on a for-position-only basis. When it's time to produce the final film, the Mac pages are passed to the workstation, where the high-resolution scans are merged in. None of these systems is online yet, which is why I cover them in the "In the Works" section of this article.

The three solutions just discussed don't sound much like desktop publishing, which is why the last option is the one that generates the most excitement. This route is for do-it-yourselfers: build the color images on screen, use Mac software to separate them, send the PostScript output to a Linotronic, and present your printer with the four film negatives, ready to go. You may or may not need to have the graphics stripped in, depending on the software and type of graphics you use.

Do It Yourself

The obvious question to ask about this approach is whether going to all that trouble will save you any money. The answer, as usual, is that it depends—in this case mostly on the type of work you do and on how good you are at making the technology work for you.

Let's leave aside the efficiencies you may derive from doing design, layout, and art-creation on the computer, and concentrate on production. Linotronic film costs between $10 and $14 a page; that's $40 to $56 for four process separations if all goes well. Add $50 for a color proof, and you're at about $100. Conventional separation costs vary widely, depending on the size of the image and the level of quality you demand, but $150 is a ballpark figure for separating a color slide to 3-by-5-inch film (including the proof). If you do lots of work with a separation house, that figure can go as low as $60. On the other hand, if you want any color correction, it can easily mount to $500.

The other major cost consideration has to do with stripping. No matter how you create separations, stripping them into a page costs about $5. Prices for creating tinted sidebars, rules, and type vary widely; depending on the printer, how many times you use a tint in a document, how many of the process colors are included in the tint, and even the width of lines surrounding tinted elements (hairline boxes cost more to fill with tints, because they require more accuracy). One major commercial printer charges $5 per color for dropping in square tints—into a sidebar, for instance. Reverse or solid type in a tint will run you $16 a color. So if you have a headline, a sidebar, and a sidebar head, each in a two-color tint, plus one four-color graphic, you're in for $90. A color key of that page (four overlaid color films that enable you to proof the stripper's work) will cost another $30 or so.

Of course, some pages are much more complex than the one just described, and some graphics demand expensive film work as well. It's not unusual for stripping on a complex color page to run anywhere from $200 to $1000—plus the cost of separations. If you use QuarkXpress and Illustrator or the PageMaker/Separator combination, you can produce film for the same complex page with no stripping charges at all (see "Take the Xpress Way").

Those savings sound wonderful, but this is where the quality problems associated with Linotronic separations come in. You may run into moiré patterns or banding on your separations, and have to rerun the film. That's another $100 for the film and proof. $100 here and $100 there, and pretty soon you've erased your savings. On the other hand, if you know how to work within the system's limitations (see "Color Separation Explained," part one of this two-part series, in last month's Macworld), you can usually get by with one trip to the Lino.
Even if you use PageMaker to build pages for Color Cutter, all the color elements come from Illustrator—sidebars, colored type, and so on. You don’t use PageMaker’s color specifications. This is bothersome if you want, for example, color subheads, since you have to place them as graphics rather than include them in the text where they will flow with design and editing changes.

Also, you’re limited to Illustrator’s spacing controls (no manual kerning), you can’t specify a column width for colored type or justify a column (you use a hard return for each line in Illustrator), and the color elements don’t show up in color in PageMaker. FreeHand doesn’t have any of these problems, which is why Image South recommends using it for creating colored type.

Once you’ve built your pages and placed all the color elements, you save the file as PostScript and send it to Image South. The company sends you back the separated pages for $72 a page plus $10 for every minute of line time above three minutes per piece of film. For that price, you get all four layers plus masks as necessary for color photos, and Image South will go in and build traps for you. The company also offers training and consulting, and may help subsidize your equipment purchases, depending on the volume of your business.

One key component of the Color Cutter service is that Image South provides its customers with a program called MultiSend. MultiSend does several things, but the most important is that it reads Illustrator EPS files and

Illustrator Two Ways
The graphic at the upper left was created in Illustrator and separated in Separator. Notice the very complete printing information, which Separator includes automatically when it prints a separation. On the lower right, the same Illustrator file has been incorporated in a PageMaker page, which was separated by the Color Cutter Service.

The bottom line is that as far as making separations goes, if you’re using object-oriented Mac graphics and tints, you can probably save some money, since the results for these elements are pretty consistent. You can also separate bitmapped, paint-type graphics and color screen shots with good results, though final colors may not match the on-screen versions exactly. Separating photographs is much harder than doing graphics, so the need to rerun film may well eat away any savings on separations you might have realized. Stripping is where the big savings come in. The more complex your pages and the bigger your stripping bills, the more you stand to save.

Available Software
With these strategy issues in mind, let’s take a look at the software tools that can take you from on-screen to linescreens.

Color Cutter
Color Cutter is not actually a software program, or to be more precise, it’s a program that you can’t buy. Image South (formerly People’s Publishing) uses Color Cutter to separate electronic files for you. You send the files, Image South sends you back the film. Color Cutter will separate color Illustrator files, either by themselves or on PageMaker pages (see “Illustrator Two Ways”). You can also use FreeHand, but Image South recommends Illustrator for graphics because it saves CMYK percentages, not RGB, in its EPS files (see “Color Models and Color Palettes”). Note: FreeHand 2.0, just shipping as this article went to press, does save CMYK values.—Ed.
Color Models and Color Palettes

Different programs take different approaches to specifying colors for four-color process separation. The four predominant models are red/green/blue (RGB), hue/saturation/brightness (HSB), cyan/magenta/yellow/black (CMYK), and palette color. While each of these schemes has its place, the variety of models often makes it hard to move images between programs, or to separate the output from one program using another.

Since final output of separations is always based on CMYK values, that system is the model of choice for specifying colors. It lets you explicitly control all four values, and you can use widely available printed CMYK charts to see what colors will come off press. The CMYK model is standard in object-oriented programs such as FreeHand, Illustrator, and QuarkXPress, and it’s also available in some bitmapped painting programs, such as PixelPaint.

The RGB and HSB models are most common with scanned images, since most color scanners capture information in RGB form. Since there is no such thing as a printed RGB or HSB color chart, it’s hard to know how the color you see on screen will actually print once it’s been converted to CMYK.

To make things confusing, some programs let you specify colors using one model, but they store the color values using another. When you export a CMYK-specified FreeHand image in EPS format, for instance, it saves RGB values, not CMYK, making the file much less useful if color separations are the goal.

A color palette can use any of the three color models to store colors, but the values are accessed by selecting from a menu, or palette, of (usually 256) colors. If the palette changes, as when you open a file created with one program in another, the colors change as well. Modern Artist has the greatest problems with mismatched color palettes.

PMS (Pantone Matching System) palettes constitute a special case. In standard printing, Pantone colors are typically printed using special inks that produce particular shades. On the Mac, software makers provide a library of Pantone shades that can be simulated using CMYK. Thus the Pantone system is used only as a color standard. Since CMYK equivalents don’t exactly match the PMS charts, however, it’s more reliable to simply specify CMYK colors to begin with, using a CMYK chart.

There is a simple rule here: use CMYK specifications whenever possible. (It’s not generally possible with scanned images, in which case you have to rely on the limited color correspondence between your color display and the printed results.) Don’t use PMS palettes, and don’t use RGB or HSB if you have CMYK available.

Adobe Separator

Adobe Illustrator 88 comes with a stand-alone application called Adobe Separator, which separates Illustrator and some other PostScript files. If you specify CMYK colors to create your Illustrator document, Separator simply separates out those colors. If you use the PMS palette included with Illustrator 88, the program either produces a separate piece of film for each PMS color or converts any of those PMS colors to their process equivalents. Separator includes more information on the final film—including file name, process-color name, and even color bars—than any other Mac program (see “Separators Compared”).

Separator provides only limited options for modifying screen frequency, and the angles for each frequency are fixed (see “Separator Pros and Cons”). If you really want that control, you have to use a word processor to change the (commented but undocumented) PostScript Printer Description files.

builds dummy files. The dummies contain a PICT representation for placing in PageMaker, along with a few lines of the actual PostScript that point to the full PostScript file on disk. This lets you place the same image numerous times without eating disk space, and lets you change the image throughout a document without going through and replacing it. When MultiSend prints a document, it incorporates the external PostScript files where they’re required.

The Color Cutter process doesn’t let you control everything yourself, it costs more than doing everything yourself, and it forces you to use Illustrator or FreeHand for color elements. On the other hand, it’s great not to have to worry about traps, it’s cheaper than traditional methods (at least with complex pages), the quality is excellent (screen tints are guaranteed to within 2 percent), and the turnaround is fast.
Separator’s separations are consistently good, though there are still some problems with banding at line screens over 120 lines per inch (lpi) and when producing large areas covered by gradations. Moirés make their appearance, but they’re not as frequent or as bad as those produced by Aldus FreeHand. If there is no black in the colors specified, Separator rarely troubles you with moirés. The difficulty of changing screen angles in order to eliminate moirés when they do occur, however, is inexcusable.

Nevertheless, Illustrator and Separator are programs of choice for color illustration on the Mac, especially since the Illustrator PostScript format has become something of a standard.

Separator and PageMaker
For those who want to use PageMaker to create full-color pages, there’s good news and bad news and good news. The good news is that you can specify colors for page elements in PageMaker, creating full-color, CMYK-specced pages, right on screen. The bad news is that you can’t do anything with those color pages except print spot-color overlays or black-and-white renditions—no process seps.

The good news is that you can create color elements with Illustrator or FreeHand, place them on PageMaker pages, save those pages to disk as encapsulated PostScript (choose print, select a single page, hold down Option-#, and click OK in the print dialog box), and separate them with Separator. You still need to separate color bitmaps and PICT files separately and strip them in, but everything else comes out in place.

This combination approach to building pages has all the limitations discussed in the section on Color Cutter. You can’t see the color on the page, color subheads don’t flow with the text, and if you are using Illustrator, you are stuck with its limited type-handling for color type.

The other problem with this approach is the number of large, redundant files you end up with: the Illustrator color elements, the PageMaker pages, and the printed-to-disk PostScript pages. And if you want to change any color elements, you have to modify them in Illustrator or FreeHand, then place them again in PageMaker.

All those limitations make the Illustrator/FreeHand/PageMaker/Separator scenario a bit unwieldy, but in return you get to work with the most popular tools on the market.

Aldus FreeHand
FreeHand gives you more control over the separation process than any program, and aside from color bars, includes everything on the final film that a printer might need.

The overprint feature in FreeHand applies only to “Custom” colors, which generally means those colors that will be printed with PMS inks. This is useful when you want your printer to create knockouts and traps for two- and three-color printing, but it can’t be used to overprint black, and you can’t overprint selected objects, as you can in Illustrator.
Freeland's separations are every bit as good as Separator's, except with fountains. Freeland's fountains employ a complex PostScript method that doesn't bear description here. The result is a propensity for serious moiré patterns (see "Am I Normal?")—that is, when the fountains don't crash the Lino. Alsys, creator of Freeland, is working on a fix for these problems, and version 49.4 of PostScript, which should be available soon as an upgrade to L-300 owners, should help solve the problem of crashes. If you avoid fountains, or keep them simple, FreeHand produces top-notch separations.

Note: Freeland 2.0, released as this article was going to press, adds overprinting for lines and fills and a Pantone palette. CMYK colors are now saved in EPS files using CMYK values, not RGB. Dialog boxes have also been consolidated, so separation controls are more easily accessible. We were unable to test for quality and compatibility in the latest version.—Ed.

LaserPaint Color II

LaserPaint is like a precocious, annoying child. It bothers the heck out of you when you first meet it, but you can't help being impressed by its abilities and may even come grudgingly to like it. LaserPaint separates more file types than anything else on the market does. But its features are implemented in odd ways, and some obvious things are missing (such as including a color name on each piece of film).

LaserPaint's method of specifying colors is infuriating. In earlier versions you could specify CMYK percentages, although the resulting colors were accessible only as color swatches on a palette or in PMS numbers that you assigned (at random, or according to any scheme you devised). In the latest release, Laserware has eliminated CMYK specifying entirely! All that's left is RGB. The whole approach to specifying colors, especially with the Auto-Airbrush (fountain) tool, is incredibly wrongheaded.

To its credit, LaserPaint is the first commercially available Mac program (and at this writing still the only one) to produce separations from 8-bit as well as 24-bit color TIFF and PICT2 bitmapped images. It is the only program implementing undercolor removal and gray-component replacement when it creates separations, and it even lets you do your own gamma color correction for color bitmaps (PhotoMac and PixelPaint Professional will do all these things when they ship).

LaserPaint takes an unusual but flexible approach to separations. After importing or creating your art, you choose Four Color Separate, and LaserPaint creates four new LaserPaint files, one for each color. You can open each of those files and edit it (and you need to, if only to write the color name on the layers). When you print from the original, full-color file, LaserPaint opens and prints each of the separated files, one after the other. You can also choose Line Color Separate if you want color overlays for each color in the document.

## Separators Compared

<table>
<thead>
<tr>
<th>Feature</th>
<th>ColorSep 1.0</th>
<th>Adobe Separator 2.0</th>
<th>Aldus FreeHand 1.0</th>
<th>LaserPaint Color II 1.9.2C</th>
<th>Color Cutter (service)</th>
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</thead>
<tbody>
<tr>
<td>File types separated</td>
<td>Modern Artist PICT files</td>
<td>Illustrator, some imported EPS (including PageMaker), some other PostScript</td>
<td>FreeHand files, some imported EPS</td>
<td>8- and 24-bit TIFF and PICT2 bitmaps and objects, LaserPaint</td>
<td>PageMaker with Illustrator and FreeHand</td>
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*Specifications subject to change. **Undercolor removal, gray-component replacement. ***Limited selection available. ****Possible to set angle by editing PPD file.
LaserPaint is the best choice around if you want to separate color screen shots or other images created with color paint programs. It handles colors very well, without modifying the palette and screwing up the color scheme. It also works with color scans, though the quality still doesn't match that of commercial separations and the program is very slow in 24-bit mode (see "The Face of the Future"). It also works well with objects created and colored within the program, though the Auto Airbrush--created fountains consistently fail to separate properly.

**Modern Artist**

Modern Artist is well known as a color paint program, but until recently there hasn't been a good method for getting Modern Artist images into print. The new ColorSep utility that comes with Modern Artist 2.0 solves that problem, although the version I tested, 1.0, had some serious problems. It generally works with images saved in Modern Artist's proprietary PICT mode, but when I tried to separate Modern Artist standard PICT files or a PixelPaint PICT file, the program had a variety of difficulties, from crashing repeatedly to changing the color palette to printing separations with a distinctly underwater appearance. Even with proprietary files the program has a tendency to crash.

Computer Friends says it tested ColorSep 1.0 with Apple's System version 5.0, and that it works fine with any System version up through that number. As I write this, the company is working on an upgrade for System 6.0 and above. The upgrade will be shipped free to registered users; call or write Computer Friends if you haven't received it yet. If you're thinking of buying Modern Artist and need ColorSep, be sure you get a good demo of the separation-printing function first to be sure the corrections are in place.

When you are working with proprietary files, ColorSep lets you control the brightness of the entire image on each of the process colors individually, as well as specify percentages for undercolor removal. You can also sharpen or smooth any image. Another useful feature lets you enter an identifier that is printed on each layer. If you choose to Spool the seps, ColorSep will save four PostScript files on disk, which you can then download.

**QuarkXpress**

If you want full-color pages, right from your Mac to the Lino, using a single program, QuarkXpress is the only choice right now. The program lets you specify the fill and outline colors for any frame on the page, select colors for type (but not different colors for outlines and fills), and even colorize a black-and-white...
If you want more complex graphics on the page, Xpress can import and separate Illustrator 88 color images (though it won't display them in color). Between Xpress and Illustrator, you can include almost all the color elements you might need.

There is one fatal flaw in this magnificent scenario, however: the colors you specify in Xpress don't match printed process color charts. They come out too dark. If you specify some color swatches in Illustrator, specify the same colors in Xpress, and separate them side-by-side on an XPress page, the Illustrator colors come out fine, but the Xpress colors are way off. Quark says it's working on this problem, and should have it fixed by the time you read this. Watch for version 2.01.

In the Works

In addition to the programs mentioned above, there are a few packages that are on the verge of release at this writing, including two correction and separation programs for color scans.

- PhotoMac, from Avalon, at first glance may look like another color paint program, but it's actually a tool for manipulating and separating color scans. Its tools for lassoing noncontiguous areas (even finding boundaries automatically, within limits) and modifying the colors for those selections far surpass anything currently available on the Mac.

The beta version I worked with lets you control the percentages for gray-component enhancement (encompassing both undercolor removal and gray-component replacement) and control the percentages for gray balance—a key factor in getting accurate colors on press. The gray-balance controls let you specify percentages of cyan, magenta, and yellow that combine to create gray. The program will also correct colors automatically for coated stock, uncoated stock, and newsprint (see "Expert Color Control").

PhotoMac is designed to work with scanned images, which use RGB values, so all colors are specified using RGB or hue/saturation/brightness (HSB). Since there is no method for calibrating the monitor to match printed results, it's difficult to know what screen colors will come out looking like.

- PixelPaint Professional is a color paint program with built-in separation capabilities. It's limited to working with 8-bit images, though PixelScan, included with the program, converts 24-bit images to 8-bit. You can set the percentage of undercolor removal and the maximum ink buildup (how much total ink is permissible for a given spot), and the density ranges for all four process colors (specifying the minimum and maximum percentages for each).

PixelPaint Professional stands out among paint programs, because you can specify colors using CMYK percentages, in addition to being able to use RGB, HSB, and the most complete electronic Pantone library on the market (for whatever that's worth). PixelPaint Professional is a promising contender, though its inability to handle 24-bit images restricts it to paint-variety graphics.
**Photoshop** is the name going around for a hot new color-scanning and image-editing tool that promises to put the current crop of applications to shame. It will be marketed with the BarneyScan slide scanner under the name BarneyScan XP, and it has also been licensed to Adobe Systems. Photoshop allows images to be split into separate RGB or CMYK channels; each channel can be edited, corrected, and merged with other channels before separations are made.

**Color System I** is a complete scanning/image editing/page markup/color separation hardware and software system based on the Macintosh II and the UltreSetter, a high-resolution (up to 3000 dpi) output device. The system will work with BarneyScan, Eikonix, and other color scanners. It will output to film, RC paper, and 3M dry silver material (for proofing). And it will support typefaces from the Compugraphic, Adobe, and Bitstream libraries. Complete turnkey systems will cost $40,000 and up.

**Enterprise**, which may have been released by the time you read this, is the only moderately priced Mac program besides QuarkXpress that will produce and separate pages with color type and graphics in place. Enterprise works with single pages only, but you can specify CMYK colors for any page element. At $795, it's targeted for those who produce high-quality, single-page display ads.

**ImageStudio**, the color version. Watch for this in the first quarter of '89. It will handle 24-bit TIFF and PICT, but will include "simple default-level separation capabilities" only, according to Letraset. A follow-up stand-alone utility will offer full-blown separation control.

**SpectreMatch** and **SpectrePrint** are two products from PrePress Technologies. Originally created for IBM compatibles, these programs are now being ported to the Mac. They run $3000 and $6000, respectively, and require a 4MB Mac II with a 24-bit card, so they aren't for casual separators. For professionals, however, they offer control that's unavailable with other Mac programs, such as highlight and shadow control for cyan, magenta, and yellow, and adjustment of gradations for highlight, 1/4-tone, midtone, 3/4-tone, and shadow areas.

**Hybrid Systems**

When you get into the area of color scans, especially when you want a full-page output with separated color photos in place, you are beyond the realm of current Macintosh software. Several systems are emerging, however, that combine the page-making powers of Macintosh software with the scanning and color separation prowess of expensive prepress systems. Crosfield has announced an interface that will import ReadySetGo pages, so scanned separations can be merged on the Crosfield system. And Cyber-Publishing's CyberChrome system will merge scanned separations onto pages from either PageMaker or QuarkXpress.

The advantages of these systems remain to be determined. The disadvantage is obvious: the relatively high initial cost. Even if service bureaus spring up to handle the electronic stripping and image-management end of this arrangement, whether such a service will save you money will depend on overall economies of computer versus manual business. No single part of the process will be a big saver. True, you'll avoid mechanical stripping, but you'll have to pay much higher rates for the digital stripping you'll still require. And you'll still be paying to have a professional separation made.

**Final Advice**

As things stand now, QuarkXpress, Image South's ColorCutter Service, and the PageMaker/Separator combination promise the greatest savings for color publishers using the Mac (along with Enterprise, when it's released), because you can create full-color pages with type, graphics, rules, and tint boxes all in place, saving the stripping costs that add up so fast.

The object programs Illustrator and FreeHand offer the most consistent results if you want to separate Mac graphics. The bitmap separators like LaserPaint and ColorSep work well, though the color correspondence they provide isn't as good as that of the object programs. And as the photos in "The Face of the Future" show, new software is even making separations of scans an economic reality.

In parting I have to offer just one caveat: you never get something for nothing. Making your own separations can give you a new level of control, save you money, and in some instances speed turnaround time, but you have to be ready for the difficulties that always arise when you bring an out-of-house job in-house. Learning to set your own type wasn't that hard, and the slight drop in typographic quality it involved was more than offset by the advantages. But as these articles have demonstrated, the world of color printing is far more complex. Before you cross the final desktop publishing frontier, think twice about whether you're ready for the inevitable challenges you'll face as a Macintosh pioneer. ☐

See Where to Buy for contact information.

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*Steve Roth is the editor of Real World PostScript (Addison-Wesley, 1988) and the former editor of Personal Publishing Magazine.*
Mac Fax: Not Ready for Prime Time

For sending and receiving documents on the spot, the latest weapon of business is the facsimile, or fax for short. There are currently over one million fax units in operation in the United States, with another two million units installed worldwide. Now that fax modems are available for the Macintosh, you and your Mac won't be left outside of this worldwide networking system.

A fax modem lets you automatically receive faxes on a Mac. (But you will need a hard disk, because the faxes take up so much space.) You can send electronic files stored on a Mac directly to stand-alone fax units and other fax modems. You don't have to print documents to transmit them. In fact, sending a fax is just as simple as printing a document on a LaserWriter or an ImageWriter—just a few clicks of the mouse and it's off.

Let's delve into the machine for a moment to see how the fax-Mac marriage works. You might already be familiar with the basic components of a fax machine: a scanner, a printer, a modem, and a control panel (see "Putting the Pieces Together").

Since a fax modem can automatically send documents from the Mac's hard disk, you can dispense with the scanner—unless, of course, you also have hard copy to send. As far as the printer is concerned, you may find that when you receive a fax, the electronic document is all you need. In any case, the printer you already use should be good enough for printing most faxes.

Fax modem parameters—telephone numbers, transmission quality, and so forth—are controlled by Mac software, rather than with a physical control panel. It's this software that determines how easy and convenient a fax modem is to use. Thus, the fax software is at least as important as the fax modem itself—how easy it is to establish a fax system's desirability and efficiency.

As this article is being written, two companies are shipping fax modems for the Mac: Apple and its AppleFax Modem, and STF Technologies and the FAXstf. In

You'd better look long and hard before picking a Macintosh fax modem over a regular fax unit

by Dave Kostur

Dave Kostur, a Macworld contributing editor, is the publisher of Connections, an international newsletter concerned with Macintosh networking. He has two AppleTalk network zones in his house.
Putting the Pieces Together

The diagram below shows how two Macs equipped with fax modems duplicate the transmission process of two stand-alone facsimile machines. Most of the time Mac fax modem users will probably send files produced on the Mac, a process that doesn’t require scanning. But if you want to send a copy of a paper original (as you would with a fax machine), you’ll have to use a Mac scanner (1). A typical scanned document has 3.7 million dots per page; the Mac’s fax software compresses the image to reduce transmission time (2).

The Mac fax modem then converts the compressed digital data into an analog signal that is compatible with the telephone network and sends it to another Mac fax modem (3). Reversing this process, the receiving Mac answers the phone transmission and converts the analog phone signal back into digital form (4). The fax software decompresses the document, restoring the original image (5). The receiving Mac can either view this image onscreen or print it on a laser printer (6). When you send a copy between two stand-alone facsimile machines, the same process takes place, but the fax machines themselves handle all the steps.

addition, Solutions International offers BackFax, a software product designed specifically for use with Apple’s AppleFax Modem. I was able to actually test the AppleFax Modem and the FAStFax, as well as BackFax. Abaton’s InterFax was also available for testing in the final stages of its development, but Cypress Research’s FaxPlus and Genius’s TransFax were only available for examination, not testing.

Getting Connected

What should you look for in a fax modem? Certain capabilities emerge as the bare minimum for an acceptable fax modem. These include compatibility with fax standards, transmission speed, on-screen viewing of received faxes, user-defined address books and distribution lists, scheduling for delayed fax transmissions, and background operation. You can see how the various Mac fax offerings compare in the table “Facts on Fax.”

You wonder why you can’t use a regular modem to send and receive faxes? The answer is that fax modems and regular modems use different communications standards. Standards for fax transmission are dictated by the Consultative Committee for International Telegraph and Telephone (CCITT). Fax modems use the CCITT standard for Group 3 faxes, which requires devices to send and receive images in a line-by-line raster format (unlike the bit-by-bit format used by regular modems) and has no error-checking capability so the receiving modem can’t resend incorrect lines. If a fax modem is designed with both fax chips and regular modem chips, however, it can perform double duty.

When choosing a fax modem you should consider which CCITT standards it conforms with. Of the four sets of standards, Group 3 is currently the most popular (see “What Group Does What?”). At the very least, a fax modem should be compatible with Group 3 fax units.

Standard Group 3 fax machines recognize 9600 bits-per-second (bps) transmissions; however, they can lower their speeds to match the transmission speed of another fax station. For the fax, transmitting at 4800 bps will take twice as long as transmitting at
# Facts on Fax

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</table>

9600 bps. The longer the transmission, the more expensive the phone bill. Unless you have money to burn, and don't care if fax transmission takes longer, look for a 9600-bps fax modem.

You'll need to view received documents on the Mac's screen, if only to determine their contents. Unfortunately, most fax documents are illegible on the Mac's screen, which displays at only 72 dots per inch (dpi). Because fax documents have a resolution of 200 dpi, a lot of detail in the fax document can get lost on-screen without magnification. If the fax document is skewed a little while being fed into the fax, the characters probably look even worse. Remember, you're not substituting nicely designed screen fonts for the characters, you're looking at bitmaps that once were characters. Good fax modem software not only displays the images, but also magnifies them.

Many stand-alone fax machines allow you to store frequently used telephone numbers in their memories for easy access. Similarly, fax modems should be able to access numbers stored in an address book on the Mac. The ability to keep multiple address books and to group addresses into distribution lists are also handy features for heavily used faxes.

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<td>Analog</td>
<td>Limited</td>
<td>3 minutes</td>
</tr>
<tr>
<td>3</td>
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<td>Complex</td>
<td>&lt; 1 minute</td>
</tr>
<tr>
<td>4</td>
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### Facts on Fax

<table>
<thead>
<tr>
<th>Company</th>
<th>BackFax</th>
<th>FaxPlus</th>
<th>FAXstf</th>
<th>InterFax</th>
<th>TransFax</th>
</tr>
</thead>
<tbody>
<tr>
<td>Company</td>
<td>Solutions</td>
<td>Cypress Research</td>
<td>STF Technologies</td>
<td>Abaton</td>
<td>Genius</td>
</tr>
<tr>
<td>Price</td>
<td>$245</td>
<td>$995</td>
<td>$695</td>
<td>$495</td>
<td>$1295</td>
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<tr>
<td>Background operation</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
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<td>File translations</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>TIFF</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Glue</td>
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<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>PICT</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
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<td>MacPaint</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
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<tr>
<td>EPS</td>
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<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
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<tr>
<td>Regular modem</td>
<td>n/a</td>
<td>2400 bps</td>
<td>4800</td>
<td>4800</td>
<td>9600</td>
</tr>
<tr>
<td>Speed of fax modem (in bps)</td>
<td>9600</td>
<td>9600</td>
<td>9600</td>
<td>n/a</td>
<td>9600</td>
</tr>
<tr>
<td>Auto redialing</td>
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<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Forwarding</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Binary file transfers</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Speed (in bps)</td>
<td>9600</td>
<td>9600</td>
<td>9600</td>
<td>n/a</td>
<td>9600</td>
</tr>
<tr>
<td>Magnification of received fax file</td>
<td>variable</td>
<td>25%, 50%, 200%, 300%</td>
<td>5%-100%</td>
<td>33%, 67%</td>
<td></td>
</tr>
<tr>
<td>Pass-through for external modem</td>
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<td>n/a</td>
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<td>Pass-through for external phone</td>
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<td>n/a</td>
<td>n/a</td>
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</tr>
<tr>
<td>Multiple address books</td>
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<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Import text address files</td>
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<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Group distribution lists</td>
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<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Scheduled transmissions</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Multiple files to one recipient</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
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</tr>
<tr>
<td>Multiple recipients for one file</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Activity log</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Cover sheet</td>
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<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Resizable facsimile original</td>
<td>33%, 66%</td>
<td>33%, 67%</td>
<td>variable</td>
<td>33%, 67%</td>
<td></td>
</tr>
<tr>
<td>Manual connection</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Adjustable length to fax page</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
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</tr>
<tr>
<td>Image rotation</td>
<td>n/a</td>
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But the product, compatible only with the AppleFax Modem, has its own problems. For example, Solutions, the program’s developer, seems to have forgotten that users may want to view their faxes. There are no magnification options in BackFax.

**FAXstf**

STF Technologies’ FAXstf is the most compact unit of all, about the size of a pocket calculator. The FAXstf’s size is an indicator of its simplicity. It’s only a 4800-bps fax modem with no frills.

STF’s FaxManager software also has a clean, simple look. It’s not too difficult to figure out how to use the program to create phone entries and send faxes (see “FAXstf Phone Book”). A Manual Send feature allows you to dial a number, speak to the person on the other end, and then start a fax transmission without hanging up. If you use the FAXstf in the background, then you’ll need to launch another application, the FaxMonitor, which controls the fax modem. FaxMonitor operates independently of FaxManager.

FAXstf includes a few reductions and magnifications for viewing faxes, good enough for most purposes. You can print, or cut and paste, bitmaps of received files. Also, the software does not support group-distribution lists.

**InterFax**

Abaton’s InterFax 12/48 is a 4800-bps fax modem that includes an additional 1200-bps modem. But as with the FAXstf, sending faxes at the InterFax’s maximum 4800 bps will up your transmission costs.

The InterFax software consists of three components: the fax driver (selectable via the Chooser), an Interfax Control file, and the InterFax application. The InterFax Control file installs a CDEV file that, when accessed from the Control Panel, controls the fax modem. You can turn the receive/send function of the fax modem on or off, view the status of fax traffic, or cancel a fax receipt or transmission. You use the InterFax application to set up an address/phone book and to view fax documents.

When you view a document, there are two methods for setting magnification: type in a percentage, or ask the program to map a specified number of fax pixels to one screen pixel (see “InterFax Software”). You can also change the orientation of the image on the page. As an added feature, InterFax has a menu choice for converting fax documents to and from certain graphics formats, namely MacPaint, PICT, or TIFF.

**FaxPlus**

At first glance, the FaxPlus from Cypress Research looks like a regular modem; it actually contains a 9600-bps fax modem and a 2400-bps modem. From a hardware viewpoint, the FaxPlus thus offers you the most communications capabilities for your money.

The software has many of the features you’d expect to find in a good fax program. There is variable magnification for viewing documents, as well as support for saving faxes in different file formats and image orientations. The address/phone book—which is actually a DA—is one of the most complete I’ve seen; you can enter not only a street address, but also electronic mail information for each recipient (see “FaxPlus Software”). And the software functions in the background, even without MultiFinder.

If you must use the same phone line for voice and fax transmissions, the FaxPlus lets you converse with the receiving party, then switch over to fax transmission.

**BackFax**

Part of the BackFax interface resembles that of Solutions’ sister product, Desktop Express. You can view separate logs for sent and received messages. Double-clicking on the name of a fax—in this case, a message that has already been sent—displays a zoomable window with the contents of the document (front-most window).

