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<td>$399</td>
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<tr>
<td>PowerVision 8-bit video</td>
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<td>adapter for PowerBook</td>
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<tr>
<td>w/0 MB of RAM</td>
<td>$499</td>
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<tr>
<td>w/2 MB of RAM</td>
<td>$699</td>
</tr>
<tr>
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<td>$999</td>
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<tr>
<td>16-inch Mirror Trinitron</td>
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</tr>
<tr>
<td>w/8-bit board</td>
<td>$1099</td>
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<tr>
<td>w/16-bit board</td>
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<td>w/24-bit board</td>
<td>$1449</td>
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<td>20-inch ProView Trinitron</td>
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<tr>
<td>w/8-bit board</td>
<td>$2499</td>
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## Monochrome Systems

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<td>21-inch Grayscale Display w/ monochrome card</td>
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| 800 DPI        | 800 Pro Color Scanner, with JPEG Compression and MirrorScan Software $1,599
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10:12 Process

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10:45 Present

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Circle 139 on reader service card.
**PowerBook 180 Slow Shipping:** Apple confirmed that the PowerBook 180 is shipping only in limited quantities because the LCD maker has failed to deliver enough displays. However, an Apple representative said shipments of the laptop are increasing every week. Another Apple employee said that the screen vendor was in violation of its contract with Apple. Both said the 180 was not in danger of being discontinued.

**Prison for Software Pirates:** The federal government recently passed legislation making copying software for commercial purposes a felony punishable by five years in prison or a $250,000 fine. The legislation only affects organizations that use pirated software internally or resell it.

**Adobe's New ATM:** Adobe (415/961-4400) is developing SuperATM, a version of its font-rendering utility, Adobe Type Manager, that will intelligently substitute fonts and maintain page layout when a document is moved to a machine that lacks the right fonts. The $149 SuperATM will include two Multiple Master fonts, several other typefaces, and a version of Adobe Type Reunion that indicates which fonts are substitutes.

**Apple Bundles E-Machines Board:** As a special promotion, Apple is offering the Apple 16" Color Display bundled with E-Machines' DoubleColor SX graphics adapter for $1799. The 256-color adapter will be available with the monitor through April 18. Contact your Apple reseller.

**Apple Support for the Deaf:** Apple has upgraded its Customer Assistance Center phone system with Telecommunications Device for the Deaf (TDD) software so that deaf and hearing-impaired people can access sales information and general customer information. The 24-hour Customer Assistance Center number is 800/833-6223.

**88MB SyQuest Drive:** In January SyQuest Technology plans to announce at Macworld Expo, and start shipping, an 88MB removable-cartridge drive that can read from and write to the huge number of existing 45MB SyQuest cartridges. The current 88MB SyQuest drive can read 45MB cartridges but can't write to them. The drive, called the SQ5110C, will be available through third-party vendors at prices to be set by those vendors.

**Connecting Ethernets:** Compatible Systems (303/444-9532) is shipping a RISC-based gateway and router for connecting and moving packets between Ethernets running AppleTalk, TCP/IP, or DECnet. The RISC Router 3000E lists for $2995. Future plans call for IPX support as well.

**Compressed Color:** Storm Technology (415/691-6600) is upgrading its JPEG-based color image-compression program PicturePress to version 2.5 with a faster engine and support for UserLand's Frontier scripting system. PicturePress comes with several scripts, including one for automating batch jobs. It lists for $199, or $999 with Storm's PhotoFlash accelerator board.

**Type Solutions Goes Pro:** Incubator Pro adds support for Type 1 PostScript to its TrueType support, converts between formats, and offers three new editing controls: x-height, descender size, and tracking. $129 from Type Solutions, 603/382-6400.
**When the mercury rises**

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Circle 188 on reader service card
Navigating by the Stars

BY ADRIAN MELLO

SOMETIME IN JANUARY OR February, Apple expects to sell its 10 millionth Macintosh. This milestone marks a remarkable year in which the Macintosh had a 20 percent growth in unit sales and Apple surpassed IBM to claim the title of maker of the best-selling personal computer. As the Macintosh installed base has been growing, so have the number of products available to support it. The Mac is a very healthy personal computer platform, and we all know that one of the key signs of a healthy computer is the size of the software base that supports it. But with thousands of hardware and software products now available for millions of Macintoshes, users have a problem. It’s no small task to choose among all these products to find those that best meet all your needs.

Since its founding, Macworld has dedicated itself to helping readers find the best products for their use. Ten months ago Macworld nearly doubled the number of stand-alone reviews appearing in each issue to provide more purchasing guidance through the product maze. We also added ratings to our Reviews section to provide an immediate assessment of each product. These ratings have made it much easier to quickly evaluate the relative worth of the many products we review.

Star Ratings
THIS MONTH WE MAKE IT STILL EASIER for our readers to find the quality products that meet their requirements, by adding a section called Macworld Star Ratings. The Star Ratings section appears in the back of the magazine and includes all the products evaluated in Reviews over the course of the past year. Products are organized into categories and then listed alphabetically. Each product review is summarized with a star rating and one or two concise sentences that capture the essence of the reviewer’s opinion.

Your search for the ideal product begins with the star rating itself. Each product is rated with one to five stars. Five stars is the best rating we give; one star is the worst. Five-star ratings are reserved for truly exceptional products that may inspire a quasi-religious experience in the reviewer. Four stars are awarded to well-designed products that excel in their respective categories. Three stars are given to good products that are reasonably effective for their intended use. Two stars means the product has one or more shortcomings that currently prevent the reviewer from recommending it. One star means the product is badly flawed or deficient and the reviewer recommends avoiding it until the manufacturer significantly improves it.

Keep in mind that ratings and reviews ultimately represent a reviewer’s opinion. Different reviewers can have different takes on the same product. Products have a complex set of features applied to a varied set of jobs—no two reviewers will weigh this mix in precisely the same way. You can gain a little more insight into the rating by looking at the pros and cons listed in the header of each review. However, when you are seriously considering a product for purchase, it’s always wise to read the body of the review to understand the reasoning behind the reviewer’s opinion. That’s why we provide a reference to the original review for each product listed in the Star Ratings section; we also indicate the current version number so that you know whether the product has been updated since the review was written.

Behind the Ratings
TO PROVIDE CONSISTENCY, THE EDITORS AT Macworld ask that all reviewers apply key criteria to every product they evaluate. The main criteria that influence the ratings are interface, ease-of-use, design, documentation, support, value, performance, reliability, and innovation.

Interface has long been a key facet of the Macintosh’s usability, and ratings take this into consideration. Ease-of-use covers how long it takes to learn to use the product and in what stages users are exposed to more-complicated features. When evaluating a product’s design, the reviewer considers whether the product’s features are well chosen and well implemented. Documentation and support are important because it’s not enough to create a good product without providing a solid framework for using it. Support is especially important; users need to be able to count on a company’s assistance. Judging the value of a product requires the reviewer to ask whether the product is competitively priced and whether it’s priced reasonably for the job it performs. Performance includes an appraisal of the product’s speed and responsiveness. Reliability is crucial because even a fast and well-designed product can be useless if it’s incompatible or buggy. Finally, the rating includes a consideration of how innovative a product is. Macintosh products have a proud history of pioneering new application areas as well as providing more-elegant solutions for existing categories. We think it’s important to reward products that continue this tradition.

