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21-Inch Apple Monitor Sparks Protest
A 21-inch color monitor that Apple is expected to announce in early June is being protested by some third-party monitor makers and international distributors who say the monitor will hurt their business and possibly reduce the number of distributors who carry Apple-related products internationally. The two-page monitor will be made by FIMI, a subsidiary of Philips Italy; will have reduced magnetic-field emissions; and will be bundled with an 8-bit graphics adapter, according to sources inside Apple and at third-party vendors briefed by Apple. "If they bring it out, then companies such as RasterOps, Radius, SuperMac, E-Machines, PCPC, and others will probably find that their [large-screen] 8-bit sales will drop off completely," said Randy Green, executive director of the Federation of International Distributors, a not-for-profit association in Boston. The monitor's features, combined with the Apple logo and a rumored low price, could be deadly for the third-party vendors, according to Green. Green and the third-party sources said that Apple had already made a concession by not bringing the monitor out in the United States. However, the monitor is expected to be available in Canada and Mexico, making a U.S. gray market possible.

Quark and Scitex Settle
Quark and Scitex have settled a dispute that forced Scitex to stop marketing Visionary, a version of QuarkXPress that can read Quark files and send them to a Scitex prepress system. Quark, which developed Visionary for Scitex, wanted Scitex's permission to make Visionary capable of saving files in a format that QuarkXPress could read, but Scitex refused. The agreement calls for Scitex to take over Visionary and develop it as an add-on to QuarkXPress. The Visionary Xension, as the new product will be called, will probably not allow QuarkXPress to open its files.

What's True at Letraset
FontStudio 2.0 can create TrueType fonts and convert Type 1, Type 3, and Letraset fonts to TrueType format. It can also interpolate between heavy and light weights to create intermediate weights, and automatically add hinting. It lists for $595. Letraset 2.0 incorporates Pantone's tools for precise matching of Pantone, RGB, and CMYK colors; antialiases the color channels as well as the black; imports Illustrator 3.0 outlines directly; and supports copying and pasting the "envelopes" that contain font-manipulation information from one block of text to another, as well as saving envelopes as templates. It can perform distortions on all four sides of a text block at one time, and screen-rendering speed is greatly increased. Pricing for Letraset 2.0 was not set at press time. Letraset is at 201/845-6100.

Farallon Rewrites Sound Edit to Work with 6.0.7
Farallon Computing said recently that it has rewritten its Sound Edit utility to enable its Sound Recorder to work with Apple's new Sound Input Manager in System 6.0.7. Apple designed Sound Input Manager to work with the microphones and other hardware included with the Macintosh LC and the IIsi, but the software was incompatible with several third-party sound-editing utilities, according to Farallon. For upgrade information, contact Farallon at 415/596-9100.

Apple Says Macintosh Shipments Up by 85 Percent
The total number of Macintoshes shipped in Apple's second fiscal quarter was up by about 85 percent over the same quarter a year ago, Apple said. Apple chairman John Sculley attributed the increase to the company's strategy of lowering prices and gaining market share.

Rush Hour
One of the first announced utilities for managing the complexities of System 7.0 is Traffic Controller, which will monitor AppleEvents—communication between applications—and enable users to intervene by, for example, redirecting an IAC call to a different application. Traffic Controller will also let users examine a log of publish-and-subscribe relationships; keep several iterations of intertwined files and roll them back to earlier versions; and provide information about network AppleEvents for network administrators. Single-user Traffic Controller will list for $129, and the network version for $249. For more information, contact Tactic Software at 305/378-4110.

Toshiba Shows Speedy CD ROM Player
Toshiba America Information Systems has announced the TXM-3300A, a fast CD ROM player with an average access time of 325ms. Unlike most CD ROM players, the drive has improved seals to prevent (continues)
contamination by dust, and it automatically cleans the read lens for greater reliability. The TXM-3300A, slated to ship in July, comes in versions with interface kits for IBM PCs and compatibles or Macs. The Macintosh version will have a suggested list price of $895. For more information, contact Toshiba at 714/583-3000.

**Ethernet Hits New Low at $199**

Start-up vendor Sonic Systems says it has begun shipping two series of Ethernet boards for Macs at a cost of $199 each, considerably less expensive than other Ethernet devices. The Ether TinT series all have a thin Ethernet interface, and the Ether TwiT series of 10BaseT boards connect via twisted-pair cable. All the boards are compatible with AppleTalk Phase 1 and Phase 2 protocols, which means they can communicate using those protocols over Ethernet and connect more easily to AppleTalk networks. The company said it ships both series in versions that work in the Macintosh SE, SE/30, LC, and all Macintosh II machines. The $199 price is a firm figure, since the company sells direct. For more information, contact Sonic Systems at 408/725-1400.

**Kodak Gives Away Color Tool**

Eastman Kodak is releasing a public domain utility for decompressing color images compressed with the company's Colorsqueeze, a $179 application. The utility is available on most online services. Kodak is also developing a system to convert images from photographic film to digital format and save them on a CD ROM. Kodak is at 716/726-3437.

**HP Drops Price of DeskWriter Again**

Hewlett-Packard recently cut the suggested retail price of its popular DeskWriter ink-jet printer for the Mac from $995 to $729. The cut came not long after Apple introduced its low-cost StyleWriter and Personal LaserWriter LS. For more information, contact HP at 800/752-0900.

**AppleTalk's New Voice**

Like most network-management tools, TalkManage can watch activity on a network, decode packet headers, and record traffic levels, transmission errors, and similar information, and display the information in real time on a histogram. But it also has some unusual features. Currently shipping version 1.4 can send a message on its own or use QuickMail to inform someone when a network event triggers an alarm—for example, informing the net administrator when a device disappears from the net. TalkManage generates a map of a network (in 1.4 the map is resizable) and provides tools for analyzing network layout and designing more-efficient networks. From within TalkManage you can also configure most AppleTalk routers, including those from Cayman Systems and Shiva. Version 2.0 will provide similar tools for Ethernet, including configuring a VAX-based Ethernet using DEC's DEcMec; will be able to send messages with Microsoft Mail; and will support the Simple Network Management Protocol, which Apple has finally settled on as its AppleTalk standard. Pricing depends on network configuration. For more information, contact Distributed Technologies at 617/684-0060.

**Silicon Graphics to Discontinue Mac Development?**

Silicon Graphics Inc. (SGI) recently said that it will likely discontinue any development of its highly regarded IRIS 3-D graphics software for the Macintosh. In early April Silicon Graphics signed a technology agreement with Microsoft to integrate SGI's IRIS Graphics Library into Microsoft's applications and system software. At the same time, Compaq Computer and SG announced a strategic relationship and Compaq acquired 13 percent of SGI's stock.

**Apple II Board for the Mac LC Shipping**

Apple said it has begun shipping the Apple II emulation board designed for the Macintosh LC. The Apple IIe Card was designed to let schools and others buy Mac LCs without losing the benefit of the Apple II software they already have. The board is compatible with most of the thousands of Apple II applications, according to Apple, and can support an external Apple II 5¼-inch floppy drive and an Apple joystick. The card's suggested retail price is $199. For more information, contact your Apple dealer.

**The Future of Fax**

The TR-29.2 committee of the Telecommunication Industry Association is establishing a new fax-modem standard, Class 2, which moves responsibility for timing control from the computer to the fax chip. The committee may also require fax-modem chips to detect when the computer's serial port overflows and loses data. Committee member Tom Eyslin, whose company Solutions markets Macintosh fax-modem software, says the Mac's tiny 3-byte serial port buffer is especially vulnerable to data loss, and that on-chip detection would let fax modems run reliably in the background. Class 3 modems, which are years away, will free up the computer from imaging tasks—for example, converting QuickDraw or PostScript to a fax bitmap.

**DiskExpress Ready for System 7**

Version 2.07 of the disk-optimization utility DiskExpress II is designed to cooperate with System 7's complexity. It can defragment a volume that several people on a network are sharing with FileShare, without disturbing users' access privileges; notice and optimize around blocks marked as unusable by System 7; and operate in virtual memory and large RAM environments. It will list for $89.95. For more information, call ALSoft at 713/353-4090.
Redefining the Paint Category

PixelPaint defined the category of Professional Color Paint. Now, version 2.0 extends the Paint category into artistic image processing. Demanding designwork requiring image compositing, 8-bit masking, transparency and antialiasing or special effects such as embossing, patterning, tinting or controlled warping is dramatically simplified. Photographs can be turned into spectacular art with a few commands or brushstrokes. And precision controls and full color separations mean your designs come out looking the way you expect them to look.

While Better Simulating Traditional Paint

And, if you enjoy working with physical media, Pro 2.0 has the tools you’ve been searching for! PixelPaper™, which simulates textured surfaces such as linen, charcoal paper or even concrete, and pressure sensitive brushes, charcoals, pastels and airbrushes, combine to create outstanding, natural, painterly effects on a computer. In autoscrollable documents up to 4000 x 4000 pixels. All with the flexibility of Macintosh®-assisted design—Pro 2.0’s object-oriented paint tools allow you to continue manipulating your strokes before applying them to your image.

With Second Generation Interface Breakthroughs

A second generation in Paint, Pro 2.0 is easier to use than ever before because the interface has been redesigned with the designer’s needs in mind. Floating palettes and multiple documents allow you to immediately access and apply tools without climbing through a jungle gym of menus. And, with Balloon Help under System 7.0, Pro verbally tells you what each tool will do.

Buy PixelPaint Professional 2.0 now and receive a CookBook tutorial ($19.95 value) free when you return your registration card. Call 1-800-624-8999 (x. 210B) for more information about Pro 2.0.
Remember the first day you got your hands on a Mac?
Remember how excited you felt when you saw all the things it could do?
This may refresh your memory.
Introducing WordPerfect® 2.0.

Every once in a while a new product comes along that sparks the same kind of excitement you may have experienced with your first Macintosh (you stayed up half the night, right?). As we've shown new WordPerfect® 2.0 to Macintosh users around the country, we've seen a very similar reaction. First eyes open wider. Then heads start to nod. Followed by grins that stretch dimple to dimple.

Here are some of the more graphic improvements.

We built a graphics and drawing package right into the program. With WordPerfect 2.0, you don't have to leave your document to incorporate graphics. You can create, edit, size, scale and crop graphic figures just by clicking “graphics” or “draw” on the pull-down menu. The palette includes all of the standard drawing tools, plus Bezier curves, polygons and a free rotation tool.

WordPerfect 2.0 also lets you create text boxes. Inside your text boxes you can change font size and attributes. Then you can drag your text box wherever you want in your document and the rest of your text will wrap around it automatically.

The list of new features could fill a page.
Or up to 24 columns.

By clicking and dragging icons on the new WordPerfect ruler, you can create columns (newspaper or parallel) and then adjust the column settings, align text, set tabs, change line spacing, move margins and do a number of other formatting changes to your document.

Want to add a border to text, paragraph, column, or page? Easy. WordPerfect 2.0 gives you 36 different border styles from which to choose.

Like working with Styles? WordPerfect not only lets you use them, you can also share your styles with other people on your network.

We've also added new features like a Macro Editor, Tables of Authorities, and Line Numbering. And we've made enhancements to Merge, Search and Replace, and Macros.

Of course, what counts is how you feel.

See WordPerfect 2.0 up and running at your dealer. Better yet, buy a copy of WordPerfect 2.0 and load it onto your Mac. But when you try WordPerfect 2.0 for the first time, one word of warning. Don't plan on going to bed early.

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What's Happening to Desktop Publishing

PART TWO: WORKING WITH PHOTOGRAPHY AND PREPRESS COLOR

BY JERRY BORRELL

Cooking instructions for using color in desktop publishing. 1. Obtain graphics file from a color scanner. (For this recipe use a 90MB file scanned on a Scitex system.) 2. Launch Adobe Photoshop in order to look at the file on screen. 3. Open the file (assuming you're lucky enough to have the file in a format Photoshop can read). 4. Buy a larger hard drive. (Photoshop keeps a "scratch copy" of the image you have opened, requiring that you have disk space available that equals the size of the original file.) 5. Wait 35 minutes for the file to open. 6. Convert the file from CMYK mode to RGB mode in order to see it in color (this operation requires another 50 minutes). 7. Once the file is in RGB format, move the on-screen image (wait 3 minutes for it to redraw). 8. Save the file as, say, a PICT file (wait 15 minutes). 9. Now you can begin work. Allow 50 minutes (or more) for Photoshop operations such as applying a filter to the image, or 25 minutes to compress the image with Radius's Impresslt.

Warning! These instructions apply only to ideal situations and may prove more difficult in practice.

How It All Got Started

A few months ago, assistant managing editor Luis Camus retrieved two test files from our color-separation house, Balzer/Shopes. One was a 90MB file produced by scanning a 4-by-5-inch transparency, which was enlarged to fill the first two pages of our March hard drive article. The other was a 7MB file of another image that ran with the same article.

I had eagerly installed Impresslt on our international file server and was preparing to compress the 90MB file to a size that would be practical for Macworld Japan president David Ushijima to download in Tokyo via our ISDN link. It was Friday afternoon, the start of a pretty spring evening in San Francisco, and we had some new products to play with before taking off.

By 9 p.m. San Francisco time Luis and I were both calling our respective dates to explain that we had run into a few problems. So began our glorious venture into the world of four-color electronic publishing. I made a call to David in Tokyo and explained that we should wait a little longer before he tried downloading the image files for output on the kanji PostScript imagesetter in Tokyo.

How We Got This Far

This spring was an expectant time for us. Since May of 1989 Macworld has used desktop publishing technology. There is a bustle behind-the-scenes activity required to put each issue of the magazine together. Every article is designed on the Macintosh, but type, illustrations, mechanical color, and...
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**Seagate drive mechanisms also available (capacities from 300MB to 1.2GB).
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COMMENTARY

Sanjay Sakhuja (standing) and Eric Hudson of Digital Pre-Press International working with the Scitex SmartScan.

Leslie Barton of the Macworld design department placing 8-bit versions of scanned photographs in PageMaker.

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four-color and continuous-tone image separations are produced by different service bureaus. These prepress processes are joined in a final step to produce the film that we send to Brown Printing, in Wasaca, Minnesota.

In February we began to unite all these prepress processes and to produce film on an Agfa Compugraphics SelectSet 5000. We had several reasons to push ahead with our use of the technology. First, we support other Macworld magazines around the world, and those publications can take advantage of our digital page separations (see Part One, Commentary, in the June issue). Our ISDN and Switch 56 network capability offers more-reliable phone connections and higher transmission speeds than standard transmission lines do, making it practical to download large story files to these foreign publications.

We also hope to reduce costs, speed production, and simplify processes such as accounting, by reducing the number of suppliers with whom we have to work, and gain greater control over the entire production process.

Finally, we feel an obligation to use the technology that we write about, rather than merely recording our observations of others’ work. It helps keep Macworld articles useful. So if prepress on the Macintosh was actually becoming practical, we felt it was time to take the plunge.

Talks with Our Suppliers
As you might imagine, magazine editors become jaundiced by talking with developers—all of whom say they are going to ship new products tomorrow. But as consumers of professional services from graphics arts suppliers, we demonstrated considerably more naiveté. When we began, we met with a multitude of prepress-service suppliers to discuss who would work with us on color publishing. When we asked for film output, the crowd thinned considerably.

Since placement of continuous-tone (CT) scans was crucial, we had to select a partner who had the highest-quality scanning equipment available. One of our suppliers already had Crosfield and Scitex scanners. But as a large business, this supplier seemed less than attentive to our need to push the technology forward, and mainly interested in building a business that would serve the existing customer base and expand into a new market.

One of the contenders, Sanjay Sakhuja at Digital Pre-Press International (DPI), agreed to buy a high-end scanner that would match in quality the Agfa CG 9600 and Agfa CG SelectSet 5000 imagesetters that his company already owns. He also cooperated by adding a direct connection to our digital (ISDN) network, enabling us to transmit files and images between Macworld and DPI at 64,000-bits-per-second. This makes Sakhuja’s computers appear on our network as if they were actually in our building.

Sakhuja was uncertain whether to purchase a Scitex or a DaiNippon screen scanner; in the end he chose the Scitex SmartScan because it’s faster to load with transparencies (since it uses a flatbed rather than a drum) and is semiconductor-based.

(continues)
PostScript solutions for LaserJet printers haven't exactly set records for speed.

But times have changed.

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Introducing PacificPage XL™ for Macintosh - it will change the way you look at PostScript emulation products, both in performance and price.

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and thus more easily updated as technology changes. With this device he can scan 35mm, 125mm, 3 by 4, 4 by 5, and 8 by 10 transparencies, as well as entire groups of transparencies on one plate. At its highest resolution, the scanner digitizes at 5000 lines per transparency—regardless of the transparency’s size. This is where we obtain all of the information that makes up a color file (at 8 bits per pixel, each of 3 scans for red, blue, and green; files are then processed into CMYK by the scanner’s firmware).

That amount of data is required to describe the color values in a transparency in order to print high-quality film for separations.

Once the transparencies are digitized, low-resolution versions of the original scans are available on our network for designers, such as Macworld’s Leslie Barton, who places the images as Desktop Color Separation (DCS) files in Aldus PageMaker for positioning, scaling, cropping, and other effects. Once the page design has been completed, the PageMaker file is transmitted to DPI, where Sakhuja’s staff uses Aldus PrePrint to make color page separations. As Aldus PrePrint processes the separations, it automatically pulls in high-resolution image files stored on a file server at DPI to replace the low-res files denoted by DCS tags on the PageMaker page files. Sakhuja’s staff then outputs the final color page separations on the Agfa SelectSet.

Who Does Color Retouching?

Until now, our color retouching work has been performed by only one of our suppliers, using a Scitex Assembly station at costs of up to $250 per hour. Many publishers and designers working with color want to avoid these costs.

The color-separation houses that have kept color publishing looking good over the years sense that the days of charging $250 per hour are nearly over. But not entirely, since those of us rushing to bring prepress technologies in-house often lack the skills and equipment in the near term to compete with the quality that service bureaus produce on high-end Scitex- and Crosfield-based systems.

We cannot compete in part because until recently, our artists and designers have not needed to be concerned with some aspects of their trade, such as the impact that manipulating 32-bit images on-screen has on the quality of film produced through analog devices. But they will probably develop the same facility in adapting to in-house prepress color work that they showed when we replaced traditional design and typography processes with Aldus PageMaker.

Not Ready for Prime Time

The real problems that slow down the process of bringing color prepress work in-house are the woeful inadequacies of today’s hardware and software. When you watch a Mac take 30 minutes to open a file, you realize that Macintosh hardware and software are inadequate at present to the task of color prepress. But if we want to use the technology we’ll have to suffer through the transition.

Problems first arise because of the size of the files. I’m using a Rodime Cobra 650 and a Storage Dimensions MacinStor 650 drive to open test files. Our image files generally run 7MB to 15MB in size, but full-page images can be as large as 45MB. When I try to open the 90MB two-page spread, Photoshop responds with a dialog box saying that there is insufficient disk space—an impossibility. I discovered that both drives, because of manufacturer formatting, may not allocate physical space large enough to store a single file as large as 90MB unless I reformat the drive. Then I can store (continues)
Another new model year. And Canvas is still miles ahead. Lucky you. With brand new models of both the world's top-ranked drawing programs to choose from. Simultaneously.

And MacDraw® Pro isn't a bad try. In fact, it reminds us of another drawing program we've always had the utmost respect for: Canvas 2.1.

Unfortunately for Claris, our new Canvas 3.0 includes enough major enhancements to leave their latest effort idling somewhere back in the dust. Again.

Let's take a look under the hoods.

Canvas 3.0 gives you more high-end text handling features. Like binding to curves. Slanted margins. Text-wrapping outside — and/or inside — irregular objects, and full kerning & tracking control. Even conversion of PostScript® Type 1 fonts to customizable Bézier outlines.

MacDraw Pro doesn't.

Canvas 3.0 gives you more design/illustration features. Including unparalleled Bézier curve editing power— from multi-point selection & editing to automatic object conversion, combining and blending. Magnetic guidelines. Center line auto tracing of scanned images. And full bitmap editing in 24-bit color.

MacDraw Pro doesn't.

Canvas 3.0 also gives you new built-in translators for important multi-platform formats like CGM, IGES and DXF™. And Open Architecture technology — allowing new tools, effects and translators to be added with ease at any time.

MacDraw Pro doesn't.

You are what you drive. Like Canvas 2.1 before it, the new Canvas 3.0 was developed in direct response to the wish lists of thousands of drawing professionals. Its heritage of performance is proven. Its price is right. And its ease of use is legendary. Which leaves just one last question. If what you draw is important to you, why settle for Claris's sedate sedan when you can get your hands on a dream machine?

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Radius's Mike Boich (at the wheel) and Storm Technologies' Adriaan Ligtenberg—in a race to supply image-compression technology to professional publishers.

multiple large files on one drive.

The real hardware problem is the Mac: the 68030 chip's inadequate power for image processing (particularly since it does double-duty running the operating system); the inadequate technology for processing large blocks of data within the computer system; the inadequate technology for writing images out of memory and onto the screen. Thirty minutes for Photoshop to apply one filter to an image? This is simply not real-world. And those of us looking at accelerators that use the 68040 microprocessor—the microprocessor that will be the heart of Apple's new high-end Macintosh—do not believe that the 640 chip will solve these problems. Nor will simply adding 24-bit color to the system board of a next-generation computer.

If Apple and the Macintosh are to be players in the desktop publishing market's next evolutionary step, that of color prepress on the desktop, then Apple is going to have to reconsider the kind of computing horsepower that it supplies its customers.

Image Processing

In terms of software, we have been blessed in the Mac universe with Adobe Photoshop. This product is known to most of us as a universal opener for images because we use it to open files saved in different formats, but it has some other uses. Macworld readers, for example, voted Photoshop their favorite for both color paint and image processing. It is in these two capacities that artists and designers are coming to depend upon Photo-

(continues)
Even before the Macintosh Classic & its new companions came along to wow the reviewers with heroic price/performance ratios, UltraPaint was keeping them plenty busy.

"As advertised, Deneba's UltraPaint...really does set new Macintosh graphics standards", wrote Ernest Mau of CompuServe.

"...many more B&W paint features than SuperPaint, almost all of PixelPaint's color tools, a superset of MacDraw II's object-oriented features, and the gray-scale prowess of Digital Darkroom. All this comes in a single program for less than half the price...", wrote David Pogue in MacWorld.

Perhaps Chris Prior of MacUser UK summed it up best when he wrote that "UltraPaint...could prove to be the ideal software package for those looking for a powerful, all-around draw and paint program."

And it's true. UltraPaint really does offer you the same sophisticated graphics processing power of several leading programs combined — all in one inexpensive, easy-to-use package.

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See below for further details.
Betsy Mill put it all in perspective when she wrote to us, "I love [Microsoft] Excel as much as my microwave oven but no love is perfect."

Well, Betsy, get a load of this. We think new Microsoft Excel version 3.0 is the closest thing to perfection ever seen in a spreadsheet for the Mac. For one good reason.

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Highlight a row or column of numbers, hit the Σ button (that's Autosum'), and voilà — it all adds up.

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Yes, I'd like to move up to Microsoft® Excel version 3.0 for the Mac® for just $129. Please send me the update information kit that explains how to do it.

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version 3.0. The result response course.

or expand worksheets without having to create multiple files.

As for charting, we took our cue from Paul Woods, who began his letter with the salutation, “Charts, charts, charts!” Hey, Paul – check out the picture and caption for the full scoop.

Did we mention that you can consolidate up to 255 worksheets at a time, regardless of format?

Or the Goal Seek feature, which lets you put in the total you want and works backwards from there to fill in the variable you need?

Or the fact that this is the first System 7.0 application available?

Plus, you can update to version 3.0 for $129. If you acquired your current version of Microsoft Excel on or after 12/7/90, the upgrade is only $50. Call (800) 541-1261, Department Q83, to find out more.

By the way, Bryan Larson: we said hi to Bill for you. He sends his regards.

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COMMENTARY

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Image Compression Is Crucial
Given the size of the files that I'm writing about, compression is vital. We have to store a year's worth of images for use by our sister Macworlds. We'll eventually build up a collection of multigigabyte drives, but they're expensive. And at up to a gigabyte of storage for each issue of the magazine, we'll never be able to afford storing images at full size.

Compression is important for other reasons as well. We want to transmit images across our ISDN network, which is too slow even at 64,000 bits per second and runs out of capacity quickly. Storm Technologies' Adriaan Ligtengberg and Radius's Mike Boich have been sensitive to our initial input on these products, and changes are under way in their compression products.

Looking Ahead
Last year I suggested that 1991 would be the year of color in publishing. I still believe that, but it's going to take until the end of the year before we get all the bugs worked out and are producing all our photography on the Mac. And, of course, just a little more equipment.
Mirror's Color Monitors Give You More Mice at Half the Price.

We thought the Mirror Trinitron® was a real bargain.

MacUser May 91

Radius 19" 24 bit color
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Radius has always made an excellent big screen color monitor. But according to a recent MacUser magazine article, Mirror makes a better one. In fact, in one of the biggest reviews yet on the color display category, MacUser gave Mirror 4.5 Mice and said "its 19" Trinitron® System was a razor-sharp standout and had excellent software".

Mirror has been manufacturing Macintosh peripherals since 1985 and quality has always been a tradition. And it continues with our 8-bit and 24-bit color monitors which feature a Trinitron® tube and other extras such as an anti-glare screen and our exclusive DeskTop Designer™ software featuring pop-up menus and a handy screen saver. And we back all our monitors with a one year warranty, unlimited free technical support, and a 30 day money back guarantee.

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Incredibly enough, Pathworks for Macintosh has made the world's Network Application Support (NAS). Digital's unique way of turning every system into an open system. So if you like the sound of Pathworks, call us. The number's 1-800-345-4040.

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With these kinds of advancements in the art and science of color, there’s no doubt that the new RasterOps 24XLTV is a whole new ball game. But that should come as no surprise. After all, in the field of color video solutions, RasterOps has consistently been batting 1000 season after season.

To find out more and get a free poster size version of this True Color photo, call us today at 1.800.SAY.COLOR, ext. 220.

Circle 15 on reader service card
End of the Macintosh

Won't it be great when Apple finds its Macintosh monopoly and market share and technological lead disappear at the hands of all those NuTek machines ["Send In the Clones," April 1991]? Won't it be great when Apple loses its peripheral business? Or loses its dealer network at the hands of mail-order shops? Hey, who cares? Apple can always fall back on its mainframe business like IBM did. What? Apple doesn't have a mainframe business? Too bad.

I guess I have to go with the clone article as my favorite. After all, I made a conscious decision to go Mac rather than IBM, and if I end up with an orphan machine I have no one to blame but myself.

Paul Galanti
Indianapolis, Indiana

The Atari That Would Be Mac

In your discussion of Mac clones and emulators currently in production, I was disappointed that you failed to mention the Spectre GCR cartridge, which transforms an Atari ST computer into a (faster) Mac Plus. The Spectre GCR (minus the 128K Mac Plus ROMs) retails for $299.95 from Gadgets by Small, Inc., 40 W. Littleton Blvd., #210-211, Littleton, CO 80120.

Forrest Blood
Delran, New Jersey

Develop, Don't Litigate

What a waste! If NuTek spent those billions on developing the next generation of personal computers instead of meticulously cloning the Mac and preparing to do battle in the courts, the consumer would be light-years ahead.

Apple is equally to blame.

Michael W. Miller
Middleton, Wisconsin

AutoMac's Unlauded Advantages

Yes, you can assign the F-keys to your [AutoMac III] macros ["The Desk Potato's Guide to Macros," April 1991], although you can't just press F8 and start recording a macro to empty the Trash or print, as you can with other macros. You can still use them by simply typing "FS" in the Record dialog box. AutoMac will then ask you to press the FS key to define its position on the keyboard, then just record away. You can use all 12 F-keys and also the escape key this way.

Where you got the figure 20 for the number of times AutoMac can loop, I don't know. I set up a macro before I leave for the night and it's still running in the morning.

I was also disappointed that you did not mention the editing feature in AutoMac, which has been a real time-saver more than once.

Paul Reznick
Troy, Michigan

Thanks for pointing out the undocumented feature. In our tests, AutoMac's recursive macro loop only about 20 times. In related news, CE Software has released an Extensions set for QuicKeys. One of them pastes any text or graphic at a keystroke; another permits controlled looping; and still another switches your monitor between various color settings.

Paper Chase Redux

You guys were way too easy on that apparent environmental nut who complained in a letter to the editor in your April issue that you are using 1485 metric tons of paper per month to include subscription forms in Macworld. That figure is incredible because it is grossly wrong. My calculation gives something like 5 tons. Even her calculation of 809.4 times $40,000 was off by more than a factor of 10. Your (continues)

Corrections

The upgrade price [Updates, April 1991] for Falcon from Spectrum Holobyte is $5.

Emman lowered the price of the Swift 165 hard drive as "Midrange Hard Drives, Just Right" (March 1991) was going to press. The $849 price is reflected in the table but not in the text.

'The TokaMac LC accelerator' (MacBulletin, April 1991) is available from Fusion Data Systems, 512/338-5326.
typist should have caught that. Why are people so gullible about ridiculous environmental claims? Anyone who didn’t instantly recognize how preposterous the numbers in that letter were would probably also believe, say, that monitor emissions are harmful.

Bill Mixon
Austin, Texas

In fact, we use 10 tons of paper per issue for the subscription cards and the reader service cards combined. Also, the National Academy of Sciences is currently studying electromagnetic emissions.

Biodegradable Reviews

How about printing Macworld on quality recycled stock? Garbage magazine does it and it looks great. If you’re serious about the environment, drop the posturing and do something constructive!

Gary Young
Albany, California

We are exploring with our printer the use of recycled paper and soy-based inks. Currently, there are no acceptable solutions, but we are in constant contact with our printer about the latest technological breakthroughs and how soon we might be able to utilize them. We currently use recycled paper for all our marketing pieces and are testing the use of recycled paper for our inserts and subscription and renewal cards.

Pros of Prodigy

Prodigy has yet to have a fair review in your magazine. Essentially, Prodigy gives you unlimited time on the service for $10 a month. Some few percent of its membership were using this fact to send over 1000 pages of mail a month. Prodigy could do it only if other members subsidized the heavy E-mail users.

The question of censorship is two-sided. Because of children, Prodigy needs more supervision of its bulletin boards and public clubs than the other services.

Calvin S. McLaughlin
Corona del Mar
California

Don’t Censor Stupidity

I find it amazing that one of the examples cited by Brian Ek of Prodigy [Letters, April 1991] is their censoring of the comment, “You can’t get pregnant if you don’t have an orgasm.” So now they are censoring stupidity as well? As an educator, I find this disturbing. The best way to combat such stupidity is to bring such comments to the fore and let the light of public scrutiny set such people straight. Learning and truth thrive when there is a free and open exchange of ideas.

Allen Shoemaker
Grand Rapids, Michigan

Keyboarding with UltraKey

Unfortunately, Larry Stevens’s comments [Window Shopping, March 1991] are uninformed about the purpose of a keyboarding tutor. Most keyboarding tutors do little more than provide drill and practice. UltraKey shows people how to type correctly. In each (continues)
Man Heaving 75-lb. Boulder. Woman Emptying Bucket of Water on Seated Companion. Man Balancing on One Foot. A ballet for eccentric acrobats? Yes, but at the time, also the world's most ambitious photographic research project. Refining the techniques he developed taking pictures of Leland Stanford's race horses in California, Eadweard Muybridge produced 100,000 negatives in the span of a year and a half. On a good day, he would take five or six hundred 4 x 5 pictures. — In your own quest for fresh insight, which type for the Macintosh will be your most faithful servant? Perhaps it will be type from the foundry that spares nothing when it comes to capturing the original. Bitstream, where the spirit of type burns brightly. Where the kerning is exquisite. Where people go to outrageous lengths to preserve the integrity of a type designer's dream. Where our library of over 1,000 faces is growing all the time. Call to order or ask for a complete showing of PostScript-compatible fonts. Bitstream. Labor of love.
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   *Baseview Products*

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   *Baseview Products*

4. **QSpool** adds high-speed document spooling.
   *Baseview Products*

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   *Baseview Products*

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   *Computer Friends, Inc.*

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   *Compumation, Inc.*

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   *DKA Inc.*

9. **Xdata** automates database publishing.
   *Em Software, Inc.*
Xstyle provides palettes for paragraph/character settings and style sheets.

Em Software, Inc.

CopyFlow automates placement of text and graphics into layouts.

North Atlantic Publishing Systems, Inc.

ProPublisher adds keystroke-activated features that use extended keyboards.

EPIC Publishing Solutions

Grid Layout creates uniform snap-to grids.

J. Michael Marriner

Atan EXPRESS processes and paginates ATEX markup files in QuarkXPress.

John Juliano Computer Services Company

TMS EXPRESS processes and paginates TMS/EMS markup files in QuarkXPress.

John Juliano Computer Services Company

CopyFlow Reports generates layout diagrams and document status reports.

North Atlantic Publishing Systems, Inc.

Overset creates temporary text boxes for viewing overflow text.

North Atlantic Publishing Systems, Inc.

SpectreScan QX lets you scan color, grayscale, and B&W images from within QuarkXPress.

Pre-Press Technologies, Inc.

SpectreSeps QX lets you make color separations of QuarkXPress documents.

Pre-Press Technologies, Inc.

Flexo Step & Repeat outputs step-and-repeat files to Label, Tag, or Flexo printers.

Professional PrePress

DataLock XTension prevents users from changing certain QuarkXPress attributes.

PTN XTension

The Puzzler lets you define patterns and numbering for crossword puzzles.

PTN XTension

Wang WP/PC XTension imports Wang text files directly into QuarkXPress documents.

PTN XTension

WordPerfect DOS XTension imports WordPerfect files directly into QuarkXPress documents.

PTN XTension

QuarkFreebies adds seven features and network communication to QuarkXPress.

Quark, Inc.

QuarkXTras adds seven special design and production tools to QuarkXPress.

Quark, Inc.

SCS/LinX 3.1 imports Layout-8000™ geometries to paginate full newspaper pages.

Software Consulting Services

NewsLink flows text from Synaptic's SunType Editorial System into QuarkXPress documents.

Synaptic Micro Solutions

Sonar Bookends generates indexes and tables of contents.

Virginia Systems, Inc.

Sonar Professional provides high-speed text retrieval, text analysis, and indexing.

Virginia Systems, Inc.

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lesson, keys are introduced by demonstrating the keystroke and letting the user respond.

The review’s largest oversight is the failure to mention the skill-check component of UltraKey, which treats users to a unique, new experience. UltraKey is the only keyboarding tutor that tests your skill by letting you freely type just as if you were word processing. It then analyzes your work, looking for strategic problems—the kinds of problems that result from poor posture and incorrect hand position. When you use UltraKey, it’s like having a private teacher.

We know that UltraKey costs more, but in our opinion, a $79 list price is what it takes to provide customers with a key-boarding tutor that really works. If, after using UltraKey in the recommended manner, any customer is not satisfied that UltraKey is worth every penny paid, then Bytes of Learning will refund that customer’s money.

Art Willer
President, Bytes of Learning
Willowdale, Ontario, Canada

Bad Call to Bottom Line

I was looking for a printer for my Mac, and on page 329 of your February issue I saw an ad from Bottom Line Distribution that quoted a price significantly lower than any other I’d seen. The ad also gave a 900 phone number, and said it would cost me $2 per minute to call. That made me a bit nervous, but I figured even with a few bucks for the call, the price would still be lower than anywhere else. So I made the call, and was told the item was “out of stock.”

Now I get my phone bill and find it cost me $4 to learn this. So how come this company has a 900 phone number? Generally, the point of a 900 number is that what the caller is buying is the content of the call itself—as in the 900 numbers on late-night TV ads featuring sultry girls in filmy negligees. In this case, Bottom Line’s quoted prices are pretty sexy, to be sure, but the final product delivered is what used to be called a tease. Big talk, no action.

Macworld made money on the ad; I got taken. I’m disappointed in you guys.

Andrew Main
Santa Fe, New Mexico

Bottom Line Responds

We use our 900 number as a tool to help lower our overhead. The majority of our customers realize that the phone charges are small in comparison to the amount of money they save, as well as the service and technical support that Bottom Line provides.

It is an unfortunate reality that items are sometimes out of stock. However, as we do stock over $160 million worth of inventory, if anyone has it, chances are it is us. If you had requested that we do so, your order could have been filled.
Introducing the first computer in history that's easier to use and more powerful than a Macintosh.
High Yield CDs.

Quantum Leap Technologies delivers great value in CD software.

Quantum Leap Technologies created the largest collection of Mac software ever produced—the CD7® Super-Library with over 700 megs of select shareware and public domain programs. Quantum Leap didn't stop there. We published an even larger disc, the Giga-ROM®—a hefty 1,200 megabytes of shareware on a single compact disc. How did we do it? We archived and indexed the whole collection with On Location® for fast, easy retrieval. The Giga-ROM® offers an instant 1.2 gigabyte ready-to-go BBS file section! We also gave you the world's largest collection of educational, instructional and self-help software. Macademic® Watch for Quantum Leap to set the standards for price and performance in Macintosh CD Software.

Quantum Leap
TECHNOLOGIES
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800-762-2877

Circle 82 on reader service card.

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Dangerous Surge Protection

I enjoy reading Quick Tips by Mr. Poole, but when I read the answer to the "Surge Suppression" question in your March 1991 issue, I found that for the second month in succession the subject of supplying AC power to computers did not address the potential hazards of conventional spike/surge protectors. MOV devices deteriorate with age and minor surges, and both MOV and diode protection technology are apt to damage communications equipment while attempting to protect computers by diverting high voltage to ground. The trend to network computers has made this more than just a problem for modems.

Dave Tweedars
Bethesda, Maryland

Letters should be mailed to Letters, Macworld, 501 Second St., San Francisco, CA 94107, or sent electronically to CompuServe (70370, 7021) or MCI Mail (294-8078). Please 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.

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Along with the Toolbar, this new version has a host of other power features that help you analyze, customize, and produce professional-looking charts, reports, and presentations faster than ever. And Excel 3.0 fully supports Apple's System 7.0. It truly has Excel'd itself.

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9803 Excel 3.0 .................. $309.
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And, best of all, the programs work as well together as they do by themselves. Especially with innovations like shared user dictionaries, mail integration, and Excel/Word warm links (which, for example, will automatically update a graph in a Word document when you change the linked Excel spreadsheet). This Office is definitely the fast track to productivity.

Microsoft ... 30 day MBG
5454 The Microsoft Office .............. $525.
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Whether you just want to budget your household expenses and print checks, or you’re looking for a portfolio-management and financial tool, Managing Your Money is all the software you need. The latest version features easy-to-follow visual navigators that make the learning curve real smooth and there's HELP behind every screen.

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Had it with dog-eared phone books, rolodexes, and miscellaneous scraps of paper? Manage personal and business contacts with Intouch, the DA MacUser (4/91) called “the best name-and-address DA for the Mac” (4½ Mice). It lets you store unlimited names, addresses, phone numbers, and up to 14 pages of notes per entry. It can dial numbers and print envelopes in a variety of styles complete with graphics and bar codes.

And to compare documents quickly...
Advanced Software’s DocuComp compares any two files and displays all the changes including inserted, deleted, replaced, and moved text. MacUser (2/91) says, "For any task that requires a clear indication of what changes have been made, DocuComp can be an invaluable time saver" (4½ Mice).

Advanced Software ... 30 day MBG
8051 Intouch 1.1 ....................... $39.
9986 Intouch Server Network (3-Pack) ... 112.
5608 DocuComp 1.5 ..................... 89.

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**SYSTEM 7.0**

As per the Compatibility Checker Stack (April 22, 1991), products and versions denoted with the symbol \( \Omega \) will run under System 7.0. As always, please check with your salesperson at the time of your order.

Also, all software is not copy-protected, unless indicated otherwise by (CP).

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<tr>
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<td>FoxBASE +/Mac 2.01</td>
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<tr>
<td>Panorama 1.5</td>
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<td>$245.00</td>
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Microsoft ... 30 day MBG

9803 *Exce 3.0—A powerful spreadsheet with even more analytical strength & graphic output. Features Toolbar which performs several steps with a click of a button. Combine text, numbers, charts & graphics all on the same page... $509.
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★ Que Corp./RightSoft ... 30 day MBG 7482 FlightWriter for the Mac 3.1 ... $54.
★ Reality Technologies ... 30 day MBG 6929 WealthBuilder 1.0 ... 95.
★ Reference Software ... 30 day MBG 6268 Grammar Mac 2.0 ... 49.
Round Lake Publishing LetterWorks, Sales or Legal ... ea. 52.
★ Sensible Software ... 30 day MBG 3375 Sensible Grammar 1.6 ... 51.
★ Shana ... 30 day MBG 8810 Informed Designer v. 1.1 ... 99.
Softwareworks 8366 Dollars & Sense 5.0 ... 59.
9863 Word for Word 1.0 ... 85.
8366 Adobe Systems ... 60 day MBG 5001 Adobe Photoshop 2.0 ... $549.
5501 Adobe Streamline 2.0 ... 122.
SmartArt I, II, III, or IV ... ea. 52.
★ Aldus/Silicon Beach ... 30 day MBG 6674 Personal Press 1.0 ... 199.
3506 SuperPaint 2.0A ... 135.
3980 Digital Darkroom 2.0 ... 259.
3507 Super3D 2.1 ... 329.
4751 Aldus Persuasion 2.0 ... 329.
7487 Aldus PrePrint 1.0 ... 329.
1330 Aldus FreeHand 3.0 ... 399.
7088 Aldus PageMaker 4.01 (June '91) ... 499.
8054 Aldus Design Team ... 869.
Alsyy 5425 Art Importer 2.0 ... 89.
9906 Metamorphosis Pro 2.0 ... 89.
1195 Fontographer 3.2 ... 165.
★ Ares Software ... 30 day MBG 8878 FontMonger 1.0 ... 62.

GRAPhICS & DESIGN
PUBLISHING, PRESENTATIONS

★ Abbott Systems ... 30 day MBG 8052 Cheshire 1.0 ... 62.
Abbott Systems Adobe Type Library (Vol. 1-220) ... call
6957 Adobe Type Reunion 1.0 ... 41.
5780 Adobe Type Manager 2.0 ... 55.
6053 Adobe Plus Pack ... 109.
6156 Adobe Plus Pack/ATM ... 159.
6098 TypeAlign for ATM 1.0.4 ... 59.
6985 Adobe ATM/TypeAlign Pack ... 89.
6671 Adobe Type Set 1 or 6677 Set 2 ... ea. 55.
7587 Adobe Type Set 3 ... 125.
8032 Adobe Type Sets 1-2-3 Bundle ... 199.
8171 Adobe Illustrator 3.0 (w/ATM) ... 379.

Shana ... 30 day MBG 7692 Informed Designer v. 1.1—If forms are part of your life, Informed should be too. Design with Informed Designer, then fill out and use the unique capabilities of Informed Manager $159.
8810 Informed Manager 1.0 ... 99.

Survivor Software ... 30 day MBG 3289 MacMoney 3.5 ... 59.
★ Symantec ... 30 day MBG 3422 More 3.0 ... 265.
★ Synergy ... 30 day MBG 6617 KaleidaGraph 2.1.2 ... 145.
★ Teleware ... 30 day MBG 7616 M.Y.O.B. 2.05 ... 139.
★ TIMESLIPS ... 30 day MBG 2986 Timeslips III 2.0E ... 194.
★ T/Maker ... 30 day MBG 3639 WriteNow 2.2/Grainmatic Mac ... 117.
8206 SmartBundle (4 programs in one!) ... 215.
★ Williams & Macias ... 30 day MBG 6926 myDiskLabeler III 3.04 ... 42.
4976 StickyBusiness 1.4 ... 51.
★ WordPerfect ... 60 day MBG 3800 WordPerfect Mac 2.0 ... 279.
9865 (5 Pack) ... $966 (20 Pack) ... 359.
★ Writing Tools Group ... 30 day MBG 6984 Correct Grammar 2.0 ... 55.

Teleware ... 30 day MBG 7616 M.Y.O.B. 2.05—Incredible accounting software. "Best business deal on the Mac"—MacUser Eddy Awards. A/R, A/P, G/L, Checkbook, Inventory, and Card File. Easy to set up and use, full integration, custom forms. ... 139.

Adobe Systems 5001 Scanandrews 2.0—Line art, photos, and hand-drawn sketches can instantly be converted into editable artwork. Offers improved conversion, color & gray-scale capabilities & expands compatibility with drawing & CAD applications ... 122.

★ Baseline Publishing ... 30 day MBG 8055 Screeshot 1.2 ... 34.
8972 MasterPaint 1.0 ... 75.
7784 Color MacCheese 1.05 ... 56.
7828 Exposure Pro 1.0 ... 78.
Bitstream 9428 True Type Fonts 1 or 9429 Fonts 2 ... ea. 59.
★ Broderbund Software 9351 Kid Pix 1.0 ... 29.
1497 The Print Shop 1.3 ... 35.
6281 TypeStyler 1.5.2 ... 115.
★ Casady & Greene ... 50 day MBG 8879 Fluent Font Library 4.0 ... 99.
Claris 1123 MacPaint II.2 ... 89.
1117 MacDraw II 1.1V2 ... 285.
8007 Claris CAD 2.0 ... 629.
★ Creative Software ... 30 day MBG 6645 Easy Color Paint 2.0 ... 45.
★ Custom Applications ... 30 day MBG 8037 Freedom of Press Lights 3.0 (17 fonts) ... 55.
6517 Freedom of Press 3.0 (25 fonts) ... 255.

Pagragon Concepts 5683 Niss 3.0—Boasts ten clipboards, unlimited undo, noncontiguous selection, and a lightning-fast search/replace that can even check unopened files. Plus: graphics and two macro levels for custom features ... $245.

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5625 PixiePaint Professional 2.0—Multiple/larger documents, 8-bit masking, image merging, color correction, pressure sensitive brushes.
PixiePaper, and more $19.
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6095 *DeltaGraph 1.5 ... 125.
* Deneba Software ... 30 day MBG
6385 *UltraPaint 1.03 ... 125.
1769 Canvas 2.1.1 (free upgrade to 3.0) ... 189.
* Dream Maker ... 30 day MBG
7684 *Clipping Toolkit ea. ... 68.
* Electronic Arts
6415 *Studio 8 2.0 ... 189.
8056 *Studio 32 1.1 ... 449.
* Foundation Publishing ... 60 day MBG
6728 Comic People or 6646 Kid Stuff ea. ... 20.
6728 *ComicStrip Factory 1.6 ... 36.
9438 *ComicStrip People & Kid Bundle ... 71.
* Generic Software ... 60 day MBG
7454 *Generic CADO 5.0 ... 389.
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7523 Evolution 1.02 ... 49.
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2417 *MacDraft 2.1—Powerful precision drawing and drafting software for the Mac. Features include advanced text handling, on-line symbol libraries, layers, Bezier and spline curves, dimensioning and more $279.
2417 *MacDraft 2.1—Powerful precision drawing and drafting software for the Mac. Features include advanced text handling, on-line symbol libraries, layers, Bezier and spline curves, dimensioning and more $279.

Innovative Data Design
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7722 SwivelArt 1.0 ... 88.
7441 Swivel 3D Professional 1.0 ... 435.
8957 Swivel Pro 3D/Windows Macintosh Bundle ... 899.
5028 ModelShop 2.0 (May '91) ... 559.
Chair
7612 QuarkXPress 3.0 ... 519.
* Springboard ... 30 day MBG
3530 *Certification Maker 2.02 ... 22.
* Stratus
7773 *Stratusion 3D 1.5 ... 349.
7772 *Stratusion 3D/ SX/Renderman 999.
* Strategic Mapping
6518 *Atlas/MapMaker 4.5 ... 369.
* SuperMac Tech. ... 60 day MBG
3380 *PixiePaint 2.1 ... 149.
5625 *PixiePaint Pro 2.0 (May '91) ... 459.
* Tactical Software ... 30 day MBG
8251 Icon It 2.1 ... 44.
8252 Magic Typist or 8249 Art Fonts ea. ... 49.
8263 Art Clips 1 ea. ... 72.
8248 Font Share 2.2 ... 129.
* 3G Graphics
3942 *Images with Impact: Graphics 1 ea. ... 49.
4583 Images with Impact: Business 1 ea. ... 64.
6379 Accents & Borders I ... 64.

* Affinity Microsystems ... 60 day MBG
7835 Tempo II Plus 2.0 ... 105.
* Aladdin Systems ... 30 day MBG
1619 *BookIt! Plus 1.5 (May '91) ... 65.
6740 *StuffIt Deluxe 2.0 ... 62.
* Aldus/Silicon Beach ... 30 day MBG
5100 *SuperCard 1.5 ... 199.
* ASSL ... 30 day MBG
9807 *DiskExpress II 2.07 ... 53.
9808 *MasterJuggler 1.53 ... 53.
9866 *MultiDisk 1.27 ... 53.
* ASD Software ... 30 day MBG
9440 *MaccosCard/Reader (req. FileGuard) ... 299.
9439 *MaccosCard/Email (1 Bundle) ... 399.
7065 FileGuard Extended 2.5 (1 user) ... 139.
7422 *DiskExpress II 2.07 (5 user) ... 469.
7423 *4user (10 user) ... 799.
* Baseline Publishing ... 30 day MBG
6666 *Personality 1.0 ... 28.
7783 *INIT Manager 1.0 ... 34.
4780 *Database 1.5 ... 72.
* Berkeley Systems ... 30 day MBG
5737 *After Dark 2.0T ... 21.
1541 *Stepping Out II 2.02 ... 49.
* Casady & Greene ... 60 day MBG
2269 QuickDEX 1.4D ... 34.
7443 *A.M.E. (single) ... 159.
7444 *A.M.E. (5 user) ... 509.
7831 *MacUser (4191) ... 849.
* CE Software ... 60 day MBG
4689 *MockPackage Plus Utilities 4.4 ... 31.
1727 CalendarMaker 3.0.1 ... 31.
6278 *QuickDraw 4.0 ... 63.
7518 *Alarming Events 1.01 ... 84.
8024 *QuickKeys 2.0 ... 94.
* Central Point ... 30 day MBG
5040 Copy II Mac 7.2 ... 24.
5041 *Mac Tools Deluxe 1.1 ... 79.
* Claris
8734 *HyperCard Development Kit 2.0 ... 149.
* Connectix ... 30 day MBG
7830 Maxima 1.09 ... 45.
6123 *Virtual 2.0 (for SE/30, lcx, lxi, & lcc) ... 113.
6647 HandOff II 1.13 ... 56.
* Dantz Development ... 30 day MBG
5255 *Retrospect 1.2 ... 147.
7935 *Retrospect Remote 1.2 ... 147.
7946 *Remote (10 Pack of initals) ... 147.
* Design Science ... 30 day MBG
7887 MathType 2.1 ... 88.

Advanced Software ... 30 day MBG
8051 Intouch 1.1—DA stores names, addresses, notes, prints envelopes and labels, dials phone numbers and more! "Best name-and-address DA," MacUser, 4/91 (4½ Mouse rating) ... 339.
9986 *Intouch Server (3 Pack) ... 112.
has a high rating.

ASD Software ... 30 day MBG
7085 FileGuard Extended 2.5.2—Protect your hard drives, applications, files/folders (including system folder) from unauthorized access, deletion, and/or illegal copying. Now with system usage audit trail. 5 & 10 user also available. ... $59.

has a high rating.

DynaPage 1.0-Prints any Mac file—double-sided—to organizer pages! Insert and Go! $72.
6915 Disk60—Fastest address manager. Print double-sided organizer pages, labels, envelopes. 72.
7440 DynaPage—Publish your organizer! 14.

CD-ROM

ActiGraph
8794 Adobe Type On Call CD/ATM ... 47.
9443 Adobe TOC&Porta Drive Bundle ... 659.

FTG-2000
9000 Meeting Maker (5 user) ... Plan, schedule & confirm meetings via network. Schedule a time & date, select required guests, & prepare agendas. Personal calendar to block out activities. $289.
9800 Meeting Maker (10 user) ... $494.

JAM Software USA ... 30 day MBG
6089 Smart Alarms 3.03 w/App. Diary 3.1 $63.
6088 Smart Alarms 3.03 (14 users) ... $95.

Kent Marsh Ltd. ... 30 day MBG
5457 QuickLock 2.0 ... $34.
9513 FolderBolt 1.01 ... $73.
2591 The NightWatch 1.03 ... $84.
9510 FolderBolt/The NightWatch Bundle ... $139.
6134 MacSafe II ... 30 day MBG
GuardCard (SE or SE/30) (May '91) ... $105.

Kiwi Software ... 60 day MBG
6267 KiwiEnvelope 3.1 ... $32.
7445 KiwiFinder Extender 1.02 ... $63.

Loop Software ... 30 day MBG
5442 PictureBook 3.2A ... $39.

Magic Software ... 30 day MBG
7267 AutoSave II ... $28.
7270 Backmatic 2.0 ... $50.

Microsoft ... 30 day MBG
4471 QuickBasic 1.0 ... $64.

Multimedia Services
8850 Multi-Ad Search 1.0 ... $125.
9767 ReportEase 2.0 ... $94.

Now Software ... 30 day MBG
6925 Now Utilities 2.0 ... $75.
6739 Prototype 3.0 ... $184.

Olduvai
4503 MultiClip 2.1 ... $69.

ON Technology ... 1 year MBG
6395 On Location 1.02 ... $75.
9810 Meeting Maker (5 user) ... $289.
9800 Meeting Maker (10 user) ... $549.

Palomar Software ... 30 day MBG
8210 PLOTter gest 2.0 (June '91) ... $199.

Salient Software ... 30 day MBG
7404 DiskDoubler 3.7 (June '91) ... $44.

Softstream ... 30 day MBG
5440 HyperHi 3.0 ... $119.

Solutions, Inc. ... 60 day MBG
3448 SmartScrap & The Clipper 2.1 ... $56.
3449 SuperGlue II 2.01 ... $75.

SuperMac Tech. ... 60 day MBG
3377 DiskFit 2.0 ... $88.

Syntex ... 30 day MBG
5176 Syntex AntiVirus for Mac (SAM) ... $65.
5724 Syntex Utilities for Mac (SUM II) ... $96.
6748 Norton Utilities for the Mac 1.01 ... $83.
3421 THINK Pascal or THINK C 165.

Tactic Software ... 30 day MBG
7872 Software Bridge 1.0 ... $79.
8964 MasterFinder 1.0 ... $49.
We take magazines

Microsoft Office—Maximize productivity in your office with MS Word for word processing, MS Excel for a spreadsheet with new Toolbar, MS PowerPoint for desktop presentations and MS Mail for electronic mail $525.

CD Technology
8057 Porta Drive CD-ROM $649.
7686 Porta Drive & MS Office CD-ROM $999.
8813 CDA-431 CD-ROM Drive $639.
9975 Voice Navigator II $549.
9279 Studio Session MIDI Utility 1.0 $59.
6135 Super Studio Session with Music Library $99.
6634 Photo Gallery
1215 Practica Musica 2.2 $66.

Electronic Arts
1846 Deluxe Music Construction Set 2.5 $84.
8999 Deluxe Music Recorder $99.
★ Ferallon Computing ... 30 day MBG
6770 MacRecorder Voice Digitizer 2.03 $104.
2199 MacRecorder Sound System 2.03 $174.
6766 MediaTracks $205.
6798 MediaTracks Multimedia Pack $345.
6767 MediaTracks Multimedia (CD-ROM) $345.
★ Great Wave ... 30 day MBG
2271 Concertware & MIDI $98.
★ MacMind ... 30 day MBG
9353 MediaMaker 1.0 $489.
6159 MacMind Accelerator 2.0 $125.
5089 MacMind Director 2.0 $629.
★ Panorama ... 30 day MBG
7839 FilmMaker 2.0.1 $435.

Designing Packages
8253 TRAX 2.0.1 $57.
8254 Desktop Music Creativity Kit $189.
8259 Desktop Music Creativity (CD-ROM) $189.
8607 Music Production Kit (CD-ROM) $1249.

Symmetry ... 30 day MBG
8172 Mariah 1.0—The "put everything..." program combines sound, graphics, text and animation in the same customized catalog. Search volumes in seconds! 14 image formats supported $93.

★ Ars Nova ... 30 day MBG
1215 Practica Musica 2.2 $66.
1215 Practica Musica 2.2 $66.
9973 Desktop Mike or 9974 Headset Mike $89.
9976 VoiceLink $199.
9975 Voice Navigator II $549.
★ Bogas Productions ... 60 day MBG
9279 Studio Session MIDI Utility 1.0 $59.
6135 Super Studio Session with Music Library $99.
Bright Star Technology
6083 interFACE 1.0 $249.
Coda Music Systems
8188 MusicProse 2.0 $299.
5601 Finale 2.1 $549.

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9995 Instant Decorator $29.
9992 Design Your Home - Interiors $63.
9990 Design Your Home - Architecture $53.
9994 Design Your Home - Landscape $63.

Accolade
Stratego or Balance of Planet ea. $29.
8217 Ishiido: The Way of the Stones $32.
8220 Jack Nicklaus Golf $34.
★ Aldus/Silicon Beach ... 30 day MBG
3502 Beyond Dark Castle 1.0 $32.
3504 Dark Castle 1.1 $32.
★ Baseline Publishing ... 30 day MBG
7765 Talking Moose 3.0 $23.
★ Beacon Technology ... 30 day MBG
9996 Shakespeare on Disc $69.
9997 Sherlock Holmes on Disc $69.

BrightStar
1402 Alphabet Blocks 1.0 $29.

Broderbund Software
3415 Typel 1.0 $18.
7643 Katie'S Farm or 7640 McCaig ea. $24.
6516 The Playroom 1.0 (CP) ea. $29.
30 day MBG
Carne Sandiego Series (CP) ea. $29.
6384 Playmaker Football 1.1.1 $29.
9804 RoboSport or 8195 BannerMania $35.
8266 SimEarth 1.0 ea. $40.
4966 SimCity 1.2 (CP) $29.
5871 SimCity Supreme 1.2C $47.

Bullseye
4074 P-51 Mustang 2.82 $35.
★ Carina Software ... 30 day MBG
5726 Voyager 1.2 ea. $87.
2263 Crystal Quest 2.2 ea. $29.
Missions Starlight or Sky Shadow ea. $29.
★ Centron Software ... 30 day MBG
8525 Casino Master 3.24 (B&W) $41.
8524 Casino Master 4.1 (Color) $45.

Davidson & Associates
1734 Math Blaster 1.0 (CP) ea. $29.
6126 Math Blaster Mystery 1.0 (CP) $29.
8278 Age-Blaster Plus 1.0 $35.

Writing Tools Group ... 30 day MBG
6994 Correct Grammar 2.0—Rated top grammar checker (4% Mice) by MacUser/690. Checks grammar, punctuation & spelling. Suggests corrections before your boss does $55.
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EARTHQUEST
8050 EARTHQUEST 2.0 ............... $48.
Electronic Arts
6716 Pipe Dreams 1.0 ................ 17.
8088 Earl Weaver Baseball .......... 32.
8194 Armor Alley or 8267 Indiana Jones ... 32.
8643 Harpoon .......................... 39.
8935 Curse of the Azure Bonds .... 39.
★ Get Wave .......... 30 day MBG
KidsTime, Ameri Discox, KiziMath ea. 25.
3434 NumberMaze (B&W) 25, 8527 (Color) 36.
NumberMaze Decimals & Fractions
8043 (B&W), 25, 8044 (Color) .. 36.
★ HyperClot Software ........ 30 day MBG
Word Torture 4.0 - Beginner to Advanced
(Span., Fren., Germ., Ital. & Rus.) ea. 35.
Pronunciation Tutor - Beginner
(Span., Fren.) ea. 35. (Germ., Chin.) 39.
Verb Tutor - Intermediate
(Spanish, French, German) ea. 39.

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Enhancement technology with 300 dpi sets a
new standard. Prints up to 8 pages per minute
as well as holding up to 5 meg of memory.
Scalable typefaces and more built in .... $1699.

9348 Chinese Writing Tutor ........ 39.
9349 Chinese Survival Manual ... 39.
6611 Kanjimaster - Beg. (Japanese) ... 99.
Individual Software
7425 Training Word or 4990 PageMaker 35.
★ Inline Design ........ 30 day MBG
5870 Bomber 2.0 or 8809 Tesser aea 1.0 ea. 31.
7622 Darwin's Dilemma 1.0 .......... 31.
★ Learning Company .... 30 day MBG
2670 Reader Rabbit 2.2 (CP) (ages 4-7) 30.
5435 Talking Math Rabbit 2.0 (ages 4-7) . 30.
★ Leister Productions .... 30 day MBG
7126 Reunion 2.0 ...................... 109.
★ Microsoft ........ 30 day MBG
2688 Flight Simulator 1.02 (CP) .......... 32.
★ Mysterium Tremendum .... 30 day MBG
5841 Mortality Revenge 1.03 (CP) .......... 32.
★ Nordic Software ...... 30 day MBG
8258 Turbo Math Facts 1.1 ........... 25.
8260 Word Quest 1.0 .................. 30.
8257 PreSchool Pack 1.0 ............... 35.

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SIMMs—Crank your system's memory to
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booklet & installation video (VHS or 8mm).
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★ Penton Overseas ........ 30 day MBG
VocabuLearn/ce Leves I & II
(French, Italian, Spanish, German,
★ Personal Training Sys. .... 60 day MBG
We carry over 60 learning levels from
beginner to advanced for Quark XPress,
Excel, Persuasion, FileMaker II/Pro,
PageMaker, Illustrator, FreeHand, Word,
HyperCard, and the Mac .... ea. 50.
Postcraft
6466 Citadel 1.0 ....................... 26.
Sierra On-line
3397 Leisure Suit Larry .......... 23.
7397 Space Quest III (color reqs. 2 Mbs) . 35.
★ Sir-Tech Software ... 30 day MBG
8228 Wizardry II: Knight of Diamonds (CP) 28.
8229 Banes of the Cosmic Forge .... 35.