**FAXstf Phone Book**

FAXstf’s phone book does not allow you to assign names to groups to simplify widespread fax transmissions. Shown here is a sample phone entry, along with the activity log and fax schedule windows. The calendar and clock in the lower right of the figure enable you to reschedule any fax’s transmission date and time.
InterFax Software

InterFax is the only software that shows you the time it takes to send or receive a fax. It also offers the most flexible options for changing the magnification of a fax document for viewing.

FaxPlus Software

The window used to address a fax envelope and determine its contents resembles an actual envelope. The address goes into the upper half of the window; enclosed files appear in the lower half of the window. You can select from an address book (foreground), or you can add new addresses and phone numbers with the text-entry box at the bottom of the address book window.

On Different Scales

When is a pixel not a pixel? The answer is, when you send it via fax modem. You can get documents into, and out of, Macs using a fax modem, but my tests with the AppleFax Modem and FAXSti uncovered some scaling problems that result from dealing with the unusual specifications of fax documents.

The CCITT defines Group 3 faxes as having either a standard resolution of 203 by 98 dpi or a fine resolution of 203 by 196 dpi. Since none of these numbers translate easily to the 72-dpi screen resolution of the Mac, the 216-dpi resolution of the ImageWriter LQ, or the 300-dpi resolution of the LaserWriter, it appears that the Apple and STF developers have cut some corners in translating the fax resolutions into something usable on the Mac. And therein lie the problems.

Both the AppleFax Modem and the FAXSti ship with ImageWriter LQ fonts, which are defined for a 216-dpi resolution. If you want to send crisp, readable text via either of these fax modems, I advise you to use only the ImageWriter LQ fonts. If you don’t, you’ll end up with a case of the jaggies as the programs attempt to deal with the regular 72-dpi screen fonts.

The InterFax uses a slightly different approach to font representation. Instead of using the LQ fonts, Abaton includes two of Bitstream’s outline fonts, SWA Swiss (which resembles Helvetica) and SWA Dutch (which resembles Times). Again, if you use other fonts, they will often appear jagged.

Unless my math is wrong, 216 isn’t equal to 196 or 203. Because of that inequality, the AppleFax and FAXSti software each introduce a scaling factor for all faxes. Any fax you receive looks smaller than the original, and any fax you send out is larger than the original (see “What You See Is Not What You Get”).

Also, since the fax resolution is not the same in the vertical and horizontal directions, the current software does not scale documents the same in both directions. This problem doesn’t affect text-only documents very much, but it can be very noticeable in drawings. Any drawing that you send or receive will have neither the correct size nor the correct proportions (203/216, or 0.9398, in the horizontal direction, and 196/216, or 0.9074, in the vertical direction). Thus CAD/CAM drawings or precision artwork are nearly worthless when sent over these two fax modems.

BackFax attempts to get around this problem by offering what it calls Best Resolution and Exact Resolution options when viewing or printing faxes. When you’re printing to a LaserWriter, the Best Resolution option maps every fax pixel to a LaserWriter pixel, reducing a fax page to about two-thirds of its original size. On the other hand, the Exact Resolution attempt to match the original page size is this: the only means I’ve found for retaining an image’s exact dimensions when using a fax modem.}

There Are Advantages...

If you don’t already have a fax machine in your office, then the idea of linking a fax modem to the Mac might be appealing. After all, a fax modem occupies less room than a fax machine and provides a direct link between the computer and your fax-based clients. And well-written fax modem software provides you with fax features, such as scheduling, address books, document storage, and unattended operation, that only the higher-end, more expensive fax machines offer.

One feature that low-end fax units don’t include is a distribution list. Distribution lists simply enable you to send the same fax document to all members of a group by selecting the group’s name. Except for the ones in FAXSti, address books can also group phone numbers, for example, under the names Midwest Offices or Sales Reps.

If all fax-related correspondence that you’d handle is Mac-based, then the fax modem is a definite plus...
over the regular fax. You can send any Mac document to someone else without printing a hard copy and scanning it through a fax. And you can store anything you receive directly on a hard disk.

Abaton’s InterFax and Cypress Research’s FaxPlus can operate as regular modems. If you’re inclined to dial information services and bulletin boards or transfer files, these fax modems offer you more hang for your buck. Not only that, but getting two functions in one box might reduce clutter around your desk.

... and There Are Disadvantages

Since all fax transmissions are bitmaps, the files can take up a lot of disk space. Even simple word processor files will increase in size. For example, a 10-page, double-spaced MacWrite file that’s all text occupies 24K on my disk. When BackFax converted it into facsimile format before transmission, it took up 737K. A rather simple cover page for BackFax takes up 54K on the disk.

Some of the CCITT test charts I used for reviewing the fax modems had a lot of information on them; the scanned images took up around 450K per file as PICT files, but expanded to 1.2MB when PAxfst converted them into fax documents. Handling faxes through a fax modem is definitely not meant for floppy-based systems. And, if you’re handling a lot of fax traffic, even a 20MB hard disk may be too small.

It’s one thing to scan a sheet of fax paper to determine the subject of the document and file it. It’s quite another to try the same thing with a fax file on the Mac. All the programs I’ve seen use some form of a date-time stamp for received faxes; you then have to view them in the fax program to determine the contents. When you translate fax documents to a different file format, you can give the files more meaningful names.

I’ve already discussed the problems of displaying faxes on the 72-dpi screen of the Mac, so I’ll only say a few words here. Programs that don’t offer magnification of at least 150 percent for on-screen viewing are worthless. I don’t expect to print all of the faxes I receive, so being able to read them on my Mac is a definite requirement. After all, isn’t being able to keep everything in electronic form the whole idea of a fax modem?

Fax modems have other financial and logistical disadvantages too. First, they work only for files already on the Mac. If you need to transmit paper documents, you’ll need a scanner. That increases the cost of setting up a Mac-fax modem by around $1500. Second, to create high-quality output from the faxes you receive, you’ll need an ImageWriter LQ or a LaserWriter. Finally, should the fax modem be a resource for more than one person, it may become a nuisance for the person who must work on the Mac that the fax modem is connected to.

With the introduction of facsimile modems from Abaton, Apple, Cypress Research and STF Technologies, Mac...

Hold On to Your Checkbook

When I first thought of using a fax modem, I was intrigued by the idea of being able to receive faxes from clients and then inserting the fax material into other documents, such as page layouts. Unfortunately, the quality of the Group 3 fax standard and the inability of most fax software to represent correctly proportioned graphics keep me from cutting-and-pasting parts of my fax files into other documents. I’d have to ask my clients to use fonts sizes larger than 12-point to make documents readable (see “Careful Reading”); they’d also have to be warned to provide some dimensional information for drawings if they want me to reproduce the exact size in my documents. Faxing should be relatively painless and these unneeded constraints make it a bother.

Working with the currently available fax modem packages, I’ve yet to find one package that has it all. The hardware is definitely capably designed and ready to provide the link to the rest of the fax world out there. But the combination of the scaling problems and poor interface design in the software keeps me from actually buying one for my business. No one fax package has all the features I want to make faxing from the Mac easy and useful. If I had to buy some kind of fax unit right now, I’d probably settle for a stand-alone fax machine. Given a few more months, I might change my mind and buy a fax modem. For the time being, I think I’ll just hold on to my money.

See Where to Buy for contact information.
If you use a Mac II, you've probably noticed that Apple left some gaps in the utility software that comes with the machine. Those gaps range from the merely exasperating (you can't change the colors on your color computer) to the swear-word—provoking (the bomb appears and the System refuses to acknowledge the Restart button). The solution: fill the gaps by adding several key software utilities. These handy little programs will not only solve some of the Mac II's oversights, but will also make your use of the Mac II more fun and more efficient. You need a utility to fix the following general problems:

- screen size and type incompatibilities
- insufficient coloring resources
- problems with capturing and manipulating color graphics
- inability to organize and optimize high-capacity hard disks
- 68020 instruction cache problems
- HyperCard's dependence on Mac Plus and SE screens
- difficulty getting keys to work as labeled

I haven't tackled all of these problems but I'll address the worst ones. Some solutions are shareware; the remainder are commercial programs available from dealers or through the mail. All of the shareware products described in this article are available on large online services such as CompuServe, GEnie, and the Source. You may freely download and try out these programs at your leisure. The authors of shareware products are taking a gamble on your honesty. They're betting that once you've seen and used their product, you'll send in the product's registration fee.

**Crashproofing**

The most frustrating problem you're likely to encounter is crashes caused by software written prior to the Mac II's introduction. You've probably heard some of the stories: MacWrite wouldn't run on a Mac II, public domain programs of all kinds were causing frequent crashes, and most communications programs had problems running on a II. Some software would even crash the system so badly that the computer refused to reboot from the hard disk.

Fortunately, most of these problems have been solved. MacWrite and most other programs have been revised, and Apple...
Exorcising Cache Goblins

Nine times out of ten, you can eliminate or recover from repeating crash problems with one of three solutions: turn off MultiFinder, change your monitor configuration in the Control Panel from Color to Black & White/Grays, or install and use an instruction cache toggle. To understand what an instruction cache toggle is, you need to take a closer look at the Mac II's 68020 processor. This processor differs from the 68000 processor in the Plus and SE in one primary way: it has a small built-in instruction cache. The cache stores the most recently used instructions, which speeds up operations by reducing the number of times the processor must retrieve instructions from memory. Some software programs that predate the Mac II make modifications to stored instructions as the program runs. When you run these programs on a 68020 Macintosh, the processor won't always make the modifications, since it does not always return to memory for instructions already stored in the cache. The likely result is a system crash.

Motorola did provide the ability to turn off the instruction cache in the 68020, but apparently Apple didn't read that page of the manual. So the onus is on the user community to come up with something to turn the cache off for self-modifying programs—an instruction cache toggle. I know of two, CacheKey INIT and Toggle Cache.

CacheKey INIT lets you define an F-key (predefined as # Shift-9) that toggles the instruction cache when pressed. It comes in several variations. One example is an INIT that automatically turns the cache off at start-up, another turns it on at start-up.

Since I only use the cache toggle once a month, I use Toggle Cache—a CDEV (control panel device.) After dragging Toggle Cache into the System Folder, open the Control Panel and doubleclick on the ToggleCache II icon to open the toggle checkbox.

Getting Along with Color

Too bad Apple didn't think to provide any color utilities. You see, as delivered, the Mac II has no way to let you color dialog boxes, menus, or icons; no way to change the color lookup table being used by the System; and no way to capture, view, or print color screens. And don't even begin to think of using the Clipboard to handle color graphics. If you paid the extra bucks for color, you're sure as heck going to want to get something for that money. To correct those deficiencies, you'll need a whole diskful of utilities.

To begin with, unless you're able to read between the lines in Inside Macintosh Volume V (Addison-Wesley, 1988), juggle ResEdit resources in hexadecimal notation, and keep 32-digit numbers in your head, you won't be able to edit color resources with the tools Apple supplies. The three things you will be able to do with color resources are change the desktop pattern to a colored pattern, change the selection inversion to a color, and assign one of seven colors to icon outlines (see "Making Solid Icons" for a twist on this).

Curiously, Russ Wedmore at Apple did write a CDEV named Kolor, which allows you to change resource colors. Apple chose not to distribute it because of anticipated customer-support problems—Kolor is an unfinished work with bugs and incomplete features. But it is available on a number of bulletin board systems.

has finally fixed the Mac II's system software so that the computer should never forget the boot device after a crash. Nevertheless, it is still possible to find programs that need a utility to run on the Macintosh II. To work with these programs you need two utilities: a PRAM protector and an instruction cache toggle.

A PRAM protector allows you to recover more easily from some of the most common crashes, which are caused by software's overwriting the parameter RAM or PRAM. The PRAM is an area of memory that stores the system date and time, the beep sound, the alarm data, the start-up device, and other such data when the power is off. Disruption of the PRAM can mean that the computer no longer starts up from the hard disk and won't recognize settings for the clock and the desktop pattern. Until System 6.0, the PRAM was unprotected. If you still use System 5.0 or earlier, get an INIT called PRAM Fix and put it in your System Folder. This INIT knows when the PRAM has been corrupted and resets it so that you boot up from your system even if it is corrupted. (System 6.0, or later, users should not use this INIT. Remember to remove it if you upgrade from an earlier system.)
Kolor can change the color of controls, windows, menus, or selections (see "Kolor"). You can change the colors of controls, including the border, fill, text, and scroll box. Some programs won't recognize certain color assignments made with Kolor, so windows might appear in black and white despite your color selections.

A commercial product called Colorizer includes a CDEV called Colors that is superior to Kolor in two ways: it adds a set of predefined color combinations, and it lets you create color start-up screens. Unfortunately, the predefined color combinations Palomar Software chose to include remind me of the loud and overbearing colors found in trendy cafes. Everyone I know uses the pastel color combination called Miami Vice.

Additional utilities let you color other resources. You can color Apple-supplied alert icons (Stop, Caution, Note) by using ResEdit to paste in the cinc resources available in a shareware file called Color CICNs. You might color the Stop sign red, for example, to reinforce the meaning of the visual cue given by this alert icon. Another shareware resource file called Color Map has a colored map you can paste into the Apple Map CDEV. One last shareware resource file, Color Cursor, changes the usual arrow cursor into one that has the same colored stripes as in the Apple logo. It's not much use, but it's an interesting diversion.

One especially useful shareware utility called BWIIC (stands for black and white to color) works like ResEdit but lets you assign different colors to dialog boxes, controls, menus, menu bars, and windows of individual programs (see "Color Menus"). My favorite use for this utility is coloring the Finder's menu bar and dialog boxes a different color from the standard one (defined by Kolor or Colors). That way, when running under MultiFinder, I can easily tell when I'm in the Finder and when I'm in an application, since the menu bar changes colors when the Finder is active.

Fixing Screen Incompatibilities
Some programs won't run with the color turned on. Examples are programs that deal only with black-and-white bit-mapped images like FullPaint and early versions of MacPaint. The official Apple fix is time consuming and annoying—click on the Monitors icon, change the Control Panel setting to Black & White/Grays. A quicker way to switch monitor modes is to install an F-key called Switch-a-roo. Switch-a-roo is a shareware product that is also available as part of the commercial Screen Gems package (see "Screen Gems").

Many early Mac programs fixed the location of dialog boxes and alerts. The standard Mac II screen is bigger than the screen on the SE or the Plus (640 by 480 pixels versus 512 by 342). With a 19-inch monitor hooked up to the Mac II, you may find yourself mousing over a lot of territory to get to a dialog box positioned for the Plus and the SE. The shareware INIT Front&Center fixes this problem by positioning dialog boxes near the pointer when called. This can be a little disorienting at first, but once you get used to it you don't have to move the mouse so much.

What if you want your Mac II display to simulate the smaller screen of a Mac Plus or SE? This problem comes up often in an office of mixed Macs—perhaps you're developing a spreadsheet on a Mac II for use by someone with an SE, and you'd like to see it the way he or she will. With Screener, you can reduce the Mac II's resolution down to Plus or SE size and back again (see "Sizing Up the Screen").

HyperCard Reconciliations
HyperCard and the Macintosh II are not friends. HyperCard's most annoying trait rears its head when you use it with MultiFinder: The card window works properly, but the command window can end up floating on top of another program's window. To deal with this problem and to make using HyperCard with MultiFinder easier, Mike Swaine developed a simple script, Hide HyperCard, that creates some interesting buttons on a card. Not only does pressing one of these buttons hide the card and command windows properly, but it hides them where the button is located in the card. For example, a button in the lower right corner would cause the HyperCard window to be hidden in the lower right corner of the desktop—all you see is the top left edge of the hidden window. Click on that edge, and HyperCard is restored correctly to where it was. You can order a copy of the script and instructions for using it by sending a stamped, self-
Making Solid Icons

Ever wish you could have solid, colored folders on the desktop? Well, Apple built a method of making them. You need ResEdit to make the changes, and I suggest that you do this on a separate floppy copy of the System. Then copy the modified System file over onto the hard disk. (Hint: Boot from the hard disk to edit the System file on the floppy; boot from the floppy to copy the System file to the hard disk.)

1. Start ResEdit and open the Finder file on the floppy disk.
2. Find the resource LAYO = 128, highlight it, and select Open General from the File menu.
3. Select Find Hex from the Search menu; find the number 0000000D (you must do this on an unmodified System file to find this set of bytes).
4. If 0000000D is found, type in the change value 00C8000D and click on the Change button.
5. Select Quit from the File menu and save the changes when prompted.

Capturing Screen Images

A problem that seems to frustrate almost every Mac II user at some point is capturing or printing color screen images. Forget ⌘-Shift-3 and ⌘-Shift-4—they don't work unless the display is in monochrome mode (two colors). Even then, these commands behave unexpectedly. For example, ⌘-Shift-3 rotates the image sideways in the resulting MacPaint file.

So how do you get good screen shots with a II? In the commercial realm, you'll find Mainstay's Capture. Capture is an INIT. You save a copy of the display by pressing ⌘-Shift-C. A cross-hair cursor appears, which lets you drag a selection rectangle over menus, dialog boxes, DAs, and just about anything else that can appear on the display. If you hold the Option key down while dragging the cross-hair cursor, a PICT file is saved in your root directory—the way ⌘-Shift-3 would, if it worked. This saves memory by avoiding the Clipboard: a full screen may take as much as 2MB of storage space on the Clipboard.

Colorizer also comes with screen capture and screen print utilities. These are simply color versions of what Apple supplies, and you can install them as F-keys. On a LaserWriter, the print screen F-key maps light colors to white, dark colors to black. Screens are saved as PICT files in the directory in use.

On the shareware side, one group seems to be doing the most work to alleviate the color screen shot problem. A shareware company called Mark 3 Software has developed, get this, three separate products that can be used to capture screen images on the Mac II: Screen Dump II, ColorSnapShot, and SnapShot. Each has advantages and disadvantages. Screen Dump II, the first of the products, creates replacement F-keys for the ones Apple supplies for print and screen capture. Neither F-key does anything fancy, unless you call swapping light colors for white pixels and dark colors for black pixels fancy. Screen Dump II doesn't rotate images, although it may crop them to fit in a standard MacPaint file. Installation is simple and reasonably idiotproof. Make sure that you have no conflicting F-keys when you create the new ones, or else you'll see the infamous bomb. In other words, if you want to replace Apple's F-keys, get into ResEdit and cut them out of the System file, then install Screen Dump II.

SnapShot and ColorSnapShot are much more elaborate screen-capture routines, for monochrome screens and color displays, respectively. Both allow you to choose the file name and the file format for the saved image. With ColorSnapShot, for example, you can save in Grayview, GIF, PixelPaint, StartupScreen, PICT, and Clipboard formats. You may also select only a portion of the screen. You can capture an image of the screen with the menus pulled

addressed envelope to HyperCard Script, e/o Macreations, 329 Horizon Way, Pacifica, CA 94044.

Another problem with HyperCard is that it can't use color. Fortunately, HyperCard's ability to read XCMDs has permitted someone to write a "color hook" for HyperCard, which, with a little bit of extra work, lets you add color to cards. ColorCards installs as an XCMD, but to use it, you have to add calls to the XCMD in every script that deals with the information you want colored. Moreover, there is a limitation on how color is used, apparently due to the way Bill Atkinson designed the screen update routines for HyperCard. To wit, no two colors may be used closer than 18 pixels together in the horizontal direction. The authors of ColorCards, Bill and Steve Tuttle, call these color zones (see "In Living Hypercolor"). If all you're interested in doing is coloring backgrounds or adding color text, single-color icons, or buttons, ColorCards does the job reliably and without a lot of extra work.

Don't be upset when icons (like the Trash Can) appear as blobs of black when you boot from this disk. Select an icon, select a Color from the Colors menu, and the blobs will change from black to colors (if you didn't select black). Do this for all the blackened icons on the desktop. You'll probably also want to change your desktop pattern, as well.

Another problem with HyperCard is that it can't use color. Fortunately, HyperCard's ability to read XCMDs has permitted someone to write a "color hook" for HyperCard, which, with a little bit of extra work, lets you add color to cards. ColorCards installs as an XCMD, but to use it, you have to add calls to the XCMD in every script that deals with the information you want colored. Moreover, there is a limitation on how color is used, apparently due to the way Bill Atkinson designed the screen update routines for HyperCard. To wit, no two colors may be used closer than 18 pixels together in the horizontal direction. The authors of ColorCards, Bill and Steve Tuttle, call these color zones (see "In Living Hypercolor"). If all you're interested in doing is coloring backgrounds or adding color text, single-color icons, or buttons, ColorCards does the job reliably and without a lot of extra work.
down by pressing Caps Lock-Shift, and the number you specify. Remember, however, that color displays are memory intensive. In some situations (like 19-inch displays) with lots of color, you won’t be able to fit the resulting image on an 800K floppy. Furthermore, if you don’t have enough RAM, you may not be able to capture or edit the screen image. ColorSnapShot crashed many times while I was using it. Nevertheless, ColorSnapShot is one of the most useful Mac II utilities I’ve come across; I know of no other way to do some of the things it does (the figures in this article were captured with ColorSnapShot).

**Macro Madness**

Next in the list of gaps comes the keyboard. Those of you who’ve bought a Mac II recently probably have System 6.0.2, which includes MacroMaker. MacroMaker is Apple’s belated fix to make the big keyboard—the one with function keys across the top—work properly. Depending on the software you use MacroMaker with, the Print Screen, Scroll Lock, Pause, Help, Home, End, PageUp, and PageDown keys may or may not work. Microsoft Word, for example, can interpret only the last five of these keys. Apple’s official position is that these keys are labeled to match their IBM PC counterparts, and the only time you should expect them to work as they are labeled is when you’re running IBM PC software on the Mac. MacroMaker lets you disregard Apple’s unbecoming preference for allocating function keys to MS-DOS. You can simply assign these keys to any function you want.

You won’t have MacroMaker, though, unless you have System 6.0 or later. I know of three commonly available solutions that will put those keys to work for you with an earlier system. The simplest utility, FIF4, is a shareware INIT file that assigns the Undo, Cut, Copy, and Paste functions to keys F1 through F4. It takes little memory, does the job unobtrusively, and requires no maintenance. Put it in your System Folder once and it’ll be there every time you start up, unless you hold down the Option key while booting. Don’t install FIF4 if you’ve got MacroMaker installed, however.

Two excellent programs, QuicKeys and Tempo II, go much further than MacroMaker. Most users I know substitute one or the other for MacroMaker.

Unlike MacroMaker, both programs allow you to create an *autoboot* sequence—a set of actions that your computer always performs when you start up. For example, you could create a sequence that automatically logs onto MacNet, downloads your mail, copies all the mail into a single word-processing file, then brings up that file with the day’s mail.

Tempo II is an INIT that you invoke with a desk accessory or F-key; QuicKeys is a CDEV. Both programs enable you to assign functions to keys F1 through F12. You can also assign functions to the other labeled keys. Home, for example, could be made to perform the equivalent of moving both scrollbar boxes to their original positions (top or left).

Which of the two is for you? Well, Tempo II is a little easier to learn than QuicKeys, and it has a function called Autopaste that assigns any graphics or text you can cut to the Clipboard to a key.

Tempo II also has a CrashCatcher option useful to programmers or program testers. Finally, Tempo II has some nice branching capabilities that enable you to build macros that change in function, depending upon selected text. QuicKeys is a little more Macintosh-like, it handles *sets* of macros better, prints keyboard templates so you can remember the macros you’ve assigned, and comes with more thorough documentation. Either program is suitable for replacing MacroMaker. Beyond that, you’ll probably find Tempo II more interesting if you like programming (building macros for a spreadsheet is a programming action), and you’ll like QuicKeys better if you don’t.

Both programs are worth the extra money.

See Where to Buy for contact information.

Thom Hogan is publisher and coeditor of the Macintosh II Report, a monthly newsletter for Mac II owners. He has also written eight computer-oriented books, including the recently published Programmer’s Macintosh Sourcebook from Microsoft Press.
Macworld is proud to offer you an opportunity to cast your vote for excellence in computing—and perhaps win the ultimate Macintosh hardware and software system. Each year we invite all of our readers to voice their opinions and pick the best Macintosh products in 42 categories.

Usually we give you our opinions on the latest Mac products, but now, with the World-Class Macintosh Contest, we want to hear what you think. Which Mac products do you find significant? Which have served you well during the last year? Which would you recommend to a friend? By voting for the Mac products of your choice on the attached contest-entry form, you can both reward the hard work of your favorite product developers and help keep Macworld's editorial coverage on track.

You also earn a chance to win hardware and software worth thousands of dollars. To show you our appreciation for taking the time to participate in this contest, we will pick three winners at random from among the World-Class entry forms. The lucky grand-prize winner will receive most of the top-voted hardware and software products. A copy of each winning software package will go to the runner-up, and the third-place winner will receive a selection of the winning software programs.

Entries must be received no later than March 15, 1989; we will announce the results in our September issue. To accurately reflect readers' preferences, we'll publish figures for all significant vote-getters in each category. The following explanations define product categories that are not self-evident, to help you cast your votes appropriately.
CONTEST RULES
Each person may enter the contest only once. Entries must be printed by hand or typed on the form included in Macworld or on a reasonable facsimile. Your entry must include at least one product vote, plus your name, address, and daytime phone number. Entries must be received no later than March 15, 1989. Employees of PCW Communications are not eligible. Thank you and good luck!

Name
Company
Address
City __________________ State __________________
Zip __________________ Daytime phone __________________

Send Entries to: 1989 World-Class Macintosh Contest, Macworld, 501 Second St., San Francisco, CA 94107.
1989 World-Class Macintosh Entry Form

Please use this entry form to vote for products you are familiar with and would recommend, based on their performance and value. Choose one product per category; you need not vote in all categories. Eligible products must be compatible with the Macintosh computer and commercially available as of February 1, 1989. To ensure accuracy, we will not count a vote unless the following three items are provided: (1) correct product name, (2) manufacturer name, and (3) model number (for hardware only). Version numbers of software products are not required. Please print or type your entry; it must be received by March 15, 1989.

**HARDWARE**

<table>
<thead>
<tr>
<th>PRODUCT NAME</th>
<th>MODEL</th>
<th>MANUFACTURER</th>
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<tbody>
<tr>
<td>Alternative Mass Storage</td>
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<td>Display—Black-and-White</td>
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<td>Display—Color</td>
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<td>CPU Upgrade</td>
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<td>Digitizer/Scanner</td>
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<td>Most Promising Newcomer</td>
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<td>Printer—Dot Matrix</td>
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<tr>
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<td>Business Presentation Graphics</td>
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<td>Color Paint</td>
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<td>Communications—General</td>
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<td>Desktop Publishing</td>
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<td>Drawing/Illustration/Animation</td>
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<td>Education/Training</td>
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<td>Game</td>
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<td>Integrated Package</td>
<td></td>
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<td>Micro-to-Mainframe Communications</td>
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<td>Music</td>
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<td>Project Management</td>
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Hardware

Alternative Mass Storage
All types of mass storage devices except hard disks. Examples include external floppy drives, removable cartridge drives, and tape backup units.

Communications Board
Add-in boards that help the Mac communicate with other Macs and other computers. Examples include Ethernet boards, and 8086 and 80286 coprocessor boards.

CPU Upgrade
Products that increase the Mac's processing capability, either by using faster 68000s, or 68881, 68020, or 68030 devices.

Display—Black-and-White
Monochrome or gray-scale monitors that serve either as a component of the Mac II or as an alternative to the standard display provided by other Macintosh systems.

Graphics Board
Add-in boards that let the Mac II display color or gray scale images.

Input Device
Mice, trackballs, graphics tablets, keyboards, joysticks—everything but digitizers and scanners.

Printer—Color
Any printing device, other than a dot matrix printer or plotter, that produces color output. Examples include thermal printers and ink-jet printers.

Software

Business Accounting
A series or an integrated package rather than a single module (such as a ledger). You can choose a modular package or an all-in-one program as long as it is designed for serious business use.

Business Presentation Graphics
Packages that produce or lay out text; pie, bar, or line charts; or other graphics used by businesspeople to present information.

Computer-aided Design
Computer-aided design includes products that offer two- and three-dimensional capabilities for working with geometry, especially for applications in mechanical, architectural, and electrical engineering.

Desk Accessory
Any programs that install under the Apple menu and that don't fit in any other category. Examples include calculators, notepads, schedulers, calendars, and phone dialers.

Education/Training
Training programs provide tutorials on such subjects as typing or computer applications. Education software includes courseware, examination-preparation programs, and learning aids for children.

File Server
Products that enable multiple network users to share one storage device.

Integrated Package
Products that include several applications—such as word processor, spreadsheet, charting program, and data manager—that share data and a command structure. The applications may be on one disk or in separate modules.

Micro-to-Mainframe Communications
Programs that perform terminal emulation and data conversion for mainframes and minicomputers.

Outline Processing
Stand-alone programs or desk accessories that organize ideas and notes in outline form.

Personal Finance/Taxes
Programs that help you retrieve and handle stock information; that perform portfolio management; that assist in fundamental or technical analysis; and that help you plan or prepare your taxes.

Project Management
Programs that manage resources and scheduling, usually for large, complicated tasks.

Utility
Programs that perform a wide variety of housekeeping chores, such as file conversion, file recovery, disk backup, and keyboard enhancement.

Most Promising Newcomer

Which new products—in both the hardware and software categories—are making an impact? (You may vote for a product you've cited in another classification.) For our purposes, "new" products are those released within the last six months.
Reviews

Studio/8 1.0


Color paint offerings for the Mac are becoming increasingly sophisticated. Take Studio/8, for example. This new bitmap color painting program from Electronic Arts has a multitude of powerful painting tools and special effects that will delight any digital artist currently using programs such as SuperMac's PixelPaint and Computer Friends' Modern Artist. It's rich in features and boasts an excellent user interface and respectable performance.

A Palette of Choices

Studio/8's Tool Palette contains many of the standard drawing devices (rectangles, circles, lines, paint bucket, paintbrush) plus features usually found only in object-oriented graphics programs. The familiar spray can is absent; instead, you get a programmable airbrush with adjustable flow rate and dissipation, which more closely approximates the functionality of its real world counterpart. You get the normal polygon tool as well as a variable-side polygon (triangles, hexagons, and so on); and you can add vertices and reshape the polygon immediately after creating it. The program also incorporates a bezier tool with fully adjustable control points, like the one found in Adobe Illustrator. Besides the standard lasso and marquee selectors, there is a polygonal selector, which works exactly like a polygon drawing tool, except that it selects the region on the screen that falls inside the polygon you draw.

The brush tool is unique in the diversity of operation it offers: besides standard single-color brushes, any selected area can be turned into a brush, and documents stored on disk can be loaded into the program as brushes. Also the brush editing dialog box shows the last eight custom brushes that you created. One of the program's main menus is devoted entirely to special-effects modes for the brushes, including unique goodies such as neon and watercolor brushes. Using some of the special-effects brushes exposed one of the program's principal problems: the brushes respond so slowly that the familiar wristwatch indicator appears now and then during the process. For artists who depend on a quick and responsive paintbrush, this could prove to be a major drawback.

Below the main tool icons in the tool palette are nine tool modifiers that change the way many of the drawing and selection tools function. The tool modifiers include controls to toggle the grid, fill/frame, selection, constraining, transparency, and FatBits modes, among others. The tool modifiers, which are linked to the numeric keypad on the Mac II keyboard, allow you to toggle the modes while drawing.

Independent vertical and horizontal line weights, zoom magnifications (1, 2, 4, 6, and 8 times), fill patterns, gradients, and the main color palette are all implemented as tear-off menus that can be placed anywhere on the screen. (And the program can save the positions of the default drawing window, tool palettes, and tear-off palettes for future work sessions.)

Printing images is a straightforward process, but while I had success printing Studio/8 images to a variety of color output devices (including the Tektronix 4693D color thermal-wax printer and Presentation Technologies' Montage film recorder), some of the printouts had vertical white streaks running the entire length of the
printed page. The problem occurred randomly, so I cannot attribute it to any specific sequence of actions or conditions.