PowerBook Notes
IN ADDITION TO STAR RATINGS, WE’VE also started publishing a monthly column called PowerBook Notes. Using a PowerBook has become a new way of life for many Macintosh enthusiasts, judging by the 400,000 PowerBooks Apple sold last year. PowerBook Notes is written by Macworld contributing editor Cary Lu, who has been writing about the Macintosh since its introduction in January 1984. This issue’s premier column begins by telling you how to get the most out of your PowerBook by paring down software overhead to produce an astonishingly lean system that maximizes available storage and memory.

We hope that, like the Mac, Macworld will continue to improve with time. Star Ratings and PowerBook Notes are both the result of readers like you telling the editors how the magazine can better meet your needs. As the new editor-in-chief of Macworld, I am especially interested in finding out what changes and additions you would like to see in coming months. Please write to me with your ideas so we can continue to keep our fingers on the strong pulse of the Macintosh.
A color publishing so revolutionary news every day

Take any big story in the San Francisco Examiner, the Oakland Hills fire, the Gulf War, the fall of communism, the Giants leaving, and Radius had a hand in it.

The Examiner cranks out five editions every day. With deadlines ranging from a merely frantic three hours, to a maddening, ulcer-inducing 40 minutes. Pretty impressive. But what's really remarkable is that they put them all out in color. Thanks to Radius.

How do they do it?

Chris Gulker, Director of Development at the Examiner, explains. "We have to work fast." An understatement. "And Rockets have given us the speed we need to really make doing this kind of work feasible on a desktop system.

"Radius' Color Matching System represents another major breakthrough for us in terms of hitting really tight deadlines. Rather than going through the whole rigamarole of waiting for proofs then making all the necessary adjustments, we now have complete confidence that what we see on the monitor really is what we'll get in print. With this high level of comfort in the color on our screens, we've basically been able to turn our journalists into color separators. Which means we save in terms of both time and personnel.

"We've also done a lot with video frame grabbing. During the Gulf War, for example, the best images were coming from CNN. Using Radius products, we could put TV shots in the paper that were still of a very high quality."

On any given day, you can see six Rocket-equipped Mac IIs and IIsx with
large Radius displays working fast and furious. And, of course, each one comes loaded with Radius 24-bit color.

Satisfied though they may be, the Examiner sees better days ahead. "We're hoping to get set up with RocketShare as soon as possible. That way, while we're waiting for color to separate in the background, we can work on layout and photo editing on the screen. It's going to make life around here a lot easier."

Of course, you don't have to put out a multiple-edition city paper or work under crushing deadline pressure to appreciate the power of our color publishing system. You just have to want to do a better color job faster.

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Circle 268 on reader service card
Dead Technology

I HAVE JUST FINISHED READING YOUR article on the Performa 600, and I must say, I have seen the beginning of the Mac’s death (“Mass Market Macs,” November 1992). Now, now, take it easy. No one loves the Macintosh OS and available software more than I do. But the rest of the world is progressing at a rate faster than Apple can manage in the hardware department.

Intel and Microsoft are set to unveil the ’586 (PS) and Windows NT. IBM clones will offer computers with more than ten times the performance of the Performa 600 for a few hundred dollars more. How does Apple expect to hold them off with two-year-old, mediocre technology?

Philip Ebbert
Los Osos, California

I JUST RECEIVED MY FIRST ISSUE OF Macworld and I found the article “Mass Market Macs” very interesting. I just purchased my first computer. During the first week of trying to use it, I was ready to take a hammer to the whole mess.

The problem is the assumption that whoever buys a computer knows computers. If Apple thinks they will increase sales to first-time buyers by just offering Macs for sale in Sears, I think they’re going to be disappointed. If I hadn’t had the help of my son, I wouldn’t have bought one.

What else should Apple do, then? Perhaps display some definitions and interpretations at the point of sale—define RAM and ROM, monitor, modem, mouse, and keyboard. Relate bits, bytes, kilobytes, etc., to how many pages of print they are equal to. Above all, the sales personnel should use everyday English rather than loping into computer language. Unfamiliar words will scare prospective buyers.

A. W. Ashley
Cincinnati, Ohio

ONE COULD MAKE A CASE FOR COMPARING the Performa 600 to the Mac IIsi on a cost versus performance basis. Assuming a $2500 cost for a Performa 600 with 5MB of RAM, a 160MB hard disk, and the Apple CD 300i, you would be easily beyond the capability of most any IIsi package offered in the ads at the back of Macworld. Most IIsi offerings run between $2500 and $3500; this for a 25MHz system with a single expansion slot requiring an adapter and no separate video RAM or extra internal drive bay. Give me an Apple Color RGB monitor, a 33MHz math co-processor, and a full-blown, full-featured System 7 (rather than the watered-down one offered with the Performa series), and the Performa 600 would have me saying “Mac IIsi? What's a Mac IIsi?”

Joel Alvin Christine
Tyrone, Pennsylvania

To Each His Own Accounting

THANK YOU FOR PUBLISHING “BALANCING THE BOOKS” (November 1992). It was helpful seeing 24 financial packages summarized and put in their place, that is, organized into groups with similar capabilities. And of course, Jim Heid’s “Small-Business Accounting” (Getting Started) was an excellent companion article.

While the overview with its features chart covered many of the requirements in day-to-day use of an accounting package, there was little mention of the needs of a CPA performing a year-to-date general ledger; and general journal entries with additional description lines are all-important when handling the books over to a CPA. While most of the packages listed do include sufficient audit-trail capabilities, several of the low-end packages, especially those in the personal-finance group, do not. Even these packages will often have ways of faking it, but the targeted user (a business owner trying to keep his or her own books) is not likely to continue.

A. WAckley
Cincinnati, Ohio

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LETTERS

CORRECTIONS

"Insights on Lotus 1-2-3 for Macintosh" (December 1992) incorrectly described how to include computed records on a form. The actual data for a record selected on the entry form resides on line 515 of that same form.

I recognize this, and is thus open to having a year of data-input efforts deemed useless by a CPA.

One inexpensive and easy-to-use package that provides a complete set of accounting was left out of the overview. As a cash-basis business accounting package, CheckMark Software’s Cash Ledger bridges the gap between personal-finance and accrual-based software.

Wayne Higdon
Albany, New York

We covered Checkmark Multilcomed 2.0, which includes the capabilities of Cash Ledger.—Ed.

LAN SLAY OMITTED THE OLDEST, best, and simplest accounting program to use, Dollars and Sense from Software Toolworks. As a certified public accountant, I find it suitable for small service businesses, including corporations and sole proprietors that do not have a need for keeping a detailed inventory and are operated on a cash basis. Best of all, like Quicken, Dollars and Sense costs less than $60.

Howard Liech
New York, New York

We will review Dollars and Sense in an upcoming feature on personal finance. Even though this reader uses it for accounting, it is really geared more toward personal finance and competes in features and price with Quicken. The accounting article was intended to review products designed for traditional accounting. Please also note that Business Sense, Inc., has acquired Dollars and Sense from Software Toolworks.—Ed.