Global Village .... 30 day MBG
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Award for Best Communications Product: 2400
bps/MNP-5 modem connects via ABB Port.
SendFax (9600 baud) optional.
8946 @Datacom $139 8946 with FAX $185.

★ Softstream ...... 30 day MBG
4995 Oribbage Tutor ................. $26.
4107 Colour Billiards ................ 38.
★ Software Toolswork ........ 30 day MBG
4619 Mavis Beacon Typing 1.3 (CP) ... 32.
★ Spectrum Holobyte .... 30 day MBG
3464 Tetris 1.1, 6112 Weltiris 1.1 or
8180 Faces 1.0 ........................ ea. 22.
3459 Falcon 2.2 or 6811 Vette 1.0 .... 33.
★ Spellmaker ........ 30 day MBG
2326 Sargon IV 1.03 (CP) (cheese) .... 28.
★ Strategic Studies .... 30 day MBG
8085 Panzer Battles or 9319 Rommel .... 26.
StudyWare
ACT, GMAT, GRE, or SAT Prep. ea. 29.
8096 LSAT Prep for the Mac .... 36.
★ Terrace Software .... 30 day MBG
8192 Mum's The Word 1.0 (gardening) .. 79.
9970 Mum's The Word Plus (color) .... 107.

COMMUNICATIONS
MODEMS, MAIL, NETWORKS

★ Toyogo .... 30 day MBG
7624 Nemesis Go Master 4.7 .......... 41.
7623 Nemesis Go Master Deluxe 4.7 ... 85.
★ Voyager ...... 30 day MBG
Amanda Stories (vol. 1, 2 or 3) ea. 18.
★ XOR ...... 30 day MBG
8061 MacSki 1.01 .................... 39.
6040 MacGolf Classic 1.0 (CP) .... 52.

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by Cathy Abes

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

**Artist:** Peter Alsberg, who lives in Washington, D.C., works as an illustrator for the Washington Post and also does free-lance illustration. Since he began exploring the Mac's graphic possibilities three years ago, Alsberg has successfully adapted his brush-and-ink drawing style to work with the Mac and to make better use of FreeHand—his program of choice—with its line- and curve-drawing capabilities.

**Tools:** Mac IIlex with 5MB of RAM and an internal 100MB hard drive; Microtek MSF-300Z color scanner; Aldus FreeHand 2.02.

**How It Was Done:** Alsberg's intention was to give this illustration—which opens the *Conspicuous Consumer* column—a loose feel, to make it look less like a computer-generated drawing. This meant creating lines that didn't necessarily connect and colors that often extended beyond an object's boundaries.

He started out with a very dark, soft-pencil line drawing, which he photocopied to make the lines darker and denser. Then he scanned it into FreeHand as a TIFF file. After sending it to FreeHand's background layer (layer 0), he made the background layer inactive so he could use the image as a template; this enabled him to trace over it without worrying about accidentally moving it.

Alsberg specified the top layer (200) for all his line work (by choosing Layer Control under the View menu) so that none of the lines would get hidden behind color fills. Having the lines on the top layer also let him change the line weights without affecting anything else in the drawing.

"I try to organize my drawing so I'm drawing things on top of each other in sequence—either by drawing each new object on a higher layer or by sending existing objects to a lower layer," he says. "Generally, I draw on one layer and then send that part of the illustration to the back."

To specify the type of lines he wanted for the illustration, in the Basic Line dialog box under the Line menu he chose the settings—1.5-point line weight, round cap, and black line—and saved them; the new format then became part of the Line menu. Alsberg prefers to use round-cap lines (the ends of the lines are rounded, not flat) because they fit in better with the style of drawing he does.

After the line settings were in place, Alsberg selected the combination tool (#6-0) and began drawing. Because this tool combines the capabilities of the curve and the corner tools, it enabled him to draw the lines in his illustration more accurately than he could have by using the corner tool and the curve tool separately. With the combination tool, you create a polygon with corners clicking from point to point; clicking and dragging at the same time creates a curve.

He drew some of the more complex curves by first zooming out to make the drawing smaller and then using the freehand tool. This enabled him to create fewer points along the line and allowed him to draw a complex curve in one fluid motion, more like brush-and-ink drawing.

After finishing the line drawing, Alsberg chose a lower layer (100) in which to create the colors. He specified None in the Line menu and used the combination tool to create a closed shape for each book by tracing its outline; then he filled them with color and sent them to layer 1.

After creating the blue background (for the water), he sent it to layer 2, since he wanted the water to partially overlap the books. Back in layer 100, he filled in the rest of the colors, using Send to Back to layer each new color over the last.

To simplify the process of drawing the many crescent-moon shapes that appear in the illustration, Alsberg used both the corner tool and curve tool. He found that placing one curve point between two corner points creates a perfectly smooth arc between the two corner points. To create a crescent, he first selected the corner tool (#9-0) and clicked to make a point. Next he switched to the (continues)
The original line drawing after the artist traced it from the TIFF file he'd scanned and pasted into FreeHand.

One of the squiggly lines drawn with the freehand tool; the smoothly curved line on the left is made up of fewer points because it was drawn in zoom-out mode. The line on the right, drawn zoomed in, looks lumpy because its many points cause more variations in the curve.

To automatically create a smooth crescent-moon shape (left), the artist alternately used the corner tool and the curve tool. Using the combination tool or the freehand tool would probably have produced irregular curves (right), requiring point-by-point editing to smooth out the lines.

Not satisfied with the position of the canoeist in relation to the rest of the drawing, the artist grouped the lines and colors that defined the man, the canoe, and the book underneath, and grouped them all. Then, after choosing the skew tool, he repositioned the grouped elements and distorted their dimensions by pulling on one of the four handles.

But now, more than the shape of the elements was distorted. In FreeHand 2.0, when you alter grouped elements in any way—such as by reducing or stretching—the weight of their individual lines changes as well. To return the lines to the weight Alsbreg had originally specified, he ungrouped the elements, selected Layer Control, and isolated the layer that contained all the lines (layer 200) by making it the only active layer. Then in the Line menu, he clicked on the line settings he had originally created.
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The Rime of the Ancient Marketer
A CAUTIONARY TALE FOR LITTLE GUYS IN THE MAC MARKETPLACE

BY STEVEN LEVY

Macworld Expo is a time when the entire Macintosh community plays peacock. The booths are big and lush, the aisles packed with customers, and the parties tastelessly lavish. Wine flows and people stuff their mouths with shrimp. Everything seems dipped in an oily sheen of success. But when you make an effort to really talk to people, especially some of the smaller vendors who once constituted the heart of the Mac universe, you sometimes glimpse a dark side behind the glitz.

For the past few years, I've made a point of chatting with Dave Johnson, the president of Working Software, to soak up the latest news from his quarter of the industry. The news has not been great. We've talked in snack bars at Boston's Bayside Exposition Center and on park benches outside San Francisco's Civic Auditorium, but not at Dave Johnson's booth: Working Software can't afford a booth of its own. Which is not to say that his products and his support of them are not excellent—they are. But virtue often goes unrewarded, and the Macintosh market has been no exception to this cruel reality. Listening to Johnson's tale, a reverse morality tale that goes back to the early days of the Mac, I feel I'm hearing a long and emotional saga... sort of a Rime of the Ancient Marketer. I think it bears repeating.

Dave Johnson, a slim, affable fellow, now 37 years old, came to Silicon Valley from Detroit in the early 1980s. It was the big computer boom and Johnson, a software engineer, was part of a contemporary gold-rush-style migration. He settled in idyllic Santa Cruz, California, and went to work for Atari, the ultimate high-growth company, just in time to see dundie-headed suits take the place down in flames. (The company was later revived.) Then he worked for another high-flying game company, where he witnessed another business disaster. Johnson and his car-pool buddy, Mike Greene, watched this senseless decline and brainstormed about how things might be better arranged. Why not a company that eschewed the big rip-off and instead did things with the customer first in mind? A company built on service, not on slick packaging; a company that offered sensible products, reasonably priced. Why not?

Hard Working
In 1985, Johnson and Greene decided to start that company. They called it Working Software, dedicated it to providing quality software for the Macintosh, and began creating the first product, a spelling checker called Spellswell. It shipped in January 1986 and did "very well for a company in a garage," says Johnson. With the revenue and recognition that came from Spellswell and other products, including a file-locating program called Findswell, Working Software quickly became one of the Mac's most valued small developers—part of a community that by passion and prod-
uct helped keep the Mac afloat in its time of travail.

In late 1986, Dave Johnson bought out his partner. Now fully in charge, Johnson was forced to think long-range. With the success of the Mac Plus the market was changing, and he felt a real temptation to take the plunge into rapid growth. “I was jealous of the companies with glossy ads—‘real’ companies,” Johnson explains. “I thought that we needed the full-page ads, retail distribution, better packaging.”

It really wasn’t much of a choice. Like some sharks, or like Woody Allen’s relationship with Diane Keaton in Annie Hall, the more modest Macintosh developers had to move forward or die. Otherwise, the bigger competitors, with their marketing clout and their ability to get exposure in stores and mail-order outlets, would eclipse the little guys. It was already happening—Working Software, which at best had only been breaking even, was beginning to see its sales slip.

So Johnson hired more people and moved to bigger offices. He changed his product packaging so it would fit on store shelves and catch the browser’s eye. He expanded the product line, introducing sets of custom dictionaries for Spellswell. He invested heavily in developing a new flagship product, a program that would provide everything a user would need to churn out business letters, to be called QuickLetter.

The latter decision had its hellish consequences. QuickLetter cost a lot to develop, and, as often happens, it was late. Originally planned for early 1987, it didn’t ship until December 1988. People who bought it loved it. But not enough people bought it. The company was in trouble.

I remember Dave Johnson at the Boston Expo in the summer of 1989. Not only could he ill afford to properly display his products, but he couldn’t easily manage hotel accommodations—he was sleeping on the floor of someone’s house, 40 minutes from Boston. Due to a complicated distribution arrangement with another company, his products had been overshipped and literally no product revenue was coming into Working Software—none. He had sold his house to keep the company going. From a high-water mark of nine full-time employees he was now down to three. Not surprisingly, he sounded depressed, not only about his company, but also about the fate of others like it.

“I don’t know if any small companies will be around soon,” he told me. “Nine companies sell over 90 percent of the software, and over a hundred are fighting for the rest. Apple used to help companies like us, but now Apple has no idea who we are. We used to get dramatic help from them—they’d buy our products, literally help us keep going. Not any more.” In retrospect, it seemed that (continues)
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to be successful, a company needed big capital to buy those full-page ads, to purchase space in mail-order catalogs, to keep the company going through the long development cycle of new products.

What seemed to shake Johnson the most was the seeming repudiation of his most basic belief that if you treated your customers well, they would patronize you in return. "We learned the hard way that customer service doesn't work. People don't appreciate service until after they've already purchased the product. Spellswell is now in its 25th version (the total is now 29), and all but 3 of those upgrades were free—the others cost $10 or $15." Even the idea of low pricing didn't seem to appeal to customers. "When we raised the price of Spellswell from $49 to $59, sales went up," he said. "When we raised it to $75, sales went up again!"

But despite the evidence, Johnson vowed that he would never swerve on his policy of customer service. That way, if the company finally went bust, he would at least be able to say that he did it without cheating anybody. Especially himself.

Reversal of Fortune
My guess then was that Working Software was soon to be a goner. But at the San Francisco Expo in April 1990, when I next spoke to Johnson, he seemed slightly more upbeat. He actually could afford a hotel room, albeit one that required a trip down the hall to use the toilet. A troublesome lawsuit with the programmer who wrote QuickLetter had been resolved, and his distribution seemed somewhat straightened out—Working Software was actually selling products. The company had also gotten some revenues from producing programs on commission for other companies (such as Correct Grammar for Lifetree Software, a neighbor at the time), and QuickLetter 2.0—impressively upgraded—was on the way.

But not everything was rosy. Apple had just instituted a policy that required developers to pay $750 for the privilege of being authorized to write the software that would support the Mac. Since Working Software couldn't spare the cash, Apple declared it no longer an authorized Mac developer. Dave Johnson wrote to an Apple executive, pleading to let his company slide on the developer fee, and got his wish. But the incident was revealing.

"The Mac is great," said Johnson then, "but the people who own the Mac, the possessors of the patents, aren't so great." Noting the huge settlements that Apple executives were receiving upon being laid off in corporate reshuffling, he asked, "Do you think a guy who makes over a million dollars if he gets fired cares about the marketplace?" The future still looked cloudy for Working Software. "We might merge with somebody," he said. "We have to. We can't get venture capital since we aren't (continues)
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I sensed that things were worse than he was letting on, and later I found out that at that time, Working Software was indeed hanging by a thread. Dave Johnson now admits that if Apple hadn’t waived the $750 developer’s fee, the company would have gone bankrupt. As it was, in the fall of 1991, the company staked everything on one last chance.

The idea was to shift to direct-mail marketing. Johnson put discount coupons for Working Software products into upgrade packages. Then he swapped mailing lists with another company so he could send out marketing material. “We were literally scraping together the money to get out 200 pieces of direct mail,” he said of the company’s utter low point. “No one had been paid.”

Just when the referee’s count was approaching ten, something happened. Orders began coming in. Enough to keep the company going, enough to print more pieces of direct mail, which helped sell even more copies. As a result, Johnson says, “We had a tremendous last quarter. It was phenomenal how many people ordered our product.” After that flurry, orders went up to the point where monthly sales were far exceeding the entire annual revenues of the previous year.

Johnson says that Working Software, now in its fifth year of shipping products, seems rejuvenated. His staff is back to 12, and rising. The company is paying its bills. A new product is ready to ship—called Last Resort, it saves keystrokes in word processing programs, keeping text alive even when the computer crashes. Other new products will come after System 7.0 ships. Things are going so well that Johnson is even planning a vacation.

A full week away from work—his first since starting Working Software.

Still, Dave Johnson has no illusions. He knows that small companies are still at a nearly fatal disadvantage in the Mac marketplace. “The software business has changed completely,” Johnson now says. “Mike Greene and I wanted to start a company with the kind of things engineers talk about. Free upgrades, good service, and quality products that don’t cost too much. But it’s a world of hard-core business types, and I’m learning that.”

As for Working Software, despite the rejuvenation, “We’re aware that the prospects of surviving on our own are not good,” Johnson says. But he wouldn’t welcome just any merger partner. “If you’re not in the business primarily for money, it’s hard to think of [losing your company]—but if we found the right partner...

His sentence trails off, and I understand that to Dave Johnson, Working Software is not merely an enterprise. It’s his life.

Macworld columnist Steven Levy is writing a book on artificial life.
When it comes to selecting the right scanner, be forewarned. There is a difference you can see in black and white. And color. Just look at this comparison between the La Cie Silverscanner and the Microtek 300ZS. Both images were scanned at default settings with no corrections. This entire ad was then created and separated using Adobe Photoshop, Quark XPress 3.0 and a Linotronic 330.

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Accountant, Inc. is perfect for any type of business - retail, manufacturing, service or professional. It provides reports and performs analysis like no other software, so you can do what you do best and stop worrying about the accounting chores. Accountant, Inc. is a fully integrated accounting system.
Softsync/Bloc Publishing
#3986 Accountant, Inc. Pro 2.0...$338

Quicken 1.5
Quicken does personal and small business accounting with a simple checkbook. For regular payments, it performs all the bookkeeping, hands you the checks, ready to sign and addressed for mailing. It tracks tax deductible and prints itemized lists. Quicken also reconciles bank statements, provides detailed reports on profit and loss, income and expenses, and makes budget versus actual comparisons. MacUser rated it a full Five Mouse.
List: $60
#2591 Quicken 1.5 ...$37

M.Y.O.B.
M.Y.O.B. combines a powerful, fully integrated accounting program with management tools you can’t find anywhere else! With just a few clicks, you can control every facet of your business... print your financial reports, reconcile your checkbook, do invoicing, even call your customers. M.Y.O.B. is easy to learn and is simple to use, so it makes “doing the books” a breeze. Its unique graphic navigation moves you instantly through every part of the program. Here’s what the experts say:
"Using M.Y.O.B is simple and direct." — Macworld
"There are several unusual features that make the program easy to set up, easy to use." — MacWeek
List: $249
#3535 M.Y.O.B. .................$141

WealthBuilder
Calculate your net worth by using templates to create a personal profile, balance sheet, and budget summary. If you use Quicken, Andrew Tobias Manage Your Money, or MacMoney, you can import your data directly. Establish realistic financial goals and objectives and then take action! Reality Technologies
List: $170
#3769 WealthBuilder .......$98

In-House Accountant
In-House Accountant is the first accounting program for the Macintosh that’s powerful enough for any small business, but easy enough for just balancing the checkbook at home. In-House Accountant was developed from scratch to take full advantage of Macintosh’s power. Familiar point-and-click operations let you see at a glance all of your financial information, anytime you want. Entries made in the transaction list immediately update all related items in other lists, so there’s never a need for posting. The program handles payables and receivables, by letting you move among various accounts without ever having to change modules, or even close a window. Prints professional-looking reports, with different type styles and sizes as well as bar graphs and pie charts.
In House software, Inc.
List: $200
#3782 In-House Accountant ...........$135
Microsoft Office
Four essential business-productivity applications in one special edition. Each is an industry standard in its category: word processing, spreadsheet, desktop presentations, and electronic mail. The Microsoft Office helps business professionals power through their day's work faster than ever. Use Microsoft Word to write memos and reports; Microsoft Excel to crunch numbers and create annual-report-quality graphics; Microsoft Power Point program to create impressive presentations; and Microsoft Mail to instantly share information. Each is a top-selling stand-alone program in its own right -- used together, they maximize that productivity for your entire office.

Microsoft Excel 3.0
Microsoft Excel is the most advanced spreadsheet for the Mac. It combines a spreadsheet with business graphics and a database. It provides a worksheet area of 16,384 rows by 256 columns. Presentation tools, such as multiple fonts, variable row heights, shading, custom number formats, 88 built-in chart types and more, make Microsoft Excel the ultimate business tool. Excel has support from hundreds of other manufacturers' products and templates. Transfer Excel charts and worksheets into Word. Easy to update.

Microsoft Word 4.0
Design pages with different numbers of columns on the same page. Place sidebars exactly where you want them. Automatically wrap text around graphics. Tables are a breeze. Just enter the number of rows and columns you need and Word generates your table with automatic text-wrap within cells. Word 4.0 even has facilities for creating mathematical formulas. It has a spelling checker, hyphenation, style sheets, a glossary, automatic indexing, mail merge and an integrated outline. Coupled with a connectivity program such as MacLink, Word 4.0 on the Mac is compatible with the MS-DOS version of Word and with PageMaker (both Mac and PC versions) so you can exchange files among all these formats. Version 3.0 won the 1988 MacUserEurope Victor and Macworld World Class awards.

Microsoft Quick Basic 1.0
Put the Interpreter and Compiler under one roof. The enhanced Compiler sub-launches compiled programs with its interpreter for easy Edit/Compile/Run/Edit cycles. It supports the 68020 (and 68881 FPU), and permits recursive sub-programs.

Microsoft Works 2.0
Microsoft Works 2.0 seamlessly integrates the five most-needed office applications: spreadsheet, database, word processor, desktop publishing, and word processing documents. The drawing tools and linked columns of the desktop publishing section let you create professional-style layouts. The communications section makes E-mail and on-line work quick and easy.

Prices subject to change without notice.

#2678 Microsoft Office ............... $524
#0227 Excel 3.0 .............. $299
#2238 Word 4.0 ......................... $244
#0567 Works 2.0 .................... $183
**TouchBASE**

TouchBASE is a database to keep track of personal and business contacts. It's handy all the time because it's a desk accessory. TouchBASE can print envelopes, labels, address books, fax cover sheets, and reports. It's even a multi-user product so you can share your database on a network or use it all by yourself.

After Hours Software

List: $125

#3908 TouchBASE .......... $88

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**MacEnvelope 5.0**

MacEnvelope 5.0 prints customized envelopes and labels, with EPS, PICT or PICT2 graphics, plus text messages. Use MacEnvelope's template library, or create your own with new WYSIWYG layout capabilities. Postal bar codes save money on bulk mailings. Use as an application or as a new Desk Accessory. Stores 1600 names per file, sorts alphabetically or by ZIP codes.

Synergy

List: $129

#3142 MacEnvelope 5.0 ........... $56

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**C.A.T. III**

C.A.T. III is a relational database for professionals in Sales, Marketing, and Management. It has been designed specifically to help you manage your Contacts - Activities - Time. If your success depends on the number of contacts you make, and your ability to track, cultivate, or service them, then C.A.T. is the right tool for you.

Chang Laboratories

List: $495

#3634 C.A.T. II .......... $288

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**Data Desk**

If you really want to understand something you've got to see it for yourself. That's the idea behind Data Desk. No matter what kind of data you're looking at in research, education, business, government - the visual tools of Data Desk reveal it in surprising new ways. Data Desk brings the philosophy of exploratory data analysis into vibrant practice, right on your desktop.

Data Description Inc.

List: $595

#2210 Data Desk .................. $458

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**Double Helix 3.0**

With Double Helix 3.0 you can create customized applications quickly - without having to be a computer genius. The Icon-based programming language and Version 3.0's new HyperCard-like interface combine to let you develop user-specific custom menu systems with password protection, as well as unlimited number fields, records and files. You can tailor applications easily to reflect your changing requirements. Applications work on multi-user Macintosh LANs or on Macintosh/VAX networks.

CodaSoft

List: $595

#0609 Double Helix 3.0 .......... $388
Ashton-Tate

Ashton-Tate gives you the value of the season! Buy either Full Impact 2.0 or Full Write Professional 1.5 and Ashton-Tate will send you the other free! Full Impact 2.0 competes head to head with Excel and Wingz. Full Write delivers advanced word processing to every user - even beginners.

Ashton-Tate
List: $395 each

- #3772 Full Write 1.5 ...... $145
- #2011 Full Impact 2.0 .... $145

Informed AutoForm

Informed AutoForm turns any form created with Informed Designer into a stand-alone application, called an AutoForm. An AutoForm can permit or restrict capabilities, depending on how the form will be used. AutoForm offers an ideal method of gathering information. When data is intended to be used in other applications, such as a spreadsheet or database, AutoForm can simplify the entry process. Using the intelligence within a form including calculations, defaults, choice lists, lookups, error checking, formatting and custom help messages, the accuracy of information is assured while the entry process is made significantly faster and easier.

Shana Corp.
List: $149

- #3890 AutoForm ............ $74

Informed Designer

Use Informed Designer to automate and computerize your routine office paperwork. Shana has made it easy to produce professional quality custom forms in just minutes! Data can be printed onto custom stock, or the entire form (including data) can be output together. With the Informed Mini-Manager (sold separately) you can fill out and organize the forms on your Mac!

Shana Corp.
List: $295

- #3722 Informed Designer .................................................. $158

Informed Manager

Informed Manager is used to fill out forms created with Informed Designer. Using intelligent features such as calculations and formatting, Informed Manager makes entering information into forms both fast and accurate. You can then use its built-in database to find, sort, and manipulate completed forms. Informed Manager has flexible printing options. Options include: printing single or selected forms; data only onto preprinted forms; both the form and data onto plain paper; or data and selected graphics only.

Shana Corp.
List: $185

- #0101 Informed Manager .................................................. $98

CORPORATE AMERICA!

We accept corporate, educational and institutional purchase orders with credit approval.
Sales & Marketing Manager

In this world of fast-paced markets and even faster-paced sales, you must have the marketing software to keep up with the world. Sales and Marketing Manager is a five part program that improves your control of all sales and marketing. It allows you to set up individual companies or divisions. Whether you are one sales person working for many companies or one company with many divisions you can now keep full control.

LISI LIST $395
Mtg. Manager ............ $295

Omnis 5

Omnis 5 is a relational and/or hierarchical database program that has been designed to fully utilize the graphical interface, enhance memory, storage and color capabilities of both Macintosh and IBM PS/2 hardware. It is a comprehensive program for developing business data-management applications. Omnis 5 includes Omnis Express to allow a user to produce outline requirement of an application, and with a click of the start button it automatically builds the Omnis 5 application.

Blyth Software, Inc.
#2538 Omnis 5 ............... $648

Planisoft

Planisoft is a powerful time and resource management tools that can be shared between Mac's and PC's over any network. Planisoft offers the power to organize events, make more profitable use of resources and control valuable assets. It comes packed with a wide range of features that allow a user to manage agendas, find available time slots, research contact history, keep track of deadlines and priorities, administer and monitor availability of material resources, and exchange data with spreadsheets, word processors and databases.

ASD Software, Inc.
#3612 Planisoft ............... $138

DynoDex 2.0

DynoDex is the electronic address file that gracefully manages your most important information—names, numbers, addresses, and notes on people. DynoDex puts people at your fingertips—both on the computer and on the road. Instantly look up and dial any number you need from the full-powered DynoDex database or the handy desk accessory.

Portfolio Systems
#0119 DynoDex 2.0 ............ $71

Business Planner Toolkit

If you're a small business person or are an entrepreneur attempting to raise capital or secure a loan, this package is for you. Business Planner Toolkit is a practical guide for preparing a professional business plan with complete financial analysis, charts, sales forecasts and winning text. A complete sample plan is included on paper and on disk. Using your own word processor, the program is especially helpful for doing financial statements and making all the numbers match up. Received high praise and 4 1/2 mice from MacUser. Works with either Excel, Works, Works and any SYLK compatible spreadsheet.

Iman Software
#3910 Business Planner Toolkit ... $95
Kaleidagraph 2.0
Kaleidagraph simplifies the process of analyzing and presenting statistical information. It provides 12 different graph structures, including scatter, histogram, probability plot, polar, as well as more common types such as line, bar and pie. You can crunch large amounts of data (up to 32,000 points per column) and plot up to 10 variables at once. Supports both the LaserWriter and the ImageWriter (and color on the ImageWriter II). Synergy
#2006 Kaleidagraph 2.0 ............. $144

FastTrack Schedule 1.5
FastTrack Schedule 1.5 produces Gantt charts in outline format. It has flexible fiscal year formats, multiple activity columns, word-wrap for text, start and end point offsets and custom generic units. It won't take up your time with complicated setup and extensive data entry. But it will print informative charts with graphics showing progress reached. AEC
#3456 FastTrack ......... $138

FileMaker Pro
FileMaker Pro is an extended flat file manager. Its look-up function extracts information from other files—which is what most people really need. The new graphics tools streamline the generation of reports and layouts. User-definable buttons automate repetitive tasks or activate Scripts. The Script editor simplifies creation and editing so you can make custom applications. You'll appreciate the new data entry aids, such as check boxes, radio buttons and pop-up menus. If you purchased FileMaker II after April 1, 1991, this upgrade to FileMaker Pro is free direct from Claris. Claris
#3478 FileMaker Pro ............. $214

MacProject II 2.1
MacProject II brings structure and discipline to chaos. It helps you make decisions, set limits, and establish deadlines. Along the way, it tracks time, personnel, resources, and budgets, so projects don't run out of control. MacProject II prints progress charts and reports for the entire team. Version 2.1 includes over 20 new features, such as Data Import/Export, a Resource Leveler, and On-Line Help. Claris
#2202 MacProject II ......... $358

WingZ 1.1A
Using WingZ is like having a spreadsheet with page layout and presentation graphics all rolled into one. The program can place resizable graphics and text anywhere on the page. Its HyperScript programming language makes custom applications easy to create and use. Informix
#2224 WingZ 1.1A .... $244

How to Write a Business Plan
The one software package that provides you with a complete, written business plan. Includes entire narrative plus all financials and spreadsheets. Makes the preparation and writing of your plan as easy as ABC. This package prepares your projected three year profit and loss, balance sheet and cash flow statements. How To Write a Business Plan also provides you with all of your business plan's written sections, including marketing, products and R & D. Use your existing word processing software to produce your final business plan. Ideal for individuals, companies, lawyers and CPA's. AISB
#3565 How to Write a Business Plan ........... $85
Mathematica 2.0

Mathematica 2.0 is a powerful computational system that combines symbolic, numerical, and graphical capabilities. It is designed to handle a wide range of mathematical tasks, from simple calculations to complex problem-solving. Mathematica can manipulate formulas directly in algebraic form, perform symbolic equation solving, differentiation, and integration, and generate high-quality graphics.

GEOvista

GEOvista is a geographic presentation system that displays data on presentation-quality maps. Information can be imported from other applications and entered directly from the keyboard. Areas of the map are shaded to represent data ranges selected by the user. Included with GEOvista are 52 template maps, one for each of the 50 states divided by county, and maps of the U.S. divided by state and much more.

WriteNow 2.2 with Grammatik Mac

WriteNow 2.2 is a powerful word processor that includes a grammar and style checker, a built-in spelling checker with a 135,000 word dictionary and the WordMaster Thesaurus. In addition, WriteNow offers all the features you expect in a word processor, including mail merge, label templates, data formatting, and multiple columns. It can even import Word 3.0 and 4.0 documents for maximum flexibility.

KiwiEnvelopes

KiwiEnvelopes is a simple, easy, and fast DA solution for printing one envelope at a time on your Macintosh. Use it to print envelopes without leaving your current application. Just select and copy the address in the letter you're writing, open KiwiEnvelopes and click the Print button....that's all! It's always accessible under the Apple menu and requires little memory. Often-used addresses can be saved and recalled at the click of a mouse.

Mathematica Enhanced 2.0

If numbers are your business, Mathematica can do numerical, symbolic and graphical computation. It can be used as an interactive calculation tool and a programming language. Numerical capabilities include arbitrary precision arithmetic and matrix manipulation. Mathematica 2.0 can manipulate formulas directly in algebraic form, performing such operations as symbolic equation solving, integration, differentiation, and power series expansion. Produces two- and three-dimensional PostScript graphics.

FileForce

FileForce is a relational file manager that creates files for customers, then builds a relational file manager simply by linking the files together. It creates an invoice that automatically looks up customers, enters each line item into its own file, then computes extended price, tax and total for you. Print form, summary reports, mailing labels, mail merge letters, and e-mail messages with information from any file. FileForce combines the simplicity of file managers with the power of relational databases.

KiwiSoftware

KiwiSoftware is the developer of KiwiEnvelopes and KiwiSoftware.

4th Dimension

4th Dimension is the ideal database for novice, intermediate and power users. 4th Dimension will keep pace with your needs with its automatic button scripting, multi-page layouts, superior relational strategies, streamlined data management and easy-to-use procedures. Built-in Quick Report, label generator, and graphing tool provide point-and-click data analysis and reporting. NEW! This version supports the 4th Dimension Environment including: 4D CALC, 4D WRITE and 4D COMPILER. Find out why 4D is the best selling relational database for the Macintosh!

Acus

Acus is the developer of 4th Dimension.
Resume Kit
The Resume Kit is a remarkably complete package for managers, professionals, students or anyone who needs a great looking resume fast! Get everything you need to write, format, and print a truly great, professional looking resume and cover letter - in less than an hour! The Resume Kit takes you through a step by step process to organize the important information you need to include in your resume.
Spinmaker List: $40
#0433 Resume Kit ........... $25

Ordering with our knowledgeable Mac Advisors is always hassle free.
Language Master 3.0

Language Master 3.0 is an easy-to-use, memory-resident dictionary and thesaurus compatible with all popular Macintosh word processors. Based on data provided by Merriam-Webster, it provides instant access to complete definitions, usage notes, hyphenation and part of speech information for over 80,000 words. The thesaurus includes 1.4 million responses for over 40,000 entries: synonyms, antonyms, compared, contrasted and related words. It also inflects all responses. Language Master is THE definitive choice in linguistic software.

Franklin List $80

#0010 Language Master 3.0 ..... $44

MacProof 3.2.3

MacProof 3.2.3 is your English proofreader. Without leaving your document, you can use this handy Desk Accessory to proofread any open word processor document. MacProof checks for potential errors in punctuation, capitalization, word usage, style and structure. You can customize the Usage and Spelling dictionaries to your specific requirements. It includes on-line help and a complete user's manual.

Expertise List: $195

#1123 MacProof 3.2.3 ..... $114

Unavailable at press time. Call for details.

Editorial Advisor

Editorial Advisor is a computerized style manual that covers grammar, punctuation, style, usage and more. Learn the conventions of editing. Give your writing that professional edge. With System 7.0, you can install Editorial Advisor on your DA menu. It's like having a reference library on your hard disk.

Petroglyph, Inc. List: $150

#3944 Advisor ..... $74

Macworld • July 1991

RésuméExpert

Advance your career with professional help. RésuméExpert creates job-winning resumes from students to CEOs. Designed by a resume-writing pro, the RésuméExpert Software Series is an impressive collection of eye-catching resume and cover letter templates for Microsoft Word 3.0 or 4.0 and WriteNow 2.2. Each of the 10 editions provides over 40 distinctive and completely-formatted layouts. Easy to use—just select the appropriate template and replace the text with your own information. The highly-rated manuals provide expert tips for quickly composing professional-quality resumes and cover letters. Mac/Unix rated it 4 Mice!

A Lasting Impression

List: $75

#3103 RésuméExpert .................................. $47

Ventura Publisher—Macintosh

Powerful, fast and accurate, Ventura Publisher, Macintosh Edition, provides typeset-quality desktop publishing. Ventura Publisher professionally formats files created with word processors, graphics programs, scanners or within Ventura Publisher itself. Ventura is the product of choice for creative documents such as brochures and newsletters, or long structured documents like books, technical manuals and catalogs. It is fully compatible with all Ventura Gold Series PC versions and supports AppleShare, TOPS, Novell and PSN networks. It imports a wide variety of text and graphics files from both the PC and Mac.

Ventura Publishing

List: $795

#3909 Ventura Publishing ............. $498
Mariah

Mariah is the first true multimedia organizer that lets you manage graphics, sounds, animation and text files together in one high-speed environment. Unlimited size and number of collections! Cut & Paste between collections and applications. Play sounds and animation. Record audio items directly, Import and Export Sound and PICT resources to other documents or applications such as HyperCard.

Symmetry

List: $149

#3983 Mariah $85

PageMaker 4.0

PageMaker 4.0 goes beyond the paste-board metaphor that made the original PageMaker a smash hit. New features include a blindingly fast Story Editor, extended support for color, the ability to rotate text, a built-in dictionary and spell checker. Files can be up to 9999 pages in length and multiple files can share a common Index. Special "Hot Links" can be established between PageMaker documents and the graphics and data files they contain, so that updates in the attached files are automatically imported into the PageMaker document. You also get much more sophisticated type control, including the ability to adjust the look with point-sized dependent kerning on any text in increments of .01 point and a condense/expand range of 5% to 250%. PageMaker can import color graphics images stored in TIFF and EPS format and can use PANTONE, RGB, HLS, or CMYK color models to create color separations with Aldus PrePrint.

List: $795

#3223 PageMaker 4.0 $498

FreeHand 3.0

Aldus FreeHand 3.0 combines an elegant interface with exceptional power to give the easiest-to-use tool for creating professional-quality graphics. And its range of features makes it the most comprehensive drawing and graphics program you can use—from initial design all the way to color prepress production. Whatever your field, you'll find in Aldus Freehand 3.0 a unique combination of ease of use, powerful performance, and versatile production features—for graphics and text.

List: $595

#3947 Freehand $398

Typist

Typist is the personal scanner for Macintosh. It gives you all the raw power of a small scanning pool, right on your desktop. Scan rows of numbers or small typewritten text into your spreadsheet. Scan columns of text directly into your word processor with the click of a button. The Typist can handle virtually any font, or font size, and enter it directly into your application in whatever format that you happen to be using—as if you were typing it yourself. The Typist is more than a typical hand scanner which is generally suited to scan graphic images, but is limited when it comes to text and numbers.

List: $695

#3659 Typist $478

Great assistant for scanning graphic images, text, and numbers.
Pantone Process Color Imaging Guide
The PANTONE Process Color Imaging Guide is the perfect companion to all Pantone-licensed software programs. It provides a visual comparison of solid PANTONE Color and process simulations as they would appear on the final printed piece. As many PANTONE Colors cannot be satisfactorily reproduced in four-color process, this publication provides the user with the information to best decide whether to specify spot or process color while working on the desktop.

BannerMania
When you have something special to say, call on BannerMania! BannerMania lets you produce spectacular designs - with styles and effects that are available nowhere else. Stretch type, distort shapes, then prints smoothly with perfectly formed characters - and without the "taggies!" at the end. New features include type height measurement and a pasted piece next to each page. You can group text and graphics as individual elements and rotate them a full 360 degrees in 0.001 degree increments. A pasteboard provides a work area next to each page.

Quark XPress 3.0
XPress 3.0 boasts a more intuitive user interface, many new features, plus redesigned and reorganized documentation. New measurement and page palettes provide the user with interactive on-screen access. A library stores frequently-used items and a pasted piece provides a work area next to each page. You can group text and graphics as individual elements and rotate them a full 360 degrees in 0.001 degree increments. Color trapping ensures precise color printing.

Easy Color Paint 2.0
Easy Color Paint 2.0 will bring many colorful and fun-filled hours to your Macintosh LC or any Macintosh II. It's suitable for any user skill level: window looking for beginners, fancy menu options and a pressure-sensitive pen for pros. Print your masterpiece in color to the ImageWriter II or any Color QuickDraw printer. No wonder it's a finalist for "Best Personal Creativity Program" in this year's Software Publisher's Awards. See for yourself what all the excitement is about.

StrataVision 3D
StrataVision 3D is realistically the best 3D program on the Mac. Already adorned with industry awards there's even greater power with version 2.0. Extended modeling gives you more control over objects. Apply realistic textures, set reflectivity and soften shadows with improved ease. Animations of linked objects offer stunning results. StrataVision 3D 2.0 also has a realistic price. Whether you're an illustrator, designer or a tinkerer, StrataVision 3D offers the realistic solution.

Pantone, Inc.
List: $75
#3435 Pantone Guide ... $48

BannerMania
List: $60
#3970 BannerMania ............................................. $36

Quark
List: $795
#3488 XPress 3.0..............................$518

Easy Color Software
List: $89
#3862 Easy Color Paint 2.0...$44

Strata
List: $495
#4001 StrataVision 3D .......... $348

$3 overnight shipping on Airborne
MacVision
MacVision controls the image digitizing process. The software automatically adjusts the displayed image to the screen characteristics. MacVision also provides a variety of ways to modify the digitized images. The software is not copy protected and is supplied on an 800K double-sided 3.5" disk.
Kodak Technologies Corp
#3705 MacVision ............ $258

DeskPaint 3.03/Desk Draw
DeskPaint is a 98K DA that works as well with black & white images on a Macintosh plus or classic as it does with color images on all IIIi or IliX (even in 24-bit color). It reads and writes PICT, TIFF, and MacPaint files. It does smoothing, auto-trace, graduated fills, multiple windows, and a lot more. DeskDraw is a DA comparable to MacDraw. Some of its features include hairlines, rotated text and arrows. It reads and writes PICT files compatible with SuperPaint, MacDraw II and Canvas.
Zedcor
List: $119
#3454 DeskPaint/Draw ....... $112

ClickPaste 2.0
The one-click-per-paste intelligent scrapbook. Paste objects anywhere, anytime. No windows to open, no wasted time. Imagine an instant hierarchical scrapbook that's available with a click of the mouse. Press a keyboard combination that you have defined and click—a hierarchy menu appears with text and graphic objects, right where you clicked. It's your very own portfolio of frequently used Macintosh data.
Mainstay
List: $100
#0173 ClickPaste 2.0 ...... $59

Capture 4.0
Capture images from video cameras, VCRs, and other video sources quickly and easily. Integrated images into applications such as inventory databases, personnel files, record keeping, desktop publishing, newsletters, presentation graphics and storyboards.
Mainstay
List: $110
#0174 Capture 4.0 .......... $69

Multi Ad Creator or Search
MacUser says, "If you create ads, get it. "The top-rated desktop publishing program. Why? Power, speed, precision, spot or process color separations and much, much more. The high-end choice for making great ads— or great pages—fast. Latest version adds custom PostScript effects, gradient fills and even more text-handling power. Multi-Ad Search is an image cataloging and retrieval system. It enables user to search for images cataloged in a common database without concern for where the images are stored. Once found the image can be previewed, printed or copied. File type of PICT, RIFF, TIFF, EPSF, and MacPaint are supported.
Multi-Ad Services, Inc
#0053 Multi-Ad Creator ........ $465
#0054 Multi-Ad Search .... $115
**Publish It! Easy 2.0**

Publish It! Easy is the all-in-one desktop publisher that combines page layout, word processing (complete with thesaurus and spell checker) built-in drawing and painting tools and a slide-show in a simple, easy-to-learn package. A Quick-Start Mini-Manual will help even beginners produce professional-looking documents within the first hour. Dynamic text flow reformats text when you adjust the size of text frames. Zoomable palettes disappear when screen space is needed.

FrameMaker 2.1
FrameMaker is a powerful, WYSIWYG publishing package designed for creating professional-looking business and technical documents of any length. It combines full-featured word processing, graphics, page layout, equations editing and book building tools into one integrated package. Features include: publication-quality typography, font sizes from 4 to 400 points, mixed page orientations, zoom capability, cross referencing and footnotes, FrameMath equation editor, spot color separation, spell checking and hyphenation control.

Frame Technology
List: $995

#3582 FrameMaker 2.1.....$795

**PixelPaint Professional 2.0**

PixelPaint Professional is the first application specifically written to take advantage of Apple's new 32-bit QuickDraw software. It's designed to grow with you when you upgrade your hardware. In its most powerful mode, PixelPaint Pro provides a palette of nearly 16.8 million colors at once (if your video card and monitor can display them). It includes all the features of PixelPaint 2.0 such as the PMS color selection, dithering and the ability to make color separations. PixelPaint pro offers features that are impossible in 8-bit color, such as anti-aliasing for smooth edges, transparency control and a realistic airbrush and color mixer. It saves in most popular file formats, including EPS and TIFF and runs on the Macill family as well as the SE/30.

SuperMac
List: $249

#2665 PixelPaint Professional 2.0 ............... $488

**PixelPaint 2.1**

A wide variety of tools gives you outstanding design flexibility. Use lines, arcs, polygons, splines and fractal lines to create freehand shapes. Or choose airbrush, line drawing, oil painting or watercolor palettes to create artwork in any style. Use smearing, blending, smoothing, washing and shading techniques with any tool. Get smooth, continuous color without banding. Customize the shape and function of tools, and use masking techniques like tiling to design quickly and accurately.

SuperMac
List: $249

#1576 PixelPaint .,. $148

**Swivel 3D**

Swivel 3D is a three-dimensional color drawing/modeling program. It is intended for graphic artists, engineers and designers to create complex models for use in presentations, desktop publishing and schematic designs. Features include: a linked database with constraints that allow a user to lock the objects' relative movement and orientation; Z buffering, which solves object intersections and a full range of rendering commands, such as shadowing, projecting images and setting light sources.

Paracomp, Inc.
#2650 Swivel 3D ...............$294
#3619 Swivel 3D Pro ...........$434
MacDraft 2.1
A classic precision drawing and design program. MacDraft now features movable geometric drawing tools, a wide range of drawing capabilities, and enhanced user interface and performance. It runs on any Mac with System 6.0.2 or later.

- Symbol libraries
- 44 different scales
- Dimension lines, Bezier and spline curves, and area calculation
- Smoothing of freehand shapes and polygons
- Full Macintosh color support

BluePrint 2.0
CAD for the technical professional.

- Parallel line tools with merging of intersection
- Line styles that you can customize
- Edges together, unguate, and unglue (glue and unglue)
- Object associative dimensions
- Updated when objects are resized
- Optional keyboard editing

Print from any Mac Plus or higher with System 6.0.2 or later.

Dreams 1.1
An excellent, cost-effective choice for those who need access to higher levels of power and precision. Dreams provides standard drafting tools as well as three expanded drawing capabilities: parallel line tools with merging of intersection, 16 line styles you can customize, and line weights. Dream runs on any Mac with System 6.0.2 or later.

- Parallel line tools
- 16 line styles
- 3 expanded drawing capabilities

MiniCad 3.1
A product that integrates a spreadsheet and a relational database into a drawing program so you can keep track of costs as the design evolves. Database information is linked to a particular object, staying with that object even when it is cut and pasted into another drawing. MiniCad also has a built-in programming language and a "smart cursor" to aid in the finer points of drafting.

- Spreadsheets and relational databases
- Integrated into a drawing program
- Built-in programming language

Ask about our Generic CADD upgrade

Generic CADD
Easy from start to finish, Generic CADD is the only program that goes the distance in professional design and drafting work. Use it to sketch your ideas then stay with it to create complete, fully-accurate drawings.

- From start to finish
- Goes the distance
- Professional design and drafting work

Design Your Own Home
Whether you're a novice or professional, you can now design your own home with these three programs:

- Architectural Design enables you to draw floor plans, side views, and structural details in a fraction of the time it takes to draw by hand.
- Interior Design allows you to arrange furnishings in your floor plan, explore color schemes, and make changes with just a few easy steps.
- Landscape Design allows you to create full-color plans for your property by experimenting with flowers, shrubs, trees, and other elements.

- Architectural Design
- Interior Design
- Landscape Design

Design Architect
- Architectural Design
- $64

Design Landscape
- Interior Design
- $64

Design Interiors
- Landscape Design
- $64
$3 Overnight Shipping via Airborne Express

Relational Objex
Relational Objex can help educators create animated drawings to illustrate the principles and mechanics of mathematics or physics. Managers can plot Gantt charts with dependencies between tasks, which update automatically. Electrical engineers can check system timing in digital circuit designs. Mechanical engineers can simulate mechanical movement. Artists can create animated color drawings with point and click simplicity.

SoftStream
#3468 Relational Objex .......... $148

Claris CAD 2.0
Claris CAD is the professional design and drafting tool for engineers and architects. It integrates a wealth of two-dimensional design and drafting features, including mouse/keyboard entry, construction of fillets, tangents and perpendiculars and automatic dimensioning, while fully utilizing the Macintosh interface. Version 2.0 includes a new interface Graphic Guide, which intelligently guides you, anticipating the next steps and locating and indicating key geometric points on screen. You then simply point and click for precise alignment and placement.

Claris
#3693 Claris CAD .......... $644

New Low Price Shipping Soon!

MathType

If you need an easy way to create technical reports, slides, class notes, research papers, or even entire books, then MathType is your tool. It's an intelligent equation editor that lets you build complete equations, with simple point-and-click techniques, then paste them into your word processing documents. Creating an equation couldn't be easier—you just click on templates and symbols in the on-screen palettes then type into the empty slots.

Design Science
List: $149
#3559 MathType ............... $88

Call Us for Everyday Low Prices
Choose the CD-ROM Adobe type solution from NEC and get authentic Adobe type and a CD-ROM reader.

Choose the CD-ROM Adobe type solution that gives you your first three typeface families free, as well as the lowest combined CD-ROM reader-type library cost. And other important advantages.

Now you can buy the best Adobe type solution on CD-ROM. You'll get NEC's Type Gallery PS Locked Version and the amazing NEC Intersect CDR-36 CD-ROM reader. You can choose any three typeface families (up to a maximum of 15 individual typefaces) from more than 1000 Adobe typefaces on the disk. Plus, you'll save an average of 48% every time you call NEC in the future to unlock additional families.

NEC List $1,098

#0077 NEC Type Gallery PS w/CDR-36 $475

Other NEC Products Available

#0082 PhotoGallery ......... Zone price $245
#0081 Image Gallery .......... Zone price $245
#0085 Clip Art 3-D .......... Zone price $245
#0076 Intersect CDR-36 Battery pack .......... Zone price $95

NEC Intersect CDR-73

NEC's CDR-73 external reader is rated among the highest performance CD-ROM readers currently available with average access time of 500 milliseconds and data transfer rate of 150 KB/second. This makes the Intersect reader one of the fastest ways to access data from CD-ROM applications.

NEC List $999

#0079 Intersect CDR-73 $659
The professional's choice in PostScript art

Save the cost and hassle of creating custom artwork from scratch. Cliptures puts a wealth of useful ready-to-use EPS (Encapsulated PostScript) illustrations right at your fingertips! Enlarge, reduce, stretch or skew them; Cliptures graphics are flexible and easy to use. They look great when printed at 300- or up to 3300 dpi, and can even be modified or have color added with either FreeHand or Illustrator. Cliptures works with any program that accepts EPS files. A PostScript compatible printer, or interpreter program is recommended for best results.

Dream Maker Software

Volume 1: Business Images
Features 148 terrific business illustrations including a wide selection of male and female executives and a variety of tantalizing business cartoons, graphics and symbols. Perfect for newsletters, memos, presentations.

Volume 2: Business Images 2
Adds 206 powerful business illustrations of men and women at work plus people silhouettes, business cartoons, aircraft, money, telephones and lots of computers. An idea assortment for business and office publications.

Volume 3: Sports
Puts 228 fantastic sports images at your fingertips. Men and women athletes, a rich collection of outstanding sports graphics, symbols and icons. Includes backgrounds and mortise designs to create unique emblems and logos.

MacGallery
The ideal choice for fun, easy-to-use clip art!
Tantalizing collection gives you well over 400 ready-to-use bit map images. This broad assortment of light-hearted artwork is just right for holiday greeting cards, special occasions, fliers, memoirs, stationery, business cards, newsletters and other projects. Includes a bonus collection of great looking border art. Available in MacPaint file (works with any paint program) or HyperCard stack format. Perfect for ImageWriter users!

Fluent Laser Font Library 4.0
The Library includes 79 PostScript typefaces, ATM compatible, Type 1. John Dvorak once recommended these same fonts for an Eddy award! The purchaser is entitled to a 6-month free subscription to Publish Magazine. No one else has this kind of variety and style at such an affordable price. (This collection previously sold separately in 21 volumes for $89.95 per volume.)

Casady & Greene, Inc.
#0315 Laser Fonts ................. $99
Bitstream Font Pack 1 & 2—TrueType

These Font Packs provide the highest quality type for the latest font technology. Each Font Pack contains seven typefaces to use with any printer or operating system incorporating TrueType technology to be included in Apple’s new System 7. You get four styles of a text face plus three dynamic decorative fonts. Only Bitstream Font Packs give you seven great fonts that take advantage of TrueType today.

Bitstream
List: $68

#0396 Font Pack 1 .................................. $58
#0397 Font Pack 2 .................................. $58

FontMonger

FontMonger software converts type formats between PostScript Type 1 (for use in Adobe Type Manager), Type 3 and True Type (for system 7.0). It also provides complete Adobe Illustrator and Aldus Freehand support for True Type, since all your converted fonts can be imported or exported as EPS files. You can even generate customized typefaces and characters such as obliques, fractions and small caps, or merge characters from different typefaces to form a new typeface.

ARES Software Corp.
List: $100

#0078 FontMonger .................................. $62

Clipart Business Images

Business Images includes over 160 high-quality ready-to-use PostScript clip art graphics. You can have professional-quality artwork to enhance your business publications, newsletters, brochures, advertisements, memos or any printed piece. This package includes images most requested from professional artists including: people, computers, equipment, symbols, hands, phrases, backgrounds and much more.

On Line Arts
List: $129

#0178 Clipart ................................. $79
MacomoMind Director V2.0  
MacroMind Director 2.0 is the multimedia presentation and animation tool that helps you communicate with greater impact than ever before. Director allows you to easily create and integrate graphics, text and animations, then import sound and add a full range of interactive control. MacroMind Director is a powerful system for live presentations, visualizations, video productions and interactive training.

- MacroMind, Inc.  
- #283 Director V2.0  
- List: $695

ComputerEyes  
ComputerEyes captures video images and converts them to digitized graphics files. It accepts any standard NTSC video signal from camera, camcorders, VCRs (Beta VHS or 8mm), videodisc, the new still frames video cameras and more. Software saves files in PICT and TIFF color formats, black and white TIFF, PICT MacPaint and EOS formats. With a 24-bit color video card and monitor, it also works with the 32-bit QuickDraw format. Can adjust brightness, contrast, hue and saturation before or after capturing the image. Imagine the impact your projects will have when you can place color or B&W photos in your next desktop presentation.

- Digital Vision  
- #3278 Computer Eyes B&W  
- List: $450
- #3277 Computer Eyes Color  
- List: $348

QuickImage 24 Video Frame Grabber  
The QuickImage 24 Video Frame Grabber captures 24 bit color or 8 bit gray scale images from full motion video. It fits in a single NuBus slot and does auto switching between NTSC and PAL signals. It accepts standard Composite and S-VHS input signals. A live preview window lets the user select the exact image desired. A Photoshop plug-in allows users to capture images directly into Adobe Photoshop. It saves images as PICT, TIF or TIFF. Compressed for desktop publishing; presentation or video projects. It captures at 1/30th or 1/60th of a second for fast-moving images. QuickImage 24 is display independent and will work with any Mac II system; 24 bit color, 8 bit color or gray scale. New with Photoshop Limited while supplies last.

- Mass Micro Systems  
- #0180 QuickImage 24  
- List: $995

FilmMaker  
The Eddy Award winning FilmMaker is the masterful animation and multimedia graphics program. This amazing application allows the user to create professional quality presentations and animations quickly and easily. What takes hours to create in other applications can now be done in just minutes with FilmMaker. If you're a professional animator who wants to create stunning effects for video, or just someone who wants to put their ideas in motion, FilmMaker is the ultimate answer.

- Parscomp  
- #3850 FilmMaker  
- List: $695

Animation Works  
A fantastically creative program allowing the easy way to animate, create and present. An animation package that allows you to combine graphics, text and sound into colorful, high-impact movies. Ideal for education and sales presentations, simulations, storyboard, video titling and video production. Comes with FREE instructional video.

- Gold Disk  
- #3974 Animation Works  
- List: $200
Sargon 4

"I am Sargon and I challenge YOU to world class chess like you've never seen before!" Sargon was the warlord who ruled the ancient world. Patient, cunning, a master strategist, he has inspired this fourth generation chess program. Now Sargon 4, the software, is at your command to challenge, coach and entertain you.

Spinnaker

#1916 Sargon 4 .................. $27

Sky Shadow 1.09

Shoot-em-up Arcade Action! Save your people from an attack from the dreaded Razorpacers with your white-knuckled bombing raids over enemy territory. At 100,000 points watch your heart rate! You'll enter Mega mode with double game speed, scoring power and action—like swatting your way out of a swarm of bees! 500K digitized sound and 16-color landscape. Game Hall of Fame 1990 Macworld

Casady & Greene, Inc

List: $50

#3462 Sky Shadow .........$28

22nd Street Whist Tutor, Solitaire DA, MacRummy

22nd Street Whist, perfect for your computer: straight forward and challenging. Includes tutorial. Solitaire is a high-power DA to play any time. A great stress reliever! MacRummy, play it straight or play Gin—keeps track of your scores.

Softstream

List: $50 (each)

#0441 Whist .................. $31

#0261 Solitaire DA .......... $23

#0255 MacRummy ............ $32

Electronic Arts Presents:

King's Bounty

You have conquered all the dungeons and monsters flee at the mention of your name. Now you wish to retire. But a band of unsavory monster criminals has stolen noble King's Sceptre, and you are the only one who can return it.

#0474 King's Bounty .......... $32

Loom

A fantasy adventure set in the mythical Age of Great Guilds. Features a revolutionary new interface which relies on icons and music instead of text. Includes a 30-minute stereo cassette to set up the story.

#0307 Loom .................. $29

PGA Tour Golf

Tee off against 60 top PGA Tour pros in real tournaments on actual Tournament Players Club courses. Stunning color or B&W graphics with TV-style coverage. Fast animations and accurate half play.

List: $50

#0473 Golf .................. $38

World Atlas

Bring the globe to your computer screen. World atlas, almanac and world fact book with instant access to over 240 fully detailed, EGA/VGA color maps and database of international information.

List: $20

#3589 World Atlas ............$38

Harpoon

As Commander of NATO's North Atlantic Naval Task Force, with a devastating arsenal of weaponry, you alone must face the Soviet battle fleet. Mastermind tactics and strategies. Stimulates and challenges like no other game can do.

List: $50

#3600 Harpoon ...............$39

Earl Weaver Baseball System

Real major league action. More stats than the Sunday Sports page. Camera angles rivaling network TV. Puts history's most winning manager in the dugout. Play and/or manage with real player stats. Manage your own team. Four skill levels.