**Color My World**

Studio/8 doesn’t skimp in its color-handling capabilities. You can work with either a default Apple system palette, 256 gray shades, or a custom color palette (Studio/8 also works with 4-bit/16-color Mac II video cards). Colors can be created in a number of ways, including a unique Color Mixer window that allows you to smear various colors together to create new shades, and a color table that automatically creates intermediate shades between a number of fixed base colors. Custom color ranges and gradations can be named and saved in the program’s Preferences file (where they are maintained independent of any particular document).

Color gradations are easy to create and edit, and you can use either the existing colors in the current color palette or create new colors, depending on the beginning and ending colors of a gradient range. Each gradient can also have a texture value, which provides a grainy texture to an otherwise banded gradation between colors. There are two gradient modes: shape fitting and uniform, which can be interchanged to achieve a number of 3-D shading effects.

A pickup, or dropper tool, lets you select a color on the screen and make it the current foreground, or painting color.

While most other color painting programs offer a similar tool, Studio/8’s dropper adds some special capabilities: by double-clicking on a color on the screen, you bring up a dialog box that allows you to change the selected color to any other while viewing the results on the screen. Also, clicking on a color in the color palette with the dropper tool causes the color to flash anywhere it appears on the screen—a color “find” function not available in any other Mac color painting program.

**Very Special Effects**

Studio/8 is capable of some stunning visual effects, including some in 3-D. A perspective dialog box allows you to set a three-dimensional viewpoint by rotating a grid-plane in any axis. You select any object on the screen, it can either be individually mapped onto the perspective plane, or the perspective plane can be filled with the selected image (with one of three user-selected rendering qualities)—rotation, distortion, and bending tools allow even more manipulation, resulting in some breathtaking visuals.

The masking feature is extensive and well implemented: any color or selected area (or combination of the two) can be set to a mask. When the mask is activated, any drawing tool or special effect will work only within or outside of the mask area. Masks can be saved to disk as permanent stencils and can be loaded into any document. With a separate Slip Color dialog box you can choose a color or range of colors for selection by the lasso, marquee, or polygon. By using the tool modifiers that apply to the mask and slip colors, you can exercise extremely precise control over what portion of an image the drawing and selection tools affect.

Studio/8 pays close attention to small but important details: when selecting a document to open, you can view the image in a small, scaled display (Studio/8 can open PICT II, MacPaint, and color TIFF images; and I was successful in opening a 24-bit scanned TIFF file that Studio/8 converted into 8-bit format, with exceptional color optimization). When creating custom grids, you can select an object on the screen and use the rectangular horizontal and vertical dimensions as a basis for the grid constraint, an immensely useful feature. The FatBits window is movable and resizeable, and you can switch the view to
have the actual size of the image appear in the FatBits window, while the magnified view is visible everywhere else in the main drawing window. A Trace With Brush command traces a selected area automatically with the currently selected brush shape and color; by using this command with neon brushes, you can create special type and border effects that would otherwise be difficult to create.

The documentation is well illustrated, with exceptional organization and clarity. There are even some color plates explaining how color tools work. The program itself has a complete, illustrated, online help facility. Also included in the five-disk set are scanned marble and wood textures, a selection of custom brushes, and an excellent slide show program that you can use to easily create slick full-screen presentations with an assortment of fade and dissolve effects.

**Pick Up That Brush**

Studio/8 is a powerful color painting program that addresses most of the needs of the color artist—anyone interested in producing color bitmap images on the Mac II should consider it. If you spend a little time learning to use its vast number of capabilities, you will be rewarded by all the colors at the end of the rainbow. —David Biedny

See Where to Buy for contact information.

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**OmniPage**

Scanning software package. Pros: Easy to use; works with a few different scanners (Apple Scanner, HP ScanJet); adjusts to a variety of fonts, sizes, and layouts. Cons: Documentation is thin, software tutorial is inadequate; may not do all you want it to. Company: Caere Corporation. List price: $795. Requires: 4MB, hard disk; Mac II (or Mac SE with 68020 accelerator card).

The scanner is a neat invention. You plop a document or image on it, select a few options, and presto—the image is in your Macintosh. You can then manipulate, cut and paste, and perform all the usual Macintosh functions on it. If there's text in the scanned image, however, it doesn't get read in as characters—just as indistinguishable bits.

**Easy to Use**

But suffer no more (or at least not as much), for with OmniPage's automatic text recognition and extraction you can place a document in your scanner and a few minutes later be editing a Mac text file derived from that document. Furthermore, you can extract text from images, whether those images come from a scanner, a paint program, or even another type of computer system. OmniPage doesn't work perfectly, but the amazing thing is that it works at all—especially given the wide variety of fonts, point sizes, and layouts that this software package can handle.

OmniPage is easy to use. You simply put your document in the scanner and select the Scan command in the Text menu. A dialog box appears, letting you set certain options for the document you're scanning: Input Page Layout (Single Column, Multiple Columns, or Financial Form); Single or Multiple Pages; File Format (ASCII, MacWrite, or Excel); Scan Area; Output Page Layout (Auto Pasteup, Manual Galley, Auto Galley); and so on. When ready, you click the OK button. The document is then scanned in. OmniPage searches the image for text, marks off each block of text it finds, and strips out the rest of the image. It then converts each block of text image into an actual text document. OmniPage also has a QuickScan command that bypasses the dialog box and uses the current settings.

The Settings command in the Text menu lets you set some scanner-specific options: Resolution (200, 240, or 300 dpi); Tone (Line Art, Halftone Fattening, Halftone Bayer); Contrast (Normal, Dark, Light); Data Type (Normal, Mirror, Invert); and Document Size (Letter, Legal, Card).

Since a document may require specific settings, OmniPage lets you save all the current settings as a personalized command set. For example, if you scan in articles from each issue of a given magazine, you can figure out the optimum settings once, then save them to disk. The next time you want to scan an article, you load that file in (using the Load command in the Personalize menu) and proceed with your scan.

OmniPage in Action

OmniPage can scan a document as an image or as text, as this screen shows. It also shows how well OmniPage can pull text out of a less-than-crisp image.

OmniPage adapted automatically and worked just fine with the Apple Scanner and the HP ScanJet. I also tried OmniPage with the Dest PC Scan 1000, but couldn't get the combination to work, although the Dest Publish Pac software worked satisfactorily with the PC Scan 1000.

OmniPage actually handles both text and images. You can scan and save images as either TIFF files—TIFF is the closest thing to an industry standard for graphics...

(continues)
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images—or in Uncompressed format (a normal bitmap). However, OmniPage doesn't have as many options or features for image-manipulation as bundled scanner software like AppleScan or Desk Gallery.

General text recognition is a difficult task, and OmniPage is sensitive to different factors. For example, if the document is slanted more than a little to one side or the other, the recognition rate drops dramatically. Even so, I was impressed at how well the program did with a variety of documents. However, if you're expecting to scan in a complex document and get everything exactly the same, ready to be edited and printed, you're in for a bit of a disappointment. Font type, point size, and general layout is not preserved, and recognition can drop off dramatically if the print is too small or of an unusual type. Even so, OmniPage easily outperformed the Dist PC Scan 1000's Publish Pac.

The OmniPage documentation is not that extensive, given the complexities of the subject. An accompanying HyperCard tutorial stack has a number of problems: it's more of a reference than a tutorial; you can't use it concurrently with OmniPage; the user interface is incomplete and inconsistent; and the stack has some real bugs.

Version 1.0 of OmniPage runs only on a 68020 processor, that is, a Mac II or a Mac SE with a 68020 accelerator board. I experienced some problems running OmniPage under MultiFinder: I got a "This application has unexpectedly quit" message. It's not clear whether lack of memory caused the problem, since OmniPage was set up to use 3MB of RAM and was being run on a Mac II with 5MB.

**Should You Buy OmniPage?**

OmniPage does its job and does it adequately. However, I would strongly urge you to try it out on someone else's system before buying it. If it can scan the documents you're interested in—and in a form suitable for your purposes—then OmniPage can greatly increase the usefulness of your scanner and save you hours of time as well.—Bruce Webster

See Where to Buy for contact information.

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**G330-70 Color Thermal Transfer Printer**

**Thermal color printer. Pros:** Simple, predictable interface. Cons: Effective resolution only 75 dpi; prints screen images only; can't print full pages; cursor, menu bar, and all other desktop details on screen appear on printout.

**Company:** Mitsubishi Electronics America. **List price:** $5900. **Requires:** Macintosh II with Macintosh II Video Card, color monitor and video memory expansion recommended.

Color output devices are here, and they're here in a variety of flavors. For the person who's trying to get printed copies of colorful Mac II documents, though, more choices don't necessarily mean easier choices. There are many interfaces available with the current crop of color printers, and no one interface is capable of printing all types of color screens and documents (see "Printing a Rainbow," Macworld, January 1989). A new entry into this fray is the Mitsubishi G330-70 thermal color printer, which doesn't connect to your Macintosh the same way other printers do. Instead it uses the same analog video signals that drive the AppleColor High-Resolution RGB Monitor. In other words, the G330-70 simply reproduces the same image you see on your screen. This unique interface is both the printer's greatest asset and its most severe liability.

**Unique Interface**

The G330-70 comes with an adapter cable that connects a Macintosh II Video Card to its color monitor. By interpreting video signals directly, the G330-70 avoids the need for a printer driver. Consequently, you don't have to wonder if the application you're running supports PostScript color, Color QuickDraw, standard QuickDraw color, or PICT II. You don't have to wait a long time for images to be generated when you print. You don't have to have any drivers in the System Folder or select a device with the Chooser. When you push the front panel's Screen button, you get a hard copy replica of your display, in living color. And because the direct video interface requires no drivers, rasterizers, or complex controllers (it's using the hardware and software built in to a Mac II to generate the images), it costs thousands less than other Macintosh-compatible color thermal transfer printers.

The G330-70 uses a three-color ink sheet (ribbon) to print six colors (red,
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green, blue, yellow, magenta, and cyan), plus black, at 150 dpi. Because the resolution of the Macintosh screen is only about 75 pixels per inch, the G330-70 can represent each pixel with four dots that can be combined to reproduce 125 colors. If you want to print graphic images that use a wider range of colors, the G330-70 has a dithered mode that will display 4096 colors, though dithering reduces the effective resolution of the print. It prints on 8½-by-11-inch thermal transfer paper or transparency film suitable for overhead projections.

The Screen, the Whole Screen, and Nothing But the Screen
Though the direct video interface eliminates a number of compatibility questions and makes the G330-70 exceptionally simple to set up and use, the technique carries with it some significant limitations. Output resolution is limited to the screen resolution of 75 dpi, roughly the same as an ImageWriter in Faster mode. The printer always prints the entire screen, including menu bar, cursor, window frames, and so on. There's no way to print just the image you're interested in, and Mitsubishi doesn't supply any utilities for hiding the cursor or menu bar. Perhaps the worst restriction is the fact that you can't ever print more than what's on the screen; to print larger color documents you would have to print them a screenful at a time, then carefully cut and paste them together (with scissors and glue).

Snapshot Approach
The G330-70 is a relatively inexpensive way to get quality color output from a Macintosh II. With its direct video interface you won't have compatibility problems between your applications and the printer. If you can see it, you can print it (though, like all thermal color printers the G330-70 can't reproduce as many colors as the Macintosh color display). The screen snapshot approach, though, makes the G330-70 a good choice only if you're confident that you'll never want to make color prints larger than the screen or with resolution higher than 75 dpi, and only if you can live with the cursor, menu bar, and other desktop incidentals in your output. Although the G330-70 is well documented and performs well then searches the disk and lists every occurrence of the search parameter. The

Findswell 2.0


As efficient as the Hierarchical File System (HFS) is, attempting to find a specific file in the labyrinth of a hard disk's nested folders can be downright frustrating. Apple and third-party developers have attempted to mitigate the problem with desk accessories that search a hard disk for a certain file name. However, none of these utilities is as convenient and easy to use as Findswell, from Working Software.

Seek and You Shall Find
The concept behind Findswell is simple; it locates and opens files from within standard Macintosh applications. It does this by adding a button to the Open and Save dialog boxes of each application. Clicking on the Findswell button opens Findswell’s List and Command Window, which displays a list of the last several files opened, regardless of where they are located on the hard disk. For example, say you save a marketing report in a folder called Marketing. You then open another document in another folder, but you find you need to refer to the marketing report. You don’t have to navigate up and down several folders; instead, the List and Command Window displays the file name of the marketing report in its list. To open it, all you do is double-click on its name in the list. You can set up the list so that it always includes documents you use often.

Findswell can also search for a particular file or folder. By clicking on the Find button in the List and Command Window, Findswell takes you to another window that allows you to set a search parameter by entering part or all of a file’s name. Findswell then searches the disk and lists every occurrence of the search parameter. The (continues)
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thermometer displays how much of the hard disk Findswell has already searched. As it finds matching files, Findswell lists the file names in a dialog box. If a file is compatible with the active application, you have the option of opening the file directly from this dialog box. You can also select any file and Findswell will display information about the file—when it was last modified, its size, its creation type, and type.

Just drag Findswell into the System file to install it. The next time you boot up, the program will automatically appear whenever you choose the Open or Save command. Also included are options for configuring the program for your work style. From the Control Panel you can choose the files you want Findswell to always display in the List and Command Window. (You can also disable Findswell for the few applications it doesn’t support, such as OverVue and TrueForm.) Findswell’s nine-page documentation is all you need to learn the program. Findswell also includes Program Launcher, which allows you to launch Findswell directly from the Finder, rather than having to use it through an application. Like Suitcase, Findswell is tremendously practical—an indispensable addition to my hard disk. I wouldn’t be without it.—Keith Thompson

See Where to Buy for contact information.

Springboard Publisher 1.0

Page-layout program. Pros: Easy to use; reliable, automatically flows text; special effects such as word wrap around graphics; can overlay graphics with text; supports a variety of font sizes and paint and draw tools. Cons: Sometimes hard to align frames, lines, and boxes. Company: Springboard Publisher. List price: $199.95. Requires: IMB.

The Ferraris of desktop publishing, PageMaker and QuarkXPress, are feature laden, performance oriented, and expensive. Springboard Publisher is more like a Volkswagen—it contains a basic feature set, runs reliably, and comes cheap. The program doesn’t offer QuarkXPress’s advanced typographic controls or use PageMaker’s clever pasteboard metaphor, but Springboard Publisher lets you produce well-designed newsletters, reports, or flyers quickly.

A Frame-Based Publisher

Creating page layouts with Springboard Publisher is easy. The program uses frames for holding text and graphics, much as QuarkXPress does. You draw a frame on the page, and if you aren’t happy with its position, you drag it into place or resize it. Each time you draw a frame, a dialog box appears that lets you specify whether it’s a text or graphics frame and the style and width of border (if any) that it should have. For text frames, you also specify the number of columns and their width.

Overlapping frames create special effects. For instance, you can place a newsletter’s logo in a graphics frame and then place a text frame containing a title over the graphic. If the graphic is dark, you can invert the text so that it is white. Placing text frames on top of one another is handy for adding pull quotes or sidebars because the text in the bottom frame automatically wraps around the top frame.

To create new pages in Springboard Publisher you can copy and paste a formatted page or specify a number of unformatted pages to add via an Insert Pages dialog box. Alternatively, the program can create the pages for you when you import text. If you place imported text in the bottom frame, or background, Springboard automatically flows the text into the background frames of successive pages. If you have not created enough pages to hold the text, Springboard Publisher flows text into unformatted pages. However, once you import text, changes to a layout take much longer to redraw, since Springboard must also reformat the text.

If you import text into a nonbackground frame, you can still have it flow from page to page automatically by setting up links. This involves selecting the frames and picking the Link Frames command. You can import text in MacWrite, Microsoft Word, or text-only format.

Springboard Publisher provides a solid set of word processing features for entering text directly into a layout. You can choose the margins, justification, line spacing, and indentation for a block of text. Text can be formatted in any font or style, including superscripts and subscripts. Point sizes range from 9 to 72 depending on the font. You can control character spacing somewhat by defining the number of pixels between characters (up to a total of 64) and lines (up to 72).

The program contains a search-and-replace feature (a sorely missed option in PageMaker) and lets you set tab stops that leave spaces blank, or fill them in with dots, dotted lines, or solid lines. Aside from use in creating a table of contents, I also found the filled tab stops handy for tabbed headings and price lists.

(continues)

Graphics Palettes

Springboard Publisher offers many of the same tools as MacDraw and MacPaint. To access the graphics palette, select a graphic frame and double-click on it. You can then edit the graphic or add to it. You can use the freehand tool (the bottom left tool in the side palette) to trace around the edges of a graphic, so that text wraps around the shape.
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Frames with Flair

Every time you create a frame, Springboard Publisher displays this dialog box. You define the frame as graphic or text, and choose a border style, width, and pattern. You can even crop the graphic to fit in the frame.

Putting Pizzazz on the Page

Although much of Springboard Publisher consists of no-nonsense features for quick and easy publishing, the program does offer a few of the snazzier features found in QuarkXpress or PageMaker—for instance, wrapping text around a frame or an object. You can define boundaries for wrapping text by tracing the outline of a graphic or let the program do it for you. Springboard Publisher was more accurate in tracing than I was, but by tracing an object myself, I could close off areas where I did not want text to appear. For instance, when the program traced a drawing of a horse, the word the fit in between the horse’s ears. Somehow that just didn’t look natural. So I traced the horse’s outline with the freeform tool, treating the space between the ears as though it were filled in.

Nonartists will find Springboard Publisher’s graphics features sufficient. On the simplest level, the program imports graphics in MacPaint, FullPaint, or PICT format. (For $5 postage and handling, you can order either a Holiday Series or an Assortment Series of clip art images when you buy Springboard Publisher.) All graphics can be scaled up or down to any percentage from 1 to 200 to fit into a defined area on a layout. You can also crop imported images. While Springboard does import color graphics, once it converts every nonwhite pixel to black, few color images are usable.

Springboard Publisher offers MacDraw and MacPaint-like tools for creating your own graphics within a layout. The program includes a freehand drawing tool, paintbrush, spray can, paint bucket, pencil, and eraser. A shapes palette contains rounded and straight-edged rectangles, an oval, and a polygon.

Images can be flipped horizontally or vertically. You can also freely rotate an image, although I had a hard time doing so without chopping part of it off. The skew and distort options are a lot of fun, especially when you use them to slant text. (You have to enter the text in a graphic frame to slant or rotate it.)

Fast and Easy Design

In one day, I was able to create several nice layouts using Springboard Publisher. The only thing that bugged me about the program was trying to align frames to the margins of a document or connect two lines. Springboard Publisher is not as accurate as PageMaker, so sometimes I had to redraw a frame or line a few times before I got it perfectly aligned. Still, it’s accurate enough that I doubt anyone viewing a printed document would notice the slight misalignment.

Springboard Publisher is a cooperative, straightforward program that excels in creating attractive layouts quickly and easily. And, if you have the time, you can fuss over details, such as creating perfect character spacing or getting words to wrap as tightly as possible around graphics. If desktop publishing isn’t the main part of your job, but you need to create snazzier pages than your word processor allows, Springboard Publisher is the package you need.

—Cheryl Spencer

See Where to Buy for contact information.

FORTRAN Compilers

Language Systems Fortran Compiler 1.1

Pros: Easy to use; MPW interface; many language extensions; built-in editor; segmentation capability. Cons: Large overhead with MPW; no on-screen listing during compile; no symbolic debugger. Company: Language Systems. List price: $345 with MPW; $250 without. Requires: 1MB.

MacFortran Plus 3.0

Pros: Easy to use, built-in editor; easy Toolbox interface and control of compilation process; many language extensions; on-screen listing during compile; symbolic debugger; batch capability. Cons: No MPW compatibility; unnecessary switching between compiler and editor. Company: DCM Data Products. List price: $399. Requires: 512KE.

MacFortran/MacFortran/020

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Circle 306 on reader service card
stance, all three are full implementations of Fortran-77, the standard for FORTRAN compilers. (I tested this by compiling some standard Fortran-77 programs on each of them, and I did not encounter any problems.) All offer debugging facilities, a linker to merge several modules into a single program, and various language extensions.

On a Mac Plus with 1 megabyte of RAM and an Apple Hard Disk 20, all three compilers were reasonably fast at compiling my programs. MacTran Plus took 18 seconds to launch and compile 28 lines of FORTRAN code. Absoft's MacFortran took just 14 seconds to do the same. The Language Systems compiler, which runs under the Macintosh Programmer's Workshop (MPW), took a minute and a half; but most of the difference is due to the overhead of

Language Systems Fortran
As of this writing, only Language Systems Fortran runs with MPW (version 2.0.2), which gives it a clear advantage over the others. Because Language Systems Fortran does not have its own stand-alone application, you must access its compiler from within MPW. But MPW provides dozens of programming tools, which makes it invaluable.

Language Systems Fortran also uses the MPW editor, which is a standard Mac cut-and-paste editor. It allows both editing and compilation windows to be open on the same desktop, allowing for easy switching. LS Fortran has a standard Mac Toolbox interface, as described in the several volumes of Inside Macintosh. Because the program runs under MPW, it allows for

MacTran Plus
MacTran Plus has features that set it apart from the other compilers. First, it automatically lists a program on the screen as it compiles it, so you can see lines containing errors when they are detected. Since you can also suspend, resume, and stop program compilation and execution at any time, you can correct the error immediately. MacTran Plus offers a symbolic debugger that enables you to set breakpoints in a program, step through a program, examine and modify variables, and observe variables as they change. It also shows you statements as they are being executed.

MacTran Plus has a built-in cut-and-paste editor, but using it is a bit cumbersome. After you compile or run a program, you have to select the Edit option from one of the menus in order to return to editing. MacTran Plus removes the editing window from the screen automatically after you have used the editor, regardless of whether or not you wish to close it — so you have to keep reselecting Edit.

Besides supporting the standard FORTRAN-77 language, MacTran Plus offers various language extensions, from the next version of the American National Standards Institute (ANSI) FORTRAN standard and from VAX FORTRAN. It offers several data types, although not as many as Language Systems FORTRAN.

MacTran Plus is the only one of the three compilers to offer a simple toolbox interface, which DCM calls the High Level Toolbox Interface. Using the commands in this interface, I was able to program a simple figure-drawing program, complete with menus, in less than an hour. This interface is fairly complete and is easier to program than the Apple Toolbox (also offered by MacTran Plus).

MacTran Plus offers a batch mode, in which complex sequences of program compilations, module linkages, and program executions can be written in a command (batch) file, which can then be run. This allows the user to avoid repeating complex sequences of commands.

(continues)
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Reviews

MacTran Plus has easy-to-read documentation, divided into a users' guide, describing how to use the system, and a language guide, describing features of the language.

MacFortran
Absoft was involved in Microsoft Fortran's development, so it is not surprising that Absoft's MacFortran is similar to Microsoft Fortran, the first FORTRAN available for the Mac. Microsoft Fortran had several deficiencies, and these have not been remedied in MacFortran.

MacFortran does not have a built-in editor, relying instead on the Apple-supplied Edit program. This means you frequently have to switch between MacFortran and Edit during the program development process. For efficient use of MacFortran, you need to load both MacFortran and Edit into MultiFinder, and use MultiFinder to switch between them.

MacFortran has the ability to load modules that have not been explicitly linked into a program, as the program executes. Like MacTran Plus, it enables you to execute batch command files, called scripts, in MacFortran. Like its two competitors, it can also call the Mac Toolbox.

MacFortran has a symbolic debugger, so you can single-step through a program, set breakpoints, and examine and set program variables.

MacFortran's documentation is generally well-written, but several sections of it seem haphazardly appended.

Comparison
MacFortran has no clear advantages over its two competitors, and its lack of built-in editing is a clear disadvantage. Although it's adequate, it ranks as my third choice.

MacTran Plus, with its ability to create Mac-style applications easily, without a detailed knowledge of the Toolbox, is the best bet for the FORTRAN programmer who wants to explore programming for the Mac without exploring the intricacies of Inside Macintosh or learning the MPW environment.

Right now, Language Systems offers the most complete FORTRAN on the market.—Matt Zeidenberg

See Where to Buy for contact information.

StandOut 1.0


Previously released as ReadySetShow, StandOut is a presentation program that employs the gridwork layout approach of ReadySetGo, the layout program also written by Manhattan Graphics and sold by Letraset. StandOut's design grids enable you to rough out a slide design quickly—before using detailed style sheets, templates, and other convenient design aids—to ensure an accurate, consistent presentation.

From Grids to Style Sheets
You place elements common to all slides on a Master Slide. You can design each slide individually or recall previously saved slide designs from a scrollable template field containing black-and-white design miniatures (see "Design Templates"). Style sheets let you specify font size, style, and alignment; word and paragraph spacing; leading; indents; and color designations. And although slide shows usually contain only a few words, StandOut's spelling checker and glossary come in handy.

Text, Charts, and Pictures
You can fine-tune text blocks with StandOut's precise kerning, tracking, and control over superscripts and subscripts, as well as its text- and format-sensitive find-and-replace capability. StandOut accepts a variety of formats: imported PICT, PICT2, EPS, TIFF (essential if you are planning to use scanned images), or RIFF graphics can be cropped, rescaled, and superimposed.

Charts and tables are integral to any presentation. StandOut cannot boast the chart-handling capabilities of a dedicated chart designer; however, its pie, scatter, line, column, and bar chart capabilities can probably take care of most of your charting needs. Using the Clipboard, you can import portions of Microsoft Excel spreadsheets as tabular material.

For flow chart diagrams, StandOut adds a triangle, a diamond, and a parallelogram to the standard line, rectangle, and ellipse objects. To facilitate the positioning of text and graphics, StandOut provides automatic text runaround. Drop-shadow effects, customized arrowheads, and automatic frame, leader, and trailer callouts are also included. Other programs can emulate these options, but having them directly available speeds up the design process considerably.

You can attach colors to backgrounds, text, and object outlines and fills. Though StandOut's pull-down color menu is limited to 9 colors, users with full color capabilities can access a unique StandOut 256-color scroll bar or choose a custom color from Apple's 16-million-plus color palette (see "Style and Color").

From Slide to Show
You can arrange your completed slides by dragging miniature images of them into proper sequence. StandOut will use the slide designs to generate speaker's notes and audience handouts. Each speaker's

(continues)
January 1986, Macintosh Plus takes the stage. But SuperMac™ steals the show. With DataFrame™, the first SCSI hard drive for the Mac, and we're still the superstar in Macintosh mass storage.

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Design Templates
Double-clicking on a design miniature immediately transfers its design elements to the slide. You can add, delete, or reposition text and object blocks. You can also name and add new designs to the template.

Note contains a single black-and-white reduced slide image and room to append related text or graphics. All of StandOut's graphics and text tools are available, so pages can be as elaborate as you like.

Audience handouts consisting of only two, four, or eight slide reductions arranged on a page are disappointing. The best way to make handouts is to rescue the slide-show file and tailor-make a set of "speaker's notes" for distribution.

A much more serious concern, however, is how to produce slides or transparencies once your presentation has been designed. Rather than limit StandOut's output to a particular slide-generating service center, Manhattan Graphics opted for an output format it believed would work with most graphics applications and desktop film printers—the PICT/PICT2 format.

Does StandOut Stand Out?
StandOut compares favorably with other desktop presentation programs. However, its slightly cumbersome user interface (which requires you to return to the menu and toolbox too frequently) and its disconcerting horizontal top-of-the-screen toolbox slow down operations unnecessarily.

Today's presentations depend on transparencies and slides created at a service center. But desktop presentations of the future will probably choreograph and display presentations entirely from the computer screen. StandOut has not been optimized for stand-alone operation. In Slide Show mode, StandOut limits you to manual (mouse-click) slide-switching or fixed interval autoswitching, in either case employing only one of its fourteen transitional effects (for example, Wipe Right, Venetian Blind, Random).

StandOut comes with a user manual, tutorial, quick-reference guide, and design guide. A user manual supplement elaborates on color options and keyboard slide-show control.

StandOut Outstanding
StandOut brings sophisticated desktop publishing features, such as kerning, tracking, and style sheets, to desktop presentation. Though the program's interface is not cleanly developed, and not enough attention has been given to StandOut's automatic slide-show capability, if you have a good sense of design and a reliable slide-generating source you can count on StandOut for outstanding desktop presentations.—Joost Romeu

See Where to Buy for contact information.

Desktop Printer and Printer Driver

Brother HL-8 Desktop Laser Printer
Pros: Fast printing of text-only documents. Cons: Has only three fonts, in one size each; does not support PostScript, AppleTalk, downloadable fonts; extremely convoluted installation, wiring, and interface; bewildering manual. Company: Brother International. List price: $289.50. Requires: 512K.

Printworks for the Mac/Laser Version

The Brother's Keeper

To plug in the Mac, it turns out, you need a $100 Macintosh conversion kit, which includes an adapter cable and a software printer driver called the MacDriver.

The MacDriver, however, contains no driver for the HL-8. It includes only drivers for the company's dot matrix and daisy wheel printers. Brother says that one of these drivers—the one for the Brother Twinriter—works with the HL-8. Using the buttons on the HL-8's front panel, you simply set it to the Twinriter emulation mode.

Now the shock: the HL-8 with the MacDriver provides only three fonts, one of which is inaccessible to the Mac. The HL-8 can't print any normal Macintosh laser fonts, and you can't download any new ones. Of the two usable fonts, one, called Compressed, resembles the Mac's Monaco font, and comes only in one size (8-point). The other, available in a 10-point (Elite) and a 12-point (Pica) size, resembles the Mac's Courier. Neither font is available in any other point size. The third built-in font, Aneta, which looks like the Mac's Times font, has no corresponding screen font, making it theoretically inaccessible to the Mac. The HL-8 fonts do not support Option-key characters such as copyright, trademark, or diacritical marks. These limitations reveal the HL-8's Brother ancestry; even with the MacDriver, it's no more flexible than an electric typewriter.

Since the HL-8 is a non-PostScript printer, it won't print from programs like Illustrator and FreeHand. With the MacDriver, the HL-8 is limited to printing 72-dpi bitmapped graphics, even from object-oriented (MacDraw-type) programs, although the HL-8 is capable of 300 dpi. And the MacDriver software, unlike the LaserWriter driver, has no smoothing routines to soften the jaggies of 72-dpi graphics.

Enter the Hero

Eventually, a technician at Brother admitted to me that the Brother MacDriver kit isn't very useful. He recommended the $145 Printworks for the Mac/Laser Version instead, a software and cable package from Phoenix/Softstyle.

Printworks is the closest thing to a hero in this story. With this special printer driver, you can trick the HL-8 into thinking that it's a Hewlett-Packard LaserJet printer, eliminating some of the MacDriver's limitations. For example, with Printworks the HL-8 can print MacDraw graphics at full

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The HL-8 laser printer from Brother international is 17.9 inches wide, 19 inches long, and 9.1 inches tall.

300-dpi resolution. With Printworks you can also print Option-key characters. And Printworks helps to overcome the biggest drawback of the HL-8—its lack of different fonts and sizes—by letting you print bit-mapped (low resolution) versions of any Mac screen fonts, much as the Apple ImageWriter does. Furthermore, Printworks, like the ImageWriter, will search your system for a screen font twice the size of the one you're trying to print; if the double-size font is installed, Printworks will reduce it by 50 percent, doubling the resolution of the printed text.

The Printworks package also gives you access to the HL-8's third built-in font, Anelia. Printworks has a desk accessory called Font Adjustment, which lets you map any Mac screen font to one of the three printer fonts.

But there's yet another complication: since Printworks treats the HL-8 as an HP LaserJet, the printer fonts listed in the Font Adjustment DA are all LaserJet fonts, not HL-8 fonts. What Mac owners know as Times and HL-8 calls Anelia. Printworks calls Roman-8. You have to use trial and error to figure out which fonts are which, and which Mac screen fonts you should map them to. But even when you've chosen a Mac font to be the screen stand-in for Anelia, you're in for another headache: the printout doesn't match the formatting shown on the screen, since the Mac display shows one font and prints another.