I have found the documentation with Wetzel & Company’s Profitability Professional to be more than adequate. Profitability is packaged as, and performs as, a stand-alone program. Unfortunately, many people still think of HyperCard as a toy. HyperTalk has allowed a small software publisher to put forth an accounting program that holds its own with the best of them.

Carinna Pierrollo
Westport, Connecticut

Our article did not address what I consider to be an important feature of any accounting package: the ability to correct typographical or clerical errors made in recording data.

The argument, as I understand it, is that by making it impossible to correct typographical errors, it is more difficult for unauthorized users to embezzle funds. I do not have any concern for employee dishonesty and want to have the option to make such electronic corrections. In trying to help me solve this problem, a dealer has let me take a look at M.Y.O.B., which does permit the user to select a Change-ability option. Your article fails to consider this capability.

Samuel Field
Kalamazoo, Michigan

I see that you included Business Sense. I am a little surprised that they are still out there somewhere. I bought Business Sense and have found it to be a good package in many respects. It does, however, have two major problems. It is poorly documented and the publisher is totally unresponsive.

When I received the package from a well-known mail-order house, it did not have a registration card. I sent a letter to

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Wyoming Software, which is listed as the publisher in my documents, requesting a registration card, and received no response. I sent a registered letter with a return receipt. Someone there signed for the registered letter, but I am still waiting for any kind of response.

Joe Aldrich
Kingwood, Texas

Wyoming Software closed its doors earlier this year. (For more information, see Conspicuous Consumer, October 1992.) You may have better luck getting documentation, a registration card, and support for Business Sense from the current publisher, Business Sense, Inc., at 800/377-4954.—Ed.

Storage Obsolescence

I am angry by Matthew Leeds’ article “Removable Storage” (November 1992). He declared that because the new SyQuest Mesa series of 105MB removable will soon hit the market, the Bernoullis, Ricohs, and older SyQuests will become obsolete. A service bureau or major corporation that just spent tens of thousands on 44MB and 88MB SyQuests and 90MB Bernoullis is not going to just clear out the desks to let the SyQuest Mesa 105MBs in! I have good reason to be upset: I just bought a Bernoulli! 90MB MacTransportable for $499 and think that it was the best $500 I ever spent on a peripheral for my LC II.

Thomas Bakovich
Hudson Heights, New Jersey

Leeds also stated that the 44MB SyQuest drives will be around for a while due to their large installed base. SyQuest has a much larger installed base than Ricoh or Bernoulli, so if you are buying a drive and will be sharing data with others who are not at your company, a SyQuest is a better choice. If, however, you are only going to swap data between drives in one company or if you are buying a drive for personal use, then any of the technologies is adequate—but be warned that as with all technology, current picks will eventually be made obsolete by bigger, better ones.—Ed.

Poor Rating Undeserved

I am writing with questions about “Optical Update” (November 1992) in which FWB’s technical support was rated as being poor for both our hammerDisk130 3.5-inch optical drive and our hammerDisk6005 5.25-inch optical drive. In another article in the same issue, “Removable Storage,” FWB’s support was rated as being good. We are concerned, not only about the poor rating, but also about the mixed signals.

We’d like to know the criteria used to determine these ratings, and exactly what we did, or didn’t do, to deserve the poor rating for our support of the hammerDisk130 and hammerDisk600S optical drives. Were three calls made for each product, or were the results extrapolated to apply to both products? If our staff somehow slipped up we’ll take immediate action to bring our level of service and support in line, but we don’t know what went wrong without your input.

Steve Goodman
Vice President
Sales & Marketing
FWB
San Francisco, California

When we test technical support, we make three phone calls to each company in each article, not three calls per product. We rate the technicians on ability to correctly diagnose and solve each technical problem; helpfulness; and promptness of response. We average the ratings for the calls to get the final score. In this case, we do owe FWB an apology. The company should have received a good rating in “Optical Update.” The discrepancy occurred because we misinterpreted a technician’s response to a question when we were scoring.—Ed.
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Circle 170 on reader service card
Consider the Color-Blind

I GREATLY ENJOYED THE ARTICLE ON data representation by Charles Seiter in the October issue ("What's Wrong with This Picture?"). However, I would like to point out another potential problem in constructing color charts. A small proportion of the population (7 percent of North American men, 1 percent of women) is red-green color-blind, a hereditary condition that results in an inability to distinguish between these two colors. Unfortunately, there seems to be a propensity to use this color combination, perhaps because of the stop-go traffic-signal metaphor. Six of the ten color illustrations in the article use these two colors.

I would encourage those who make charts to avoid the red-green combination so that charts can be attractive, accurate, and readable for "the rest of us."

T. Rauen
Calgary, Alberta, Canada

Ween Catches a Bug

I HATE TO BE A TECH WEEenie, BUT you have a small bug in your "Inside the Processor" article (October 1992). On page 142, you have an illustration of a processor tracing a calculation. The instruction you claim to be tracing is "Add 32 digits in a register to a memory address." The instruction you display in Stage II of the diagram is, however, the following:

1101 0001 0110 1101
0001 1110 0101 0110
which translates to add.w d0,$1E56(a5)

This is, of course, valid, but if the application programmer expected a 32-digit add and got a 16-digit add instead, the results could be disastrous.

Sheridan Raelin
Walsham, Massachusetts

We love tech weenies, and you're absolutely right. We started off using 16-bit instructions because we were going to illustrate the 68030, but then we switched to a 68040 to match the photograph and forgot to use the add instruction for long (32-bit) words instead of add.w for regular (16-bit) words.

—Ed.

I HAVE NEVER FOUND THE NEED TO write to you regarding an article that you have published; however, I feel obliged to do so at this time to clarify some misconceptions that you may have inadvertently passed along to your readers in the article "Inside the Processor."

"Fabricating Transistors," a section of the sidebar "Making a Processor," describes the process that is used to fabricate the microprocessor.

The statement "the exposed photoresist handset" is descriptive of an older technology known as negative photoresist. In most modern fabrication facilities, negative photoresist has been replaced by positive photoresist because it can produce extremely fine, that is, 1-micrometer or less, patterns; this capability was absent in most negative photoresists.

You also mention that a machine "shoots ions at the wafer," and this is true. High-energy ions are implanted into the silicon to create the semiconductor properties of the device. This may be done several times. However, this process is not known as etching but as implantation. In addition, an integrated circuit or transistor must have electrically conducting features, usually metals, to connect the various circuit elements such as resistors, capacitors, and transistors. The patterns in the metal can be created by etching away unwanted metal after patterning the photoresist.
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Brady Cantor
San Francisco, California

to resist, or by depositing metal on top of the photoresist-patterned wafer and subsequently washing away the metal along with the photoresist on which it sits.

Favorite Tip

I SAVED $150 DUE TO A SIMPLE TIP IN your How To/Quick Tips section (November 1992). When I receive the magazine, it is the first section I turn to. Using the tip, I was able to convert my HyperCard 2.1 that was bundled with my Mac to the scripting level. Because of this, I did not have to buy the HyperCard development kit. Thank you.