List: $30

#3602 Weaver Baseball ........$33
RoboSport
RoboSport is a computerized battle-strategy simulation game. It combines the tactical challenge of chess with the intensity of guerilla warfare to provide total strategic mayhem. Armed with bombs, bullets, missiles, grenades and more, you control teams of Robots that compete in five different sports: Survival, Treasure Hunt, Capture the Flag, Hostage and Baseball. Plan your tactics, instruct your troops and kick Robotbutt.
Braderbund Software
#0145 RoboSport ...$37

Casino Master
Feel the suspense-filled action of casino gambling with Casino Master. Learn and practice at your own pace without risk. Go from game to game with a keystroke or mouse click. Place bets and watch the action. Player-selectable stake and chip value. Pop-up windows with odds and betting hints. Long term storage of wins and losses. Includes Craps Master, Roulette Master, Blackjack Ace, Poker Master and Baccarat Master with complete manuals including rules and betting strategies. Not copy protected.
Centron Software
List: $89
#2471 Casino Master B&W ... $40
#2470 Casino Master Color ... $44

Tesserae
Tesserae is a color puzzle game in which the player eliminates tiles from a "board" according to color and texture. When only one tile remains on the board, a different, more difficult arrangement appears. For the beginner the object of the game is to remove as many tiles as possible. The more advanced player tries to improve his high score by using the fewest possible moves. The player can choose Beginner, Intermediate, or Advanced play.
Online Design
#3934 Tesserae .........$31

OIDS
Rescue the OIDS from the fiendish Biocretes who are turning them into vending machines and household appliances! Create your own games with the OIDS Construction Set. Design your own planets and puzzles in minutes with simple cut-and-paste operations. It's easy! Make new games for yourself or trade them with friends.
FTI Games
List: $45
#0240 OIDS ...................$29

MicroLeague Baseball II
MicroLeague Baseball II offers authentic performances featuring real-life players and accurate stats. You boss actual major league teams by setting up and changing lineups, picking your spots for pinch hitters and relievers, deciding when the players will steal, bunt or do a pitchout—in short, make every managerial maneuver in every game. More than just a game simulation!
MicroLeague Sports
List: $60
#2923 MicroLeague Baseball II ....$37

NFL Challenge
NFL Challenge is the most authentic, realistic football game ever created for computers. Features: all 28 NFL teams, computer coaching, two levels of difficulty, animated play action with slow-motion instant replays.
XOR Corporation
List: $100
#0895 NFL Challenge .......$55

MacSki
No Snow? No Equipment? No Time? NO PROBLEM! MacSki brings the slopes to you. Select a course from a number of challenging runs or design your own using the Course Editor. MacSki is your lift ticket to FUN! Hit The Slopes!
XOR Corporation
List: $69
#3625 MacSki ......$37

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Tesserae is a color puzzle game in which the player eliminates tiles from a "board" according to color and texture. When only one tile remains on the board, a different, more difficult arrangement appears. For the beginner the object of the game is to remove as many tiles as possible. The more advanced player tries to improve his high score by using the fewest possible moves. The player can choose Beginner, Intermediate, or Advanced play.
Online Design
#3934 Tesserae .........$31

Darwin’s Dilemma
Loosely based on the ideas of evolution, Darwin’s Dilemma is a captivating strategy game in living color. The player moves up through the levels of the game by colliding and merging icons that represent increasingly complex life forms. Each level brings new creatures and a more difficult puzzle to solve. Like a classic board game, Darwin’s Dilemma is easy to play but tough to master and highly addictive.
Online Design
#3494 Darwin’s Dilemma ... $31

NFL Challenge
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XOR Corporation
List: $100
#0895 NFL Challenge .......$55

Moriarty’s Revenge
The infamous Dr. Moriarty is now leader of a world-wide crime organization and you must track him down. You’ll travel the world, taking notes, puzzling over clues and trying to stay alive. Over 1,000 clues and a computerized notebook to keep them in. With varying levels of difficulty, it’s never the same game twice.
Mystrium Tremendum
List: $20
#3290 Moriarty’s Revenge....$31

MacSki
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XOR Corporation
List: $69
#3625 MacSki ......$37

Citadel with Secrets
Your quest is to free the Lady Synd cruelly imprisoned by the Evil Wizard. You’ll experience knockout sound and graphics as you create your own heroes, encounter might and magic, and engage in realistic combat. Also enjoy Citadel Secrets—more than just a hint about the story behind the explorer’s wanderings through depths of the Citadel.
Postcraft International
List: $50

City of Secrets
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#0895 NFL Challenge .......$55

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XOR Corporation
List: $69
#3625 MacSki ......$37
Earthquest
The ultimate learning game. Gain knowledge of our land, water, air and life. Walk through history from 7000 BC to the present. Learn about vital problems and solutions. Help save our environment by taking some of the 191 steps included. View fun and educational animated moves and much much more.
Earthquest, Inc.
List: $80
#3661 Earthquest ...... $48

Macintosh Bible, Third Edition
The newly revised Third Edition of the Macintosh Bible contains thousands of hints and tips on using the Macintosh. It explains all those mysterious, undocumented, Option and Command key combinations that perform special tricks for you. It contains over 1,000 tips, tricks and shortcuts in 1,084 pages. For newcomers, it's an indispensable source for experienced users; a handy reference.
Goldstein & Blair
List: $28
#3814 MacBible .... $19

Also available:
Individual Training for Word ...................... $38
Typing Instructor Encore ...................... $17
Power Macros-Excel .......................... $28
101 Scripts/Buttons ...................... $28

Individual Software

Professor Mac
Professor Mac is your personal tutor on proper use of your computer. He'll take you through all the basics with an introductory tutorial that starts where Apple's guided tour left off. The self-paced lessons use an interactive Q&A format to guide you through. Quizzes help you evaluate your progress.
List: $59
#3998 Professor Mac

Individual's ResumeMaker
Individual's ResumeMaker helps you quickly get on the right track for the job you want. It's easy to use: simply fill in on-screen information forms with your experience, education and skills. It then automatically compiles this information into a winning, professional-looking resume. Includes varied resume formats, Guided Letters, a full word processor, target company database and much more.
List: $50
#0431 ResumeMaker

Typing Instructor Encore
Typing Instructor Encore's 300 pages of exercises and tests can help build up your speed and accuracy. It's the only program that features "off by one" space correction, advanced diagnostics to chart your progress and optional "pen" style. Discover disks to expand your knowledge as you type.
List: $25
#3759 Typing Instructor Encore .... $17

Individual Training for PageMaker 4.0
Individual Training teaches users how to take full advantage of Microsoft Word's array of features through step-by-step on-screen lessons and exercises. The program allows users to progress at their own pace. Users will learn document and file concepts, use of fonts, size and formats, page setup and printing, utilizing section options, and creating style sheets. Includes spell checking and hyphenation, creating an index and table of contents, making and using tables and footnotes, and using print merge, creating custom menus, preferences and learning tricks of the trade. The program is compatible of running side-by-side with Microsoft Word, using MultiWindow, and letting users practice new skills as they are learned.
List: $70
#3838 Alge-Blaster or Personal Trainer for the SAT ....... $35

Davidson & Associates

Davidson & Associates
#3847 Personal Trainer for the SAT ..... $35
#3838 Alge-Blaster

Individual Training for PageMaker 4.0 ......... $29
THE WORD
Processor 5.0
Find any verse in the Bible instantly!
Search for any word, or phrase or even for concepts using a built-in thesaurus. Easily
find the exact verse you need. Create your
own Bible cross-reference lists that
permanently store your personal studies.
Print any portion of Bible text. Select one of
the four Bible translations (NIV, KJV, NKJ, RSV). 10th Anniversary Edition.
Bible Research Systems
#0186 THE WORD KJV .............$145
#0187 THE WORD NIV .............$145
#0188 THE WORD NKJ .............$145
#0189 THE WORD RSV .............$145

Number Munchers
Munch your way to math mastery! Endless hours of
basic math fun. With the Munchers' help, you'll learn
basic math skills the fun and exciting way. It mixes
amusing graphics and sounds with practical math
skills. Hundreds of different game boards ensure
each game will always be new and exciting. As you
attain more advanced math skills and want more
challenge, you can change the difficulty levels of the
games.
MCC
#0072 Number Munchers ...$28

The Oregon Trail
Players load up their gear and hit the trail with other
pioneers in this realistic, award-winning learning
simulation. While experiencing life of the American
frontier along the 2,000 mile route, players will talk with
colorful characters, navigate rushing rivers and greet
friendly Indians. They'll also learn to think fast and
shoot straight when wild game crosses their path!
MCC
#0074 The Oregon Trail $28

Interactive Physics
The easy to use, yet surprisingly powerful
physics laboratory on a computer. Masses
include: circles, squares, rectangles and
free-form polygons. Adjustable friction,
elasticity, size, mass and velocity. Constraint
objects include: springs, dampers, ropes and
constant forces, each fully adjustable. Gravity
and air resistance are variable. Measurement
devices include numerical readouts, analog
display and graphing capabilities for 16
different physical properties. Animated arrows
can be used to represent vector quantities. Endless possibilities: FUN.
Knowledge Revolution
#0260 Interactive Physics ...........$188

Personal Training Systems Tutorials
Personal Training Systems Tutorials are just like having your own private tutor. The Tutorials are interactive, which means you work on your Macintosh using
the real program as the instructors talk you through step by step. These audio-
based tutorials are self-paced and modular, allowing you to receive training at
the most suitable level: beginning, intermediate or advanced. Each module is
reusable, takes about 90 minutes to complete; and includes an audio cassette,
example files on disk, and a quick reference card. All Tutorials are uncondition-
ally guaranteed.
Personal Training Systems
List: $80
See Index for Complete Listings $51

macBible
Zondervan macBible presents several different versions of the Bible to help you
understand its meaning more clearly. It quickly finds the passage you want. It can open
five text windows and one special purpose window at once. Three study modes open it
Bible to your questions. The Word-and-Phrase mode locates individual words, phrases
and groups of words. The Verse mode displays any range of verses by book, chapter or
verse. The Count mode displays statistical information about words or groups of words
to complete your study.
Zondervan Electronic Publishing
List $100
#0021 Greek .................$98
#0023 Hebrew ...............$98
#0016 NIV .................$58
#0017 KJV .................$58
#0018 RSV .................$58

MACWORLD • JULY 1991
HyperBible 2.0 KJV
This computerized Bible is a departure from the popular
Thompson Chain-Reference Bible with many of its features, including: cross-referencing of
over 100,000 topics, preselected topics for Bible studies, general index of over 7,000
topics and names, archaeology information, Harmony of the Gospels, outline studies of
each book of the Bible, character studies, and more. Version 2.0 includes full-Boolean
search capabilities, multiple windows and HyperCard 2.0.
Bright Star Technology
#0247 HyperBible 2.0 KJV ......$124

Gems of the World KJV
Gems of the World is a collection of over 2,000 of the most popular and useful
passages of the Bible, organized by contemporary topic. Over 150 topics provided and
easily accessed. It includes a DA that allows it to be run from within any
program. Startup program "Gem of the Day" displays a new passage each day based
on your topic of interest. Printing and text export via the clipboard are included.
Bright Star Technology, Inc.
#0246 Gems of the World ..........$25

Kid Pix
Kids Pix is an amazing paint program created
just for kids. It combines special effect art tools,
picture stamps, sounds and magic screen transformations to turn the computer into a
magical art studio. With Kid Pix, you don't just
paint a masterpiece, you hear it too! Every brush and tool has its own unique sound effect.
You can even record greetings, poems or music
to enhance your creations.
Brodbeck
#3994 Kid Pix ...............$29

System 7.0 Revealed
Written by Macintosh authority, Anthony Meadow.
System 7.0 Revealed offers programmers a first look
at System 7's many new features and shows how to
take full advantage of these features in developing
Macintosh software. Other books in the acclaimed
Macintosh Inside Out Series and the Apple Technical
Library, including Inside Macintosh Volume VI, can be
found in the index.
Addison-Wesley
#0250 System 7.0 ............ $18

At Your Service
Add a friendly, polite assistant to your Macintosh, with real-life motion
and digitized sound. Phil will notify you of important meetings, prompt
you when phone calls need to be made and remind you when
deadlines approach. He'll alert you
when E-mail arrives, provide a report on your computer's
memory usage and system and
monitor keyboard and mouse
activity to suggest when you
need a break.
Bright Star Technology
#0415 At Your Service ......$30

Talking Tiles
Talking Tiles uses Bright Star's HyperAnimator to teach reading. The animated
mouth motions synchronized with highlighted letters demonstrate the
relationship between spoken sounds and written symbols. Old timers will
remember this method of teaching reading as "phonics." Its advantage over the
"look and say" method is that readers know how to sound out words they don't
know by shape or form. Talking Tiles is useful from preschool to adult literacy.
Bright Star Technology
#1941 Talking Tiles ............$25

Alphabet Blocks
Alphabet Blocks teaches reading skills with an interactive talking elf. The
entertaining animated character asks questions and responds to answers.
When the elf speaks, his mouth changes to show how the sound is made, thus
teaching phonics and letter names. The elf adapts his questions to the learner's
responses, guides him or her to the right answer, and tracks progress. Parent's
manual included.
Bright Star Technology
#1614 Alphabet Blocks ...........$29

Word Torture 4.0
Foreign language software for
Macintosh computers with a hard
disk drive. HyperCard 2.0 and
system 6.0.5 or higher
Automated vocabulary drill. Over
1400 verbs, nouns, adjectives,
advances, comparatives, and
functions words and their
translations. Drill from English
to target language or vice versa.
For students, travelers and
anyone studying a foreign
language who wants to review
frequently used words or to
create personal vocabulary lists.
HyperBolt Software Co.
# 3737 Word Torture: Spanish $34
# 3741 Word Torture: French ...$34
# 3745 Word Torture: German ...$34
# 3748 Word Torture: Italian ...$34
# 3732 Word Torture: Russian $34

The Mac Zone
Established 1986

At Your Service
Add a friendly, polite assistant to your Macintosh, with real-life motion and digitized sound. Phil will notify you of important meetings, prompt you when phone calls need to be made and remind you when deadlines approach. He'll alert you when E-mail arrives, provide a report on your computer's memory usage and system and monitor keyboard and mouse activity to suggest when you need a break.
Bright Star Technology
#0415 At Your Service ......$30

Talking Tiles
Talking Tiles uses Bright Star's HyperAnimator to teach reading. The animated
mouth motions synchronized with highlighted letters demonstrate the
relationship between spoken sounds and written symbols. Old timers will
remember this method of teaching reading as "phonics." Its advantage over the
"look and say" method is that readers know how to sound out words they don't
know by shape or form. Talking Tiles is useful from preschool to adult literacy.
Bright Star Technology
#1941 Talking Tiles ............$25

Alphabet Blocks
Alphabet Blocks teaches reading skills with an interactive talking elf. The
entertaining animated character asks questions and responds to answers.
When the elf speaks, his mouth changes to show how the sound is made, thus
teaching phonics and letter names. The elf adapts his questions to the learner's
responses, guides him or her to the right answer, and tracks progress. Parent's
manual included.
Bright Star Technology
#1614 Alphabet Blocks ...........$29

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Finale
Finale is designed to be the last music composing and publishing software you’ll ever need. Finale understands music and music notation. Now you can compose, edit, transcribe, orchestrate and publish without using a pencil. Improves a score on a MIDI keyboard and see it displayed on screen in standard music notation in seconds. All you need is the inspiration to write music. Finale does the rest.
#3127 Coda Finale ...... $548

Practica Musica 2.2
One of MacUser’s “Best 200 products of 1989.” Practica Musica is a music tutor that covers ear training and music theory—for both beginners and advanced students. Using either the Mac speaker or a MIDI instrument, it teaches you how to recognize and notate intervals, chords, melody and rhythm, identifies chords that you play, gives you practice in writing tunes by ear and much more. It will even invent a short melody in your choice of key, scale and meter! Includes coordinated textbook Windows on Music: Ars Nova
List: $125
#1479 PracticaMusica ...$68

Master Tracks Pro 4.0
Master Tracks Pro 4 turns your Macintosh into a 64 track MIDI recording studio. The improved cut and paste Track Editor is easier to use and has graphic MIDI volume faders for each track. A new Event Editor displays editable data for each track. Master Tracks Pro 4 can sync to SMPTE time code (with external hardware) and even control MIDI lighting boards. Enter music by playing it on a MIDI instrument or use the Stop Time Editor.
Passport Designs
#2828 Master Tracks ... $318

EZ Vision
EZ Vision is an intuitive MIDI sequencer for recording, editing and playing back music with MIDI synthesizers. Equipped with familiar tape deck style controls and 16 tracks, it acts as a complete recording studio, allowing graphic editing, arrangement and mixing. EZ Vision is compatible with music notation programs, allowing printed scores.
Opcode Systems, Inc.
List: $149
#3937 EZ Vision ...... $99

MIDI Translator
The MIDI Translator interface attaches to either the modem or printer port on your Macintosh. It provides one MIDI In and three MIDI Outs that may be connected to any synthesizer, drum machine or other MIDI device using standard MIDI cables and requires no power supply.
Opcode Systems, Inc.
List: $59
#3938 MIDI Translator , $42

MIDIplay
MIDIplay allows addition of MIDI-based music to HyperCard, SuperCard and MacroMind Director based multimedia presentations. It allows you to play a MIDI file and change the parameters of playback, even in real time.
Opcode Systems, Inc.
List: $66
#3939 MIDIplay ........ $42
Wayzata Technology Presents:

**Vietnam Remembered 3.02**

*List:* $129

**Front Page News 3.02**
World-wide news at your fingertips! Full text of over 10 US and international wire services, news sources. Over 175,000 articles.

*List:* $149

**The CD Fun House 2.61**
Public domain collection of best shareware/freeware games available for the Macintosh. Includes movie style rating list.

*List:* $85

**Middle East Diary 3.02**
Represents a review of Middle East history, personalities and conflicts. Includes State Dept. and CIA information, treaties in force, etc.

*List:* $139

**Down to Earth 1.00**
Contains over 750 high resolution color and B&W PICT images ready to use. Range from illustrators line drawings to full grayscale scanned photos.

*List:* $249

**BBS in a Box from MacWizards 1.00**
First CD ever produced for Macintosh BBS that provides over 7,000 compressed Macintosh files with BBS directories on 18 topics.

*List:* $119

**USA Factbook 1990 3.02**
Electronic almanac of 50 States and territories. Published annually. Covers geography, vital statistics, government, politics, much more.

*List:* $139

**U.S. Presidents 3.0**
Contains biographies and statistics of the 41 U.S. Presidents. Includes many interesting historical and presidential facts.

*List:* $39

**The Korean War 3.03**

*List:* $25

**More titles to choose from!**

**Quick Art 2.02**
#3504 Quick Art 2.02 .............. $299

**U.S. Presidents 3.0**
#3505 U.S. Presidents .............. $174

**USA Factbook 1990 3.02**
#3508 USA Factbook .............. $85

**The Sporting News Baseball 3.02**
#3510 The Sporting News Baseball 3.02 .......... $155

**BBS in a Box from MacWizards 1.00**
#3512 BBS in a Box from MacWizards 1.00 .......... $155

**Disc Tracy—Programmer’s Detective 2.50**
#3507 Disc Tracy—Programmer’s Detective 2.50 .......... $85

**All of MacTutor—Includes Articles 1-5 3.02**
#3506 All of MacTutor—Includes Articles 1-5 3.02 .......... $155

**GEM Macintosh 1.00**
#3509 GEM Macintosh 1.00 .......... $75
SuperCard 1.5
SuperCard extends HyperCard. Just import your present HyperCard stacks and improve them with all the new capabilities of SuperCard. Or use SuperEdit to create your own stand-alone applications. New features include Script Tracer debugger, colored text, new animation, improved speed, polygon buttons and pop-up and hierarchical menus. SuperCard permits you to have multiple stacks and types of windows, resizable windows and color graphics. Any object can be a button with an attached script.

Silicon Beach

#3492 SuperCard 1.5 .......... $198

ScriptExpert 1.0
ScriptExpert is push-button programming for HyperCard by Dan Schaefer, the author of the best-selling book, HyperTalk Programming. ScriptExpert requires little or no programming experience. You can write grammatically correct scripts by pushing buttons and answering questions. ScriptExpert knows the rules for every command, function, property, and message in HyperTalk. It lets you focus on your project because it remembers the syntax and structure of your scripts. ScriptExpert is the ideal companion for HyperCard training classes.

HyperPress

#3776 ScriptExpert 1.0 .......... $44

Quantum Leap Technology Giga-Rom, Macademia, or CD7
Giga-Rom is the largest collection of Macintosh software ever assembled. Files are archived in Bill Goodman's "Computer" format and indexed with On Location. Macademia is 7,500 programs and related files for Education and Instructional use. Subject range from the arts to the sciences. CD7 is the largest non-compressed collection of Macintosh software with over 15,800 files including art, games, demos, and music files with digitized sounds.

Quantum Leap Technology

#0152 Giga-Rom .............. $98
#0151 Macademia .............. $73
#0150 CD7 .................. $49

ADDMotion
ADDMotion is the first animation and color paint program to be fully integrated with HyperCard 2.0. With ADDMotion you can quickly and easily add animation, color and sound to any HyperCard stack. It can be used by anyone who wants to create exciting presentations, develop interactives training systems, or simply have fun. ADDMotion includes HyperCard 2.0.

Motion Works

#3985 ADDMotion ............. $182
Mass Microsystems DataPak
Removable Hard Drives

Voted the best by the industry critics, it's still the first family of removable cartridge drives for the Macintosh. With 45 megabytes on each removable All Mass Microsystems drive products come bundled with DiskDoubler from Salon.

#0175 Single 45 MB Removable ............... $724
#0176 IIC 45 MB Removable .................... $778
#0177 MO 512 Optical Read/Write ............ $3,424
#0164 DataCartridge MO for Optical ........ $208

Sigma Double-Up Board

Double your disk capacity with DoubleUp from Sigma Designs. DoubleUp compresses any data, image or application file - so fast you hardly notice it happening. You will notice your disk capacity expand, by 100% or even more. It's like doubling the number of hard drives in your system. DoubleUp comes with DiskDoubler software for user-friendly operations, and a Macintosh NuBus card for unbeatable speed. So you can work with files the way you usually do, even after they're compressed. And data is never lost or altered.

Sigma
List $829
#0215 Double-Up Board .................... $167

45 MB Removable Hard Drive

They are not just for backup anymore! At 20 millisecond average access speeds this high performance drive is faster than most fixed drives. When you need additional storage, simply add another cartridge. Imagine sending a cartridge overnight or taking one home instead of an entire drive. Independently fused AC outlets, eliminating power surge damage, two EMI filtered AC outlets for single switch power up, a push button SCSI ID selector and a louvered chassis reducing noise levels by 50%. Performance, flexibility and security.

Sigma
#0229 Double-Up Board ................. $167

800K External Floppy Drive

This is the perfect solution for anyone who is still swapping disks or logging a hard drive between office and home. It utilizes proven Fujitsu technology for quiet, reliable performance. It is so quiet that we've installed an LED indicator light that signals when the disk is working. Small, very compact, and simple to install and use, the 800K external floppy disk drive is an ideal and necessary peripheral for you Macintosh. You'll wonder how you ever got along without it.

Sigma
List $229
#0253 800K Drive ............... $125

Cutting Edge External 40mb Hard Disk Drives

Cutting Edge hard disk drives plug directly into your Mac's SCSI port and are preformatted so they're ready to use right out of the box. Many major enhancements to the new series make them still easier to use and more functional than before. All external drives now have dual 50-pin SCSI connectors, so you can easily connect several devices together in your SCSI chain. Two power outlets, dual fuse circuitry and a fuse access hatch add more user convenience. The newly-improved manual tells you exactly what you need to know to get the most out of your Cutting Edge drive. A quieter fan makes it a more pleasant desktop companion. All Cutting Edge drives are now subject to a 24-hour burn-in test and come with the manufacturer's one-year warranty.

Cutting Edge
List $749
#3299 45 Mb External ........... $438
LaCie Tsunami QLPS 50 MB Hard Drive

Tsunami drives come initialized with SilverLining, the standard of hard disk utility software, and SilverPlatter. Apple's system, five megabytes of public domain software and Norton Utilities are also included on the drive. LaCie features a warranty of 5 years on the Tsunami drive.

LaCie

#3948 Tsunami QLPS $599

Applied Engineering 800K Drive

The AB 3.5 Drive offers all the reliability and performance of Apple's 3.5 drive. It incorporates the same top-quality Sony mechanism that Apple uses, along with a thick ABS case to stack with and exactly match the color and footprint of Apple's drive. The drive's two-way LED indicator shows green for reading and red for writing. The drive also features auto-eject, complete delay chaining capacity and a full one-year warranty.

Applied Engineering

#3671 800K Drive $195

3.5" High Density Floppy Drive

Add a second 1.44Mb drive to any SuperDrive-equipped Macintosh and make back-ups and disk copying easy. Applied Engineering's 3.5 external high-density drive looks and performs like Apple's but costs much less. The drive incorporates the same high-quality Sony mechanism Apple uses and features auto-eject, MS-DOS compatibility, and AE's exclusive true-color read/write indicator light.

Applied Engineering

#3672 High density Drive $228
PLI CD-ROM

With Adobe Type-On Call

The PLI CD-ROM is the most fully-featured drive available. It has a self-cleaning objective lens, eliminating bothersome dust problems. It offers audio output through a 1/8" headphone jack and two RCA jacks. Volume control for the headphones is provided by a convenient dial on the front panel. PLI software is compatible with virtually every CD-ROM drive on the market, and supports all of the HyperCard audio XMODs. It also allows channel control on those drives which support it. Get a free copy of Adobe Type-On Call with PLI CD-ROM purchase, while the supplies last.

PLI #3691 CD-ROM w/Type On Call............$775

PLI Turbo 600

External HardDrive

600Mb 5.25" CTC drive. Access time of 16.5 milliseconds and MTBF of 100,000 hours. Turbo 600 comes with Turbo Cash, Turbo Back, Turbo Spool and Turbo Optimizer.

PLI #3281 600 Mb Hard Drive ..............$2,959

PLI Infinity 40 Turbo REM HD

The Infinity-40 Turbo uses PLI's turbocharged drive software to attain a 20ms access time. With the TurboCache disk accelerator and TurboBoost, you can achieve near zero effective average access times. This removable 45Mb drive gives you infinite storage potential with removable cartridges. Each one holds 44Mb and costs only slightly more per megabyte than floppy disks.

PLI #2181 Removable Hard Drive..........$748

PLI Turbo Floppy 1.44 Mb Drive

The Turbo Floppy from PLI is an innovative new disk drive that combines the benefits of SCSI performance with the latest advances in floppy disk technology. The Turbo Floppy Drive is the first high-speed 1.44 MB floppy disk drive to offer all Macs an upgrade path to high-density formatting.

PLI #2298 Turbo Floppy Drive .......... $308

Sy'Quest Removable Cartridge

The Sy'Quest Removable Cartridge features low cost and high volume data storage. It is dependable and easy to use with unlimited storage. Sy'Quest is great for color scanning, data storage, and all kinds of back-up storage.

Sy'Quest #2183 44 Mb Cartridge .......... $74

Lexus Turbo 2400 BPS Mini Modem

Intelligent, compact 2400 baud modem. Fully compatible with Hayes AT commands set. Easy to install and ready-to-use, all cables included. All the features you need in a modem, including auto answer, auto dial and advanced diagnostics for error checking. Eight front panel LED lights let you know what the modem is doing. Compatible with all major communications software. Comes complete with everything you need to get started, including MacKnowledge 1.02 MZ communications software, special introductory membership to CompuServe and Genie.

Lexus Turbo #0028 Mini Modem .......... $95

Clipper Compact Hard Drive

The new ultra compact Clipper from IDS delivers powerful portability in a tiny package. Measuring 1" x 3" x 5", the Clipper weighs just 10 ozs, fits easily into a shirt pocket or briefcase, and plugs directly into the back of any Macintosh computer. Features last 20 ms access speed, convenient auto termination, rugged 100g shock rating and a 2-year warranty.

IDS #0144 Clipper ......................$428
Place your orders now for upgrades for System 7.0

Magellan 040 Accelerator system

The Magellan series of Advanced High Performance Accelerators for the Apple Macintosh computer family is designed to augment the Macintosh host platform CPU with the high performance 32-bit integrated CPU/FPU/PMU engine of the Motorola MC68040. The supported Apple platforms include the Macintosh SE/30, Macintosh Ilt, Macintosh Iic and Macintosh IIx.

Magellan 25 mhz 040 w/PMMU

0292 Mac SE/30 .............................................. $1995
0291 Mac Ilt .................................................. $1995

Gemini II

Gemini II transforms your Mac 128, 512, Plus or SE into a Ilc-stomper. Snap applications open, pop open even the largest documents, and zap graphics around the screen. Low-cost display options turn portfolio glimpses into dual-page vistas--at irresistible prices. Virtual is free! Installation is easy. You can even use your existing 256K and 1MB SIMMs. Plugs into SE slot; requires Gemini Plus kit for Plus and earlier.

0616 003 33 mhz w/o FPU .................................. $1195
3655 003 33 mhz w/FPU .................................. $1575
0647 030 40 mhz w/o FPU .............................. $1325
3752 030 40 mhz w/FPU .................................. $1850
3692 030 56 mhz w/FPU .................................. $2175
0693 Gemini Kit .......................................... $125

Mercury

Mercury 030 revitalizes your Mac 128, 512, Plus or SE; in easy stages. Double your speed with the 68030 CPU; later add the 32-bit memory and for even more speed, Optional SCSI module for Plus and earlier for more efficient hard disk operation. If you work with large files, desktop publishing, or math intensive applications, add a 88862 chip any time. Installs easily with a wide range of large screen display options. Virtual included free.

0638 009 16mhz (Plus) ................................... $515
0633 003 16 mhz w/FPU .................................. $675
0643 030 16 mhz SE ..................................... $388
0641 030 16 mhz w/FPU SE............................. $550
0640 32-bit SCSI Card (Plus)......................... $188
0649 RAM Module ........................................ $245
0550 Mercury Kit (Plus) .............................. $59
DataLink LC
Maximize your LC with this multi-function internal card. More than 2400.00 data/fax modem, the card gives the LC a multi-processor socket and even an extra serial port (system 7.0 compatible)! The V.42bis option offers 9600 bps error-free data transmission. Send-Fax is standard with Receive-Fax available in the near future. The package has everything you need to get on-line fast including communications software, more than $200 dollars of network memberships and on-line time included free, and a five year warranty.
Applied Engineering List: $349
#3980 DataLink LC ...... $245

DataLink Express
AE's DataLink Express offers what you need in an external modem. Its twelve indicator lights keep you fully informed of the modem's activities. The exclusive line-engaged indicator lets you know if a shared line is free or in use. The die-cast aluminum case is perfectly matched to Mac's 'platinum' color. On the modem's back panel you'll find both Apple's Mini-B DIN connector and a DB-25 connector as well as a line jack and phone jack. Send faxes to any Group 3 fax machine with AE's Send Fax option and enjoy error-free data transmission at 4800 bps with optional MNP-5. The modem comes complete with transformer, software, free on-line time and AE's five-year warranty.
List: $350
#3667 DataLink Express ............... $235

DataLink/Mac
This full-featured internal data/fax modem for the Macintosh II family includes an extra serial port with driver software (System 7.0 compatible), communications software, free on-line time and network memberships (worth $200), optional send-fax and MNP-5 for error-free data transmission at 4800 bps. Includes manufacturer's five-year warranty.
Applied Engineering
#3668 DataLink/Mac .............. $235

FastCache IICi
DayStar's 4K FastCache IICi for the budget-minded is the leader in standard cache cards. The powerful FastCache IICi completes the Mac IIC design by allowing it to operate at maximum speed. The Mac's processor can't run at its most efficient level without a cache card. The FastCache IICi plugs directly into the IICi's Cache Connector and boosts processing speed from 30% to 70%! Installation is as easy as plugging in a NuBus card and can be done in minutes at home or the office. Proven reliability and performance for over a year.
Applied Engineering
#2877 FastCache IICi ............ $278

QuadraLink
QuadraLink is Applied Engineering's answer to clogged serial ports. With the proliferation of popular serial devices, printers, scanners, digitizers, plotters, modems, graphics tablets and the like, comes the need to control several serial ports simultaneously. QuadraLink is fully compatible with the Mac's Communication Toolbox and System 7.0 (when released). For software, the QuadraLink package includes software to create a "Shadow Driver" so its serial ports will be recognized by the software. Lately the Mac II's existing serial ports; QuadraLink's four serial ports are standard Mini-B DIN connectors.
Applied Engineering
#3673 Quadralink ........... $208

Orange Micro 386
The 386 is truly a second computer functioning independently inside your Macintosh. The dedicated 16 MHz Intel 80386 microprocessor and 1Mb of on-board RAM (expandable to 10Mb) assures that your 1Mb programs execute with maximum compatibility. The Orange 386 is loaded with innovative features, including two IDE/AT slots which allow you to add IBM PC cards inside your Macintosh. This capability opens the broad range of PC cards for the Mac.
Orange Micro
#3562 Orange Micro ........ $1,695
DoveFax Plus

Dovefax Plus offers the most sought-after fax software features such as: full background operation when sending or receiving a fax (with or without MultiFinder); automatic answer, which allows you to receive a fax without interruption; redialing, which guarantees fast delivery; pre-scheduled transmissions, that allows you to send multiple faxes after hours when rates are lower; customized cover sheets and more! With the DoveFax Plus, your Mac turns into a personal voice messaging system, as well as a full-featured fax machine. The DoveFax Desktop can be upgraded to the DoveFax Plus with the simple addition of a microphone and software.

Microphone II

Microphone II has earned praise for its ease of use. Its scripting language makes using electronic mail services an automatic operation. Other types of file transfers are equally effortless. Microphone II now supports the hot new ZMODEM transfer protocol (in addition to XMODEM, YMODEM, KERMIT, and MacTerminal 1.1) and can operate modems at any speed from 50 to 67,500 baud. Microphone II sports improvements in the script language and offers more ways to execute scripts. For work with systems in foreign countries, Microphone II supports character substitution in seven languages under ISO-7 standards, plus user-defined character sets. It also supports large screen monitors and color, including color icons and offers VT102 and ST102 simulation.

Publisher Software Ventures
List: $295
#1902 Microphone II $214

FreeSoft Co.
White Knight

White Knight is a powerful general-purpose telecommunications program that packs in almost every imaginable feature. It combines technical sophistication, reliability, user-friendliness. White Knight takes strong advantage of the capabilities of 128K ROM's, which means that it will run on a Mac Plus, SE, II or later machine.

FreeSoft Co.
List: $199
#2881 White Knight $84

Personal Modem 2400plus

Specially designed to simplify communications for the first-time home or business user. Personal Modem Plus products offer a complete PC or MacModo communications solution since they are bundled with SmartTerm communications software and come with permanently attached computer and telephone cables.

Hayes
List: $199
#0451 Personal Modem $149

Ultra 96

It's all here in one product family for your Mac. Need 9600 bps V.32 capability? Need compatibility with 2400bps or 300bps modem? Data compression? Error Control? The Hayes family of modems has them all: V.42 error control and V.42bis data compression provide error-free throughput to 38.4 kbps over dial-up phone lines. It even includes support for MNP 2-4 and 5 for backward compatibility with your old modems. If you're a Packet Switched Network fan, you'll love the V-series PAD for dial-up access to X.25 networks.

Hayes
List: $925
#0452 Ultra 96 Package
M;acintoshMembership

Free Compuserve Almanac with every Mac Membership Kit. Order now, limited time offer.

TelePort
TelePort plugs into your ADB connector (like your mouse and keyboard), eliminating a power adaptor, freeing your serial ports, and enhancing portability. TelePort, 2400 baud Hayes compatible modem, incorporates MNP5 data compression/error corrections.

Global Village
List: $225
#3883 TelePort.......................$128
#0395 TelePort 24/96 ............$184

Macintosh Membership Kit
The largest on-line data service, with over 750,000 users. Services include electronic mail, bulletin boards, special interest groups (Forums), and a discount department store. You can read the complete text from major newspapers and encyclopedias, plus stock data, weather forecasts and book and movie reviews. Mac users have three special interest Forums and bulletin boards. The Membership Kit contains everything you need to get started, including credit against your first two hours on-line.

Compuserve List: $40
#0213 Mac Membership Kit ....$40

TEFAX
Now you can send or receive faxes directly from your Macintosh and get a 16 level half-tone scanner and a 200 dpi printer all in one very convenient and portable package. Reliays introduces the NEW TEFAX System RZ2125 - a complete fax system that gives you the advantages of both a dedicated fax machine with the convenient software package, AutoFAX. NEW AutoFAX software includes powerful graphics editing capabilities for scanned or faxed documents.

Reliays Systems
List: $1,575
#0256 TEFAX..........................$869

FAXGATE Plus
Imagine sending documents to any fax machine in the world from any computer on your network. If you have Microsoft Mail or QuickMail, all you need is FAXGATE and a FlexFAX, OrchiFax or AppleFax modem. FAXGATE is an economical alternative to overnight delivery and MailMaker, bundled with FAXGATE, ensures that everything looks great when it gets there.

Solutions, Inc. List: $395
#3621 FAXGATE Plus ...........$238

2400 Turbo Lexus Modem
Intelligent, compact 2400 baud modem. Fully compatible with Hayes AT command set. Easy to install and ready-to-use, all cables included. All the features you need in a modem, including auto answer, auto Dial and Advanced Diagnostics for error checking. Eight front panel LED lights let you know what the modem is doing. Compatible with all major communications software. Comes complete with everything you need to get started, including MacKnowledge 1.92 MZ communications software, special introductory membership to Compuserve and Genie.

Lexus Turbo
#0028 2400 Turbo Lexus Modem ...............$195
NetModem V.32
The NetModem V.32 is a 9600 bps modem that is designed to be shared over AppleTalk. The NetModem also includes Dial-In Network access software which allows a remote Mac or PC to dial into the network and use electronic mail, printers and other network resources.

Shiva Corp.
List: $1,699

#3251 NetModem V.32...$1,165

NetModem V2400
The NetModem V2400 is a 2400-baud modem that can be shared by Macs and PCs on the AppleTalk network. It plugs in anywhere along the network, needing just a single phone line. The NetModem V2400 also has Dial-in support so you can use the AppleTalk network from a remote location.

Shiva Corp.
List: $2,795

#1615 NetModem V2400.........$338

FastPath IV
Shiva FastPath 4 gateway allows Macintoshes on a LocalTalk network to access Ethernet network systems and services. It also allows Ethernet-based machines to access AppleTalk on a LocalTalk network. Everyone has company-wide access to printing, electronic mail and file servers, wherever they're located.

Shiva Corp.
List: $2,795

#2685 FastPath IV..............$1,885

NuvoLink SC
Plug the NuvoLink SC into the ECP port of your Mac, and you can connect to an Ethernet LAN. The package includes AppleLAN manager, an Ethernet compatible drive, installation software along with statistical and diagnostic software to help manage NuvoLink SC effectively. Front panel indicators show Power On, configurations, diagnostics and network activity.

Nuwave
List: $495

#3115 NuvoLink SC..............$369

AT/EGA Module: Soft PC
The Soft AT/EGA Module is a powerful add on that enhances SoftPC's inherent XT compatibility and performance by adding AT capabilities with vibrant EGA color, LIM expanded memory support, and the ability to run programs that use a math co-processor.

Insignia Solutions
List: $199

#2506 Soft PC 1.3...$241

#3282 AT/EGA Module: Soft PC..............$124
**GatorBox CS**

Cayman Systems' AppleTalk-Ethernet gateway, the GatorBox CS, connects an entire Macintosh network on LocalTalk to high speed Ethernet. With it, Macintosh users on LocalTalk can communicate with most minicomputer, workstation and PC users on Ethernet. The GatorBox CS fully supports AppleTalk Phase I and II and the TCP/IP protocol set. The GatorBox CS features two megabytes of RAM (including flash EPROM for storing the operating software), hardware and software diagnostic capabilities and a universal power supply. Downloading of software or battery back-up is not required after unexpected power loss.

Cayman Systems

#0181 GatorBox CS .................. $1,955

**TOPS 3.0 Network Bundle For Mac**

TOPS 3.0 provides a complete network/E-Mail solution for any combination of Macs, IBM PCs, and Sun Workstations. With TOPS every computer is a server and each user decides which files are public or private. TOPS follows AppleTalk File Protocol so AFP-compatible multi-user applications will run properly. Includes TOPS Spool for background printing on the network, and a 20-user package of InBox 3.0.

TOPS

#3167 TOPS 3.0 ..................... $186

**Asante Ethernet Family**

Asante Technologies' family of Ethernet solutions gives your Macintosh all the right connections. The MacCon+ network interface cards plug into your Mac to deliver high performance connectivity that's reliable and cost effective.

Asante Technology

**Thick/Thin Products:**

- #3641 MacCon+ II E .... $269
- #0221 MacCon+ II E64 .... $304
- #0020 MacCon+ 301E .... $269
- #2647 MacCon+ 301E64 .... $304
- #3648 MacCon+ SEE ..... $269
- #0327 Asante EN/SC ..... $359

**10 Base T Products:**

- #3885 10T HUB ......... $989
- #3945 10T MAU .......... $99
- #3643 MacCon+ II ET ..... $269
- #3642 MacCon+ II ET64 .... $304
- #3646 MacCon+ 301ET .... $269
- #3649 MacCon+ SEE1 .... $269

**Mac to Mac 5-Pk.**

Mac to Mac offers direct file transfers over any AppleTalk network, across zones, without a server. Increases work-group productivity by allowing Macs on a network to quickly and simply send or retrieve files smoothly in the background, all without leaving your desk. No work disruptions, no waiting. Excellent disk and folder level security options. Complete fileshare transaction log. User list automatically maintained. Includes two-way text conferencing and messaging capabilities.

Caravelle Networks

#3386 Mac to Mac 5-Pk .......... $164
#3887 Mac to Mac 10-Pk .......... $218
#3888 Mac to Mac 50-Pk .......... $949

**DayStar LT200 PC & MC**

The DayStar LT200 Boards allow an IBM PC, PS/2, or other compatible computer to connect to a LocalTalk Local Area Network. Once connected, the PC or PS/2 can share files and network devices (such as printers and file servers) with others on the network, including those using Macintosh computers.

DayStar

#2214 DayStar LT 200 PC .......... $185
#2215 DayStar LT 200 MC .......... $295 (microchannel)
MacLink Plus/PC

MacLink Plus/PC 5.0 is a complete kit for transferring and translating documents between a Macintosh computer and an IBM PC. It comes with everything needed: an RS232 cable, software for both machines, the full library of translators, and DOS Mounter software. The library of over 350 conversion solutions translates file formats from word processors, spreadsheets, databases and graphics, while the included DOS Mounter software provides visibility to DOS disks inserted in the FDHD drive both on the Macintosh desktop and within all Mac applications.

DataViz

List: $199

#0039 MacLink Plus .......... $128

GraceLAN

GraceLAN lets you scan and profile every Macintosh, printer, PC, monitor, Neulux Card, network peripheral or SCSI device on any size network—without leaving your desk! Identify systems and memory configurations, software versions, disk accessories, INIT's, printer drivers and much more—all in real time. GraceLAN's powerful interface makes it easy to quickly obtain all kinds of detailed information. The Mac Details Window provides an extremely detailed report of each user's current hardware and software configurations in scrollable fields.

Technology Works, Inc.

List: $395

#0486 GraceLAN .......... $217

Send Express

Send Express is a Macintosh desk accessory that lets you transfer files, folders, personal notes, and clipboard selections directly from your Macintosh to others in your AppleTalk network. Its approach is simpler than similar programs since it doesn't require a network server dedicated to file transfer processes. You can electronically send files and folders around your office, no more walking floppy disks from one Macintosh to another! The note feature lets you communicate directly with your co-workers.

Omicron Technology

List: $79

#0142 Send Express .......... $56

Grappler LX

Grappler LX is an all-in-one printer interface. The Grappler LX combines high speed performance with years of printer expertise to bring you the best Macintosh interface available. Software improvements make the Grappler more memory efficient and like other Grapplers, it's compatible with virtually every software package written for the Macintosh. Now you can print Mac documents on the HP LaserJet Printer plus laser printers such as the LaserJet, Okidata, Kyocera and Baser. Grappler cannot print Postscript files.

Orange Micro

List: $199

#3015 Grappler LX .......... $133
ClearAccess allows you to create SQL-type queries to most relational databases by just pointing and clicking on the data items you want. Queries can then be recorded as "scripts." Makes host-based data access a natural and transparent part of your experience, connecting you to a wide variety of corporate databases in a straightforward, uniform manner.

Fairfield Software

#3992 ClearAccess ........... $350

DataClub 1.1

DataClub is an amazing breakthrough in file server software offering real, tangible advantages over conventional file server systems. Instead of requiring dedicated hardware or multiple servers on the network, it's Virtual Server creates a single, shared disk which is centrally managed and maintained. By utilizing the combined resources of the network (available disk storage and server processing) DataClub provides centralized server access and unlimited scalability, yet requires no dedicated hardware.

International Business

#3917 DataClub 1.1 (3-pack) .... $198
#3918 DataClub 1.1 (10-pack) ... $525

Software Bridge

Macintosh

Software Bridge is a word processing file conversion program that operates under Apple File Exchange. It retains formatting as users convert (to and from) 24 popular word processing programs such as Word, MacWrite II, and WordPerfect.

List: $129

#3894 Software Bridge ...... $78

EHelp

Give your Macintosh application the edge with context sensitive, structured hyper-text help with the EHelp help engine. EHelp supports PICTS, color, all Mac text fonts and styles, topics, hyper-text links, pop-up notes, modal and modelless help. Includes EHelp Compiler, EHelp Tester for compiling and testing help files, ANSI 'C' interface, documentation and examples. Price includes perpetual license for single Mac application.

#0417 EHelp .................. $210
If you're not shopping at the Zone, you're paying too much!

Serius Programmer
One picture is worth a thousand words. If you're a typical Macintosh user, you'd love to create your own custom software quickly and easily, but couldn't because you're not a programmer. Now you can! Built around Serius Programmer's revolutionary information control system, Object Interaction Protocol (OIP), Programmer's tools offer a variety of advantages over conventional development systems. Every custom application can use the full array of Macintosh graphic controls including windows, menus, buttons, lists and others. You'll have complete control over the look and feel of your new application. When you finish designing it on screen, Programmer will compile and save your work as a stand-alone application which can be used by anyone. You can even draw your own icon to display in the Macintosh Finder.

Serius #3409 Serius Programmer............$210

List: $295

True BASIC 2.02
Use the BASIC that gets results—fast! It combines all the best features of modern structured programming in a BASIC that's fast, clean and yet still easy to use. It's fast because it combines a b-code compiler, linker and loader in quick fix or major software development. True BASIC is a solid, dependable solution.

True Basic, Inc. #1834 TrueBASIC..................$54
List: $99

How to speed up program development and have fun doing it:

Prograph 2.0 with Compiler
1. Free programmers from the tedium of typing code so they can concentrate on the creative aspects of application development.
2. Get rid of the frustrating edit-compile-run-debug cycle by letting them design and edit programs while they’re running—testing new ideas on the spot.
3. Liberate programmers from laboriously coding menus and windows by letting them click and draw their interface instead.
4. Eliminate the need for repetitious recoding by giving them object-oriented programming (OOP).
5. Turn abstract control structures into concrete diagrams so they can see where the data comes from and where it's going.

Prograph 2.0 provides:
- Visual OOP language
- Visual editor/interpreter
- WYSIWYG interface builder
- BB/0 compiler
- Mac Toolbox support
- Importation of C code
- 60 day money back guarantee

TGS Systems #3431 Prograph 2.0..................$244
List: $395

Save up to 60% off list prices everyday!
**ScanMaker 600ZS**

Introducing the ScanMaker 600ZS, the newest addition to Microtek's award-winning series of color/grayscale scanners. Capable of scanning 24-bit color, 256 shades of gray and black and white, the ScanMaker 600ZS captures images with up to 600 dpi resolution. It boasts outstanding color image quality and features a new, compact flatbed design. A built-in SCSI interface makes installation a snap! More amazing is the price...hundreds less than you would expect to pay for a scanner with this many unbeatable features. Included with every ScanMaker 600ZS is a full version of Adobe Photoshop. Adobe Photoshop, winner of MacUser's 1990 Eddy Award for Software Product of the Year, is a sophisticated image editing and retouching program designed for artists and desktop publishers.

*Microtek Labs, Inc.*

#0369 ScanMaker 600ZS .......... Call

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**ScanMaker 1850S**

Microtek's ScanMaker 1850S is a revolutionary new 35mm slide scanner that's perfect for desktop publishing, presentation graphics and multi-media applications. You can scan 24-bit color and 256 shades of gray at up to 1850 dpi resolution. With a scanning area of 35mm x 35mm, ScanMaker 1850S is versatile enough to scan slides in portrait and landscape modes. Included is a full version of Adobe Photoshop (winner of MacUser's 1990 Eddy Award for Software Product of the Year), a sophisticated image-editing and retouching program designed for artists and desktop publishers.

*Microtek Labs, Inc.*

#0370 ScanMaker 1850S .......... Call

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**Personal Scan**

The DEST Personal Scan is the first scanner to combine full-page, one pass, hand-held scanning with full-page scanning in one desktop unit. Read almost any document into your computer: books, manuals, technical documents. Odd-shaped or oversized originals are no problem with the full-page, hand-held unit. Use the automatic document feeder and scan up to 10 pages at a time, fully unattended, for real productivity. Personal Scan comes bundled as a kit that includes everything you need to begin scanning today, such as: high quality 300 dpi scanning resolution, complete with cables and interface, one-year warranty. Comes in MAC and PC models.

DEST  
List: $995

#3929 Personal Scan with Recognize .......... $685

DEST  
List: $695

#3930 Recognize OCR Software ............... $515

---

**Kurta 8.5 x 11 tablet with pen**

The RSAJ8 graphic tablet that allows you to draw, sketch and trace far more accurately than with a mouse. One of the biggest benefits is absolute positioning: every point on the tablet corresponds exactly to a point on the screen. The tablet includes a row of programmable functions keys, and "scale keys" to allow instant rescaling to match the computer screen so the tablet is a 1:1 source to output representation.

Kurta Corp.  
List: $395

#3009 8.5 X 11 Tablet with Pen ............. $318

#3010 12X12 Tablet .......................... $384

#3011 12X17 Tablet .......................... $624

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**The Complete Answer for Every Scanning Need**

- 24 bit color
- 256 shades of gray
- black and white
- includes Adobe Photoshop

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**Personal Electric**

The DEST Personal Electric is the first scanner to combine full-page, one pass, hand-held scanning with full-page scanning in one desktop unit. Read almost any document into your computer: books, manuals, technical documents. Odd-shaped or oversized originals are no problem with the full-page, hand-held unit. Use the automatic document feeder and scan up to 10 pages at a time, fully unattended, for real productivity. Personal Electric comes bundled as a kit that includes everything you need to begin scanning today, such as: high quality 300 dpi scanning resolution, complete with cables and interface, one-year warranty. Comes in MAC and PC models.

DEST  
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#3929 Personal Electric with Recognize ...... $685

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*Microtek Labs, Inc.*

#0370 ScanMaker 1850S .......... Call
The hand-held UAHllr that runu any Image

Lightning Scan 400

Lightning Scan 400 provides the functionality of a flatbed scanner with the low cost and versatility of a hand-held scanner. In one quick pass any printed image becomes a high resolution Macintosh graphic. Lightning Scan 400 is the only hand-held scanner with a join feature for full page scanning. The exclusive snap-on guide ensures straight, even scanning. A RAM buffer makes it fast and selectable settings from 100 to 400 dpi provide sharp scans. Now includes ThunderWorks, new scanning and image enhancing software and a DA for scanning anywhere. ThunderWorks converts images to 37 levels of gray and echs in 256 levels of gray on all Macs. Thunderware

List: $549

#2212 Lightning Scan ........... $384

MacTRAC ADB

MacTRAC ADB fits beside your keyboard. Since it's only four inches wide and stays put, it saves your desk space. It has three buttons that wrap around the ball so you can click with your fingertips or thumb and still keep your hand on the ball. The middle button serves as a drag lock to make graphics work easily. The ergonomically-designed unit has a sloped wrist rest to eliminate fatigue and is designed to fit the curve of your hand. Complete with a locking ring to keep the ball inside the unit.

List: $119

#3305 MacTRAC ADB ............. $74
#3306 512/Plus .................... $60

#0149 Hand Scanner ..... $575

ThunderWare

List: $549

#3305 MacTRAC ADB ............. $74
#3306 512/Plus .................... $60

Call us for everyday low prices!

True-Color Hand Scanner

Animas is proud to present its True-Color Hand Scanner

- Definitive answer to your desktop publishing scanning problems
- ASC106 is invincible
- Fully equipped with Color Scan MacCheese™ software
- Flexibility and compatibility to paint, edit and save in the universal PICT format.

Animas

List: $799

#0149 Hand Scanner ..... $575

Lightning Scan

The hand-held scanner that turns any image into a Macintosh graphic... instantly!
### Gravis MouseStick

For entertainment it's the high-scoring MouseStick. Its advanced optical technology and dedicated processing unit are ideal for flight simulators or mouse-intensive entertainment software. Includes pre-installed settings for popular games—or you can create your own.

<table>
<thead>
<tr>
<th>Gravis MouseStick</th>
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<th>#2740 MouseStick</th>
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<td>#2741 MouseStick ADB</td>
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<th>Gravis SuperMouse</th>
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### Gravis SuperMouse

For productivity and performance, the three-button high resolution Gravis SuperMouse is more than JUST a mouse; it requires minimal desktop space. Its buttons access menu commands, tool palettes or macro programs (QuickKeys Lite included). Ideal for graphics, CAD, DTP and professional users. A/W, Exodus and SoftPC compatible.

| Gravis SuperMouse | List | #0055 SuperMouse | $89 |

### The Complete Full Page Scanner

This scanner is a full-page scanner with advanced features usually found in products costing much more. You can scan images up to 14" long and save files in popular image formats like TIFF, PICT, MacPaint and PS/EPSP. The powerful SmartScan software (included) now handles up to 256 shades of gray so you can easily edit and manipulate continuous-tone images for your documents.

| The Complete PC | List | #3232 The Complete Full Page Scanner | $755 |

### Half Page Scanner/400

The half-page scanner is an easy to operate hand-held scanner which also handles up to 256 shades of gray. It delivers precise tracing control, scans at up to 400 dpi and sells at a price that just begs you to buy it. It's no wonder Macworld called it "the hands down favorite," it comes with special-effects filters that let you sharpen, smooth and detect edges as well as lighten and darken images.

| The Complete PC | List | #3231 The Complete Half Page | $294 |

### New

- Scan color and B&W
- Full version of Adobe Photoshop included

### Abaton 300/Color and GrayScale Scanner

The new affordable 300/Color Scanner is designed to handle all of your scanning needs. Provides 24 bit color and 256 grayscale, halftone, line drawings and text. Almost 28% faster than Microtek 300cs and 300% faster than the Epson ES-300C. The Scan 300/Color is covered by a one year parts and labor warranty. Bundled with Eddy award winning full version Adobe Photoshop.

<table>
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<tr>
<th>Abaton 300/Color and GrayScale Scanner</th>
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<th>#0216 Abaton Color Scan 300</th>
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Voice Link

Voice Link sound system includes everything you need to integrate voice and sound with your Macintosh applications. You'll find the Voice Link digitizer, sound editing software, voice messaging software and other tools that make it easy for you to integrate sound. Advanced audio technology dramatically increases the quality of sound input on the Macintosh. Delivers unsurpassed audio quality to Voice Annotation, Voice Messaging, Narration and Sound Effects.

Voice Link is interrupt-driven with a RAM buffer.

Articulate Systems, Inc.
List: $269
#3933 Voice Link ......................... $199

Voice Navigator II

Just speak to your computer and it will do what you say! Voice Navigator II allows you to control your Mac by speaking to it. It is compatible with all Mac software and can run on any Mac. Using state-of-the-art technology, you can use any language, accent or voice to drive your Macintosh faster than you ever thought possible. It also provides the highest quality sound digitizing available for recording voice and music. It's the ultimate productivity tool.

Articulate Systems, Inc.
List: $795
#3932 Voice Navigator II ............. $570

Order by Fax (206) 881-3421 any time 24 hours a day!

UnMouse

The UnMouse does everything a mouse can, only faster, easier and in less space. To move the cursor simply slide your finger over the glass surface. To make a selection, merely press down. The UnMouse also serves as an extended keyboard. Tap the large red button and you instantly have a Power Keypad with 16 keys available to execute macros (50 in advanced mode). With its one million touch points the UnMouse also performs admirably as a graphics tablet.

Microtouch Systems
List: $295
#3412 UnMouse .......................... $180

ScanMan

Gray Scale Scanner

Add photos, drawings, text, etc., into any application with Logitech's ScanMan Model 32 hand held scanner and enhanced version 2.1 software. Easily merge two or more scans into one full-page image. 32 gray scales offer superior image quality and easy editing capability. Save images in MacPaint, TIFF and PICT formats. Advanced half-toning capability provides optimum image output on your monitor or non-postscript printers.

Logitech, Inc.
List: $549
#2561 ScanMan Model 32 ............ $298
Your One Stop Source for all your Mac Needs

ReadRight
With ReadRight for Macintosh and a full-page scanner you can easily and efficiently convert paper documents into editable computer text files. Recognizing with an accuracy of 99.9%, ReadRight automatically separates text from graphics and outputs text directly into your word processor, spreadsheet or database. Advanced features include a built-in dictionary, error checker and deferred processing.

OCR Systems
List: $499
#0461 ReadRight $329

DataDesk SwitchBoard
New SwitchBoard is the first user-configurable keyboard. Its unique modular design allows you to arrange the Alpha, Cursor and Numeric keypads into many different positions to best suit your computing needs and comfort. Additional input devices such as Trackball, vertical function keys, digitizer tablet and programmable macro keys can either replace existing keypads or be added to the keyboard. This allows SwitchBoard to evolve with your needs and preserves desktop space since all modules can be integrated into a single unit. SwitchBoard is the first keyboard engineered to work on both IBM and Apple computers.

DataDesk International
List: $240
#3326 DataDesk $158

Felix
Unlike a mouse, Felix maps one-to-one with your screen. The arrow doesn’t wander off into limbo. Felix automatically adjusts to your screen, no matter what the size or shape. It stays put so you won’t have to search for it under papers. It’s as comfortable to hold and use as a pencil. Felix lets you perform with all the speed of your sophisticated hardware and software because of its unique ergonomics. Since Felix uses optical technology and is self contained, it never needs routine maintenance.

#2935 Felix...$116

Sony Tapes & Disks
Sony data cartridges and disks offer a simple to use, more efficient means of data storage. Designed and constructed to provide a durable, accurate data storage and retrieval. Tested to ensure reliability.

Sony

Enhanced Keyboard
This extended keyboard utilizes the technology every serious Macintosh lover raves about. The smooth full-stroke, audible-click key action makes data input easier, and Cutting Edge’s existing quality control and testing makes it dependable. It has been widely accepted in business and professional settings, trusted because of Cutting Edge’s commitment to customer service and satisfaction. When other keyboards break down, or when you’re simply ready for the advantages of extended keyboarding, Cutting Edge is the one to choose. Apple Desktop Bus interface compatible.

#0435 Enhanced Keyboard $129

Cutting Edge List: $189
"#0932 XD 2000 40 Mb tape ... $19
#0938 50 Pk DS/DD 800K Disks ... $59
#1158 10 Pk DS/DD 800K Disks ... $79
#2192 50 Pk DS/DD 1.44 Mb Disks ... $119
#2193 50 Pk DS/DD 1.44 MB Disks ... $129
#1109 QD600A 60 MB Tape ... $20
#8666 360K 5.25" Diskettes, 10 Pk ... $9
#8671 1.2M 5.25" Diskettes, 10 Pk ... $18
#2192 10 Pk DS/DD 1.44 Mb Disks ... $119
#2193 50 Pk DS/DD 1.44 Mb Disks ... $75
Cutting Edge 15"
Full Page Monitor
Eliminate all the scrolling, scratching and squinting of a small screen. The monitor can display an entire 8-1/2"x11" on screen with flicker-free refresh rate of 75 Hertz and a high resolution of 640x870 pixels.

Cutting Edge List: $899
#3303 FPD SE/30 .... $579

RasterOps 24STV
New generation 24-bit True Color display board with real-time video in a window. The 24STV drives a 15" monitor in 1,2,4, 8, or 24-bit color modes at 640 X 480 resolution featuring a 2X- and 4X Pan/Zoom and Extended Desktop. A 1-bit mask plane allows windows or buttons to overlay true video windows. MetaGrabber application program included to provide extensive control over the display and capture of a single video frame or a sequence of frames for use as an animation file.
RasterOps List: $1,795
#0005 24STV .......... $1,299

Rival 19" Black & White Monitor
The officially acclaimed Mega Graphics Rival is now available for all Macintosh models. It gives you the most crisp, most clear and brightest image in the business, truly WYSIWYG. Because the 19" screen displays two facing pages, it is ideal for desktop publishing, layout and word processing. The wide expanse of workspace is an enormous benefit when using CAD and spreadsheet applications.
Mega Graphics List: $1,688
#3924 II ....... $1,199
#3925 SE/30 ... $1,199
#3926 SE ...... $1,199

Sigma L-View Multi-Mode Monitor
An ergonomic monitor design offers user-oriented details like a tilt/swivel base and paper white phosphor. L-View's Low-Emission design meets guidelines for electromagnetic field emissions established by the Swedish National Board of Measurements and Testing. L-View includes video card, 19" monitor, control panel software, and user's guide.
Sigma List: $1,999
#3854 Multi-Mode Monitor ...... $1,475

T-16 Color Display
Spread out with almost twice the display area of the standard 13" color monitor. View your work exactly as it will be printed at actual size - 72 dpi. Save almost half the cost of a 19" color monitor. Get the sharpest, clearest color display at any price. The T-16 has excellent colors, linearity and sharpness, and it sells for a lot less than its larger cousins. The T-16 is an excellent choice for CAD/CAM or color graphics.
E-Machine List: $2,995
#3919 T-16 8-bit Color System ........ $2,095
MacPrint

Print any Macintosh application on many different printers. MacPrint is a chooser-level program, completely transparent in operation. It displays all your printer's resident fonts on screen. If none is found, it creates a printable font based on Macintosh QuickDraw screen fonts, maintaining spacing, style, and word wrap. What you see on the screen is what prints.

Supports all internal fonts and font cartridges for HP and HP compatible printers like Pacific Data Products, Epson, Animac and Computer Peripherals.

Insight Development - List: $149

#2423 MacPrint 1.2 ..$93

Menu Fonts 3.0
Displays each font name on your menu in its own typeface so you can see what your fonts look like. With the Key Scroll feature, type the first letter of the font name and the list scrolls to the right place. Specify point size and color (with color hardware) for menu display. Supports NIMIT font numbering system and is MultiFinder compatible.

DUBI·CHECK

Menu Fonts .......... $28

Stuffl Deluxe

Stuffl Deluxe makes file compression so simple even beginners can benefit immediately. This newest generation of the popular compression, encryption and archiving application offers 75 new features including many new compression techniques (such as file-specific optimizers) and new security methods. Stuffl Deluxe opens and manipulates multiple archives with a Finder-like interface.

Aladdin Systems List $100
#3458 Stuffl Deluxe ..$61

My DiskLabeler III

My DiskLabeler III creates neat practical disk labels that list the contents of disk, or attractive custom labels. Print up to 100 filenames on a label. Complete directories for disks or hard drives can be sorted, displayed and printed on standard paper. Custom graphics and icons can be added to the label in a flash.

Williams and Macias List: $83
#3324 My DiskLabeler...$41
**Intouch**

Intouch is an easy-to-use Macintosh Desk Accessory that stores unlimited names, addresses, phone numbers and notes, prints envelopes and labels, and dials telephone numbers. Because Intouch is a DA, it provides you with instant access to your data.

Advanced Software  List: $80

#0282 Intouch ... $40

**DocuComp**

DocuComp automatically generates marked-up documents in seconds! It can compare any two versions of a document and report changes as minor as an inserted comma and as major as a complete rearrangement of text.

Advanced Software  List: $149

#2847 DocuComp .......... $88

**Now Utilities 2.0**

According to MacUser, "Now Utilities 2.0 is a must-have for experienced users and novice users alike." Featured products include SuperBoomerang, which MacWeek rated as the best of the Open & Save dialog boxes enhancers; StartUp Manager, the most powerful INIT and cdev manager; WYSIWYG Manus, which displays font names in their own typeface; MultiMaster, the most versatile file and application launching utility; and Screen Locker, a beautifully streamlined executive password protection system.

Now Software  List: $129

#3779 Now Utilities ........................................ $74

**Freedom of Press 3.0**

With Freedom of Press a PostScript printer is not required to output PostScript files. You can now print them to non-PostScript devices like the Hewlett-Packard LaserJet II, IIIP and IIID, DeskWriter, PaintJet and Epson LO Dot Matrix Printers. It comes with 35 scalable PostScript fonts and supports all additional fonts including Adobe Type I and new Microsoft True Type.

Custom Applications  List: $495

#3209 Freedom of Press 3.0 .......... $254

#3839 Freedom of Press Light .......... $55

**Retrospect 1.2**

With Retrospect you can remove seldom-needed files to permanent storage and free space on your hard disk. It works with almost any media, from floppies to re-writeable optical discs. Retrospect maintains a catalog on your hard disk so you always know where to look for archives or backup files.