Oh, Brother
If all this sounds confusing, I'll translate: For the $2895 you'd pay for an HL-8, you could buy a LaserWriter II SC, which has several attractive fonts (in more than one point size, of course) and the potential for adding more. For $700 less you could buy a Personal Laser Printer Plus from GCC Technologies, which offers 13 font families and the capacity for more fonts as they become available. Both the LaserWriter SC and the PLP Plus are designed for the Mac and are easy to operate.

If you have an IBM and a Mac that need to share a printer—precisely the market niche the HL-8 purports to fill—here's another idea. Instead of buying an HL-8 and using its HP LaserJet emulation mode, simply buy a LaserJet and pocket the $200 you'll save. Not only will Printworks still work its magic, but you'll have one less conversion to make on the road to Mac compatibility.

Does the HL-8 have any good features? One: it prints text much faster than PostScript printers. That's because PostScript printers store each character as a hollow outline, so that text can be resized, reshaped, or shaded. The HL-8's fonts aren't outline fonts; instead, it stores each character as a solid shape of fixed size, like a character on a daisy wheel printer. Unlike its Postscript rivals, the HL-8 has no calculating to do to print text; it simply pops each memorized character image onto the page—a very quick process. If the HL-8 weren't so expensive, it might merit consideration as a lightning-fast, text-only business printer.

The HL-8 has one fundamental problem: even with the excellent Printworks driver, it betrays all of the Mac's standards of simplicity and ease of use. Getting the HL-8 to work with the Mac is an inexcusably technical, convoluted process. And you won't get any help from the poorly translated manual. Try, for example, to write through this grammatical morass: "If the printer have different point size fonts which have the same character pitch, in this case this command may be useful even for fixed pitch font."

Really, though, your understanding of the manual is irrelevant, since the manual doesn't even mention the Macintosh. That's because the HL-8 is not, in fact, a Macintosh printer. It is an IBM printer. It may even be a good IBM printer. But Brother fools nobody—or so I fervently hope—in claiming that the HL-8 is equally at home with the Macintosh. —David Pogue

Reviews

Three-Font Monte
The HL-8 is extremely fast if you print text only and use one of its three built-in fonts. In the Pica/Elite style, the capitals are shorter than tall lowercase letters, as you can see in the word Elite. The Palatino example was created by Printworks from the installed 24-point screen font. Printworks has an option to use a screen font four times larger than the text on the screen—48-point in this case—thus creating even finer resolution.

The Brother HL-8 offers three fonts: Anelia, Pica/Elite, which resembles the Mac's Courier font, and Compressed, an 8-point font.

This example took 17 seconds to print.

With Printworks, the HL-8 can print bitmapped versions of Mac screen fonts. This is Times 12 point.

This is 12-point Palatino, which looks better because Printworks is scaling 24-point Palatino for resolution that's twice as good.

This example took over three minutes to print.

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Which Macintosh II graphics card offers the widest range of capture and display resolutions—NTSC, PAL, Apple® Monitor, hi-res, interlaced, non-interlaced and other modes?

a) NuVista 2M  b) NuVista 4M  c) All of the above

Name the only videographics card which provides true-color, real-time capture and broadcast-quality display while occupying only a single slot in a Macintosh II.

a) NuVista 2M  b) NuVista 4M  c) All of the above

Which videographics card offers full QuickDraw™ compatibility at 1,2,4,8,16 or 32-bits per pixel?

a) NuVista 2M  b) NuVista 4M  c) All of the above

If you chose (c) on all three questions, congratulations! You know that the NuVista series from Truevision is the answer to all your advanced videographics needs. The NuVista is available with either 2 Megabytes or 4 Megabytes of video memory, and creates professional video effects and computer graphics using any QuickDraw compatible software, now and in the future. No patches, no gimmicks, no hassles.

So whether your application is video production, digital pre-press, presentation graphics or 3D renderings, you'll find the NuVista will pass your test with flying colors. Oh, and if you answered (a) or (b) to any question above, give yourself half credit. Then obtain even more NuVista information by requesting a copy of our educational brochure True color? True answers. or visiting your local Authorized Truevision Reseller. Either way, you can find all the answers with a NuVista. Call us at 800-858-TRUE.

You may now return to your regular reading.
FastPath 4

Gateway for connecting LocalTalk LANs and Ethernet networks. Pros: Autoconfigure option for AppleTalk only networks; K-Star simplifies TCP/IP configurations; dynamic assignment of IP addresses possible; gateway can be configured from either LocalTalk or Ethernet side. Cons: Manual doesn't offer enough examples of IP addressing. Company: Kinetics. List price: $2795. Requires: Mac 512KE; 512K), which allows you to take greater advantage of some of the new software that uses the AppleTalk protocols.

The FastPath gateway for connecting AppleTalk Local Area Networks (LANs) and Ethernet networks was the first product offered by Kinetics. Since then the market has matured, and so has the FastPath line. The latest model, FastPath 4, adds features that make it easier to set up links between AppleTalk LANs and links to networks based on Transmission Control Protocol/Internet Protocols (TCP/IP).

Looks Aren't Deceiving
There are two noticeable hardware differences between FastPath 4 and prior models. First, FastPath 4 now has front-panel lights that show power on/off, data in transmission, and data received. That immediately resolves one problem I had with the older models: I couldn't easily tell if the unit was turned on. The second improvement is built-in support for both thin-wire and thick-wire Ethernet. In the past, you had to buy a different model for each different cabling scheme.

There are many other changes to the internal hardware. The most significant is additional RAM (256K, expandable to 512K), which allows you to take greater advantage of some of the new software that Kinetics provides with the unit.

Simple Links
Accompanying firmware allows you to automatically set up FastPath as a gateway between a LocalTalk net and an Ethernet network without specifying any parameters. Once you make the connection, FastPath dynamically configures itself to the AppleTalk network, much like other devices that use the AppleTalk protocols.

However, you can use the new software, FastPath Manager II, to specify some of FastPath's parameters, such as net names or net numbers, if you wish to reconfigure your existing AppleTalk network layout. Also, you may configure FastPath 4 through either the LocalTalk or the Ethernet connection; you could configure prior models only through LocalTalk.

FastPath Manager II really shines when it comes to configuring FastPath 4 for use with TCP/IP networks. Because IP addresses are static, you usually must select an appropriate IP address for each device. There is a somewhat complex set of rules for assigning IP addresses according to nets and subnets, each of which determines which devices can talk to one another. To simplify the assignment of these addresses, Kinetics includes address-management software called K-Star. With K-Star loaded on FastPath 4, users don't have to worry about assigning an IP address to their Macs; K-Star does it dynamically.

When an AppleTalk device on a LocalTalk network sends information through a FastPath gateway configured for IP, the FastPath can encapsulate the AppleTalk packet in an IP packet. With this kind of support, you can use FastPaths on a complex IP network (one that includes bridges, for example) to connect two or more LocalTalk LANs. In addition, FastPath 4 can route AppleTalk packets and TCP/IP packets simultaneously on the network.

Ring Out the Old
The FastPath Manager II software retains the capabilities of its predecessor, but features a redesigned configuration window. A Help area has been added to provide information about any of the options shown in the configuration window. The Help window contents change according to the field or button that you access (see "Configurations").

Kinetics has also done a good job of improving the FastPath manual. It now contains all the information you need to set up FastPath, whether it's for an AppleTalk-only network or a TCP/IP net. The only useful item that's missing from the manual is the IP subnetting worksheet, which used to be included in the FastPath Documentation Addendum that shipped with version 3.0 of FastPath Manager.

FastPath 4 isn't any faster than its predecessors in serving as a gateway between LocalTalk and Ethernet. The major advantages of the new model are its autoconfiguration for AppleTalk-only nets, the innovative K-Star software for dealing with TCP/IP nets, and the combination of both thin-wire and thick-wire connections in one model. Whether you intend to use FastPath 4 with Ethernet to extend and link LocalTalk LANs, or to use it to link Macintoshes to a host computer over a TCP/IP net, FastPath 4 is designed to make your job easier. And it achieves that goal.

—Dave Kosiur

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BackFax

Software for sending and receiving facsimiles with the AppleFax Modem.
Pros: Allows background receipt and transmission of facsimile files, even without MultiFinder; converts facsimile files to TIFF, PICT, MacPaint, EPS, and Glue formats; supports user-defined cover pages.
Cons: No zoom options for viewing facsimile files; cannot automatically assign cover pages.
Company: Solutions International.
List price: $245. Requires: 1MB; hard disk recommended.

It seemed only natural that someone would eventually offer software to compensate for the shortcomings of the AppleFax Modem (see Macworld's January issue). Solutions International has done just that with its BackFax software. If you have an AppleFax Modem and are dissatisfied with Apple's software, BackFax should relieve most of your discontent.

Boxes, Cabinets, and Books
The main BackFax window includes icons for In and Out boxes, In and Out file cabinets, address books, and cover sheets. Clicking on any icon opens a window that displays the contents of pertinent files; clicking on the Out file cabinet, for example, displays a window containing a list of Sent Messages (see "Central Control").

BackFax lets you maintain multiple address books anywhere on your disk. An address book can consist of a single individual's fax phone numbers and distribution lists composed of groups of these numbers. You can create new address books and transfer fax numbers between any of your address books.

Under Cover
BackFax offers the unique ability to make cover pages. You can use any Mac application to design a cover page, bearing in mind that the uppermost five inches of the page will be used for routing information. Then, theoretically, you select BackFax's MailSaver icon from the Chooser and print to BackFax with the Make Cover Page option selected. However, BackFax failed to recognize the cover pages I created until I used ResEdit to change their file type to match that of BackFax's cover page example. Unfortunately, you can't specify particular cover pages for fax numbers in your address book, which would be a real time-saver.

BackFax makes good use of file translations. You can translate any fax file into a MacPaint-, PICT-, TIFF-, EPS-, or Glue-formatted file, or vice versa, within BackFax. This allows you to use fax files as graphics, although you'll always be limited to the maximum 200-dot-per-inch (dpi) resolution of faxes.

Regrettably, BackFax lacks any zoom options for viewing fax documents on the screen. Faxes viewed at the standard Mac's 72-dpi resolution are often illegible; if you simply want to read a fax on your Mac with BackFax, you may be out of luck. I don't want to be forced to print a copy of a fax in order to read it—after all, electronic storage of faxes is one of the reasons I connected my Mac to a fax modem in the first place.

Although I like dealing with faxes on my Mac's screen, you might want to use BackFax's AutoPrint option in some situations. With it you can automatically print any fax upon receipt. Say you have one Mac acting as the central fax machine, and you have to distribute hard copies of faxes to your coworkers. Since a LaserWriter can take four to five minutes to print a single fax page, you may be better off letting BackFax automatically print the faxes you receive overnight for distribution in the morning.

Solving Apple's Problems
As its name implies, BackFax enables you to use your AppleFax Modem in the background on any Mac with at least 1 megabyte of RAM, whether or not you're running MultiFinder. BackFax will briefly display a dialog box when you're in another application, informing you if you've received a fax or a Mac file; at least you'll no longer need to dedicate a Mac to only sending and receiving faxes.

Just as important, you can use BackFax to set up address books and reschedule fax transmissions without being connected to the AppleFax Modem. I found Apple's insistence that, in order to use its software, the fax modem be powered on and connected to your Mac, to be a nuisance.

Finally, BackFax resolves AppleFax's inability to maintain the proper dimensions of text or graphics objects in a fax. For CAD/CAM drawings, this could be fatal. BackFax includes an Exact Size option for viewing and printing faxes that properly maps the fax's pixels to either the screen or the printer. Beware of using BackFax's Best Resolution option, which maps each fax pixel to a LaserWriter pixel, since it prints a two-thirds-size image.

BackFax software is a welcome add-on for more efficient use of your AppleFax Modem. However, since the purchase of BackFax brings the cost of a fax modem system (without scanner) to about $1000, I find it difficult to recommend this software if you're shopping for a fax system for the first time.—Dave Rostur

See Where to Buy for contact information.
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# Reviews

## Animated Adventure Games

**Space Quest II: Vohaul’s Revenge 1.50.**  
**Pros:** Excellent animation directed by player input; cleverly scripted with mature humor.  
**Cons:** Graphics confusing when viewed in black and white.  
**Company:** Sierra On-Line.  
**List price:** $49.95.  
**Requires:** 512K.

**Police Quest: In Pursuit of the Death Angel 1.50.**  
**Pros:** Excellent animation directed by player input; cleverly scripted with mature humor.  
**Cons:** Bombed during game.  
**Company:** Sierra On-Line.  
**List price:** $49.95.  
**Requires:** 512K.

**Law Enforcement by the Book**  
**Police Quest:** In Pursuit of the Death Angel utilizes the same interactive animation as Sierra’s other games, but represents a departure from fantasy. Your input directs street police officer Sonny Bonds (who moves remarkably like Roger Wilco) through a realistic routine of briefings, duty shifts, and off-duty camaraderie—he even applies for promotion. The goal of the game is to have Sonny be successful as a patrolman, earn promotion to detective, then bring a notorious drug dealer to justice. Codeveloped by a former police officer, Police Quest requires Sonny to follow actual police procedures (from performing a walk-around inspection of his patrol car to reading his arrestees their Miranda rights). You must study an abbreviated but realistic police manual that contains virtually everything you need to know to win the game.

Once Officer Sonny enters his police cruiser, the computer displays an overhead view of the city of Lytton. Cars on the streets stop and go at traffic lights and sometimes break traffic laws. You direct the police car’s movement around town, obeying traffic rules, avoiding collisions, and becoming familiar with the city’s parks, hangouts, and official buildings, like the courthouse and the jail. You experience the boredom of uneventful patrol time. You catch a speeder and write a ticket (actually, you type “give ticket to driver”). You even arrest a drunk driver and take him to jail for booking. In another case, you have to deal with warrants and court appearances.

If you follow the procedures and perform well on traffic patrol, you’ll earn Sonny’s promotion to detective and be able to proceed to the next part of the game—a disappointingly straightforward encounter (featuring a bit of poker playing) with a drug-dealing murderer. Unfortunately, Police Quest plays like a long version of a routine TV cop show, and you can’t lose if you just follow the manual. The game begs for a challenging mystery with red herrings, multiple suspects, and realistic plot twists.

**Haste Makes Waste**  
Regrettably, there were signs of haste in the creation of these two games. If you selected By Name from Police Quest’s View menu (handy if you’re storing lots of saved games), the program bombed. As of this writing this bug had been fixed, but another oversight may not have been. In Space Quest II, a yellow rope that stands out on a gray rock in color looks like shadowing or texture in black and white; without color, the accompanying text description is confusing. Attention to details like this one is what I have come to expect from Sierra On-Line’s history of innovation and quality.—Keith McCandless

See Where to Buy for contact information.
Quit wasting time.
Excel with Excel. It takes almost 17 seconds to fill this spreadsheet on the Mac SE. Or less than 4 seconds with the Excelerator XL25 board.

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Circle 82 on reader service card
DTP Advisor


The dawn of desktop publishing promised us that anyone with access to the appropriate desktop publishing hardware and software could take an initial idea and see it through to the printed page. It soon became apparent, however, that few new electronic publishers have much graphic design experience, and almost none are privy to the finer points of the printing process itself. DTP Advisor, an elegant HyperCard stack from Broderbund Software, attempts to fill those gaps by serving as both a tutorial for design and print production and as a project-management system for graphic arts projects.

From the first control card through the dozens of subsequent tutorial cards and project-management forms, it is obvious that DTP Advisor's designers have a strong aesthetic sense and good familiarity with the subject matter. Unfortunately, invaluable advice for the novice publisher is sometimes offset by an editorial attitude that some may find inappropriate.

Project-Management Forms

The project-management forms that make up the backbone of the program are linked to tutorial cards that illustrate—through text, images, and animation—the planning and design stages of a publishing project. The tutorial cards also give detailed information on typography, art production, and the actual printing process. Advisor includes a full, easily accessible glossary of technical terms as well as a database for storing information on sources, writers, artists, photographers, and printers.

Tutorial cards supplementing the Project Definition Form encourage the new publisher to examine the objective, target audience, audience features, and strategies behind the proposed project. A section on tactics offers useful hints and tips on brochures and flyers, newsletters, posters, calendars, and a variety of other specific projects.

Logging dates into the Project Schedule Form is only half the battle. As the accompanying tutorial points out, "A schedule is only as good as your ability to meet deadlines." Figuring the costs of even a moderately complicated project can be a headache, but the Project Estimate Forms and Worksheets make it easier by itemizing and automatically calculating individual costs. Forms for print bids and freelance assignments are also included.

You may need help when consulting with a printing house: the Typography Specifications Form and the Printing Specifications Form should prove useful. Both are detailed enough to help the publisher and printer avoid costly misunderstandings (see "Printing Specifications"). Linked information on typographical history, characteristics, families, and letterform parts is fascinating. Complex printing techniques—offset lithography, letterpress, silk-screening, and multicolor printing—are also covered in depth. The HyperCard animation of a four-color sheeted press in action is particularly well done.

Tutor in a Stack

The Program Menu serves as the clearinghouse for information and forms included in the stack. Buttons lead to the glossary, or project-management forms, or directly to tutorials on initial planning, graphic design, page layout, typesetting particulars, art production, mechanicals, or printing processes. This nesting and interlinking of information illustrates the program's excellent use of the HyperCard interface as an instructional tool.

Nearly all the illustrations on individual cards are actually buttons that trigger animations or sounds, or open windows that contain additional information. Many print terms are technical conundrums to the newcomer, and the program thoughtfully stars each unfamiliar word. Clicking on starred words pops the glossary definition onto the screen.

Many neophytes are intimidated by schematics and mechanicals, prepress representations of final products that are integral elements of the publishing process. DTP Advisor's tutorial on mechanicals is particularly graceful and informative. And anyone putting out a first brochure or newsletter can benefit from the discussion on the advantages of one-, two-, three-, and four-column layouts.

Strong and Weak Points

The sections of the tutorial that focus on the technical aspects of publishing are far more informative and professional than those that deal with planning and personnel management. When exploring a potential audience, for instance, the new publisher is advised, "The male of the species is a rather predictable creature. He still tends to respond to messages that appeal to his ego, his wallet and his car." And, a few paragraphs later, DTP Advisor notes that "When promoting or marketing to a business audience, it is important to know something about that business or about businesses in general."

When hiring illustrators, DTP Advisor grumbles, "Unfortunately, you will have to communicate verbally." And, when hiring photographers, "Experience and ego usually determine the fee."

The authors' opinions were no doubt shaped by personal experience, but there is an editorial pomposity in blanket statements such as these that undermines the real value of the program.
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### V.I.P. 2.51

**Graphic approach to program development.** Pros: Easy to use, three user-defined toolbox extensions, point-and-click interface, Hypertext-like flowchart environment. Cons: Poor printing interface, documentation weak on extensibility, cannot generate DAs, needs more predefined constants. Company: Mainstay. List price: $149.95. Requires: 512KE, 1MB recommended.

V.I.P. (Visual Interactive Programming) offers a graphic approach to Macintosh software development. Its goal is to help you interactively develop Macintosh applications, or create and modify prototypes of applications, without an extensive knowledge of *inside Macintosh*, the Mac programming bible published in five volumes by Addison-Wesley (1985–1988). Mainstay also offers M.I.P. (Macintosh Introductory Programming), a complementary product that is essentially a tutorial introduction to V.I.P. and includes a demo version of V.I.P.; M.I.P. is offered separately for $49.95.

An Untraditional Approach

Traditional software development on the Macintosh usually involves programming in C, Pascal, BASIC, or Assembler. In V.I.P. you don't learn a traditional programming language; instead you work with a toolbox of icon metaphors for various programming chores. The V.I.P. tools consist of 18 icons each representing a class of procedures (including 3 user-defined extensions); 6 icons for object types; and 6 for logic forms.

For example, if you want to create a window in your program, you would first click on the Window icon and a list of window-related procedures appears. Selecting New Window from this list brings up a template for specifying the type of window you want to create (see "Procedure Box"). The procedures available create objects, or perform operations on objects, and appear in a flowchart format.

When you want to execute a procedure conditionally, select the logic form if-then-else, fill in the requested information, and place the icon in the appropriate branch of the structure provided.

Defining objects is as easy as clicking on the appropriate Object Type icon and answering the questions in the dialog box that appears.

**How Well Does It Fare?**

Unfortunately, V.I.P.'s manual is little more than a reference and doesn't adequately explain the underlying concepts of programming or how the tools in V.I.P. tie together. M.I.P.'s manual provides a good introduction and tutorial for V.I.P., but should have included graphic displays of the V.I.P. logic flow in addition to the text program listing.

V.I.P. promotes icon-based, point-and-click programming and does it well. The only time you need the keyboard is to fill in values. But I was disappointed that there are no keyboard alternatives for the point-and-click operations. Constantly moving between the mouse and the keyboard when you are creating instructions that perform computations can be annoying. Fortunately, I was able to use CE Software's QuickKeys to create keyboard equivalents for frequently performed operations. Another approach is to select the procedure you want to repeat, copy and paste, and then edit the contents. You will also have to cut and paste to reorder any program commands.

V.I.P. lacks predefined constant names for such things as window types, fonts, standard dialog items (like controls), cursors, and patterns. Instead of descriptive names, you need to remember that a standard document window with a zoom box is 7, a check-box control is 3, the New York font is 2, the watch cursor is 4, and so on.

V.I.P provides source-level debugging with an integrated debugger. You can set breakpoints, step through your program one statement at a time, observe it, and alter variable values. Again, because the debugger did so much so well, I was unhappy not to find breakpoints implemented. (Watchpoints are breakpoints that are only in effect if a specific condition exists—for example, *Break here if the lineLength variable is less than 0*.)

You can add procedures to V.I.P. in one of the three user-defined icons available in the toolbox. This is one of V.I.P.'s strongest features, similar to the XCMD/XFCN capability in HyperCard. Unfortunately, the documentation of this capability is extremely sparse, with no good example—it exists only as a brief appendix. Further, the 2.5 addendum manual states that the format for these procedures has changed, but it doesn't tell in what manner.

V.I.P. performs noticeably better than the BASIC interpreters I've seen, but it runs slower than any of the compiled languages. When you turn off the debugger and save in a compiled form, performance improves.

Online help is provided via a desk accessory based on Mainstay's Think 'n Time. The reasonably useful help system has a tree-like approach to topic selection. One annoyance when using the help system is that you must constantly switch between the Help I-beam cursor and the V.I.P. cursor.

An Objective Look

V.I.P. is an excellent alternative to BASIC for anyone interested in learning to program on the Macintosh. It is also an ex-

(continues)
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Reviews

to create functional prototypes of applications, but it's not yet an
environment for creating commercial
products. In short, it's a great environment
for the casual Mac programmer and a useful
tool for serious software developers
who need to make prototypes before pro-
gramming in a more traditional develop-
ment system.

Visual, object-oriented approaches to
programming are the coming trend, and
MLP is among the first of the breed. In its
current state, it could be likened to the
512K Mac. It's useful and capable of doing
really nice things, but it still needs some
improvements and polishing to really
catch fire.—Dennis Coben

See Where to Buy for contact information.

HyperCard
Entertainment Stacks

Amanda Stories, Volume I and Volume II.
Pros: Entertaining for young children; stack
scripts are easy to examine. Cons: Simple stories
lack variety; older children may lose interest
quickly. Company: The Voyager Company.
List price: $19.95 per volume. Requires: 1 MB;
hard disk.
The Manhole 1.2. Pros: Imaginative,
immense fantasy world with nonlinear struc-
ture; dazzling visuals and hilarious details;
appeals to anyone old enough to use a mouse.
Cons: Very large; requires hard disk; stack scripts
are hidden from casual browsing. Company:
Activision. List price: $49.95. Requires: 1 MB;
hard disk.

Personal computers provide
youngsters with all kinds of entertain-
ment possibilities, from computer-
ized versions of traditional games to
unique entertainment forms that demand
active involvement on the part of the player.
Interactive fiction is particularly promis-
ing in this regard, both as an entertainment
medium and as a tool for education.

Until now, most interactive fiction has
taken the form of text adventures aimed at
older users, with solid reading skills, who
enjoy solving complex mental puzzles.

Today, however, a handful of HyperCard
stacks suggest a new genre: interactive
fiction for nonreaders.

Inigo and Your Faithful Camel
The first of these interactive cartoons
was Inigo Gets Out, a delightful picture
story by Amanda Goodenough that quickly
found its way onto public domain bulletin
boards everywhere. Inigo, a puff-ball cat,
responds to clicks on the screen by explor-
ing an environment full of the kind of sur-
prises you'd find in a children's storybook.
But unlike a storybook, this stack responds
to the whims of the explorer: click on the
birdbath, and the birds disappear in a
flurry of feathers; click on the river, and In-
igo falls in with a splash. Inigo Gets Out
proved to be as popular with adults as with
children: Bill Atkinson showed it off to ap-
preciative crowds at HyperCard demon-
strations when it came out last year.

With the help of HyperTalk creator
Dan Winkler, Goodenough has created
several more interactive children's story
stacks, sold in inexpensive packages called
Amanda Stories, Volumes I and II. Volume I
contains four Inigo stories, including a re-
fined version of Inigo Gets Out. Volume II
chronicles the explorations of Your Faith-
ful Camel, a silly-looking camel with an
offbeat sense of humor (see "One Camel
to Go").

Interactive, Not Hyperactive
There's no white-knuckled hyperten-
sion in any of these stories; they have the
same kind of gentle pacing you find in the
simplest children's books. The Amanda
stories are especially appealing to very
young children who are just developing
mouse skills. Each collection comes with
a title screen that allows a child to switch
from story to story without using the menu
bar. Young mousketeers often spend hours
exploring these stories over and over.
Older children might explore them once
or twice and then examine the underlying
scripts for HyperTalk tricks.

Enter The Manhole
If the Amanda Stories define a new
genre, The Manhole certainly expands
the boundaries of it. This five-disk super-
stack—the first children's software to re-
quire a hard disk—contains a strange and
beautiful dreamworld that includes a couch-
potato rabbit, a musical roll-top desk, and a
drive-talking dragon, for starters.

The Manhole isn't really a story; once
you begin the journey by clicking on the
manhole, you have almost endless choices
for exploring the visually dazzling world
above and below it. There are all kinds of
connections between scenes, some obvi-
ous and some surprising. Hop in the boat
and you might find yourself in the rabbit's
teachcup (see "A Cup of Good Cheer");
choose a channel on the dragon's remote-
control TV and you teleport to almost any-
where. When you return to the dragon's
den (there are several ways to get there),
he may or may not be home. The Manhole
universe keeps changing, making it fun for
kids—and adults with a sense of adventure
and a sense of humor—to explore over
and over. The realistic sounds, the fantasy-
filled graphics, and the stack construction
are truly impressive.

Buttoning Up
While exploring these stacks, my
young software testers found them to be
free of any apparent bugs. But once they

(continues)
On CONNECT, I share graphics with all our 24 branches and swap sweet nothings with Tony in Tucson.

The CONNECT™ Professional Information Network for Macs and PCs offers a fast, simple, and inexpensive way to share files, graphics, and even scanned images worldwide. It’s the first forum for information exchange that is as user-friendly and as easy to use as a Macintosh®.

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It’s the most effective way of swapping information with thousands of PC and Mac users worldwide. Or sweet nothings with one special person. And it’s quicker than sending flowers.

Call 1-800-234-3231 or 408-973-0110 today to order your low-priced evaluation package or for the CONNECT dealer nearest you. And get connected.

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The Professional Information Network
What caused these surprises, but it appears to be the result of a negative interaction between the sound generators in HyperCard and Apple's System 6.0.2; the problems disappeared when I substituted System 5.0. Hopefully Apple will correct the problem in future releases. It's discouraging when preschoolers uncover system bugs.

Frozen screens notwithstanding, I highly recommend both of these stacks for young children. Older children and adults may or may not be charmed by the simple Amand Stories; it's a question of taste. But it's hard to imagine a playful soul of any age who wouldn't enjoy exploring the mind-tickling world inside The Manhole.

—George Beekman

See Where to Buy for contact information.

Mac II 19-Inch Monochrome Displays


It's not unusual to find competing color video boards using the same monitor. PCPC and SuperMac both use the Sony 19-inch. The same is true of some monochrome displays. The Nutmeg 19 (from Nutmeg Systems) and the DualPage Display System (from Cornerstone Technology) both use the Sampo BDS-1902, a 19-inch monochrome CRT. Each company just sticks a label on the front and adds its own video board.

The monochrome Sampo 19-inch is attractively designed and a decent performer. It has a 64-KHz refresh rate, with a maximum resolution of 1280 by 960 pixels.
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Although I’ve taken a few courses in programming and even published a children’s book on BASIC, I’m not much of a hacker. My writer’s mind, which is always looking for three different ways to say the same thing, can’t get used to small subsets of English that make up programming languages. Besides, I’m a sloppy typist and speller, so even when I use the language correctly, I tend to make syntax errors.

Because of all this, it was not until late one Friday afternoon that I finally broke open some packages of HyperCard development tools. I expected to put in a few hours with them and spend the weekend recuperating. But scriptExpert and Icon Factory made HyperCard programming so easy and the Sound Resource Libraries made it so much fun, that I ended up spending most of the weekend working with them. The final result was a bizarre stack in which button commands, special effects, and music combined in a way that was more bewildering than useful. But I now consider myself a junior HyperCard programmer, and that’s not bad after only about 15 or 20 hours of work.

**scriptExpert**

Both a teaching and development tool, scriptExpert provides a menu approach to scripting HyperCard. For example, if you want your Mac to beep twice each time you click on a button, you first go to scriptExpert’s list of system messages and select mouseUp (this means the action will occur when the mouse is clicked). You then go to the Command menu, also called the Main Card, and click on Beep. The program asks you how many times, and you type 2. The correct syntax, ready to be pasted into your button’s script, appears at the top of the screen.

With more complicated commands, scriptExpert walks you through all the steps. If you choose Set from the Command menu, the program brings you to a second menu that asks what kind of property you want to set—button, background, field, and so on. If you click on Button, you get a dialog box that asks if this is to be a background button or a card button. Choose Card, and you see a second box that asks what you want to name the button. If you give it a numeric name, scriptExpert asks if it is a name or an ID number. Next you are shown a third menu screen of attributes for style, location, and icon. If you click on Style, a fourth menu screen asks you to choose among the various styles, such as Transparent, Rectangle, or Opaque. After making that choice, you are returned to the Command menu where the syntax `set the style of card button "NAME" to rectangle` is displayed, ready for cutting and pasting.

If you select Visual from the Command menu, the program displays a menu card that lists HyperCard’s visual effects. After you make the selection and set the

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**HyperTalk Pocket Reference**

I had hoped that the *HyperTalk Pocket Reference* (Hyperpress Publishing Corporation, 1988) would clear up some of the questions left unanswered by scriptExpert, but this handbook (I wouldn’t call a 4-by-11-inch book “pocket”) only helped a little. The book lists commands by cate-
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gory and after each command it gives the syntax, a brief description (usually two lines but up to six lines), and sometimes an example of the usage.

If you have a general idea of a command but can't remember the exact syntax, this book will help you. If you're unfamiliar with the commands, only about 70 percent of the explanations offer enough information to help you.

But, after all, this is a reference book, not a primer. Few people could learn a foreign language by scanning a dictionary, but they'd have a hard time progressing in a new language without one. For $11.95, HyperTalk Pocket Reference is a pretty good dictionary.

**Icon Factory**

A stack should contain buttons whose icons are good reminders of the buttons' functions. Icon Factory provides a way of creating those buttons. There are two parts to this package. The first is a library of icons that you can simply paste into any of your stacks. The second is the Factory where you can alter or create buttons from scratch using the FatBits mode, as in MacPaint. You can also import icons from any application. After creating a new or altered button, you can save it in the Library as well as paste it into a card. This utility is easy to use, it works well, and the documentation is clear. It costs $49.95.