Michael HaZen via CompuServe

Review Response

OUR NOVEMBER 1992 REVIEW OF NightWatch II failed to understand the modular positioning of the product. NightWatch II’s locking techniques, user privileges, and true site-license capabilities are unique. The benefits from those features were not addressed. Instead, your reviewer focused on circumventing screen privacy, a user convenience we do not even consider security. This approach ignored the product’s principal modular purpose—hard disk locking. If access protection is required while the machine is in use, use FolderBolt or MacSafe II.

We continue our high respect for Macworld and its writers. In the future, however, we hope that greater efforts will be made to identify and address product positioning in your reviews.

V. G. Nesbit, CEO
R.C. Weslick, COO
Kent Marsh
Houston, Texas

CD ROM, Not Record

IZA WEIMAN STATES, “WITHOUT the drop in speed, music would sound like a 33-rpm record played back at 78 rpm” (“CD ROM Drives: Into the Mainstream,” October 1992). This is ridiculous. The DAC (digital-to-analog converter) is crystal controlled and spits out audio at a 44.1kHz word-clock rate regardless of how fast data is being fed it. The worst that could happen is that you would overflow the buffer.

John Pand via America Online

Flakes in FreeHand

I FEEL I MUST RESPOND TO DEKE MCCLELLAND’s response to my letter about his June 1992 review of Aldus FreeHand 3.1 (Letters, October 1992). First, I remember reading that the EPS file format was developed as an export/import-only format. Second, I tried the experience.
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Behind Macworld's Graphics

**Art Beat**

**BY CATHY ABES**

**Artist:** Diane Fenster is an illustrator, fine artist, and designer based in Paciﬁca, California, who has been working on the Macintosh since 1985. Once she conquered her fear of computers, she found the Mac to be a perfect environment for transforming her traditional collaging into an electronic art form.

**Hardware:** Mac IIx with 32MB of RAM and a 425MB Quantum internal hard drive; 337MB Wren Runner external hard drive; SyQuest 44MB removable-cartridge drive; 128MB Sony rewritable optical drive; Nexus FX 35MHz accelerator board; AppleColor 13-inch monitor; SuperMac Spectrum/24-24-bit accelerated graphics board; 19-inch Mega Graphics monochrome monitor; AppleScanner with Abaton grayscale upgrade.

**Software:** Adobe Photoshop 2.0.1.

**How It Was Done:** For the illustration that opens our feature on security products, Fenster began by making a rough sketch in Photoshop (in grayscale mode) by scanning in various elements: the woman, the padlocks and keys, the man’s head, the door and steps, the hand, the starry background, and the moon. Then she arranged other images on top of the starry background and printed out a laser copy on which she hand-sketched some of the missing details for rough placement: the Mac and the encrypted code displayed on its screen.

Next Fenster switched from grayscale to RGB mode and began colorizing each element in its own separate document (she filled in the patterned backgrounds later). To gradate the sky from black at the top to dark blue at the bottom, she used the magic wand with tolerance set at 1 and clicked on the black of the background. After saving that selection as a new channel within the document, she went back to the original background and brought up the palette so she could choose a range of colors for the stars. Because the document was scanned in gray-scale mode, each star had a haze of gray pixels. Selecting the paintbrush and choosing Color Only mode allowed Fenster to paint just the gray pixels around the outer edge of each star without affecting the stars’ white centers or the sky’s black background. On some of the stars she used the magic wand (again with a tolerance of 1) to select just the white centers, and used the blend tool to add radial fills of color.

The figure of the woman began as an old black-and-white engraving from a book of clip art. Instead of scanning it in black-and-white mode, Fenster scanned the image in grayscale. Because in grayscale mode the scanner interpolates pixels, interpreting any areas that don’t appear to be pure black or white as varying shades of gray, the image ended up with a much greater pixel depth than it would have had as scanned line art. After switching to RGB mode, Fenster applied Photoshop’s Unsharp Mask filter to sharpen the image, then used the Adjust Levels command (in the Adjust submenu under the Image menu) to achieve the desired gray-scale.

The illustration that opens our feature on security software, page 144.
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The original black-and-white engraving of the woman scanned in gray-scale mode (top); the scan in the process of being colorized (middle) with the arbitrary map (bottom).
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Circle 145 on reader service card
The original photo of the man photo scanned in gray-scale mode (top left); after the background was clipped out and the man was colorized with the arbitrary map (top right); the man inverted and solarized (bottom left); the man with neon edges along shadow lines created by slightly offsetting the colorized image from the gray-scale one underneath (bottom right).

scanned image. After scanning the lock and key, she separated them into two files and duplicated the lock using the Duplicate command in the Calculate submenu (Image menu), keeping one as a template for later use. Using the magic wand with a tolerance of 1, she selected the white background around the lock and used the Inverse command (to make the lock the selected object). She copied a small rectangular section of a pattern she had previously created and pasted it into the lock using the Paste Into command. Then she stretched the pattern using the Scale command (in the Effects submenu under the Image menu) to cover the entire lock. Now the pattern covered the lock but not the background. Then she used the Paste Controls command set at 80 percent Opacity and Fuzziness set at 23 so the detail on the lock showed through and the fuzziness smoothed it out. Using a different pattern, she repeated the process with the second lock. For the third lock, she selected the object and saved that selection as a new RGB channel, which made the background black and the lock white. She then used the Load Selection command to load the selection back onto itself in the new channel. After copying another pattern, using Paste Into, and stretching the pattern to cover the lock, she went back to the original composite channel and loaded the selection (the new channel) into it. Then she took a completely different pattern, copied it, pasted it into, and stretched it over the lock. In effect, the original pattern became a mask, allowing the newly pasted pattern to show through it in varying degrees: completely in the white areas, progressively less in the darker areas, and not at all in the black areas. On the keys, she used the same technique she had used to texturize the first two locks. For the moon, she scanned a black-and-white photo in gray-scale mode, then used the paintbrush with the Color Only option at 40 percent opacity to colorize only the gray pixels, making them blue.

For the head of the man (another black-and-white photo scanned in gray-scale mode), Fenster cut away the background by outlining his head with the pen tool, making the head a selection, choosing Inverse to select the background, and deleting it. After switching to RGB mode, she used Color Balance to add overall color tone, then created another arbitrary map, through which she added yellow and lavender tones in the shadow and highlight areas. Going back to the original gray-scale image, she inverted it and changed it to RGB mode, then applied the Solarize filter (in the Stylize submenu under the Filter menu). In the colorized image, she selected the background, selected Inverse (Select menu), then copied and pasted the head using Paste Controls at 100 percent opacity with the Color Only option so the shadows and highlights of the gray-scale image underneath would show through. Then to create a neon edge effect, she offset the floating selection by dragging it slightly away from the underlying image.

The hand was the last element to be added. Fenster used the same process she'd used to colorize the locks, except that she pasted in a pattern using the Color Only option (of the Paste Controls command) so that only the gray pixels would be changed, leaving the black lines and the white areas unaffected. This technique preserved the engraved effect of the original image while subtly colorizing it.

The illustration, whose file size was 17MB, took Fenster approximately 25 hours to complete.
Help!™ Puts 2,000 Macintosh Experts At Your Desktop

"...Help! is a solid solution."
MacUser Magazine, July 1992

Help!™ is a configuration problem solving utility. With Help! installed on your Mac, you'll benefit from the knowledge of more than 2,000 Macintosh experts. That's because Help! incorporates information provided continuously by Macintosh developers, consultants, service providers, systems engineers, etc. from all over the world. With Help!, you can improve the efficiency of your Macintosh and prevent system crashes.