Dantz Development  List: $249

#2586 Retrospect 1.2 ......................... $146

#3805 Retrospect w/ Rem 10 pack .......... $264

#3828 Remote 10 pack ....................... $146
Virex
Virex is a comprehensive solution to the threat of Macintosh computer viruses. It detects the presence of computer viruses and repairs files infected by known Macintosh viruses. Once a system is disinfected, the Virex INIT continuously monitors the computer so that virus infections are prevented.
Microcom
List $100
#2077 Virex $6

Carbon Copy Mac
Carbon Copy Mac™ is a network and communications software that allows you to remotely operate another Macintosh, transfer files in the foreground or background or manage your AppleTalk network. With complete control of another Mac's software, peripherals, screen, keyboard and mouse, Carbon Copy Mac is ideal for training users, collaborating on projects and supporting and troubleshooting your AppleTalk network.
Microcom
List $199
#3285 Carbon Copy Mac $116
#3477 Twin Pack $188

PYRO! 4.0
Images left on screen too long can burn a permanent image into the phosphores. PYRO! automatically substitutes a variety of user-selectable graphics routines designed to keep damage from happening. Touch any key or the mouse to bring back the original display.
Fifth Generation Systems
List: $30
#2194 PYRO $24

Suitcase II
Suitcase II expands your font and desk accessory menus to as many as 255 items each. Lets you directly install and use any font, DA or KEY. Configure special Font/DA files for each application. Helps keep your system file a manageable size.
Fifth Generation Systems
List: $60
#2002 Suitcase $48

PowerStation
Lets you organize and work for quick and easy access to applications, documents and desk accessories. Rapidly locate and access any application or document by location or name. Let you arrange software tools on 16 "pages" to find hundreds of applications or documents without searching folders.
Fifth Generation System
List $60
#2067 PowerStation $33

SuperLaserSpool
Controls your printer in the background as you work in the foreground. Automatically processes your documents, sends them to the printer and even downloads fonts while you continue working. Gets your Mac back in seconds instead of minutes or hours.
Fifth Generation Systems
List: $150
#1020 SuperLaser $92

FastBack II
FastBack II is a high-speed backup utility that allows a user to back up a hard disk at more than 1 MB per minute while simultaneously formatting the backup disks. The program uses advanced error detection and correction so that data can be restored even if the backup disks are damaged in storage.
Fifth Generation System
List: $189
#3826 FastBack II $117

FLASH
Fastest, friendliest way to transfer files over AppleTalk. Transfers are done the Mac way - with folders. To send files to Joe, simply drop them in a folder named "to Joe" and they'll be sent in the background while you work, even across network zones. One set will serve an unlimited number of users per zone.
Beagle Brothers
List: $200
#3219 FLASH $124

911 Utilities
Microcom 911 Utilities is a comprehensive problem recovery package for the Macintosh. 911 incorporates an extensive Troubleshooting Guide along with a collection of powerful utility programs that enable you to recover files thrown in the trash and recover files infected by known Mac viruses.
Microcom
List: $150
#3823 911 $83
After Dark 2.0
After Dark 2.0 prevents screen burn-in and it does it with style! In fact, use any style you choose including fish, flying toasters, lightning bolts, meteors, abstract art, crawling worms, a jump to light speed, or a basic dimmer. Also features system ID, password protection and sound!
Berkeley Systems

#2785 After Dark 2.0.................................$22

PicturePress
PicturePress compresses and decompresses 24-bit color images 10 to 60 times, using the emerging Joint Photographic Experts Group international still image compression standard. PicturePress operates alone or can be accelerated 20 to 50 times by the PicturePress Accelerator Card, a Programmable 60 MIPS image processing NuBus Card.
Storm Technologies

#3993 Picture Press.............................$120
#0179 Accelerator Card & Software.....$653

CanOpener 1.1
CanOpener lets you scan any disk or network volume, find files by content, then view the contents and copy anything you want. It can recognize text in ASCII format, pictures in MacPaint, MacDraw II, TIFF, PICT, PICT II, ICON, and EPS formats as well as sounds in ".snd" resource format. Since CanOpener overrides file formats, it can open documents or missing applications or even recover data from broken files.
Abbott Systems

#2895 CanOpener 1.1..........................$62

Cheshire 1.0
The fastest way to convert numbers into business charts right in PageMaker, Work MacWrite II or MacDraw II documents—without switching to a separate program. Press one key, Cheshire offers bar, column, line or surface chart types. Pick a chart, Cheshire instantly plots your numbers and pushes the charts into your document. It can also plot what you type into its window.
Includes 21 B&W chart types, or add more any time. MacUser 1990 Editor's Choice Award. Reputable Mention: Best Utility
Abbott Systems

#3927 Cheshire 1.0.............................$61

MacSleuth
MacSleuth is a valuable utility to help resolve hardware and software conflicts on your system. Features include: General System Information; status of all installed device drivers; current settings of Permanent Parameter RAM and more. You can also view the contents of the clipboard and investigate memory usage.
Dairana Technology

#3799 MacSleuth.............................$85

1-800-248-0800
PowerICONS
PowerICONS lets you create icons to launch an application or attach a document. It uses a copy of the application icon so you are familiar with a familiar image. Move launchable icons anywhere or have multiple icons for one application without adding confusion to the system. Unlike DAs and INITs, PowerICONS uses no system memory to operate!
Magic Software List: $100
#3329 PowerICONS $38

BackMatic
BackMatic automatically backs up your files each time you shut down your Mac. Install this handy INIT in your system folder and you'll never need to remember to make a backup again. Configure it to back up only files changed or all your most important files.
Magic Software List: $100
#3328 BackMatic $49

AutoSave II
AutoSave II saves files automatically with the applications and time intervals specified. Macworld (7/90) said, "It's so useful, it should have been built into the Macintosh system software."
Magic Software List: $50
#1244 AutoSave II $26

DiskDoubler 3.0
DiskDoubler compresses your files whenever you save them and expands them whenever you open them. In effect, it doubles your hard disk (and floppy disk) storage capacity. It works transparently within any application and operates in the background under MultiFinder. Disk Doubler works with documents and applications, plus sound, graphics and scanner files.
Salient Software List: $70
#3515 DiskDoubler $44

Inside Information
If it's out there, it's in here! This new DA is a comprehensive reference tool organizing the English language into logical categories of defined words. More than a dictionary or thesaurus, it lets you quickly and easily explore any of seven general Classes: Nature, Science & Technology, Domestic Life, Institutions, Art & Entertainment, language and The Human Condition.
Microlytics List: $120
#0437 Inside Information $67

Gofer 2.0
Gofer 2.0 adds many useful new features to this popular file finding utility. It now works with Word 4.0, MacWrite II, FullWrite and MS Works. It has a Move to Desktop command, wild card search and the ability to save and retrieve such criteria in their own files. An enhance export feature lets you select a specified number of lines above and below the "hit line."
Microlytics List: $60
#1940 Gofer $44

Word Finder V2.0
Installed as a DA, Word Finder gives access to a 220,000-synonym thesaurus. Synonyms for a highlighted word are instantly displayed to be used. It also helps confirm both word meaning and spelling. A smaller database is provided for users with limited disk space.
Microlytics, Inc. List: $50
#1501 Word Finder $33

The Elements of Style
Now The Elements of Style is available for your Macintosh: the ideal tool to make your writing crisp, concise and powerfully effective. Seven rules of usage, eleven principles of composition, matters of form, a list of often misused words and a style guide will guide any user toward a writing style that, according to Strunk, "makes every word tell."
Microlytics List: $60
#0416 Elements of Style $33

The Random House Encyclopedia
Microlytics, Inc. List: $120
#0438 Encyclopedia $67

Word Finder
The Elements of Style
The Random House Encyclopedia
DiskDoubler 3.0
AutoSave II
PowerICONS
BackMatic
Inside Information
Gofer 2.0
Microlytics, Inc.
The Random House Encyclopedia
The Elements of Style
DiskDoubler 3.0
AutoSave II
PowerICONS
Inside Information
Gofer 2.0
Microlytics, Inc.
MasterFinder
MasterFinder is the complete disk management utility. MasterFinder allows for the complete control and manipulation of files and folders on any hard drive or floppy disk. It's a total replacement for the Mac Finder. Using a concept of window panes as its basic user interface, each pane displays file names from a directory of a mounted drive.
MasterFinder's start-up view: the Panel View, consists of four panes that can display information on all mounted drives.
Tidac Software
#0148 Master Finder ...........$49

Quick Dex
QuickDEX is the fast and painless way to keep your data right under the Apple menu. QuickDEX stores data in “card decks.” Eight fit in the QuickDEX menu, but you can have as many as memory allows. Files are compact and searches are speedy. QuickDEX is also smart enough to find and dial the phone number on a card when click you the Dial button. It also prints Rolodex cards and mailing labels. Requires $12K or higher.
Cassady & Greene
#1670 QuickDEX ...............$33

SAM 3.0
The Symantec Anti-Virus for Macintosh detects viruses by monitoring the suspicious activities that characterize them. The INIT portion acts like a watchdog during startup to detect viral activity. The CDEV portion operates during normal Mac usage and offers a number of options for checking disks and folders as you work. SAM has an Audit Trail to keep track of its activity and your responses.
Symantec
#0116 SAM 3.0 .............$66

Norton Utilities
Norton Utilities for the Mac gives you an unbeatable combination of disk and data recovery software, along with disk optimization utilities. Now you can keep your valuable disks and data safe, secure and operating smoothly. It provides three levels of increase. Designed to give you optimal recovery options. The advanced diagnostic routines dig deep into the Mac operating system to find and recover lost data in minutes. With the Norton Utilities you can even reform a damaged, accidentally-formatted hard disk. You also get Speed Disk, a powerful disk defragmenter and optimizer to significantly increase system performance by reducing data access time.
Symantec
#008 Norton Utilities ........ $129

FolderBolt and NightWatch
Two powerful modular security systems to give your unsurpassed protection. FolderBolt provides easy-to-use protection for Macintosh folders and is fully integrated into the desktop. Select a folder and it prompts for a password. Includes many options. NightWatch is the most widely-used system for Macintosh hard disk security that works like your bank teller machine card. Compatible with any Mac hard disk. A snap to use.
Kent-Marsh, Ltd.
#0258 FolderBolt .............$88
#1817 NightWatch ...........$84

Mac Zone's Choice for Security
MaccessCard Reader and FileGuard
The MaccessCard Reader is a very convenient security add-on for your Mac. Working in tandem with FileGuard 2.5 software, it controls access to your Mac using magnetically-striped cards and an (optional) access key. You can use the cards that come with the system or quickly train it to recognize any ID card, such as your VISA, ATM, company or student ID card. After a registered user turns on your system with the MaccessCard Reader, FileGuard continues to control access to your Mac's hard disk, partitions, folders, files, applications, deskop, etc.
ASD Software
#0412 Maccess/FileGuard Bundle ....$395
#0161 MaccessCard Reader ...........$295
#3286 FileGuard 2.5 ......................$138
#3322 FileGuard 2.5 Office Pack 5 ...$348
#3323 FileGuard 2.5 Office Pack 10 ....$578

Macworld • July 1991
Ultimate SE & Classic Case

Put your Mac SE into either the Ultimate SE or Classic Case and you can take it anywhere. This premium quality case pampers and protects your SE with half-inch high density foam padding. The sturdy DuPont Cordura nylon exterior looks great and keeps the weight down. Inside you'll find padded compartments for your keyboard (any model), mouse, external hard disk and cables. Two exterior pockets hold everything from manuals and floppy disks to sweaters and umbrellas.

I/O Design: List $130
#3797 Ultimate Black .......... $78
#3791 Ultimate Navy .......... $78
#3793 Classic/SE Black ...... $64
#3907 Classic/SE Blue ...... $64

Uninterrupted Power Supply

The power to protect your Mac. APC's UPS110SE and UPS370CI not only to provide better line filtering and surge suppression than most surge suppressors, but they also deliver backup power during ACX line failures -- giving you enough time to perform a safe shutdown. The UPS 110SE is sized for (and slides right under) a SE, SE/30 or Classic. The UPS370CI fits under your MacII monitor and is sized to power a Mac II or IIx with a two-page monochrome monitor. APC also offers a complete line of more powerful UPS systems and PowerChute, a UPS monitoring program for AppleShare Networks.

American Power Conversion
#2464 UPS 110 SE ........ $208
#0305 UPS 370 CI ........ $328

HardTop Keyboard Covers

Protect your keyboard from dust, major spills and falling objects. Hard plastic cover in attractive design. Fits easily over your keyboard.

Basic Needs, Inc.
Hard Tops
#0109 Mac Plus KB .......... $15
#0110 Mac LC KB .......... $15
#0111 Mac Standard KB .... $15
#0113 Mac Extended KB .... $16
#0123 DataDesk 101 KB ..... $16
#0124 Apple Imagewriter II $15

Nylon Dust Covers

Basic Needs Nylon Dust Covers protect your computer and printer against dust and spills. They look great because they are machine-stitched and custom-fitted to your equipment. The platinum colored covers are made of washable, rip-stop nylon which is anti-static and won't crack, yellow or fade like similar priced vinyl.

Basic Needs Inc.
Keyboard Covers
#0043 Mac Classic w/LC KB .... $16
#0058 Mac Plus w/Plus KB ... $16
#0089 Mac IICx/CI 13" Monitor Ext KB .. $17
#0030 Mac SE w/Std KB ...... $16
#0127 Utility Pac ........... $15
Mac Bag

Mac Bags are designed to carry all the needs of an accountant to an engineer while still fitting under most airline seats. Mac Bags are made of strong, durable nylon that is padded to protect your Mac and accessories, while still looking attractive.

Make Bag SE/30 Classic

Mac Bags are designed to carry all the needs of an accountant to an engineer while still fitting under most airline seats. Mac Bags are made of strong, durable nylon that is padded to protect your Mac and accessories, while still looking attractive.

#1117 Teakwood Disk File .......... $14

Teakwood Disk File

Kalmar storage cabinets protect your valuable 3.5" floppy disks from dust and other harmful influences. At the same time, they dress up your desk and office. These handcrafted cabinets are made of solid teakwood and have a capacity of 45 disks.

Kalmar

List: $30

LaserWriter Toner Cartridges

Supreme Office and Computer

#2732 INTX ....................... $104

#3733 PLUS ...................... $89

Mac Bag

Mac Bag SE/30 Classic

Mac Bags are designed to carry all the needs of an accountant to an engineer while still fitting under most airline seats. Mac Bags are made of strong, durable nylon that is padded to protect your Mac and accessories, while still looking attractive.

List: $100

#2089 Mac Bag SE/30 Wine ........ $69

#2090 Mac Bag SE/30 Gray ........ $69

#1352 Mac Bag SE/30 Navy ........ $69

Targus Premier Macintosh Case


Targus

List: $196

#2630 Premier Case ............. $68
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### Education

- 3587 Accu-Writer
- 1838 Adobe Illustrator Design Book 1
- 2636 Adobe Illustrator Design Book 2
- 3212 Align: 3
- 2414 Arthur Blocks 1 1-2
- 3215 Arthur Blocks 2 1-2
- 2412 Art xnxx 1 1-2
- 3208 Art xnxx 2 1-2
- 3206 Art xnxx 3 1-2
- 3202 Art xnxx 4 1-2
- 3215 Art xnxx 7 1-2

### Programming

- 2909 Business Plan for Macintosh
- 2912 Call Again
- 2909 Call Again
- 2912 Calendar
- 2909 Calendar
- 2912 Calendar
- 2909 Calendar
- 2912 Calendar
- 2909 Calendar

### Modern and FAX

- 2691 MacFax 1.1
- 2691 MacFax 2.0
- 2691 MacFax 3.0
- 2691 MacFax 4.0
- 2691 MacFax 5.0
- 2691 MacFax 6.0
- 2691 MacFax 7.0
- 2691 MacFax 8.0
- 2691 MacFax 9.0

### Storage Devices

- 3539 Band-a-Box
- 2636 Band-a-Box
- 2636 Band-a-Box
- 2636 Band-a-Box
- 2636 Band-a-Box
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### Product Listings

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**Networking and Connectivity**

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**Input & Output Devices**

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**Utilities**

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**Storage Media**

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<td>3772</td>
<td>DVD Player</td>
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*The Mac Zone*

Established 1986

1-800-248-0800
Kensington PassProof
PassProof offers total defense against unauthorized use of your Mac without inhibiting authorized use. It's safe and easy to use, and unlike potentially dangerous encryption programs, your data is never altered or manipulated in any way. PassProof works with a simple and logical series of "locks". Some are hardware, some are software - you decide which ones to use and when.
Kensington List $100
#3660 PassProof SE Type Cases........$70
#3676 PassProof Cx, Cr, Left Drive ...$70

Maccessories Tilt/Swivel
Raise your Mac 2°. Allows you to swivel up to 100°, 150° each way from center, and lift up to 10°. Made of sturdy plastic and high density polyethylene for smooth movement.
Kensington List $50
#2976 Tilt/Swivel ....$21

Maccessories SE Anti-Glare Filter
Put an end to eye strain, blurred vision, and headaches with our Maccessories Anti-Glare Filter. Made with a unique anti-glare, reflective coating, these filters reduce glare reflected from your Mac's screen up to 98%. And they improve screen contrast and clarity up to 20% to eliminate the "fuzzy halo" that often appears around text and graphics. So even the tiniest numbers on a spreadsheet will be easier to read. Made of optical quality glass with ceramic anti-reflection, scratch-resistant coating. Filters VLF/ELF radiation and dissipates statics. Grounding wire draws emissions to earth grounding point. Sips onto front of monitor. No adhesives required.
Kensington List $100
#3292 SE Anti-Glare Filter ...............$51

Kensington PowerTree
PowerTree protects your Mac against electrical power problems. Each provides a lighted master switch and surge protection for your Mac, plus an LED to indicate if there's a surge. If the circuit fails, a buzzer sounds and the LED goes dark.
Kensington List: $50, $30, and $100
#3339 PowerTree 10 ...........$19
#3342 PowerTree 20 ...........$27
#3343 PowerTree 50 ...........$54

Kensington Turbo Mouse
If you use a mouse, chances are you've come to swear by it. But here's a reason to give it up - Turbo Mouse. Winner of the 1987 and 88 Macworld World Class Awards for Best Input Device, Turbo Mouse is quicker, more precise and easier to use than any other mouse. Because the ball is on top, you move only the ball, not the whole mouse. Its automatic acceleration senses the speed at which you're working and moves the cursor farther when you move faster. Roll the ball slowly for 200 DPI pin-point precision. Roll it quickly and you'll fly across even the biggest screen.
Kensington List $169
#1411 Turbo Mouse ADB ...........$107
#1292 Turbo Mouse Plus ...........$107
Agfa has developed a simple way to add new PostScript fonts when you really need them.

We've put over 1,650 PostScript fonts—all compatible with ATM—including nearly 1,000 Adobe typefaces on a single compact disc. As a Macintosh user, you can gain instant access to single volumes, or to the entire collection. Then, add new faces from the most complete Type 1 font selection when your next rush job walks in the door.

All you need is the AgfaType CD-ROM, a CD drive and the access codes. You get the codes by simply making a call to our 800 number and placing an order. You get the AgfaType CD-ROM and a Toshiba CD drive by taking advantage of our special offer. Now, new technology is more affordable than ever. Didn't you know that someday it would come to this?

<table>
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<th>Bernhard Modern Roman</th>
<th>PL Davison Americana</th>
<th>Egiziano Black</th>
<th>TC Europa Bold</th>
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Get the AgfaType CD-ROM v2.1 with 20 exclusive Agfa headline faces unlocked plus a Pi and Symbols font of your choice. Order #0326

$61

Get a CD Technologies drive, the AgfaType CD-ROM v2.1 with 20 Agfa headline faces unlocked, plus a Pi and Symbols font. Order #0381

$689

**ORLANDO**

- Quirinus Bold
- Seina Black
- SECTION BOLD CONDENSED
- Stratford Bold
- PL Tower Condensed
- PL Westervelt

**WOODBLOCK**

Choose from 126 exclusive Agfa Pi and Symbols fonts

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**SHIPPING NOW!** This offer expires July 31, 1991. For details please call: 1-800-248-0800
PhoneNET StarController® EN Series 500
The StarController EN repeats Ethernet signals over 12 ports and monitors network traffic and error rates. It’s fully compliant with the IEEE 10BaseT standard, so it supports a variety of Ethernet devices, from PCs to VAX mini-computers. It continuously monitors your network as a background application running under MultiFinder.

#3333 PhoneNET Series 500......$1,588

New! Now supports color

Timbuktu 4.0
This new version of the Eddy Award–winning software now supports color. It also provides clipboard exchange and full background file transfer. Timbuktu is a versatile network application that allows you to observe or control another Macintosh over any AppleTalk network. With Timbuktu, multiple users can share multiple screens across the network—turning any software application into a team activity!

#0420 Timbuktu 4.0 .........................$139
#0422 Timbuktu 4.0 10-Pack ...................$719
#0423 Timbuktu 4.0 30-Pack ....................$1,429

PhoneNET StarController Series 300
The StarController hub is a multport LocalTalk repeater you mount in the telephone wiring closet. It connects all your network devices together in a star configuration, repeating and amplifying signals over existing telephone wire. Extend your network to as many as 48 locations. Easy-to-read LED displays on the StarController tell you a summary of traffic on each of the 12 ports and alert you to signal errors. Manage your LocalTalk and Ethernet StarController hubs from the same Macintosh.

Farallon Computing
List: $1,295

#0829 PhoneNET Series 300 ......$824

Ethernet Cards
for SE/30 and Mac IIs
The 10BASE-T compliant PhoneNET Card enables Macintosh SE/30 or Macintosh II family users to use the increased speed and bandwidth of Ethernet running over ordinary telephone wire. A built-in, 10BASE-T transceiver lets you attach twisted-pair telephone cable directly to your Macintosh—no external connector or transceiver is needed. The PhoneNET Card comes with Timbuktu software.

Farallon Computing

#3902 Mac II..................$358
#3904 Mac II 10-Pack...........$3,258
#3901 SE/30......................$3,388
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Thousands of our satisfied and loyal customers have made us the world's third largest direct market reseller of Macintosh products. We would like to introduce you to some of our team members who make it all happen. From great service, low prices, overnight delivery and most of all our knowledgeable sales advisors - it's truly the people at the MacZone who are working extra hard for YOU... our customer.

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Our staff of over 25 people are the finest in the industry. They know their products and how to assist you by suggesting the products that best suit your needs. Our MacAdvisors are highly trained by developers of Mac products and use these products themselves. Thousands of new products are introduced into the market every year, and we make sure you only get the best of them. Call one of our advisors today for the best service you can get.

– David Burcham, Sales Manager

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The Apple Macintosh is an amazing computer. No matter what Mac you have, we can help you enhance it. The technical support staff at the MacZone is dedicated to providing you with the best possible information and service. Many of us have had the opportunity to work with Apple's upcoming System 7.0 and its new disk and file sharing capabilities. I believe the many great new features of System 7.0 will require a lot of customers to upgrade their processors and memory. We are ready to help you make an intelligent and knowledgeable decision.

– Dan Stinson, Technical Support Manager

Corporate Sales

"Here at the MacZone, we understand the frustrations the corporate, government and institutional buyer faces. Our Corporate Department will do everything in its power to make your purchasing hassle-free. The reason is simple. Our corporate account executives have vast experience in dealing with requests for quotes, purchase orders and institutional processes. We strive to work within YOUR organization's purchasing system to make YOUR job easier. The MacZone also has a special toll-free corporate line (800-258-0862) to speed up your order placing even more! The reason why AT & T, General Electric, NASA, Harvard and hundreds of other organizations come to the MacZone is because we offer guaranteed product availability and low prices. Give us a call, you'll be glad you did."

– Joe Rand, Corporate Account Executive

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"Shipping thousands of orders requires precision handling. We understand the need to ship the correct product the first time because your satisfaction is important to us. Your order is packaged carefully in environmentally safe packaging material and shipped overnight via Airborne Express with the greatest care. Our goal is to ship the right product the first time, every time. Our state of the art computer package tracking system allows us to guarantee next business day delivery." – Roger Rudolph, Warehouse Manager

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– Jon Jaffe, Purchasing Manager

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Exploring the Mac

INFORMATION SOURCES THAT MAKE IT EASIER

BY DEBORAH BRANSCUM

There's a dazzling array of information out there that can add to one's knowledge about the Macintosh. Here's a brief and opinionated overview of resources that Macworld editors have found useful or entertaining.

**Newsletters** The FileMaker Report has been in my good graces recently because it solved a thorny problem: how to sort on repeating fields in a record without sorting on the first entry. Late one afternoon I called Claris tech support begging for an answer to the mystery. The kindly technician who took my call was unable to help but said that according to rumor, the FileMaker Report folks had an answer. Rumor was right and a forthcoming issue should spell out the solution.

The FileMaker Report regularly showcases tips and tutorials for this popular database. A 5-issue subscription costs $36 in the United States; 20 issues go for $116. Contact Elk Horn Publishing in Freedom, California, by phone (408/761-5466) or fax (408/761-5469) for more details.

The Cobb Group of Louisville, Kentucky, publishes four monthly newsletters that provide application tips and techniques using clear and straightforward language and graphics for Macintosh users. The April issue of Excellence, which focuses on Excel, included an explanation of the problem of stray digits in the results of Excel formulas—and how to solve it. In April, Inside Microsoft Works tackled drawing tips and a spreadsheet technique, and Inside Word included how-to's on overlapping text and graphics and dealing with hidden text (as well as a detailed bug report). The March premier issue of Inside HyperCard followed the formula with tips on managing radio buttons, debugging, and using the Navigator palette.

Subscriptions for the Excel, Word, Works, and HyperCard newsletters cost $59, $49, $39, and $69, respectively. Free sample issues are available from Cobb's customer service department at 800/223-8720. (Cobb can also be reached at 502/491-1900.)

**Software** A couple of interesting stacks make browsing worthwhile. A clean design distinguishes Macintosh Yellow Pages, a HyperCard directory to Macintosh hardware, software, and accessories. This guide does not cover everything, but it does cover more than 1500 products. Product descriptions include suggested retail prices, memory requirements, and 800 numbers when available. A one-year, six-issue subscription is available for $69 through product manager Laura Marmorstein in Cambridge, Massachusetts. Reach her by phone at 617/577-9568.

Bomb and Crash Encyclopedia by Erik Thauvin offers brief, clear descriptions of the most common Macintosh errors and suggested solutions. Thauvin, a computer consultant, based his $15 shareware stack in part on the expertise of the BMUG tech-support folks. You can download the Encyclopedia from the HyperCard Forum (keyword MHC) on America Online or receive it directly from Thauvin by (continues)
IT ALL STARTED INNOCENTLY ENOUGH.

Then the conflicts began. At first we did it just for fun. A screen saver. A menu clock. But you know how it goes: you keep wanting more. A font/DA manager, then an anti-virus utility and a spell checker... soon we had a system folder full of INITs. All rushing into RAM at every startup.

Clearly, it had to stop. First some of the INITs stopped working. Then one of our major applications just refused to run. Before long the little devils were regularly causing system crashes with reckless abandon.

So then we found INITPicker. It clearly identifies all our INITs and lets us select which ones to run in what order. It can even figure out which INIT has caused a crash and prevent it from loading. So we don't have to spend hours trying to find the culprit by the process of elimination.

INITPicker. It's just a real simple program that keeps INITs real simple. Needless to say, our conflicts are over.

“My top recommendation...”
—MacUser, August 1989

“Simply outperforms and outclasses its competitors.”
—MacWEEK, June 12, 1990

SERVICE HERO

In the spring of 1990, Brad Saunders of Rochester, New York, bought an Ehman 44MB removable drive that used a SyQuest mechanism. He had problems with strange system crashes, data corruption on some files, and occasionally, being unable to start the system. Eventually the internal hard drive in his system wouldn't mount. Saunders learned this year that SyQuest reportedly had problems with some F5E series SQ555 drives, the model he owns. Ehman referred him to SyQuest, which asked him to send the drive in for an evaluation.

A call came from engineer Pat Allen two days later. SyQuest wanted to replace Saunders's SQ555 mechanism. SCSI-related problems were brought about by the lack of shielding and filtering in the power supply, so Allen shielded it and added the proper filters as well at no charge, writes Saunders. "My 44MB Ehman now acts like a different drive. It spins up in half the time and no longer freezes my Mac."

SyQuest officials say few consumers have been affected by this problem, but the company is willing to deal with faulty products. The freeware utility SCSI Probe, generally available online or through user groups, can determine if your drive is version F5E. If you are having problems with a SyQuest-based removable drive, such as a high error rate or a loud noise during retries, contact SyQuest's tech support at 408/226-4280.

Books There are many books, recent and more established, that we
As long as you love us, it's all right. And love us you will. Statistical software from SPSS is designed to work the way you work. By giving you the power to enter, edit, manage, analyze and present data on virtually every type of PC, workstation, minicomputer and mainframe. By giving you better decision-making ability through the most comprehensive set of statistical procedures available. And by giving you a choice of options to meet your specific data analysis needs. So if you're thinking about statistical software, think about flexibility. Because flexibility means value. And when it comes to value, we top the charts.

The Accessibility of SPSS makes it ideal for beginners and advanced users alike. With its straightforward menus and context-sensitive help and statistical glossary, SPSS gets you started fast. And with the help of our time-saving programming facilities, including macros and a matrix language, you'll have the power to go deeper even faster. And regardless of your experience with statistics, you'll be supported by the documentation and training that's set the industry standard for over 25 years. Documentation that InfoWorld calls "The Best in the Business."

The Statistical Procedures in SPSS give you the power to examine data more thoroughly, revealing patterns that might otherwise go unnoticed. We offer the most in-depth group of statistical procedures available, including univariate and multivariate descriptive, model building, hypothesis testing, clustering and classification, survival analysis, time series and perceptual mapping. No matter what your question, SPSS provides the flexibility to find the answer.

The Data and File Management capabilities of SPSS give you unparalleled flexibility when preparing data for analysis. With SPSS, information can be quickly reorganized, cleaned and transformed, regardless of size or structure. Multiple missing values for nonresponses can be defined and labeled according to your specifications, while built-in controls easily manage information stored in complex file formats, including custom file formats. Self-documenting portable files give you the freedom to move your analysis from one computing environment to the next, saving time and resources. And because SPSS supports most popular microcomputer file types including Lotus® DBF and SYLK, and offers free interfaces to such leading SQL-based database management systems as Informix®, ORACLE® and Sybase®, there's no need to re-enter data or write out intermediate files.

The Choice of Options offered by SPSS provides the flexibility to meet both your immediate and future data analysis needs. Unlike other statistical packages, we give you more than just the ability to choose between the options you may or may not need. We give you a choice of options designed to work together. Options that work as a system, providing the best possible software solution. Options for data entry and editing. Or producing publication-ready tables and reports. Options to analyze the past and help predict the future. Or to present your results with over 40 high-impact color displays, including a variety of charts and maps. No matter what you do, SPSS can help you do it better.

So if you're in the market for statistical software, keep an open mind. Go with the value of SPSS, suppliers of statistical solutions to over 2 million users worldwide. Because when you have the advantage of flexibility, the chances are you'll still be a hit tomorrow.

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Mahtivator, Macintosh and AppleLink trademarks are owned by their respective companies.

Circle 95 on reader service card.

CONSPICUOUS CONSUMER

The Bomb and Crash Encyclopedia is a $15 shareware stack with definitions of system failures, application failures, and failures of disks, serial ports, and clocks. My favorite advice, for one system failure: "Restart and pray."

Fans of Jim Heid's Getting Started column in this magazine should enjoy the Macworld Complete Mac Handbook (IDG Books Worldwide, 1991). This $26.95 volume, from a subsidiary of Macworld's parent company, covers a broad range of topics, from how to buy a Mac to animation, System 7.0, and more.

The Macintosh Bible "What Do I Do Now?" Book (Goldstein & Blair, 1990) by Charles Rubin is a $12 troubleshooting guide to common errors and resolutions. It's clear and simple and should help you avoid needlless calls to tech support.

Typesetters often wince at the ugly publications churned out by Mac enthusiasts with more energy than style. The Mac Is Not A Typewriter (Peachpit Press, 1990) is a wonderful, short stylebook by Robin Williams. (continues)
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With general ledger, accounts receivable and payables, inventory, payroll, even project management — Accountant, Inc. is the only complete integrated accounting system. That means when you load the program, everything is there at your fingertips. And, you can move from one task to another, seamlessly. That’s critical in a small business where you wear many hats — sales by day, payroll and purchasing by night, marketing on Wednesday, inventory on Thursday. With Accountant, Inc. you can switch hats in a moment, moving from writing invoices, to paying bills, to generating payroll or any other task that needs immediate attention.

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Up-to-date information is also critical in a small business. When your resources are tight, you want to make the most of them. And you can if you are able to interpret the information in your accounting system. With Accountant, Inc. you have more than just accounting data — you’ve got sales, marketing, inventory, payroll, and other analysis in all shapes and forms.

We’ve added to Accountant, Inc.’s already extensive reporting formats — now over 100 in all — to tell you anything you need to know. And you can select any font and size to make reports look great too.

Accountant, Inc. has the uncanny ability to take everything you’ve given it during the day and interpret what’s really going on. Account agings and transaction listings, income statements, balance sheets, payroll reports and sales breakdowns any way you like, inventory levels, back orders and more. Sharpen the focus with Accountant, Inc.’s advanced analysis tools to see who’s ordering what, who owes money, when a certain customer placed his last order and how he’s doing on his credit line.

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Because you don’t have a lot of time, Accountant, Inc. handles all of your company’s time-consuming financial details. Everything from writing checks, invoices and credit memos to creating insightful reports, meticulous breakdowns and extensive analysis. It makes your life easier too — from automatically tracking back orders to reconciling the checkbooks. Pay bills by clicking on them, create invoices by filling in a form. And the program takes care of all
the tedious posting and balancing automatically. Accountant, Inc.'s built-in power gives you the flexibility to turn on a dime, like the rest of your business does.

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For example, our System 7 compatible version will link Accountant, Inc. with forms design software, enabling you to create fully customizable forms. You can make your invoices, purchase orders, statements and other forms look exactly how you want them to.

How'd you like to have your reports automatically create 3-D charts? With System 7's publish and subscribe feature, Accountant, Inc. and a graph program will take your plain old text reports and bring them to life, instantly.

Today, Accountant, Inc. version 2.0 is the most exciting accounting and financial management software available for the Macintosh. And tomorrow, with multi-user and System 7 capabilities, Accountant, Inc. will continue to evolve as the leading edge in Macintosh accounting.


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© 1991 Softsync, Inc. © 1991 Softsync/BLOC. All rights reserved. System 7™ is a trademark of Apple Computer, Inc.
This $9.95 volume shows the typesetting-impaired how to get professional results from the Mac.

Although you might not know it from Apple's latest introductions, there are still dot matrix printers out in the world. *Macintosh Printer Secrets* (Hayden, 1990) by Larry Pina is a $34.95 guide to setup, repair, and upgrade for such printers.

The following three volumes aren't Mac-specific but make for interesting reads. *Cyberpunk* (Simon & Schuster, 1991), $22.95, by Katie Hafner and John Markoff, reveals the compelling stories behind several young hackers who clashed with the law, including Robert Morris, Jr., the Cornell student whose virus brought down the Internet network.


**Bookstores** If you can't find the computer books you want locally, consider buying by mail through one of the following bookshops. Computer Literacy, in San Jose, California, can be reached at 408/435-1118. Opamp Technical Books in Los Angeles is at 213/464-4322. Powell Technical Bookstore in Portland, Oregon, is available at 503/228-3906 or 800/225-6911. And Quantum Books, in Cambridge, Massachusetts, can be reached at 617/494-5042.

For more Mac resources, see the *Conspicuous Consumer* column from June 1990.

(Research assistance by Carolyn Bickford.)

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Send nominees for sainthood to Service Heroes, Macworld, 501 Second St., San Francisco, CA 94107 or via AppleLink (Macworld1) or America Online (Brenscum). Conversely, drop Conspicuous Consumer a line if a company is ignoring you.
You don't need to wait hours to change tapes.

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One 8mm tape drive will already deliver more than they promise.

It's the digital CY-8200, now with optional data compression. And you can get it exclusively from Contemporary Cybernetics Group.

With data compression, the CY-8200 can quadruple the amount of data you can load on an 8mm cassette that fits neatly in your shirt pocket. Meaning the already tremendous savings in man hours, media costs, storage and shipping are multiplied by four.

Until now, the best 8mm drive on the market stored an impressive 2.5 GB per tape at speeds up to 15 MB per minute.

Our data compression option allows you to write up to 10 GB per tape at up to 60 MB per minute. Completely unattended.

Of course, the data compression feature is switch-selectable, so you can turn off data compression to read and write standard 8mm tapes.

Plus it's a simple upgrade for the best tape drive built: our CY-8200. Offering a complete range of standard interfaces, a 2-line, 40-column display option, and optional security card encryption. And assuring you of full support and a 12-month warranty from the leader in advanced 8mm helical scan technology.

The CY-8200 with data compression will remain the best value in data storage for a long time to come. So now you've got many good reasons for calling us today and no good reason for waiting.

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In Canada, call 1-800-668-8948, ext. 48. ©1991 Claris Corporation. All rights reserved. Claris, FileMaker, MacDraw, MacPaint, MacProject, MacWrite and SmartForm are registered trademarks of Claris Corporation. HyperCard is a registered trademark of Apple Computer, Inc., licensed to Claris Corporation.
The newest Macintosh® computers were designed to deliver leading edge technology in the most cost effective packages. With them, Apple has taken a giant step into the world of value. Frankly, it's a world in which we at Storage Dimensions have been doing business for some time now.

Our new slimline ZFP (zero footprint) models, for instance, reflect giant steps of their own—and leave no footprints. Tucked smartly under the Mac Classic, or just as smartly between the Mac II chassis and monitor, they’re available in 50, 100, and 205 MB capacities. And they’re among the fastest in the industry. What’s more, they include comprehensive disk management software, with advanced features like disk mirroring and volume spanning.

In fact, features like these have always been included across the entire MacinStor product family. Whether it’s a 650 MB internal or a 4 GB external. Whether it’s an erasable optical solution or a hard disk standalone solution, every MacinStor delivers more for your money. Because Macintosh users expect more.

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by Dan Littman and Tom Moran

It's a Color Calibrator
and a Floor Wax

RasterOps announced in mid-May its CorrectColor Calibrator, a device that calibrates 24-bit displays, printers, and scanners and measures colors on paper and film. Intended for publishing professionals, the RasterOps calibrator uses four optical sensing devices in a suction cup that attaches to a monitor. Three of the optical sensors measure RGB, and the fourth measures white light. The sensing device, together with its base unit (called the Color Integration Processor) and various standard attachments, acts as a densitometer for measuring colors on film, as a colorimeter for calibrating a monitor and measuring colors on paper, and as a luminance-measuring device that can accurately set the color temperature of certain monitors.

To set the base color temperature of a monitor, the calibrator needs to know the size and precise refresh rate of the monitor so that it can synchronize with the monitor's scanning beam. Currently the CorrectColor Calibrator looks for identification in the monitor's ROM and then looks up the monitor's refresh rate in a table kept in the calibrator. However, for marketing reasons, RasterOps includes the necessary information only for Apple's 13-inch color monitor, some Sun monitors, and all RasterOps 24-bit displays, the company said. To set the color temperature, the user places the sensing device over a white rectangle on screen, and the software makes a contour map of the screen and changes the monitor's gamma tables. A total of 49 rectangles appear in a 7 by 7 grid, so 49 measurements are necessary. However, this process usually needs to be done only once per monitor.

To calibrate a scanner, the user places a reference image in the scanner and the calibrator software puts it on screen next to a disk-stored copy of the same image. Differences between the two images tell the calibrator how to calibrate the scanner. Special attachments that come with the sensing device let you use a similar process to calibrate a printer or film recorder. RasterOps said the calibrator will support any standard color space.

RasterOps began shipping the CorrectColor Calibrator to developers of publishing software at the end of April, and expected volume shipments to end-users to begin in May. RasterOps expects developers to make changes to their applications to help them work with the calibrator. The list price for the CorrectColor Calibrator was not set at press time, but RasterOps predicted it would be around $5000. The company will provide an ADB version for the Macintosh, and a serial-port version for PCs. For more information, contact RasterOps in Santa Clara, California, at 408/562-4000.—T.M.

Soft TV

Playing full-motion video on a Macintosh screen has until now required special hardware to convert input from a tape, laser disc, or video camera.
How to improve your personal image.

Introducing the new TurboPS Personal Series laser printers.

Take it from Fred B. Dull. With NewGen™ TurboPS Personal Series printers, your documents will look amazingly crisp, clean and professional.

With our new line of personal PostScript®-compatible printers, you can greatly enhance images beyond your wildest imagination. The TurboPS/400p™ (400 dpi) and the TurboPS/300p™ (300 dpi), both offer the convenience and compactness of a personal printer. And proprietary features the competition can’t touch.

Like Image Enhancement Technology (IET)™ standard on the TurboPS/400p, to smooth characters, lines and curves. And Automatic Recognition Technology (ART)™ that smartly selects interfaces and emulations without operator intervention.

A second paper tray, memory cards, SCSI interface and other I/O expansions are among the options when you’re ready to upgrade. All this at a surprisingly low price.

To learn more, or for your nearest Authorized Dealer, contact NewGen today. The NewGen TurboPS Personal Series laser printers. If they can do this much for Fred B. Dull, just think what they can do for you.

NewGen Systems Corporation

California Sales Office:
17580 Newhope Street, Fountain Valley, CA 92708
Telephone (714) 436-5100 FAX (714) 641-2800 Toll Free 1-(800)-879-4639

Minnesota Sales Office:
Telephone (612) 942-5665 FAX (612) 942-5923 Toll Free 1-(800)-879-4639
Cricket Software veteran Jim Rafferty is developing software-only tools to pull compressed video from a hard drive, decompress it, synchronize digitized sound, and play it in real time.

Unfortunately, Rafferty says, a standard Macintosh IIci tops out at drawing a Digital video is coming to the Mac: Jim Rafferty with several videos cued up on his Mac and ready to roll.

### Large-Screen Graphics Boards for the LC and Illsi

SuperMac has designed 8-bit boards that support monitors as large as 21 inches diagonally for the Macintosh LC and the Illsi. The board for the Illsi, called the Spectrum/8 si, plugs directly into the Illsi's slot, making an adapter board unnecessary. The Spectrum/8 si is compatible with Apple monitors and with 16-inch, 19-inch, and 21-inch monitors from SuperMac and other vendors, according to SuperMac.

The board for the LC, called the Spectrum/8 LC, contains all the functions of the Illsi board and draws only 4 watts, well within the LC's power budget. Both boards have a 75Hz refresh rate to eliminate flicker.

Both boards also come with SuperMac's hardware pan-and-zoom feature, and the company's Virtual Desktop, which effectively increases resolution to 4096 by 1536 for viewing large documents.

SuperMac began to ship the new products in late March. The suggested retail price is $999 for either board. The company is also offering for $189 a 68882 math coprocessor that plugs into the Spectrum/8 si. For more information, contact SuperMac in Sunnyvale, California, at 408/245-2202.—T.M.

### The Thinking Mac’s Book

With 26 million copies in print, Jacqueline Susann’s Valley of the Dolls is the best-selling novel of all time. Freelance writer and self-taught artificial intelligence expert Scott French hopes to duplicate its success with Just This Once, a Susann knockoff written with the help of expert system software running on a Macintosh Illix.

Both novels focus on the drug and sex addictions of music and movie stars. Both have the same
Now you can travel from here to there with twice the horsepower.

Getting from your Macintosh to virtually any fax machine in the world is now a lot faster.

Because the new 9600-bps Abaton InterFax 24/96 gets your message across twice as fast as before. And since the InterFax software compresses the file before sending it out, you spend even less time faxing than with any other 9600-bps fax/modem.

But we didn't just double the raw output speed, we made it easier to use. We included direct scan support, so you can fax art and photos straight from the scanner with excellent resolution. We also made the software easier to use — it's as simple as printing to any printer. And we made the InterFax work in background (with or without Multifinder), so you can get back to work while your Mac faxes. You can even schedule when faxes are sent to take advantage of lower phone rates.

As an added plus, the new InterFax also works as a 2400-bps Hayes-compatible data modem with MNP 5 error correction. All these features together made MacUser name the InterFax 24/96 the best communication product of 1989.

If you want to get from here to wherever with twice the horsepower, call Abaton at 1-800-444-5321, or fax a note and your business card to (415) 683-2956. The new InterFax 24/96 will make your ideas easier to publish. Anywhere.

Introducing the Interfax 24/96

[Image of Abaton InterFax 24/96]
style, and for the most part, both use the same vocabulary. French analyzed the entire text of Valley of the Dolls for parts of speech, words associated with particular characters, words relevant to a time in the story, and so on. He updated the vocabulary with terms for freebasing cocaine and for describing sex in greater detail than Susann did in 1966.

French developed his expert system with Nexpert Data's Nextra and Nexpert Object. Nextra helped him convert his study of Susann's style into rules for advancing the plot, determining characters' emotional reactions, and selecting words; Nexpert Object applied the hundreds of rules.

French claims that he wrote about 10 percent of the text without the Macintosh, the Mac wrote 25 percent without him, and the two revised each other's work to produce the rest. French remained in control, of course, feeding the computer suggestions about characters and situations, to which it responded with text that he then edited to eliminate irrational dialogue or action. The computer seems to have worked somewhat like an in-between, an animation artist who draws the frames in between key frames drawn by a master animator.

French acknowledges that his system can imitate only linear, straightforward writing without complex syntax and metaphor or great intuitive leaps. Many best-sellers have none of these qualities, though, and Just This Once raises high-stakes intellectual-property issues. He has not sold the book yet, but French's literary agent describes it as "very commercial" and has found French a copyright attorney to fend off a lawsuit that is now threatened by Susann's estate.

Nexpert Data is in Palo Alto, California, at 415/321-4488.—Ann Garrison

Is it writing, or is it programming? Scott French wrote a pulp novel with the help of Nexpert Object.

The Spirit of 7-Point-0

Those Apple patriots in the Claris building at the corner of Bunker Hill Lane and Patrick Henry Drive are getting ready for some System 7.0 action. On the Claris roll call are

- MacWrite Pro
- PipeLine, a tool for managing the tangled web of published and subscribed-to files (not expected to be released this year)
- Resolve (a spreadsheet based on Wingz)
- MacProject II 2.5
- HyperCard 2.1
- programmers' guidelines for making other applications able to communicate with Claris applications

MacWrite Pro is the big news. It has real style sheets for both characters and paragraphs, tracking, a Word-like section feature, and a frame-based interface that can wrap text around graphic elements the way Rag-Time and Quark-XPress do. MacWrite Pro will support external add-ons and will ship with one for creating tables and another for adding notes. The program is expected to list for $249.

Resolve looks a lot like Wingz but, in addition to 7.0 features, Resolve adds such Claris standards as the Claris spelling checker and the MacDraw tool palettes. Resolve's new interface has some nice touches, like including the arguments when you paste a function into a cell, and, says Claris, Resolve lacks bugs provided in the Informix product. Resolve will list for $399.

HyperCard version 2.1 and MacProject II 2.5 are 7.0-smart upgrades. For example, MacProject, which will list for $499, will be able to run Resolve scripts to generate and update graphs inside MacProject files, and Resolve will be able to use HyperCard 2.1's Data Access Language support to bring mainframe data into worksheets.

For more information, contact Claris in Santa Clara, California, at 408/987-7000.—D.L.

HP Unveils 4-ppm and 17-ppm Printers

Hewlett-Packard has recently introduced the HP LaserJet IIIP and the HP LaserJet IISi, laser printers that produce 4 pages per minute and 17 pages per minute, respectively. The LaserJet IIIP improves on the existing LaserJet II, with higher performance and HP's Resolution Enhancement Technology (RET). The 300-dpi IISi, HP's first venture into high-speed laser printers for personal computers, also includes (continues)

The shape of things to come: Claris's PipeLine is a good example of the new utilities System 7 will spawn.
The Ultimate Productivity Tool...
your Voice

Winner of two consecutive MacUser Editors' Choice Awards:
"Best Input Device 1990"
"Most Significant Hardware Product 1989"

Run at least 50% faster-
Control any Macintosh application by voice, using spoken commands to execute any function normally performed with your keyboard and mouse. Voice Navigator II recognizes any voice, any accent, any language. Really.

Imagine selecting tools, changing fonts and point sizes, zooming in and out, clicking buttons, filling cell ranges, sending voicemail messages, all by spoken commands. Now imagine programs like PageMaker, Illustrator, Word, MacDraft, Director, FileMaker Pro, Canvas — all running at least 50% faster.

Whether you’re responding to dialog boxes, selecting menus, entering data, or controlling presentations, Voice Navigator II, with its Voice User Interface, makes your Mac faster and easier to use.

According to Robert Wiggins of MacUser Magazine, after you've used the Voice Navigator, "...you won't know how you lived without it."

Call today for our demo video and see for yourself the power of voice control.

Get our Video Demo & Free $20 Rebate!

See Voice Navigator II in demos with the entire Articulate Systems Product Line. Only $99.95 includes shipping — and a special bonus to you, a Free $20 Rebate Certificate!

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RET and has a toner cartridge that contains unusually fine toner particles. This combination produces output rivaling that of printers with 600-dpi resolution, according to HP. The III Si incorporates a RISC processor for faster printing. The printer has two 500-sheet input trays and produces up to 50,000 printed pages a month.

The III Si lists for $5495 and began shipping in volume in early March. An option for printing on both sides of the paper also began shipping in March at a suggested list price of $695. A power envelope feeder going for $495 should be available this summer.

Neither printer is currently available in a model designed specifically for the Mac, but Macintosh users can adapt the IIIP with the $275 HP AppleTalk Interface Kit, an additional 1MB of LaserJet RAM that lists for $230, and the $695 HP LaserJet PostScript Cartridge. The III Si can connect to Macs (and PCs at the same time) via the BridgePort 2674, a $595 intelligent switching device from Extended Systems. Hewlett-Packard said it expects to offer both printers in Mac versions sometime in the fall.

For the III Si to work with the BridgePort 2674 (and thus the Mac), it must have HP's $895 PostScript upgrade, which includes extra RAM. Extended Systems is currently shipping the BridgePort 2674.

The $895 Radius FPO full-page display works with the Classic and with most higher-end Macintoshes.

For more information, contact HP at 800/752-0900, or Extended Systems in Boise, Idaho, at 208/322-7575.—T.M.

Radius Reintroduces Its Full-Page Display

Despite the apparent success of the monochrome Radius Pivot monitor and the recent introduction of the Color Pivot, Radius has decided to reintroduce the Radius FPO, a full-page display that is fixed in portrait mode but costs several hundred dollars less than the monochrome Pivot. The company says it was influenced by the tremendous success of the Macintosh Classic and Mac LC systems. When the first Pivot was introduced, in March 1990, the company discontinued its original FPO, which had been the first full-page monochrome monitor for the Mac. Radius said at the time that it expected to compete through high volume and by offering the additional feature of pivoting, but conceded that the mechanically complex Pivot monitors are inherently more difficult and costly to make.

The new Radius FPO lists for $895 and has been improved over the old model, Radius says. The monitor offers a resolution of 640 by 870 pixels at 78 dpi, and comes with RadiusWare screen-utility software. Although it works in monochrome with the Classic, the FPO can provide gray scale when connected to a Mac with built-in video or an adapter board. The FPO is currently incompatible with the Plus or other monochrome Macs that lack expansion slots.

The Radius FPO began shipping in the middle of April, according to the company. Radius began offering a series of adapter boards for the FPO at the same time. The monochrome adapter boards for the Classic and SE list for $295, while boards for the LC, SE/30, and Macs that include the NuBus have a list price of $395. For $795 Radius is offering an 8-bit adapter board for the Mac LC. For more information, contact Radius at 408/434-1010.—T.M.

Big Words

The dearth of Mac products for retrieving information from gigabytes of text on hard drives or CD ROMs is both cause and consequence of the Mac's weak presence in insurance and legal offices, government, and other text-in-
Arrange your files, folders and applications to fit the way you work, and your hard drive won't be so hard to handle.

The ultimate control panel for file manipulation. The DiskTools DA instantly finds, marks, copies or modifies files.

With QuickLaunch, you can blast off into any application without going back to the desktop.

Don't be stuck on sticky notes. Organize your messages and reminders in File Director's autodialing phone pad DA.

Pop up the calendar DA while you're in any application to make notes or schedule cold calls and hot dates.

Got half a mind to get organized? Get File Director.

It's a contradiction we humans have been living with for millions of years: one brain, two ways of thinking. The right half of the brain is creative and carefree, while the logical left hemisphere is designed to put things in order. So when you try to get your head together and organize your hard disk, the result can be a filing system that doesn't work for either half.

That's why you need File Director, the left-brained program for right-brained people. File Director makes everyday operations easier by letting you logically arrange your files, folders, documents and applications on "pages" by date, job, client or whatever makes sense to you.

And with The DiskTools DA, opening one window puts you in complete control of finding, moving, copying, deleting and modifying files. You can even QuickLaunch into another application without going back to the desktop.

File Director also comes with four bonus DA's—phone pad, calendar and two calculators—that come in handy for taking and making calls, setting up appointments and crunching numbers. All without quitting your application.

If you've been giving some serious thought to getting organized, get File Director.

And keep this in mind. We'll send you a free copy of Pyrol, the entertaining screensaver (a $39.95 value), just for writing "Pyrol" on the File Director registration card before you return it. For more information, call 1-800-477-8212 today.

File Director from Fifth Generation Systems, Inc.
Circle 73 on reader service card
programming tools also support indexing and searching of incoming data in real time—for example, from a news wire.

Prizing for the Mac product will probably be about the same as for the Windows product, which lists for $895. CPL starts at $20,000. For more information, call Personal Library Software in Rockville, Maryland, at 301/926-1402.—D.L.

QMS and NEC Printers Work with Macs and PCs

Both QMS and NEC Technologies have introduced 8-ppm laser printers that can work with Macs and PCs over a network. The QMS printers are the QMS-PS 815 and 825; both feature a new Canon print engine with improved front-panel LCD controls. The 815 and 825 offer QMS’s Emulation Sensing Processor, which senses whether an incoming file is in PCL (on the PC side) or PostScript (from a PC or Mac).

Both QMS printers use a 20MHz 68020 microprocessor that speeds up the rasterizing of the print image. The only difference between the two is that the 815 has just one 200-sheet paper feeder, while the 825 has two. Both printers accept letter- or legal-size paper and come with 45 PostScript fonts. They also have buffers that allow their AppleTalk, parallel, and serial ports to all accept data at the same time.

The NEC SilentWriter2 990, designed for stand-alone use or for small graphic arts or CAD/CAM workgroups, can also accept PostScript or PCL files, but only accepts one file at a time. Users must go to the printer and manually select the AppleTalk port, parallel port, or serial port if the desired interface is not already chosen. Macintosh users sending PostScript files will get a “printer not found” message if the printer is not set to receive via AppleTalk. For DOS machines, NEC includes a utility called the NEC Printer Control Panel (from LaserTools), which appends a header to files, telling the printer whether the files are in PostScript or PCL.

The SilentWriter2 990 has a Weitek XL-8200 RISC processor that makes the printer as much as seven times faster than most PostScript printers, according to NEC. The printer comes with 2MB of RAM, 35 Adobe fonts, and an emulation of the Hewlett-Packard LaserJet II P that includes 12 fonts for PCL. It has one 200-sheet feeder for letter- or legal-size paper. To accommodate an external hard drive that could store forms and additional fonts, the NEC printer has a SCSI interface. The NEC printer and the QMS printers all have 300-dpi resolution.

(continues)
Grayscale, Color and OCR Scanners

AVR scanners include 300 dpi black & white, 8-bit grayscale and 24-bit color models.

The grayscale model is field-upgradeable to color, keeping your options open and preserving your investment.

Every AVR scanner includes top image editing software: PhotoShop™ LE (Mac) or Picture Publisher™ (PC).

Sleek, compact frogdesign® package (designers of Macintosh and NeXT®) compliments any desktop.

AVR is the only US-based designer and manufacturer of desktop scanners.

AVR offers the widest range of desktop scanners, including support for PC, PS/2®, and Macintosh®.

Only AVR scanners emulate the HP ScanJet Plus™ and Apple® scanners so you can use any application software.

Ask your dealer about the affordable AVR 3000 Series™ or call 800-54-IMAGE.

Capture the Image™
The SilentWriter 2 990, shipping now, has a suggested list price of $4495. The QMS-PS 815 and the QMS-PS 825, both also shipping, list for $4995 and $5995, respectively. For more information, contact NEC in Boxborough, Massachusetts, at 508/264-8000, or QMS in Mobile, Alabama, at 205/633-4300.—T.M.

Birth of a Star

Like hot gases speeding away from the center of the universe, Macintosh network technology is coalescing into stars.

Farallon’s StarController and Nuvotech’s TurboStar are facing competition from a new kind of network switching-hub. A new company, Tribe Computer Works, whose president Jim Li previously worked on Thinking Machines’ parallel-processing supercomputers, is applying the strength of multiple processors to Tribe’s LocalSwitch star-configuration network hub.

The LocalSwitch is a 16-port hub with 8 microprocessors; each links a pair of ports for incoming and outgoing signals. For example, when a user prints a file, it goes from the Macintosh to the printer selected in the Chooser, whereas a StarController’s single microprocessor broadcasts the print request out of every port, relying on the selected printer to catch the job.

LocalSwitch’s design has several advantages. It should be able to maintain throughput for up to eight connections at or near LocalTalk’s 230Kbit maximum speed, whereas a StarController switches a single 230Kbit link between ports. Also, because the LocalSwitch narrowcasts its packets, it provides greater security from network snoops. However, a 16-port LocalSwitch ($5495) costs about twice as much per port as a StarController ($1295). You can connect LocalSwitches to each other—to form larger networks—without routers, or through routers you can connect LocalSwitches to other networks such as Ethernet. The StarController and the LocalSwitch include network-management software.

Both companies are located in Emeryville, California, Farallon at 415/596-9000, and Tribe Computer Works at 415/547-3874.—D.L.

Look Who’s Talking Now

In March, On Technology shipped a group calendar and meeting scheduler called Meeting Maker. Now it’s preparing a tool that—let’s hope—makes meetings obsolete.

Instant Update is like an electronic whiteboard that you can check when you have a spare moment, or like an E-mail system that files messages for everyone on a network in one big document, instead of as a series of separate notes, and provides each person with a different view of the master file. For example, several medical researchers might collaborate on writing an article. As each one completes an experiment or a statistical analysis, he or she adds the results to the master file. The next researcher to open that file can click on a button to update his or her version of the file.

The only comparable product on the Mac is Information Research’s Syzygy, but Syzygy requires everyone to work on a file at the same time. Unlike Instant Update, Syzygy works via modem (On Technology’s product will add this capability later) and provides draw and paint tools. Instant Update can create tables and can search for text by its contents and by who wrote it.

The program will list for $495 for two users and $995 for five users. For (continues)
TO HEAR PEOPLE TALK, NOTHING STACKS UP TO BERNOULLI TECHNOLOGY.

A lot of people have had something to say about Bernoulli Technology® lately. Probably because this unique technology makes Bernoulli® removable-disk drives so much more than other removable storage systems. More reliable. More powerful. More transportable. In short, more of what you need in a removable-disk drive.

A word about Bernoulli Technology.
Crash-resistant—that’s the key to Bernoulli Technology. Bernoulli was designed from the ground up to protect your data from the rigors of removability.

Bernoulli’s sophisticated aerodynamics create an air flow, causing the flexible disk to fly up to within 1/100,000 of an inch of the read/write head without touching it (fig. 1). As the disk flies at high speed, it becomes rigid, giving you hard-disk-like performance. If the air flow is interrupted by a jolt, power surge, dust—you name it—the media simply falls away from the read/write head (fig. 2). No contact. No head crash.

Bernoulli’s removable data disks take care of your data as well. In fact, they’re so rugged that they can withstand an 8-foot drop to a hard surface (let alone a trip in your briefcase or the mall).

A word to the wise.
Consider—because all removable-disk drives are not the same. And the more you value your data, the more you should weigh the differences. From company service and support to system software, right down to the technology itself.

Call 1-800-777-3057.

Discover why people are talking about Bernoulli. Call for a free brochure. Then maybe you’ll have a few choice words for Bernoulli yourself.
Type of Computer Used by Child/Student at School

<table>
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<th>Percentage of respondents</th>
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<tr>
<td><strong>Apple II</strong></td>
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<tr>
<td><strong>Macintoshes</strong></td>
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<td><strong>IBM or compatible</strong></td>
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<tr>
<td><strong>Other computer</strong></td>
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<tr>
<td><strong>None</strong></td>
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<tr>
<td><strong>No answer</strong></td>
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Total is over 100% because multiple responses were allowed.

The most common computer in grades K-12 is still the Apple II, with the Macintosh placing a strong second. Low-cost Macs have made respectable inroads since their October debut.

Survey: Macs in Education

This month's reader survey covers the use of Macintoshes and other personal computers in grades K-12. Among respondents, 35 percent are parents, 4 percent are teachers, and 7 percent are both parents and teachers. The Apple II dominates in schools: 72 percent of responding readers who are parents or teachers say that their children and/or students use the older Apple family of computers. The Macintosh comes in second, with 42 percent of the parents/teachers citing the Mac. IBM PCs and compatible systems are mentioned by 28 percent, Commodore systems by 5 percent, and Atari systems by 1 percent. Other computers are reported by 4 percent. Only 8 percent of the parents/teachers say that their schools have no computers. The figures add up to more than 100 percent because of multiple responses.

Although the Mac SE is mentioned by 19 percent of parents/teachers and the Plus by 19 percent, the newer low-cost Macs are already appearing in schools in fairly significant numbers. The Classic is cited by 5 percent of readers, the LC by 4 percent, and the IIci by 4 percent. Other Macs account for 3 percent.

The age breakdown for children or students who use Macs is 10 percent in kindergarten, 20 percent in grades 1 to 3, 24 percent in grades 4 to 6, 19 percent in grades 7 to 9, and 24 percent in grades 10 to 12.

The most-mentioned application is games/entertainment, cited by 63 percent of parents/teachers. Word processing is second at 62 percent, while course-specific software is third at 47 percent. Databases and music follow at 16 percent and 14 percent, respectively. Other applications are cited by 17 percent of responding parents/teachers.

When asked the main advantage of having computers in the classroom, 35 percent of all responding readers say making learning fun, 31 percent say improved problem-solving skills, and 13 percent cite gaining job skills. —T.M.

Aldus Opens Up PageMaker

Aldus is developing two sets of tools for modifying PageMaker. One is an English-like scripting language for controlling PageMaker, and the other is Aldus Additions, an interface that enables programmers to write external applications that plug into PageMaker.

The scripting language will be able to automate executing any PageMaker command, for performing such tasks as extensive formatting of imported text and pasting up pages. Users will be able to script a task in text mode while inside PageMaker and then have PageMaker execute the script, similar to running a script in HyperCard. A later version of an Aldus Addition will provide more advanced procedural commands as well.

The Aldus announcement is clearly a response to Quark's Xtensions, a set of programming tools for writing custom plug-ins for QuarkXPress. Third-party developers and Quark have published numerous Xtensions, but Aldus would not say whether it plans to publish Aldus Additions or leave the market strictly to outside developers.

At press time, Aldus had not established pricing or a release date for either piece, but expects to complete the programming interface first. For more information, contact Aldus at 206/622-5500. —Luis Camus

Further information call On Technology in Cambridge, Massachusetts, at 617/876-0900. —D.L.

Virus Watch

Current viruses, Trojan horses, and worms affecting the Macintosh community.

**HC**

Type: Data virus
First listed in Virus Watch: 6/91
Info: Infects HyperCard stacks.
Impact: Causes the Mac to hum oddly. At press time Macworld did not know if HC is destructive.