**Sound Resource Library 1 and 2**

What made my last HyperCard weekend the most fun was playing with the sounds in B & B Soundworks' Sound Resource Libraries. There are human voices (Angry mother: "This room is a pigsty."); office sounds (Mac typing), animal sounds (dog barking), and a wide range of musical instruments.

You install the sounds in your stack using the Resource Mover, an Apple utility that comes with the library and works much like the Font/DA mover. The HyperCard script for playing sound is easy to use: 

- play [NAME].

Sound effects are useful in dressing up presentation stacks such as product demonstrations. Sound becomes old on a stack that you use on a regular basis, like your address book. It's fun to choose and install sounds, so buy these ($49.95 each) and enjoy.

**Mavis Beacon Teaches Typing 1.2B**

I've been putting off reviewing this one for a couple of months. I was turned off partly by the stereotyped typing instructor (prim, black female) pictured on the cover of the package, and partly because I didn't see why the Mac world needed yet another typing program. Now I'm sorry I waited. Mavis Beacon Teaches Typing is unique. As I said in a past column, I'm not sure that bells and whistles in typing programs really translate into quicker learning. But if you like bells and whistles, Mavis Beacon Teaches Typing gives you more than any other package.

The program is partly an expert system with Mavis Beacon (not a real person) as the expert. She is a tough but understanding instructor. At times she may chide you for asking to quit soon after you start; the Quit dialog box reads: "You'll never learn that way." Other times she'll suggest that you knock off for a while: "You've made a lot of mistakes one after another. Do you want to take a break?" She may play music or a metronome to help pace your typing, or display or hide a digital or analog stopwatch. She may show you the entire paragraph that you will be typing or display only one line at a time. She may allow you to retype a mistyped character or the entire word. She may make you play the instructional video game that comes with the package after every three lessons, or she may stretch it out to every six lessons. Basically, the program experiments with all these choices, calculates the way in which you work best, and customizes Ms. Beacon's lessons to fit.

Before each lesson, you are shown a picture of a blackboard with the goals of the lesson written in neat cursive letters. (What else?) In each lesson you work on a row or a letter combination. The lesson proceeds by displaying characters that you are to type. There is also an animated picture of a keyboard and a pair of hands whose fingers guide you by pointing to the correct key.

After each lesson, you are given a drill in which you practice the lesson and your weak letters and letter combinations. As you type, a gauge displays your speed and accuracy in real time.

Mavis Beacon Teaches Typing uses a wide range of parameters in both creating the lessons and in generating graphs that measure progress. All typing programs look for such things as weak letters, weak letter combinations, a weak hand, weak fingers, and weak rows. But Mavis Beacon Teaches Typing tracks more subtle errors, such as slow transition between two keys, hitting two keys at a time, and hitting in the right row but with the wrong finger.

I'll leave it to educational theorists to decide if this customized approach actually produces better results. But it is certainly unique. For $49.95, this would be my first choice among typing programs.

**MenuFonts 2.01**

MenuFonts 2 replaces an application's font menu with a menu that displays font names in their actual font. If you have a lot of fonts, the only reasonable way to remember what they look like is to have a font menu that displays them the way they actually look. MenuFonts 2 can change the size of the fonts in the menu (from 9 to 24 points). And it has a keystroke feature that can save you scrolling down the menu; with it you can, for example, get to all the fonts that start with the letter N by typing an N. If you collect fonts and can spare $49.95 and about 25K of disk space, this program is for you.

**Word Processing: the Usable Portable Guide**

Word Processing: the Usable Portable Guide (The Writing Resource, 1988), by Jon Haber and Herbert R. Haber, provides basic instructions for 11 word processing programs, including two for the Mac (MacWrite and Microsoft Word 3.0). The instructions are clear, concise, and as far as I could determine, accurate. For $11.95, this won't make you a power user of any of these programs, but if you find yourself moving from office to office and working on a number of different programs, this book may help get you off to a quick start.

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To fax from your computer, all you need is a personal computer with a modem and a CompuServe membership. To join, call 800 848-8199, or see your local computer dealer. If you’re already a CompuServe member, type GO FAX at any ! prompt.
New Products

Information on the Mac’s latest hardware, software, and accessories

Edited by Mary Margaret Lewis

This section covers Macintosh products formally announced but not yet evaluated by Macworld. All prices are suggested retail. Please call vendors for information on availability.

HARDWARE

CD-Star Compact disk system for transfer of archival records. Stores digital data and digitized images on one system for search and display. 5 ¼-inch and 12-inch disks available. Expandable database. Price depends on custom configuration. Conversion Dynamics, 408/355-2197.

Color Monitor and Color Multiscan Monitor Mac-compatible 14-inch analog monitor (model RE1475) with nonglare display, 35 kHz scanning frequency, and 640-by-480-pixel resolution at 84 dpi. VGA and Mac II-compatible color multiscan monitor (model RE1520) with 15-inch nonglare display, analog video input, and unlimited display colors at 1024-by-768-pixel resolution. Model RE1475 $645; Model RE1520 $995. Relisys, 408/945-9000.

Datacopy 730GS Desktop scanner with 64-level (6-bit) or 16-level (4-bit) gray tones. Scans at resolutions of 60 to 450 dpi, with 27 variable settings. Accepts documents in various forms—including single sheets, layouts, and books. $1995. Xerox Imaging Systems, 415/965-7900.

DayStar 33/030 Accelerator II Accelerator card based on the Motorola 68030 processor that increases speed of the Mac II by two to five times, depending on application. Runs at 33.33 MHz, with zero 68030 wait states. Compatible with all standard Mac II software and Apple’s A/UX operating system. $6000. DayStar Digital, 404/967-2077.

Emac Impact Series External Hard Drives Available in 40MB, 60MB, and 80MB capacities. Feature front-mounted power switch, status lights, automatic head park, external SCSI address selector, and external terminator for daisy-chain-

FlashBox Device that enables Macs and IBM PCs to communicate over LocalTalk-compatible networks at 770 kilobits per second. Automatically selects correct speed for FlashTalk or AppleTalk. $189. TOPS Division, Sun Microsystems, 415/549-5900.

Memorybank High Capacity Backup Integrated 2.3 gigabyte tape backup for Memorybank. Compatible with any Mac (continues)
New Products

model. Backs up disks unattended. $15,600-$17,900. Northern Telecom Memory Systems Division, 800/521-3278.


One Megabyte Memory Modules One megabyte memory-expansion modules for the Mac Plus and Mac SE. Call company for current price. Clearpoint Research Corporation, 617/435-6184.

PCPC Jetstream Tape Backup System Tape backup system for the Mac Plus, SE, and II that archives data from any size storage device, from 20MB to 2.3 gigabytes at up to 14.4MB per minute. Backs up multiple drives on one tape. $5995. Personal Computer Peripherals Corporation. 813/884-3092.

RGB Color Thermal Printer Produces 240 dpi on paper and overhead transparencies in 72 seconds. Chooser-compatible driver lets you control printer functions via pull-down menu. $695. RGB Technology, 705/556-0666.

Sound Accelerator Digital signal processing (DSP) card for the Mac II and SE. based on the Motorola 56001 DSP chip. Provides stereo playback of sounds directly from the computer, and performs most sound processing and synthesis functions in real time. $1295. Digidesign, 415/327-8811.

Telebit T1000 Multispeed modem that runs at throughput of up to 9600 bps without data compression. Continually analyzes line conditions and adjusts its speed. $795; optional stand $15. Telebit, 415/979-3800.


Applications and Routines for 4th Dimension Teach nonprogrammers how to write basic business programs in 4th Dimension. You use cut and paste modules to create a library of commonly used procedures. 1MB min. memory. $129. DucSoft, 419/626-6797.

Arkanoid Arcade-style game that tests your reflexes. Dodge and destroy Koners, Pyradoks, Tri-Spheres, and the like. Has high-score table and variable skill levels. $49.95. Discovery Software, 201/268-9877.

Azimuth Mapping program for graphic artists that accurately draws global views of all countries in the world, and all states in the United States, from any distance or angle. 1MB min. memory. $595. Diehl Graphsoft, 301/461-9488.

Color Session Software that lets the Mac emulate an HP 2397 color graphics terminal. Has up to 16 color palettes, emulates dithered area-fill patterns with

SOFTWARE

Abra 2000 Mac Human resource management system. Base system has more than 50 standard reports for things like salary reviews, telephone directory, and benefit plan enrollment. Optional attendance module. 1MB min. memory. Abra 2000 Mac Base System $995; Attendance Module $395. Abra MacDabra, 408/737-9451

(continues)
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**Empower** Macintosh computer security program. Contains both access control and automatic data encryption. Works for files and programs residing on hard disks or floppies. 1MB min. memory. $395. Magna, 408/433-5467.

**Firepower** Arcade-style action game featuring one-to-one playability with the computer, another person, or over a modem. Tank and battle continuous shoot ‘em up action. 512K min. memory. $29.95. Microlusions, 800/522-2041.


**Food Processor II Nutrition Analysis System** Analyzes nutrients in daily intakes, diet plans, menus, and recipes using American and Canadian nutrient

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The system's large 8 megabyte memory can handle complex applications. And a 20 megabyte hard disk offers generous space for downloadable typefaces to complement its 35 resident Adobe typefaces.

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**Harmony Grid** Real-time musical instrument program that teaches harmony concepts while you play. You control melody, modes, chords, and rhythm with the mouse and keyboard. Metronome keys allow gradual or metrical tempo changes. 128K min. memory. $99. Hip Software Corporation, 617/661-2447.

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**JurisDocket** Civil litigation database application that automatically posts data, integrates multiple files, and distributes functions among users. Establish your own system of passwords, attorney codes, and custom form letters. 1MB min. memory. Basic application plus runtime engine $675; multiuser version $1250; demo copy $15. Seamless Software Systems Corporation, 312/939-6647.

**Keymaster** Automatically creates screen fonts, supports up to 16 graphic characters per font, and imports art from most drawing programs into PostScript. Has built-in font editor. Supports all filled and stroked figure styles. 1MB min. memory. $99.95. Altsys Corporation, 214/424-4888.


**Mail Dex** Desk accessory rolodex-style database, envelope and label printer, and phone dialer. Searches entries for full or partial matches to given criteria. Prints three-across mailing labels and envelopes. 512KE min. memory; requires System 5.0 or later version. $49.95. Mission Accomplished Software Services, 213/870-2441.

**MetCom Modula-2 Programming Environment** Extension of Pascal for the Mac. Integrated environment with multiwindow text editor, one-pass Modula-2 compiler, and interactive source-level debugger. 1MB min. memory. $245. Metropolis Computer Networks, 514/866-4776.

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Affordable Macintosh Publishing

In the past, Macintosh users had to choose between printers they could afford and output that looked good. Laser quality, previously out of reach, is now available to everyone regardless of his budget. The new DeskJet 300 DPI printer from Hewlett Packard provides the solution. With a retail price of only $995, the DeskJet offers quality matching that of the Apple LaserWriter II SC, at a cost below that of the ImageWriter LQ. At only 14 lbs., the DeskJet easily follows you to where the work is. Additional features include easy front paper loading, affordable and convenient ink cartridges, and envelope printing. If you need top quality output for the home, school, or small business, the DeskJet delivers.

The DeskJet and the Grappler LS

Until recently, the only problem with the DeskJet was that it didn't work with the Mac. Now the Grappler LS printer interface provides a complete solution, allowing the DeskJet to print from the Macintosh at a professional 300 DPI. Now your letters, homework, proposals, and every document you produce can have that laser quality desktop publishing look.

<table>
<thead>
<tr>
<th>Quick Draw Printer</th>
<th>Resolution</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apple LaserWriter II SC</td>
<td>300 DPI</td>
<td>$2,799</td>
</tr>
<tr>
<td>Apple ImageWriter LQ</td>
<td>216 DPI</td>
<td>$1,399</td>
</tr>
<tr>
<td>Hewlett Packard DeskJet</td>
<td>300 DPI</td>
<td>$995</td>
</tr>
<tr>
<td>Apple ImageWriter II</td>
<td>144 DPI</td>
<td>$599</td>
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</tbody>
</table>

The Grappler LS is the latest Macintosh interface solution from Orange Micro. The Grappler LS connects the HP DeskJet or any HP compatible serial laser printer to the Macintosh Plus, SE, or II and drives it at its full 300 DPI resolution. To achieve this, the Grappler uses a standard Apple printer driver and translates the output for your printer, allowing compatibility with hundreds of popular packages.

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Nutrition Stack Keeps a daily log of your meals and calculates daily totals of protein, carbohydrate, fat, fiber, cholesterol, sodium, eight vitamins, and six minerals. 1MB min. memory. $49.95. Big Byte Software, 617/444-3028.

Order House Business-management software tracks people and services, and inventory items linked with related notes and comments. Includes General Ledger. 1MB min. memory; 2MB recommended. $995. Elefunf Software, 415/843-7725.

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(continues)
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New Products


Panorama

Pirates Role-playing game in which you can choose from 6 different time periods; 9 types of ships; and over 50 different islands and nations to visit, trade with, or capture. Graphic depictions of pirates and accurate representations of pirate ships of the day. 512KE min. memory. $54.95. MicroProse Software, 301/771-1151, ext. 228.

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Focal Point II .................. 89.
HyperCard Reports .............. 89.
Bantam
Complete HyperCard Handbook ... 23.
Beacon Technologies
HyperView International Version ... 155.
HyperView King James Version ... 159.
BrainPower
ArchText .................. 182.
Bright Star Technology
HyperWriter ........................ 79.
HyperPress Publishing
Script Expert .......... 149.
Icon Factory .............. 29.
Macromedia
VideoWorks II HyperCard Driver ... 60.
MicroMaps
HyperAtlas ........ 64.
Power Up
HyperTutor .................. 29.
SoftWorks, Inc.
HyperTools #1 or #2 ... 69.
Slack Cleaner ........ 39.
Symmetry
HyperDA .................. 38.

UTILITIES
Affinity
Tempo II .................. 89.
Berkeley System Design, Inc.
Stepping Out II ...... 62.
Beyond, Inc.
MenuFont II ........ 30.
CE Software
DiskTop 3.0.2 .......... 27.
QuickKeys (macro programmer) ... 53.
Central Point
Copy II Mac (with MacTools) ... 20.
PG Tools Deluxe For Mac ... 40.

Emerald City Software
LaserSoft 1.0 .............. 187.
Fifth Generation
PowerStation .......................... 32.
Suitcase II .................. 45.
ICOM Simulations
On Cue .................................. 36.
Kent Marsh
MacSafe or NightWatch .... 69.
LaCie
SilverServer ............ 92.
Mainstay
Capture III .................. 42.
TypeNow .................. 30.
Microlytics
Galer .................. 44.
Olduval
ClipShare .................. 109.
FontShare .................. 149.
icon-II .................. 39.
MultiClip .................. 36.
PCPPP
HFS Backup 3.0 ........ 54.
Simon and Schuster
Fully Powered Mac ................ 24.
Software Power Company
PowerOP 1.4 .................. 39.
SuperMac
DiskFit or SuperSpool 5.0 .... 54.
Sentinal 2.0 ........ 155.
SuperLaserSpool 2.0 ........ 82.
Symantec Corporation
Symantec Utilities for Macintosh ... 59.

DESKTOP ACCESSORIES
Borland
Sidekick 2.0 .......... 85.
Turbo Pascal ............ 85.
Turbo Database Mac ....... 85.
Mai Software Systems
Aztec C or Unlimiteds .... 85.
Aztec C+SDB ............ 99.
Aztec CmpW ............ 99.
Microsoft
Basic Interpreter 3.0 .. 62.
QuickBasic ........ 65.
SmethersBarnes
Prototyper ........ 72.
Symantec
CAPP's Lightspeed C or Pascal .... 49.
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LANGUAGES
Borland
Tango Pascal ........ 85.
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COMMUNICATIONS
CE Software
QuickMail .................. 165.
CompUser
Compuserve Navigator .... 45.
DataViz
MacLink Plus w/Cable .... 145.
FreeSoft
Red Ryder 10.3 ........ 54.
Hayes
Smartcom II ........ 88.
Insigme Solutions
Soft PC (Mac II) ........ 479.
Software Ventures
Microphone II ........ 225.
SuperMac
Acknowledgew ... 349.
Traveling Software
Fax Link ........ 84.

DATABASE SOFTWARE
Aclus
4th Dimension ........ 489.
Ashley-Tate
dBase Mac ................ 295.
Borland
Reflex Plus ........ 165.
Claris
FileMaker II ........ 239.
Zendo
Fox Software
FoxBASE+ for Mac .... 206.
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Quark

Xpress or QuarkStyle .................................. 52.

Springboard

Springboard Publisher .................................. 109.

Target

Scoop .................................. 189.

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Connect Inc.

MacNet .................................. 43.

Faronic

Timbu1tu 2.0 .................................. Call.

Hytech

Turbonet .................................. 30.

SuperMac

Network DiskFit .................................. 199.

TOPS

TOPS 2.0 .................................. 119.

MacMoney

MacMoney 3.02 .................................. 62.

MacVision

MacVision 2.0 .................................. 219.

MacIntTax

Federal '88 .................................. 69.

TaxView Planner .................................. 64.

Software for Recognition Tech

Coda

MacDrums .................................. 84.

select Micro Systems, Inc.

Exstatix .................................. 139.

Great Wave

ConcertWare + MIDI 4.0 .................................. 79.

Impulse

Audio Digitizer w/SoundWave .................. 149.

Intelligent Music

OvalTune .................................. 95.

Opode Systems

Music Mouse .................................. 39.

Passport Designs

Master Tracks Pro .................................. 209.

NoteWriter .................................. 169.

EDUCATIONAL/PERSONAL

BrightStar

Alphabet Blocks .................................. 32.

Talking Tapes .................................. 69.

Bookware Software

ResumeWriter Pro .................................. 75.

Broderbund

Calculator, Geometry, Physics ea. ........ 59.

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Deneba
Canvas 2.0 ........ 169.
Dream Maker
Clippers, Business Images ... 97.
Maggallery
Electronic Arts
Studio/B ... 319.
Sprawlers
Mircollusions
Photon Pains ........ 179.
MacAtlas Pro (MacDraw format) .... 129.
NuEquation
NuPaint .... 99.
Olduvai
Art Chips .... 69.
Paracomp
Swivel 3D .... 265.
Silicon Beach
Digital Darkroom or Super 3D ... Call.
SuperPaint 2.0 ... Call.
Solutions
Curator (graphics management) .. 79.
SuperMac
ProPaint/Paint Call.
Symmetry
PictureBase & WetPaint .... 99.
T-Maker
ClickArt EPS illustrations .... 75.
Zedcor
Deskpaint 2.0 ........ 69.

DESKTOP PUBLISHING PRODUCTS

Adobe
ACE-Textures, Fill, and Patterns ... 168.
Illustrator 88 ........ .................... 319.
Streamline ... 295.

BOOKENDS

SupraModem 2400
More bauds for the buck! The SupraModem gives you $400 baud performance for less than the cost of 1200
tips units. Offers complete support of the Hayes "AT" command set, auto answer/origin, pass-through phone
tack, programmable-volume speaker, and a one year warranty. (modems) $169.

\[ \text{Milo} \]

The math processor for the Mac! Milo is the first math processor that combines mathematical
calculations with graphing and word processing capabilities. Solve problems with a click of
the mouse. Milo is an essential tool for students, teachers, engineers, and math stu-
dents. (statistics) $169.

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More bauds for the buck! The SupraModem gives you $400 baud performance for less than the cost of 1200
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the mouse. Milo is an essential tool for students, teachers, engineers, and math stu-
dents. (statistics) $169.
Neck and back pain will disappear like magic when you put your Mac on a Mac Tilt. You'll be more productive when those aches and pains from improper viewing angles go away. MacTilt raises your screen 4 inches off the desk and gives you a swivel and tilt joint so you can fine-tune your viewing angle and minimize glare. The tilt covers a 30 degree angle and the swivel goes around a full 360 degrees. The tilting cover is 30 degrees angles, complete with a data sheet on blank paper or printed forms, both IRS approved. (finance) $69.

MacTilt (ergotron) Neck and back pains disappear like magic when you put your Mac on a Mac Tilt. You'll be more productive when those aches and pains from improper viewing angles go away. MacTilt raises your screen 4 inches off the desk and gives you a swivel and tilt joint so you can fine-tune your viewing angle and minimize glare. The tilt covers a 30 degree angle and the swivel goes around a full 360 degrees.

GAMES
Access Software Inc.
World Class Leader Board ................................ 34.
Artworx
BRIDGE 5.0 .................................. 22.
GrillQuest ........................................ 19.
Broderbund
Ancient Art of War At Sea .......................... 27.
Shufflepuck Cafe .................................. 22.

MacTilt (ergotron) Neck and back pains disappear like magic when you put your Mac on a Mac Tilt. You'll be more productive when those aches and pains from improper viewing angles go away. MacTilt raises your screen 4 inches off the desk and gives you a swivel and tilt joint so you can fine-tune your viewing angle and minimize glare. The tilt covers a 30 degree angle and the swivel goes around a full 360 degrees. (accessories) $68.

Word (4.0) (Microsoft) Word 4.0 adds new page design capabilities! Create newsletters with multiple columns. Automatically wrap text around graphics. Tables are a breeze. Use Style Sheets to create tables with self-calculating columns. Word 4.0 has a spelling checker, hyphenation, glossary, mail merge, and automatic indexing. Word 4.0 also includes SuperPaint 1.1 at no extra charge. (word processing) $249.

Centron Software, Inc.
BlackJack or CrapsMaster .................. in 27.
CasinoMaster (5 pack) .................. in 56.
Discovery Software
Arkainoid .................. in 27.
Electronic Arts
Chessmaster 2000 (deluxe chess) .... in 26.
Potion vs. Remmel (strategy) ........ in 15.
Starfleet I: The War Begins ........ in 37.
Epyx
Sub Battle Simulator .................. in 29.
Inflowcom
Leather Goddess of Phobos .................. in 15.
Micro Sports MSFL Pro League Football .................. in 32.
Mindscape
Balance of Power, Deja Vu ........ in 30.
Shadowgate, Uninvited ........ in 30.
Nemesis
Go Master .................. in 49.
Jocelli Tutor ........ in 30.
PCL
MacCourses .................. in 32.
MacGolf 2.0 .................. in 35.
MacGolf Classic .................. in 54.
Road Racer .................. in 45.
Sierra ON-Line
Leisure Suit Larry .................. in 23.
Silicon Beach
Apollo Strike, Dark Castle ........ in 27.
Beyond Dark Castle .................. in 27.
Simon & Schuster
Spectrum HaloByte
Falcon 2.0 .................. in 32.
Solitaire Royal or Tetris ........ in 20.
The Software Toolworks
The Hunt for Red October .................. in 29.

Carmen San Diego .................. in 25.
Bullseye
Ferrari Grand Prix (racing) .................. in 32.
PS1 Mustang .................. in 32.
Casady & Greene
Crystal Quest 2.2 w/Critter Editor .................. in 42.

Disk Drives/ Memory Upgrades
1 MEG SIMMS .................. Call.
AST
CMS 286 Co-Processor (Mac II) ........ 1079.
CMS
CMS TapeStack 60 Meg .................. Call.
MacStack 20 Meg .................. 569.
MacStack 40 Meg .................. 789.
MacStack 60 Meg .................. 849.
Cutting Edge
680k Hard Drive "NEW" .................. 175.
Wedge XL 30 Plus .................. 625.
Wedge XL 45 Plus .................. 829.
XL 30 Internal or 45 Internal ........ Call.
Dayna Communications
DaynaFile single 360K (5 1/4) ........ 525.
MacSnap 2S .................. 700.
MacSnap 2SE .................. 439.
MacSnap 48 .................. 1486.
MacSnap 65 .................. 2975.
MacSnap SC/Interface Port ........ 169.
MacSnap 554E (512K to 1 meg) ........ 200.
MacSnap 524S .................. 375.
MacSnap 548E (512K to 2 meg) ........ 549.

Payroll PLUS
This complete payroll program provides Federal, State, Local, and FICA tables plus user-defined miscellaneous deductions. Calculates hourly wages or salary. Prints paychecks and more. (finance) $159.

World Class Leader Board
Play the courses that challenge the greatest golfers or create your own. Digitized sound, practice putting greens and driving range. Choose your club, distance and type of shot. For 1 to 4 players. (entertainment) $34.

Swivel 3D
Swivel 3D is the ONLY 3D drawing program with color and it's fast. Start with 2D drawings and Swivel's intuitive interface turns them into 3D objects. Use the "Twisting" function for animation. Comes with a library of pre-drawn images and supports PICT and MacPaint files. (graphics) $265.

Carmen San Diego
Bullseye
Ferrari Grand Prix (racing)
PS1 Mustang
Casady & Greene
Crystal Quest 2.2 w/Critter Editor

Where in the World is Carmen San Diego
Bullseye
Ferrari Grand Prix (racing)
PS1 Mustang
Casady & Greene
Crystal Quest 2.2 w/Critter Editor

Casino Master (Centron)
Become a Master of Casino Gambling!
Five separate Casino Games Include Blackjack Ace, Crapsmaster, Roulette Master, Pokermaster, and Baccarat Master.
Learn and practice at your own pace! Exact table simulation. mouse controlled betting, selectable bankroll, 40 card shoe and hands statistics and complete manual for rules and strategies included for each game. Recommended and used by professional gamblers!
For individual games $27 ea or get the 5-game Casino Master Package $85.
(entertainment)
### The BIG Thesaurus
Contains over 100,000 root words from the Merriam-Webster Collegiate Thesaurus. Inserts replace your document. Compatible with MultiFinder and Hypercard. *(spelling) $53.*

![The BIG Thesaurus](image)

### BASF 3.5" Double Sided Double Density
High capacity diskettes with no capacity for error. Every bit, every byte on every track of each BASF 3.5" Diskette is certified 100% error free. Warranty for life. *(media) $17.*

### MediaMate
Have all your programs at your finger tips! MediaMate holds 10 3 1/2 inch disks in an easy access design. When not in use, it folds up for easy storage. *(accessories) $12.*

### Spelling Coach Professional
Complete on-line spelling and reference system includes Merriam-Webster's 158,000 word dictionary, 245,000 synonym thesaurus, hyphenation, and a dictionary with 85,000 real definitions! *(spelling) $105.*

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### From MacWAREHOUSE™

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- 20Mb Raw Int. Drive Kit $379.
- 45Mb Raw Int. Drive Kit $549.
- Mobius MultiScreen Video Card $349.
- PCPC
- MacBot HD21 (SCSI) Call for MacBot HD32 (SCSI) special $859.
- MacBot HD45 (SCSI) $779.

#### MediaMate
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#### Spelling Coach Professional
- Complete on-line spelling and reference system includes Merriam-Webster's 158,000 word dictionary, 245,000 synonym thesaurus, hyphenation, and a dictionary with 85,000 real definitions! *(spelling) $105.*

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- High capacity diskettes with no capacity for error. Every bit, every byte on every track of each BASF 3.5" Diskette is certified 100% error free. Warranty for life. *(media) $17.*

### More II (Symantec)
From reports to speeches you're a pro with More II. Use the outlier to capture and organize your thoughts. Plan the presentation using the full-function word processing section. Finish with stunning presentation graphics, formatted handouts and a self-running slide show. More II's graphic tools help you create and import charts, graphs, diagrams and illustrations to make your points. It reads PCT, PICT2 and EPS files. *(business) $235.*

### MODEMS
- MAC - 101 Keyboard (Data Desk) Features 101 keys including a numeric keypad, a separate T-shaped cursor keypad, Cancel Key, Option and Command keys at both ends, delineable function keys, plus scrolling, page control, and zooming keys. Comes with free macro software and manufacturer's two year warranty. *(input/output) CALL.
- UniMac 3.5 or 5.25 Int. Mounting Kits Call. *(storation) $69.*
- Abalon
- InterFax 12/48 Call.
- Best Data Products SmartOne 2400/1200 with cable and software $169.
- Everex EMAC 2400 $225.
- Hayes Smartmodem 1200 $299.
- Smartmodem 2400 $448.
- Smartmodem 5600 (V series) $685.
- Mignet Pocket Modem (ext. 300/1200 baud/115.
- Promethus Promodem 2400 $309.
- Shiva NetModem 1200 $359.
- Supra Supra Modem 2400 $149.
- US Robotics Courier 1200 Modem $189.
- Courier 2400 Modem $349.

### BLANK MEDIA
- B.A.S.F. DS/DD (box of 10) $17.
- Sony DS/DD (box of 10) $19.
- SS/DD (box of 10) $13.

#### INPUT/OUTPUT
- Asher Engineering Turbo Trackball (121/Plus or Swivel) $89.
- Cutting Edge CE-165 ADB Keyboard $155.
- DataDesk Mac 101 Keyboard Call. *(Kensington) $109.
- New Turbo Mouse $225.
- Koala MacVision 2.0 $225.

### ACCESSORIES
- Amray Medifile Fax Puc $12.
- Computer Friends, Inc. MacFinder (IW & IW II) $41.
- Ergotron MacTower or MacTower SE $66.
- Mouse Cleaner 360 $15.
- I/O Designs ImageWare II Carrying Case $49.
- IK Design ImageWriter LC Ruiten Call.
- IW II Ribbons Black or Color Call.
- Macinware Plus Carrying Case $64.
- Macinware SE Carrying Case $75.
- Kensington Anti-Glare Filter $33.
- Apple Security Kit $34.
- Disk Drive Cleaning Kit $20.
- Mac II Stand w/Cable Kit $65.
- MasterPiece Mac II $105.
- Modem/FAX Protoster 20 $95.
- PowerTree SurgeProtectors Call.
- System Saver $64.
- Mobius Products Fanny Mac GT $60.
- SE Siler $39.
- Omnium Corporation Mac Desktop Workstation $75.
- Orange Micro Mac Tilt or MacTilt SE $36.
- Targus, Ltd. Deluxe Plus/SE-XMB Case (black) $69.
- ImageWriter II Case (black) $59.

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### Impact Hard Drives (Drewes)
The EMAC Impact Hard Drive series features high speed 19 ms performance, external SCSI addressing, external termination, whisper quiet operation and a compact, slim-line chassis 2 1/2 x 6 x 10 1/2 in. (disk drives) EMAC Impact 60 MB or EMAC Impact 40MB Plus. CALL.

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### MacWAREHOUSE™
**OVERNIGHT DELIVERY: ONLY $3.**

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**1-800-255-6227**
New Products

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**Floppiclene**  Disk drive cleaning kits for 3 1/2-, 5 1/4-, and 8-inch formatted disks. Each kit consists of 50 disposable cleaning disks, cleaning solvent, and reusable disk envelope. $35 per kit. Tech-Sa-Port, 412/661-2629.

**The Incliner**  Portable, forward-tilting computer cart. Holds any Mac, a small printer, and a variety of peripherals. Makes the computer and equipment accessible from lounge chairs, sofas, and beds. Handcrafted solid oak. $599. Jenston Manufacturing, 512/653-0414.

**Joystick/Keyboard Assembly**  Metal enclosure for Mac II keyboard, with built-in joystick mouse replacement and removable silicon seal that adheres to the standard Mac II keyboard. $495; joystick alone $129. CTI Electronics Corporation, 203/386-9779.

**Mach IV Plus**  Mouse replacement for all mouse-intensive programs. Cursor moves in same direction as stick handle with increasing speeds as you move the stick farther from its center. $89.95; joystick alone $129. CH Products, 619/744-8546.

**MacLift**  Lifts the screen of Mac 512K, Plus, or SE at an angle; the front feet of the computer fit into one of the device's five grooves. Raises the front of the Mac (continues)
Teach your Mac to perform unnatural acts.

If you're losing your passion for running the same old programs on your Mac, add a little excitement to the relationship. Start writing your own, with the new Microsoft® QuickBASIC for the Macintosh®.

BASIC is already the easiest language to learn on the Mac. And now, with new Microsoft QuickBASIC, it's even easier.

We've built the compiler and the interpreter into one program. Which means you can compile and execute whatever your heart desires with a simple double click of the mouse.

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New Products

MacLift
by up to 2 inches. Platinum or beige. $12.95. Cordry-Berg Enterprises, 714/361-2557.