Help! is different from all other diagnostic tools because it uses artificial intelligence to pinpoint conflicts, incompatibilities, and other configuration problems and recommend solutions. This technical support program not only analyzes your system, but it also tells you exactly how to fix all detected problems. Help! even has a simulation feature which allows you to perform a "what if" analysis and check in advance for problems prior to making changes.

Help! detects:
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MacInTax is now the easiest way to do your taxes. With MacInTax, you can view your tax data on your Mac and print the form. The new MacInTax includes over 90 forms, schedules, and worksheets, complete with IRS instructions. It's available for the Apple II and Macintosh in versions 2.3 and 3.1. MacInTax has been redesigned to work with Apple IIgs and Macintosh systems. You'll automatically receive the new version 2.3 with IRS-approved forms. MacInTax is available for $124.95. 

Lotus 1-2-3 1.1 for the Mac

Lotus 1-2-3 1.1 is even more powerful and easy to use than ever! You'll find new spreadsheet capabilities, including in-cell editing, true 3D worksheets, 1-2-3 Classic Menu, and much more. Lotus 1-2-3 1.1 is available for the Apple IIgs and Macintosh. For $94.95, you get Lotus 1-2-3 1.1 for the Apple IIgs, plus Lotus 1-2-3 2.3 for the Macintosh. 

Microsoft Excel 4.0

Microsoft Excel 4.0 provides even more powerful and easy-to-use functions. You can now use the native Apple IIgs spreadsheet, Lotus 1-2-3, and Microsoft Excel 4.0 on the Macintosh. Excel 4.0 is available for the Apple IIgs and Macintosh for $124.95. 

Microsoft Word 5.1

Microsoft Word 5.1 provides a full range of features, including WYSIWYG editing, flexible slide masters, and TrueType fonts. Word 5.1 is available for the Apple IIgs and Macintosh for $49.95. 

Reunion

Reunion is a family genealogy software that allows you to scan pictures and legal documents for a complete archive. It includes features such as family trees, birthday calendars, mailing lists, and more. Reunion is available for the Apple IIgs and Macintosh for $114.95. 

Microsoft PowerPoint 3.0

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## MacTurbo 24/96 Fax Modem

Send faxes without leaving your desk!

Our MacTurbo 24/96 Group II Fax Modem gives you both fax and modem for the price of most data-only modems. The 24/96 features 9600bps send rate, full Hayes compatibility and compact design. Includes all the necessary fax and software communications. MacTurbo 00977

### FEATURES
- 24/96 Group II Fax Modem
- Hayes Compatibility
- Compact Design
- 9600bps Send Rate

### ACCESSORIES
- SpeedReader for Macintosh
- SpeedReader for Windows
- SpeedReader for IBM PC

### STORAGE MEDIA
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### MacTurbo 24/96 Fax Modem
- Requires Macintosh 80386, 80486, or Pentium processor
- Compatible with all major fax protocols
- Supports both analog and digital telephone lines
- Includes software for sending and receiving faxes
- 2400bps data rate
- Can be used as a standalone modem
- Includes a 5-foot cable for connection to the telephone line

### Pricing
- MacTurbo 24/96 Fax Modem: $125

### Contact Information
- Tho Mnc Zone
  - 17411 NE Union Hii, Redmond, WA 98052
  - Call Customer Service: 1-100-248-99
  - Email: support@maczone.com

### Additional Information
- MacTurbo 24/96 Fax Modem comes with a 120-day warranty.
- Shipping is available via UPS or FedEx.
- Returns and exchanges are accepted within 30 days of purchase.

### Terms
- All sales are final. No returns or exchanges on software or hardware.
- Prices are subject to change without notice.
- Payment methods: Visa, MasterCard, American Express, Discover.
- Shipping and handling fees apply.

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### $125

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- Credit card and charged card is shipped. If we must step a partial order, freight is not charged on back order. (CO. orders)
- Most personal and company checks received by mail, immediately. All checks in the amount of $100 or more must be accompanied by a personal check, and personal checks are not accepted.

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Note: All prices are in USD and subject to change without notice. For the most current pricing, please call our customer service at 1-100-248-99. Shipping and handling fees may apply.
Quicktel Xeba 14400 Send/Receive Fax Modem

Here it is: the latest modem technology. On a speed-for-your-dollar basis, the Quicktel Xeba 14400 can't be beat. Comes with the manufacturer's lifetime warranty and connection cable. You get 14,400 send/receive fax with complete fallback, V.42bis and MNP5 data compression with throughput to 57,000bps. Quick. Comes with connection cable and the manufacturer's lifetime warranty. Logicode #05308 $348

$2284

Hammer 1000MF

With an average seek time of just 9.5ms the handsome Hammer 1000MF (Fast Media Format) delivers incomparable capacity, performance and legendary Hammer reliability. Like all Hammer drives, the 1000MF comes in a rugged aluminum enclosure, uses only the finest components and construction techniques available and includes an auto-switching universal power supply for plug-and-play operation anywhere in the world. FWB #05422 $2284

$2698

SuperMatch 20•T Multimode Trinitron Display

The SuperMatch 20•T is an exceptionally versatile display for color professionals who want a desktop view that's right for every project. With easy customization controls, Trinitron technology, and exceptional color rendition, SuperMatch 20•T is right for every work environment. SuperMac #06224 $2698

$2175

Radius Rocket 33

Blast your II, IIs, Ilex or IIfc computer into another dimension of performance with the Radius Rocket 33 accelerator. This awesome 33MHz Motorola 68040 powerhouse increases the processing speed of the original Mac II by up to eight times, making it even faster than the Quadra 700 in most cases—and it costs less than Apple's own upgrade! Radius #05250 $2175

$658

MultiSync 3FGx

Some products demand to be described with superlatives. The new FG series of MultiSync monitors from NEC fall into that category. They feature the best color accuracy in their class. Completely redesigned from the inside out, they give your Mac brighter, sharper, more accurate images. The FGx's flat (perfectly flat) 15" screen is packed with state-of-the-art extras like the new NEC FullScan capabilities which allow you to see up to 36% more active screen display. And it turns out the fastest refresh rate in the business—which means crisper, deeper, truer colors than you've ever seen before. NEC #07144 $658

$2075

M95FX Printer w/ PostScript Plain Paper Fax

Now everyone linked to the printer will also have access to fax. Sound too good to be true? Take a look. NEC's new Silentwriter Model 95 incorporates the latest in intelligent laser printer technology—Adobe PostScript II—with the latest in high-performance fax. On the printer side, the M95FX prints 6 ppm, comes with 2MB of memory and ships with 35 scalable Adobe fonts, 14 bitmaps and 8 scalable HP LaserJet fonts. It automatically configures for PCs and Macs, simultaneously handles paper and envelopes and automatically detects the source file type and sets the printer accordingly. Plus, you get all the convenience of personal fax capability. Fax an original-quality proposal to a sales rep for prompt delivery to a customer. Fax a high-quality proof to your client. Or, receive original-quality reports from field offices—ready for immediate use in your executive presentation. The possibilities are endless. NEC #11660 $2075