**nCAM**

Type: Virus
First listed in Virus Watch: 5/91
Info: An nVIR clone.
Impact: Nondestructive; infects applications and system files; can cause crashes.

**MDEF D**

Type: Virus
First listed in Virus Watch: 5/91
Info: Infects applications and system files.
Impact: Nondestructive; can cause crashes.
COMPUTER BUSINESS TODAY
AN 8-PART SPECIAL EDITION

In Today's tough competitive corporate climate timely technology decisions can have a profound effect on a corporation's performance capabilities, at every level.

"Computer Business Today" is a fast-paced special edition of Business Today whose format is strictly application-oriented "Hands On" information, with the end user in mind.

An Elite assembly of the industry's state-of-the-art products will be showcased each week beginning May 12. Pictured below is a representative window to a range of technologies featured that harness the impact of computer technology to create and solve task-specific applications from Color Presentations to Connectivity -- solutions that today's marketplace demands.

The SMART-UPS 600 by American Power Conversion -- providing complete power protection for high performance file-servers and critical workstations.

VarColor Publishing System by Varityper -- An integrated, low cost, color image processing system that allows users to combine high fidelity color and high productivity from a desktop solution.

"Bemoullı Box" Transportable drive by Iomega -- featuring a removable 44MB data cartridge. Delivering the speed and reliability of hard disks combined with the flexibility, security and unlimited storage capacity of removable media.

Xicom's external Pocket LAN Adapters available for Ethernet, Token Ring and ARINCet, have set a new standard for convenience in laptop to LAN connectivity, by eliminating the need for an internal card.

HP PaintWriter by Hewlett-Packard for the Macintosh -- with the power and versatility to create high-quality, bolder, brighter colors.

OkiTax 600 and 650 with memory by OkiData -- fully-featured machines, offering high image-quality and reliability at very affordable prices.

"Computer Business Today", For People who use computers. Tuesday evenings, Friday and Sunday mornings. Check your local listings for time and channel information.
Tomorrow's Upgrade For Your Mac Is Only $59*

A MacWarehouse Expansion Kit will dramatically increase the power of your Mac. And our fast, reliable overnight service will have your Kit in your hands tomorrow!

MORE BRAIN POWER FOR YOUR MAC

Never again will you have to quit your word processor just to answer a question about a spreadsheet. Install extra memory and you can leave your letter open while you refer to last month's sales figures. You can edit those monstrous scanner files with advanced graphics applications or develop your own custom HyperCard stacks. More memory means more power at your fingertips.

PLUG IN INSTALLATION

Adding memory doesn't require technicians in lab coats. Just open your Mac, slide out the main circuit board and plug in your SIMMs. Our FREE video will give you step-by-step installation instructions. Every type of Mac is covered and we think we've made it a breeze.

WHAT DO I NEED?

Our helpful sales and technical staff is standing by to answer any questions and take the mystery out of memory upgrades. Memory cards come with one megabyte on each card and are usually sold in pairs - (2 x $59 ea.).

TO OPEN YOUR MAC PLUS OR SE, YOU'LL NEED A SPECIALLY DESIGNED TOOL - IT'S AVAILABLE FROM US AS PART OF A HANDY TOOL KIT FOR JUST $9.

WHAT YOU NEED TO KNOW

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

Prices can vary a lot, based on quality, speed and demand. At press time our price for 1MB, 100ns SIMMs is $59. Please call for the very latest prices and availability. Our sales staff will tell you what you need and help you make your choice an easy one.

OVERNIGHT DELIVERY

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

1-800-255-6227

Call toll-free Twenty-four hours a day, seven days a week.

WHAT YOU NEED TO KNOW

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

Prices can vary a lot, based on quality, speed and demand. At press time our price for 1MB, 100ns SIMMs is $59. Please call for the very latest prices and availability. Our sales staff will tell you what you need and help you make your choice an easy one.

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

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AH, TECHNOLOGY—HOW IT MARCHES. Should all the talk about new Macintoshes and System 7.0 leave you feeling slightly trod upon, don't despair. No matter which Mac you own, there are upgrade options available that let you move to a higher class of performance. Deciding to upgrade is easy; figuring out how to upgrade isn't. If anything, that process is even more complicated now, thanks to Apple's introduction of the Mac Classic, LC, and IIx. Not only can you choose from traditional approaches to upgrading—system upgrades, memory, and accelerators—but you also must consider if the best upgrade might be just to buy another Mac. To give you a better idea of the options, I'll discuss three types of upgrades for Macs from the Plus up: system upgrades, memory upgrades, and accelerators.

A system upgrade gives a Mac new capabilities—whether the upgrade be a floppy drive, a SCSI port, color support, or a logic board. And depending on the features offered, system upgrades range widely in price and complexity. The most important thing

by Brita Meng
latest in upgrades
to do before buying a system upgrade is to make sure that your Mac can support the features the upgrade offers.

Quite often, compatibility depends on whether the Mac has the appropriate read-only memory (ROM) chips for the upgrade. Sitting there on a Mac logic board, ROM chips look pretty nondescript. But don't be fooled—they contain information necessary for a Mac to function.

Different Macs use different ROMs. For example, all Mac ROMs include QuickDraw—the routines a Mac uses to display information on screen. But only Mac LC, IIsi, IICI, and IIx ROMs have 32-bit Color QuickDraw built in. To make things even more confusing, even if different Macs have the same size ROMs, it doesn't mean the ROMs are identical. And sometimes the same Mac model can have two different versions of ROMs. (The first Mac II ROMs had problems recognizing add-in memory boards.)

ROMs also determine what kind of floppy drive you can install in a Mac, and whether the Mac can access a SCSI device. To use an 800K floppy drive or an external hard drive, a Mac must have at least 128K ROMs (the Mac Plus ROMs). Similarly, the ROMs in the Plus, II, and some SEs don't support an internal SuperDrive.

Mac SE and II owners can install a SuperDrive by purchasing a FDHD upgrade kit from Apple. The kit includes an internal SuperDrive as well as the ROMs required to recognize it. If you own a Plus, or if you want an external drive for your SE or II, you can opt for a floppy drive from PLI or Kennect Technology. Both companies offer external high-capacity 1-4MB floppy drives with capabilities similar to those of the SuperDrive.

ROMs can also limit the type and amount of RAM a Mac can use to run applications. Because some ROMs run only in 24-bit mode, they can't take advantage of all the RAM that you can install in a 32-bit, 68030-based Mac. In addition, the ROMs in a Mac determine whether you can take advantage of System 7's virtual memory feature (see "Coping with Virtual Memory").

Logically Speaking
If you want to upgrade more than just a floppy drive, you should consider an Apple logic board upgrade. With Apple's logic board upgrades, you swap the current main logic board in a Mac for a totally new one, thus giving the Mac a complete personality change. Four Macs can take advantage of these upgrades—the SE, the IICl, the II, and the IIx.

Apple's Macintosh SE/30 Logic Board Upgrade ($1699) replaces the main logic board of

### ABOUT YOUR MAC

<table>
<thead>
<tr>
<th></th>
<th>Plus</th>
<th>SE</th>
<th>Classic</th>
<th>SE/30</th>
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<tbody>
<tr>
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<td>8MHz 68000</td>
<td>8MHz 68000</td>
<td>16MHz 68030</td>
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<tr>
<td>Math coprocessor</td>
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<td>Memory management unit</td>
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<td>ROM capacity/expandable</td>
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<td>ROM SCSI support</td>
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<tr>
<td>ROM QuickDraw</td>
<td>b &amp; w</td>
<td>b &amp; w</td>
<td>b &amp; w</td>
<td>color</td>
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<tr>
<td>ROM 32-bit memory addressing</td>
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<tr>
<td>Built-in video support</td>
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<tr>
<td>Floppy drive</td>
<td>800K</td>
<td>SuperDrive</td>
<td>SuperDrive</td>
<td>SuperDrive</td>
</tr>
<tr>
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<td>one SE</td>
<td>SuperDrive</td>
<td>none O30</td>
</tr>
</tbody>
</table>

## COPING WITH VIRTUAL MEMORY

Virtual memory allows the Mac to treat part of a hard drive as RAM. Previously, it was thought that all you needed to take advantage of the virtual memory in System 7 was either a 68020 microprocessor and 68851 Paged Memory Management Unit (PMMU), or a 68030 microprocessor. But that's not necessarily so. Because of Apple's implementation, System 7 requires firmware routines that are not present in the ROMs of 68000-based machines and cannot be added with a software patch. As a result, Mac Plus, SE, Classic, and Portable computers that have been upgraded with 68030 accelerator boards can run System 7, but can't use virtual memory. It's possible that some accelerators could be modified to run virtual memory, but that's the responsibility of the board vendor, not Apple.

Connectix Corporation, developer of the Virtual utility, says it will update Virtual for compatibility with System 7. Until then, however, if you own a 68000-based Mac, and you must have virtual memory, you're better off sticking to System 6 and running Virtual.

If your Mac supports virtual memory, and you intend to use it, plan to have at least 4MB of RAM. Although System 7 runs on 2MB systems, using virtual memory on a 2MB system degrades performance significantly. The Mac must go to the hard drive—a process called paging—to retrieve information that's typically in RAM. Because a hard drive has a slower access time than RAM does, paging isn't efficient and it reduces performance.
Coprocessor Considerations

Depending on the Mac, you may be able to improve or enhance its performance by adding a coprocessor. Floating-point units (FPUs) such as the 68881 and 68882 are coprocessors specially designed to speed math calculations. The 68882, which comes standard with the Mac IItx, IICX, Ilci, IIfx, and SE/30 is software- and hardware-compatible with the 68881 that shipped with the original Mac II. However, the 68882 is one and a half to two times faster than the 68881.

If you have a Mac II, you might consider upgrading the 68881 to gain performance. Just swap the 68881 on the Mac II logic board for the 68882. Neither the IIfx nor the Mac LC offers a coprocessor socket on the main logic board. You can add a coprocessor to the IIfx either by installing an accelerator or by installing an adapter board such as Apple's Macintosh II FX 030 Direct Slot Adapter Card. That board provides not only a connector for an 030 Direct Slot add-in board but also a 68882 FPU. PSI Integration's Bus Adapter Card for the IIfx offers an FPU socket and a cache board slot. LC owners can take advantage of accelerators or third-party boards to add FPUs too. Ethernet add-in boards from Dayna Communications and Asante Technologies include FPU sockets. MacProducts also sells a 16MHz 68882 FPU specially designed to fit in the LC.

The 68851 Paged Memory Management Unit (PMMU) is another type of coprocessor. When the PMMU is installed, a 68020-based Mac—like the Mac II—can take advantage of virtual memory. The Mac II logic board has an

---

an SE with that of an SE/30. If you have an SE with a SuperDrive (that includes those that have been upgraded with a Macintosh SE FDHD Upgrade Kit), you end up with the exact equivalent of a stock SE/30.

The Macintosh Ilci Logic Board Upgrade turns a Mac IIfx into a Mac Icl. With the Ilci, you get on-board video, a faster CPU, a cache board connection, and ROMs that include Color QuickDraw and support for 32-bit memory addressing. But at $2399, the upgrade isn't cheap; you should consider it only if you need 32-bit addressing or speed. If you opt for this upgrade, hang on to your now-spare video board; a NuBus add-in video board performs faster than the Icl's on-board video.

At $2999, Apple's Macintosh IIfx Logic Board Upgrade for the Mac II and IIfx is the best value. Install it and you end up with a top-of-the-line Mac. If you want a true IIfx, you also need to upgrade the IIfx's 800K floppy drive with Apple's Macintosh II FDHD Upgrade Kit.

The advantage of an Apple logic board upgrade is that you get a true Mac. But there are disadvantages, too. First, Apple upgrades only exist for specific Mac models. Second, there may be hidden costs; for example, if you upgrade an SE to an SE/30 and want to add an expansion board, you have to buy an SE/30 adapter because the SE's expansion slot differs from the SE/30's. And third, Apple-label upgrades are expensive. Don't opt for an Apple upgrade without checking out third-party accelerators and CPU upgrades. You may find that such upgrades offer performance improvements identical to or even better than the improvements you'll get from Apple upgrades.

Apple's Macintosh IIfx Logic Board Upgrade for the Mac II and IIfx is the best value
Keeping current

empty socket where you plug in the 68851. The LC, which is also 68020-based, has no such socket.

Macs based on the 68030 do not require a separate PMMU because the 68851 circuitry is built into the 68030. And if you’re lucky enough to get your hands on a 68040-based accelerator, you don’t even need to worry about the FPU. The 68040 has both 68851 PMMU and 68882 FPU circuitry built in.

Of Accelerators and Speed

A Mac that needs an overall performance boost is the perfect candidate for an accelerator or CPU upgrade. Most accelerators work with the Plus, SE, II, and IIfx. Because the accelerators clip on the CPU socket on the Mac’s main logic board, you should make sure that the accelerator is securely installed. Should it become unseated, it may short out the main logic board. Environmental conditions—high internal temperatures, humidity, and pollution—can also cause corrosion in the contacts between the clip-on upgrade and the CPU. To prevent problems, you should have a dealer solder the upgrade to the CPU. It’s not pretty and it’s permanent, but at least the accelerator won’t come loose.

Processors currently available on accelerators range from a 16MHz 68000 to a 25MHz 68040. A 68040-based accelerator offers better performance, but it’s also much more expensive. For example, Brainstorm Products’ Brainstorm Accelerator—which uses a 16MHz 68000—costs $249. The 68040-based accelerators range around $5000.

Whenever you buy an accelerator, you should ask about compatibility with other Mac enhancements. This is especially important in Macs where space is at a premium—the Plus, SE, and Classic. Also keep in mind that accelerators that use the same CPU don’t necessarily offer identical performance gains. Besides processor speed, other factors that affect performance include the presence of on-board memory or cache memory. For more information on 68030 accelerators, see “The Accelerated Course,” in this issue.

Another way to squeeze performance from a Mac without squeezing your wallet is to add a cache board. According to our tests, a cache board for the IIfi can improve performance by 27 percent (see “The Accelerated Course”). Most cache boards work with the IIfi, which has a specially designed slot for them. However, Dove Computer’s Marathon Racer and Orchid Technology’s MacSprint II work on the II. Even IIfi owners can get into the act with PSI Integration’s Bus Adapter Card, which has a cache board option.

Memory Configurations

<table>
<thead>
<tr>
<th>Macintosh RAM Model</th>
<th>Maximum RAM You Can Install</th>
<th>Minimum Required Speed for RAM (in ns)</th>
<th>Possible SIMM Combinations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plus, SE</td>
<td>4MB</td>
<td>150</td>
<td>two 256K SIMMs</td>
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<td>four 256K SIMMs</td>
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<td>one 1MB SIMMs</td>
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<td>four 1MB SIMMs</td>
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<td>120</td>
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SIMMple Pleasures

A memory upgrade is the cheapest way to enhance Mac performance, especially if you're tired of getting dialog boxes saying "Out of Memory" or "Application Unexpectedly Quit." As always, the upgrade options available depend on the Mac you own. In addition, the upgrade you buy may affect your upgrade options in the future.

Most Macs use what's called a Single Inline Memory Module, or SIMM, for memory expansion. A SIMM is actually a small circuit board with dynamic random-access memory (DRAM) chips soldered to it. The exceptions are the Mac 128K, 512K, and 512KE, which have memory chips soldered to the main logic board, and the Mac Portable, which requires special low-power memory called static random-access memory (SRAM). The Classic, LC, and 111 have memory soldered to the main logic board, but you still use SIMMs to add memory.

The type of chips on a SIMM determines SIMM capacity. There are 256-kilobit chips on a 256K SIMM, 1-megabit chips on a 1MB SIMM, and so on. Currently, five types of SIMMs are available—256K, 1MB, 2MB, 4MB, and 16MB.

You may see a SIMM's size expressed as a particular capacity followed by an x and a number. That number indicates how many chips there are on the SIMM module. For example, "1MB x 8" means there are eight 1MB chips on the SIMM. Other SIMMs may have only two RAM chips. If you spot these SIMMs, don't panic. The Mac accesses RAM data 8 bits at a time, or in bytes. Because each of those RAM chips contains 4 bits of each byte, instead of just 1 bit, only 2 chips are necessary. The bottom line is that you shouldn't worry about how many chips are on a SIMM.

You may have also heard about parity SIMMs. Common in the IBM PC market, parity SIMMs contain an extra parity chip for error checking and correction. Only the IIci and IIIfx have the parity-checking capability to take advantage of such SIMMs. You can use parity SIMMs in other Macs, but because they're more expensive, you might as well buy regular SIMMs.

The speed of the chips also determines how fast the Mac's CPU can retrieve information from memory. The lower the SIMM speed number, the faster the SIMM is. And the faster the CPU is, the faster SIMM it needs. You can usually determine the SIMM speed by looking at the chips on the SIMM. You'll see a part number, a dash, and then more numbers. Multiply the numbers after the dash by 10 to get the speed. For ex-
ample, if an 8 follows the dash, then you’ve got an 80-nanosecond SIMM.

As long as your SIMMs are equal to or faster than the recommended speed for your Mac, they’ll work fine (see “Memory Configurations”). There’s no problem with installing SIMMs that are faster than the Mac needs; in fact, most companies currently sell only 100ns and 80ns SIMMs. If you put 80ns SIMMs in a Mac SE, the SE continues to access memory at 150ns, even if the SIMMs can go faster.

SIMMs come in different profiles, or heights, due to the type of RAM chip soldered to the module. Low-profile SIMMs use surface-mount chips; the leads of the chip are soldered directly to the board. High-profile SIMMs use Dual In-line Package (DIP) chips; the leads are soldered into holes on the SIMM board.

Make sure to buy low-profile SIMMs. Because of their height, high-profile SIMMs may interfere with future expansion. For example, high-profile SIMMs may block the expansion slot in an SE. In a Mac II or IIfx, they may prevent you from adding a full-height hard drive. High-profile SIMMs may also block the air circulation around the main Mac logic board, causing heat problems in Macs without internal fans. (For a complete list of memory vendors, see Where to Buy, under Memory Upgrades.)

SIMM Tips

Although all Macs can accommodate 1MB SIMMs, whether you can use other SIMM sizes depends on your Mac. Only the LC and IIfx can use the newer 2MB SIMMs. The smallest SIMM that can be used in a IIfx is a 1MB SIMM. And you cannot use 4MB SIMMs in a Plus, SE, or Classic (for more information on SIMM configurations see “Memory Configurations”).

Getting the Mac II and IIfx to use 4MB SIMMs is a bit complicated. The original Mac II ROMs cannot recognize 4MB SIMMs; if you install them, the Mac crashes during start-up. The solution to this problem is to upgrade the ROMs using Apple’s Macintosh II FDHD Upgrade Kit. But that’s not all: for 4MB SIMMs to work in a IIfx and an upgraded II, an extra programmable array logic (PAL) chip is necessary on each SIMM board. So before you buy 4MB SIMMs for a II or IIfx, make sure to ask the memory vendor if the SIMMs are compatible.

With a Plus, SE, or LC, you must upgrade SIMMs two at a time. That’s because the CPUs in those machines have a 16-bit data path; in other words, they access memory 16 bits at a time. (Remember, each SIMM provides only 8 bits, or 1 byte, of data.) All the other Macs—except the Classic—require that you upgrade SIMMs four at a time, because they have a 32-bit data path. The Classic has no SIMM sockets on its main logic board; you add memory with a special memory-expansion board.

One way to reuse old SIMMs is with a memory-carrier board. These boards, available from vendors such as Computer Care, MacProducts USA, Peripheral Outlet, or Total Systems (see “Compact Mac Upgrades”). Such upgrades either bring the Mac to Plus levels for less or provide functionality beyond the Plus. For example, Peripheral Outlet offers a 128K-to-Plus equivalent for $695 and a 512K-to-Plus equivalent for $625. Computer Care’s MacRescue Video board provides six SIMM sockets, a SCSI port, and a large-screen video interface for a 512KE. And the Gemini series of upgrades from Total Systems allows you to upgrade the CPU in those Macs to a 68030, same as in the SE/30 and IIfx.

FOR 128K, 512K, AND 512KE MAC OWNERS

No doubt about it, Mac 128K, 512K, and 512KE computers are the most affected by Apple’s introduction of the Mac Classic, LC, and IIfx. Before, the best strategy for upgrading a compact Mac was to turn it into a Mac Plus, via either Apple’s Macintosh Plus Logic Board Upgrade or an equivalent third-party upgrade. Nowadays, however, such upgrades may cost more than buying a new Mac.

For instance, to bring a Mac 512K up to Plus level using Apple’s upgrade path, you spend nearly $900. Upgrading a Mac 128K costs a whopping $1099—that’s more than the price of a Mac Classic. The outlook is brighter for 512KE Macs because those computers already have 128K ROMs. As a result, they cost less to upgrade to Plus levels.

If you can’t bear to part with your compact Mac—or can’t afford to—your best option is to buy a third-party upgrade from companies such as Computer Care, MacProducts USA, Peripheral Outlet, or Total Systems (see “Compact Mac Upgrades”). Such upgrades either bring the Mac to Plus levels for less or provide functionality beyond the Plus. For example, Peripheral Outlet offers a 128K-to-Plus equivalent for $695 and a 512K-to-Plus equivalent for $625. Computer Care’s MacRescue Video board provides six SIMM sockets, a SCSI port, and a large-screen video interface for a 512KE. And the Gemini series of upgrades from Total Systems allows you to upgrade the CPU in those Macs to a 68030, same as in the SE/30 and IIfx.
There are three ways to rid the Mac of that 8MB cap. The first is to use System 7, a 32-bit operating system. However, to take advantage of System 7's 32-bit capabilities, the Mac must also have 32-bit ROMs. Macs that satisfy this requirement—and can thus use System 7's 32-bit addressing option—include the IICl, IIfx, LC, and IIsi. Although the SE/30, II, IIfx, and IICl have 32-bit processors, their ROMs do not support 32-bit addressing. The ROMs in the Plus, Classic, SE, and Portable are moot points, since those Macs are limited by 68000 CPUs.

The second and third options do not require a system software upgrade, but do require some hardware. If you have a Mac SE/30, II (with 68851 PMMU), IIfx, IICl, or IIsi, you can use Connectix's Maxima software utility to rid them of the 8MB limit. Maxima—which runs under System 6.0.X—allows the Mac to recognize up to 144MB of RAM. Any other physical RAM beyond that becomes a RAM disk (a portion of memory that acts like a hard drive).

Two other utilities from Connectix, Optima/32 and Optima/128, allow owners of Macs with 32-bit clean ROMs to take advantage of even more memory under System 6.0.X. On Macs with enough physical memory, Optima/32 creates up to 32MB of application memory; Optima/128 allows you to use up to 128MB of RAM for running applications. Beware, however: the applications you run under Optima must—like the ROMs—be 32-bit clean.

**Think Long Term**

An upgrade is a long-term investment in a Mac. And you should take the same care in buying any upgrade that you did when you bought the Mac. Don't buy strictly on price—especially as far as SIMMs are concerned. Talk to other users to find out more about products. Check the vendor's reputation, support, and warranty.

Once you decide on an upgrade, there are installation issues to consider. Be aware that installing any upgrade yourself voids the Apple warranty. In addition, installing some upgrades yourself may void their warranties. So despite people telling you that installation is a piece of cake, if you're slightly nervous or unsure, don't do it yourself. Most upgrade vendors can give you names of dealers or certified installers in your area; often, the vendors will install the upgrade for a small fee.

No Mac is a dead end. With the right upgrade, you'll be better able to keep pace with the march of technology.

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**Don't buy an upgrade strictly on price—especially as far as SIMMs are concerned**

See Where to Buy, under Upgrades, for contact information.
These recommended drives offer great performance and value. From top to bottom: Storage Dimensions MacinStor 1020-SI, GCC UltraDrive 430S, FWB hammer1000, Liberty Systems Stealth 4250, and MicroNet SB-303NP.
Like the good Boy Scout I never was, I believe in planning ahead and being prepared. Thus, about two years ago, I purchased a 300MB hard drive, despite the fact that my files could little more than half fill an 80MB drive at the time. For quite a while, files and folders floated effortlessly within a universe of empty disk space; I smiled each time I saw the “250,000K available” message in the corner of the disk drive window. Today, of course, I no longer have the same smug smile on my face. My hard drive is nearly full; the time has come to purchase another high-capacity hard drive. But my, how times have changed.

Two years ago, there were only a handful of drives to choose from, drives in excess of 300MB were especially rare, almost all large-capacity drives were big and clunky, and prices were, well, up there. Today, however, you can pick from more than 100 hard drives ranging from 300MB to over 2 gigabytes. Some are almost as small as a Walkman tape player. And prices, though still considerable, are not nearly so painful. To help you choose from such an embarrassment of riches, we review high-capacity external hard drives 300MB and larger on the following pages. Macworld Lab analyzed 66 such hard drives for speed and noise, while I looked at a number of other important fea-

BY ROBERT C. ECKHARDT
Recommended 600MB drives include the MacProducts USA MagicDrive 600, the Ehman 660MB F/H Wren Runner, the PLI PL635 Turbo, and the HDI PowerDrive 600I.

butions for these and other qualifying drives. Apart from the ever-increasing number of drives and their still-decreasing prices, the highlights of this year’s roundup include better Macintosh compatibility and a record-low failure rate (only 1 percent of drives received were dead on arrival, compared with 4 percent last year). We identified a number of favorites, too, but I’m getting ahead of myself.

Shop Talk
Generally speaking, I prefer to think of a piece of electronic equipment as a black box—what matters is whether it performs as it is supposed to. But because the company you purchase a drive from does not make the drive mechanism itself, and because the drive mechanism is the single most important part of the package, hard drives are an important exception to my black box rule.

A hard drive is nothing more than a drive mechanism and a bunch of other, largely lesser stuff. The drive mechanism comprises two parts: a stack of spinning platters with a series of nervous read-write heads sandwiched in between, all sealed in a metal box; and a circuit board specially designed to transfer data between the read-write heads and the drive’s SCSI port. The hard drive vendor surrounds the mechanism with a power supply, perhaps a fan, a few dials and switches, some wires, one or two blinking lights, and a box with a pair of SCSI connectors. Not surprisingly, then, it is the mechanism that by and large determines a drive’s most important characteristics—capacity and speed—although the software supplied by the vendor can affect both of these attributes to a degree.

The 25 vendors whose drives we tested purchase their mechanisms from 8 sources: Fujitsu, Hitachi, Hewlett-Packard, Maxtor, Micropolis, Quantum, Seagate, and Western Digital (which, in turn, buys some of its drive mechanisms from IBM). By far the most popular source is Seagate; about 75 percent of all high-capacity drives contain Seagate mechanisms. Most vendors use only one mechanism for a given hard drive model; a few, such as Microtech International and Rodline Systems, may use different drive mechanisms at different times. The mechanisms used in the drives we tested are listed in both hard drive speed tests.

As for drives other than the ones we tested, occasionally the name Imprimis (a subdivision of Control Data Corporation purchased by Seagate in 1989) or Wren (one of Seagate’s several product lines) appears in a hard drive’s model name, indicating that the mechanism inside is from Seagate. Model name suffixes such as I (for Imprimis) and WD (for Western Digital) occasionally appear as well. Otherwise, overt clues to a drive mechanism’s make and model are rare. Most hard drive vendors will tell you if you ask, however (or you can use the utility SCSI Evaluator, as we did); of the vendors that submitted drives for testing, for example, only Optima refused to disclose the sources of its drive mechanisms.

Is Bigger Really Better?
The first consideration in any hard drive purchase is capacity. A good rule of thumb is to buy a drive large enough to fulfill your needs for the next year or two. Don’t go hog-wild and buy the largest drive available (unless you really need the capacity), thinking it will last until you retire. Hard drives do wear out, and more important, the additional capacity you’ll need in two years’ time should be much less expensive then than it is now.

If you’re a mere mortal who has outgrown a 40MB or 80MB hard drive faster than expected, you should find drives in either the 330MB or 410MB ranges more than adequate. Graphic artists, desktop publishers, multimedia types, and others who work with large numbers of large files will probably be more comfortable with drives in at least the 600MB range. If you’re a network manager, you should probably consider drives with 660MB and above.

Although it’s common practice to infer a drive’s capacity from its model number, this is not an accurate way to size up a drive. True, the model number and the formatted capacity are often close, and in many instances the difference between the two is a matter of only a few percent. Sometimes the discrepancy is in your favor, as with the La Cie ZFP+ 640MB, which formats to 645.7MB; sometimes it’s not, as with the La Cie ZFP+ 600MB, which formats to 584.7MB. Occasionally, however, the formatted capacity is significantly different from what you would expect. DJK Development’s MS-410, for example, formats to 345.8MB.
**SCSI—The Harder Part of Hardware**

All large-capacity drives for the Macintosh are SCSI devices, which attach—via a (usually very short) SCSI cable supplied with the drive—to the Mac's SCSI connector. The SCSI connectors on the drives themselves (there are two, so you can create a chain of SCSI devices) are either 25-pin (as on the Macintosh) or 50-pin. In keeping with other SCSI peripherals, such as scanners and CD ROM drives, most disk drives use 50-pin connectors. A few, including Liberty Systems' Liberty Stealth 425Q, the La Cie ZFP line, and Procom's MD320 and MD420, have 25-pin connectors. I prefer drives with 50-pin connectors; if a drive with 25-pin connectors is part of a SCSI chain, cabling is more confusing and usually requires the purchase of additional 25-to-25-pin or 25-to-50-pin cables.

Two other facts of SCSI life are termination and SCSI ID numbers. Termination refers to the need for a special resistor, called a terminator, at both the beginning and the end of a SCSI chain. In many drives the resistor is built into the internal electronics; such drives are said to be internally terminated. Internal termination can sometimes be removed by the user—with varying degrees of effort—but more often it requires the skilled hands of a technician. In many other drives, a separate terminator plug—which you attach when necessary to one of the drive's SCSI connectors—comes with the drive. The PLI drives and the Procom MD320 and MD420 allow you to turn internal termination on and off with a switch, which is a pretty convenient way to work with internally terminated drives (see "Hard Drives Compared").

If there are two or more SCSI peripherals connected to a Macintosh, SCSI rules dictate that an internally terminated drive can be attached only at the beginning or end of the chain. If your Macintosh has an internal hard drive, an internally terminated drive can be attached only at the end of the chain. Since setting up a problem-free SCSI chain often requires changing the order of the devices in the chain, the position limitations of an internally terminated drive can be a real pain in the neck. Internal termination is also a problem with the Mac IIx, which requires a special type of terminator. Internal termination is thus the least desirable of the three alternatives; avoid it whenever possible. External and switchable termination are equally acceptable; a
<table>
<thead>
<tr>
<th>HARD DRIVES COMPARED</th>
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<tr>
<td>Company</td>
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<td>APS</td>
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<td>CMS</td>
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<td>Rodime Systems</td>
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<tr>
<td>Storage</td>
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<tr>
<td>Dimensions</td>
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</tbody>
</table>

- = yes, ○ = no. 1 A = 300MB to 360MB, B = 400MB to 430MB, C = 600MB to 660MB, D = 950MB to 2GB. 2 DL = dial, DP = direct, E = external, I = internal, S = switchable, T = thumb. 3 AP = auxiliary power outlets, EP = external power-supply connector, F = external fuse, M = standard software offers mirroring, PC = SCSI bus protective circuit, S = security lock, SP = surge protection, TP = termination power indicator, UP = universal power supply. 4 PD = public domain and shareware collection. 5 Minipak 500 available.

Switch is a bit more convenient, since there's no terminator plug to lose.

In addition to proper termination, every peripheral on a SCSI chain must have an ID number from 0 to 6 (the Macintosh itself is always 7), and no two peripherals can have the same number. You can set the SCSI ID number with a thumb switch or a rotary dial, a DIP switch, jumpers (metal prongs that are either capped with a plastic sleeve or uncapped), or through software. Switches are the most convenient, and fortunately they are found on most of the large-capacity drives reviewed here. You can override the SCSI ID setting with the utility software provided in some drives, including those from Canel and MacProducts, but the confusion this
can cause to the unknowing or forgetful is probably more hassle than it's worth.

Driving the Speed Limit

One of the great joys of large-capacity hard drives is that they're so much faster than their smaller relatives. The speed of a drive can be objectively measured in a variety of ways (see “Hard Drive Speed Tests 300MB—950MB” and “Hard Drive Speed Tests 1GB and Up”). Data-transfer rates, which Macworld Lab measured with the test program SCSI Evaluator, indicate the speed with which data can be written to or read from the drive.

Since both seek time and transfer rates assume ideal conditions rarely seen in the real world, Macworld Lab also conducted a number of tests involving the opening, saving, and duplicating of large and small files and the compiling of computer code (which requires both reading and writing of data). The real-world test results are combined with the other two measures to produce an overall speed index for each drive. For convenience, we divided the tested drives into two large groups—drives between 300MB and 950MB and drives 1GB and up—and calculated the various indexes for the two separately. (For technical reasons, seek times were not available for drives 1GB and up.)

The speed of all the drives we tested is so great that they can easily outrun the ability of a Macintosh Plus to process the incoming information. With the exception of EMac's Metro drives (which use Maxtor XT mechanisms) and PLI's PL320 WD Turbo (which is the only tested drive that uses a Western Digital mechanism), all tested drives can also outrun a Macintosh SE or a Classic. Although few Plus and SE owners are likely to want drives above 300MB, those who do can assume that all but the three mentioned above will perform faster than the SCSI-transfer speeds such Macs allow.

When used with members of the Macintosh II family, on the other hand, not all large-capacity drives are equally fleet-footed. Among drives smaller than 950MB, the consistently fastest drives are those in the 600MB range based on the Seagate ST-476 mechanism, those in the 330MB range based on the half-height Seagate ST-215 mechanism, and those in the 600MB range based on the Seagate ST-472 mechanism, and all the drives in the 410MB range (based on either the Seagate ST-2502 or the Quantum PD-425S).

At the bottom of the speed scale—joining the especially slow EMac Metros and the PLI PL320 WD Turbo—are a number of drives in the 330MB range, including those based on Seagate ST-450, ST-476, and ST-485 mechanisms and several Micropolis mechanisms. Aside from the EMac Metro 670, the few drives over 400MB that we

### Driving the Speed Limit

**Drives 300MB—950MB**

<table>
<thead>
<tr>
<th>Drive Model</th>
<th>Decibels</th>
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<td>Mirror Technologies M595</td>
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<tr>
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<td>Liberty Systems Stealth 3250</td>
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<td>Deltic Server 320H</td>
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### Drives 1GB and Up

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<tr>
<th>Drive Model</th>
<th>Decibels</th>
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<td>La Cie ZFP + 1.2G</td>
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<td>HDS PowerDrive 1850MC</td>
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<td>Cralan 1G</td>
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<tr>
<td>Storage Dimensions MaciStor 1020-S1</td>
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<tr>
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<td>49.6</td>
</tr>
<tr>
<td>MacDirect Fujitsu 1.2GB</td>
<td>52.0</td>
</tr>
</tbody>
</table>

**Quietest drive**

- Less than twice as loud as quietest drive
- More than twice as loud as quietest drive

Drives are ranked here from quietest to loudest by their decibel level during normal operation. A decibel is a measurement of sound pressure, which is what the human ear responds to. The minimum change in sound that the human ear can detect is 3 dB. Because decibels are a logarithmic unit of measurement, if a sound increases by 10 dB, it sounds approximately twice as loud as it did before.

Each person has a different tolerance for background noise. To give you some idea of how these drives would fit into normal operating environments, a quiet bedroom has an average decibel level of 25 dB; a living room, 40 dB; and an average office, 65 dB. We found that drives measuring about 48 dB were noisy enough to be an irritation in our office environment.
found to be noticeably slow were Mirror Technologies’ M595, Rodime’s Cobra 650e, MacLand’s Imprimis 600, Storage Dimensions’ MacinStor 650-S1, and La Cie’s ZFP+ 600MB. As for 1GB-end-up drives, the majority are 1010MB drives based on a Seagate ST41200 mechanism. Since drives based on other mechanisms perform as well or better, there are no poor performers in this size range.

In overall performance ratings for both groups, two vendors in particular stand out. One is MicroNet, whose NuPort drives turn in outstanding performances (see “Giving SCSI the Runaround”). The other is FWB, whose hammer drives are always expensive and almost always exceedingly fast. The hammer600FMF, for example, is right behind the top-rated MicroNet SB-644NP. the hammer300 and 300FMF share the top spot in the 330MB range with the MicroNet SB-303NP, and the hammer1000 is hot on the heels of the two MicroNet drives at the top of the 1GB group.

**Smaller Than a Bread Box**

With one exception (Liberty Systems’ Liberty Stealth 425Q, which is black), the large-capacity hard drives are housed in platinum-color metal or plastic boxes. (Unless you tap the case with your finger, metal and plastic boxes are more or less indistinguishable from each other.) In general, the hard drive housings come in one of three standard shapes. The most common shape, known as the zero footprint design because it doesn’t take up desktop space, lies flat and measures about 10 inches square. The one major variable in this design is height, which varies from a sleek 2½-inch-high pizza box (in the APS 425 and FWB’s hammer300, for example) to a stately 5-inch-high hat box (in CMS’s Platinum line). Sleek or stately, these drives tuck neatly beneath a compact Mac or atop a IIci or Ilex.

The shoe box design is taller, narrower, and longer than the zero footprint case. Some shoe box cases (as in Storage Dimensions’ MacinStor drives) are slightly less than 6 inches high and fit inconspicuously beside a Mac II. Others, like the APS 330 Runner and MicroNet’s SB-303NP and SB-330 (despite their relatively small capacity), are an inch or two taller and don’t seem to fit anywhere very conveniently.

Finally, there’s the small-and-thin design, available in flat or upright orientations. The flat version looks like an oversize modem. The upright version (such as Liberty’s exceptionally small Stealth 425Q) sits like a book balanced on its spine; although it requires very little desk space, the case with which it can be tipped over makes me nervous. Whichever drive you choose, make sure its size and shape match the place you want to put it. A few drives (including those from EMac and Optima Technology) have movable feet that give you two orientations (flat and upright) for the price of one; like the Liberty Stealth 425-Q, however, most of these drives seem too tippy when placed upright.

Few high-capacity drives are likely to win any beauty contests. By far the ugliest are those in which the black metal faceplate of the drive mechanism lies exposed—IBM style—in the front of the case. (Offenders include drives from APS, Crane! MacProducts, Mirror, and Relax.) The best-looking ones, those that best match the design of the Mac itself, include the drives from Cutting Edge, Ehman, FWB, GCC, Liberty, MicroNet, Rodime, and Storage Dimensions. But even if good looks don’t interest you, beware of shoddy construction. A gap between the top of the faceplate and the top of the case in Relax’s Vista 600 and MacProducts’ MagicDrive 600 is not only unsightly, but also an obvious place for dust and dirt to enter. Another problem in some drives (including those from Crane! Ehman, and Relax) is a poorly constructed back panel that bends when you attach or remove cables.

Most drives have two LED indicator lights, one for power and the other for drive activity; a few, including drives from CMS, Crane!, La Cie, and PLI, have an activity light only. In general, I recommend two-light models, since a power light is a useful reminder to turn off the drive at the end of the day. Almost all large-capacity drives contain universal power supplies that can automatically adjust to either 120- or 220-volt power (see “Hard Drives Compared”). External fuses are handy (they can save you a trip to the repair shop) and are standard equipment on about half of all large-capacity drives. Other conveniences are rare. Notable ones include the provision for an external power supply and a special termination power indicator on Optima drives, the extra power outlet on Rodime drives, and the se-
Hard Drive Speed Tests
300MB—950MB

<table>
<thead>
<tr>
<th>Color Key</th>
<th>Overall Fastest</th>
<th>Overall Slowest</th>
</tr>
</thead>
<tbody>
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<td>Fastest</td>
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<td>11%–20%</td>
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<td>Up to 10%</td>
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<td></td>
</tr>
<tr>
<td>Percent slower than fastest</td>
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</table>

The drives are listed from best overall performance (top) to worst overall performance (bottom), based on both application and SCSI Enhancer low-level tests. To determine the ranking, we indexed overall performance numbers against the fastest drive. Thus, the MicroNet SB-644NP gets a 1.00 and the slow EMac Metro 670 gets a 0.53. Index numbers are listed next to the product name.

On the application tests, we tested each drive’s ability to duplicate a large (3.2MB) file and search a database for a specific record. We also averaged the drive’s speeds for opening and saving files from several applications including PageMaker and Excel.

Mechanism Key
F = Fujitsu M2261S
H = Hitachi DH515C
HP = HP 97549T100
IBM = 0661371 (Western Digital)
M1 = Maxtor XT
M2 = Maxtor XT-8300S
MC = Micropolis
MC1 = Micropolis 1988
MC2 = Micropolis 1948
Q = Quantum FD425S
S1 = Seagate ST41600N
S2 = Seagate ST2502
S3 = Seagate ST2383
S4 = Seagate ST4325
S5 = Seagate ST4736
S6 = Seagate ST4350
S7 = Seagate ST4702
S8 = Seagate ST4766
S9 = Seagate ST4767

Overall Slowest 0.53

Patents pending. Macworld • July 1991

Security loop (for use with security cable kits) on GCC drives.

Software as well as Hardware
All the drives we tested are delivered formatted and ready to run. Some include the most current version of Macintosh system software; others require that you provide your own. All units come with a utility program that enables you to reformat the drive and reinstall the driver (the software that enables the drive to work with a Macintosh), should that be necessary. Some vendors, such as Storage Dimensions, GCC, PLI, and Rodime, produce utilities that are tailored...
specifically to their own drives and are, usually, easier to use. Other vendors include commercially available utilities such as Disk Manager Mac (HDI), Silverlining (La Cie), Disk Utility (Relax and MacDirect), and SCSI Director Professional (DJK).

Most utilities let you subdivide a drive into smaller pieces called partitions (see “Hard Drives Compared”). The Mac treats each partition as if it were a separate volume (drive)—a useful pretense, given the Finder’s current limit of about 3000 files per volume. Most utilities enable you to password-protect individual partitions, and most let you format partitions in standard Macintosh, A/UX, and other formats. Most utilities also allow you to select the interleave factor (the way sectors are numbered on a hard drive) during formatting. Until recently, this would have been essential for optimum performance with a Mac Plus, SE, or Classic. Almost all large-capacity drives now have a little gadget called a read-ahead cache, however, which toms interleave settings into the dustbin of unnecessary utility functions.

Some drives come bundled with familiar commercial utilities, such as MacTools Deluxe, SUM II, 911 Utilities, Gofer, Norton Utilities for the Macintosh, QuicKeys, and others. A few include well-known backup programs such as Redux and respected antivirus programs such as Virex. These are nice bonuses, but unless you must choose between two drives that are otherwise equal, they shouldn’t be a deciding factor. On the other hand, software features that are rare or otherwise unavailable, such as the disk-mirroring function in Storage Dimensions’ utility program (which creates a duplicate copy of your data on another hard drive), may very well override most other concerns if the feature is important to you.

You Can Look It Up
Termination, SCSI ID, interleave, drivers, and other esoterica can easily befuddle a new hard drive owner. A good manual can help explain such mysteries; unfortunately, a good manual is hard to find. Some vendors, such as Crel, MacLand, and Hard Drives International, provide either no manual at all or a manual that’s not much better than none at all. Only a few—including Cutting Edge, Ehman, GCC, Optima, and Rodime—provide manuals that are complete, comprehensible, and well organized. If you’re at all shaky concerning the ins and outs of hard drives, be sure to buy a drive with a good manual—or make friends with a power user in your local user group.

If you look it up in the manual and you still can’t figure it out, it’s useful to be able to call for help. All of the hard drive vendors offer technical support by phone, but only some of them offer a toll-free support line. Some vendors also operate or participate in an electronic bulletin board from which you can obtain answers to questions or download the most recent versions of driver or utility software. Vendors also differ in the length of their warranty (ranging from a stingy one year to a very generous five years), the availability of an optional extension, the time the company claims it takes to repair a broken drive, and whether data recovery is included in the repair.
Because I work in a quiet room at home, I also want to know how noisy a drive is. If you work in a quiet location, such as a library or an enclosed office, we recommend the drives our tests measured at 40dB or less (see “Noise Test”). If you work in a large, open office or have a Mac II system unit—and its whirring fan—sitting on your desk, drives rated at 48dB or less are not likely to have a noticeable effect on your sound environment. The drives rated at over 48dB can be heard in almost any work environment—except where typewriters are in constant use—and are not recommended.

The Final Tally

Last but not least is the question of how much all this new storage space is going to cost. In general, drives from APS, HDI, La Cie, MacLand, and Mirror tend to be the best bargains in each size range. On the opposite end of the scale, drives from Cutting Edge, FWB, MicroNet, Optima, PLI, and Rodime are usually the costliest, although street prices may, in some cases, be significantly lower than the suggested retail price.

All told, my ideal large-capacity drive would be small, fast, quiet, good looking, and inexpensive. It would have external termination, a switch or dial for changing the SCSI ID, two LEDs, a good manual, a two-year-or-longer warranty, and utility software that’s full-featured and easy to use. None of the drives we tested fit those requirements perfectly, but many come close enough to win our admiration.

For the budget-minded wanting to accept such inconveniences as internal termination, poor manuals, slightly slower speeds, and clunky cases, we recommend Mirror Technologies’ M333 ($1297), La Cie’s ZFP 320 ($1799) and ZFP 420 ($1899). DJK Development’s MS-410 ($1899), HDI’s PowerDrive 660MC ($1899) and 10501 ($2699), and MacLand’s Imprimis 1.2GB ($2599).

On the opposite extreme, for those who want the best drive possible, regardless of cost, we recommend FWB’s hammer300 ($2999), 300FMF ($3749), 660FMF ($5399), and 1000 ($5899); MicroNet’s SB-303NP ($3445), SB-644NP ($5295), SB-1288NP ($9990), and SB-1300NP ($7995); and Optima’s Concorde 1050 ($5995).

For the rest of us, those who must temper high ideals with financial restraint, we recommend Deltaic’s Server 320H ($2499) if you don’t mind the high noise level, Optima’s DisKovery 325 ($2499), Storage Dimensions’ MacinStor 325-SI ($2099), Liberty’s Stealth 425Q ($2299), GCC’s UltraDrive 430S ($2699), MacProducts’ MagicDrive 600 ($2350), Relax’s Vista 600 ($2619) and 660 - Runner ($2349), Ehman’s 660MB F/H Wren Runner ($2489), La Cie’s ZFP+ 1.2G ($4599), and Storage Dimensions’ MacinStor 1020-SI ($5099).

GIVING SCSI THE RUNAROUND

Speed test results for MicroNet’s NuPort drives are significantly better than those for almost all other drives we tested. One key to this remarkable record is that NuPort drives use superfest Seagate drive mechanisms. The other major factor is that the drives are connected to the Macintosh not through the SCSI port, as one would expect, but by means of a NuBus board supplied with the drive. By bypassing the SCSI port and its controller, the NuPort system can transfer data to the Macintosh as fast as the drive can dish it out, yielding dramatic increases in both data-transfer test results and real-world performance.

But MicroNet isn’t the only vendor that recognizes the performance bottleneck created by the Macintosh SCSI controller. Storage Dimensions has announced its Data Cannon board in both NuBus and even faster PDS (processor direct slot) versions (the NuBus slot, too, can be a bottleneck for speedy transfers); they work on the same principle as the NuPort board and should be available in the spring. DayStar Digital’s SCSI PowerCard, available now, is a NuBus board that combines a Mac SCSI controller bypass with special caching software and a 1MB, 4MB, or 16MB memory buffer.

Because they add a second SCSI port, all three boards double the number of SCSI devices you can chain to the Macintosh. The NuPort and Data Cannon boards can be purchased only with a new MicroNet or MacinStor drive, or as an upgrade. The NuPort board adds $600 to the retail price of a MicroNet drive, while Storage Dimensions reports that a Data Cannon board will add $570 to the retail price of its drives. DayStar’s SCSI PowerCard is much more expensive (the retail price of the board alone, without any of the required cache memory, is $1499), but it is available separately and thus can be paired with any drive. And unlike with the NuPort and Data Cannon boards, which can boost the performance of only the fastest drives, DayStar says that even habitually slow mass storage devices, such as optical and CD ROM drives, will show significant speed gains with a SCSI PowerCard.

On the whole, there are few drives that we recommend against buying. Specifically, we suggest you avoid the exceedingly slow EMac Metro 335 ($2499) and 670 ($3395). Also on our caution list are a few drives that, in our tests, refused to act as start-up drives: HDI’s PowerDrive 3201 ($1449) and 6001 ($1799), and CMS Enhancements’ Platinum Series PD 320 ($3099). (If you have two or more hard drives, this may not cause you any difficulties.) Otherwise, I’m happy to report that the quality of large-capacity hard drives continues to go up, even as prices go down, and that’s welcome news for anyone itching to enlarge their megabyte horizons.

See Where to Buy under Large-Capacity Hard Drives for contact information.

Robert C. Eckhardt is a Macworld contributing editor and author of The Fully Powered Mac and Inside Word for the Macintosh (Brady).
CONTROL: SYSTEM 7.0
MULTITASKING / GO
VIRTUAL MEMORY / GO
COMPATIBILITY CHECKED / GO

10...9...8...7...6...5...4...3...2...1...ALL SYSTEMS GO...

QUERY:
ALIASING
DATA ACCESS
You've been hearing about this famous System 7 for years—literally. Now it's finally here. The disks, the manuals, the box, and the shrink wrap are on your Apple dealer's shelf and can be yours for $99. (You can buy a group upgrade kit for $349; prices are subject to last-minute change.) Now that you can get this long-awaited upgrade to Macintosh system software, the question is, should you?

CONFESSIONS OF A SYSTEM 7 USER

Emphatically yes. Dollar for dollar, System 7 is the best enhancement you can add to the Mac—even if you have to add more memory to use it. The new Finder in System 7 is worth the cost alone. In addition, you get sharper text, built-in file sharing, and a whole lot more (see "System 7 Boiled Down"). Such a blanket endorsement may surprise you. Anyway, making it surprised me. When I first started working with System 7, I expected to find that its new capabilities would make it overly complex for a typical Macintosh user—witness the vast majority of System 6 users who shun MultiFinder. But most of System 7's complexity remains hidden until you seek it out. One exception is multitasking, which you may find disorienting if you aren't already accustomed to MultiFinder.

Not that it's all rosy. A few minor problems surfaced that I wouldn't have anticipated. For instance, even those accustomed to MultiFinder must learn new techniques for switch-
ing between programs. Everyone must learn new methods for editing icon names. And, there are surprises in store when you use directory dialog boxes to open and save files.

Some users might upgrade to System 7 and barely notice the difference, at least at first. In the following pages I describe the new capabilities as you will probably encounter them. (The descriptions are based on 7.0b4, a prerelease version, and it’s possible that names and icon designs have changed somewhat since then.)

**New Menus**
The first clue to these new capabilities is in the System 7 menu bar. There are two new permanent menus at the right end of the bar: the Help menu and the Application menu.

The Help menu lets the Mac explain itself. A Show Balloons command in the menu turns on System 7’s optional balloon help feature. When balloon help is turned on and you place the pointer over an object, a concise description of the object appears in a cartoon-style balloon. Aside from balloons appearing and disappearing, everything else works normally. You may perceive a slight delay as help balloons come and go, especially if you use a slower Macintosh.

Balloon help knows about all standard objects in the Macintosh interface. However, it cannot describe a specific program’s menu commands, window contents, dialog boxes, and so forth. For that to happen, the program must be revised to include the necessary help balloons.

**Multitasking**
With System 7, multitasking is no longer optional, and even those familiar with MultiFinder may need balloon help and their wits about them to get used to the new environment.

Just as with MultiFinder, the Finder is always available without quitting the program you’re using, and you can have as many programs open simultaneously as will fit in your computer’s memory. Multitasking’s valuable benefits sometimes have disorienting side effects, however. For instance, you may think the program you’re using has unexpectedly quit when actually you’ve switched to another open program by clicking one of its windows. You must condition yourself to look at the menu bar when you need to know which open program is currently active.

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**System 7’s Top Ten Desktop Surprises**

The first clue that a user is running under System 7 will be the new look of the Finder. Here are the top ten visual cues.

1. **Finder text**
   Text is no longer restricted to Geneva font for desktop display. You can change the display font in the Views control panel.

2. **Apple menu**
   You no longer install desk accessories with Font/DA Mover; now you simply drop them into the Apple Menu Items folder in the System Folder.

3. **Alias files**
   Choosing Make Alias from the File menu lets you create a 1K to 3K stand-in file; you can recognize them by their italicized names.

4. **Folder structure**
   In Name view, a window’s folders appear in an indented outline. To show or hide a folder’s contents, you click on the triangle next to its icon.

5. **Find**
   Using the new Find command, searches are much more specific.

6. **Help menu**
   Besides offering a variety of Finder Shortcuts, the new Help menu lets you turn balloon help on and off.

7. **Application menu**
   Rather than listing open applications under the Apple menu, as MultiFinder did, System 7 lists them under this new menu.

8. **Color**
   Assign colors from the Label menu to color-code icons. You can also choose colors for title bars, scroll bars, and highlighted text from the Color control panel.

9. **3-D Icons**
   In Icon view, you see shaded, 3-D icons.

10. **Trash**
    The Trash Can no longer automatically empties. It remains bulging until you choose the Empty Trash command from the Special menu.
The active program's icon appears at the right end of the menu bar as the placeholder for the new Application menu. That menu lists the programs that are currently open; choosing a listed program makes it the active program (see "Multiple Programs Open"). The Application menu also enables you to hide program windows without closing them or quitting programs, thereby reducing window clutter. For more information on dealing with MultiFinder, see "Getting Started with System 7," elsewhere in this issue.

Apple Menu
Under MultiFinder using older system software, open programs were listed in the Apple menu. In System 7, the Application menu takes over listing open programs, and the Apple menu has a new role: it expedites opening anything you use frequently, including documents, application programs, desk accessories (DAs), folders, control panels, and even fonts and sounds.

You put an item in the Apple menu by dragging it into the Apple Menu Items folder, which is located in the System Folder. The item becomes instantly available in the Apple menu. (There's no need to restart the Macintosh.)

Color Windows and Icons
Aside from the new systemwide menus (Apple, Help, and Application), the most pervasive change in System 7 is its use of color. Trendy three-dimensional shading modernizes all types of systemwide menus and dialog boxes—on monitors displaying at least 16 grays or 256 colors, that is. This doesn't do much to improve your productivity, but it sure makes you feel better when you see a Next computer.

Additionally, standard Apple icons have three-dimensional shading on monitors that display at least 16 colors or grays. Most other icons are black-and-white (software developers will probably add color when they upgrade their products for System 7 too). You can customize any icon by pasting a picture from a painting or drawing program into the icon's Get Info window.

New Views
In the improved Finder, you can see, select, and reorganize items from different folders in the same window. All list views (name, size, kind, and so forth) display folders and their contents in an indented outline format. The levels of indentation clearly diagram the structure of nested folders. By clicking a triangle next to a folder's icon, you can show or hide the corresponding folder's contents.

The new Finder also lets you control how icons and window contents are displayed. Using the Views control panel, you can pick the font and size of item names and window headings for all views. You can set the alignment of icons in the Icon and Small Icon views.

For list views, you select the icon size, pick which columns of information you want to see, and more. Your Views control panel settings immediately affect all windows.

Finding Items
No more jokes about the Finder not finding anything. The new Find command (located in the File menu) finds and fetches lost items for you quickly—no more hunting through folders and disks for a misplaced file—a chore even with the new outline views.

In its simplest form, the Find command looks through all disks whose icons are on the desktop for an item whose name contains the text you specify. It displays the first item it finds, and opens the folder that contains the item to show the item in its native surroundings. You can find additional matching items with the Find Again command (also in the File menu).

The Find command has an exotic form as well. It lets you specify the type of search by name, size, kind, label, date created, date modified, version, comments, or lock status. You can also specify exactly what you want matched (for example, a date) and how you want it matched (for example, look for items modified before that date). You can restrict the search to a single disk or to the active window. If you want, the Find command will even select all the items it finds at once in an outline view.

Aliases
Although the new Find command is very fast, it doesn't take the place of well-organized disks. Enter the System 7 alias, chosen from the Make Alias command in the File menu. An alias of a program or document is essentially a stand-in for an original program or document that you can use as if it were the original. It's not a copy, but rather a small (1K to 3K) file that directs the computer to the original file.

You can open an alias, move it, or even drag items to it. In fact, an alias even looks exactly like the original item except its name is italicized and initially has the word alias at the end. Aliases have a variety of uses, and you can read more about them in the Macintosh Library and elsewhere.

PERFORMANCE ISSUES

When I started using pre-release versions of System 7 last fall, I thought it would be too slow on a Mac Plus, SE, or Classic. In fact, System 7 isn't perceptibly slower overall than System 6 on my 2.5MB Mac Plus, and it is appreciably faster at a few things—such as copying files on my crowded hard drive.

Additionally, I worried that System 7 would devour too much memory and disk space. It turns out that the 2MB that System 7 requires is roughly equivalent to having 1MB with System 6. As a rule of thumb, figure you need 1MB more than you actively use now. (You may have to add more than 1MB, depending on your current RAM configuration.) The only people I would recommend not upgrade to System 7 are those who routinely use all of the memory in a 4MB Mac Plus, SE, or Classic. You also need a hard drive to use System 7, but that's hardly an odd requirement these days.
"Getting Started with System 7." But just to whet your appetite, here are some things you can do with them.

- Open frequently used programs, documents, and folders from the desktop while the real items remain buried in nested folders.
- Add items to the Apple menu without moving the originals from their folders.
- Organize documents and folders according to multiple filing schemes without duplicating items.
- Simplify access to file servers and individual items on servers.
- Have nearly automatic access to your Mac's hard drive(s) using a floppy disk in any other Mac on the same network.

**Editing Icon Names**

In Finder 7, clicking an icon no longer selects the name for editing. Instead, to select an item name for editing, you either click the icon and then press either the return or enter key, or click the name itself.

If you're an experienced Macintosh user, the new method of editing icon names is one of the toughest System 7 changes to get used to. On the good side, you can no longer accidentally, and perhaps unknowingly, rename a selected document or folder by bumping the keyboard.

**More Finder Improvements**

A number of improvements to the Finder give you more control over its windows. The most noticeable improvement is that windows scroll automatically if you drag an item or a group of selected items past the active area of the window. Dragging into a window corner scrolls diagonally.

Clicking the zoom box makes the active window just large enough (or small enough) to show all items in it. You can select multiple items by dragging over them in any view (not just Icon and Small Icon views). Items are highlighted one-by-one as you drag over them, not en masse when you stop dragging. And, you can change the order of items in a list view by clicking a column heading instead of using the View menu.

When you press the % key while clicking in the title bar of the active Finder window, a pop-up menu appears. The menu reveals the path through the folder structure from the active window to the disk. You can open any folder along the path by simply choosing it from the pop-up menu.

You can select an item in a Finder window or on the desktop without using the mouse. Typing an item's name or the first part of it selects the item. There are other keystroke combinations that select an item near the currently selected item, open the item, and more. The details are spelled out by the Finder Shortcuts command in Finder 7's Help menu.

When you drag an item from one Finder window to a folder in an overlapping window, Finder 7 keeps the destination folder in view. Older Finders bring the source window in front of an overlapping target window as soon as you begin dragging, possibly covering the destination folder.

If windows have become smarter, then the Trash has become dumber (and safer). Now the Trash is emp...
tied only when you choose the Empty Trash command from the Special menu. You can even shut down the Mac, and the Trash doesn’t empty if there are files there. Unlike older Finders, Finder 7 does not fuss if you put application programs and System files into the Trash. It also lets you drag locked items to the Trash but won’t delete them until you unlock them.

Finder 7 lets you classify folders, programs, and documents by labeling them with a word or phrase from the Label menu. The Label menu replaces the Color menu that appears on color Macs running older Finders; thus, on systems that are able to display colors or gray shades, labeling an item also colorizes it.

System Folder Renovation

Nothing mentioned so far helps you organize the king of clutter—your System Folder. Now preference files and control-panel and start-up documents are kept in special folders inside the System Folder. Moreover, Finder 7 is smart enough to place many of these files in the new Extensions, Control Panels, or Preferences folders when you drag them to the System Folder icon.

The old Control Panel desk accessory, like the System Folder, has become overcrowded and harder to use. In System 7, selections in the Control Panel are now separate control panels that you open like ordinary application programs. They are kept in a special Control Panels folder within the System Folder. For convenience, an alias of the Control Panels folder appears in the Apple menu so you can open the folder easily.

One problem that you may encounter is that some older preference files, control panel documents, and system extensions don’t work correctly when you put them in the new Extensions, Control Panels, or Preferences folders. In those cases, you have to drag the items to the System Folder window (not to its icon) for them to work.

The Font/DA Mover is no longer necessary. You can open desk accessories just as you would regular application programs (by double-clicking the icon) or you can install DAs in the Apple menu by dragging them to the Apple Menu Items folder. To install fonts you drag their icons to the System Folder. Finder 7 puts fixed-size bitmap fonts and TrueType outline fonts in the System file for you.

If you open the System file (you can do that now), you see an icon for each installed font. Opening a font icon displays some simple text in that font. To remove a font, drag its icon to a folder or the desktop. You can install, inspect, and remove three other kinds of items in the same manner: system alert sounds (for use with the Sound control panel), keyboard layouts, and language system scripts.

Directory Dialog Improvements

The directory dialog boxes you get when you use Open and Save As commands from any program work more like a one-window Finder. As always, a single directory window lists the contents of a folder or disk alphabetically by name. Names longer than 25 characters now appear in the directory window in compressed-style text.

More important, directory dialog boxes provide a view of the desktop for the first time—you can open disks and other items on the desktop. In fact, opening a disk at the desktop level is the new method of switching disks (see “Desktop Access”).

TrueType

Thanks to System 7’s TrueType fonts, almost all programs display and print smooth text at any size. (The exceptions are programs that restrict your selection of text sizes.) TrueType fonts are variable-size outline fonts similar to the PostScript fonts that look so sharp on LaserWriters.