Manifesto Executive Desk/Workstation Handmade oak desk/workstation with motorized platform for the Mac. Press a button or turn a key to lift the computer up to use the Manifesto as a workstation, or place it flush for use as a desktop. Holds Mac, printer, scanner, and storage. $1995. Sunrise Technologies, 800/446-5991 or 619/466-5991.

PC100+ Power Inverter Produces 100 watts of AC power from any 12-volt battery source. Requires no permanent mounting. Alarm sounds when battery is getting low; unit shuts off when battery gets down to 10 volts. $179.95. Statpower Technologies, 604/420-1585.

Surelock Security Kit Steel-cable and brass-lock security system designed to secure Macs and peripherals from theft. $39.95. Reiko, 206/672-5353.

Textured Papers for Impact Printers Three new papers: riblaid available in white, ivory, and gray; linen (25 percent cotton) with embossed texture in white, gray, and blue; and brushed cotton (50 percent cotton) with woven finish in white, ivory, and blue. $24.95 per box of 250 fanfold sheets. James River Corporation, 413/589-7592.

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With JetLink Express™, it's a remarkable new generation of printer driver for Macintosh® computers and DeskJet, LaserJet, or LaserJet compatible printers. Simplicity, speed, versatility and dependability — without the 'jaggies'.

But that's only part of the story.

JetLink Express employs the same leading-edge outline font technology used by PostScript® laser printers, the standard in desktop publishing. This allows you the flexibility to create various fonts, sizes and styles with astonishing results. Where reliability, quality and speed count most, JetLink Express achieves first-rank performance. The competition doesn't even come close to delivering 300 dpi in large fonts and sizes without the 'jaggies'.

So if you're looking for a printer driver with a heart, we've got your number. Now all you have to do is push ours. You'll get what you need in record time.

Mac Daisy Link™ continues to be the preferred tool for the daisywheel printers and typewriters.

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BOOKS & VIDEO


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You've known us as AppleCrate. We are now Crate Technology. So, just say Crate!

We offer a great line of external disk drives now known as MacCrate ranging from 20MB to our performance driven 80MB model all using Seagate quality disk drives.

We have expanded our product line to include InnerCrate: our solution for your Mac SE and Mac II internal disk drive needs. InnerCrates range from 30MB to our high performance 300MB model.

Introducing TapeCrate, our high speed quality backup system. TapeCrate's high speed data transfer rate, protects 60MB of your valuable information in just 12 minutes. TapeCrate comes with a 60MB data cartridge and is ready for "Plug and Play" operation.

### MacCrate Models

<table>
<thead>
<tr>
<th>Model</th>
<th>Size</th>
<th>Time</th>
<th>Price</th>
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<tbody>
<tr>
<td>Mac SE 30MB</td>
<td>28ms</td>
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<td>Mac SE 50MB</td>
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<td>$730</td>
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<tr>
<td>Mac II 40MB</td>
<td>28ms</td>
<td>$585</td>
<td></td>
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<tr>
<td>Mac II 60MB</td>
<td>28ms</td>
<td>$655</td>
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<tr>
<td>Mac II 80MB</td>
<td>28ms</td>
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<td>Mac II 300MB</td>
<td>16.5ms</td>
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### InnerCrate Models

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<tbody>
<tr>
<td>Mac SE 30MB</td>
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</tr>
<tr>
<td>Mac SE 50MB</td>
<td>28ms</td>
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<td>Mac II 40MB</td>
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<tr>
<td>Mac II 60MB</td>
<td>28ms</td>
<td>$1149</td>
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### TapeCrate Models

<table>
<thead>
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<th>Model</th>
<th>Size</th>
<th>Time</th>
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</thead>
<tbody>
<tr>
<td>60MB tape backup sys.</td>
<td>$739</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
How to avoid making backups.

Make Irwin® do it.

An Irwin tape backup system, that is. So go home early. Because an Irwin system will back up your data, your programs, your breakthrough ideas—all automatically.

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It doesn’t matter whether you’re backing up a Mac or a PC.

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All in all, that’s why more people rely on Irwin minicartridge systems to do their backup than all others combined.

Just call 1-800-BACKUP1 for the dealer nearest you. Because the best way to make backups is to avoid it.
Quick Tips
Answers to your questions

by Lon Poole

The down-up commotion an ImageWriter II makes before it prints the first page of a document on pin-feed paper may jam the paper. As reported in last October's Quick Tips, you can avoid the jam by starting printing on the second sheet of paper; by choosing the Manual Feed option in the Print dialog box; or by forsaking pin-feed paper and getting a sheet feeder.

On closer inspection of the phenomenon, Ron Zammit of San Luis Obispo, California, observed that the paper doesn't jam if the print head is centered left to right. The clear plastic paper guides on either side of the print head direct the paper beneath the pressure rollers during the down-up movement. A problem occurs only when an application leaves the head off-center after printing a document. You can manually center the print head by lifting the ribbon cover to create an error condition, replacing the cover, and pushing the Select button on the printer. Switching the printer's power off and on also centers the print head.

Don't Ask Me That Again
Have you had enough of the Finder interrupting you with comments like "That item is locked or in use and cannot be removed" and "Are you sure you want to throw away the application——-?" You could haul out ResEdit and permanently silence those warnings, as one reader suggested. But you can easily override the Finder's warnings about removing applications, system files, and locked items by pressing Option while you drag the item in question to the Trash. When you press that Option key, you'll hear the Finder clearing its throat as a subtle reminder to proceed with caution.

Q Icon Tell
Glancing at a disk icon tells you whether the disk is selected, whether the icon is open (so you can see the disk directory window), and in some cases whether the disk is inserted or ejected.

Q Icon Disguises
Disk icons have several different looks—white, gray, or black; with or without lines depicting the disk label and shutter. What do they all mean?
Dave Reese
Stoughton, Massachusetts

A We're all graphically oriented here, aren't we? Look at "Icon Tell" for the answer to this question.

Q Violent Reaction
On some occasions when there is software incompatibility, my Mac SE reacts violently rather than gracefully. Instead of getting the comparatively polite system-error message with its bomb icon and restart button, I hear horrible crackling noises and see flashing lines running across my screen. Is any harm being done? Why is my Mac behaving so violently? Does this behavior come under the heading of bombs?
Chris W. Anagnost
Dover, New Jersey

A Video and audio static does signify a bomb, or crash, much like a system error, but less controlled. The rude sights and sounds occur when a damaged application program or damaged System software writes random information in the areas of memory used by the display screen and sound circuit. Usually, the only harm done is a loss of all work completed since you last saved. However, there is a remote danger of corrupting a disk, particularly if the crash occurs while saving to disk. The risk is a bit greater if you are saving to a 400K disk drive. To recover, you must switch the Mac off and on or press the reset button on the programmer's switch (if it is installed).

Q Font Corruption
I have a corrupted screen font (Adobe Garamond) in my System file that causes a system error whenever I try to use it. The same system error occurs when I try to remove the font with Font/DA Mover (version 3.6). The font seems fine on the floppy-disk copy, but causes the error when it's in any file on the hard disk. I'm using a Mac SE with an internal hard disk and System 4.2. Is there any utility software that I can use to remove just the one font?

(continues)
The fastest way to get here.

Claris CAD can't reduce the huge number of two-dimensional drawings it takes to get a plane off the ground. But it makes them a lot easier to do.

Claris CAD supports ANSI Y14.5 and other drawing standards. So those who design parts can share with those who design wholes.

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Claris CAD is the epitome of "less is more." Less time learning. More time creating.

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Claris CAD makes it easier to sell your inspirations. Plot your plans, concept sketches, schematics and working drawings exactly as you see them, turn them into slides or overheads, or cut and paste them into proposals and reports.

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Claris CAD integrates with other CAD software via optional IGES and DXF conversion programs. So you can move them to larger CAD/CAM systems for 3-D modeling and prototyping.

Here's the next step: order the Claris CAD Starter Kit, just $29.95 (refundable when you buy the complete program). To order call 800-628-2100. And see how intelligent design begets intelligent design.
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Circle 229 on reader service card

How To / Quick Tips

Any thoughts as to the cause? I use a lot of fonts and this is the only one that has caused a problem. I got the fonts from the Linotronic service bureau where I do business.

Kirk Wilie
Irvine, California

A

If the font works on other disks, something may be wrong with the System file on your hard disk. To eliminate this possibility, replace the System file and other items in the hard disk’s System Folder with like-named items from a clean copy of the latest System Tools and Printing Tools disks. System version 6.0.2 was the latest at this writing. Before replacing your current System Folder, be sure to make a copy of it in case something goes wrong.

Fonts are resources, so you can probably remove the troublesome font from your System file using Apple’s resource utility, ResEdit. The font will have one FOND resource and many FONT resources, one for each different point size installed and an additional one for an imaginary size 0 font. To see the size 0 resource, you may have to open the FONT resources using the Open General command in ResEdit’s File menu.

You can get the latest version of ResEdit with documentation from Apple Programmer’s and Developer’s Association (206/251-6548), or your local user group should have it.

Q

Squashed Lines

I've had a problem with my ImageWriter II printer for years. One line of print near the top of the page gets distorted. I'd sure appreciate any direction you could suggest.

Bob Ricketts
Irvine, California

A

Pin-feed paper may buckle slightly as the perforation goes through the ImageWriter’s pinch roller (also called the paper bail), resulting in a flattened line. The glitch occurs about 1 inch from the top of the page on an ImageWriter II. The paper feed path is different on an ImageWriter I, where the glitch occurs about ½ inch from the top of the page.

You may be able to alleviate this problem by increasing the tension on the paper coming out of the printer. Try advancing one sheet of paper through and letting it hang there. Try attaching a light weight, such as a clothespin or binder clip, to the exiting paper. Let the exiting paper fall to the floor.

To eliminate the problem, switch to single-sheet paper. I highly recommend using a cut-sheet feeder on an ImageWriter II. It really works well, but be careful removing and reinstalling it so you don’t break the plastic hinges that hold the two halves together.

Q

Comparing Times and Distances

The Map device in the Control Panel operates properly on our school’s office Mac SE, but not on mine at home. The Time Zone/Time Difference feature, which is supposed to calculate the time zone and the time difference between the chosen city and Greenwich Mean Time, always shows the same answer for both.

Jerry A. Neff
Curtis, Nebraska

A

The Time Zone feature indicates the number of hours and minutes that the location marked by the flashing star is ahead of or behind Greenwich Mean Time. The Time Difference feature (which you access by clicking the words Time Zone) shows the time difference between the location marked by the flashing star and the location marked by a flashing cross, which is called the Current Location. If the Current Location is in the same time zone as Greenwich Mean Time, then the Time Zone and Time Difference will be the same.

You can change the Current Location using Map. First find or add the location you want to designate. Then click the Set button. The flashing cross visibly confirms the setting.

When you change the Current Location, Map automatically adjusts the time and date in the Mac’s clock according to the time difference between the new and old Current Location. The Current Location is stored in the Mac’s battery-powered memory, along with the time of day and other semipermanent Control Panel set-

(continues)
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Circle 458 on reader service card
How To/Quick Tips

- **ImageWriter Color**
  - **Tip:** Does your ImageWriter II print a rainbow where it should print a solid color? My dealer says this is a common problem with many different brands of color ribbons. The ImageWriter II's ribbon-adjustment mechanism (described in *ImageWriter II Technical Reference*, published in 1987 by Addison-Wesley) isn't always adequate. The solution is to make a shim of masking tape or tiny self-adhesive labels.

  Build the shim by layering tape or labels on the underside of the ribbon cartridge in a solid flat area that contacts a flat part of the ribbon deck (see “Color Shimmy”). Don’t let the shim touch any holes, depressions, or protrusions. If the print head is hitting low on the ribbon—for example, if yellow text is red at the bottom—apply the shim to the end of the ribbon cartridge nearest the front of the printer. If the print head is hitting high on the ribbon—red text is yellow at the top, for example—apply the shim to the end of the cartridge nearest the print head.

  Test your shim using the printer’s self-test feature (hold down the Form Feed button as you switch on the printer). Adjust the thickness of the shim by adding or removing layers of masking tape or tiny labels to get the best results. Don’t make the shim so thick that you can’t snap the cartridge into place easily, though. I used 22 labels (about 3/16-inch thick overall) to correct one of my ribbons, and the cartridge still snapped into place easily. If you have to make the shim so thick the cartridge won’t snap into place, give up and get another ribbon.

- **Flush Left with Indents**
  - **Tip:** Here’s an easy way to do indented paragraphs and flush-left subheads in MacWrite: Set the automatic first-line indentation, but also set an ordinary tab about two characters from the right margin (see “Flush Indents”). At the end of a regular indented paragraph, press Return and then Tab. The next line appears flush left, ready for a subhead. (If it doesn’t, move the tab closer to the right margin.) This method works with any word processor that allows automatic indents.

- **Shim here if the bottoms of characters are the wrong color.**

  - **Shim here if the tops of characters are the wrong color.**

Pressing Return, as you suggest, places a blank line above the subhead. To suppress the blank line, press Tab without pressing Return. If you have other tabs set, you may have to press Tab more than once to get to the next line. And if the first word of the subhead is short enough that it remains at the end of the previous line, you may have to prefix it with a few blank spaces to make it appear at the left margin.

- Moving or Resizing
  - **Tip:** In MacDraw and MacDraw II, choosing the Show Size command from the Layout menu makes it easier to tell whether you’re moving or resizing an ob-
  
  (continues)
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Size for size, you're also getting the fastest drives available. Each one bundled with MacTREE Plus, the hard disk management system, and DS BACKUP. And all for the most competitive pricing around.
Flush Indents
This MacWrite formatting rule gives indented paragraphs when you press Return, but lets you create flush-left headings by pressing Tab once or twice to get to the start of a new line.

ject. If the size changes as you drag, then you're resizing. If the size disappears in MacDraw, or is replaced by offsets in MacDraw II (look for symbols in the measurements), then you're moving the object.

David L. Chang
Okemos, Michigan

Bagging the Big Ones
Tip: Have you ever scanned an image at a service bureau only to discover that it wouldn't fit on an 800K disk? You had room for it on your hard disk, but no way to get it there. Next time take a copy of a backup application and several blank floppy disks. Scan your images to the service bureau's hard disk. If an image exceeds 800K, “back up” the file to your blank disks. Back at your Mac, “restore” the file to your hard disk.

Diana Shannon
Princeton, New Jersey

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Circle 77 on reader service card
Getting Started with Tax Software

Will tax-preparation software save you money or waste your time? Read the attached and write your answer on Line 6, Part A.

by Jim Heid

Filing a tax return is more taxing than ever. Orbiting around Form 1040 are more than 30 schedules and forms for reporting everything from business expenses to the income of children under age 14 who have investments. And the Tax Reform Act of 1986 didn't make things any easier. Replacing multiple tax brackets with just two tax brackets sounded as if it would simplify the process, but remember that the bill was drafted by politicians. Behind the tax act lurks one of the most drastic tax-system overhauls in United States history. Dozens of new rules, new interpretations of old rules, and reams of new forms and schedules have made completing a tax return as easy as filling out a checklist—for a space shuttle launch.

Several tax-preparation packages are available for the Mac. Most work along with a spreadsheet program such as Microsoft Excel; one is a stand-alone application; and another runs under Apple's HyperCard. Although they all work differently, they do share a common claim: that using the Mac to prepare tax returns will save time and money.

Don't believe it—at least not without doing some research first. The tax world is too complex for such claims to apply to everyone. Tax-preparation software works for some people, but it is important to determine whether or not you're in the lucky group. This month, we'll tour the world of Macintosh tax software and look at the factors to consider before you decide whether or not to computerize your return. If you aren't interested in taking chances with tax software yet, see "Every Little Bit Helps," to learn about other ways the Mac can assist at tax time.

Filling In the Blanks

Given that completing a tax return involves plugging in numbers and calculating sums, it's not surprising that most tax software runs along with a spreadsheet pro-

(continues)

The author wishes to thank Barton Goodeve for sharing his expertise with tax law and tax-preparation software.

Jim Heid is a Macworld contributing editor who focuses each month on a different aspect of Mac fundamentals.
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Circle 86 on reader service card
Regis McKenna

Age: Old enough to remember the day that Intel Corporation was founded.

Profession: Chairman of Regis McKenna Inc., a major marketing company based in "Silicon Valley." A general partner in the venture capital firm of Kleiner Perkins Caufield & Byers. Author of the Regis Touch and most recently, Who's Afraid of Big Blue?

Hobbies: Enjoys doing extensive research on innovative new technologies. He recently became involved in building and archiving an extensive database, using state-of-the-art page recognition software.

His Page Recognition Software: OmniPage

of course. According to Regis: "OmniPage represents one of the most complete page recognition software products; providing incredible flexibility to customize data which can be easily accessed later. All of a sudden the cost of archiving and retrieving data has dropped significantly. The "Information Age" is upon us and we have an exciting new tool!"

Favorite Quote: The New York Times: "OmniPage could be the most significant advance in personal computing this year."

Things Disliked Most: "Technology that is not easily accessible or powerful enough to serve the needs of people."

Favorite Scan: "I'm using OmniPage to build an extensive electronic library that pertains to the growth and evolution of technology over the past 25 years. Being able to scan literally any article, regardless of layout or column format, has suddenly made this all possible. It's eliminated the labor intensive task of data entry. I'll be able to share this information with employees, customers and colleagues over time. It's an exciting collection of business case studies for future reference."

Future of Page Recognition: "OmniPage has provided me with the customizable tool that I need. I can use the Partial Page feature to scan only that text which is relevant to my needs. Having a version that runs in MS-Windows should impress those who are committed to that environment. What we're seeing here is the emergence of a new product category."
Every Little Bit Helps

Lightening the load at tax time doesn't have to mean using a tax-preparation program. The Mac can help in other ways.

- **Tax planning.** Many tax software firms also offer tax-planning software. With products such as EZWare's Microsoft Excel-based EZTax-Plan and SoftView's TaxView Planner, you enter key figures from last year's return, and the software projects your taxes for this year. From there, you can experiment with different strategies—such as increasing IRA deposits or postponing a major purchase or sale—and see how they would affect your taxes. Using tax-planning software is also an ideal first step toward computerizing your return, since you'll learn about tax regulations and preparation. And because you don't sign the result and submit it to the IRS, there's no risk.

- **Organizing deductions.** Instead of handing your tax preparer a shoebox filled with receipts, use a database manager or a spreadsheet program to itemize and total your deductions according to the categories on Schedule C. By doing this groundwork, you'll save money on preparation fees.

- **Accounting.** A classic problem in tax preparation occurs when figures don't prove out—that is, when net profit doesn't equal gross profit minus expenses. At the heart of this problem is a failure to accurately record expenses and income. Accounting software can help you do that, and can also provide an audit trail—a report that lets you retrace your accounting steps to verify a calculation or track down a specific piece of information. For details on accounting software, see “Who Keeps the Books?” *Macworld*, September 1988.

Spreadsheet Taxes

With EZWare's EZTax-Prep, used with Microsoft Excel, the first step in filing a return is to open the forms and schedules you'll need (Part I). In Part II, Schedule C is being completed. In Part III, EZTax Prep has copied the total from Schedule C to the appropriate line on Form 1040. The bottom of the Form 1040 document displays a running total of taxable income and the taxes owed.

(continues)
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*MacWeek September 13, 1988
**Suggested Retail Price
out a MacInTax form is similar to completing a paper form, except that you don't need an eraser.

Or a calculator. Like a spreadsheet, MacInTax calculates values for you. When you arrive at a form that requires a total from another form or schedule, double-click on the space where that total should appear and the related form appears for you to fill out. MacInTax copies the total from this form to the appropriate line of Form 1040 (see "Filling In the Forms").

MacInTax even includes electronic versions of the IRS's instructions. Double-click on a given line, and a window appears containing the IRS's instructions for that line.

With MacInTax you can enter different values as you work on your return to test different strategies. MacInTax has more smarts—technically speaking, it performs more error trapping—than many spreadsheet-based products. For example, if you enter a Social Security number for a spouse, and then specify your filing status as single, MacInTax notifies you of the inconsistency. And because MacInTax is a stand-alone application, you don't have to own Excel in order to use it.

Questions and Answers
If you prefer more hand-holding in your tax software, check out StackWorks' Tax Stacks, which was in development at this writing and scheduled for delivery in January 1989. Tax Stacks runs under Apple's HyperCard and takes a very linear, stepwise approach to completing a tax return. With spreadsheet-based products and with MacInTax, you can move to another form without completing the form you're working on—just as if you were jumping from one paper form to another on your desk. With Tax Stacks, you prepare a return by working through a tax questionnaire that uses yes/no questions and accurate facsimiles of key schedules and forms to gently interrogate you for the necessary information (see "Taxes in HyperCard"). When you've finished, you can preview the return on the screen and correct entries by clicking on them, and you can print IRS-approved hard copy.

If you're a tax novice, Tax Stacks' stepwise approach may be best for you. Because you can't easily jump between forms, you're less likely to forget to enter a key value. If you can't complete a given card, click on the card's flag icon, and Tax Stacks returns to it later. Other icons display IRS instructions, a calculator, and a notepad. And when you get depressed thinking about how your tax dollars are spent, click on the joke icon to read one of Tax Stacks' many built-in tax jokes, which include knee-slap'ers like "Give a politician a hand, and he'll put it in your pocket."

As you can see, each category of tax preparation software relies on different data-entry techniques: from navigating spreadsheet cells to shuffling on-screen IRS forms to completing a questionnaire. Which approach is best? At first glance, you might assume that MacInTax's approach is more Mac-like because it accurately repro-

Filling In the Forms
With MacInTax, you complete a return by filling in accurate on-screen facsimiles of IRS forms. In a line that requires figures from a different form or schedule, double-clicking on the space where the numbers should appear brings up the related schedule. Here, in line 8 of Form 1040, MacInTax has copied the total from Schedule B (shown in Part II).

(continues)
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How To/Getting Started

How complex is your return? The simpler your return, the less risk of errors

Some programs do little more than turn the Mac into an electronic typewriter and calculator: they calculate the numbers you enter, and then use lookup tables to determine your tax. With inexpensive, spreadsheet-based products such as Taxmaster and Tax Pro, the onus is on you to know the tax laws, which forms and schedules to file, and how to file them.

More ambitious programs, including MacInTax, Tax Stacks, and the EZTax series, do more of the work for you. They know how various forms and schedules interrelate, and based on your input, will help you determine which ones to use. Of course, this extra measure of intelligence can't make up for tax ignorance on your part.

Another way good tax software earns its keep is by using error-trapping routines to guard against inaccurate data entry. No tax program can prevent you from typing $5000 instead of $500, but a good program should keep you from making inappropriate entries, such as typing a letter where a number belongs.

Why all the fuss about accuracy? The answer is penalties. Tax penalties were originally imposed to assure compliance, but many have evolved into downright punitive laws. You might call forgetting to enter a number from a W-2 or a 1099 form an honest mistake, but the IRS calls it negligence and finds you guilty until you prove yourself innocent. The bottom line: mistakes are going to cost you. Developers of tax software—especially of programs that do more than simply calculate values—have a degree of legal accountability similar to that of tax preparers, but the buck always stops with the person whose signature is on the return.

Should You Prepare Yourself?

How do you decide if you can benefit from tax-preparation software? Start by answering a few questions.

Do you prepare your own taxes now? If so, you have a head start over people who don't. You've already struggled with the concepts and the instructions, and you can apply your combat experience to the world of tax software. If you've never prepared your own return, it may be too late to think about buying tax software this year, since you'll have two learning curves to climb: one for the tax laws themselves, and another for the tax software.

How do you prepare your own taxes now? Some programs do little more than turn the Mac into an electronic typewriter and calculator: they calculate the numbers you enter, and then use lookup tables to determine your tax. With inexpensive, spreadsheet-based products such as Taxmaster and Tax Pro, the onus is on you to know the tax laws, which forms and schedules to file, and how to file them.

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loss limitations, and that means a fairly complex tax return. You're also a candidate for a complex return if you're subject to the alternative minimum tax or if you have large and varied types of interest expenses. The regulations governing these types of returns are so complicated that many pro­fessional tax preparers seek assistance from large tax-preparation bureaus. So if you do anticipate filing a complex return, make sure your program includes the forms and schedules you'll need.

How much are you willing to spend on software? Because regulations and tax rates change yearly, a tax package is good for only one year. Yearly updates are available to registered users, but they aren't free. Depending on the complexity of your return and on what a professional would charge to complete it, it may not be cost­
effective for you to update a package every year. And speaking of updates, find out when they'll be available before buying. The IRS often changes its rules or its forms late in the season, and updates should reflect the latest rules.

Advice for the Determined
If you've read this far and are still determined to computerize your tax return, you're braver than I am. In addition to wishing you luck, I can, thanks to my accountant, offer a few words of advice.

Edu cate your self: Tax software won't make you a competent tax preparer any more than a word processor will make you a good writer. Learn about those aspects of tax law that affect you. A good place to start is by reading a tax guide such as The Price Waterhouse Personal Tax Adviser, published each year by Bantam Books. This clearly written volume does a good job of demystifying the rules and terminology of taxation. (It's bundled with MacIntax.)

First organize your data manually. Have your W-2's, 1099's, and everything else you need close at hand. Tax software can't cure disorganization, so sort through those shoeboxes and get your paperwork in order before you begin.

Anticipate your results. Don't simply plug numbers into the computer and trust that the tax software will know what to do with them. If you don't have a rough idea of what your return should look like when you're finished, you aren't ready to start.

Know your limits. It's easy to sink so much time and energy into a complex project that you can't let go when the going gets rough. If you get stuck, get help; the time you've invested in the software will enable you to talk more intelligently with a preparer.

If I sound cautious about the world of computerized tax preparation, it's because I am. Tax-preparation software has been a boon to professional tax preparers, but that's because they use the software to automate the mechanical process of completing a return. They don't look at a tax pro­gram as a mentor that will tell them what to do, and neither should you. Carelessly using a tax program isn't the only way you can get into trouble with the federal government, after all. You could use a modem to break into the IRS's computers and change your refund.

But who needs the trouble? □

How To/Getting Started

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TABLE OF CONTENTS

Hamlet II .......................................................... 11
Antidote: Romeo & Juliet II ..................................... 33
Henry IV: Part XXI ................................................ 54
The Merchant of Florence ......................................... 106
Beneath the Merry Wives of Windsor ....................... 124
Macbeth IV .......................................................... 155
As You Like More of It ............................................. 183
Friday, The Thirteenth Night ................................... 196
The Merchant of Turin ............................................. 222
Brutus ................................................................. 256
The Taming of That Darn Cat .................................. 300
Bill Shakespeare, My Story ...................................... 300

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Updates

This list brings you the highlights of software updates recently received but not yet tested. The first price is the upgrade cost for registered owners; the second is the current list price.

Alchemy version 1.2 has 16-bit stereo sound editing; sound processing; and network support to E-mu Systems Emulator III, Roland S-50, and Roland S-330 digital sampling instruments. SCSI sample dump capacity for Emulator III and Ensoniq EPS (with SCSI serial port option). Blank Software, P.O. Box 6561, San Francisco, CA 94101; 415/863-9224. $25; $495 new.

Cue version 2.1 can import and play back MIDI files. Opcode Systems, Inc., 1024 Hamilton Ct., Menlo Park, CA 94025; 415/321-8977. For owners of version 2.0 $20 plus $5 s/h; for owners of earlier versions $75 plus $5 s/h; $595 new.

FoxBase+/Mac version 1.10 lets you create data-input-and-editing screens without programming. You can create screens by moving selected objects into place. Pictures may be inserted anywhere on forms. Fox Software, 118 W. South Boundary, Perrysburg, OH 43551; 419/874-0162. Free; $395 new.


Interleaf Publisher for the Apple Macintosh II version 3.5 supports the Apple Font Manager’s open font architecture; converts typed-in text to graphic fonts that can be sized, stretched, filled, and rotated; supports a variety of monitors; and runs under MultiFinder. Interleaf, 6404 Ivy Ln., #408, Greenbelt, MD 20770; 301/982-0991. Free; $2495 new.

LaserPaint Color II version 1.9 can cut and paste between 8-bit and 24-bit color scanned images. Transparency modes for color-wash effects on gray-scale scans. Imports and saves in most Macintosh file formats. LaserWare, P.O. Box 668, San Rafael, CA 94915; 415/453-9500. Free; $595 new.


MacHerbal version 1.1, database of traditional Chinese herbal medicine, has revised user guide with two new appendixes. Includes alphabetical listing of all therapeutic categories in the database; tells how to change program’s default setting for wholesale herb suppliers; adds a list of mail-order herb suppliers. Summerland Press, P.O. Box 77, Summerland, CA 93067; 800/542-5233 in California, 800/543-5233 elsewhere. $35; $295 new.

MacVision version 2.0 captures video images from VCR, camcorder, or video camera and turns them into gray-scale digitized images on the Mac II. For Mac Plus and SE systems, the image is translated into a 512-by-342-pixel dithered bitmap. Imports RIFF and TIFF files. Koala Technologies, 269 Mt. Hermon Rd., Scotts Valley, CA 95066-4029; 408/438-0946. $79.95; $399.95 new.

Managing Your Money version 2.0 does rapid searches for accounts/budgets when recording a transaction, includes updated tax laws, and sorts transactions by date within accounts. Prints to screen (continues)
Updates

or disk and can print loan amortization schedules. Meca Ventures, Inc., 355 Riverside Ave., Westport, CT 06880; 203/226-2400. $49.95; $219.98 new.

Microsoft File version 2.0 comes bundled with SuperPaint 1.1 by Silicon Beach and with AutoMac III 2.0 by Genesis Micro Software. New features include multicol­umn label support, horizontal and vertical blank-space compression, and memo field. Includes indexing default, data formulas, editable user preference, custom paper size, and zoom box. Microsoft Corp., 16011 N.E. 36th Way, Box 97017, Redmond, WA 98073-9717; 206/882-8080. Free if purchased after May 1, 1988; $50 if purchased before then; $195 new.

Microsoft Works version 2.0 includes new drawing tools, 60,000-word integrated spelling checker with customizable dictionary, and larger spreadsheet with cell notes and date/time functions. Supports color for the Mac III. Print Preview feature lets you view pages of a document before printing. Microsoft Corp., 16011 N.E. 36th Way, Box 97017, Redmond, WA 98073-9717; 206/882-8080. $75 to registered Microsoft Works users; free if purchased after August 1, 1988; $295 new.

Music Publisher version 2.0 lets you transpose by modal, chromatic, or diatonic method. Includes automatic measure-numbering, automatically places odd beat markings, and aligns lyrics to notes. Includes MIDI Playback, MIDI Input, and custom note-spacing features. Graphic Notes, 200 Seventh Ave., Santa Cruz, CA 95062; 408/476-0147. Free; $595 new.

Nemesis Go Master version 3.0 lets you increase the amount of time the machine takes to contemplate its moves and enables you to watch the machine consider its various possible moves. Has automatic game-replay feature. Rated 15Q by the American Go Association's human tournaments rating system. Toyogo, Inc., 76 Bedford St., #34, Lexington, MA 02173; 617/861-0488. Free; $79 new.

Parameter Manager Plus version 3.0, data acquisition and analysis software, allows for graph sizes of up to 400 inches by 400 inches. Can handle up to 32,767 graphs from a single data set. Imports data without constructing a template and no longer requires additional time to generate multiple graphs. Rebus Development Corp., 2230B Walsh Ave., Santa Clara, CA 95051; 408/727-0348. For owners of version 2.2 $25; for owners of version 2.0 $50; for owners of version 1.0 $100; $595 new; if bundled with PM Talk $100; communications option $795.

Publish or Perish version 3.0 lets you load references in text-file format, one field per line; redefine field names for uses other than bibliographic reference; and globally define field style. Park Row, 4640 Jewell St., #101, San Diego, CA 92109; 619/581-6778. $10; $49.95 new.

QuickMail version 1.0.5 increases run-time speed by approximately 50 percent over original version. CE Software, 1854 Fuller Rd., West Des Moines, IA 50265; 515/224-1995. Free; $300 per package new (10 users per package).