$1244

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Maxa Corporation · #03025

$128

After Dark & More After Dark—Bundle
After Dark, one of the finest screen saver collections available for the Mac, comes with over 30 displays including Flying Toasters and Fish! The package also includes sound, password protection and message displays. More After Dark comes with over 25 incredible new displays for After Dark. It features contest winners Mowin Man, Tunnel, GraphStat and beautiful new Fish! Crazy Kittens and Lunar Fringe game modules (requires After Dark).
Berkeley Systems · #04046
#04053 More After Dark Vol.1

$38

DateBook / TouchBASE—Bundle
Keep track of your life and the people in it with DateBook, the Macintosh personal organizer that enables you to enter and keep track of appointments, schedules and things-to-do. TouchBASE is a database which keeps track of personal and business contacts. It remains handy all the time—no matter what application you're using.
After Hours Software #06167
#05209 DateBook v 1.5 $78
#03908 TouchBASE $78

$94

Sprout!
Sprout! is a complete computer planning tool for vegetable gardeners. With it you can easily produce a graphic, scalable garden plan with correct plant and row spacing. In addition, Sprout! contains a fully editable database of vegetables for 7 climate regions. Print out garden layouts, calendars, shopping lists and reports.
Abracadata · #05085

$42

Mighty Draw
Mighty Draw is the affordable, general-purpose, object-oriented drawing program that allows you to create pie charts, column charts, bar charts, flow charts, organizational charts, graphs, electronic schematics, network diagrams, flowcharts, news letters, greeting cards, advertisements, logos, clip art and much more. Mighty Draw comes with symbols for flow charts, electrical schematics and more. You can even add symbols from other programs.
Abracadata · #06162

$26
Morph

The holiest movie image effect of the '90s is now available on the Mac! Morph smoothly transforms one image into another, creating dazzling images and effects. Whether it's last year's car model turning into this year's, or a docile kitten transforming into a ferocious tiger, this effect has astounded audiences all over the world. Morph is fast, easy-to-use, and fully compatible with QuickTime.

CA-Cricket Draw III

CA-Cricket Draw is a fully-featured drawing program for producing professional quality graphics on the Mac. It features high-end drawing power with its Bezier-based tool palette, flexible color interface and more. Computer Associates #04414

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Newton Rising

BY STEVEN LEVY

THE ICONOCLAST

HE NEWTON SLIDE SHOWS have been humming for almost a year now. The magazine covers—Newsweek, Byte, and yes, Macworld—have all been printed. The term PDA—short for personal digital assistant—has wedged its way into our vocabularies. Thanks to Apple’s early disclosure, we all know that Newton is Apple’s bold new venture into Jetson-tech, where portable smart devices will perform routine chores for us.

Newton definitely fires the imagination. But without a real product to ground our preconceptions, it’s difficult to nail down what Newton really is. Apple only confuses things by attempting to explain what Newton is not. Newton is not a product, we are told. Newton is not a product line. Uh, come again? Newton is a set of software and hardware technologies that enable multiple product lines. Oh.

You know those comedians like Jerry Seinfeld who always say, “Ever have the problem where...” and then describe a mundane dilemma you perpetually suffer but never really think about? Well, Newton is sort of a Seinfeld machine. For every stupid problem you have in capturing, organizing, and communicating your routine information transactions, a Newton device will solve your problem. If Apple has its way, Newton will put a thousand stand-up comics on the bloodstream.

But, as far as I can make out, none of those devices alone will be Newton. Newton will reside in a collection of common behaviors. These include the ability to recognize and digitize scrawled input and sketches, the intelligence to decipher and execute complex requests based on simple (or even implied) commands, and the vivaciousness to communicate with other Newton devices and the world at large. The interface, a button-laden, H) ‘per­ tional organizer that performs the duty of a private secretary; a smart telephone that automatically orders a pepperoni pizza and pays for it at the touch of a button; or a student’s desk mate that reads a teacher’s notes from a Newton chalkboard and inputs answers to a surprise quiz.

But freedom unchecked leads to messiness. As the proposed computer took on more features, it became so powerful, in fact, that some on the team began to think they were hatching a costly monster.

The engineers begged Apple to assign a marketing person to the team. Though on the face of it this seems strange—why would wire­heads want a bottom-line type around?—it makes sense. A smart marketing person, with an awareness of what people fantasize about and what they’re willing to pay for, could help focus the product. There was plenty of information...
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tion to sift through—Apple had done zillions of user studies about the way people handle information. There were analyses of everything from telephones to chalkboards to Post-it notes. At one point Apple even had an anthropologist trailing knowledge workers, jotting down how they integrated stray bits of data into their daily lives. Still, engineers being engineers, the driving impulse on the project seemed to be Go Bonkers.

**The Little Hack That Could**

**THE TURNING POINT CAME IN 1990,** when multiple events conspired to irrevocably set the course of Newton. Gassée, whose technology-as-sex-object mentality had encouraged the engineers to keep raising the processing ante, had left Apple, and Sakoman went with him. Michael Tchao arrived to be the marketing person. John Sculley put the project under the control of Apple vice president Larry Tesler, a heavy hitter on the executive team. The new regime agreed that the project was too big, and the engineers began scaling down to something that might cost half as much.

But Capps and Tchao realized that the very concept of Newton was still off. The problem was that they were building a computer. "As a computer designer you know all about computers, and you look at all sorts of tasks, thinking, 'This has to be better than the best computers,'" explains Tchao. But if Newton's charter was to deliver smart information-processing on the run, it was wretched excess to compete with desktop machines in word processing and accounting. "You can't do it!" says Capps. "You can't run Excel 9.0!"

Tchao suggested that they focus on what they could do. Capps had the answer: "What is Apple good at? Making sexy user interfaces!" That sparked the idea to make a software core the essence of Newton. This required a major break in procedure. Newton could not be a Macintosh. It had to live in another realm. "Can you imagine if you came out and said, 'This is a Macintosh computer and it doesn't do windows?'" asks Capps. Instead, the new system, which Capps called "a little hack," would take a little bit of Mac and put it in a hand-held device. It would be an omniscient toy, a software core of the equation. Why would Apple devote so many resources to an alien business? The answer lies in the fact that the computing world, particularly Apple, has changed drastically since 1987, when the Newton group was originally formed.

The writing is on the wall, and the medium is liquid crystal: the desktop Macintosh has peaked. Apple’s recent impressive revenue gains are the result of monster sales of PowerBooks. Besides, the popularity of Microsoft Windows has helped assure that all desktop computers essentially work the same; the fact that Macintosh does more elegantly is small consolation. And since Apple is betting that the desktop computer of the future will be the PowerPC—developed jointly with former blood rival IBM—it is assured that Apple computers in the future will look no different from anyone else’s.

This puts Apple in a strange position. The company mission is to produce distinctive products that, to quote Gassée, "smell like infinity." Five years from now, all desktop computers will be commodities, and they’ll smell like manual typesetters rescued from a pawnshop shelf. In order to recapture Gassée’s cosmological fragrance, Apple has to focus on a new area, big-time, and design excitement into it. Thus Newton is Apple's attempt to do with the operating system of mobile computers what it did with the operating system of desktop computers—develop the technology of tomorrow and convince people that it's the technology for today.