If you use large font sizes or have a printing device that uses screen fonts—an ImageWriter, fax modem, ink-jet printer, or PostScript-less laser printer—TrueType fonts will save disk space. Because TrueType fonts can be scaled to any size, you no longer need the double, triple, or quadruple fixed font sizes that eat up your hard drive.

You can still use old-style fonts, but, as always, they look good at their fixed sizes and lumpy when scaled to other sizes. You can intermingle TrueType fonts with the PostScript fonts used by LaserWriters and other PostScript devices. If a document being printed on a LaserWriter contains

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**SYSTEM 7 BOILED DOWN**

In the whole, Apple engineers have succeeded admirably in making System 7’s new capabilities available but not intrusive. The system software’s look and feel has changed amazingly little considering that System 7 lets you do the following things:

- Access and organize stuff on disks faster and easier with a greatly improved and omnipresent Finder.
- Open several programs concurrently (memory permitting) and have unattended tasks done in the background while you continue working.
- Use disk space as if it were memory for opening programs and documents (though not on a Mac Plus, SE, Classic, LC, or Portable).
- Share files with other computers networked to your Macintosh.

- See sharp text at any size on any screen, printer, or other output device.
- Be cool, with color windows and icons (requires a color monitor).

All these capabilities are available with the programs you have now. With future upgrades to application programs, you can

- Remain proficient in a wider variety of programs and learn new ones more easily by using interactive help.
- Automatically update copied material in one document when the original material in another document (which can be on another Mac in your network) changes.
- Link programs to merge their capabilities.
- Get data from large databases on other computers with one simple menu command.
a TrueType font that has no PostScript equivalent, System 7 smoothly scales the TrueType font to the resolution of the output device.

**Extending Memory**

Less flashy than TrueType fonts but probably more important to your productivity are System 7's two means of letting you use more memory: 32-bit addressing and virtual memory. Not everyone will be able to use these options, however.

By using 32-bit addressing, some Macintosh models can access more RAM (random access memory). To turn 32-bit addressing on and off, you use the new Memory control panel. With 4MB RAM SIMMs installed, for example, turning on 32-bit addressing lets you use 10MB of RAM on an LC, 17MB on a IIsi, and 32MB on a IIfx or IIfx X. If 32-bit addressing is off, you can only use 8MB of RAM regardless of the amount installed.

Not all applications will be compatible with 32-bit addressing, however. Apple has been exhorting developers to make their products 32-bit clean for two years now, but not all have complied.

Unfortunately, Mac II, IIfx, IICX, and SE/30 models cannot use 32-bit addressing because their ROM (permanent read-only memory) chips are incompatible with it. Although these models have a replaceable ROM, Apple has no plans for making ROM upgrades available. Mac Classic, SE, Plus, and Portable models can't use 32-bit addressing because their 8000 central processing units don't support it.

**Virtual Memory**

You may be able to increase the amount of memory available on your Macintosh without installing more RAM. System 7 can transparently use part of a hard drive as additional memory. This extra memory, called virtual memory, lets you open more programs at once and increase the amount of memory each program gets when you open it.

However, virtual memory only works on a Macintosh equipped with a Paged Memory Management Unit (PMMU). The SE/30, IICX, IIfx, IIsi, IIC, and IIfx models all have PMMUs, and a Mac II can be retrofitted with one. An LC can be upgraded with an accelerator board containing a PMMU. However, a Mac Plus, SE, Classic, or Portable with such an accelerator can't use virtual memory because the ROM chips in those Macs lack some necessary information.

**File Sharing**

If your Mac sits on a network, System 7 lets you share hard drives, folders, and files with other networked users. You can access folders and drives on other Macs; likewise, users of other Macs (including those running System 6 with AppleShare client software) can access folders and drives on your Mac.

Before any of this is possible, however, you must use the new Sharing Setup control panel to configure your Mac as an AppleShare file server. Then, select either the drive or folder you want to share, and use the Finder's new Sharing command to display the item's sharing information window. There, you specify access privileges, that is, who can see the item's folders, see its files, and make changes to it. You identify registered users, set their passwords, and create groups of users with the new Users & Groups control panel.

To share another Mac's folder or drive, you use the Chooser. It lists as AppleShare file servers the names of all computers that are sharing their folders and drives. After you select one, the Chooser asks you to connect as a guest or a registered user, and then presents a list of items you may share.

Accessing someone else's folders or drives is considerably slower than accessing your own. Also, your computer's performance degrades markedly while others share your folders or drives.

A Macintosh should have at least 2.5MB of RAM if you want to open more than a single midsize program (say maybe a DA or two as well) while sharing folders or drives. Sharing items with others increases the system's memory usage by 250K to 300K. That leaves only about 600K for opening programs on a 2MB Mac.

**Live Copy and Paste**

Some programs use System 7 to let you share information dynamically among documents, which means that changing original information in a file automatically updates copies of it—whether that copy is on your Mac or on a networked Mac. Think of it as a live copy and paste.

To make information available for dynamic sharing, you publish an edition of it. You then include copies of the published information in a document by subscribing to the edition (see 'Publish and Subscribe'). Only programs that include Edit menu commands for publishing and subscribing can dynamically share information. You won't find these com-
COMPATIBILITY REPORT

If you're like most Macintosh users, most of the software you already have will work with System 7. Some programs will have minor cosmetic flaws, others will acquire minor disabilities, and a few will break. The older and more obscure a piece of software is, the more likely it is to have serious problems, and the less likely it is to be upgraded for System 7. Although System 7 itself seems quite rugged, you should expect more system crashes using it than with System 6.0.5 until you upgrade your other software to versions made for System 7.

So that you don't have to crash test all your software, Apple will include with System 7 a HyperCard stack called Compatibility Checker. Using information Apple has compiled from developers, Compatibility Checker checks your application programs, desk accessories, system extensions, and control panels; lists their version numbers; and reports what is known about each item's compatibility with System 7. The checker notifies you if your version of a certain program doesn't work with System 7, or if your version is compatible but there is a more recent version. In either case, the Compatibility Checker gives you a phone number to call for an upgrade. If your version is compatible or its compatibility is unknown, the checker reports that too.

Programs can be compatible with System 7 and still lack the following four features: balloon help, live copy and paste (publish and subscribe), data access (DAM), and program linking. Software developers must upgrade their programs to take advantage of those features. Also, software must eventually be made 32-bit clean if it isn't already. Many companies have already announced upgrades or new products incorporating these features, including Andyne Computing, Articulate Systems, Claris, Deneba, Farallon, Interleaf, Microsoft, Pharos, RagTime, Softsync/BLOC, SuperMac, Symantec, and Symmetry. In addition, Bitstream, Kingsley/ATF, Linotype, and Monotype Typography USA will be making TrueType fonts.

mands in the programs you have now, because software developers must upgrade their programs to include those commands.

Accessing Data
The programs you have now must also be upgraded to take advantage of System 7's Data Access Manager (DAM). DAM provides a simple method for getting data from a variety of large databases resident on host computers of all brands and sizes. You can usually recognize a program that supports DAM by the Open Query command in its File menu.

You use the Open Query command to open a query document that describes the type of data you want. A dialog box describes what you will get if you enter the information it requests and click a button to start the query. For example, it may ask you to enter your name and password and select a type of report. Behind the scenes the query document and DAM connect to the host computer, request the information using the arcane commands of the host database, obtain the information, and finally, paste it into your document.

Program Linking
System 7 paves the way for programs to work together. While you work in one program, you will be able to use the commands and tools of other programs made by different software vendors. For example, Claris's new version 2.5 of MacProject II uses Claris Resolves, a forthcoming spreadsheet program, to prepare graphs from tables of numbers.

Program collaboration relies on System 7's framework for information interchange, called AppleEvents, which lets any program send messages to other programs. System 7 stores AppleEvents messages sent to a closed program and forwards the messages when the program is next opened. It also dispatches messages across a network to programs on another Macintosh.

Getting Used to System 7
All these new features and capabilities may sound intimidating at first. Remember, though, that you can learn how to use most of them at your own pace. Take your time exploring the many Finder improvements. Wait to explore file sharing, virtual memory, and 32-bit addressing until you need them. Turn on balloon help only when you find it beneficial. Figure out publishing and subscribing (live copy and paste) and data access when you get updated programs that include them.

System 7 brings only a few changes you must face from the moment you begin using it. You can't dodge multitasking; you must get used to having multiple programs open at once. Also, longtime Macintosh users will have to learn a few new skills when editing icon names and using the standard directory dialog boxes for opening and saving items.

You upgrade to System 7 not for the changes it forces on you immediately, but for the possibilities it offers. Take your time. If you currently have only 1MB of RAM, wait to upgrade until you can afford to increase your Mac's memory (and get a hard drive, if you don't already have one), but do upgrade. As surely as 20MB hard drives have given way to 40MB hard drives, a year from now we will all think of System 7 capabilities as ordinary Macintosh capabilities.

Contributing editor Ken Poole has reported on System 7 since Apple announced it two years ago. He switched to System 7 last fall and since then has used it on a variety of large and small Macs in preparation for this article and for his complete book on the subject, Macworld Guide to System 7 (IDG Books, 1991).
A primer on digital type

Innovations in typesetting have revolved around changes in the master images of characters, allowing us to harness new kinds of machines to reproduce type. In 1456, Johannes Gutenberg perfected a method for casting individual characters in metal, and handset type began its 400-year domination of publishing. Handsetting type, by assembling individual metal letters in lines, is a tedious business. Trained compositors might produce a line a minute, and after printing, they must return every character to the typecase. With a cast letter as a type master, an enormous inventory of type is required to produce different sizes and type styles, and the proper fit of the letters is governed by their placement on metal type bodies. Handset type is inelastic, unchangeable, and requires intensive manual labor to set. Nevertheless, its introduction represented an exceptional advance over handwritten manuscripts of the prior 5000 years.

The next typesetting innovation occurred in 1886, when Ottmar Mergenthaler commercially introduced the Linotype, a machine that mechanized every aspect of composition, and introduced a keyboard as a means of control. The Linotype is a linocaster, a machine that is something of a self-contained foundry. The type
MAKING TYPE LEGIBLE

Resolution | Pixels activated by an unhinted font outline | Font outline reshaped by hinting | Pixels activated by a hinted font outline | Resulting bitmap, enlarged and at actual size
--- | --- | --- | --- | ---
At 72 dpi screen resolution | G | G | G | G
At 144 dpi ImageWriter resolution | G | G | G | G
At 300 dpi LaserWriter resolution | G | G | G | G
At 600 dpi high-resolution laser printer | G | G | G | G
At 1200 dpi medium-resolution imagesetter | G | G | G | G
At 2400 dpi high-resolution imagesetter | G | G | G | G

Scaling an outline font for display as a bitmap can distort the character's form, especially at low resolutions where only a few pixels are available to create the complex image. 1) Pixels whose centers fall within the area defined by the character's outline are turned on. 2) Hints are rules for adjusting the character's outlines to create the best possible image at low resolutions. 3) Hints subtly alter the original outline so that selected pixels can be turned on. 4) The result is that legible letters can be imagined at low resolutions. At higher resolutions the pixels are smaller; this means more of them fall in the outline, and they re-create the letterforms more accurately. The same letter imaged at 2400 dpi (imagesetter resolution) needs no hints to produce what appears to be an exact representation of the original outline.

e all, the machine made typesetting faster than it had been before. Good compositors can set seven lines per minute.

In 1949, Rene Higonnet and Louis Marius Moyroud demonstrated a machine that set type from photographic masters at the American Newspaper Publishers Association conference. Their machine, the Photon, went into commercial use in 1954, and the publishing industry began a slow but steady shift toward photocomposition. Instead of using metal type or matrices, photo-composition machines make type images by directing a stroboscopic lamp through a film master of the type design, exposing an image of the letters on light-sensitive paper. A lens enlarges the film master to different type sizes, and an escapement mechanism positions each character on the line. This system freed typesetting from the physical constraints of metal type; letters no longer had metal sides that fastidious handset compositors had to file away in order to ensure aesthetic letterfit. The white space around letters was under the typographer's control. Because they used light to make the type images, photocomposition machines were quite fast compared to all previous technologies, yielding 50 lines a minute, producing type faster than people could enter text.

The introduction of digital phototypesetters in 1972 changed typesetting yet again, and once more the type master led the revolution. Digital phototypesetters use a digital representation of the design as a master instead of an image on a piece of film. This means that letters can be retrieved many times faster than with nondigital typesetters—3000 lines can be set every minute, which amounts to a full magazine page in 15 seconds. Digital type masters never wear out, they are compact and portable, and they allow more sophisticated type manipulation than any of the previous typesetting technologies.

The first digital typesetters used an electron beam to write digitized letterforms onto a cathode ray tube (CRT). The type image on the CRT is then projected onto photosensitive paper, yielding output identical to that produced by photocomposition. After settling on digital storage of fonts, the typesetting industry then pursued more efficient output devices. The electron beam painting a CRT tube was eclipsed in sharpness by a laser beam generating an electrostatic charge on a drum. Toner particles are attracted to the charged areas and fused onto paper with heat. This eliminated photographic development of typeset galleys, and dry typesetting began.

In 1985, the introduction of PostScript brought digital typesetting to a vast new consumer market that had previously been unable to afford it. Typesetting itself moved downward
from expensive, proprietary equipment used by newsrooms and commercial typesetters to inexpensive systems that were within the reach of individuals and small businesses. PostScript provided a way to obtain type and graphic images from a variety of output devices, ranging from high-resolution image setters to desktop laser printers.

The ABC's of Letters
While the technology used to set type has changed radically and with increasing speed, the alphabet itself has remained remarkably stable. The same letters you see emerging from a LaserWriter were originally drawn with pen and brush, or carved in stone or clay. The Romans contributed the root design for capitals, and medieval European scribes perfected the lowercase letters.

You're reading 9-point ITC Garamond Light right now, from a font family that you can purchase from Bitstream for less than $100. In fairness, you're a bit more than $100 away from producing pages like this, but page-layout applications for the Mac offer type management capabilities that in many ways exceed the control professional typesetters had through the 1960s.

The gap between this magazine page and your printed output is up to you. If you learn about typography, equip yourself with the proper applications, peripherals, and fonts, and have access to a high-resolution printer, you have the capability of composing text as professionally as any commercial typesetter. But be forewarned, typesetting is a difficult craft and can be an all-consuming passion. As Donald Knuth (see "Capturing the Designer's Intentions") remarked, "Now when I go into a restaurant, I spend the first five minutes staring at the type on the menu . . . only later do I notice what kinds of food they serve."

The most fundamental distinction between type styles is between serif and sans serif faces. A serif is the finishing stroke on the letters that you see in the Garamond that you are reading right now. A sans serif face, like the one in the bold subheads throughout this article, is one that lacks these finishing strokes. A closer examination of the details of each letter, and an understanding of the key elements common to all letters, is the next step in exploring typography (see "Illustrated Guide to Type"). A well-trained eye will allow you to identify hundreds of widely used typefaces and to recognize the distinctions of thousands more.

The Digital Domain
For the opening ceremony of the 1984 Los Angeles Olympics, the audience was, in effect, digitized. Each seat had a color flash card, and the

Designing for a Digital Medium
Matthew Carter's career spans the entire development of digital typography. Currently vice president of design at Bitstream and an internationally recognized type designer, he has done everything from handcutting type for traditional letterpresses in Holland to designing typefaces for AT&T's U.S. telephone directories and National Geographic's captions. In between he has designed type for phototypesetting equipment from Crosfield Electronics and the Mergenthaler Linotype Company.

Carter thinks that the main difference in designing for a digital medium is that the designer never really knows how the type is going to be used in the end. When a letter was cast in metal its design was frozen completely, and when type was set on proprietary phototypesetters, type designers had strict control over how their designs were implemented. But today, because digital type can be output on many different devices, at many resolutions, designers have no idea where their designs will end up, be it billboards or baseball bats.

Yet for all these new factors, Carter is emphatic about one central issue, "a high-end imagesetter is without question the best way of representing type that has ever existed. If you can't design type that looks good on those machines, you never could design type that would. It is the perfect way to image letters."

To Carter, technology is not now, and never has been, the determining factor in type design. "People do say that digital technology imposes itself upon letterforms. But it will only do this if the designer allows it to. If you were designing by hand and were incredibly lazy, you'd have bad design too. The fact is, with digital typography, you can really make any shape that you like. Technology can only show what you tell it to show. Good design is entirely the responsibility of the designer. If you set out today to design a font with current digital tools, it will be years in your professional progress before you discover things that you can't do. And then, they will undoubtedly deliver an upgrade."—L.W.
spectators were instructed to hold up their cards on cue to form a pattern none of them could see, or form, alone. Given enough people to hold the cards, you can make pictures of flags, the Taj Mahal, or Garamond. This stadium full of people holding cards is much like a computer screen displaying black pixels and white pixels, or a printed black-and-white page. Individually, each bit signifies very little, but collectively they can create images of great subtlety and meaning.

These digital records of letter shapes can be stored compactly, preserved indefinitely, and represented on screens and printers flexibly. The simplest way to record a shape digitally is with a bitmap, a map of which screen pixels are turned on and which are turned off. Imagine the dots an extremely patient artist would draw if he or she marked every position on the line instead of drawing the line itself.

The Mac’s display screen is a CRT that emits light when its phosphorescent surface is bombarded by a beam of electrons. The beam itself scans the surface line-by-line and is turned on or off at precise intervals, creating picture elements, or pixels, on the line currently being scanned. What the beam writes are pixels, and the line-by-line writing process is called raster scanning. A bitmap is the image a printer puts
on paper, as the printer's rasterizer specifies which dots within the page's grid are on (black) or off (white).

Bitmaps conveniently describe the final images that both screens and printers produce but present some problems. The Mac's display consists of 72 dots per inch, while the LaserWriter has a hearty 300 dpi, and a high-resolution output device, necessary for professional typesetting, offers well over 1000-dpi resolution. If your type masters are bitmaps, you need a different set for each output device. What's more, you would need different bitmaps for every size of type, since a bitmap records the specific dot array necessary to compose a shape, and so cannot be resized with good results. In fact, many early Macintosh fonts are exactly that, specific bitmaps designed for particular sizes and styles. Until the introduction of Adobe's ATM (Adobe Type Manager) technology, the Mac needed screen fonts that were hand-tweaked bitmaps to draw legible characters on screen.

**Outlining the Advantages**

Instead of packing hard drives and printers with bitmaps, though, current digital font technology is based on mathematical descriptions of the outlines of letterforms. Outlines describe font data with greater economy than bitmaps do and rely on an interpreter's calculations to create the bitmaps you ultimately need, at the highest possible resolution for the output device you use. Instead of recording which pixels must be turned on and off to create the whole letter, as a bitmap does, an outline describes only the boundary of each letter and does so with a mathematical formula. The outline formula is then mathematically manipulated (or scaled) to create an outline of the letter at the requested point size. The pixels whose centers fall inside this outline boundary are identified and activated (or turned on), creating the bitmap necessary for printing or display. At least, that is the idea. In fact, there are all sorts of challenges associated with deciding which pixels fall on or off a scaled outline (see "Making Type Legible").

Representing a letterform by the mathematical description of its outline solves several important technical problems. First, the outline eliminates a host of redundant information by ignoring the black interior of a letter, concerning itself only with describing the boundary of the shape. Second, the description is compact and easy to manipulate mathematically. And since the computer understands the letter as a mathematical formula, changing a letter's size, or skewing, slanting, and rotating it, becomes possible through a simple series of numeric calculations. Third, the type designer doesn't have to know in advance which kinds of output

When Donald E. Knuth, professor of The Art of Computer Programming at Stanford University and author of three volumes (so far) of The Art of Computer Programming (Addison-Wesley), decided to create a computer language to describe digital type, he had no idea that it would become a nine-year project.

His initial work on digitizing fonts took place at Xerox PARC (where John Warnock was also hard at work developing PostScript). What Knuth had imagined as a simple task, digitizing fonts, turned out to be a difficult one. He ended up trying to digitize fonts with a TV camera and a primitive frame grabber.

Then he took 35mm slides of the font, projected them on his living room wall, held a piece of paper to the wall, and traced the letters. Again, the resulting outlines were fuzzy and he got poor data.

"Then it occurred to me," continued Knuth, "that these letters were designed by people with ideas... what I wanted to do was somehow state the intelligence of what font designers were doing, and find a way to describe it digitally. It would be neat to have a language for graphics where you would state how you were drawing something. It would be a tool for designers rather than a tool for copying things."

**Metafont is**

**The First Computer Language to Describe the Underlying Principles of Font Design**

Metafont, a computer language for creating fonts, was the product of that search. By generalizing the underlying principles of a font, it allows designers to go beyond creating a single font. Instead, they specify the form of the letters in Metafont, modifying them with parameters, numeric variables that change the generalized shape in a particular way. A designer can create an entire family of fonts with an infinite number of variations.

"I knew that digital typography was going to be big when it hit the world back in the late 1970s," recalled Knuth. "We had one of four Xerox XGP low-resolution graphics printers at the Artificial Intelligence Lab at Stanford University... when the XGP was broken, half the parking lot would be empty."—L.W.

Note: Metafont is in the public domain and is available from the TeX user group, box 9506, Providence, RI 02940.
devices will be used to print the type. Because
the outline has no relationship to the ultimate
point size produced, it is scaled when printed,
outputting type at any size on any output device
(see “Making Type Legible”).

It’s Open to Interpretation
The key to this elegant system of outline fonts is
the interpreter, a complex program that does the
mathematical calculations necessary to scale
type, developing the bitmaps necessary for a
particular device, using the same outline master
for all resolutions and environments. Interest­
ingly, the interpreter can be based in the printer
or in the computer’s operating system, or it can
be a special application of its own. I’ve seen all
these sources used, and it’s not surprising that
vendors are still shuffling this deck, looking for
the most elegant solution.

PostScript is the best-known interpreter. A
printer with a PostScript raster image processor
(RIP) converts font outlines in the printer’s
memory to bitmaps. (PostScript-compatible
printers usually also locate the interpreter in the
printer.) The Mac’s current operating system
(6.0X) uses QuickDraw, a set of graphics com­
mands and routines, to display fonts on the
screen. However, QuickDraw wasn’t designed for
the full range of interpreter chores, and it is lim­
ited to routing out the bitmaps stored in the
System Folder as screen fonts, and scaling them,
if need be, to different point sizes. QuickDraw
can also derive bold, oblique, and shadow/outline
styles for the stored fonts.

Another approach to interpreting outlines is
embodied in Adobe’s ATM, a subset of the Post­
Script interpreter that runs on the Mac instead of
in the printer. This software goes off to the printer
font outlines to produce smooth bitmaps in any
point size and then supplies those bitmaps to
QuickDraw and the Mac’s Font Manager.

Apple’s TrueType, available as an INIT for
System 6.0.7 and built into System 7.0, promises
a major turn for font technology. TrueType en­
dows the Mac’s system software with an
interpreter and locates most of the necessary
decoding information within the font de­
scription itself. In theory, this approach ensures that key
aspects of font-imaging technology can evolve
independently of printers or screens. In True­
Type, the Mac is pressed into service to carry
out instructions that a printer’s CPU once per­
formed. The most appealing benefit here is that
every dime you invest in upgrading your Mac has
the potential to improve your type display and
output speed.

Theory into Practice
The Mac has always offered an advantage over
character-based display systems in the integration
of graphics and text in documents because it
displays screen images from bitmaps—the under­
lying model for all digital imaging. Even better,
it’s management of type makes most of the es­
sential work—communication between the appli­
cation, system software, and output device—
invisible to the user.

When an application accepts your keystrokes,
it looks to a font metrics table to see how much
horizontal space the letter you’ve chosen occu­
pies on the line. It uses this width information
to position the characters in that line of type and
to determine where to break the line. At the
same time, a screen representation of the char­
acter is called up or scaled on the fly to rep­
resent that letter on screen. If you’re using Adobe’s
ATM, its interpreter builds the bitmap from the
same outline master used by the printer. Without
such an interpreter (under System 6.0X and before),
the Mac fetches a specific bitmap—one
of the screen fonts you’ve loaded with Font/DA
Mover. If the exact size you want isn’t available,
the system scales an existing screen font to size,
often with chunky, chunky results. With System
7.0 or the TrueType INIT, the Mac produces
display bitmaps from the same outlines the
printer will eventually use, in a process similar to
the way ATM prepares them.

When you are ready to print a page, the appli­
cation you are using, working together with
the printer driver you’ve selected using the
Chooser, converts the commands you’ve given
your application into the page-description lan­
guage that the printer uses to image pages. If
you’ve chosen a PostScript printer, for instance,
your document is translated into PostScript syn­
tax. Then the printer constructs an image of the
page in memory. Within the stream of PostScript
commands headed from the Mac are instructions
for the placement of text, images, lines, and other
graphic elements. The application uses width
information embedded within the fonts to display
text, while the PostScript printer constructs font
bitmaps according to the outline font data stored
in its ROM chips or downloaded to its RAM.

This communication between the Mac Oper­
atting System, the application program, and the
printer allows a system in which you can mix and match printers, applications, systems, and fonts freely.

New developments, from Adobe, Apple, and others, promise improvements in digital typography that will both expand our control of type and return to us the aesthetic refinements that were lost when handset composition became impractical.

Adobe’s Multiple Masters approach provides two or more outline masters to define a character. When a light and an extrabold version of the letter are both provided, users can summon type weights that fall anywhere between the two masters, obtaining medium, demibold, or any weight they wish from a single font. A font including four masters can provide a spectrum of weights plus the range of widths between expanded and condensed.

Fine type designers have always known that the huge difference in size between 8-point text and 72-point headlines calls for different designs in the characters themselves. When type was cast in metal, these adjustments were made as a matter of course, but when phototypesetting was introduced, few vendors offered the multiple film masters necessary to maintain distinctions among type sizes, and fewer users bought them. Instead, it became common practice to use a single master and rely on the phototypesetter’s lens to create the various point sizes needed. Scaling type from a single master, however, is not the best solution since that fattens a letter as much as it increases its height.

Until now, digital type imaging relied on single outline masters. TrueType technology will permit subtle scaling changes to preserve character stroke weights during enlargement. Adobe’s Multiple Masters will offer specific differences in master outlines, plus the ability to alter x-height and other character attributes.

Digital type is inexpensive, widely available, and easy to use, and it has the capacity to fulfill some of the highest aesthetic goals we have, and have ever had, for type. Drawbacks of digital type will continue to challenge font designers and typographers to refine their work for this new, and still evolving, medium. And they will be the more eager to do so because in you their innovations have a large, watchful, and appreciative audience. In fact, you are not only watching this revolution, you are making it.

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**INVENTING POSTSCRIPT**

If any name is synonymous with digital typography, it is John Warnock. Chairman and CEO of Adobe Systems, Warnock has been at the center of virtually every significant type development since 1985, when PostScript was released on Apple’s LaserWriter.

When he worked at Xerox Parc (1978–1982) it was widely believed that building high-quality bitmaps for low-resolution devices was impossible.

But when he left and formed Adobe with Chuck Geschke, Bill Paxton, and Doug Broz, finding a way to do it became a business necessity. Their pioneering work developed the techniques that PostScript uses to build bitmaps at a wide variety of output resolutions.

Warnock remembered that, at first, it was difficult, if not hopeless, to capture high-quality font outlines from printed sources. “We even,” he remembers, “employed some of our kids for the early digitizing. I digitized the first alphabet myself. Those were hopelessly primitive attempts. We’d get the typeset masters, put them on enlarging copy machines, and then trace around these copies with digitizing tablets. We had terrible outlines to work with at first.”

Creating good type, they learned, only got harder as their eyes, and sense of design, became more discriminating. Eventually, they hired designer Sumner Stone to help make their fonts correct typographically.

“One of the big problems with inventing typographic technology,” Warnock says, “is that if you don’t understand the cultural and subtle design aspects of typography, you can’t do a good job. We’ve tried very hard to combine the art, the craft, and the science of type at Adobe.”

“At first,” he recalled, “it looked like a simple, straightforward technical problem; it is only after several years that you begin to appreciate the

There is no precise mathematical description of type, only a cultural definition. It is part of the fabric of the culture.

... subtlety and difficulty of what you’re dealing with. I know 10,000 times more about type now than I did in 1982, and I’m still learning. There is no precise mathematical description of type, only a cultural definition. It is part of the fabric of the culture.”—L.W.
Macworld Lab tests 27 CPU accelerators
SOONER OR LATER your Macintosh may seem like it has slowed down a notch. It could be that you caught a glimpse of a flashy Mac IIfx, or maybe you're just more impatient. Innocently enough, you start rationalizing the need for a faster Mac. This state of mind progresses to a point where you find yourself using the P-word: “A faster computer would increase my productivity by reducing the time spent waiting for time-consuming calculations.” “Not only would my productivity improve, quality would improve because I could experiment more freely.” Yeah, right.

Remember the first time you sat down in front of a Mac II after using a Plus or SE for several months? As application windows blasted into view, were you thinking “Ooh,
Speed Tests

All times in seconds; accelerators ranked fastest to slowest in overall performance.

*Total Systems has replaced the 25MHz Gemini accelerator with a Gemini II-series accelerator that has the same specifications but comes only as a 6030-based product.

Processor-intensive tasks show what an accelerator can do when much of the overhead associated with disk access and screen redraw is eliminated. We tested the accelerators performing such processor-intensive operations as redrawing a graphics file, grouping objects in a graphics file, performing a find and replace in a Word file, and sorting databases.

To help you wade through all the choices, Macworld Lab tested 27 accelerator boards to find out which ones were fastest at performing a variety of common operations (see "Speed Tests"). We also tested the different models of Macs to see how their raw speed compares to that of accelerated Macs. Most of the accelerators we tested use the Motorola 68030 processor, which is found in higher-end Macs such as the IIx. The odd men out were the Dove Marathon 020, the Radius Accelerator 16, and the Radius Accelerator 25, which use the slower Motorola 68020 (found in the Mac II and LC). Although other 68020 accelerators exist, we tested these popular products only in order to compare their performance to the move up-to-date 68030 accelerators. We didn’t test any 68000-based accelerators, since we feel that they don’t provide a reasonable price-to-performance ratio. And the recently announced 68040 upgrades were not yet

improved productivity? Not likely. Don’t apologize for wanting a faster computer; accept your lust for speed. Consider upgrading the Mac with an accelerator board or with an Apple logic board. Basically, either type of board boosts a Mac’s performance by replacing the processor already installed in the Mac with a faster one. If you own an older Mac such as a Plus, you might even consider selling it and purchasing a faster Mac, either new or used.
## Video-Intensive Tasks

The speed of many tasks depends on how fast the screen redraws as well as on how fast the processor runs. Scrolling is a prime example of a video-intensive task. Here we timed PageMaker, Excel, and Word in scrolling and averaged the results.

| Time (seconds) | 41 | 52 | 50 | 53 | 56 | 61 | 58 | 81 | 61 | 66 | 71 | 71 | 74 | 82 | 79 | 78 | 80 | 72 | 66 | 71 | 71 | 74 | 82 | 79 | 78 | 80 | 72 | 97 | 80 | 79 | 78 | 80 | 72 | 97 | 80 | 79 | 78 | 80 | 72 | 97 | 80 | 79 | 78 | 80 | 72 | 97 |
|----------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|

## Disk-Access-Intensive Tasks

Here we timed the accelerators for opening PageMaker, Excel, ModelShop, ClarisCAD, and Word; for saving PageMaker, Excel, and Word; and for compiling Think C and MPW Pascal. These tasks are all highly dependent on disk access. We averaged the results for all these tasks.

| Time (milliseconds) | 135 | 133 | 151 | 155 | 159 | 170 | 167 | 205 | 172 | 178 | 217 | 216 | 195 | 195 | 228 | 233 | 204 | 208 | 205 | 247 | 247 | 244 | 244 | 229 | 223 | 289 | 282 | 247 | 285 | 285 | 329 |
|---------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|

## Math-Intensive Tasks

Math-intensive tasks, such as recalculating an Excel spreadsheet and running a calculation in Mathematica, require the use of a floating-point unit (FPU) on the accelerator. The Macs and accelerators with an NA instead of a bar (below) don't support an FPU and so could not run the Mathematica version we used.

<table>
<thead>
<tr>
<th>Time (seconds)</th>
<th>NA</th>
<th>NA</th>
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available at test time (see “The Motorola 68040: The Mac’s Next Brain”).

The accelerators we tested are available only for the Plus, SE, SE/30, and the discontinued models of the Mac II series (II, IIt, and IIfx). We also tested a few cache boards for the IIfx, and one of them transformed a IIfx into the fastest Mac we've ever tested. No accelerators were available for the Classic, LC, IIfi, IIfx, and the Portable at test time. However, DayStar Digital, Dove, Mobius, NewLife, Novy Systems, MacProducts USA, and Total Systems will soon ship accelerators for the LC, IIfi, and Classic. We didn't forget vintage Macs such as the 128K, 512K, and 512KE, but we decided not to test accelerators for these models because it doesn't make good economic sense to upgrade them.

## Processors and Speed

Be forewarned that an accelerator containing the same processor as the Mac IIfi may not make a Mac Plus's overall performance equal to that of the IIfi. For overall excellent performance, the Mac needs to have a balanced hardware design. The amount of memory, the speed of the hard drive, and the bus configuration all play important roles in system performance. For instance, the Mac Plus, SE, and Classic use comparatively slow SCSI ports. Reading data from and writing data to a hard drive remain relatively slow on these Macs if you
THE MOTOROLA 68040: THE MAC'S NEXT BRAIN

Closilying in on the horizon are accelerators based on the Motorola 68040—the latest member of the 68000 family, on which all Macs are based. Apple will ship a system based on the 68040 as soon as the chip is available in sufficient quantities to meet customer demand. The 68040 will initially be available in only a 25MHz version. When compared with a 50MHz 68030, a 25MHz 68040 is one and one-half to two times as fast in basic integer performance and about five times as fast in floating-point performance. Mac applications overwhelmingly depend on integer performance for most calculations. The performance gains are the result of a number of improvements, including much larger data and instruction caches and a higher degree of integration. One difference between the 68040 and its predecessor, the 68030, is that the 68040 incorporates floating-point operations.

A few vendors have announced accelerators based on the 68040. Total Systems plans to offer the Magellan line of 68040 accelerators. Fusion Data Systems has announced the TokaMac 68040 accelerators for the Macintosh LC, IIfx, Iici, and SE/30. Novy, IIfx, MacProducts, and Siclone told us that they are working on 68040 accelerators. One particularly interesting announcement is the Radius Rocket—a 68040 accelerator on a NuBus board. The Rocket's 68040 will not replace the processor on a Macintosh II-series machine but will permit applications to divide processing tasks between the Macintosh II's original processor and the 68040 on the Rocket. The Rocket is also equipped with a processor direct slot that could potentially be used to hold gigabyte-back expansion boards specialized to accelerate options such as SCSI transfers, image compression, and rendering.

Not all vendors plan to develop 68040 accelerators immediately. DayStar, for example, believes that moving to the 68040 will be challenging, since some applications may have compatibility problems with the 68040's new features—memory management, exception handling, and floating-point operations. The company also believes that for most users the 25MHz 68040 will not provide a significant performance improvement over a 68030 because most Macintosh users don't rely heavily on floating-point calculations. DayStar will await Apple's introduction of a machine based on a 68040, which will lead the developer community to solve compatibility problems.

However these issues prove out, you should expect to pay a premium price for a 68040 accelerator, at least for a while. Thus, you will still get the best price-to-performance value with a 68030 accelerator.

add an accelerator that does not include an option for a faster SCSI port.

Still, raw computing power eventually comes down to the type and speed of the Mac's processor. The Mac Plus, SE, and Classic all use the comparatively slow 68000 processor. The performance of these machines can be improved, often dramatically, by adding an accelerator with a faster 68020 or 68030 processor. Similarly, the 68020-based Mac II's speed can be noticeably improved by adding a 68030.

The speed difference can be attributed to the improvements Motorola has made in each chip's design. Unlike the original 68000, the 68020 and 68030 processors include a 256-byte cache that stores frequently used instructions. Since the 68020 and 68030 retrieve these instructions from the cache rather than from slower main memory on the logic board, these processors gain a speed advantage over the 68000. The 68030 ups the ante over the 68020 by including a second cache for frequently used data. Additionally, the 68030 is more efficient at processing instructions than the 68020 is.

The 68030 also includes memory-management capabilities required for advanced System 7.0 features such as 32-bit addressing and virtual memory. (A less expensive version of the 68030—the 680EC030—does not include memory-management features. One model of the Mobius 030 Accelerator uses this chip.) Keep in mind that even though an accelerator—or certain models of the Macintosh, for that matter—provides a 68030, you won't necessarily be able to take advantage of these features (see "Keeping Current" in this issue). For this reason many accelerators come with Virtual, a utility from Connectix that gives the Mac virtual memory capabilities even without System 7.0.

**Faster Than a IIfx**

Since its introduction, the Mac IIfx has been the computer against which all other Macintosh models and accelerators are measured. The IIfx, however, uses a 68030 processor as does the Mac IIx, IIfx, Iici, IIfx, and the SE/30. So how do you explain performance differences between these machines? Differences occur because the 68030 comes in different clock speeds. (Clock speeds are measured in megahertz.) The higher the clock speed, the more information the processor can handle at once.

In general, our test results show that an accelerator that uses a 40MHz 68030 (the processor found in the Mac IIfx) outperforms an accelerator that uses a 25MHz 68030 (found in the Mac Iici). Of course, you pay for those extra hertz. For example, the 50MHz Siclone Si3050 lists for $2499 while the 33MHz Siclone Si3033 costs $1799—that's $700 more for the faster accelerator.

Some vendors provide accelerators with a 50MHz 68030. However, this alone doesn't guarantee that a board will make a Mac faster than (or
Accelerator Advantages

Accelerators achieve faster performance in several ways. This diagram shows how an accelerator upgrade, such as the NewLife 33, provides key speed improvements to a standard Macintosh SE.

1. Faster Processor
   The NewLife's 33MHz 68030 chip is faster than the SE's 8MHz 68000, partly because the 68030 uses a 32-bit data path (not 16-bit) and includes built-in 256K instruction and 256K data caches.

2. Math Ceprocessor
   Most accelerators offer an optional math coprocessor, either a Motorola 68881 or 68882, to speed floating-point operations. The NewLife 33 includes a 68882.

3. Static RAM Cache
   Many accelerators include a high-speed static RAM cache to quicken the transfer of information between a fast processor and memory. This board uses 256K of 20ns static RAM.

4. Faster Memory
   Many accelerators provide faster memory to keep pace with the addition of a faster processor. The 80ns RAM on the NewLife 33 replaces the slower 150ns RAM on the SE's logic board.

5. Copy ROM into RAM
   Key routines from the ROM on the SE's logic board are loaded into the accelerator's RAM at startup so that they are readily available.

6. RAM Disk
   Many accelerators include software that lets you use the slower displaced RAM on the SE's board as a RAM disk.

For the Mac SE, a 25MHz 68030-based accelerator such as this one from NewLife Computer is the best value.

A Memory Divided

Upgrading a Mac with a faster processor, however, won’t address the whole speed problem. That’s because the Mac still needs to transfer data from the main memory on the logic board to the processor over a data path or bus. With a faster processor, the bus becomes the bottleneck in attaining ultimate speed.

One solution to the bottleneck problem is to add a small amount of superfast, 20 nanoseconds static RAM (SRAM) to the accelerator. This SRAM acts as a cache between the accelerator and the main system memory already on the Macintosh. Data from the main system memory is stored in the SRAM, where the processor can grab it with very little delay.

Another common solution (especially on accelerators for the Plus and SE) is to place RAM directly on the accelerator board so that data transfers directly between the processor and the memory—bypassing the Mac’s data bus completely. Unfortunately, you can’t just take the standard RAM from the Mac’s logic board and add it onto the accelerator. You need to match the faster processor with faster memory. For instance, the Plus, SE, and Classic use 150ns RAM, which is adequate for the 8MHz 68000 processor installed in these machines. If you upgrade one of these Macs with an accelerator that uses a 16MHz 68030 or faster processor, however, the 150ns RAM becomes woefully inadequate. You need at least 120ns RAM with a 16MHz 68030.

Accelerators that add a 33MHz 68030 or a faster processor and that don’t use an SRAM cache may ideally require extremely high-speed 50ns RAM. Unfortunately, these fast chips are in short supply and nearly impossible to come by. No vendor was able to supply us with 50ns RAM. The workaround the vendors offer is to delay the processor so that slower memory can synchronize with it. This period of delay is called a wait state; the number of wait states an accelerator has varies depending on how much time is required to synchronize...
Handling Math

Like students, accelerators vary in their aptitude for math. The Mac's processor is relatively inefficient at dealing with floating-point calculations (calculations involving decimal points). Floating-point calculations are most often used in CAD applications. They are also used in some spreadsheet calculations.

There are a couple of ways in which the Mac augments the floating-point deficiencies of its processor. The Plus, SE, and Classic rely on SANE (Standard Apple Numerics Environment) routines stored in ROM and in the System file to relieve the processor of the burden of calculating decimal-point numbers. A Mac can perform calculations faster, however, if you install a math coprocessor or floating-point unit (FPU), a special chip that is optimized for handling floating-point calculations. The Mac II comes with a 68881 FPU; the SE/30, IIFx, IICx, IIC, and IIIfc come with a 68882 FPU.

Most accelerator vendors let you add an FPU to the accelerator board—an option that makes sense if you perform tasks that make abundant use of floating-point calculations. Generally speaking, the clock speed of the FPU should match the clock speed of the microprocessor. So, for example, if you add a 40MHz 68030 accelerator to a Mac II, you should also replace the Mac II's 16MHz 68881 with a 40MHz 68882.

To take advantage of an FPU, all accelerator vendors include an option called a SANE trap, which routes all mathematical computations away from the SANE routines contained in ROM and to the math coprocessor. Although slower, SANE routines are more accurate than the hardware routines found in the math coprocessor. The math coprocessor is sufficiently precise for most applications, but certain specialized applications require the exactness of SANE. For this reason all vendors let you turn the accelerator's SANE traps on and off, usually via the Control Panel.

Installation Notes

Some dealers offer free installation if you purchase the board from them; other dealers charge from $50 to $100. Although a number of experienced Macintosh users have successfully installed accelerators, attempting to do so is inadvisable for a number of reasons. Performing your own installation exposes you to the risk of serious—even life-threatening—electrical shock, even when the Mac is
Many accelerators for the SE, and especially those for the Plus, are difficult to install because of the tight fit inside the case. The Mac Plus doesn’t have a slot and wasn’t designed for add-in products, so the accelerator attaches with a clip-on device that can be difficult to install and may present reliability problems if not attached correctly.

The interior of a Mac II is more accessible but you still have to be careful not to damage accelerator components. To install accelerators from Dove, DayStar, and Siclone you must first remove existing processor chips. DayStar provides a special tool (a PGA puller) to make this job easier. In general, the accelerators from these vendors include clear instructions and are relatively easy to install. Still, we can’t warn you enough: if you opt to install these accelerators yourself, exercise extreme care when inserting the new adapter board into the sockets that once contained the original processor—otherwise you’ll damage the new processor’s pins, rendering the accelerator useless.

A couple of Mac models present installation hurdles that have deterred most vendors from producing accelerators for them. Newer SE/30s contain processors that have been soldered on; only the Dove Marathon 030 works with these Macs. The processor in the majority of Mac IIcx’s is also soldered on; only DayStar sells an accelerator for the IIcx. However, you must send the Mac to DayStar for the installation. The NewLife 25 and NewLife 33 can’t be installed on older SEs because the extra video connector on these accelerators doesn’t fit into the SE’s case.

The accelerators we tested didn’t have any compatibility problems. Most vendors have solved previously common problems with timing-dependent operations such as sound, AppleTalk, and formatting high-density floppy disks. In the event that one of these problems appears, most vendors let you turn the accelerator and its various features on and off to circumvent potential difficulties. Some Macintosh Plus and Macintosh SE accelerators permit the optional attachment of a large-screen monitor, but be sure that the accelerator you plan to purchase works with the monitor you have in mind; many combinations are incompatible.

**Mac Plus and SE Recommendations**

If you own a Mac Plus, it’s not economically advisable to upgrade. To overcome the Plus’s weak points, a
Cache boards are an appealing performance upgrade because they are inexpensive compared to accelerator boards. Cache boards fit into the Ile's processor direct slot and include from 32K to 128K of static RAM. This RAM acts as a high-speed cache; the Ile's microprocessor can access data and instructions more quickly from this cache than from the slower DRAM chips on the digital board. Bigger static RAM caches are not necessarily faster than small ones, since different boards use different information-handling techniques.

Cache boards for the Ile are available from companies such as Apple, Applied Engineering, Daystar, Micron, and UR Micro. PSI recently announced its O30 Adapter Card for the Ile, which provides a PDS slot for another board as well as a static RAM cache option. Macworld Lab tested two cache boards, the Micron Xceed and the UR Micro MacCache, to find out how much they speed up a Ile. We found that for a few hundred dollars, cache boards provide a Ile with about a 25 to 30 percent overall performance improvement.

**Mac II Recommendations**

If you own a Mac II or IIX, and are a real speed maven, I recommend purchasing Apple's $3000 Mac Illx upgrade board. If you want the best price-to-performance ratio, however, I recommend any of the 25MHz or 33MHz accelerators from Daystar, Siclone, or Total Systems. These accelerators provide improved Mac II performance for between 30 percent and 50 percent less than the cost of a Illx upgrade board.

The best value for the Mac II, however, is DayStar's 25MHz PowerCard O30. It boosts the speed of a Mac II up to the range of a Ile for $1000 or so. At press time I was able to find street prices under $1000 for this accelerator without the FPU. If you're on a tight budget, the Dove Marathon O30 upgrade can freshen up the performance of a Mac II with roughly a 45 percent improvement for a street price typically under $500.

You have few options if you want to accelerate a Mac Ile. You can either buy an Apple Ile logic board upgrade or purchase a DayStar PowerCard O30 in one of three clock speeds: 25MHz, 40MHz, or 50MHz. Again, the 25MHz version is the best value. The higher-speed versions make less sense to me, since they approach the price of the Apple Ile upgrade board, you should consider buying the Apple upgrade and adding a static RAM cache board (see "Cache Boards"). Adding a 40MHz or 50MHz PowerCard O30 to a Ile gives you a Mac that is somewhat faster and less expensive than an Ile configured with a cache board. If you opt for the Apple logic board upgrade, however, you can enhance Ile-level performance later with a cache accelerator like the Siclone Intensi er ci or the DayStar Powercache. Personally, I don't find the options compelling enough to upgrade my Illx yet.

This brings us to lle accelerators—the most promising products we tested. Both Siclone's speedy Intensi er ci and DayStar's PowerCache lle have begun to ship. At press time, Sigma announced a similar accelerator, the Bullet 3040, which provides a 40MHz 68030 accelerator with 32K static RAM cache and data compression for both the Ile and lle. Top-of-the-line performance is expensive, however. Thus, you should try to live with an unadorned static RAM cache board for at least the next year or so. By then prices for the lle accelerator boards should have dropped.

If you have an SE or a Mac II, you don't have to feel like you've been left in the dust as newer and faster Macs are introduced. With the many good accelerators available you can get a sizable performance improvement at a reasonable price. And that's just the ticket for returning the luster to your trusty Macintosh.

See Where to Buy, under Accelerators, for contact information.
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Australopithecus

This bipedal hominid lacked the ability to remain erect for very long and relied exclusively on floppy disks – 800k was adequate storage for his limited cranial capacity.

Homo Erectus

The need to inventory large stone and rock collections using tapes drove this wayward creature to the brink of extinction.

Homo Sapien

Fortunately for modern men and women in business today – the DataPak MO from Mass Microsystems provides the most economical way to store and archive data and images of all sorts – whatever their cranial capacity.

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And now you can get more storage bang for your buck! DiskDoubler®, the data compression utility by Salient®, is now shipping with every DataPak MO.
REVIEWS

WORDPROCESSOR

WORDPERFECT 2.0

Pros: Mac-like interface; styles can be shared across networks; powerful macro editor. Cons: Awkward transfer of Microsoft Word files; performance sluggish at times; only one level of undo.


Requires: Mac Plus; System 6.0.3. List price: $495.

The release of WordPerfect 2.0 goes a long way toward eradicating many of the idiosyncrasies of WordPerfect 1.0. Gone is the Byzantine interface with its peculiar buttons and its sea of submenus (down from 18 to 13—which is still a lot, but now they tear off). The revamped interface is much more to Mac standards.

The new interface is apparent as soon as you call up the ruler. In version 1.0 the ruler contained only tab and alignment buttons. The ruler now contains six pull-down menus, which include the version 1.0 commands as well as column assignment (up to 22), line spacing, and magnification (from 25 percent to 800 percent).

New Features Galore

WordPerfect 1.0 had macros, but you couldn't edit them; now you can. The easiest way to use this feature is as a tape recorder to eliminate repetitive tasks, such as inserting the closing of a letter. There is even a 400-plus-page macro manual that accompanies WordPerfect 2.0.

In market-leader Microsoft Word and in other word processors, styles are tied to a particular document; so to copy a style from one document to another in Word you must use the Define Styles option to transfer the style to your new document. In WordPerfect 2.0, styles can be made easily available (via a submenu) for any document you create—or for anyone else on your network.

The drawing layer includes color support; editable bezier curves; full rotation of text and graphics (PageMaker can't boast that); and the ability to place graphics within text, on top of text, and even behind text in the form of a watermark. WordPerfect imports graphics in PICT, GIF, TIFF, EPS, and paint formats. You can add one of 36 border styles and 64 border patterns to any amount of selected text.

All the tools function well, though bezier curve-editing functions are limited. And you can't place graphics with the freedom of a true page-layout program.

The text box feature lets you create sidebars, tables, and other ancillary text. Most of WordPerfect's features can be used to create these documents-within-documents.

When you move an object in most page-layout programs, markers in the ruler allow you to keep track of exactly where the pointer is in relation to margins and other page elements. WordPerfect 2.0 doesn't offer this feature, so positioning text boxes requires a bit of guesswork.

Rough Edges

Despite these impressive features, the rewriting of WordPerfect isn't perfect. The program's file-transfer capabilities are its most glaring imperfection. WordPerfect cannot transfer Word 4.0 documents directly. Instead, the Word file must be saved in RTF (Rich Text Format), opened in WordPerfect, and then, through the Save As function, saved to WordPerfect 2.0 format. According to the company, new Microsoft Word filters will be available in version 2.0.

Transfers between WordPerfect 2.0 and WordPerfect on the PC work fine. You can also transfer documents as text (ASCII) files.
WordPerfect's screen refresh is slow. There is a perceptible pause as lines wrap or move.

Selecting text with keyboard commands could be smoother. When you select a paragraph word-by-word, not only is the final word selected, but so are all the carriage returns and all the space to the margin. When you try to deselect, the penultimate word in the sentence is left highlighted as the other words become deselected.

WordPerfect lacks the ability to count the words in a selected block of text. Only full-document word counts are possible. You can perform a workaround using the spelling checker, which lists the number of words it has checked.

Some features available in version 1.0 are missing in version 2.0. The otherwise much-improved online help now lacks references to the corresponding page in the manual. And Undelete, which allowed three levels of undo, is also gone. With version 2.0's increased graphics-handling capabilities, multiple undos are a must.

All in all, this is a powerful word processor. WordPerfect is still not perfect, but it's so improved that there are undoubtedly people at Microsoft now looking over their shoulders with real concern, and for good reason.—Phil Bishop

See Where to Buy for contact information.

Mighty Macros: WordPerfect 2.0 takes the mystery out of macro making. This macro inserts the current date, a salutation, and a closing to a letter and lets you add an address block, pausing between each operation. The numbers in parentheses define the location of the prompt boxes.

OASIS 1.0

Pros: Lightbox tracing feature; good control of pressure-sensitive brushes.
Cons: No zoom; no antialiased brushes; expensive.
Company: Time Arts.
Requires: Mac II; 3MB of RAM; System 6.0.5; 32-bit QuickDraw; color or gray-scale monitor. Recommended: Wacom pressure-sensitive tablet; 24-bit color board. List price: $795.

Painting by computer has always been somewhat of a compromise for artists accustomed to using paintbrushes. While there is a variety of paint software available on the Macintosh, the issue of simulating the subtleties of a paintbrush has always eluded even the finest paint programs. Oasis now offers these subtleties. (One bit of general advice: the more unique features of Oasis have been specifically designed to work with the Wacom pressure-sensitive tablet, so if you don't already own one, you might as well factor in the price of the tablet when you plan your software purchase.)

Different Strokes

The basic drawing tools found in Oasis, such as the primitive-shapes tools, the lines, polygons, eraser, and curve tool, all work as you would expect. The Artist and Effects brushes let you reasonably emulate various types of paintbrush strokes and paint styles—including wet and dry paint, pencil, chalk, pastels, and charcoal. These different styles are achieved by manipulating the “wetness” of the brush and the dispersion of the inner and outer edges of the brush stroke. The program's documentation provides a good starting point with initial settings for different effects. You can control brush size, paint opacity, and color with stylus pressure. A gradient bar enables you to link different colors to specific pressure settings: as you press down on the stylus, the brush smoothly changes color. The Effects brushes also offer a variety of modes, such as smearing, smudging, pushing, tinting, and more.

The color-palette window offers a straightforward approach to selecting and mixing colors. You can use a finger smearing tool and airbrush to apply and mix colors, or you can use an eyedropper to pick colors from an image window. You can toggle between different color models, including HSB (hue, saturation, brightness), RGB, and CMY (cyan, magenta, yellow). The color-palette window also contains the gradient bar: you drag color swatches onto the bar, and the program automatically creates the intermediate gradients (much like the gradient control in Electronic Arts' Studio/8 and Studio/32). Video artists will appreciate the video safe switch, which insures that a selected color falls within a specific saturation and brightness range. For example, if you attempt to increase a color's brightness, Oasis lowers the saturation value in order to achieve acceptable video output. If you have a Truevision NuVista or NuVista+ or a RasterOps 364 video frame grabber, you can digitize incoming video directly from within Oasis—a handy feature.

Special F/X

Oasis's special-effects filters are generally good. The filters include emboss, reveal (which works exactly like the reveal brush, except that it works on selected regions), hard, soft, saturation, brightness, contrast, monochrome, video colors (decreases saturation of bright red and blue regions), and others. The overall filter interface is quite gratifying: you are presented with a miniature display of either the currently selected area or the entire image, before and after the chosen effect. As you use the parameter sliders, an approximation of the affected image appears in the dialog (continues).
Oasis Lightbox The Lightbox feature enables you to superimpose an active painting window on top of another image document. You can either use the background image as a tracing guide or selectively reveal the background in the foreground image.

Filter Interface Oasis's filter interface displays pre- and postprocessed images, letting you preview an effect without processing the entire selection.

Still Thirsty in the Desert
I found Oasis to contain a number of problems for the typical Mac artist. One of the drawbacks of the various brush tools is that the edges of the brushes aren't anti-aliased, something you would expect from a program of this genre. Another major problem is that there are no zoom controls—you are always working at a 1 to 1 ratio, which can be a real hassle when you're attempting to fine-tune detailed artwork. (According to the company, the next version will have zoom controls.)

There is no facility for rotating images, only for scaling them (through the standard marquee tool). Oasis is also a memory hog—unlike Photoshop or ColorStudio, it has no built-in virtual-memory scheme. While the program can run on a 5MB machine, you'll really need 8MB to do any substantial work, especially when using the Lightbox feature. I also found that a faster Mac II, such as an accelerated IIfi or IIfx, is more desirable for maximizing the brushstroke speed and minimizing lag time. Even with a Mac IIfx, I experienced a delay when using larger airbrushes.

At print time, Oasis doesn't allow you to have a lot of control over image output quality. There are no halftone or screen controls; you're basically stuck with the standard printer parameters that are part of each printer's driver. You'll find yourself exporting Oasis images into other programs for printing.

The program's documentation is fairly clean and simple, but lacking in meaningful technical data. The manual could also use some color.

Oasis's biggest drawback is its price: at $795 this is an expensive paintbrush. If the program could better compete with packages such as Photoshop or ColorStudio, the price would be justified. As it stands, though, many Macintosh artists (specifically those who use a Wacom tablet) will find Oasis a useful addition to the capabilities of Photoshop or ColorStudio, but hard to justify at its current asking price. If you are mainly interested in re-creating real brush effects, Oasis is still worth a test run.

—David Biedny

Stuffit Deluxe 2.0

Pros: Desk accessory, Finder-menu, and QuicKeys versions included; Finder-like file manipulation within archives; myriad security, IBM-transliteration, and scripting features. Cons: Installs 48 files on a hard drive; clutters System Folder; Deluxe archives can't be opened by Stuffit 1.5.1; somewhat confusing. Company: Aladdin Systems. Requires: Mac Plus; System 6.0.2; second disk drive. List price: $99.95.

Stuffit was a shareware gem that worked like a trash compactor: it crunched down any file to consume less disk space. This ability to shrink files made Stuffit a hit with modern users, who, by sending files in compressed form, could cut down the time they spent online. The recipient would use Stuffit to expand the file to its normal, usable state. Because the program was simple and efficient, it became a standard for Macintosh file compression.

Stuffit Deluxe 2.0, the commercial, dramatically enhanced version of the old standby, has an impressive list of features, an ambitious open architecture, and an infinite future.

Sprawling Tendencies
For all but the power user, however, impressive, ambitious, and infinite aren't necessarily desirable qualities in a piece of software. Indeed, one reason for the original Stuffit's success was its simplicity: double-click and go.

Stuffit Deluxe, on the other hand, consists of 48 files and litters the System Folder with an incredible 7 folders. It doesn't slump its files into a single folder, like other support-file-heavy programs. (Aladdin protests that three of these folders are mandatory in System 7 anyway, but that's little consolation to those of us trying to keep our hard drives manageable.) The total package consumes nearly 1.5MB of disk space—over ten times as much as the original Stuffit. The Stuffit Deluxe Installer does let you specify elements of the installation to (continues)
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omit; unfortunately, if you don't install everything, later when you try to do something the program beeps and announces that it cannot find something it needs. The Installer desperately needs a Minimum Installation button, like the one in Apple's System Installer.

**Feature Frenzy**

If you've never worked with file-compression programs before, you have a lot to look forward to: gigantic TIFF files shrink to 5 percent of their original size. Most other files get compressed by half, making file-compression utilities great for maximizing hard disk space.

StuffIt Deluxe works the way StuffIt did: you create a container file called an *archive*, then select files you want to stuff into it. (Most people give the archive's name the .SIT suffix, indicating that it's been compressed with StuffIt.) Taking its cue from Microsoft Word, Deluxe lets you switch between Standard Menus, where the most technical commands are hidden, and Expert Menus...a great idea that could be carried further.

According to Aladdin, StuffIt Deluxe also has 70 other new features. Among the most useful: you can view the contents of multiple archives in different windows and drag stuffed files between them (see "Deluxe Interface"). There's more to Deluxe's Finder-like behavior, too. When you double-click on a stuffed folder in an archive, instead of unstuffing the entire folder (like the old StuffIt), the program opens a list of its contents that can be individually unstuffed. If an archive contains a text file or a PICT graphic, you can unstuff and view it without leaving StuffIt Deluxe. The program now allows you to select from a variety of different compression algorithms, each offering a different speed/compression ratio. Unfortunately, their names aren't much of a selection guide. Your choices are Fast, Faster, Optimal, Best Guess, and Better. The program's password-based security, virus detection, and IBM-file translators have all been enhanced.

For added security you can embed your signature into the archive. Unfortunately, you're forced to create your signature, using a MacPaint-type pencil, when you install the program—even if you have no intention of ever using this feature.

**Extending the Metaphor**

Of the new features, the cleverest are the extensions of the main program into other formats. For example, two desk accessories come with StuffIt Deluxe 2.0, StuffIt and UnStuffIt—yes, at last you can stuff stuff without exiting your word processor. There's also an INIT called Magic Menu, which puts a new menu on the Finder menu bar (à la DiskDoubling). Click on a file icon, choose Stuff or Unstuff—and Magic Menu, you never have to encounter a dialog box. There's even an Extension for QuickKeys that lets you stuff a specific file or folder as part of a macro.

StuffIt Deluxe 2.0 is faster than previous versions of StuffIt, and it's even generally faster than Compact Pro (Bill Goodman shareware). Even when compressing files for which it has special Optimizers (such as sound and text), however, Deluxe is still slower than DiskDoubling 3.1.2, which also produces smaller files in the bargain.

**Of Visions and Versions**

If StuffIt Deluxe is somewhat overblown, it's only because it was developed by a small, zealous, visionary company that earnestly wants to please everybody. You've never heard of technical support so good—I often found Aladdin reps answering the phone at ungodly hours; they maintain active and interesting folders on America Online, CompuServe, GEnie, and AppleLink; their updates, including version 2.0, have all been free; and they have exciting plans for integration with System 7.

The final example of Aladdin's goodwill—and another example of the confusion it can create—is that they have released yet another program: the new, confusingly dubbed StuffIt Classic. This shareware version, also called StuffIt 1.6, shares the file format, virus checking, online help, and Finder-like archive structure of Deluxe. (It does not offer the Magic Menu, desk accessories, or other extensible features.) StuffIt Classic is available from user groups and online networks; if you do use it, you're asked to send $25 to the company.

The upshot: there are three current versions of the program, and they're not mutually compatible. StuffIt Deluxe (commercial) and StuffIt Classic (shareware) are new and have the new file format. StuffIt 1.5.1 is the trusty old shareware edition—the real standard, gathered over the years by thousands of Macintosh users and reinforced by millions of online-service files.

In other words, in the interest of building a better program, Aladdin has had to abandon the standard that put StuffIt on the map; it will probably be years before the Deluxe/Classic format totally replaces the early version. Nonetheless, releasing a Deluxe-compatible shareware version was a generous and shrewd maneuver on Aladdin's part.