QuickShare version 2.0 lets you print PostScript-formatted PC files directly on a Mac-compatible printer and redirect Mac files to a PC printer port. Gives you access to up to eight Macintosh virtual disks residing on a PC. Compatible Systems Corp., P.O. Drawer 17220, Boulder, CO 80308-7220; 303/444-9532. $75; $465 new.

Sniffer version 2.0 uses a machine-language compiler for complex filters and triggers and can be triggered by an external electronic signal. Automatically recognizes manufacturer IDs. Color-codes protocol layers of the OSI Reference Model, and supports spreadsheet comma-separated value (CSV) formats. Network General Corp., 1945A Charleston Rd., Mountain View, CA 94043; 408/965-1800. If you have a warranty $50; if you don't have a warranty $350. Contact vendor for list price.

To have products listed in this section, send upgraded software, an outline of major changes since the previous release, upgrade price, suggested retail price, company name, mailing address, and phone number to Updates, Macworld, 501 Second St., San Francisco, CA 94107.
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Where to Buy

This listing provides company addresses and phone numbers for products mentioned in this issue. Allow several weeks for responses to Reader Service Card inquiries. Asterisks indicate vendors who prefer to be contacted by phone.

750 Adobe Illustrator 88. Adobe Systems, Inc., P.O. Box 7900, Mountain View, CA 94039-7900; 415/961-4400, 800/833-6687.
752 Amanda Stories, Volume I & Volume II. The Voyager Company, 1351 Pacific Coast Hwy., Santa Monica, CA 90401; 213/451-1383.
753 AppleFax Modem. Apple Computer, Inc., 20525 Marians Ave., Cupertino, CA 95014; 408/996-1010.
754 BackFax. Solutions International, 39 Commerce St., Williston, VT 05495; 802/658-5506.
755 BarneyScan XP. BarneyScan, Inc., 1198 Tenth St., Berkeley, CA 94710; 415/524-6648.
    * BWFIC. Shareware by Rick Giles, P.O. Box 207, Acadia University, Wolfville, Nova Scotia, Canada BOP 1X0.
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    * ColorCards. Shareware by Bill & Steve Tuttle/Imaginetic Neovision.
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758 Colorizer. Palomar Software, Inc., P.O. Box 120, Oceanside, CA 92054; 619/721-7000.
    * Color Map. Shareware on CompuServe.
759 Color System I. Knowledge Engineering, 115 Mason St., Greenwich, CT 06830; 203/622-8770.
760 DualPage Display System. Cornerstone Technology, Inc., 1883 Ringwood Ave., San Jose, CA 95131; 408/279-1600.
762 EZTax-Plan Business Edition. EZWare Corp., P.O. Box 620, Bala Cynwyd, PA 19004; 215/667-4064, 800/543-1040.
763 EZTax-Plan Personal Edition. EZWare Corp., P.O. Box 620, Bala Cynwyd, PA 19004; 215/667-4064, 800/543-1040.
764 EZTax-Prep 1040. EZWare Corp., P.O. Box 620, Bala Cynwyd, PA 19004; 215/667-4064, 800/543-1040.
766 FAXsoft. FAXsoft, 48/431 Milmont Dr., Fremont, CA 94538; 816/847-7727, 800/444-5321.
767 Findswell. Working Software, Inc., P.O. Box 1841, Santa Cruz, CA 95061-1841; 408/423-5696, 800/331-4321.
    * F1F4. Shareware on CompuServe.
All tax programs should look and print like this one.

Better yet, all tax programs should think like this one.

### MacInTax Federal for the Apple Macintosh.

Simply put, MacInTax whisks you through stacks of receipts and W-2's by allowing you to enter data directly into 72 IRS forms, schedules, worksheets and statements displayed on-screen in identical IRS format. The program totals all entered amounts, automatically makes all tax calculations, and instantly links data to and from individual forms, schedules, worksheets and statements.

It even checks your input and helps you prevent illogical, inconsistent or incomplete entries.

The complete IRS instruction booklet is stored on a line-by-line basis.

What's more MacInTax lets you easily import text files from a variety of outside spreadsheet, database and accounting programs.

When you're ready to sign and send your completed return, the program prints forms and schedules identical to the official IRS versions (complete with your data) onto blank paper using your supported laser or dot-matrix printer. Of course, all printed forms are fully IRS-approved.

One look and it's easy to see why, each year, users give this program their highest rating.

To order your copy publisher-direct, call SoftView at 1-800-622-6829. Or, visit any one of 10,000 retailers offering MacInTax.

MacInTax Federal 1988

SoftView, Inc.
4820 Adohr Lane, Suite F
Camarillo, CA 93010
(805) 388-2626

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Circle 419 on reader service card
When NASA Started Flying Again
They Chose the Macintosh and

BY RANDALL D. SMITH

ORLANDO, Fla. - NASA is flying again and many of the flickering screens in the background are Macs! And, just like everyone else, NASA needed valuable, quality, and affordable training on their Macs. On November 30th, NASA sent 58 of their top employees to MacAcademy in Orlando.

In October, Motorola sent 38 employees to MacAcademy in Austin. GTE sent their employees to MacAcademy in Boston. Jet Propulsion Labs, GE, and the University of California attended in Los Angeles. The FBI, the University of Texas, Federal Express, Citicorp, Polaroid, MIT, the State of California, Mobil Oil, and over 1,000 other companies choose locations throughout the U.S. to send their employees to MacAcademy.

Over 10,000 people, individuals and corporate employees, have attended MacAcademy in the past 12 months!

Why is MacAcademy so popular? The simple answer is that it provides what most Mac owners have been looking for since the day they first used their computer. MacAcademy fills a learning gap that can't be provided by the magazines, trade shows, Apple dealers, user groups, and audio training programs. It not only provides what the graduates call the Ultimate Macintosh Learning Experience, but it accomplishes this task for an unbelievably low price.

MacAcademy is a two-day workshop taught by many of the nation's leading Mac experts. Each instructor is a top business executive who uses the Mac in everyday business operations. Each instructor draws on actual hands-on experience when teaching the operation of the Mac, Excel, Word, FileMaker, PageMaker, HyperCard, and Works.

MacAcademy offers a smorgasbord of workshops allowing each participant the luxury of choosing their own individual class schedule.

Graduates who have attended MacAcademy have given the learning experience an overall rating of 4.5 on a scale of 1 to 5. The entire two days is only $249 which includes the workshops, class materials, and even lunch.

MacAcademy is designed for Mac owners who are facing the Mac training void and want to slash the learning curve.

To register for MacAcademy or for more information, call 904-677-1918 or write to: MacAcademy 477 S. Nova Rd. Ormond Beach, FL 32074.

Schedule of Upcoming MacAcademy Workshops

<table>
<thead>
<tr>
<th>Location</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chicago</td>
<td>Feb 6, 7</td>
</tr>
<tr>
<td>Dallas</td>
<td>Feb 8, 9</td>
</tr>
<tr>
<td>Houston</td>
<td>Feb 10, 11</td>
</tr>
<tr>
<td>Seattle</td>
<td>Feb 13, 14</td>
</tr>
<tr>
<td>Portland</td>
<td>Feb 15, 16</td>
</tr>
<tr>
<td>Hartford</td>
<td>Feb 21, 22</td>
</tr>
<tr>
<td>Atlanta</td>
<td>Mar 2, 3</td>
</tr>
<tr>
<td>Boston</td>
<td>Mar 20, 21</td>
</tr>
<tr>
<td>New York</td>
<td>Mar 22, 23</td>
</tr>
<tr>
<td>Philadelphia</td>
<td>Mar 27, 28</td>
</tr>
<tr>
<td>Wash. D.C.</td>
<td>Mar 29, 30</td>
</tr>
<tr>
<td>Detroit</td>
<td>Apr 6, 7</td>
</tr>
<tr>
<td>St. Louis</td>
<td>Apr 10, 11</td>
</tr>
<tr>
<td>Minneapolis</td>
<td>Apr 14, 15</td>
</tr>
<tr>
<td>Chicago</td>
<td>Apr 17, 18</td>
</tr>
<tr>
<td>Milwaukee</td>
<td>Apr 24, 25</td>
</tr>
<tr>
<td>San Diego</td>
<td>May 8, 9</td>
</tr>
<tr>
<td>Anaheim</td>
<td>May 11, 12</td>
</tr>
<tr>
<td>Los Angeles</td>
<td>May 15, 16</td>
</tr>
<tr>
<td>San Jose</td>
<td>May 18, 19</td>
</tr>
<tr>
<td>San Francisco</td>
<td>May 22, 23</td>
</tr>
</tbody>
</table>

2 Full Days
9 Mac Business Experts
14 Hrs. Of Instruction
Workshop, Computer Discs, Workbook, & Lunch
Only
$249

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Where to Buy

* Hide HyperCard. Shareware by Macreations, 329 Horizon Way, Pacifica, CA 94044.

771 HyperCharger 020. GCC Technologies, 580 Winter St., Waltham, MA 02154; 617/890-0880, 800/634-9737.

772 HyperTalk Pocket Reference. Hyperpress Publishing Corp., P.O. Box 8243, Foster City, CA 94404; 415/345-4620.

773 Icon Factory. Hyperpress Publishing Corp., P.O. Box 8243, Foster City, CA 94404; 415/345-4620.

774 ImageStudio. Letraset USA, 40 Eisenhower Dr., Paramus, NJ 07653; 201/845-6100, 800/526-9703.

775 InterFax. Abaton, a division of Everex, 48431 Milmont Dr., Fremont, CA 94538; 415/683-2226, 800/444-5321.

* Kolor. Shareware by Russ Wetmore, 101 Los Gatos Blvd., #5, Los Gatos, CA 95032.


777 LaserPaint II. Laserware, Inc., P.O. Box 668, San Rafael, CA 94915; 415/453-9500, 800/367-0688.

778 MacFortran. Absoft Corp., 2781 Bond St., Rochester Hills, MI 48309; 313/853-0050.

779 MacFortran/020. Absoft Corp., 2781 Bond St., Rochester Hills, MI 48309; 313/853-0050.


781 MacTran Plus. DCM Data Products, Inc., 1710 Two Tandy Center, Ft. Worth, TX 76162; 817/870-2202.


784 The Manhole. Activision, 3885 Bohannon Dr., Menlo Park, CA 94025; 415/329-8080.


* Menu Fonts. Beyond, Inc., Box 31990, Tucson, AZ 85751; 602/290-2970.


789 Musical Instruments Sound Resource Library. B & B Soundworks, P.O. Box 7828, San Jose, CA 95150; 408/241-7986.


791 OmniPage. Caere Corp., 100 Cooper Ct., Los Gatos, CA 95030; 408/395-7000.


794 PhotoMac. Data Translation, Inc., 100 Locke Dr., Marlborough, MA 01752; 508/481-3700.


795 Police Quest. Sierra On-Line, Inc., P.O. Box 465, Coarsegold, CA 93614; 209/693-6858.

* Printworks for the Mac/Laser Version. Phoenix Technologies, Ltd., 846 University St., Norwood, MA 02062; 617/551-4000.


796 QuarkXpress. Quark, Inc., 300 S. Jackson, #100, Denver, CO 80209; 303/934-2211, 800/356-9363.

797 QuicKeys. CE Software, P.O. Box 65580, West Des Moines, IA 50265; 515/224-1995, 800/523-7658.

798 Radius Accelerator 16. Radius, Inc., 404 E. Plumeria Dr., San Jose, CA 95134; 408/444-1010.

799 Radius Accelerator 25. Radius, Inc., 404 E. Plumeria Dr., San Jose, CA 95134; 408/444-1010.


* Screen Dump II. Shareware by Mark 3 Software, 215 Thayer Pond Rd., Wilton, CT 06897.


798 Screen Gems. Microseeds, 7030B W. Hillsborough Ave., Tampa, FL 33615; 813/878-2142.

799 scriptExpert. Hyperpress Publishing Corp., P.O. Box 8243, Foster City, CA 94404; 415/345-4620.


801 Sound Effects Sound Resource Library. B & B Soundworks, P.O. Box 7828, San Jose, CA 95150; 408/241-7986.

802 Space Quest II. Sierra On-Line, Inc., P.O. Box 485, Coarsegold, CA 93614; 209/683-6858.

SuperPaint 2.0
Setting the Standard. Again.

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

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

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

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

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

In Version 2.0, SuperPaint gives you more graphics power than the costly “professional” drawing programs, yet it’s easier to use. Draw spontaneously with the freehand Bezier tool, for example. You don’t have to get it perfect the first time—the Bezier path is completely editable, so you can progressively refine your work. Or use AutoTrace™ to instantly convert any bitmapped image to an object-oriented line drawing.

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

We’ve added nearly all the other features you wanted, too. You can set any document size for printing multiple pages, work in landscape view, or use SuperBits™ to edit bitmaps of any size and resolution—you can even edit a full page at 300 dpi. Plus you can preview your image in color before printing.

More power, more flexibility, and easier to use. That’s SuperPaint 2.0—setting the standard for Macintosh graphics...again.

Suggested retail price: $199. Upgrade from 1.0 or 1.1: $50.
Where to Buy

806 Springboard Publisher. Springboard Software, Inc., 7808 Creekridge Circle, Minneapolis, MN 55435; 612/944-3915.
807 StandOut. Letraset USA, 40 Eisenhower Dr., Paramus, NJ 07653; 201/845-6100, 800/526-9703.
808 Studio/8. Electronic Arts, P.O. Box 7530, San Mateo, CA 94403; 415/571-7171, 800/245-4525.
• Switch-a-roo. Shareware by Bill Steinberg.
809 TaxMaster 1988 Preparer. Island Computer Services, 3501 E. Yacht Dr., Long Beach, NC 28461; 919/278-9483, 800/826-7146.
810 TaxMaster 1989 Preparer. Island Computer Services, 3501 E. Yacht Dr., Long Beach, NC 28461; 919/278-9483, 800/826-7146.
811 Tax Pro. Chesapeake Software/MG, P.O. Box 1014, Richmond, VA 23208-1014; 804/358-7802.
812 Tax Stacks. StackWorks, Inc., P.O. Box 426, Urbana, IL 61801; 217/328-5257.
814 Tempo II. Affinity Microsystems, Ltd., 1050 Walnut St., #42, Boulder, CO 80302; 303/442-4840, 800/367-6771.
815 33/030 Accelerator II. DayStar Digital, Inc., 5556 Atlanta Hwy., Flower Branch, GA 30542; 404/967-2077, 800/962-2077.
• Toggle Cache. Shareware by Jan Eugenides, P.O. Box 151, Maynard, MA 01754.
816 Turbo SE. Siclone Sales & Engineering Corp., 1169 Borregas Ave., Sunnyvale, CA 94089; 408/734-9151, 800/862-2636.

Public domain software and shareware are available through online information services, user groups (call 800/538-9696 ext. 500 for information on a local user group), or mail-order clearinghouses such as Budgetbytes (800/356-5551 for orders; 913/271-0022 in Kansas), Educomp (800/843-9497, 619/259-0255 in California), or the Public Domain Exchange (800/331-8125, 408/496-0624 in California).
Peel this Apple
and get Macintosh performance
without the Macintosh price.

On the surface, this Apple appears to be a flawless, shiny Lisa. But get under its skin and you'll discover Macintosh Plus capabilities in all their glory. There's just one way this Apple doesn't measure up to a Macintosh. At $995, the Lisa falls impressively short of a Macintosh price tag.

Meet the New Lisa with MacWorks Plus

We thought it looked like a perfect match: the highly efficient Lisa and the myriad of Macintosh software solutions. On the one hand, there was the Lisa, a professional business computer with an extra-large 12" screen, Macintosh graphic interface, familiar mouse, easy-to-reach internal components, space for an internal hard disk drive, three expansion slots, and a numeric keypad on the keyboard. Then there was the popularity of the Macintosh Plus, with its amazing capabilities, functionality and software applications.

What we did to bring the two together was develop a software program called MacWorks Plus. MacWorks Plus brings Macintosh functionality to the Lisa, plus compatibility with every application that runs on the Macintosh Plus. With MacWorks Plus, the Lisa can run HyperCard, MultiFinder, AppleShare, WordPerfect, Adobe Illustrator and Cricket Draw. (To name a few.)

How We Support Lisa and MacWorks Plus

We do a lot more than market the Lisa and MacWorks Plus. We offer a complete line of out-of-production, new and used Apple compatible products. And we are the only company authorized by Apple Computer Inc. to sell and service their out-of-production equipment. Because of this, we have invested sizeable resources in developing improvements for all of the out-of-production and reconditioned products we sell. Plus, every product that comes from us must pass rigorous Apple quality control tests. We also back our products with a 30- to 90-day money-back guarantee.

Call 1-800-821-3221 for your Apple Lisa

If you like the capabilities and compatibility of Macintosh, but don't like the price, pick the Lisa with MacWorks Plus. To order a Lisa, or get a copy of our product catalog, call 1-800-821-3221 and we'll send your order out today. All major credit cards accepted.

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Circle 186 on reader service card
## Product Index

### Software

<table>
<thead>
<tr>
<th>Category</th>
<th>Product Name</th>
<th>Reader Service Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Educational</td>
<td>Design Science, 72</td>
<td>165</td>
</tr>
<tr>
<td></td>
<td>Lexiprinte, 32</td>
<td>472</td>
</tr>
<tr>
<td></td>
<td>Microsoft, 22</td>
<td>220</td>
</tr>
<tr>
<td></td>
<td>Personal Training Systems, 203</td>
<td>42</td>
</tr>
<tr>
<td>Entertainment</td>
<td>PCAI, 28</td>
<td>290</td>
</tr>
<tr>
<td></td>
<td>Silicon Beach Software, 257</td>
<td>266</td>
</tr>
<tr>
<td>Networking</td>
<td>Compuserve, 198</td>
<td>319</td>
</tr>
<tr>
<td></td>
<td>Faxallon, 84</td>
<td>150</td>
</tr>
<tr>
<td></td>
<td>Top, 74</td>
<td>12</td>
</tr>
<tr>
<td>Personal Business/Home</td>
<td>Shana Corp., 55</td>
<td>297</td>
</tr>
<tr>
<td></td>
<td>Survivor Software, 208</td>
<td>112</td>
</tr>
<tr>
<td>Utilities</td>
<td>Adobe, 8</td>
<td>35</td>
</tr>
<tr>
<td></td>
<td>Berkeley System Design, 206</td>
<td>187</td>
</tr>
<tr>
<td></td>
<td>Central Point Software, 159</td>
<td>357</td>
</tr>
<tr>
<td></td>
<td>Deneba, 25</td>
<td>340</td>
</tr>
<tr>
<td></td>
<td>Deneba, 27</td>
<td>180</td>
</tr>
<tr>
<td></td>
<td>GDTools Software, 224</td>
<td>439</td>
</tr>
<tr>
<td></td>
<td>Macemp, 246</td>
<td>478</td>
</tr>
<tr>
<td></td>
<td>Olduvai, 34</td>
<td>284</td>
</tr>
<tr>
<td></td>
<td>Preferred Publishers, Inc., 70</td>
<td>317</td>
</tr>
<tr>
<td></td>
<td>Symantec, 9</td>
<td>257</td>
</tr>
<tr>
<td></td>
<td>Xtree, 35</td>
<td>470</td>
</tr>
<tr>
<td>Vertical</td>
<td>Adobe Systems, Inc., 26</td>
<td>426</td>
</tr>
<tr>
<td></td>
<td>Caere Corp., 239</td>
<td>340</td>
</tr>
<tr>
<td></td>
<td>Checkmark Software, 232</td>
<td>220</td>
</tr>
<tr>
<td></td>
<td>Paracomp, 230</td>
<td>284</td>
</tr>
<tr>
<td></td>
<td>SBT, 193</td>
<td>450</td>
</tr>
<tr>
<td>Word Processing</td>
<td>Ashton-Tate, 38-39</td>
<td>220</td>
</tr>
<tr>
<td></td>
<td>Claris, 247</td>
<td>180</td>
</tr>
<tr>
<td></td>
<td>Deneba, 25</td>
<td>165</td>
</tr>
<tr>
<td></td>
<td>Design Science, 72</td>
<td>180</td>
</tr>
<tr>
<td></td>
<td>Microsoft, IFC-1</td>
<td>400</td>
</tr>
<tr>
<td></td>
<td>Round Lake Publishing, 22</td>
<td>215</td>
</tr>
<tr>
<td></td>
<td>Symantec, 12</td>
<td>352</td>
</tr>
<tr>
<td></td>
<td>T/Maker, IBC</td>
<td>372</td>
</tr>
<tr>
<td></td>
<td>Working Software, 191</td>
<td>475</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td>Aldus Freehand, 10-11</td>
<td>329</td>
</tr>
<tr>
<td></td>
<td>Aldus Persuasion, 168-169</td>
<td>306</td>
</tr>
<tr>
<td></td>
<td>Checkmark Software, 232</td>
<td>329</td>
</tr>
<tr>
<td></td>
<td>GDTools Software, 224</td>
<td>439</td>
</tr>
<tr>
<td></td>
<td>Microsoft, IFC-1</td>
<td>340</td>
</tr>
<tr>
<td></td>
<td>Microsoft, 22</td>
<td>340</td>
</tr>
<tr>
<td></td>
<td>SoftView, Inc., 254</td>
<td>429</td>
</tr>
</tbody>
</table>

### Hardware

<table>
<thead>
<tr>
<th>Category</th>
<th>Product Name</th>
<th>Reader Service Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boards</td>
<td>American Micro Distributors, 222</td>
<td>403</td>
</tr>
<tr>
<td></td>
<td>Cispoint, 92</td>
<td>127</td>
</tr>
<tr>
<td></td>
<td>Clearpoint, 92</td>
<td>357</td>
</tr>
<tr>
<td></td>
<td>DayStar, 79</td>
<td>476</td>
</tr>
<tr>
<td></td>
<td>DayStar, 81</td>
<td>494</td>
</tr>
<tr>
<td></td>
<td>DayStar, 77</td>
<td>477</td>
</tr>
<tr>
<td></td>
<td>Irwin Magnetics, 184-185</td>
<td>82</td>
</tr>
<tr>
<td></td>
<td>National Semiconductor, 166</td>
<td>196</td>
</tr>
<tr>
<td></td>
<td>Novell, 16-17</td>
<td>347</td>
</tr>
<tr>
<td></td>
<td>Truevision, 178</td>
<td>455</td>
</tr>
<tr>
<td>Digitalizers/Scanners</td>
<td>Digital Vision, 224</td>
<td>242</td>
</tr>
<tr>
<td></td>
<td>Faxlogic, 189</td>
<td>356</td>
</tr>
<tr>
<td></td>
<td>Sharp, 30</td>
<td>327</td>
</tr>
<tr>
<td></td>
<td>Thunderwave, 24</td>
<td>376</td>
</tr>
<tr>
<td>Hard Drives/Storage</td>
<td>American Micro Distributors, 222</td>
<td>403</td>
</tr>
<tr>
<td></td>
<td>CompuServe Systems, 164</td>
<td>233</td>
</tr>
<tr>
<td></td>
<td>Crate, 225</td>
<td>452</td>
</tr>
<tr>
<td></td>
<td>Deneba, 27</td>
<td>451</td>
</tr>
<tr>
<td></td>
<td>Microtech International, 231</td>
<td>458</td>
</tr>
<tr>
<td></td>
<td>Microtech International, 233</td>
<td>243</td>
</tr>
<tr>
<td></td>
<td>Microtech International, 235</td>
<td>242</td>
</tr>
<tr>
<td></td>
<td>Microvision/UPSInc.</td>
<td>440</td>
</tr>
<tr>
<td></td>
<td>Mobile Zones Int'l, 90-91</td>
<td>449</td>
</tr>
<tr>
<td></td>
<td>Personal Computer</td>
<td>223</td>
</tr>
<tr>
<td></td>
<td>Peripherals Corp., 98</td>
<td>223</td>
</tr>
<tr>
<td></td>
<td>Rodile, 201</td>
<td>149</td>
</tr>
<tr>
<td></td>
<td>Seagate Technology, 57</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td>Storage Dimensions, 161</td>
<td>410</td>
</tr>
<tr>
<td></td>
<td>Tallgrass Technologies, 243</td>
<td>320</td>
</tr>
<tr>
<td></td>
<td>Tallgrass Technologies, 248</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>Tecom, 252</td>
<td>321</td>
</tr>
<tr>
<td>Expansion/Upgrades</td>
<td>Micron, 154</td>
<td>161</td>
</tr>
<tr>
<td>Modems</td>
<td>Computer Friends, 214</td>
<td>68</td>
</tr>
<tr>
<td></td>
<td>Vns-Tel, 44</td>
<td>469</td>
</tr>
</tbody>
</table>

### Accessories

<table>
<thead>
<tr>
<th>Category</th>
<th>Product Name</th>
<th>Reader Service Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Services</td>
<td>Macworld Expo, 268-269</td>
<td>293</td>
</tr>
<tr>
<td></td>
<td>Safeware, 258</td>
<td>293</td>
</tr>
</tbody>
</table>

### Mail Order

<table>
<thead>
<tr>
<th>Category</th>
<th>Product Name</th>
<th>Reader Service Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Video</td>
<td>Computer Friends, 99</td>
<td>61</td>
</tr>
<tr>
<td></td>
<td>General Parameters Corp., 80</td>
<td>467</td>
</tr>
<tr>
<td></td>
<td>Magnavox, 182</td>
<td>467</td>
</tr>
</tbody>
</table>

### Miscellaneous

<table>
<thead>
<tr>
<th>Category</th>
<th>Product Name</th>
<th>Reader Service Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Graphics/Deskto Publishing</td>
<td>Adobe, Inc., 26</td>
<td>401</td>
</tr>
<tr>
<td></td>
<td>Adobe Photoshop, Inc., 26</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td>Adobe Systems, Inc., 26</td>
<td>401</td>
</tr>
<tr>
<td></td>
<td>Advanced Graphics, 180</td>
<td>360</td>
</tr>
<tr>
<td></td>
<td>Agfa Compugraphic, 162</td>
<td>379</td>
</tr>
<tr>
<td></td>
<td>Aldus Freehand, 10-11</td>
<td>329</td>
</tr>
<tr>
<td></td>
<td>Aldus Persuasion, 168-169</td>
<td>305</td>
</tr>
<tr>
<td></td>
<td>Berkeley System Design, 206</td>
<td>357</td>
</tr>
<tr>
<td></td>
<td>Caere Corp., 239</td>
<td>42</td>
</tr>
<tr>
<td></td>
<td>Ceres Software, 22</td>
<td>357</td>
</tr>
<tr>
<td></td>
<td>Computer Friends, 99</td>
<td>400</td>
</tr>
<tr>
<td></td>
<td>Dayton-Speck, 78</td>
<td>213</td>
</tr>
<tr>
<td></td>
<td>Deneba, 25</td>
<td>340</td>
</tr>
<tr>
<td></td>
<td>Deneba, 27</td>
<td>180</td>
</tr>
<tr>
<td></td>
<td>Lexar Modems, 90-91</td>
<td>440</td>
</tr>
<tr>
<td></td>
<td>Lexar Modems, 90-91</td>
<td>243</td>
</tr>
<tr>
<td></td>
<td>MacWarehouse, 215-221</td>
<td>411</td>
</tr>
<tr>
<td></td>
<td>Macworld Expo, 104-111</td>
<td>124</td>
</tr>
<tr>
<td></td>
<td>MacWorld Expo, 104-111</td>
<td>124</td>
</tr>
<tr>
<td></td>
<td>MacWorld Expo, 104-111</td>
<td>124</td>
</tr>
<tr>
<td></td>
<td>Micro Star, 267</td>
<td>411</td>
</tr>
<tr>
<td></td>
<td>Multicomp, 246</td>
<td>478</td>
</tr>
<tr>
<td></td>
<td>Multiplex Zones Int'l, 90-91</td>
<td>449</td>
</tr>
<tr>
<td></td>
<td>Open Mac, 261</td>
<td>45</td>
</tr>
<tr>
<td></td>
<td>Programs Plus, 56-59</td>
<td>44</td>
</tr>
<tr>
<td></td>
<td>USA Flex/Comark, 262</td>
<td>305</td>
</tr>
<tr>
<td>Floppy Disks</td>
<td>BASF, 86</td>
<td>470</td>
</tr>
<tr>
<td>Furniture</td>
<td>Anber Corp., 36</td>
<td>195</td>
</tr>
<tr>
<td></td>
<td>ScatCo, 71</td>
<td>195</td>
</tr>
<tr>
<td>Services</td>
<td>GE Rental/Lease, 245</td>
<td>406</td>
</tr>
<tr>
<td></td>
<td>MacAcademy, 255</td>
<td>406</td>
</tr>
<tr>
<td></td>
<td>Macworld Expo, 268-269</td>
<td>293</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td>Computer Friends, 214</td>
<td>68</td>
</tr>
<tr>
<td></td>
<td>I/O Design, 76</td>
<td>385</td>
</tr>
<tr>
<td></td>
<td>Kensington Software, 69</td>
<td>390</td>
</tr>
<tr>
<td></td>
<td>Kensington Software, 69</td>
<td>390</td>
</tr>
<tr>
<td></td>
<td>Micro Computer Accessories, 100</td>
<td>388</td>
</tr>
<tr>
<td></td>
<td>Micro Vision, 26</td>
<td>239</td>
</tr>
</tbody>
</table>