This is why, when Capps and Tchao proposed Newton’s fateful downsizing, Apple seized the moment—even if it meant dramatically changing the way it did business. This is why the project, without a product to sell or even preview, was announced last year with such fanfare. The Macintosh, as much as we love it, is yesterday’s news. Newton is tomorrow.

There are plenty of obstacles in Newton's path. Apple isn’t the only one to realize that the company that lays the rails for a mobile computing architecture gets to claim the whole train set—this is the dream of a whole range of pen-based start-ups. And you can't say the word standard on planet Earth without raising the attention of Bill Gates and company—Microsoft has recently announced plans for its own Newton-like operating system.

It’s far from assured that the development of new communications technologies will be rapid and organized, particularly in the wireless realm so essential to the fulfillment of the Newton vision.

And then there’s the danger that the first Newton device, by freezing Apple’s broad imaginative vision into a first-generation product, is bound to disappoint—especially since Newton doesn’t get really interesting until many Newtons exist to talk to each other. "We're very concerned about that," admits Michael Tchao. "A single walkie-talkie is a lonely place, so we intend to make it valuable right out of the box." Even if Newton doesn’t take off, Tchao says, "Apple can afford to be patient" and wait until other Newton devices come online.

Patience may be required, but the pressure for Newton to succeed is beginning to build already. I predict crescendo levels. Apple may not be betting the company here—but enough of its chips are on the table to identify Newton as its heftiest bet since Macintosh.

It’s a heavy load for a "little hack" to bear. But Newton is one heavy hack.
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Tips for Healthier Computing

BY DEBORAH BRANSCUM

FIRST, THE BAD NEWS. THE number of workplace injuries associated with working on computers continues to rise. Moreover, several recent studies suggest there's reason to be concerned about the possible health effects of exposure to extremely-low-frequency (ELF) electromagnetic fields (EMF). The good news is that the risk of keyboard-related injuries can be minimized by taking frequent breaks from typing and following other simple guidelines. And there's no need to panic over sitting in front of a monitor—any health risk from ELF emissions is quite small and can be lowered further by sitting at arm's length from your computer.

Workplace Injuries

CUMULATIVE TRAUMA DISORDERS (CTDs), also called repetitive strain injuries, are the most clear and present health threat to computer users. These injuries to the hands, wrists, arms, shoulders, and neck—associated with repetition, force, and awkward posture—affect a growing number of office workers. Some researchers believe CTDs are related to job dissatisfaction and work load as well. And CTDs are not limited to white-collar workers—they've existed among factory workers, musicians, and athletes for years.

Last fall the National Institute of Occupational Safety and Health (NIOSH) announced the results of a two-year survey of nearly 1000 employees at the Los Angeles Times. NIOSH medical officer Dr. Bruce Bernard said that about 40 percent of the employees reported pain while typing; a subsequent one-day medical examination found evidence of injuries in more than half those cases. And like several earlier studies, this survey found that the more time employees used a keyboard, the greater the risk of injury.

"A lot of our recommendations try to deal with work-rest cycles," says Bernard. "There have been some studies that show people won't take breaks and will only get up when they start to feel bad. That's too late." The Los Angeles Times has instituted an electronic message system to remind people to take breaks. Most experts I've spoken to recommend breaking each hour or two of typing with a 15-minute period of different activity, but even brief breaks are a good idea, says Bernard.

"Get up from the computer on a regular basis and do something else. If you need to, put a timer on your computer to do that," says Dr. David Rempel, an assistant professor of medicine at the University of California, San Francisco. Another expert, Dr. Barbara Silverstein, told the New York Times that a national commission in Japan limits the time workers can spend at keyboards and has set mandatory rest periods, resulting in fewer injuries. Taking rest breaks, in other words, is the single most important thing computer users can do to stay healthy.

How you work is just as important as what you work with. "I try to make the point that ergonomics is not just the keyboard you buy but also how you use it," says Dr. Thomas Armstrong, an ergonomics specialist at the University of Michigan at Ann Arbor. In addition to breaks, here are some other commonsense precautions.

- Keep your keyboard low and your wrists in a neutral position, parallel to the floor, as you type.
- The top of the display should be at eye level. (If the display is too low, just pop a book or two under it.)
- Adjust your chair, if possible, to fit your height, so that your feet are flat on the floor. (If your chair is too tall and can't be adjusted, try resting your feet on a phone book.)
- At least one study suggests full-back support is helpful for keyboarding, along with an erect sitting posture. So sit up straight, for more comfortable computing.

No Magic Solution

"THERE'S THIS GROPING FOR a magic answer," says Rempel, alluding to the slew of so-called ergonomic products on the market and in development. The problem is that there is no magic solution for preventing CTDs, although plenty of companies claim to market ergonomic products that prevent injuries. And more products are on the way.

"I get two calls a day from companies that would like me to look at a product and give it my blessing or give it an endorsement," says Rempel, who has mixed product endorsements to date. His advice? "Buyer beware."

Most of this stuff simply hasn't been tested sufficiently to know if it works. Because CTDs involve many factors, simply changing one aspect of a chair or mouse or keyboard or display may not solve a given problem, and could cause others. Of course, innovative products do exist to make computing more comfortable, and users deserve many more choices when it comes to keyboards and other computer devices (see Conspicuous Consumer, August 1991). Just remember that comfort is highly subjective; don't buy an expensive "ergonomic" device without a money-back guarantee.

Lawsuit City

AT LEAST 19 PRODUCT-LIABILITY LAWSUITS have been filed nationwide by users who claim they were injured by working on their computers. Apple is named in at least one suit, and IBM in at least two. (The rest of the suits are directed at computer workstation manufacturers such as Atex, Wang, and Computer Consoles.) Apple denies any liability and is vigorously defending itself against the $1.2 million suit, according to company spokeswoman Marianne Lettieri. But clearly Apple is concerned about the issue and it shows in the company's recent products. PowerBooks, for example, have a built-in wrist rest to help users maintain a neutral wrist position as they type.

Apple has also lobbied for additional federal research on CTDs and is supporting independent research with its own cold cash. Dr. Rempel directs an ergonomics lab at UCSF and is testing keyboard concepts with funding from Apple and other companies. Apple, along with Compaq and IBM, also founded the VDT Health Foundation, which is funding the Center for VDT and Health Research at Johns Hopkins University, an independent center headed by Dr.
Ronald Gray and founded last fall to research both the ergonomics of computer use and the electromagnetic fields faced by computer users. One of the center’s primary goals is expected to be supporting research on workplace measurements of EMF.

Magnetic Fields and Miscarriage

WHEN IT COMES TO ELECTROMAGNETIC fields, “we’re dealing with a situation that is still unclear, in my view,” says Gray. “I think that what we need is first to step back and review what we’ve learned; identify what might be the problems, particularly in measurement; and then decide if we can resolve some of the outside concerns. I think it is worth doing because VDT use is just becoming a part of all our lives.”

Two and a half years after Macworld’s July 1990 cover story on extremely-low-frequency EMFs and computer monitors, there’s still no scientific consensus that these fields present a health risk. Some scientists dismiss the issue entirely. But the results of several recent Scandinavian studies imply that minimizing your exposure to these fields may be a good idea.