**Compression Conclusions**

The power-user features unique to StuffIt Deluxe include the Finder, DA, and QuickKeys extensions; scripting for automated selective backups; and translation of IBM-format Zip and Arc archives. If you require these features, rejoice; StuffIt Deluxe works precisely as advertised, is nicely priced, and is backed by a bright-eyed company.

If you're an orner y cuss like me, however, and resent having a humble utility dump a megabyte of clutter into your System Folder, get StuffIt Classic (1.6). It feels odd to recommend the shareware version over the commercial one, but for the casual user, Classic offers most of Deluxe's advantages without its sprawl. And hey—next time someone wants to create a new standard, how about making simplicity part of the formula?
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Forecasting and Risk Analysis Software

CRYSTAL BALL 2.0

Pros: The only software defense against spreadsheet forecasting mistakes; easy to use; notably enlightened manual.


The day after the first computer spreadsheet was sold, someone somewhere began using it to make a wildly unrealistic business projection. This was simply the microcomputer version of the "garbage in, garbage out" phenomenon demonstrated back in the days of punched cards and room-size mainframes. Desktop computers gave average citizens the ability to delude themselves with a thoroughness formerly possible only for large corporations. There is, fortunately, a statistical way to sort through the connection between your own assumptions, probable facts, and projected outcomes; and that way is delivered in easy-to-use form in Crystal Ball.

The Art of Seeing

When you try to play "what if" in a spreadsheet, you typically make up a calculation similar to a budget, with cells filled with estimates of materials costs, promotional expenses, salaries, revenues, and other expected financial items, to arrive at an educated guess for profits. In a more sophisticated version, you might make up high, low, and midrange values for all the items. But the fact is that all this makes for a remarkably error-prone way to make an important estimate.

Instead of entering single numbers as values in spreadsheet cells, a more realistic way to make estimates is to give cells all the possible values in a weighted distribution. For example, rather than use a single number for sales, a calculation should be performed over and over with values for sales taking on probable values from a statistical distribution. Furthermore, if all important values in a calculation are actually represented by distributions, you have the most realistic simulation of your actual prospects that a computer can give you. The problem is, a standard spreadsheet can't do this kind of computation without dozens of pages of complicated macro programming. Crystal Ball is the solution to that problem.

Improving the View

To use Crystal Ball, you simply make up a basic spreadsheet computation representing the quantities in a projection as single values, then save the computation as a SYLK file (you can use any spreadsheet that saves files in SYLK format). When you open the spreadsheet in Crystal Ball, you can attach a distribution to any value in the projection. The Crystal Ball spreadsheet preserves formulas but can only substitute distributions for plain numbers, not formulas, in the original spreadsheet; the cells that display results computed with formulas (not present value computations and the like) will now show these results based on the distributions in the simple numeric cells.

To associate a distribution with a numeric value, you select the Define/Change Assumption command from the Cell menu, and pick the distribution you think corresponds to the real-world possibilities (see "Probable Suspects"). (The manual contains an easy-to-follow, comprehensive mini-course in distribution selection.) The ability to correctly select and tailor the distribution is what makes a Crystal Ball forecast statistically superior to the usual hit-or-miss spreadsheet methods. Because you are forced to pick a most likely distribution rather than simply entering your favorite number for a value, the chances of the program generating a realistic forecast are greatly improved.

The actual projection uses the Monte Carlo technique, meaning that a random number generator produces values for each of the assumption cells during a series of tests, and gives numerical estimates in the cells you have identified as forecast cells. Monte Carlo methods are compact enough that the projection can run on a basic Mac; if you have more memory you can select Latin Hypercube sampling for faster results. Version 2.0 has improved on a basic Monte Carlo projection. You can select correlations between values if you think you have some valid correlation assumptions. If you think house sales go down as interest rates go up, you can call up a correlation dialog box that lets you set the correlation coefficient, and the program will warn you if this correlation conflicts with assumptions you made elsewhere. You can also now use trend charts to explore in detail the way your uncertainties in a project expand as you extend forecasts further into the future.

Version 2.0 includes a few new spreadsheet-handling and interface improvements. You can open multiple spreadsheets and linked spreadsheets, use cell references instead of numbers in SYLK models, work with standard date and time functions, and leave circular references in iterative calculations. Report output now can have borders, use bold and italic fonts, and display assumption distributions; statistics reporting now includes exact calculated results; and exported result files can include statistics as well as forecast values.

A Prediction

The first version of Crystal Ball provided a unique service to people who make forecasts and risk assessments; the second version offers a particularly refined and feature-rich implementation of this service. It's the only known cure for unrealistic spreadsheet financial projections, it provides a valuable education in practical statistics, and its cost is, to be blunt, negligible compared to the cost of the mistakes it can help you prevent.

—Charles Seiter

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**DISKFIT 2.0**

**Pros:** Easy to use; can incrementally back up changed files only; reclaims floppy disk space. **Cons:** Poor tape support; limited file selection. **Company:** SuperMac Technology. 

**Requirements:** Mac 512KE; System 6.0; hard drive. **List price:** $99.95.

**NETWORK DISKFIT 2.0**

**Pros:** Retains and restores AppleShare folder privileges. **Cons:** Poor file selection; inadequate scheduling features. **Company:** SuperMac Technology. 

**Requirements:** Mac 512KE; System 6.0; hard drive; AppleTalk or TOPS network. **List price:** $395.

DiskFit 2.0 and Network DiskFit 2.0 are the latest upgrades to SuperMac's popular backup programs. They add some frequently requested features, reaffirming DiskFit's place as one of the best backup programs for users with smaller hard drives. Time, however, has passed Network DiskFit by.

Both programs create a SmartSet, which is a set of disks containing all the files or documents on the hard drive. SmartSets can consist of applications and system files only, documents only, or both. Unlike some other backup programs, DiskFit maintains files in normal Macintosh format so that you can easily restore a single file from a SmartSet floppy disk to the hard drive. If a file is larger than a floppy disk's capacity, DiskFit breaks up the file to fit on two or more floppy disks.

Incremental hard drive backups couldn't be easier. Start DiskFit, press return, insert your first SmartSet disk, and hit return again (see "Fast and Clean"). That's it. The program scans the hard drive, prompting you to insert only those floppy disks that contain files that have changed since the last backup. Files that have been removed from the hard drive are erased from the backup set, making room for more data. DiskFit places a backup report in the System Folder that lists the folders and the floppies to which the files have been copied.

Although DiskFit is primarily intended for backing up to floppy disks, the program can handle any removable media that can be mounted on the desktop, including SyQuest, Bernoulli, and magneto-optical cartridges. DiskFit also backs up to some older DC-2000 tape drives, such as the discontinued SuperMac DataStream, but the process is slow. To access a tape drive on the Mac desktop takes a long time. Tape drive users are much better off using the software that comes with their drive, or Dantz Development's Retrospect.

DiskFit's included help feature is excellent. And the SuperMac technical-support people I spoke with (not toll-free) were knowledgeable, although I waited on hold for almost ten minutes. They also responded promptly to questions I sent on CompuServe and Connect.

**What's New?**

DiskFit now lets you select individual folders, although not individual files, for backup. You can exclude files from the backup set by type and creator. This exclusion feature needs to be refined; excluded file types are listed in a scrollable window, but DiskFit doesn't include the actual name of the excluded file type or application. The program also handles larger files than the previous version did; now you can back up files as large as 2 gigabytes. You can view and print the backup report from within DiskFit. And the new Subvolume feature lets you perform a duplicate backup to a folder on another hard drive. Unfortunately, you can't perform a SmartSet backup to a Subvolume, and you can only use the New Folder Selection feature with SmartSets, so Subvolume backups aren't as useful as they might be.

Delayed backups enable you to delay the start of a backup for a specified number of minutes. Most backup programs let you enter a particular time for the backup to begin. The delay feature for floppy disk backups is useless. This feature is mainly meant for tape users, but there are better programs for backing up to a tape drive.

---

**Fast and Clean**

DiskFit has new features, but the main controls are still clean and uncluttered. After you start the program, it takes just two clicks on the mouse to start your backup.

**Network DiskFit**

Network DiskFit has much the same features as the single-user version, adding the ability to back up AppleShare or TOPS server volumes while retaining folder privileges. It also lets you back up a local hard drive to a folder on a remote volume. My speed tests showed that Network DiskFit provides acceptable backup speeds over AppleTalk to an AppleShare server, but the program still comes up short in today's network environment.

No network administrator would attempt to back up a large network server to floppies; even SyQuest cartridges aren't sufficient. And the program's inadequate scheduling and unattended backup features rule it out. I recommend large-capacity (150MB and heftier) tape drives used with a superior backup program such as Dantz Development's Retrospect for server backups.

**A Winner and a Loser**

DiskFit has enjoyed a fine reputation for years for its reliability and ease of use. It's still a very good choice for users with hard drives as large as 40MB. A 40MB drive requires almost 30 high-density floppy disks for a complete backup. This is basically the realistic limit; more floppy disks, and you will require the patience of Job. If you have a medium-size hard drive (up to about 150MB) you can still use DiskFit well if you back up to a removable cartridge drive. But if you don't have a cartridge drive, a tape backup is a better choice for medium-size to large hard drives. And finally, network administrators should look elsewhere for their backup needs.

—Tom Negrino

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Although frequently overshadowed by Claris CAD and others, MiniCad+ is a features-for-price value leader in CAD programs. Version 2.0 integrated a spreadsheet, a macro language, and improved drafting and 3-D features. Version 3.0, demanding a higher price and more hardware, is now a direct competitor of such high-end offerings as AutoCAD. The MiniCad+ cursor performs more tricks than a performing poodle; the program's easy-to-use 3-D features have become easier still; a built-in relational database lets you associate all kinds of information with drawing objects; and a DXF translator (for communication with other CAD packages) is now part of the Import and Export commands.

By Design
The basis of MiniCad+ is its strong 2-D drawing section. It has all sorts of editable lines, fills, and arrowheads; splines (cubic and bezier) for curve correction; mirroring; hatching; and provision for creating arrays of circles and other elements. The program provides as many drawing layers as memory allows, user-defined symbol libraries, simple zooms in and out, a constraint palette, and a flexible auto-dimensioning system. If all these MiniCad+ features sound good to you—and they're competitive with most of the popular 2-D drafting programs—but you don't care a whit for 3-D, you might look at Graphsoft's 2-D-only product, Blueprint, a $295 CAD program.

MiniCad+ 3.0's "smart cursor," a feature implemented to various extents in some other CAD programs as well (Ashtor Vellum, Claris CAD), changes its configuration as it passes over different parts of a drawing, indicating snap points, midpoints and endpoints of lines, intersections, tangents, and parallels. In practice this saves drawing time by eliminating guesswork and faulty positionings. When you select a drawing tool—the rectangle tool, for example—the cursor becomes almost deliciously chatty, spewing out location information in a tiny text box. You can turn it back to a plain arrow cursor if you find all this conversation distracting.

Adding It Up
The smart cursor is an important addition, but MiniCad+ actually serves a different conceptual function than do pure drafting programs. Like comprehensive workstation CAD programs, MiniCad+ is an attempt to automate much of the after-the-drawing work that a real project entails. Real drawings result in orders for components, cost calculations, and lists of machining or construction tasks. Processing this information by hand can be more time-consuming than generating drawings in the first place. That's why version 2.0 featured an Excel-like spreadsheet linked directly to a drawing (spreadsheet cells can also be linked to drawing objects).

The relational database in version 3.0, in combination with the macro facility, is Graphsoft's solution to the problem of automating numeric and object data in a drawing. Objects in a drawing can be tagged, with any type of text or numeric data—the data for the currently selected object appears in a Data Palette. A drawing of an office layout, for example, can include prices, suppliers, catalog numbers, and other information for all the furnishings and fixtures in the office. This information can then be searched. An architect might search for price as a criterion to identify stand-out cost items in the design. The real point of Graphsoft's grand design is that over time you can buy or develop libraries of symbols, which have their own data palettes, and develop or buy third-party macros to automate assembly of the symbols into finished drawings. You then have a CAD system in which drawings can be generated, complete with parts lists, vendor sources, and other critical information, in a matter of hours. Graphsoft probably had something like this in mind when it included MiniPascal in the earlier versions (it's still there), but now mere mortals with drafting training can implement this futuristic vision using macros and the new database.

The Final Lines
MiniCad+ 3.0 might not yet be perfect, but Graphsoft is clearly trying. The program no longer runs on a 1MB Plus, but RAM is cheap (you'll be happier with 4MB than with the minimum 2MB). Drawing windows still lack scroll bars, and the menu bar still displays cryptic symbols, but these are quibbles. More serious annoyances are that you must buy all plotter support, and there's no online help (to be fair, a decent help file for a program like this would be huge). Finally, an obstacle to the full use of the program is that the manual is at many points more like a Pascal programmer's guide than a training document for people with a traditional drafting or even standard CAD background. With MiniCad+ 3.0 not only do you get everything including the kitchen sink, but you can define a reusable kitchen sink symbol, with its own linked data set of suppliers and prices. The catch is that some of the advanced functions are difficult to use if you don't have a programming background. Even so, with version 3.0, MiniCad+ has gone from very good to great as an advanced drafting program, and it offers lots of power beyond straight drafting to those willing to invest the learning time.

—Charles Seiter
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Circle 80 on reader service card
MITSUBISHI SC-7500

Pros: 400-dpi resolution; 11-by-17-inch scan area; good registration of red, green, and blue color layers.

Cons: Expensive; poor image quality.

Company: Mitsubishi International.

Requires: Mac II; 4MB of RAM; hard drive; 8-bit color board; color monitor. List price: SCSI version $8950; GPIB version (without interface board) $8450.

Most often the reviewer's job is a careful balancing act, a matter of weighing pros and cons and of making recommendations and qualifications. Sometimes, however, rendering judgment is easy. I can sum up my opinion of the Mitsubishi SC-7500 color scanner, for example, in three words: Don't buy one. The SC-7500 achieves the deadly distinction of combining the worst performance with the highest price in its class.

The SC-7500 is a 400-dots-per-inch, 24-bit color flatbed scanner with a scanning area that measures 11 by 17 inches. When this review was written, the scanner worked only with reflective art. According to the company, a transparency attachment with a projected price of $950 was scheduled for release sometime in the second quarter of this year, however.

The SC-7500 is unique among Mac color flatbed scanners in that it is a true one-pass device. Like virtually all other Mac scanners, the SC-7500 produces a 24-bit file containing millions of colors by adding 8-bit (256-color) red, green, and blue files together. All other Mac flatbed scanners produce the red, green, and blue files using one light sensor, which captures light tinted by red, green, and blue filters or produced by three separate color bulbs. Some scanners make three separate passes, and some take three readings for every scan line as the sensor proceeds across an image.

In contrast, by using three light sensors—each of which has been altered so that it reads only one color of light—the Mitsubishi can read a full 24 bits of color simultaneously. One might think that this would give the SC-7500 a speed advantage over its rivals, but actually the machine came in on the slow side in my speed tests. The one advantage of the three-sensor design is that scans produced by the SC-7500 are sharper than average because of excellent registration between the red, green, and blue layers. Slight misregistration of the color layers is common in Mac scanners, and can cause blurred edges and softened details.

Perfunctory Programs

The SC-7500 ships with two pieces of software: a ColorStudio module and a stand-alone program called SC-Scan. The ColorStudio plug-in enables users to access basic scanning functions from within Letraset's color image-editing package—which is not bundled with the scanner, in case you were wondering. SC-Scan provides more features than the ColorStudio module; and SC-Scan also enables users to avoid some of ColorStudio's limitations (for example, ColorStudio doesn't work with 1-bit black-and-white files at all, and 8-bit gray-scale files in the program take up as much memory as 24-bit color files). Either of the SC-7500's scan programs can get the job done. Neither will be winning any prizes this year, however.

Both programs suffer from bad design decisions. For example, both programs offer only five settings for scan resolution. This limited field of choice means users will frequently have to either live with scans that take up more memory than is necessary or take the extra step of using a program like ColorStudio to eliminate the unwanted information. And none of the five resolution options corresponds to screen resolution—a frequently used setting in multimedia and other on-screen applications.

A worse failing of both programs is that neither warns you when you're about to begin a scan that requires more than the available disk space. This omission is particularly annoying in the case of the ColorStudio module, since whenever you lose, cancel, or complete a scan in that program— or simply close the scan module for a minute to do something else—the software throws away the prescan. (A prescan is a small, low-resolution scan used in most scan software to select an area of an image for final scanning.) Having to continually redo a prescan would be irritating with any scanner,
but it turns out that the SC-7500 is the second-slowest prescanner in the Mac market, with each prescan taking a full minute and a half.

SC-Scan offers some relatively fancy features like controls for redrawing gamma curves for on-the-fly brightness correction and the ability to save sets of scan parameters by name for later use. However, it doesn't have one of the basic requirements of a scanning program—the ability to resize an image during scanning. And the program has a generally clunky design that forces users to go through extra steps and to be conversant in unnecessarily techy terms like \textit{xmin}, \textit{ymax}, and \textit{CLUTs}.

\textbf{The Proof's in the Printouts}

So-so software is an annoyance, but in itself it would never be enough to earn a scanner a thumbs-down rating. In the final analysis, a scanner lives or dies by the quality of the scans it makes. To put it bluntly, the Mitsubishi's scans look as bad as any I've seen.

What do you look for in a color scan? Well, one obvious thing is color. The color separations I had made of the SC-7500 came back looking very, very gray and colorless. The focus was on gray and colorless. The focus of the program was not at all pleasing (see "Dark and Dirty")

Numeric testing (in which I read color values off the screen using Adobe Photoshop's histogram) identified one reason, perhaps among many, for the Mitsubishi's poor color response. Tests with standardized red, green, and blue color swatches showed that the scanner has a difficult time seeing red. The red channel is contaminated by green at a higher level than that exhibited by any other Mac flatbed I've tested (see "Affordable Color Scanning," \textit{Macworld}, June 1991). Overall, the scanner also has an unusually strong bias toward blue, but that tendency is easier to correct than the color "cross talk." If you're paying a premium for a 400-dpi scanner, my assumption is that you intend to scan for print separation. I have to say that, for this purpose, the Mitsubishi's results are unacceptable.

To sum up: the SC-7500 is slow, ugly, and inconvenient. That would be bad enough, but it also costs $8950—over $1000 more than its 400-dpi flatbed competitors, the Agfa Focus Color ($7995—not including software) and the Howtek Scannmaster 3 ($6995 plus $1200 for GPIB board and Photoshop). If you need 400 dpi (typically, if you'll be enlarging transparencies or other materials but can't make the 600-dpi price point of $12,000), both these units provide good-quality scans. The Agfa has an 8½-by-11½-inch scan bed, so if you need an 11-by-17-inch bed, get the Howtek or, if 400 dpi isn't important to you, the 300-dpi Sharp JX-450 ($5995).

Before buying any of those units, however, I'd check into two new models that were announced but unavailable at press time. The Fujitsu M3096 and the Prime Option Phovos 400C are both 400-dpi flatbeds, and both had a projected price of about $6500. Much more like it, in my opinion.—Joe Matazoni

\textbf{Handwritten Form Recognition Software}

\textbf{PAPER KEYBOARD 1.2}

\textbf{Pros:} Handles check boxes well; under optimum conditions, saves time.

\textbf{Cons:} Crude interface; requires unnecessary programming; cryptic manual; unreliable import of TIFF files. \textbf{Requires:} Mac Plus; 2MB of RAM; System 6.0; Apple, Abaton, or HP ScanJet Plus or any flatbed scanner that generates TIFF files. \textbf{Recommended:} Sheet feeder.

\textbf{Company:} Datacap. \textbf{List price:} $895.

\textbf{Fast Times} is a magazine for high-school students. To capture teenage tastes and trends, its editors wanted to take a nationwide opinion poll of its readers. The problem: how to process the 20,000 mailed-in responses. Typing each into a database would be impossibly tedious.

They discovered Paper Keyboard, a unique program that works in conjunction with a scanner to recognize handwritten responses on printed forms. For \textit{Fast Times}, the solution was successful, because the magazine hired Datacap to do the actual processing of the forms. Had the magazine's editors tried to work the program themselves, they might have discovered that Paper Keyboard is a wonderful concept whose implementation needs some work.

\textbf{Designing in Formation}

Paper Keyboard won't work with any old form—it only works with forms that have been designed with Paper Keyboard in mind. Using the special PostScript font provided, you create a form's blanks by typing a row of blank rectangles, or \textit{dominos} (see "The Paper Key"). The font also includes check boxes for multiple-choice responses, as well as crosshairs \textit{anchors} to place in the corners of the form. When you scan a completed form, Paper Keyboard looks for these anchors to orient itself on the page. Dominos, check boxes, and anchors must be placed with white space around them according to Paper Keyboard's specifications, or the form-recognition process doesn't work.

Now you conduct a poll, survey, or questionnaire. This part is tricky, too. You have to persuade the participants to fill out the forms according to Paper Keyboard's rules. Respondents must write in a special block style, based on a model alphabet (which you should include on each form), drawing each letter
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around the dots in a domino. Paper Keyboard-style lettering looks fairly normal; only the shapes of the 6, 7, J, Q, R, and U are liable to take the form-fillers by surprise.

**Pure Speculation**

Before scanning the completed forms, you must describe the incoming images to Paper Keyboard by writing a form spec. This text file contains programmerese descriptions of every blank or box in the form, including the name of each field; the exact coordinates of each field's corners (in tenths of a millimeter); the length of the field (in characters); the data type (text, numbers, and so on). The process is staggeringly tedious if you're not already a programmer. It's a struggle to figure out the exact vertical and horizontal tenth-millimeter coordinates of every corner of every field, even using PageMaker's centimeter rulers option.

That you're condemned to programming this form spec is ridiculous—what's a computer for? The IBM version of Paper Keyboard will let you indicate the corners of each field simply by clicking; the program writes the form spec automatically.

**Scan of Worms**

Fortunately, Datacap's developers told me they're happy to help you compose the form spec—if need be, the company even writes it for you (using the IBM version, of course). "We're not going to let you fail," promises a spokesman. Indeed, after a day of frustration, I gave up and let them write the form spec for me.

To test Paper Keyboard, I distributed a 2-page, 10-question survey to 30 random New York City residents from wide social, age, and ethnic ranges. As an incentive to fill out the form correctly, I gave each a dollar.

Unfortunately, you can scan directly into the program only if you have the Apple Scanner, the HP ScanJet Plus, or the Albatron flatbed. If you use another scanner, you have to save every page as a TIFF file, which Paper Keyboard can then read. Correction: Can sometimes read; Datacap says that subtle variations in TIFF files may prevent Paper Keyboard from reading them. In my tests with a Seiko scanner, Paper Keyboard choked on about a quarter of the TIFF files, indicating its displeasure by displaying the helpful error message "Tfisfstrp: read@gj906748 got 17want 1004856018."

Datacap warns, too, that to make the Paper Keyboard process worthwhile you really need a sheet feeder for the scanner. Imagine placing each of 20,000 *Fast Times* poll forms on the glass of a flatbed scanner—knowing that if a page isn't perfectly aligned, Paper Keyboard won't read it.

**Top Form**

If you've made it this far, you get to the good stuff: the recognition process. Paper Keyboard displays the scanned image of a form in a background window, whipping through field after field. The program reads the handwriting or the check boxes as easily as you or I, and sends the form's tab-delimited data into a text file you can later import to a database for analysis and printing. When it works flawlessly on the first attempt—as it did on 2 of my 30 test forms—it's a breathtaking glimpse of handwriting recognition's future.

If the program has any doubt about the contents of a field, it stops reading and presents a text-editing box, where you can either approve or edit its guess. Paper Keyboard is extremely smart about when to consult you. In every instance, you see immediately why it doesn't recognize a letter: somebody drew outside the domino or crossed something out, for example. You can probably guess the distinctions that it has trouble making: A/R, V/U, T/Y, and so on. As you sit and correct guesses, you wish you'd spent even more time telling participants the importance of careful lettering—around-the-dots. You are happy, however, that you only have to retype the questionable responses, while Paper Keyboard enters everything else.

A number of sloppy interface and programming quirks mar the recognition process, however. If the paper wasn't straight in the scanner—and therefore the program can't locate the anchor crosshairs—there's no way to adjust anything or help the program find the crosshairs; you simply have to rescans the form. (That will be fixed in the IBM version, says Datacap.) If you edit one of Paper Keyboard's guesses and then change your mind, there's no way to go back and edit your mistake; you have to discard the good data along with the bad and, again, rescan the form.

**The Future Isn't Now**

If you meet the following conditions, the fledgling Paper Keyboard might be worth considering: You have one of the three supported scanner models, with a sheet feeder. You process enough forms to justify the considerable time, expense, and learning time. The people filling out the forms will take special care in printing any letters (check boxes, on the other hand, work like a charm, requiring much less care). And you're ready to spend long hours working with a poorly designed interface.

If that doesn't describe you, you'll have to wait for the intelligent form-spec version that Datacap promises will eventually appear.—David Pogue

See Where to Buy for contact information.
2.03, which replaces the collection's weakest elements—InstantAccess, MemorySetter, Persistence, and RearWindow—with four new utilities: FinderKeys, Super Boomerang, MultiMaster, and Screen Locker.

FinderKeys (like RearWindow) allows you to select, move, and copy files and folders in windows that are behind the currently active window—without deactivating the currently active window. FinderKeys also lets you select files or folders in Finder windows by name, open selected folders, and if MultiFinder is turned on, launch selected applications, all from the keyboard. But be forewarned: just as FinderKeys eclipsed RearWindow, System 7 will eclipse FinderKeys with its even more comprehensive set of Finder shortcuts.

Super Boomerang replaces InstantAccess and is in direct competition with Aladdin Software's Shortcut. Like Shortcut, Super Boomerang provides quick access to all mounted drives, partitions, and frequently used files and folders. Super Boomerang also creates new folders and searches for lost files—all within an Open or Save dialog box. Unlike Shortcut, which has one somewhat inconvenient menu with submenus, Super Boomerang divides its functions among six menus that are displayed across the top of the dialog box. More important, using Super Boomerang you can also rename, duplicate, and delete files within an Open or Save dialog box; specify a default folder for any application; add a submenu of frequently used files to most applications' File menus; and compress long file names so that more of the name is visible within the Open or Save dialog's scroll box.

MultiMaster, like Icon Simulations' On Cue and Software Innovations' HandOff II, enables you to launch files and applications or switch to another active application (when MultiFinder is running) from a pop-up menu or from a special menu in the menu bar. Unlike its competition, MultiMaster does not let you move between active applications with a single keystroke, but like HandOff II, it can set aside the windows of all but the active application to eliminate MultiFinder desktop clutter. MultiMaster can also be used to reset an application's MultiFinder partition size (a function formerly performed by MemorySetter) and analyze current memory usage (see "Memory").

Screen Locker, which is also available separately (for $79), adds screen-saver and security functions that were not part of the original Now Utilities collection. With its handful of relatively static screen-saver options, Screen Locker doesn't hold a candle (or a flying toaster) to the colorful and justifiably popular After Dark (Berkeley Systems) or Pyro (Fifth Generation Systems). The security part of the program shuts off the screen saver and reinstates the main screen only if you enter the correct password. You can configure Screen Locker so that a password is also required at start-up, and you can specify a set of master passwords as insurance, should you forget the main password. Screen Locker also keeps a log of attempted entries. Screen Locker is, however, a very low-level security device—anyone who knows how to turn off an INIT can easily get past it.

A new version of Startup Manager—which allows you to select which INITs run at start-up and in what order, and create different INIT configurations for use on different occasions—fixes many of the old version's flaws. For one thing, Startup Manager no longer changes the names of INITs when you ask it to alter their loading order. For another, to help you locate problem INITs, Startup Manager now allows one-time-only changes to an existing INIT configuration at start-up. Startup Manager also ensures that INIT icons display properly at start-up (a function formerly performed by Persistence), disables an INIT if it crashes during the previous start-up attempt, and provides a way—for those who know what they're doing—to reset the system heap size (a common need when large numbers of INITs are involved). Although it's not as classy or colorful as my favorite INIT utility, INITPicker (MicroSeeds Publishing), or as feature-laden as INIT Manager (Baseline Publishing), Startup Manager now gives both a run for their money.

Other parts of Now Utilities are more or less the same as in version 1.0: NowMenus adds submenus of desk accessory commands, Chooser choices, and Control Panel files to the Apple menu and adds pop-up menus to any application. DeskPicture replaces the desktop pattern with a black-and-white or color picture of your choice. AlarmsClock displays a digital clock and flashes previously recorded alarms in the menu bar. Print Previewer saves paper by displaying test documents on screen. Customizer, like the freeware program Layout (by Michael C. O'Connor), enables you to alter a variety of desktop characteristics, such as the arrangement of icons and the font used for file names. The WYSIWYG Menus utility displays each font in the Font menu in its own typeface, and groups all the fonts from one family. And Profiler creates a complete system-configuration report, which can be useful in diagnosing problems.

Altogether, Now Utilities 2.03 is a significant improvement over the original version. Although the manual is still rough sledding in places, Startup Manager, Super Boomerang, and MultiMaster can hold their own against the best, and the other elements of the collection are comprehensive in coverage and good enough for all but the most demanding Macintosh owners. With its new, lower price, Now Utilities makes it difficult to justify the expense of collecting a half-dozen or more single-purpose utilities. Anyone who doesn't already own some or all of the alternatives and finds system utilities such as these appealing (and who doesn't?) should find Now Utilities hard to resist.

—Robert C. Eckhardt

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**MAC SCHOOL 3.0**

Pros: Flexible; comprehensive; carefully designed. Cons: Requires heavy commitment in training and practice; uneven tech support.

Company: Chancery Software.

Requires: Mac Plus; 2MB of RAM; hard drive. List price: $1950 to $4200, depending on options.

Mac School is by far the leading Macintosh school-management software package. It can automate, quite efficiently too, every current type of school record. The program is flexible and can be tailored to any special circumstances. It is also complete—Mac School has a module for everything, from library management to course grading to funds accounting.

As independent Mac School consultant Doug Boehme of Hillar, California, points out, the correct relational-database structure for the records of a school or group of schools has more and trickier kinds of links than do the more familiar client-tracking or customer vertical-market databases.

**A+ for Thoroughness**

One basic single-user bundle (this cost $2400 in early 1991, but price changes are expected) includes nine modules: Attendance, Report Cards, Marks, School Setup, Student Details, Report Manager, Teacher Details, Course Details, and Query. The modules are directed from the Mac School Shell, which acts as a sort of internal Multi-Finder for managing all the modules active at one time. The modules themselves have two main strengths. First, they show familiarity with the smallest details of school practice in North America (see “High Marks for Effort”). Second, Query and Report Manager let you extract, view, and present any information from any of the modules in any custom format.

Mac School has anticipated most of the reporting formats you are likely to want if you don’t want to design your own. For example, the Report Cards module. Besides allowing for virtually any grading details (do you want a B+ to count in the grade point average as 3.5 or 3.0?), the module lets the school set a complete range of criteria for honor roll status (no more than three tardies per semester? PE grades don’t count? extra points for honors classes?). Most of the Mac School users interviewed for this review—Chancery provided a long list of references and a complete set of software for one suburban junior high school as a Macworld test site (and subsequent rich source of comments)—noted that with each release of Mac School (version 2.7 gave way to 3.0 as this review was written) the software’s anticipation of their needs is impressively complete.

The other modules, which can be added to an existing basic Mac School setup under the Shell, are Scheduling, Library, Advance Booking, ASCII, Scanning, Guidance, and Health Records. There is an optional District Student Management program for processing records from several schools at a central district office, and a stand-alone modular accounting system called Funds Accounting. Each module makes characteristic demands and offers its own benefits. Scheduling, for example, makes all the student schedules for an entire high school. Using Scheduling for the first time can take longer than doing the same task by hand, but subsequent semester schedules can then be produced in hours. Library makes the school librarian’s life a dream once it’s set up. If a school already has extensive computerized records, the ASCII module allows the import of all types of record formats into Mac School.

**Doing Homework**

Mac School offers the prospect of efficient record-keeping with potentially fewer administrative or clerical employees. This absolutely does not mean that you can mail a check to Chancery Software and make your school’s problems go away. As an administrator at the test site noted, “Each complex module—Scheduling and Report Manager, for example—takes about as much effort to learn effectively as PageMaker.” Schools that report the best success typically bought not just the on-site training ($2400) for a staff group, but also in-house training at Chancery in Vancouver (approximately $1600 each) for selected staffers who were then capable of training others. Another budget consideration is hardware. In principle you can run this system on Mac Pluses and link them with TOPS. In practice you need loaded SE/30s (the company recommends Classics), and a high-speed printer rather than an ImageWriter if you want to print 700 report cards at a time. All the references Chancery provided offered the same conclusion: if your school has the resources in money and staff time to get enough training, the investment pays for itself and works wonders. If you just buy the software and get minimal training, you’ll have traded several thousand dollars for pretty meager results.

**Report Card**

Mac School gets very good marks for software quality, despite occasional minor mysteries (one school reported its ethnicity data on individual students scrambled in upgrading from 2.7 to 3.0, and Mac School’s option-key codes don’t match those of other Mac software). Chancery has also addressed the training issue with a variety of programs, none cheap but all first-rate. Customer support quality also fluctuates a bit; most sites report immediate and helpful answers to all questions, while a few complain of waiting days for calls to be returned. On balance, though, the report card is mostly A’s. Chancery has done a superior job of understanding its customers’ needs, and Mac School as a result is an outstanding product.

—Charles Seiter

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Circle 33 on reader service card
This past year network managers have seen a dearth of programs that make their job easier (see "Managing Networks," Macworld, February 1991). Now a new tool called GraceLAN lets a manager determine who and what is on the network, as well as what software and hardware they're using, all with one program.

**Query and Control**

The GraceLAN application polls the network zone-by-zone to discover what devices are attached to the network. This includes Macs, LaserWriters, PCs, and other network devices such as routers and networked modems. The amount of detail about a particular workstation depends on what INIT is installed in that Mac. If Apple’s Responder INIT is installed, the name (from the Chooser) and type of Mac will be displayed in GraceLAN’s network map. If the GraceLAN Responder INIT is installed, the GraceLAN program obtains more information about that Mac, including system software versions, type of keyboard, NuBus boards installed, SCSI devices, monitors, INITs, and so on. (Limited information is presented by the DOS program that Technology Works provides for PCs using AppleTalk.)

Network management raises issues of user privacy. Should the network manager know everything (well, almost everything) about a network user’s Mac? How can the network manager provide user support if he or she doesn’t know what’s on each Mac? GraceLAN offers a reasonable solution to this dilemma—part of the GraceLAN security-level INIT is a cew with which the user can restrict what’s reported back to the GraceLAN application when it queries the user’s Mac. The options are Name and Machine Type Only, System Info, All Info, and Make Changes. This last option isn’t a report option—it’s meant as a control for updating the GraceLAN Responder or synchronizing the Mac’s clock to the manager’s clock.

GraceLAN also offers an option for monitoring LaserWriter usage—as long as the GraceLAN administration program is running (even in the background) on the network manager’s Macintosh, it can log the activity of selected printers on the network. The current version of GraceLAN creates a log that contains only the name of the user and the print job—it doesn’t include other useful information such as time taken to print or the number of pages.

**What to Do with It All?**

It’s often hard enough for a single user to keep track of what software is on the Mac. What’s a network manager going to do when all this information is displayed on his or her screen? GraceLAN offers a few ways to select and present the data.

First, the manager can select network devices on an individual or zone-by-zone basis for viewing. To create a map of the network topology, you’d probably want to select all zones; on the other hand, you might only want the one or two zones that correspond to a particular department if, say, you’re planning a software upgrade. Or, if you’re trying to figure out why a particular Mac continually crashes with a particular INIT, you might select only that Mac for a detailed report.

Designated devices can be selected either from the network topology window or from the text window that lists those devices (there are four text windows—Macs, PCs, Printers, and Others). From any text window you can use GraceLAN’s limited search capabilities to select a subset. For example, you can see only those Macs that have System 6.0.5 or a later version. The search facility, however, does not support any Boolean logic to allow you to couple search criteria. You cannot ask to see all Mac SE/30s that have System 6.0.5 and AppleTalk version 4+, for example.

You can print or export a copy of the information for future reference. GraceLAN comes with a FileMaker II template to make the compilation a bit easier.

**Being There?**

One difference between GraceLAN and other competing products (such as Status Mac from Pharos Technology) is its ability to collect system information from the Macs in real time. This can mean that you have to wait until all the Macs are turned on before you can get a full report, and it can mean that a user’s work is disrupted while he or she waits for GraceLAN Responder to get the information and transmit it to the GraceLAN program. The GraceLAN Responder is fairly quick, but I did notice a slowdown on some older Macs when the data is being collected. In addition, on a large network, this can mean a lot of network traffic.

If there’s some doubt about a report from a particular Mac or group of Macs, you can select them for rescanning (that is, querying them for a new report). Unfortunately, GraceLAN (continues)
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doesn't provide an easy method for rescanning the network (or even a zone) to see if devices have joined or left the network. You have to deselect a zone (or zones) and then reselect that zone for a rescan.

GraceLAN should include an easier way to rescan a network, and it should add more-sophisticated search procedures (Boolean logic, for example) to round out some of its management options. Also, GraceLAN could increase the detail in its printer log (including the number of pages per print job, for example) and let users save a PICT file of the network topology.

—Dave Kosiar

See Where to Buy for contact information.

Screen-Capture Desk Accessory

IMAGE GRABBER 2.0

Pros: Desk accessory format; simplest of all screen-capture utilities; Timed Grab captures screens other screen grabbers can't. Cons: Desk accessory format; can't save to Scrapbook; Help file needs copy-editing; inconvenient to capture menus.

Company: Sabastian Software.

Requires: Mac Plus. List price: $49.

Press ⌘-shift-3, and any Mac in black-and-white mode takes a snapshot of the current screen image, saving it as a MacPaint file. Taking screen shots has always been useful to writers, manual authors, and training personnel. And magazines; you'll find screen shots all over Macworld.

Today, screen-capture utilities are far more convenient, because they let you specify what portion of the screen to capture. They also let you specify what format to save the image in: MacPaint, PICT, Clipboard, and so on. Joining the ranks of Exposure, Capture, ScreenShot, and other programs of this type is Image Grabber 2.0. Image Grabber, however, is a desk accessory, with its own advantages and drawbacks.

When you choose Image Grabber from the Apple menu, the pointer becomes the crosshair cursor. You drag across any part of the screen, creating a dotted-line rectangle. Anything within the bounds of this rectangle is included in the screen shot. When you release the mouse button, a dialog box appears, letting you choose the new image's format or destination. For programmers, there's also an option to save the screen shot as a resource in a new or existing file. (It would be nice if Image Grabber could also send the image directly to GraceLAN, as its competitors do, so you don't have to name and file every single shot.)

Because Image Grabber is a DA, there's nothing to clutter up the System Folder, nothing to set in the Control Panel, and no chance of conflicts with other INITs. The DA format also makes Image Grabber compatible with any Mac.

On the other hand, Image Grabber's desk accessory format makes it much more difficult to capture screen elements such as menus. With an INIT screen grabber, you can capture anything at any time, even with a menu displayed, because you can press the invocation keys even if the mouse button is down. Image Grabber's normal selection method is useless for capturing menus (and most dialog boxes, for that matter) because you have to use the mouse to choose Image Grabber.

All in Good Time

To handle these situations, Image Grabber has an option called the Timed Grab. This feature works like the Camera DA: you tell the program how long to wait before recording the screen image. So, to capture a menu, you tell Image Grabber to wait for five seconds; in that interval, you pull down the appropriate menu (see "Timing Is Everything"). At the fifth second, Timed Grab takes the shot.

The Timed Grab captures virtually anything on the screen, no matter how unruly or how irregularly written the program is. For example, Image Grabber succeeded in capturing the FlowFazer screen-saver utility. While FlowFazer is a dazzling program, its coding violates some Apple programming guidelines, making INIT-based screen-capture utilities unable to handle it. Prodigy doesn't play by the Mac's graphics rules, either; but Image Grabber captured the screen image where most INIT-type programs failed (although it crashed Prodigy in the process).

Unfortunately, the Timed Grab captures the entire screen image; you can't isolate a menu, a window, or a dialog box. Therefore you must use a graphics program to erase unwanted screen elements before you can use the screen shot. That's a lot of trouble just for a snapshot of a dialog box.

And while we're on the topic of convenience, Image Grabber's online help screens—in principle, a wonderful idea—need to be copy-edited or rewritten. Not only do they contain grammatical errors and some very awkward wording, but their text is distractingly riddled with ™ and © symbols—there's one at each occurrence of the word Macintosh, for example. (Legally, the ™ symbol must appear only at the first occurrence of a trademarked name.) Sabastian plans to address the sloppiness, as well as the limitation of the Timed Grab, in version 3.0.

Shoot to Win

Image Grabber is certainly the easiest-to-use utility on the market, and probably the least expensive. Image Grabber is great for casual users and programs who'd find the resource-creation feature handy. Technical writers, manual authors, and desktop publishers, however, probably should opt for one of the more feature-laden INIT-style programs (or wait for Image Grabber 3.0), because of Image Grabber's inability to conveniently capture menus, modal windows, and dialog boxes.—David Pogue

See Where to Buy for contact information.
Since we know you're pressed for time, we'll skip the standard introduction and get straight to the point.

**Double Helix is the fastest multiuser relational database for the Macintosh.** This, you should know, is not our personal assessment, but rather the conclusive results of MacUser magazine's June 1990 speed-test. And of the four top databases, in five key commands, Double Helix finished first. By considerable margins.

### WELCOME TO THE WORLD'S VERY FIRST MAC-BASED CLIENT/ SERVER DATABASE.

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So everyone has the same data. And everyone's in sync. The end result: a group that's always working in one direction—forward.

By the way, and for the record, we were the first ever to introduce a Mac-based client/server. And while it was revolutionary at its debut in 1986, it is, remarkably enough, still revolutionary today.

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Circle 238 on reader service card
Now With Mirror's New Low Pricing, There's No Reason To Buy A No Name.

Some unfamiliar hard drives have popped up lately in the back pages of industry magazines. Most promise cut-rate prices, and quick delivery. Easy come, easy go.

Mirror believes a big part of what you buy in a Macintosh hard drive is a company that's going to be around longer than the warranty. One that's as dedicated to quality, service and support as it is to low prices.

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Now, thanks to higher volume and improvements in operating efficiency, Mirror is able to offer some of the most attractive drive prices found in any part of the book. We've done it without cutting corners and still back it with a complete 2-year warranty and a 30-day money back guarantee. So not only is owning a Mirror drive a safe buy, it's also now a very smart buy.
This month I look at a forms generator, a utility for printing or displaying fonts, a résumé application, two games for children, and two other products.

One Shot 1.0
One Shot ($99.95 from Baseline Publishing), a forms generator, provides the tools to design invoices, report cards, receipts, and so on. It also has the spreadsheetlike ability to apply functions or formulas to any data-input fields you create, so that, for example, a field at the bottom of an invoice can automatically calculate and display the total of all purchases, or a column on a report card can display average test scores. To help you program forms, One Shot provides 150 mathematical and logical functions, almost as many as you'd find in a major Macintosh spreadsheet.

One Shot enables you to satisfy a wide range of functions using only the mouse. For example, you can enter formulas using an on-screen number pad, or have numbers appear with two places after the decimal point by pointing and clicking through pop-up menus.

One Shot is a desk accessory, so it runs even on 1MB Macs. Its form-generating capabilities are easier to use and take less time to learn than those of Excel, Wingz, or Full Impact, and One Shot is less expensive and requires less RAM.

TypeChart 1.0
TypeChart ($99.95 from Octavo Productions) provides an easy way to print or view charts of System fonts. The program displays a dialog box listing all installed fonts. You select the fonts you want to chart and then select one of the five chart types; for example, Headline shows the fonts in sample headlines in all sizes from 16 to 127 points; Text shows them in sample paragraphs from 5 to 14 points; and Styles shows them in plain, bold, italic, bold italic, outline, shadow, condense, and underline.

The charts can be printed, displayed on screen, and shown in split-screen mode for making comparisons.

Of course, you could use a word processor to create a sample text document and format the document to show your typefaces in various sizes and styles, but that can be a time-consuming job.

ResumeMailer 1.01
ResumeMailer ($49.95 from Individual Software) provides many of the tools needed for a successful job hunt. Its modules help you create résumés; draft and mail inquiry, cover, and thank-you letters; remember appointments; and keep a record of job-hunting activities. The program includes a calendar, a word processor (with a good spelling checker), a mail merge feature (easier to use than Microsoft Word's), and two unique modules that help you compose résumés and letters.

To use ResumeMailer, you select one of three types: Chronological, Functional, or Performance. Each type offers several formats: for example, Chronological has eight formats including Academic, Management, and Computer Professional. The program then asks for information such as experience, education, and hobbies. Once you have entered the information, the program automatically generates a professionally formatted résumé.

The letter module includes Broadcast (or inquiry), Cover, and Thank You letters. For each letter type you choose from stock paragraphs, which you can then personalize (see "Personalizing Letters").

digiMatic 1.0
Using a digitizer or digitizing tablet you can measure objects in a drawing by selecting points on an object with an input device such as a wand, stylus, or mouse. (The manual also suggests trying a Kurta tablet or Bit Pad Plus.) Architects use digitizers to scale blueprints; machinists, to measure parts in drawings; and students, to re-create a graph found in a journal. If you can scan the drawing you want to measure, digiMatic, a $229 desk (continues)
accessory from FEB Software, can measure the on-screen image just as a real digitizer measures a drawing on paper.

digiMatic is easy to use. You click on two points in the drawing and indicate the scale. The program then creates a table containing the numeric values of the indicated points in either tab-delimited text or PICT format.

The manual does suggest two nonscanner methods of using digiMatic, but neither is entirely satisfactory. If you have a transparency of the drawing, you can tape it to the Mac screen and use the cursor, which should be visible behind the transparency, to click on the points you want to measure. Or place the drawing under the mouse and click when the edge of the mouse aligns with the points you want to measure. While I found the transparency method better than using the mouse as an input device, neither method is as precise as using digiMatic on screen. These methods might, however, be acceptable for applications that do not require absolute precision.

digiMatic is not only less expensive than a hardware digitizer, it works with all Macs, even with the older 1MB machines.

**Enchanted Journey**

Enchanted Journey (Jumping Frog Productions, $39.95) provides six games intended for 5- to 12-year-olds, each based on an interesting scene such as a medieval castle, a haunted house, or a city street. There are three types of games: jigsaw puzzle, memory game, and find-the-object hunt (see “Puzzling Out a Medieval Scene”). After completing each game, children can manipulate many of its graphic elements (for example, they can reposition the medieval scene’s jousting knights). Enchanted Journey is lavishly animated (the animations were made with MacroMind Director) and includes excellent sound.

I have two quibbles with Enchanted Journey, however. I would like a variety of games; for example, why couldn’t there be a different game for each scene? Second, I think most children over 10 will find the games boring compared to the video games they are used to. But for the

to solve addition, subtraction, multiplication, and division problems (type of problem, time limit, and difficulty level are user-selectable). For each correct answer, the child’s stash of trick-or-treat candy increases; for each missed answer, it decreases.

While Trick or Treat’s graphics and sound initially attract, the game is somewhat repetitive. Used sparingly, Trick or Treat is an excellent complement to an arithmetic class, but the novelty soon wears off.

**Real Estate Investment Analysis 7.0**

Real Estate Investment Analysis ($295 from RealData) provides complex Excel templates for analyzing real estate investment income. Taking current tax law into account, the templates help you determine cash flow and potential profit and loss on rental property. The advantage of this program is that it lets you enter a wide range of expenses and creative rental and loan options. It accepts percentage rent, for example, where the lessee (normally a retail outlet) pays a percentage of gross sales as rent. The program can also compare conventional mortgages, money notes, and rollovers.

Real Estate Investment Analysis is excellent for a real estate investor who owns commercial property or a number of apartment units. For owners with one or two income properties, I recommend the simpler and less expensive Excel templates in Real Estate Analysis (Heizer Software) or the real estate sections in Microsoft Excel Money Manager (Microsoft Press).

**Manage Your Closet 1.0**

Manage Your Closet (MYC) is a $29.95 HyperCard stack from Woodbridge Information Solutions that helps you select clothing purchases, plan what to wear for the next 30 days, decide what to pack for a trip, and select clothing in your closet to discard. MYC stores data and offers clothing suggestions. You enter information about your body shape, coloring, clothes budget, and general style, and MYC makes purchase recommendations and generates charts of what to wear with what in your present wardrobe (see “Clothing Ensembles”).

See Where to Buy for contact information.
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NEW PRODUCTS

Edited by Mary Margaret Lewis

This section covers Macintosh products formally announced but not yet evaluated by Macworld. All prices are suggested retail. Please call vendors for information on availability.

HARDWARE

84MB Removable Cartridge System
Removable cartridge system that formats to hold 84MB and uses a SyQuest drive mechanism. System has average access time of 20ms and is designed for backing up fixed hard drives or for storing or transporting large data files. System comes bundled with Retrospect Remote backup utility software. $1795. MicroNet Technology, 714/837-6033.

AVR Scanners
Gray-scale and color scanners that emulate the Apple Scanner for software compatibility. AVR 3000/GS Plus Greyscale Scanner can scan 256 levels of gray at 300 dpi and can be upgraded to a color scanner. AVR 3000/CL Plus is capable of scanning 16.8 million colors (in 24-bit color) at 300 dpi, and scans an 8½-by-11-inch page in less than 1½ minutes. AVR 3000/GS Plus Greyscale Scanner $2090; AVR 3000/CL Plus Color Scanner $2590. Advanced Vision Research, 408/434-1115.

Cache-In
Compact cache board for the Mac Iie that, when installed, leaves room inside the Iie for a 5¼-inch hard drive. $299. Applied Engineering, 214/241-0955.

Cache-In

FlexScan Low VLF Monitors
Series of color monitors that are compatible with the Macintosh II. Models 9080i and 9400i have intelligent controls that enable user to adjust the horizontal and vertical scanning frequencies to meet the requirements of specific applications. Can save frequency settings; monitors remember up to 24 combinations. Model 9080i has 16-inch display; model 9400i has 20-inch display. Both models support 24-bit color. 9080i $1929; 9400i $3899. Nanao, 213/325-5202, 800/235-2202 outside California.

LaserScript LX

LaserScript LX

ViewFrame Spectra Projection Panel
Color liquid-crystal-display projection panel projects computer graphics and data when placed on a standard overhead projector. Active matrix LCD yields colors with high contrast to make the panel suitable for animation. $5995. nView, 804/875-1354, 800/736-8439.

ViewFrame Spectra Projection Panel

SOFTWARE

4th Right
Collection of 80 external procedures that are designed to extend 4th Dimension's capabilities in (continues)
using AppleTalk, arrays, buttons, the Clipboard, variables, utilities, and windows, as well as its capabilities in creating strings and printing. 2MB min. memory. $195. Digital Concepts, 503/244-4460.

**All the Right Type**
Classroom tool for teaching students computer keyboard skills. Designed for grades 4 through 12, and can also be used for adult classes. Program comes with practice session, or teachers can make up their own. Includes built-in word processor. $12K min. memory. Dktech Software, 604/299-4435, 800/665-0667.

**The Book of MIDI**
Interactive HyperCard stack providing an overview of MIDI, computers, synthesizers, and music, and describing how they relate. Does not require MIDI hardware. 1MB min. memory. $39.95. Opcode Systems, 415/369-8131.

**The Continuous Image Photometry System**
Image-analysis and photometry system that is capable of processing multiple simultaneous images for use in applications such as animations. Creates a continuous video image composed of multiple full-screen frames, keeping all the segments to scale. Program uses image-enhancement functions such as color filtration; RGB color identification; zoom; pan; overlay, subimage insertion; and automatic and manual feature recognition, modification, and measuring. System includes Video Frame Grabber software for a Raster-Ops board, but does not require a frame grabber board. 3MB min. memory. Application $565; with interface for accepting user-written routines $1835. Visionalysis, 401/624-9214.

**ElseWare BarCode Kit**
Bar-code utility for creating and printing industry-standard Postnet bar codes, postal FIM bars, Code 39 bar codes, UPC packaging symbols, and two of the five main shipping bar codes. Includes PostScript fonts that can be used with most database, page-layout, and word processing programs. Includes ZipBars font, a HyperCard stack for creating Postnet bar code-EPS files, and ZipFix digital-calculating utility. Also has templates for MacWrite, Word, PageMaker, QuarkXPress, FreeHand, and Illustrator that indicate where to place Postnet bar codes and FIM bars on an envelope. 1MB min. memory. $179.95. ElseWare, 206/547-9623.

**Enchanted Journey**
Animated software for children that includes six fantasy worlds complete with graphics, digitized sound, and mobile figures.
for creating individual stories and scenes. The child enters the fantasies through one of three games (memory, hidden-object search, and puzzles); there the child can drag figures around the screen. Double-clicking starts one of the more than 100 animations that are hidden throughout the scenes. 1MB min. memory. $149.95. Jumping Frog Productions, 801/451-0517, 800/523-3764.

FastTrack Resource

Resource-allocation tool for managing people, rooms, equipment, time, activities, and services. Creates resource reports that can be formatted as Gantt charts, histograms, resource tables, activity tables, or combinations of these. 1MB min. memory. $235. ARC. 703/450-1980, 800/346-9413.

FastTrack Resource

The Geometer's Sketchpad Tool for teaching geometry on the Mac. Designed to help teachers and students construct figures—from simple textbook figures to working models of the Pythagorean theorem—and to create perspective drawings, fractals, and animated sine waves. Includes text capabilities that enable students to title, label, and annotate their work. Uses on-screen recording feature to create scripts of constructions, and can be used in conjunction with an overhead projector to illustrate classroom geometry lessons. 1MB min. memory. Single-user version $169.95; ten-user lab pack $399.95. Key Curriculum Press, 415/548-2304, 800/338-7638.

GraphicsVu

Runs in color. Images can be saved to disk as PICT files and can be edited with draw or paint programs. 4MB min. memory. $125. Perland Associates, 215/889-1674.

Greek Practice

Language software that has been designed for use with text-book courses on biblical Greek. Program intended for beginning, intermediate, and advanced students of the Greek lan-(continues)

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**Mr. File**
Desk accessory alternative to the Finder that copies, erases, and searches in the background, and performs standard disk-management operations. Lets user customize the way files are grouped regardless of which disks they reside on. 1MB min. memory. $99. Softways, 408/978-9167.

**NetMinder LocalTalk**
LocalTalk network-analysis tool that includes packet decoding and packet collection using filters and triggers. Features include data capture, data analysis, and the ability to decode all AppleTalk protocols including ATP, RTMP, ADSP, ASP, PAP, NBP, MacIP, and Netway 1000. Packets can be selectively captured using filtering criteria such as protocol type, source and destination address, and protocol data. 2MB min. memory. $39. Neon Software, 415/283-9771.

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Five audiocassette- and disk-based tutorials for self-paced, interactive instruction for QuarkXPress 3.0 page-layout program. Each tutorial consists of 90-minute audiocassette, practice disk, and command summary card. Tutorials consist of Beginning QuarkXPress, Master Pages, Text Formats, Color & Type, and Tips & Techniques. 2MB min. memory. $79.95. Personal Training Systems, 408/559-8635.

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spreadsheet applications to create mail merge documents, summary records, and sales lists. 1MB min. memory. Single copy $995; five-pack $2500. GT Omnicon, 416/365-1436.

Southwest Collection
EPS clip art collection containing eight volumes of illustrations representing southwestern themes. Includes borders, pottery and baskets, rugs and blankets, jewelry, kachina faces, garments, bead design. 1MB min. memory. $129.95. Grafx Associates, 602/327-5885, 800/628-2149.

Swinga
Illustrated multimedia trek through the country of Zimbabwe. Contains more than 3000 pages of text plus over 1000 maps, pictures, and drawings. Includes information about Zimbabwe agriculture, animals, insects, birds, fish, arts, culture, economics, geography, history, towns, villages, and archaeological sites. Describes 75 national parks and safari areas. 1MB min. memory. $99. CD-ROM Inc., 303/231-9373.

The Translator
English-to-Japanese language translator for the Mac. Translates 10,000 to 20,000 words per hour. Documents can be typed in or scanned with an optical character reader and imported using a Mac desk accessory. Translator’s standard dictionary holds 25,000 words and can be customized. Program requires 20MB hard drive and the Japanese Kanji-Talk Operating System. 2MB min. memory. $1799. Qualitas Trading Company, 415/848-8080.

Vette
Street racing game in which players drive one of four Corvette models through a simulation of the streets of San Francisco. Cars are maneuverable and are equipped with a rearview mirror so players can check for police. Game provides three levels of difficulty. Players on two computers hooked via an AppleTalk network or using modems can play each other. 1MB min. memory. $59.95. Spectrum Holobyte, 415/322-3584.

Video Clips
Application for recording, editing, and playing back live video sequences. Allows user to store and retrieve digitized video sequences. Frame rate, resolution, and size are user selectable. Video-capture rate, window size, and duration of a sequence are limited by hard drive capacity and throughput. 4MB min. memory. $295. Workstation Technologies, 714/250-8983.

WordScript
Utility designed to turn Microsoft Word into a

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script-writing tool. Uses style sheets for writing screenplays, television scripts, two-column A/V scripts, and storyboards. Uses automatic on-screen formatting and editing, and contains styles for different script elements such as dialogue, character names, and scene descriptions. Also has templates for screenplays, three-camera scripts, two-column scripts, title pages, cast lists, and revision pages. 1MB min. memory. $12 plus $5 s/h. WordScript, 319/339-0913.

Macintosh Memory Key
Customized software-protection device; connects to a 25-pin SCPI port and operates transparently when hard drives or other devices are plugged in to the device. Software's encryption code can be incorporated into a developer's product using an accompanying interface written in the language of the application to be protected. 128K min. memory. $59.95 per unit. 10-unit minimum. Protech Marketing, 704/523-9500, 800/843-6113.

Mini Vacuum Attachments
Vacuum cleaner attachments for cleaning computers, typewriters, and office machines. Includes 36-inch tube that attaches to the end of a vacuum cleaner hose, a brush for small items and keyboards, a straight and a curved extension pipe, and a crevice tool. Works with any vacuum cleaner with detachable hose. $10.87. The Eureka Company, 309/828-2567, 800/525-9991.

Power Wagon
Mobile Macintosh cart with casters and wheels; made of anodized aluminum; comes with an adjustable keyboard and mouse platform. $1350. Automatic, 312/733-6777.

To have your product considered for inclusion in New Products, send an announcement with product name, description, minimum memory, peripherals required, pricing, company name, and phone number (and two copies of software) to New Products Editor, Macworld, 501 Second St., San Francisco, CA 94107.
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Quick Tips

NIXING THE LASERWRITER START-UP PAGE, PLUGGING IN ABROAD, TIME AND DATE STAMPS IN WINGZ FOOTERS, AND MORE

BY LON POOLE

Did you ever wish you had another hand to press the shift key while clicking to select multiple objects in the Finder or a graphics program, or the C key while doing repeated copy-and-paste operations with the C and V shortcuts? Try using the Sticky Keys feature of Apple's Easy Access software, which comes with the Macintosh system software. You install Easy Access by dragging its icon to the System Folder (with System 7, the Finder puts it in the Control Panels folder) and restarting. "Third Hand" explains how to use the Sticky Keys feature.

Unexpected Turn-on

I just bought a Mac IIci with 4MB of RAM, an 80MB hard drive, an Apple 13-inch color monitor, and a Datadesk Switchboard keyboard. I love the setup but lately I think gremlins inhabit my IIci. It frequently turns itself on, usually when I shut off the machine with the power switch after a bomb. Unplugging the keyboard doesn't help, I have to unplug the computer itself. My dealer has never heard of this. Any suggestions?

Mark Astrmann
Ridgewood, New Jersey

Rotating the power switch while pressing it locks it in the on position. Apple put lockable switches on the IIci, Iicx, and IIsi so those models could be used as unattended file servers that would automatically restart after a power outage. Make sure the power switch is unlocked. After you press it to shut off your IIci, it should pop out completely and the notch in it should be horizontal.

Too Many Files Open

I have erratic problems printing from my Mac IIci, often getting the message "Error -42" or "Printer cannot be opened." I usually have Microsoft Word 4 open, along with Omnis 3 Plus, and use Apple's PrintMonitor software for background printing. Sometimes quitting Omnis 3 lets me print from Word 4. If that doesn't work, I try saving my Word documents, quitting Word, and then opening again. Other programs such as ReadySetGo 4.5 have similar printing problems. I don't seem to have trouble printing from an SE (upgraded with a 68030 accelerator), which is a TOPS server on the network.

The IIci has three partitions on its hard drive and one folder from the server. In addition to TOPS, the Mac has Tempo II, DiskExpress II, and Suitcase II. Can I avoid this problem? My Apple dealer is stumped.

H. Willy Chu
Dunn, North Carolina

Trying to open too many files at once causes the problems you describe. The Mac normally limits the number of files open concurrently to 40. That may seem like a lot, but everything you mentioned opens multiple files. Each open program means at least one open file. Each open Word document means two additional open files (one for the document and one for a temporary work file). Omnis 3, like any relational database, opens several files. Every disk or server icon on your desktop counts, and so do all the suitcase files you have open. Small wonder the printing software can't open a new file in which to save page images for background printing. Unfortunately, very few application programs handle this increasingly common situation with any grace at all.

Fortunately, you can use Suitcase II (Fifth Generation Systems, 504/291-7221 or 800/873-4384) to modify your start-up disk to increase the files-open limit. Follow the instructions in the Suitcase II manual for increasing the number of open suitcase files; this has the effect of increasing the limit of open files. You can also increase the limit using the Set File Count utility that comes with MasterJuggler (ALSoft, 715/353-4090).