### Readership Information

- Reader Service Number: 260
- March 1989
<table>
<thead>
<tr>
<th>Name</th>
<th>Title</th>
<th>Address</th>
<th>City, State, Zip</th>
<th>Company</th>
<th>Phone</th>
<th>Area Code</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th>Reader Service Number</th>
<th>Advertiser Name</th>
<th>Reader Service Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>340</td>
<td>Abi Software, Inc.</td>
<td>327</td>
</tr>
<tr>
<td>35</td>
<td>Adobe Systems, Inc.</td>
<td>329</td>
</tr>
<tr>
<td>401</td>
<td>Advanced Graphics, 180</td>
<td>337</td>
</tr>
<tr>
<td>579</td>
<td>Agfa Compugraphic, 162</td>
<td>354</td>
</tr>
<tr>
<td>329</td>
<td>Aldus Freehand, 10-11</td>
<td>360</td>
</tr>
<tr>
<td>306</td>
<td>Aldus Persuasion, 168-169</td>
<td>35</td>
</tr>
<tr>
<td>35</td>
<td>Aldus, 8</td>
<td>35</td>
</tr>
<tr>
<td>53</td>
<td>Atuts, 210</td>
<td>403</td>
</tr>
<tr>
<td>403</td>
<td>American Micro Distributors, 222</td>
<td>420</td>
</tr>
<tr>
<td>39</td>
<td>Anthro Corp., 36</td>
<td>420</td>
</tr>
<tr>
<td>230</td>
<td>Aston-Tate, 98-99</td>
<td>454</td>
</tr>
<tr>
<td>454</td>
<td>Autodesk, 20-21</td>
<td>479</td>
</tr>
<tr>
<td>479</td>
<td>BASS, 83</td>
<td>487</td>
</tr>
<tr>
<td>487</td>
<td>Berkeley System Design, 206</td>
<td>495</td>
</tr>
<tr>
<td>495</td>
<td>Berkel USA, 187</td>
<td>5</td>
</tr>
<tr>
<td>5</td>
<td>Beverly Hills Computer, 261-265</td>
<td>303</td>
</tr>
<tr>
<td>303</td>
<td>Buspower, Inc., 68</td>
<td>426</td>
</tr>
<tr>
<td>426</td>
<td>Cere Corp., 239</td>
<td>52</td>
</tr>
<tr>
<td>52</td>
<td>CFI, 241</td>
<td>557</td>
</tr>
<tr>
<td>557</td>
<td>Central Point Software, 159</td>
<td>565</td>
</tr>
<tr>
<td>565</td>
<td>Corel Software, 22</td>
<td>127</td>
</tr>
<tr>
<td>127</td>
<td>Checkmark Software, 232</td>
<td>575</td>
</tr>
<tr>
<td>575</td>
<td>Clearpoint, 92</td>
<td>380</td>
</tr>
<tr>
<td>380</td>
<td>Computer Graphics, 196</td>
<td>60</td>
</tr>
<tr>
<td>60</td>
<td>Computer Friends, 90</td>
<td>68</td>
</tr>
<tr>
<td>68</td>
<td>Computer Friends, 214</td>
<td>218</td>
</tr>
<tr>
<td>218</td>
<td>Connect, Inc., 191</td>
<td>241</td>
</tr>
<tr>
<td>241</td>
<td>Cord Systems, 104</td>
<td>293</td>
</tr>
<tr>
<td>293</td>
<td>Crime, 225</td>
<td>400</td>
</tr>
<tr>
<td>400</td>
<td>CTA, 270</td>
<td>260</td>
</tr>
<tr>
<td>260</td>
<td>Dateight, 25</td>
<td>404</td>
</tr>
<tr>
<td>404</td>
<td>DayStar, 81</td>
<td>476</td>
</tr>
<tr>
<td>476</td>
<td>DayStar, 79</td>
<td>217</td>
</tr>
<tr>
<td>217</td>
<td>Denon, 23</td>
<td>546</td>
</tr>
<tr>
<td>546</td>
<td>Denon, 25</td>
<td>180</td>
</tr>
<tr>
<td>180</td>
<td>Denon, 27</td>
<td>165</td>
</tr>
<tr>
<td>165</td>
<td>Design Science, 72</td>
<td>242</td>
</tr>
<tr>
<td>242</td>
<td>Digital Vision, 224</td>
<td>562</td>
</tr>
<tr>
<td>562</td>
<td>Diskette Connection, 252</td>
<td>355</td>
</tr>
<tr>
<td>355</td>
<td>Dow Jones Software, 178</td>
<td>368</td>
</tr>
<tr>
<td>368</td>
<td>Dr. Mac, Inc., 209</td>
<td>155</td>
</tr>
<tr>
<td>155</td>
<td>Dual-Click, 194</td>
<td>452</td>
</tr>
<tr>
<td>452</td>
<td>Eikon Engineering, Inc., 180</td>
<td>103</td>
</tr>
<tr>
<td>103</td>
<td>E-Machines, 48-49</td>
<td>150</td>
</tr>
<tr>
<td>150</td>
<td>E-mail, 94</td>
<td>152</td>
</tr>
<tr>
<td>152</td>
<td>Fox Software, 211</td>
<td>177</td>
</tr>
<tr>
<td>177</td>
<td>GCC Technologies, 15</td>
<td>489</td>
</tr>
<tr>
<td>489</td>
<td>GDT Softworks, 224</td>
<td>195</td>
</tr>
<tr>
<td>195</td>
<td>GIF Browser/Net, 245</td>
<td>467</td>
</tr>
<tr>
<td>467</td>
<td>General Parametrics Corp., 80</td>
<td>577</td>
</tr>
<tr>
<td>577</td>
<td>Gearysoft, 256</td>
<td>440</td>
</tr>
<tr>
<td>440</td>
<td>Hard Drives Int., 190</td>
<td>337</td>
</tr>
<tr>
<td>337</td>
<td>Image Club Graphics, 102</td>
<td>360</td>
</tr>
<tr>
<td>360</td>
<td>iTime, 43</td>
<td>471</td>
</tr>
<tr>
<td>471</td>
<td>Irius, Magnetics, 225</td>
<td>82</td>
</tr>
<tr>
<td>82</td>
<td>Irius Magnetics, 184-185</td>
<td>385</td>
</tr>
<tr>
<td>385</td>
<td>I/O Design, 76</td>
<td>102</td>
</tr>
<tr>
<td>102</td>
<td>Jasmine, 49</td>
<td>457</td>
</tr>
<tr>
<td>457</td>
<td>Jastine, 50-51</td>
<td>102</td>
</tr>
<tr>
<td>102</td>
<td>Kensington Software, BC</td>
<td>59</td>
</tr>
<tr>
<td>59</td>
<td>Kensington Software, 69</td>
<td>145</td>
</tr>
<tr>
<td>145</td>
<td>La Cie, 18</td>
<td>172</td>
</tr>
<tr>
<td>172</td>
<td>Leapsette, 32</td>
<td>466</td>
</tr>
<tr>
<td>466</td>
<td>MacAcademy, 255</td>
<td>311</td>
</tr>
<tr>
<td>311</td>
<td>MacConnection, 114-111</td>
<td>264</td>
</tr>
<tr>
<td>264</td>
<td>Macland, 266</td>
<td>253</td>
</tr>
<tr>
<td>253</td>
<td>MackTec, 200</td>
<td>208</td>
</tr>
<tr>
<td>208</td>
<td>Mac Products, 238</td>
<td>78</td>
</tr>
<tr>
<td>78</td>
<td>MacWarehouse, 215-221</td>
<td>206-209</td>
</tr>
<tr>
<td>206-209</td>
<td>Macworld Expo, 206-209</td>
<td></td>
</tr>
</tbody>
</table>

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Microsoft Word ........................................ $239
Microsoft Works ....................................... $189

Imagewriter II Carrying Case ....................... $59
Mac Plus/SE Carrying Case ......................... $59
Mac SE w/Ext. Keyboard ............................. $69

Ergotronics
MacTilt .................................................. $68
Muzzle ................................................... $58

Farallon
MacRecorder Sound System ......................... $129

OUR POLICY
• Plain and simple. Hardware; your satisfaction guaranteed or your money back.
• Software; defective software will be replaced immediately. Manufacturers policies prohibit us from offering refunds on opened software.
• We accept most major credit cards with no surcharge added.
• Your credit card is not charged until we ship.
• Please allow 10 days for personal and company checks to clear.
• C.O.D. orders accepted.
• We gladly accept purchase orders from most major institutions.
• International orders accepted.
• California, Texas, Georgia and Arizona residents please add the appropriate local sales tax.
• To Place orders call Monday thru Friday 7AM to 6PM P.S.T.
• Prices and availability subject to change.

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Internal Fan
Keeps it cool & quiet .................................. $39.95

Mobius
Fanny Mac QT ......................................... $58
SE Silencer ............................................. $39

Mouse System
A+ Mouse .............................................. $65
A+ ADB Mouse ......................................... $79

SHIPPING
All items in stock will ship in 24 hours. We offer daily service from Federal Express, UPS, U.S. Postal Service. UPS ground shipments, please add 50¢ per pound. UPS Air Shipments, please add $1 per pound. Minimum shipping charge $4.00.
### External Hard Drives

<table>
<thead>
<tr>
<th>Capacity</th>
<th>Model</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 Megabyte</td>
<td>Giga Cell 20</td>
<td>$499.</td>
</tr>
<tr>
<td></td>
<td>Crate 20</td>
<td>$539.</td>
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<tr>
<td>30 Megabyte</td>
<td>CMS Enhancements 30</td>
<td>$589.</td>
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<tr>
<td></td>
<td>MicroNet 30</td>
<td>$579.</td>
</tr>
<tr>
<td></td>
<td>Conner 40</td>
<td>$669.</td>
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<tr>
<td></td>
<td>Crate 40</td>
<td>$649.</td>
</tr>
<tr>
<td></td>
<td>MicroNet 46</td>
<td>$699.</td>
</tr>
<tr>
<td></td>
<td>Quantum 40*</td>
<td>$749.</td>
</tr>
<tr>
<td>40 Megabyte</td>
<td>CMS Enhancements 40</td>
<td>$749.</td>
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<tr>
<td></td>
<td>Crate 60</td>
<td>$699.</td>
</tr>
<tr>
<td></td>
<td>MicroNet 62</td>
<td>$739.</td>
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<tr>
<td>60 Megabyte</td>
<td>CMS Enhancements 60</td>
<td>$1,099.</td>
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<tr>
<td></td>
<td>Crate 80</td>
<td>$1,149.</td>
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<tr>
<td></td>
<td>MicroNet 80</td>
<td>$979.</td>
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<tr>
<td></td>
<td>Quantum 80*</td>
<td>$979.</td>
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<tr>
<td>80 Megabyte</td>
<td>CDC 90</td>
<td>$999.</td>
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<tr>
<td></td>
<td>MicroNet 91</td>
<td>$999.</td>
</tr>
<tr>
<td></td>
<td>Rodime 140</td>
<td>$1,299.</td>
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<tr>
<td>140 Megabyte</td>
<td>CDC 150</td>
<td>$1,949.</td>
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<td>MicroNet 150</td>
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<tr>
<td>173 Megabyte</td>
<td>CDC 173</td>
<td>$1,649.</td>
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<tr>
<td></td>
<td>MicroNet 173</td>
<td>$1,649.</td>
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**Drives over 173 Meg Call for Price**

### Internal Hard Drives for the SE

<table>
<thead>
<tr>
<th>Capacity</th>
<th>Model</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>30 Megabyte</td>
<td>CMS Enhancements 30</td>
<td>$469.</td>
</tr>
<tr>
<td></td>
<td>Conner 40</td>
<td>$549.</td>
</tr>
<tr>
<td></td>
<td>Quantum 40*</td>
<td>$629.</td>
</tr>
<tr>
<td>40 Megabyte</td>
<td>CMS Enhancements 40</td>
<td>$659.</td>
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<tr>
<td></td>
<td>Crate 50</td>
<td>$639.</td>
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### Mac II Internal Hard Drives

<table>
<thead>
<tr>
<th>Capacity</th>
<th>Model</th>
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</tr>
</thead>
<tbody>
<tr>
<td>80 Megabyte</td>
<td>CMS Enhancements 80</td>
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<tr>
<td></td>
<td>MicroNet 80</td>
<td>$899.</td>
</tr>
<tr>
<td></td>
<td>Quantum 80*</td>
<td>$899.</td>
</tr>
<tr>
<td>100 Megabyte</td>
<td>Conner 100</td>
<td>$899.</td>
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### Mac II Internal Hard Drives

<table>
<thead>
<tr>
<th>Capacity</th>
<th>Model</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>80 Megabyte</td>
<td>CMS Enhancements 80</td>
<td>$549.</td>
</tr>
<tr>
<td></td>
<td>Conner 40</td>
<td>$549.</td>
</tr>
<tr>
<td></td>
<td>Quantum 40*</td>
<td>$629.</td>
</tr>
<tr>
<td>100 Megabyte</td>
<td>CMS Enhancements 100</td>
<td>$999.</td>
</tr>
<tr>
<td></td>
<td>Conner 100</td>
<td>$999.</td>
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</table>

### Removables

<table>
<thead>
<tr>
<th>Type</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>MicroNet 45</td>
<td>$1,199.</td>
</tr>
<tr>
<td>(includes one cartridge)</td>
<td></td>
</tr>
<tr>
<td>45 Cartridge</td>
<td>$119.</td>
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</table>

### Tape Back-Ups

<table>
<thead>
<tr>
<th>Type</th>
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</thead>
<tbody>
<tr>
<td>CMS Enhancements 60</td>
<td>$699.</td>
</tr>
<tr>
<td>Crate 60</td>
<td>$669.</td>
</tr>
<tr>
<td>Irwin 40</td>
<td>$899.</td>
</tr>
<tr>
<td>Irwin 80</td>
<td>$1,099.</td>
</tr>
<tr>
<td>MicroNet 150</td>
<td>$1,349.</td>
</tr>
</tbody>
</table>

### Hardware Accessories

<table>
<thead>
<tr>
<th>Type</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anchor 5-year warranty</td>
<td>$149.</td>
</tr>
<tr>
<td>(Includes Cable &amp; Software)</td>
<td></td>
</tr>
<tr>
<td>2400 Baud Modem</td>
<td>$209.</td>
</tr>
<tr>
<td>Farrallon Mac Recorder</td>
<td>$135.</td>
</tr>
<tr>
<td>Phone Net Connector</td>
<td>$34.</td>
</tr>
<tr>
<td>General Computer Business Laser Printer</td>
<td>$3,199.</td>
</tr>
<tr>
<td>Personal Laser Printer</td>
<td>$1,499.</td>
</tr>
<tr>
<td>Qume Script 10 Laser Printer</td>
<td>$3,299.</td>
</tr>
<tr>
<td>Radius 16 Accelerator</td>
<td>$739.</td>
</tr>
<tr>
<td>Radius 25 Accelerator</td>
<td>$1,249.</td>
</tr>
<tr>
<td>Full Page Display II</td>
<td>$3,789.</td>
</tr>
<tr>
<td>Two Page Display SE, II</td>
<td>$1,849.</td>
</tr>
<tr>
<td>Radius Color Monitor</td>
<td>Call.</td>
</tr>
</tbody>
</table>

### Memory

**SIMMS IN STOCK**

All hard disk drives carry a manufacturer's one year warranty except for the Crate and Quantum drives which have a manufacturer's two year warranty.

### For Ordering and Technical Support

Call 1-800-333-3353

Visa, MasterCard, and American Express accepted NO surcharge. Your Credit Card will not be charged until your order is shipped. We accept COD orders, additional $5.00 charge. AZ residents add 6.5%. All shipments made by Federal Express.

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Donn - Lunar Lander - MacMazes - Goliath - MacFootball - Radical Castle - etc.
Animals - 3D Mazes - Life Hack - Orbit - Math Mix - Full Moon -
Hangman - Word Search - Math Mud - Pattern Block - etc.
Famous Faces - Cartoons - Bathers - Cars - Sports Clips - Logos -
Shadawodies - and more!

★ EDUCATION
Red Ryder 9.4 - Big Screen PATT - Font Utilities - Disk Librarian - Servant
- Disk Utilities - Resource Editor - and many more!

★ CLIP ART
Sound Effects - Pop Tunes - Sound Movyr - Max Headroom - Monty Python -
Cheap Deep - plus many more!

★ APPLICATIONS
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MacRobots - Dot-to-Dot - Memory - CK - etc.
Your Faithful Camel - Sound Mover - Mac Tips - Hyper Slots -
Guitar Tutor - Family Tree - The Ads Stock - etc.
Jungle Adventure - Sound Manager - The Guide - Hyper Zap
Away From Home - Tel Mover - Rome Desk - etc.
Tilt - Restaurants - Hyper Jotto - Indigo Wine Man - Hyper
- quacky - and more!
Laura's Letters - Astro Stack - Hyper BBS - Star Trek Advent
- ur Script Printer - Indigo Gets Out

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Info: (619) 436-0130

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accessories, games, and other featured programs.

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Add $5/set for single-sided. Add $4 per order for shipping
and handling. Call today for free catalog!

ORDER TOLL FREE
(800) 444-1343
7 am to 5 pm Pacific Time
Monday through Saturday

Circle 411 on reader service card
Register early for MACWORLD Expo/Washington. And save fifteen Washingtons.

This is your chance to pre-register for MACWORLD Expo/Washington, D.C., April 26-28, 1989, at the Washington, D.C. Convention Center. Please choose your package and fill out this form completely. Incomplete forms will be returned. Use one form per person. And make photocopies to register additional people. Then send the completed form(s) along with your payment to: MACWORLD Expo, P.O. Box 67, Westwood, MA 02090. Registration coupons must be received by March 24. And registration fees are non-refundable. For further information, call Mitch Hall Associates at 617-326-9955. U.S. and Canadian attendees will be mailed their badges on or around April 5. All other badges will be held at the Pre-registration Counter at the Washington, D.C. Convention Center for pick up beginning Tuesday, April 25, 1989. Registration coupons received after March 24 will be returned to you.

Please register me for:

- Package One $65 Conference sessions* and exhibits. Pre-register by March 24. $80 at door.
- Package Two $20 Admission to exhibits only. Pre-register by March 24.
- Please rush me detailed information (including pricing) about the Mac Masters Series.

Please send my badge and further information to:

Please check one:

- Home Address
- Company Address

Last Name ____________________________ First Name ____________________________
Mailing Address ____________________________
City, State, Zip ____________________________
Telephone ____________________________

If mailing to company address:

Title ____________________________
Company ____________________________

☐ Check enclosed (make payable to MACWORLD Expo) Amount $______
☐ MasterCard  ☐ Visa  ☐ American Express  Amount $______

Account Number ____________________________ (Include all numbers)
Expiration Date ____________________________

Cardholder Signature ____________________________ (Signature necessary to be valid)

If cardholder is other than registrant, please print name below:

Last Name ____________________________ First Name ____________________________

Cash only at the door. After March 24, you must register at the show.

Please check the appropriate boxes:

Your industry or profession  Your title  Size of your organization  Where will you be staying

a.  Manufacturer (noncomputer)
   k.  CEO/president/    (number of employees
      vice president      national/international)
   b.  Manufacturer (computer industry)
   l.  Comptroller
   c.  Distributor/dealer/retailer/service
   m.  DP/MIS manager
   n.  Owner/Partner
   o.  Engineer
   d.  Finance/insurance/real estate
   p.  Doctor/lawyer/dentist/CPA
   e.  Professional (law/medicine)
   f.  Communications/publishing
   g.  Education
   h.  Government
   i.  Consultant
   j.  Other (specify)__________________________
   a.  Apple II+
   b.  Apple II
   c.  Apple IIc
   d.  Apple III
   e.  Apple II GS
   f.  None
   g.  Other (specify)__________________________
   h.  Where will you be staying
   i.  Macintosh
   j.  Macintosh Plus
   k.  Macintosh SE
   l.  Macintosh II
   m.  Home
   n.  With friends
   o.  Hotel (specify)__________________________

* All conference sessions are on a first-name, first-come, first-served basis with no guaranteed seating.

Please fill out this form completely and send it, along with your check or money order to: MACWORLD Expo, P.O. Box 67, Westwood, MA 02090.
Here's a sound business deal for anyone who appreciates the value of a dollar.


That means you pay just $65, instead of $80 at the door, for three-day admission to the original Macintosh computer show at the Washington, D.C. Convention Center. This one low fee allows you to attend all conference sessions* and visit all exhibits.

Meet and talk with more than 300 exhibitors spread over 200,000 square feet of space. And take part in dynamic seminars and workshops run by the biggest names in the Macintosh industry, people like John Sculley, Bill Atkinson, and Jerry Borrell. Plus you'll hear from the gurus of the Macintosh in the federal government, C. Lloyd Mahaffey, Dave Lavery, and Steven Wolf.

There's something for everyone in business or government. It doesn't matter whether you use a Mac to run a private business or manage an agency of the federal government. In three days, under one roof, you'll gather more useful information than you could in weeks of running around to computer stores.

MACWORLD Expo/Washington is a hands-on, do-it-yourself show. You can create professional-quality presentation visuals—on the spot. Compose newsletters, reports, brochures, and ads. Send or receive messages from Mac to Mac, or Mac to PC, or Mac to DEC. Witness the power of HyperCard. Try your hand at animation or graphics. And much more.

There's literally something for every Macintosh user—from novice to aficionado—including special sessions for educators, engineers, attorneys, health-care professionals, real estate agents, bankers and financial managers, home office, corporate and government users.

Series of Private Executive Seminars.

MACWORLD Expo/Washington will feature a series of private, limited-attendance, no-nonsense seminars on the subjects executive users want to hear about most—networking, spreadsheets, databases, desktop publishing and presentations, HyperCard, telecommunications and more.

Each practical, in-depth seminar gives you the rare opportunity to learn directly from Macintosh masters. Pick up pointers and shortcuts you can put to work right away. And get the straight story on major applications and vendors in your subject area.

If you would like to know more about the Mac Masters Series, please check the appropriate box on the attached reply form. Or call 214-554-0111. We'll send you an information package, including pricing, immediately.

Save on airfare and hotels.

American Airlines is offering special airfares to attendees of MACWORLD Expo/Washington. Simply call 1-800-433-1790 and ask for STAR File #716676. You'll automatically receive a discount.

MACWORLD Expo/Washington has also arranged for special rates at a variety of hotels in area code 202: Comfort Inn Downtown, 289-5959; JW Marriott, 393-2000; Grand Hyatt Washington, 582-1234; Hyatt Regency, 737-1234; Quality Inn, 638-1616; Ritz Carlton, 293-2100; The Bellevue Hotel, 1-800-327-6667; Holiday Inn-The Governor's H.S., 296-2100; The Mayflower, 347-3000; Hotel Washington, 638-5900; Holiday Inn-Thomas Circle, 737-1200; One Washington Circle, 872-1680; Vista International, 429-1700; Embassy Square Hotel, 659-9000; Washington Marriott, 872-1500; Washington Plaza Hotel, 842-1300; The Henley Park Hotel, 638-5200; Days Inn Downtown, 842-1020. Call soon to ensure reservations.

Avoid long lines and save. Register for MACWORLD Expo/Washington conference sessions* before March 24 and save $15. Simply fill out the attached registration form and mail it with your check or money order for $65 (or supply credit card information) to the address on the form. After March 24, the cost is $80 and you must register on-site. Registrations received after March 24 will be returned.

If you want to attend the exhibits only, admission is $20. And if you're a student, the pre-registration cost is just $15. But you must send us a copy of your student I.D. with your registration form to qualify. We encourage you to register now and avoid long lines at the door.

If the registration form is missing from this ad, please call Mitch Hall Associates at 617-326-9355. We'll be happy to send you one.

Don't miss this opportunity to attend the first-ever MACWORLD Expo/Washington. And save fifteen Washingtons.
We’ve got a new concept in Optical Character Recognition for the Mac. It’s called TextPert. We’ll show you five good reasons that make TextPert the most intelligent OCR purchase you can make.

1 Flexibility
Flexibility in the type of document you want to read—(TextPert can read documents as simple as mono-spaced, typewritten pages or as complex as newspapers and telephone directories). Flexibility to read any text—bold, italic, written in a foreign language with special characters, or written in an unusual font. Flexibility in choosing the scanner you want to use or turning the scanner you already have into an Expert TextReader—(we work with all Macintosh compatible scanners on the market).

2 Ability
Ability to read columns of kerned text from 4 to 36 points in size printed on poor quality paper. Ability to read columns or tables of information, maintain their format, and import them into databases. Ability to read text even if it has up to a 25% rotation.

3 Compatibility
TextPert is compatible with you. It is intuitively written to modify the reading parameters automatically according to the document it is reading. And it is compatible with all of the major word-processing and page layout programs available on the Macintosh.

4 Affordability
TextPert gives you the power and functionality of large OCR systems at a fraction of the price.

5 It Works
Unlike other programs which claim to give you large system functionality at a fraction of the price, TextPert works... with an error rate of less than 1/2% on high quality originals.
Now *Macworld* connects you with the world of Macintosh products instantly. And cost-effectively. *The Macworld Catalog* is your immediate access to hundreds of Macintosh products, manufacturers, and services. Each month, this special direct response section brings you detailed product information arranged by category—so you can quickly compare prices and capabilities. Then pick up the phone and order!

For the best Macintosh buys, scroll through *The Macworld Catalog*. 
# The Macworld Catalog

## Accessories
- Furniture ................ 273
- Hardware .............. 273
- Mouse Pads ............ 273
- Supplies ............... 273

## Hardware
- Bar Code ............... 274
- Computer Systems .... 274
- Data Acquisition ...... 275
- Emulators .............. 275
- Expansion Chassis .... 275
- Memory Upgrade ....... 275
- Miscellaneous ........ 277
- Networking ............ 278
- Peripherals ............ 278
- Printers ............... 278

## Software
- Financial .............. 285
- Fonts .................. 285
- Fund Raising .......... 286
- Graphics .............. 286
- Health ................. 286
- Languages ............. 286
- Medical ............... 287
- Music/MIDI ............ 287
- Politics .............. 287
- Programming Tools .... 288
- Public Domain ......... 288
- Real Estate ............ 288
- Recreational ........ 288

## Services
- Computer Insurance .. 279
- Data Conversion ....... 279
- Desktop Output ....... 279
- Desktop Publishing ... 279
- Disk Duplication ....... 280
- Laser Recharge ......... 280
- Training ............... 280

## Miscellaneous
- Business Opportunities 291
- Mailing Lists ........ 291

Categories are subject to change

### Advertising Rates & Information

The Macworld Catalog section is a monthly link-up for advertisers and volume purchasers of Macintosh-related products and services. The Catalog offers advertisers a low-cost marketing opportunity and provides readers with a timely, easy-to-use menu for product buying.

Display ads are sold by column inches (2" minimum). Standard red is available as a second color. Text-only listings are available for a minimum of three issues at $322 per issue ($966 total).

For more information, space closings, and material deadlines, please call toll-free 800/888-8622.

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Take advantage of the direct link with your buyers that maximizes exposure at a low cost. The Macworld Catalog reflects the expanding corporate Macintosh audience whose purchasing activities increasingly include mail order. The cost-effective direct response advertising available monthly in The Macworld Catalog links you instantly with nearly 500,000 qualified buyers. Get in the link. Call 800.888.8622 and place your ad now!

800.888.8622

For your ad to appear on The Macworld Catalog screen, call 800/888-8622.
The Macworld Catalog

Hardware

TURBO MOUSE*

Now you can own the Winner of the 1988 Turbo Mouse Race, for less than half the retail price! Our Turbo Mouse has been named Top Input Device for '87 & '88 by the readers of Macworld. The '88 Macworld standings for Hardware Top Input Device: • TURBO MOUSE* • Abaton Mouse Trackball-Pro-point • Apple Expanded Keyboard • Mac-101 Enhanced Keyboard • Mouse Systems A+ Mouse Also Turbo Mouse ADB at low, low prices!

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Size: 9¾" x 8" x ¼"

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- 36 pads $8.50 w/logo
- 72 pads $6.90 w/logo
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- 500 pads $4.14 w/logo
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ENTIRE pad imprinted. Guaranteed to last. Multi-color jobs OK. SAMPLES w/your company logo $12.50

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Only $29.95

Mac portability for less! Not bulky to carry & holds small for storage

Nylon webbing, padded leather shoulder strap, quick-release buckles Keyboard, mouse & cables attach with straps (included)

Only $29.95

MacHarness™

Carrier

Embroidery

Macportability for less!

Nylon webbing, padded leather shoulder strap, quick-release buckles Keyboard, mouse & cables attach with straps (included)

MacHarness™

Carrier

Furniture

Save up to 40% factory direct

C.A.D.-C.A.M. WORKSTATIONS
LASERWRITERS/DRIVERS
PRINTER STANDS
AND MORE...

The Museum of Modern Art design classic.

For Free Catalog

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1-800-962-6789

1-800-1328-0077, 612-1917

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Furniture for the Macintosh
Nationally advertised fine oak furniture

The Macworld Catalog screen, call 800/888-8622.
Supplies

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Mac, keyboard & mouse.
Reg. $32. NOW $25.
Mac II, monitor atop CPU, keyboard & mouse.
Reg. $42. NOW $33.
*Free 8"x9½ Mousepad valued at $10 with cover set purchase.
Satisfaction Guaranteed.

**Computer Cover Company**
23392 Peralta, #4, Laguna Hills, CA 92653
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<tbody>
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<td>$Call</td>
</tr>
<tr>
<td>Macintosh SE 2 800k drive</td>
<td>$Call</td>
</tr>
<tr>
<td>Macintosh SE 30mb internal</td>
<td>$2695</td>
</tr>
<tr>
<td>Macintosh SE 40mb internal</td>
<td>$2895</td>
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<td>Macintosh II 40mb internal</td>
<td>$3995</td>
</tr>
<tr>
<td>Macintosh II 60mb internal</td>
<td>$4150</td>
</tr>
<tr>
<td>Apple keyboard for SE or II</td>
<td>$100</td>
</tr>
<tr>
<td>Datadesk 101 keyboard</td>
<td>$140</td>
</tr>
<tr>
<td>Apple 13” color monitor</td>
<td>$750</td>
</tr>
<tr>
<td>Mac II 8 bit video card</td>
<td>$495</td>
</tr>
<tr>
<td>Imagewriter II w/cable</td>
<td>$450</td>
</tr>
<tr>
<td>Imagewriter LQ w/cable</td>
<td>$995</td>
</tr>
<tr>
<td>Apple Laserwriter II NT</td>
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<table>
<thead>
<tr>
<th>Months on chart</th>
<th>Last month</th>
<th>This month</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Business Software</strong></td>
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</tr>
<tr>
<td>46</td>
<td>1</td>
<td>1 Microsoft Word <em>Microsoft</em></td>
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<tr>
<td>25</td>
<td>3</td>
<td>2 Microsoft Works <em>Microsoft</em></td>
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<td>37</td>
<td>2</td>
<td>3 Microsoft Excel <em>Microsoft</em></td>
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<td>33</td>
<td>4</td>
<td>4 PageMaker <em>Aldus</em></td>
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<td>22</td>
<td>5</td>
<td>5 MacWrite <em>Claris</em></td>
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<td>6</td>
<td>6</td>
<td>6 WordPerfect for the Macintosh <em>WordPerfect</em></td>
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<td>6</td>
<td>7</td>
<td>7 Adobe Illustrator/Illustrator 88 <em>Adobe Systems</em></td>
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<tr>
<td>1</td>
<td>-</td>
<td>8 FreeHand <em>Aldus</em></td>
</tr>
<tr>
<td>21</td>
<td>-</td>
<td>9 SuperPaint <em>Silicon Beach Software</em></td>
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<tr>
<td>5</td>
<td>-</td>
<td>10 QuarkXpress <em>Quark</em></td>
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<td><strong>Education Software</strong></td>
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<tr>
<td>13</td>
<td>2</td>
<td>1 Reader Rabbit <em>The Learning Company</em></td>
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<td>29</td>
<td>1</td>
<td>2 Math Blaster <em>Davidson &amp; Associates</em></td>
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<td>26</td>
<td>3</td>
<td>3 Typing Tutor <em>Simon &amp; Schuster Computer Software</em></td>
</tr>
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<td>26</td>
<td>4</td>
<td>4 KidsTime <em>Great Wave Software</em></td>
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<td>5 Geometry <em>Sensei Software</em></td>
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<td>1 MacGolf <em>PGA</em></td>
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<td>2 Flight Simulator <em>Microsoft</em></td>
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<td>3 Dark Castle <em>Silicon Beach Software</em></td>
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<td>4 Falcon <em>Spectrum HoloByte</em></td>
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<td>9</td>
<td>5</td>
<td>5 Beyond Dark Castle <em>Silicon Beach Software</em></td>
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<td><strong>Networking/Data Communications</strong></td>
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<td>1 TOPS <em>TOPS</em></td>
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<td>29</td>
<td>3</td>
<td>2 LocalTalk <em>Apple Computer</em></td>
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<td>16</td>
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<td>3 PhoneNet <em>Parallon Computing</em></td>
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<td>4 AppleShare <em>Apple Computer</em></td>
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<td>5 MacLink Plus <em>DataViz</em></td>
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<td><strong>Hard Disks</strong>*</td>
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<td>1 Rodime 45 Plus External <em>Rodime Systems</em></td>
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<td>2 SD Macstack 20 MB <em>CMS Enhancements</em></td>
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<td>2</td>
<td>5 Pro Series 30-SE Internal <em>CMS Enhancements</em></td>
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<td><strong>Add-In Boards</strong></td>
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<td>16</td>
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<td>1 Radius Accelerator <em>Radius</em></td>
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<td>2 Apple 2MB Memory Expansion <em>Kit Apple Computer</em></td>
</tr>
<tr>
<td>3</td>
<td>2</td>
<td>3 Radius Interface Display <em>Radius</em></td>
</tr>
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<td>-</td>
<td>4 Mac286 AST Research</td>
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<td>5 Micro Snap Memory Expansion <em>Kit Microtech International</em></td>
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<th>Last month</th>
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<tr>
<td><strong>Product Watch</strong></td>
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<td>Editors' choice of other recent or forthcoming products of particular interest.</td>
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<tr>
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<td><strong>Aldus FreeHand 2.0</strong> <em>Aldus</em> color drawing package</td>
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<td><strong>More II</strong> <em>Symantec</em> presentation graphics</td>
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<td><strong>Wingz</strong> <em>Informix</em> spreadsheet</td>
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**Source:** Exclusive InfoCorp survey of more than 125 Macintosh retailers and selected mail-order suppliers. Covers sales during November 1988.

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