Traveling Mac

Your new book gives some useful information about using your Mac in other countries. For example, I
The transformer should be rated to handle the total wattage of all equipment you attach to it. If you use a cheap voltage converter, it will ruin your equipment. You may be able to find a transformer at a local electronics supply store, or you can order one from Electronics Plus (800/321-4524 or 415/457-0466). (At this writing, Radio Shack did not carry them.)

Also, take along a multioutlet power strip with surge protection. You’ll have a tough time finding one after you leave the country.

### LaserWriter Start-up Page

I’ve heard I can configure the LaserWriter so it does not print a start-up page every time it is turned on. How?

Bill Pope
Cambridge, Massachusetts

You can turn the start-up page off (and on again) using the Widgets utility program, which is part of MockPackage Plus Utilities from CE Software (515/224-1995 or 800/523-7638). Also, a LaserWriter Font Utility program that lets you control the start-up page may be included with Apple’s System 7 software package (it was distributed with prerelease versions); ask your Apple dealer.

### Macintosh 101

I’d like to learn how the basics of Macintosh system hardware and software are designed and how they interact. The level of complexity I desire is comparable to that of a Macworld feature article.

Roger F. Anderson, Jr.
Raleigh, North Carolina

Read the book *Technical Introduction to the Macintosh Family* (Addison-Wesley, 1987). Although it doesn’t cover the latest hardware and software developments, it clearly explains the concepts behind the Macintosh user interface and ties the concepts to the ROM toolbox. The book also clarifies Macintosh graphics, system software, files and volumes, memory management, operating system, resources, and hardware.

The book is aimed at experienced users and novice programmers. It doesn’t assume you know how to program or will ever want to. All special terms are carefully defined, making the book easy to read.

### A Few Bytes More

**TIP:** Recently I needed to copy files to floppy disks, only to have the Finder tell me that “the file is too large” by 1K or some small amount. The floppies had seen some file shuffling, which can enlarge the desktop file, and I remembered that rebuilding the desktop file can free up some disk space. I tried it and it freed up enough space to copy the necessary files over.

Adam Frix
Columbus, Ohio

To rebuild the desktop file on a floppy, press Shift-option while inserting the disk. For a hard drive, keep pressing Shift-option during start-up until the Mac asks if you want to rebuild the desktop on that hard drive.—L.P.

### Original Zero

**TIP:** Often I need to reset the zero point of PageMaker’s rulers to its original position, after moving it to measure an object. (It seems like it would be a trivial addition to allow resetting the zero point by double-clicking the intersection of the rulers.) For a long time I would manually drag the zero point back there. Finally the secret was revealed to me. You simply choose Page Setup from the File menu, make no changes, and click OK.

Sterling Tedet
Powder Springs, Georgia

### Quark Recovery

**TIP:** Since surviving the pain of document losses, I have discovered some methods for recovering QuarkXPress 3.0 documents. If a document freezes and precipitates a crash when you scroll or manipulate one of its pages, the document file is bad. Get around this by dragging its thumbnail-view pages into a new document with the same page setup. The master pages come along for the ride.

If you get a “Bad File Format” error when attempting to open a document, that document is history. You can recover most of its text with Microsoft Word’s Open Any File command. (To get at that command, press the shift key while pulling down (continues)
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NEC
TIME AND DATE STAMP

axes, reorganizations, and "let's make one more small change in this spreadsheet before it goes to committee" are given in the corporate world. So how do you keep track of which one is the most recent version? Although most word processors feature easy time and date stamping in footers, spreadsheet developers generally seem to have considered it a low priority. Robert H. Blalock of DFW Airport, Texas, suggests this method for adding automatic updating to a Wingz page footer.

1. Enter the spreadsheet name and the Wingz auto-page-numbering code, &p, into a cell (AA1 here).

2. Enter the formula =now () in two other cells (AB1 and AC1 here).

3. Under the Number submenu of the Format menu, apply the MM-DD-YY format to the first cell (AB1 here) so it shows the date of the most recent change to the spreadsheet. Apply the HR:MN AM format to the second cell (AC1 here) so it shows the time of the most recent change.

4. Combine the contents of the three cells as text in a fourth cell (AA2 here) using the celltext() function and the concatenation operator. Make that cell the footer by selecting it and choosing Report Footer Range and then Report Footer Right (or another of the footer alignment commands) from the Report submenu of the Sheet menu. Then choose the font, size, style, and other attributes for the footer from the submenus of the Format menu.

5. This is how your finished page footer should look.

Quick Check

TIP: To check a small portion of DesignStudio text that is difficult to read on screen (type smaller than 8 or 9 points), select up to 20 characters with the I-beam tool and look at the third item of the Text menu (see "Easy Reader"). Your selected text appears as part of the Find command there. You save time by not having to change the page magnification.

Jonathan Macagha
Philadelphia, Pennsylvania

We pay from $25 to $100 for tips published here. Send tips or questions (include your address and phone number) to Quick Tips, Macworld, 501 Second St., San Francisco, CA 941107. Send electronic mail to CompuServe (70370,702) or MCI Mail (294-8078). All published submissions become the property of Macworld. Due to the high volume of mail received, we're unable to provide personal responses.

Lon Poole answers readers' questions and selects their tips for this monthly column. His two most recent books are Amazing Mac Facts (Microsoft Press, 1991), a collection of the best published tips, and Macworld Guide to System 7 (IDG Books, 1991).
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The Creative Edge in Business.
I f you’ve read “Confessions of a System 7 User” in this issue, you have a good idea of why everyone is talking about the latest update to the Mac’s fundamental system software. Never before has the Mac’s system software offered so much to such a wide range of users. Novices will appreciate System 7’s balloon help and the way System 7 simplifies many of the technicalities that have made the Mac more complex in recent years. Mac veterans will adore System 7’s vastly improved Finder, its built-in file-sharing, and its interapplication communication (IAC)—its ability to allow programs to exchange data automatically.

So where do you start? First, get the upgrade package (and its first-rate manuals) from your Apple dealer. Use the Before You Install disk for an intro to System 7’s key enhancements. Then scan the hard drive with the BYI disk’s compatibility checker—an electronic reconnaissance squad that searches the hard drive for anything that might have problems coexisting with System 7. I discovered remarkably few incompatibilities when working with prerelease versions of System 7, and chances are your experiences will be as favorable.

But use the BYI disk to be sure.

If the compatibility checker reports no serious problems, install the System 7 software. Then sit down at the Mac and continue reading for a hands-on look at some of System 7’s hottest new features.

Doing More at Once
In my January 1991 column (“Getting Started with Mac Operating Techniques”), I briefly covered the benefits of MultiFinder, which lets you run two or more programs at the same time and switch between them with a mouse click. MultiFinder also lets time-consuming operations such as printing take place in the background while you work, and it makes managing disks and files easier, since you don’t have to quit a program to get to the desktop. However, many Macintosh users have avoided MultiFinder’s multitasking benefits, primarily because 1MB Macs lack sufficient free memory to run more than one program at once. Even a 2MB Mac is taxed by complex programs like PageMaker 4.0.

With System 7, multitasking isn’t just a good idea—it’s the law. You no longer have the option of using the one-program-at-a-time Finder. That’s one reason why System 7 requires a minimum of 2MB of RAM. If you find yourself cramped with 2MB now, you’ll quickly want more after upgrading to System 7.

You can get a feel for the benefits of multitasking by starting a couple of programs and switching between them using the application menu (at the right edge of the menu bar) or (continues)
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Switching Strategies

System 7 provides several ways to switch between programs that are already running: by using the application menu (1); by double-clicking on the grayed icon of an open application (2); and by clicking within the window of an inactive application (3). To indicate that it’s OK to switch to a different program while a file operation takes place, the Finder displays this new type of dialog box containing a single keystroke.

You Can Run—And You Can Hide

One problem with the old System 6 MultiFinder was that after you’d opened a couple of programs, your screen became cluttered with windows. Returning to the Finder or switching to a specific program was often cumbersome. System 7’s application menu provides two Hide commands and a couple of options that allow for tidier desktops and more efficient switching.

The hide Others command hides all open windows except those of the active application—the one whose menus are in the menu bar. You use this command if an inactive program’s windows are obscuring something on the desktop, such as the Trash icon, or simply to reduce distracting clutter.

The Hide command always includes the name of whatever program is active—because it hides only the windows of that program. (If the Finder is active, for example, the command reads Hide Finder.) You might, for example, want to temporarily hide a spreadsheet’s window so you can access another file on the desktop, or to hide a game’s window when the boss shows up.

Another alternative is to switch to another program and hide the current program’s windows in one fell swoop. Just press the option key while choosing the second program’s name from the application menu or while clicking in a window of the second program. This option-switch trick is handy for jumping back to the Finder: press option while clicking on the desktop, and the active program is hidden while the Finder is activated.

Incidentally, hiding an application is not the same as quitting it. Not only is a hidden program still open, if it’s performing a background operation (such as transferring a file over a modem) when you hide it, the operation continues uninterrupted. And if you check out the application menu, you’ll see that the program is still listed, but its icon (not its name) is grayed, indicating its hidden status. Choose the program’s name, and its windows appear in a flash.
To install a font, drag its icon to
the icon of the System Folder.
The Finder recognizes that
you’re moving a font and asks if
you’d like to stash it in the System
folder (bottom). Click on OK, and the
Finder installs it for you. If you’ve
already opened the System file, you can
drag the font to the System file’s
window.

To remove a font, open the System
file by double-clicking on it. A
window appears listing the contents
of the System file. Locate the font you
want to remove, and drag its icon out
of the System file’s window. To delete
the font permanently, drag its icon
to the Trash. For storing fonts you
want to keep for future use, consider
creating a folder with a name such
as Inactive Fonts.

Nor does hiding a program save
any memory. If memory is tight but
you want to start another program,
you need to quit one or more of the
programs you’ve already opened. Re-
member that you can display a
memory-usage graph by choosing
About This Macintosh from the Apple
menu when the Finder is active. You
can use this graph to gauge how your
Mac’s memory is being used and to
determine how much free memory
remains. You can also fine-tune your
program’s memory requirements by
using the Get Info command. For
more information, see the System 7
manuals as well as “More For Your
Memory” and “Getting Started with
Memory,” Macworld, April 1990.

Truth in Type
System 7’s TrueType outline fonts let
the Mac display and print sharp text
regardless of size. With the fixed-size,
or bitmapmed, fonts used by previous
System versions, that wasn’t the case;
the Mac needed a separate, space-
consuming font description for every
size you used. If you chose a size for
which no description existed, the Mac
scaled an existing size, which resulted
in lumpy, jagged-edge text.

To see for yourself, start up a
word processor and choose Helvetica
from its Font menu. (You will notice
that in the program’s Font or Size
menu, every size appears in outline
style—System 7’s way of letting you
know that they are outline fonts.)
Type a sentence, and then select the
text you typed. Next, choose some
different sizes of Helvetica—try some
tiny ones such as 6-point and some
huge ones such as 127-point. (In
Microsoft Word, choose Character from
the Format menu to specify these
oddball sizes; in Claris’s MacWrite II
and T/Maker’s WriteNow, choose
Other from the Size menu.) As you
zip from size to size, the benefits of
TrueType fonts will become clear.

If you have some old, fixed-size
fonts you’re fond of, you can still use
them with System 7, but you get good
results only when you use sizes that
have bitmapmed descriptions. If you
choose a size for which no bitmap
exists, it’s back to the scaling world
and its ugly side effects.

If you use Adobe Type Manager
(ATOM), you’ll be glad to know it works
well under System 7. Indeed, TrueType
and ATM complement each other nicely—TrueType creates sharp
text at any size for fonts in its own
format, and ATM does the same for
downloadable PostScript printer fonts
(continues)
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Circle 342 on reader service card
Aliases are small files that give you quick access to the items they’re associated with: files, folders, applications, or even disks.

To create an alias, select the icon of the original item, then choose Make Alias from the Finder’s File menu. The alias (which looks just like the original except that its name is in italics) appears alongside the original, but you can move it wherever you like.

Here, aliases have been created for the folder named Navarro Proposal, which is nested within the Proposals and Documents folders. One alias has been moved to the Apple Menu Items folder (within the System Folder), which puts it on the Apple menu, while a second alias sits on the desktop. The original folder can now be accessed without opening any disk or folder windows, either by choosing the alias from the Apple menu or by double-clicking on the alias on the desktop.

(...those font files you stash in your System Folder and that are downloaded to a PostScript printer’s memory during a print job). You can also use font-management utilities such as Fifth Generation’s Suitcase II with System 7, although System 7’s streamlined approach to installing and removing fonts makes such activities less valuable unless you frequently switch between sets of fonts.

A Better Finder
System 7’s greatly improved Finder makes installing and removing fonts very similar to dragging files into or out of a folder (see “Font Moving Simplified”), but you’ll notice these operations take quite a bit longer than dragging files. That’s because the same technical gymnastics that were performed by the Font/DA Mover utility under previous systems now take place behind the scenes. In System 7, the Finder is the gymnast. (So forget Font/DA Mover—if you try to run it under System 7, a message appears telling you that it isn’t needed.) Just remember to quit any programs or desk accessories before trying to install or remove a font; System 7 can’t install or remove fonts when any programs are running because Mac programs can’t update their Font menus on the fly.

And the Finder finally lives up to its name, providing a Find command that lets you locate an item by specifying part of its name or using other criteria. The Finder streamlines the Mac’s operation in other ways.

• You can select an icon by typing the first few characters of its name. Combine this technique with the $-O keyboard shortcut for the Open command, and you can open a document or application without touching the mouse. Other keyboard shortcuts let you open and close folders and expand or collapse the outline view of a disk or folder; for a list of these and other shortcuts, choose Finder Shortcuts from System 7’s Help menu.

• You can open a document by dragging its icon to an application icon. When you do, the application icon becomes highlighted. Release the mouse button, and the Finder opens the document. This trick is handy for (...continues)
importing a text-only file into a word processor. For example, to start Microsoft Word and open a text-only document, drag the text-only document to the Word icon.

- You can install a system-related file—a font, INIT, control panel (a cdew—one of the files whose icons appeared in the old Control Panel DA), printer driver, and so on, simply by dragging it to the System Folder. The Finder then asks if you'd like to put them in the appropriate folders within the System Folder.

A Tidier System Folder
Those folders within the System Folder hold many of the icons that cluttered the System Folder in previous system versions. The Control Panels folder replaces the old Control Panel desk accessory, which has gone to the great Trash icon in the sky. This new approach is far more flexible: you can open any control panel by double-clicking on it, you can move often-used control panels to the Apple Menu Items folder, and you can have more than one control panel open at once.

The Preferences folder is designed to hold the preferences files that many programs create as they run. Most current programs store their preferences files in the top level of the System Folder, and will need to be updated to take advantage of the Preferences folder.

The Extensions folder holds printer drivers and INITs. The former are now officially called Chooser extensions by Apple; INITs (sometimes called start-up documents) are now called system extensions.

The Startup Items folder holds anything that you want the Mac to open automatically after starting up, such as often-used programs, documents, control panels, or desk accessories. Don't let the Startup Items folder's name confuse you—this folder does not hold INITs.

System 7's subdivided System Folder has important ramifications for INITs. In earlier System versions, all INITs and cdews with INIT components live in the System Folder and load in alphabetical order. In System 7.0, INITs still load alphabetically, but from a few different places. First, System 7 alphabetically loads the extensions in the Extensions folder, followed by those in the Control Panels folder, and then those in the top level of the System Folder. You need to keep this loading order in mind when troubleshooting INIT conflicts. Also, if you use an INIT-management utility such as INITPicker, you must put it in the Extensions folder so that it loads before other INITs.

Aliases and the Apple Menu
One of System 7.0's most useful features is the alias, a small file that acts like an electronic remote control for a file, folder, program, or disk. Aliases have 1001 uses, but the most common is to give you convenient access to a file or program that you've buried within other folders (see "Making an Alias"). For example, you merely double-click on an alias you've created for your word processor to open the actual application, without opening its folder. And you can have multiple aliases—in various locations—for the same item.

A newly created alias icon looks exactly like the icon of the file or program it points to. The only difference is that it has the word alias in its name, but you can change the name to anything you like; you'll still know the item is an alias because its name appears in italics. If you need to quickly locate the item that an alias points to, select the alias, choose Get Info from the Finder's File menu, and (continues)
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click on the Find Original button. And aliases are smart—you can move and even rename the item that an alias points to, and the Mac will still find the item when you open its alias.

Aliases team up well with the new and improved Apple menu, which gives you quick access to anything you can open, including programs, documents, folders, control panels, and

Aliases. To add an item to the Apple menu, simply put it (or its alias) in the Apple Menu Items folder, which is located within the System Folder.

More Customizing Options
In last month’s column, I discussed numerous Finder-customizing projects, most of which required resource-editing utilities such as Apple’s ResEdit and Michael C. O’Connor’s Layout. In System 7, you can perform many of the same customizing tasks—as well as some new ones—without any additional utilities.

The Views control panel lets you tweak the way the Finder displays disk and folder contents (see “Improving Your View”). The Always Snap to Grid option is handy. It puts the Finder in what I call Felix Unger mode—it always cleans up after you, snapping icons that you drag to an invisible grid, keeping them neatly aligned.

Another customizing task involves disabling the warning message that appears when you choose Empty Trash. It’s easy: Select the Trash icon and choose Get Info. When the info window appears, uncheck the Warn Before Emptying box. Keep in mind that this removes an important safety net, so don’t choose Empty Trash unless you really mean it.

Speaking of Get Info, its window is the gateway to two more customizing options. You can use the Get Info window to change the icon of a file, folder, or disk (see “Custom Icons”). You can even paste a scanned image into an icon—a handy way to preview a scanned image without starting up a graphics program.

(continues)
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A document's Get Info window contains a Stationery Pad check box that lets you turn a document into a stationery pad, a template you can use as a starting point for new documents. Candles for stationery pads include a custom letterhead, a newsletter template, or a fax cover sheet. When you open a stationery pad, the Finder makes a copy of the pad, leaving the original unchanged. Thus you can reuse the same document without worrying about accidentally replacing its contents.

As you work with System 7.0, you'll discover that many of its features become even more powerful when you combine them. For example, say your office has one Macintosh whose hard drive has been made available to everyone via System 7's file-sharing features. You can create a stationery pad for a document on that shared hard drive, then make an alias of it, and then stash the alias in the Apple Menu Items folder on your own hard drive. From then on, whenever you choose the alias's name from the Apple menu, the Macintosh will connect to the shared hard drive if necessary, make a copy of the stationery pad, and then open the copy—a multistep process reduced to one mouse-click.

There's far more to System 7 than I have room to describe here. In upcoming columns I'll take a closer look at some of System 7's subtleties, especially IAC. With IAC and AppleEvents, programs (or more accurately, versions of them updated for System 7) will be able to work together in remarkable ways. IAC lets you move information from one program to another and have the information updated automatically when you change the original. AppleEvents allows separate programs to work together intimately, exchanging data and even controlling each other.

In the meantime, the best way to master System 7's new features is by experimenting. Explore the Finder's new menu commands. Turn on the balloon help feature and point to everything you see, including files and folders within the System Folder. The Finder provides over 1300 help balloons that succinctly explain its menu commands, the System Folder's components, and the Mac's user-interface elements. If you're just getting started with the Mac, you'll develop a better understanding of how it works. And if you've used earlier versions of system software, you'll feel like you've discovered the Mac all over again.

Contributing editor Jim Heid focuses on a different aspect of Mac fundamentals each month. For more on System 7.0, see his latest book, Macworld Complete Mac Handbook (IDG Books Worldwide), an updated, expanded collection of more than 40 Getting Started columns.
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HINTS FOR MAKING WORDPERFECT DOCUMENTS A LITTLE CLOSER TO PERFECT

BY CHARLES SEITER

Longtime Mac enthusiasts who have been typing away for years in MacWrite, Microsoft Word, or WriteNow will probably be surprised to hear that most of the time WordPerfect is the second-best-selling Mac word processor on the market. The first version, released after formidable delays (at one point, in fact, WordPerfect Corporation was marketing the beta version to the public), had an impressive array of power features but a quirky, PC-influenced, and decidedly un-Mac-like interface. Version 2.01 is coded from scratch and offers still more power while managing to bring its interface into closer conformity with the expectations of users trained on the Mac. To appreciate the power of WordPerfect 2.01, it is worth getting past the beginner’s level. Here are some hints for doing just that. Special thanks to Marsha Terry and Kathryn Pond-Sargeant of WordPerfect Corporation for their advice and for reviewing these tips.

Style Is Everything

One of the main differences between 2.0 and earlier versions of WordPerfect is 2.0’s Styles feature. It is a welcome addition, since everyone simply expects styles in a high-end word processor. The first thing you might want to know about style is how to change the parameters of Normal, the default style that ships with the program. Go to the Layout menu, pick Styles, and select Edit from the pop-up menu that appears. Scroll down the list of styles to Normal, select it, and click on the Edit Contents button. Now you can define the style you want using the standard menus; just pick font, font size, columns, or other formatting information from the menus, and watch the program record the information in the styles-editing screen that opens at the bottom of the current document (see “Taking Note of Styles”). Note that, even if it may seem more convenient to pick style information from the Ruler—as you can in Word—the style option is available only from the menus.

The best method for developing new styles that have at least a few elements in common with an existing style is to use the Based On and Link To options, which appear when you select New from the Styles pop-up menu. Based On makes the current style a base; you simply call up the appropriate items from the Layout, Font, and Style menus to make any changes (see “Based on Basics”). Link To makes it easy to format complex layouts with several styles. If, for example, you are creating a newsletter that has a heading with a distinctive font and margins, you can save time by linking two styles. First, create the text style with the font and (continue)
Merging with Macros

Macro programming can seem a daunting proposition for users whose main interest is basic word processing. WordPerfect makes macro programming fairly simple by offering a Record facility that can access all the capabilities of the Search menu and the Tools menu (including Graphics)—often you can produce a useful macro with just a few keystrokes. Even simpler than the Record feature is the use of the macros already provided in the current shipping version (2.01). Two of these macros are particularly useful. The first is Tables. When you select Tables, WordPerfect prompts you to provide the number of rows and columns you wish, and the macro sets up a boxed table for insertion of data. The other macro that you're likely to use extensively is the standard Labels Layout, for printing mailing labels.

Macro Power

A little work with the macro manual can often save lots of time. Suppose, for example, that you have a mailing-list file in another program and you try to use it with a form letter generated in WordPerfect. Immediately you realize that the rest of the software world is set up to use tab-delimited databases or lists (fields are separated by tabs; records are separated by returns). By creating a basic macro, you can bring a tabbed text file into WordPerfect, but the program can't read the file unless fields are marked with WordPerfect's own end-of-field symbol and the records end with its end-of-record symbol.

If you have a list of 500 names and addresses, you are not going to want to replace all those tabs and returns by hand. But macros can make the replacements semiautomatically. One simple way to create such a macro is to turn on the Record function from the macro menu after you open the imported tabbed text document—be sure your cursor is at the beginning of the document.

In the dialog box that appears, enter a name for the macro; choose either the Private Library or the current document in the Save In pop-up menu; and click on New to dismiss the dialog box. Now choose Find Code from the Search menu, scroll down to tab in the list that appears (or press F to get there fast). Next click on Find (you'll see that the cursor jumps to the first tab in the open document), then click on Remove, and close the Find Code window. Now choose Merge from the Tools menu and double-click on End of Field in the scrolling list that appears. Finally, choose Stop Recording from the Macro menu and click on Yes when the program asks if you want to save your changes.

What you have at this point is a little one-at-a-time replacement macro. If you have 500 records, you probably want something a little more automated. By selecting Edit from the Macro menu you can call up your macro as a text file (see "Making Macros"). You can add a loop that repeats the one-time replacement as many times as you want. Suppose each record contains five fields. Then the whole file has 2500 tabs to be replaced. If you add the following lines in the macro-editing window, the macro will execute 2500 times.

Assign(Var01;0)
Repeat
(core replacement macro you just recorded)
Assign(Var01;Var01 + 1)
Until(Var01 = 2500)

This macro merely makes all the replacements you need. Now go through and record a macro for changing all the hard-returns to End of Records (using the same Find Code and Merge list you used in the first case), and make that macro repeat 500 times instead of 2500. After you (continues)
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run both macros, the file is properly formatted for merging with a WordPerfect document.

This, by the way, is the least sophisticated way to get the job done; an experienced macro programmer would write a loop that searches for and replaces each kind of delimiter automatically until the loop reaches the end of the file, so the user doesn’t have to keep track of file length. But the above procedure works, it’s easy to debug, and it lets you get a glimpse of macro power.

Switched-On Macros

If you name a macro OnStartUp and save it in your USA Private Library (the new 2.01 name for WP Private Library), that macro runs every time WordPerfect is started. Often this approach is convenient if you are working on a project that calls for unusual document formats or graphic constructions embedded in documents. You can also put start-up macros into the Common Library for network users.

Similarly, if you name a macro OnOpenDocument and save it in your document, the macro executes automatically when you open that document in WordPerfect. This trick doesn’t work if you open the document simply by double-clicking on the Desktop icon, but this apparent limitation in function means that you can easily choose whether to run the macro or not.

Page Layout for the Amateur

The Text Box feature of WordPerfect can be used to sew together professional-looking one- or two-page flyers in a hurry. Basically, when you open a text box you get a minwindow for word processing (the text box can handle WordPerfect’s full range of fonts, styles, and columns), which can be dressed up with attractive frames and borders. A text box can also be positioned (using box handles), numbered, and captioned. So, if you have a number of short text items to arrange on a page, one maneuver is to put all items smaller than a page-

POWER DRAWING

The Replicate command in the Arrange menu of the Graphics window in WordPerfect is a veritable artwork factory—you can replicate any graphic selection while scaling, rotating, translating, and even color-blending the set of copies.
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length column of text into text boxes. That way you can drag text boxes, and any graphics boxes you have, around on the page just as if they were independent pieces of paper and you were doing traditional high-school-newspaper pasteup, except that the pieces are floating on a Macintosh screen and are still editable.

This tip comes in handy for publications that have repeating headlines, or information boxes. You can create a headline or text, in a text box, with the style parameters that you want. These boxes can be stored, placed into a page layout, and moved around like objects. For short documents you can juggle text boxes to produce PageMaker-style results without having to worry about picas, or consulting a manual.

**Quick Pix-Fix Tricks**

The graphics environment in WordPerfect 2.01 is full of large and small amenities. If you double-click on the color tool in the Draw palette, for example, you can edit color selections, producing novel blends or rainbows (you can also edit the pen pattern by double-clicking on it). The same is true for the monochrome tools—essentially you get a FatBits-like edit capability for the fills.

Another slick feature is graphics cropping. To crop an image you simply hold down the option key while you size the graphics box that automatically surrounds images in WordPerfect documents. This trick works for graphics created in WordPerfect as well as for imported art. When you hold down the option key as you move the handle of the graphics box inward, the box becomes smaller, but the graphic remains the same size. If you move the handle outward, the image remains stationary, but the box enlarges to include more of the image. This is not only a fun tool to use, but can make a dramatic impact on the art you create as well.

Finally, you can make complex repeated graphics easily in WordPerfect 2.01 using the Replicate command, which is under the Arrange menu in the drawing window (see “Power Drawing”). Note that you can specify offset position, size change, and rotation of each repeated figure independently.

**Character Map Key**

Instead of calling up Key Caps to find the option- or shift-key combination for characters, you simply pull up the Character Map and click on the character you want (see “Lots of Characters”). It’s probably not the preferred way to type rapidly in French, but if you just need to find an occasional ™ or ® symbol it’s wonderful.

**Sharing the Wealth**

If you’ve found a tip or shortcut not mentioned here, spread the word to other Macworld readers by sending it to Quick Tips, and if you’ve got suggestions for products you’d like to see covered in Insights, send them to Insights, Macworld, 501 Second St., San Francisco, CA 94107.

As a Macworld contributing editor, Charles Seiter is no stranger to either his keyboard or the world of word processors.
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With each entry include this form or a photocopy (FILL OUT COMPLETELY AND SIGN), a detailed technical description of how you produced the work, and $10 per entry. Send entries to: Macintosh Masters IV Art Contest, Macworld, 501 Second St., San Francisco, CA 94107, USA. Make checks payable to Macworld.

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Here's our list of some of the latest versions of Mac software that were announced at the time we went to press. We hope you'll find it useful. The first price is the upgrade cost for registered owners; the second price is the current list price. (Send your update announcements to Updates, Macworld, 501 Second St., San Francisco, CA 94107.)

DataPrism version 1.1 allows local sorts on data that has been retrieved from server. Supports Oracle's SQL Connect and Rdb servers through the Sequoia interface. SAM version 3.0 can be updated with new virus-definition files from the Symantec BBS or the company's 24-hour virus news line. Includes a scaled-down version of the SAM Intercept module for systems with limited memory. Supports System 7.0. Symantec, 408/253-9600. $29, $99 new.

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*Price = cost for update to registered owners.
*a = contact your dealer for update policy.*

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**Macworld** • July 1991

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Mac IIfx $6549
4 megabytes of RAM, 105mb Quantum Hard Drive, 14mb Apple SuperDrive, Mouse, MacPro Extended Keyboard, 8-bit color, 13" Apple RGB High Resolution Color Monitor.

PRODUCT UPDATES

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</table>

MacSource: Do It For Your Mac and For Yourself!

FUJITSU
"The world's most reliable drives"
Fujitsu is one of the world's largest manufacturers of hard drives for a good reason: They make the most reliable products available. Hard drives with an incredible mean time between failure that are warranted for up to five years. All featuring the "zero defect" reliability Fujitsu Mainframe and Super computers are famous for. At MacDirect, we ship hundreds of Fujitsu's 5.25" and 3.5" special Macintosh-version drives every month. So don't let your drive get you down. Order a Fujitsu from MacDirect today.

<table>
<thead>
<tr>
<th>Fujitsu 3.5&quot; Drives</th>
<th>3 Year Warranty</th>
<th>*50,000 Hours MTBF</th>
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<td>680 MB 5.25&quot; Full Hght 16ms</td>
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<td>1.2 Gig 5.25&quot; Full Hght 14ms</td>
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*Mean Time Between Failure is the average life expectancy of a drive. 24 hour factory replacement available for 5.25" drives for additional fee.

Siemens 525 MB Tape Backup
525 MB Tape
-Use two tapes for 1 gigabyte
-Fast network and unattended backup capabilities

Wang Dat Tape Backup
1.2 Gig DAT
-Fast network and unattended backup capabilities

Ricoh Optical
600 MB Optical
-Read/write reliable storage

WREN! DRIVES
Quantum Drives
800K Mac Floppy Drive
The Fujitsu External floppy drives have a one year warranty. These are the same drives that retail for $259!

<table>
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WREN! DRIVES Internal | External
300MB F/H      | $1248     | $1398    |
300H/H         | $1294     | $1394    |
337 MB RUNNER  | $1398     | $1498    |
404MB/H        | $1578     | $1678    |
600MB F/H      | $1624     | $1724    |
630MB RUNNER H.| $2038     | $2138    |
1.2 Gig        | $2548     | $2648    |

SyQuest!
Sharp Scanners and Printers!

44MB REMOVABLE With Cartridge! $458.00
2 Year Warranty

JX450...$4,295
**COMMERCIAL COLOR SCANNER**

JX 300....$1,795
**COLOR SCANNER**

JX 730....$1,695
**COLOR PRINTER**

Circle 140 on reader service card
Wholesale 54 brings you the highest quality hard drives available. And, a multi-million dollar inventory allows us to bring them to you at the lowest prices in the industry.

External drives include:
- zero-footprint solid metal case
- dual SCSI ports for daisy-chaining
- external LED
- SCSI cable
- power cable
- ONTRACK formatting/partitioning software

Internal drives include:
- mounting brackets
- SCSI cable
- ONTRACK formatting/partitioning software

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All drives are new!!

Toll-free In U.S. and Canada

800-473-0054

Mailing Address:
520 S. 52nd St., Ste 204
Tempe, AZ 85281
FAX: (602) 350-1191

Policy: Prices, terms & availability subject to change without notice. All products come with a manufacturer's warranty. No returns on opened software. 11/05. No surcharge for MasterCard/VISA. Shipping UPS or FedEx only. ARO/ISO orders accepted. PO's accepted, some restrictions apply. 20% equipment immediately replaced upon return. Product must be undamaged & in original packaging and condition. Personal checks will delay shipping 10 days.
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A Guide to Products Featured in This Issue
WHERE TO BUY

Minicad+ Graphsoft; 301/461-9488; fax 301/461-9245.

Network Diskit
SuperMac Technology; 408/245-2202; fax 408/735-7250.

New Utilities 2.0
Software; 503/274-2800; 800/237-3611; fax 503/274-0670.

Oasis
Time Arts; 707/576-7722; fax 707/576-7731.

One Shot Baseline
Publishing; 901/682-9676, 800/926-9676; fax 901/682-9691.

Paper Keyboard
Datacap; 914/347-7133; fax 914/347-7136.

Real Estate Investment
Analysis Version 7.0
RealData; 203/255-2732, 800/899-6060; fax 203/852-9083.

ResumeMailer
Individual Software; 415/734-6767, 800/833-3533.

SC-7500
Mitsubishi International; 914/997-4999; fax 914/997-4976.

SimMac
Simware; 613/727-1779, 800/267-9991.

StuffIt Deluxe
Aladdin Systems; 408/685-9175.

Trick or Treat
BES Software; 913/478-4243.

TypeChart
Octavo Productions; 604/987-5270, fax 604/987-5787.

UPGRADES
Apple Computer
408/996-1010.

Applied Engineering
214/241-6060; fax 214/494-1365.

Asante Technologies
408/752-8388, 800/662-9686; fax 408/734-4864.

ATT Technology
716/688-4259; fax 716/636-3630.

Brainstorm Products
415/964-2131; fax 415/964-2135.

Computer Care
612/371-0051, 800/950-2273; fax 612/371-9242.

Computer System Associates
619/566-3911; fax 619/566-0581.

Dayna Communications
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DayStar Digital
404/967-2077, 800/562-2077; fax 404/967-3018.

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MacProducts USA
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Noy Systems
904/427-2358.

Orchard Technology
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Peripheral Outlet
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PPL
415/657-2211; 800/288-8754.

PW Electronics
313/442-2300; fax 313/442-2302.

RADIUS
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Shadow Technologies
415/548-0130; fax 415/477-5502.

Siclo Sales & Engineering Corp.
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Spectral Innovations
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System Technology
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Tercom Corp.
206/575-8631, 800/827-1257; fax 206/524-4831.

Third Wave Competing
512/852-8822, 800/284-0486.

Total Systems
503/345-7395, 800/874-2288; fax 503/343-6292.

UR Micro
716/689-6100, 800/876-4276; fax 716/689-0062.

WordPerfect
WordPerfect Corp.; 800/225-5000, 800/521-4566.

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Monochrome, 80DPI, 75Hz Vertical Refresh Rate
$479

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Monochrome, 72DPI, 78Hz Vertical Refresh Rate
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20" Trinitron IKegami Color Monitor
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$2795

$459
SyQuest Removable
with cartridge
Extra cartridges $69

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Sterling Solutions
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FAX 1-801-521-6604
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**MACWORLD *JULY 1991***
**Laser Printer Sale!**

**NEC SilentWriter 90**
- $1,599
  - 6 pages per minute
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  - 6 pages per minute
  - 35 typefaces
  - Letter, Legal and Transparencies

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  - 2 Megabytes of RAM
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Seagate/Wren Drives Now Have a TWO Year Warranty!

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<th>Size/Speed</th>
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<td>Wren Runner 337Mb 10.7ms</td>
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<td>Wren 1.2 Gigabyte</td>
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Hard Disk Drive Megabyte Sale!

Quantum

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Here's what MacUser Magazine said about the CrystalPrint Express in the October 1990 issue:

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Desk... 129
DeskPaint and DeskDraw... 189
Vision PRO Monitor System

When purchasing Systems, compare the options and features. VisionPRO Color Graphic cards are manufactured under license for MacTel Technology and support Macintosh graphical needs now and in the future.

Video Graphic System

- 8-Bit Business System 20"  
  - Business System card not Upgradable, 20" Trinitron  
  - $2795

- 8-Bit System PRO SONY 19"  
  - VisionPRO Video Card, 19" Trinitron (QDM: 1900)  
  - $3795

- 24-Bit Vision PRO Interface Upgrade Kit  
  - w/ purchase of any system PRO $100

*All VisionPRO Interface cards have multi-monitor support (Sony 19" & 1400 V; support BlockMode transfer & acceleration. Upgradeable 8-Bit to 24-Bit cards, Pan/Zoom 2X & 4X and virtual desktop. Business system video card offers Pan/Zoom 2X & 4X and virtual desktop.

Monitors

- Apple 13" RGB  
  - $794

- Hitachi 14" MXV Super Hi-Res Monitor w/Tilt & Swivels  
  - $575

Upgrade Kits

- Vision ST Upgrade Kit (8-24 Bit)  
  - $135

- VisionPRO 8-24 Bit Upgrade Kit  
  - $700

Quantum Drives Index 3.5"

"In keeping with our commitment to provide you with a complete line of high quality economical products, MacTel is proud to offer you a complete line of Hard Drives. We carry only the finest mechanisms available in the market. We are assured of reliable performance day-in, day-out...

2 Years Warranty !

<table>
<thead>
<tr>
<th>Drive Type</th>
<th>Internal</th>
<th>Price</th>
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</thead>
<tbody>
<tr>
<td>52 Mb</td>
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<tr>
<td>80 Mb</td>
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<tr>
<td>425 Mb</td>
<td>12 ms</td>
<td>$1499</td>
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</table>

Removable & Cartridges

- MacTel 45R W/1 card  
  - $499

Squeak Card SQ 400  
  - $69

- 2 GB DAT Drive w/Retrospect V1.2 & Tape  
  - $1799

The Postscript Corner

- MacTel offers you the best low cost postscript printers in the market today. As further proof of our commitment we designed and built the 1 Mb upgrade for these printers.  
  - MicroLaser PS-17  
  - $1999

- MicroLaser PS-35  
  - $1999

- MacTel Nats  
  - $15

- 1 MB UPGRADE SALE!  
  - $79

*price include AppleTalk Connector

Contact the professionals at MacTel Technology. We handle only the best in Macintosh hardware, systems and peripherals.

Names like Apple, Nikon, Raster Ops, Wacom, Sharp and our own, top-quality Index brand.

Circle 142 on reader service card.
### PRINTERS

**TI microLaser PS17**
- MacUser #1 Personal Printer
- $1299

**TI microLaser PS35**
- Call
- $1599

**TI microLaser XL**
- 16 Pages per Minute!
- Call
- $95

**Memory**
- We Stock All Accessories & Supplies for TI microLaser Printers

<table>
<thead>
<tr>
<th>Printer</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abaton Laser LX</td>
<td>$1650</td>
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<tr>
<td>Epson EPL-7500 (RISC Fast!)</td>
<td>$2295</td>
</tr>
<tr>
<td>NEC Silentwriter II/90 &amp; II/290</td>
<td>Call</td>
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<tr>
<td>QMS PS410</td>
<td>$1995</td>
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<tr>
<td>CalComp Colormaster Plus</td>
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<tr>
<td>Kodak Diconix Color 4</td>
<td>Call</td>
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</tbody>
</table>

### ACCELERATORS

**DayStar Fast Cache IICi**
- $269

**DayStar 40 MHz PowerCache IICi**
- $895

**DayStar 25 MHz PowerCard**
- $995

**DayStar 23, 40 & 50 MHz PowerCard**
- Call!

**lR 32K IICi Cache Card**
- $195

**lPl QuickSCI Card**
- $449

**Sigma DoubleUp Data Compression Card**
- $179

**NewLife SE 16 MHz 68030**
- $395

**NewLife SE 25 MHz 68030**
- $895

**NewLife SE 33 MHz 68030**
- Call!

**The Fastest 33 MHz SE accelerator available!**

### SIMMS

- **Microtek 600ZS**
  - Call!

### FAX MODEMS

**Abaton InterFax 24/96**
- $295

**Challenger VP24/96 (9600 send fax)**
- $99

**DoveFax**
- $275

**DoveFax Plus**
- $395

**Global Village TelePort**
- $175

**Orchid Fax Modern**
- $495

**Prometheus 9600M Plus**
- $599

**Prometheus 14.4/9600 Ultima**
- Call

### SCANNERS

**Abaton Scan 300/Color**
- $1395

**Caere TYPST**
- $465

**Epson ES-300C**
- $1649

**Umax UG80 (256 Grey Scale)**
- $995

**OmniPage**
- $479

### DATA MODEMS

**Challenger VP2400**
- $75

**Zoom VP2400 V.42 bis (MacUser #1)**
- $175

**Practical Peripherals 9600SA**
- $499

**US Robotics 14.4 V.32 bis**
- $695

### HARD DRIVES

**Eagle Syquest Drive**
- $499

**Mass Micro DataPak**
- $699

**Mass Micro DataPak 88**
- $1195

**PLI Infinity 40 Turbo**
- $649

**PLI Infinity 88 Turbo**
- $1195

**Wren (s.25, Full Height)**
- $125

**Removable Cartridge**
- $125

**Syquest**
- $68

**Optical Cartridges**
- $125

### 44 MEG REMOVABLE DRIVES

**Eagle Syquest Drive**
- $499

**with Cartridge, Metal Case, 15 Meg of Shareware & 2 year warranty**

### HARD & FAST RULE:

**BIG, FAST, HARD DRIVES COST LESS AT MacCenter**

**Wren**
- (8.25, Full Height)
- Int: $1395/Ext: $1495

**2GB (255NM-Runner)**
- $1595

**3GB (366NM)**
- $1855

**4GB (467NM-Runner)**
- $2095

**1 GB (124NM)**
- $2495

### MACINTOSH SYSTEMS

**We Buy and Sell**

**New and Used Systems.**

**Ask About Leasing Macintosh Systems!**

**Prices valid 5/29/91 - 6/28/91**

**Most products available in 110 volt & 220 volt.**

**All returns require approval and are subject to a restocking fee.**

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**NO surcharge for Fax or foreign orders.**

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**800-950-3726**

**INTERNATIONAL 0005 512-478-1489**
Quark XPress 3.0 $449
Includes free upgrade to XPress 3.1. A $100 value!
Expand the power of Quark XPress with XTensions. Bottom Line carries over 40 separate XTensions.

Seiko CM-1445 $545
14" color Trinitron with tilt and swivel base

Abaton Interfax 24/96 $275
2400-9600 fax/modem. MacUser Edky Award Winner!

PII Infinity 40 / Infinity 88 $999 / $1125
LC Math CoProcessor $125
1.2, & 4 MB SIMMs $35, $99 & $179
HP DeskWriter $459
FileMaker Pro $181

PU Infinity 40 / Infinity 88 $999 / $1125
LC Math CoProcessor $125
1.2, & 4 MB SIMMs $35, $99 & $179
HP DeskWriter $459
FileMaker Pro $181

PRESS

CD ROM Libraries
Chiron CD- ROM 825
Daystar Digital FastCache 11i 525
Daystar Digital FastCache 11i 695
Dove Fax 24/48 695
Dove Fax 24/48 Plus NEW! 485
Dove Marathon Boards 850
E-Machines 115 249
E-Machines 119 943
E-Machines 119 1080
GCP Partial Laser Printer 1609
GCP Partial Laser Printer 1838
GCP Partial Laser Printer 1649
GCP Partial Laser Printer 2399
Hayes Smart Modem 1200 799
Heiwit Packard Lasso 249
Heiwit Packard Lasso 499
Heiwit Packard Lasso 325
Heiwit Packard Lasso 459
Heiwit Packard Lasso 399
Kensington Turbo 101 110
Kensington Turbo 101 299
Kensington Turbo 101 799
Kensington Turbo 101 1510

Marstels-800 Mac Mac-64 $369
800 DPI hand scanner with Enhancer image software

MacRecorder Digitizer Only 3000 $89
MacRecorder Digitizer Only 3000 $469
Magazine 14" Color 253
Micra Micro Quick Image 24 649
Micra Micro Quick Image 24 649
Motorola PAMM/F5675 109
NEC Monitors & CD ROMs 139
NEC 14" MacSync 229
NEC Silentwriter II Model 90 1599
Phone/Mod Star Controller 739
101 Keyboard $79
Macintosh Extended Keyboard 101

MacRecorder Digitizer Only 3000 $89
MacRecorder Digitizer Only 3000 $469
Magazine 14" Color 253
Micra Micro Quick Image 24 649
Micra Micro Quick Image 24 649
Motorola PAMM/F5675 109
NEC Monitors & CD ROMs 139
NEC 14" MacSync 229
NEC Silentwriter II Model 90 1599
Phone/Mod Star Controller 739
101 Keyboard $79
Macintosh Extended Keyboard 101

Kensington Turbo Mouse ADB $95

TOP LINE DISTRIBUTION

CD ROM Libraries
Chiron CD- ROM 825
Daystar Digital FastCache 11i 525
Daystar Digital FastCache 11i 695
Dove Fax 24/48 695
Dove Fax 24/48 Plus NEW! 485
Dove Marathon Boards 850
E-Machines 115 249
E-Machines 119 943
E-Machines 119 1080
GCP Partial Laser Printer 1609
GCP Partial Laser Printer 1838
GCP Partial Laser Printer 1649
GCP Partial Laser Printer 2399
Hayes Smart Modem 1200 799
Heiwit Packard Lasso 249
Heiwit Packard Lasso 499
Heiwit Packard Lasso 325
Heiwit Packard Lasso 459
Heiwit Packard Lasso 399
Kensington Turbo 101 110
Kensington Turbo 101 299
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Kensington Turbo Mouse ADB $95

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Bottom Line Distribution is committed to the needs of the international Macintosh user and reseller. Fast and reliable customer service is standard. Contact our full-time international department via fax at (512) 476-6399. We ship DHL, UPS International, or Federal Express. We stock 220v versions of most hardware and 220v converters are available. Dealer inquiries are welcome. Language interpreters are available. Internationale Handlerkonditionen.
## The Bottom Line in Professional Video Solutions

**TI microLaser PS35 $1545**
- 6 ppm Adobe Postscript
- AppleTalk Interface included
- 1MB TI Memory $75
- TI Letter or Legal Tray $49
- Replacement Toner $60
- Envelope Feeder $244

**TI microLaser PS17 $1245**

---

**NEW! $1425**

**Microtek 600ZS**
- 600 DPI 24 bit Scanner with Photoshop

---

### RasterOps

<table>
<thead>
<tr>
<th>Product</th>
<th>Price</th>
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<tbody>
<tr>
<td>RasterOps 2STV</td>
<td>$1152</td>
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<tr>
<td>RasterOps 2st</td>
<td>$625</td>
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<td>RasterOps 2st</td>
<td>$125</td>
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<tr>
<td>RasterOps Video Expander (NTSC or PAL)</td>
<td>$486</td>
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<tr>
<td>RasterOps TV Tuner</td>
<td>$346</td>
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<tr>
<td>RasterOps R.19&quot; Trinitron with 8-bit card</td>
<td>$397</td>
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<tr>
<td>RasterOps 2L.19&quot; Trinitron with 24-bit card</td>
<td>$525</td>
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<tr>
<td>RasterOps ClearVue (Mac II)</td>
<td>$1094</td>
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<tr>
<td>RasterOps ClearVue SE w/ 16MHz Accelerator</td>
<td>$1350</td>
</tr>
</tbody>
</table>

### JetFill HP Refill

- The Leak-proof, inexpensive solution for refilling HP DeskWriter cartridges. Colors available now.
- Permanent ink is now available for the Apple StyleWriter.
- $1095

### Cutting Edge

- Cutting Edge 44MB Removable: $529
- Cutting Edge 40MB External: $279
- Cutting Edge 60MB External: $349
- Plustor 60MB Removable: $1195
- Plustor Super Floppy: $208
- Quantum ProDrive 40MB: $208
- Quantum ProDrive 80MB: $395
- Quantum ProDrive 120MB: $395
- Quantum ProDrive 170MB: $730
- Internel/External Drive Kit: $299

### Radius

- Radius Pivot $710
- Radius Color Pivot $1699
- Radius Color Pivot Interface II, I, I, SE, SE/90 $1549
- Radius Two Page Display 19" $975
- Radius Two Page Display 21" $1249
- Radius Two Page Interface II, I, I, SE, SE/90 $1215
- Radius Color Display 19" $2099
- Radius Color Display 21" $2149
- Radius 8 bit Interface 72 DPI $1325
- Radius 21 bit Interface 72 DPI $2515
- Radius QuickColor Graphics Engine $2275
- Radius Precision Color Calibrator $485

### Software

<table>
<thead>
<tr>
<th>Software</th>
<th>Price</th>
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<tbody>
<tr>
<td>Adobe Illustrator 3.0</td>
<td>$335</td>
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<tr>
<td>Adobe Fonts from 64</td>
<td>$515</td>
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<tr>
<td>Adobe Type Manager</td>
<td>$379</td>
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<tr>
<td>Adobe Type Reunion</td>
<td>$379</td>
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<tr>
<td>Adobe PageMaker 4.0</td>
<td>$449</td>
</tr>
<tr>
<td>Adobe PageMaker 4.0</td>
<td>$449</td>
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</table>

### Software Options

- Cutting Edge 44MB Removable: $529
- Cutting Edge 40MB External: $279
- Cutting Edge 60MB External: $349
- Microtek 60MB Removable: $1195
- Plustor Super Floppy: $208
- Quantum ProDrive 40MB: $208
- Quantum ProDrive 80MB: $395
- Quantum ProDrive 120MB: $395
- Quantum ProDrive 170MB: $730

### Contact Information

**Fax:** 1-900-420-8770
**Bottom Line Distribution**
2204 Rio Grande, Austin, Texas 78705

**1-900-420-3636**

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**How to Order:**
- Visa, Mastercard, Discover (no surcharge), checks, and CODs. 50% minimum on CODs. Texas residents add 8% sales tax. Prices and terms subject to change and availability.

**International:**
- 5% surcharge on international orders. Mail In: Orders accepted with a $50 surcharge. Terms: 15 days after receipt. You are not charged until your order is shipped. Phone charges cannot be refunded. **Shiping:** minimum S&H $50. UPS Ground, Blue Box, Federal Express, **Returns must be in original condition and package and require an RMA.**

**Terms:**
- You are not charged until your order is shipped. Phone charges cannot be refunded. **Shiping:** minimum S&H $50. UPS Ground, Blue Box, Federal Express. **Returns must be in original condition and package and require an RMA.**

**Fax:** 1-900-420-8770
**Bottom Line Distribution**
2204 Rio Grande, Austin, Texas 78705

**1-900-420-3636**

---

**Top Line Distribution**

**1-900-420-3636**

---

**$2 PER MIN**
### Aurora's Quantum Hard Drives

<table>
<thead>
<tr>
<th>Capacity</th>
<th>Internal</th>
<th>External</th>
<th>Access</th>
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<tbody>
<tr>
<td>52MB LP Drive</td>
<td>$287</td>
<td>$385</td>
<td>12ms</td>
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<tr>
<td>105MB LP Drive</td>
<td>$438</td>
<td>$536</td>
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<tr>
<td>120MB Pro Drive</td>
<td>$599</td>
<td>$699</td>
<td>12ms</td>
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<tr>
<td>170MB Pro Drive</td>
<td>$697</td>
<td>$799</td>
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<td>210MB Pro Drive</td>
<td>$755</td>
<td>$859</td>
<td>12ms</td>
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Accessories included: Modems, External Termination kits.

*2 year warranty on Quantum drives. 5 year warranty upgrade for $50 at time of purchase only.*

### Aurora Large Capacity Drives

<table>
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<th>Capacity</th>
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<td>1GB</td>
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<td>CD ROM</td>
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<td>$549</td>
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*1 year warranty on large capacity drives.*

### Microtech International Hard Drives

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<th>Capacity</th>
<th>Model</th>
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<tr>
<td>50MB</td>
<td>Nova</td>
<td>$619</td>
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<td>Nova</td>
<td>$824</td>
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<td>200MB</td>
<td>Nova</td>
<td>$1241</td>
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<tr>
<td>400MB</td>
<td>Nova</td>
<td>$1715</td>
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<tr>
<td>20MB</td>
<td>Europa</td>
<td>$440</td>
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<tr>
<td>40MB</td>
<td>Europa</td>
<td>$468</td>
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<tr>
<td>100MB</td>
<td>Europa</td>
<td>$774</td>
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</table>

*5 year warranty on Nova drives. 2 year warranty on Europa drives.*

### EMAC Hard Drives

<table>
<thead>
<tr>
<th>Capacity</th>
<th>Model</th>
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<tbody>
<tr>
<td>80MB</td>
<td>Metro</td>
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<td>100MB</td>
<td>Metro</td>
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<td>170MB</td>
<td>Metro</td>
<td>$1017</td>
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<td>20MB</td>
<td>Impact</td>
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<td>$737</td>
</tr>
<tr>
<td>170MB</td>
<td>Impact</td>
<td>$976</td>
</tr>
</tbody>
</table>

*2 year warranty on Metro and Impact drives.*

### Accessories

- 2400 Baud Modern: $107
- 2400 V42 Modern: $209
- 9600 V42 Modern: $475
- Dove Fax: $294
- Dove Fax Plus: $357
- Ext. Full Height Kit: $149
- Ext. Half Height Kit: $132
- Internal Kit: $35

*Modems 100% Hayes Compatible.*

### Memory

- 1MB Classic: $64
- 1MB SIMMS: $46
- 3MB Classic: $136
- 4MB SIMMS: $199
- 52/1MB Classic: $356
- LaserWriter SIMMS: $53
- 52/3MB Classic: $422

*5 year warranty on memory kits.*

### Entry Form

<table>
<thead>
<tr>
<th>Name</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Address</td>
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<tr>
<td>City</td>
<td>State</td>
</tr>
<tr>
<td>Telephone</td>
<td></td>
</tr>
</tbody>
</table>

### Now FREE Overnight Shipping

(Continental U.S.A.) $6 for C.O.D.

Call for details about higher capacity drives, used and refurbished drives, and volume pricing.

**Win A Macintosh Classic!!!**

To enter the drawing, just order from Aurora, or mail in the entry form.

**AURORA INDUSTRIES, INC.**
60 Skiff Street, Suite 1011, Hamden, CT 06517-1017

Inquiries 203-624-9018 • Fax 203-562-8191

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1-800-426-1591

Mon-Fri 9 a.m. - 8 p.m. EST

All products come with a 30 day money back guarantee against defects. 10% restocking charge on non-defective, unauthorized returns. Prices subject to change without notice. Product subject to availability. All orders shipped Federal Express and pay delivery unless UPS. Ground delivery overnight. Some rural areas require an extra day. Shipping is free to the continental United States. $6.00 charge for C.O.D. Orders; Credit Card reference is required. International inquiries welcome.

Circle 18 on reader service card
The Most Affordable DATdrive™ on the Market, now only $1495.

Third Wave's DATdrive™ with Retrospect—backup an entire network on a single DAT cartridge. Now available with 2 gigabytes of storage.

<table>
<thead>
<tr>
<th>SyQuest, Tape, DAT, Optical</th>
<th>UltraCombo</th>
</tr>
</thead>
<tbody>
<tr>
<td>4SR SyQuest, one cart</td>
<td>300/45R</td>
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<tr>
<td>45DR SyQuest, two carts</td>
<td>300/150t</td>
</tr>
<tr>
<td>150 Teac Tape Backup</td>
<td>600/DAT</td>
</tr>
<tr>
<td>DATdrive™ 2.0GB DAT Backup</td>
<td>600/150t</td>
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<tr>
<td>OptDisk™ 600 Sony Optical Drive</td>
<td>1000/DAT</td>
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<tr>
<td>OptDisk™ 1000 Taitum Optical Drive</td>
<td>2000/DAT</td>
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</tbody>
</table>

The 4SR was SyQuest cartridges available as single, combo or dual removable.

<table>
<thead>
<tr>
<th>Internal &amp; External Disk Drives</th>
<th>Media</th>
</tr>
</thead>
<tbody>
<tr>
<td>40L* (Maxtor)</td>
<td>TecT600H (60mb) $17</td>
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<tr>
<td>80L* (Maxtor)</td>
<td>TecT600N (150mb) 24</td>
</tr>
<tr>
<td>120 (Quantum)</td>
<td>4mm DAT Tape 19</td>
</tr>
<tr>
<td>170 (Quantum)</td>
<td>(Certified computer grade) Office Card (ISO) 512/1024 149</td>
</tr>
<tr>
<td>210 (Quantum)</td>
<td>4mm DAT Tape 19</td>
</tr>
</tbody>
</table>

*Low power internal drives that most Classic, IIsi & LC power specs.

<table>
<thead>
<tr>
<th>Seagate MacWren Drives</th>
<th>UltraCombo</th>
</tr>
</thead>
<tbody>
<tr>
<td>300</td>
<td>300/45R</td>
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<tr>
<td>425</td>
<td>300/150t</td>
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<tr>
<td>415</td>
<td>600/DAT</td>
</tr>
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Washington, D.C. 20001

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- **Disk-for-Disk Replacement Warranty** • Quantum, Maxtor, ARDAT and Syquest Drives carry a two year “parts & labor” disk-for-disk replacement warranty. WREN, Teac, WangDAT, CD-ROM’s and Syquest Cartridges carry a one year “parts & labor” disk-for-disk replacement warranty.

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<th>WREN 10.7 to 16ms Access</th>
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Circle 85 on reader service card
## BEST-SELLERS

### BUSINESS SOFTWARE

<table>
<thead>
<tr>
<th>Product</th>
<th>Company</th>
</tr>
</thead>
<tbody>
<tr>
<td>Microsoft Word</td>
<td>Microsoft Corporation</td>
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<tr>
<td>Microsoft Works</td>
<td>Microsoft Corporation</td>
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<td>Microsoft Excel</td>
<td>Microsoft Corporation</td>
</tr>
<tr>
<td>Aldus PageMaker</td>
<td>Aldus Corporation</td>
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<tr>
<td>FileMaker Pro</td>
<td>Claris Corporation</td>
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<td>MacWrite II</td>
<td>Claris Corporation</td>
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<tr>
<td>QuarkXPress</td>
<td>Quark</td>
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<td>WordPerfect</td>
<td>WordPerfect Corporation</td>
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<tr>
<td>Adobe Illustrator</td>
<td>Adobe Systems</td>
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### EDUCATION SOFTWARE

<table>
<thead>
<tr>
<th>Product</th>
<th>Company</th>
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<tbody>
<tr>
<td>Where in Time Is Carmen Sandiego?</td>
<td>Broderbund Software</td>
</tr>
<tr>
<td>Reader Rabbit</td>
<td>The Learning Company</td>
</tr>
<tr>
<td>Where in the World Is Carmen Sandiego?</td>
<td>Broderbund Software</td>
</tr>
<tr>
<td>Where in the USA Is Carmen Sandiego?</td>
<td>Broderbund Software</td>
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<tr>
<td>Math Blaster</td>
<td>Davidson &amp; Associates</td>
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### ENTERTAINMENT SOFTWARE

<table>
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<tr>
<th>Product</th>
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<tbody>
<tr>
<td>SimCity</td>
<td>Maxis</td>
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<tr>
<td>Tetris</td>
<td>Spectrum HoloByte</td>
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<tr>
<td>SimEarth</td>
<td>Maxis</td>
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<td>Falcon</td>
<td>Spectrum HoloByte</td>
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<td>Welltris</td>
<td>Spectrum HoloByte</td>
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### NETWORK/DATA COMMUNICATIONS

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<tr>
<th>Product</th>
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<tbody>
<tr>
<td>TOPS</td>
<td>Sitka Corporation</td>
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<td>AppleShare</td>
<td>Apple Computer</td>
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<tr>
<td>Timbuktu</td>
<td>Faronon Computing</td>
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<tr>
<td>White Knight</td>
<td>FreeSoft</td>
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<td>MicroPhone II</td>
<td>Software Ventures</td>
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### MASS STORAGE*

<table>
<thead>
<tr>
<th>Product</th>
<th>Company</th>
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<tbody>
<tr>
<td>MacStack SD40</td>
<td>CMS Enhancements</td>
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<tr>
<td>UltraDrive 45</td>
<td>GCC Technologies</td>
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<tr>
<td>Platinum PI 40 (Internal)</td>
<td>CMS Enhancements</td>
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<tr>
<td>Q40X</td>
<td>Total Peripherals</td>
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<tr>
<td>Infinity 40 Turbo (Removable)</td>
<td>PLI</td>
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### ADD-IN BOARDS

<table>
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<tr>
<th>Product</th>
<th>Company</th>
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<tr>
<td>Macintosh Display Card B+24</td>
<td>Apple Computer</td>
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<tr>
<td>Pivot</td>
<td>Radius</td>
</tr>
<tr>
<td>Macintosh Ili-NuBus Adapter Card</td>
<td>Apple Computer</td>
</tr>
<tr>
<td>Radius TPD Interface</td>
<td>Radius</td>
</tr>
<tr>
<td>Apple Ethernet LC Card</td>
<td>Apple Computer</td>
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### UTILITY SOFTWARE

<table>
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<th>Product</th>
<th>Company</th>
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<tbody>
<tr>
<td>SAM II</td>
<td>Symantec Corporation</td>
</tr>
<tr>
<td>The Norton Utilities for the Macintosh</td>
<td>Symantec Corporation</td>
</tr>
<tr>
<td>SUM II</td>
<td>Symantec Corporation</td>
</tr>
<tr>
<td>After Dark</td>
<td>Berkeley Systems</td>
</tr>
<tr>
<td>Virex</td>
<td>Microcom</td>
</tr>
</tbody>
</table>

### PRODUCT WATCH

Recent or forthcoming products of particular interest:

- Mr. X Educorp: CD ROM version of popular comic book in English and Japanese.
- Desert Storm: Warner New Media; Time Magazine’s new CD ROM on the Gulf War.
- Timbuktu 4.0: Faronon Computing; Color version of remote-control software.

Source: Exclusive InfoCorp survey of more than 125 Macintosh retailers and selected mail-order vendors. Covers sales during March 1991.

*Does not include hard drives installed at the factory.
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