Early last year a team of Finnish scientists announced the results of a little-publicized study that measured the ELF magnetic fields faced by a group of pregnant workers. Dr. Maija Hietanen of the Helsinki Institute of Occupational Health found no correlation between miscarriage and the number of hours a woman worked in front of a video display terminal (VDT). She and her colleague did find a relationship between ELF and very-low-frequency magnetic fields and miscarriages, however. According to a report in the March/April 1992 issue of VDT News, “VDT operators who were exposed to extremely low frequency magnetic fields of greater than 9mG [milligauss] had a miscarriage risk close to three-and-a-half times greater than those who used VDTs with ELF exposures of less than 4mG... Women exposed to 4-9mG ELF magnetic fields had nearly twice as many miscarriages as those exposed to less than 4mG.”

Hietanen’s study compared 191 clerical workers who suffered miscarriages with 394 clerical workers who gave live birth between 1975 and 1985. Both Hietanen and her partner, Dr. Marja-Liisa Lindbohm, stress the need for their results to be confirmed. In the meantime, should a pregnant woman who uses a computer take any special precautions? Many studies have failed to turn up an association between working on computers and miscarriages, although plenty of studies link stress with health problems. So the most important precaution is not to get stressed out over using computers—there’s simply no confirmed evidence that a problem exists.

That said, VDT News quotes Dr. Hietanen suggesting that those women who are concerned about electromagnetic fields buy a monitor that meets the Swedish MPR-II guidelines (liquid crystal displays are another option). Her partner, Lindbohm, has said, “When you use a VDT, it would be better to have the lowest possible magnetic field,” according to VDT News.

Reducing Your Exposure

BUT YOU DON’T HAVE TO BUY A NEW monitor to reduce your exposure to ELF fields. The simplest way to limit your exposure is simply to sit back from your computer. Electromagnetic fields drop off sharply with distance; at 28 inches from the front of many monitors, people are exposed to negligible levels of magnetic fields. That’s particularly true for monitors that meet the Swedish MPR-II guidelines and that are offered by many companies, including Apple, Nanao, NEC, Radius, RasterOps, and Sigma Designs. (See Macworld, March and September 1992, for monitor overviews that...
include ELF field measurements.)

If you do go shopping for a new monitor, keep in mind a few loopholes in the MPR-II testing requirements. Vendors are required to test their monitors at only one resolution. If you are buying a multiresolution monitor, ask the company at what resolution the monitor meets the MPR-II guidelines. Generally, the higher the resolution, the greater the electromagnetic fields. Ditto with brightness; the higher the brightness, the higher the fields. Vendors test at midpoint brightness, but that's not necessarily what users are exposed to. A quick look around the Macworld offices shows that like me, many people have their brightness setting cranked up all the way. The point is that the numbers manufacturers use to meet the MPR-II guidelines may be lower than what actual users are exposed to. So sit back from that display!

Keep in mind, too, that the strongest fields are emitted from the back and sides of a monitor. If you are concerned about EMF, avoid those areas. If you must work next to the side or back of someone else's computer, or if you have an old monitor that you can't replace, Macworld found two products on the market that actually reduce ELF magnetic fields. NoRad (310/395-0800) markets a set of special metal bands called ELF Protech that fit around the top and sides of a monitor, deflecting magnetic fields from the monitor toward the bands. Macworld tests showed a reduction in ELF magnetic fields of between 17 and 69 percent, depending on the measuring points. ELF Protech is priced from $65 to $131, depending on monitor size. Fairfield Engineering (515/472-5551) manufactures E.L.F. Armor, a steel-alloy cylinder that fits over the yoke of a display's cathode-ray tube. Macworld measurements showed significant magnetic-field reductions in a monitor fitted with the device, which must be installed by a qualified technician and costs $89.95.

The Power Line Debate

ON SEPTEMBER 30, 1992, Swedish researchers announced the results of two major epidemiological studies involving magnetic fields. A residential study done by Dr. Anders Ahlbom and Maria Feychting of the Karolina Institute in Stockholm found a dose-response relationship between childhood leukemia and exposure to weak magnetic fields from power lines. Ahlbom and Feychting found that "children exposed to more than 1 mG had twice, those exposed to more than 2 mG had close to three times, and those exposed to more than 3 mG had nearly four times the incidence of leukemia of those exposed to less than 1 mG," according to a report in the September/October 1992 issue of Microwave News.

Several earlier U.S. studies found excess rates of cancer among children living close to power lines, but didn't find an association between the higher cancer rates and actual magnetic measurements (see Conspicuous Consumer, October 1991). As in those studies, the Swedish scientists didn't find a relationship between cancer and spot measurements of magnetic fields. They did find a relationship between cancer and estimated field exposures to magnetic fields based on a sophisticated computer model and a Swedish electric power grid study.

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Perhaps the most important advantage of the new PowerBook 160 and 180 and the Duos (with docking station) is the inclusion of a video port—which allows them to connect to a large-screen monitor, color monitor, or color projector. Connecting an older PowerBook, an Outbound notebook, or a compact Mac to an external display requires a special peripheral—a video-display adapter. As we tested the different types of PowerBook video peripherals—internal adapters, external SCSI adapters, and SCSI monitors—for the feature "Expanding Your PowerBook" in this issue, we discovered the problems inherent in trying to make a computer do something it wasn't designed to do.

**Internal Adapters**

The only internal adapter available for our tests was Computer Care's BookView Imperial, whose circuitry design is very similar to an LC II's internal video. The BookView Imperial maps 1MB of video RAM (VRAM) into the PowerBook's memory (the PowerBook has no VRAM). A connector lets the BookView run an external monitor. Like all video adapters, the BookView treats the Mac's built-in monitor as a second display. Since the BookView Imperial has no graphics processor, the Mac's CPU must do all the processing. Other Mac internal video adapters work similarly.

**External Adapters**

We tested three external SCSI adapters: Radius's PowerView, Aura Systems' ScuzzyView, and Lapis PowerBase 1. All use INITs to reroute video data over the SCSI bus to the adapter (which then sends the data to a monitor), but they differ in how they process the video.

The Radius PowerView tells the Mac's CPU to process the video image, and reserves part of the Mac's RAM to do this. The Macintosh then sends the processed data (initially an entire screen's bitmap image) to the adapter's video buffer, and the adapter sends the image on to the monitor. If subsequently only a portion of the image is updated, the PowerView software sends only the changes to the adapter. This is crucial because SCSI cannot send whole screens of data quickly enough to update the monitor at an acceptable pace.

Instead of having the Macintosh process the video, the ScuzzyView handles the processing itself. The ScuzzyView INIT intercepts QuickDraw calls and forwards them to the adapter box via the SCSI port. The adapter's graphics processor generates the images for the selected monitor in the 1MB video buffer; afterward the ScuzzyView sends those images to the monitor.

The Lapis PowerBase 1, a video adapter that supports only monochrome monitors, either processes the video itself or hands it off to the Mac, depending on the requirements of the Mac it's connected to. When running in accelerated mode with a 68000-based machine like the PowerBook 100, the PowerBase I traps QuickDraw calls and forwards them through the SCSI bus to the adapter, which renders the image. With Macs that contain Color QuickDraw, or when running in nonaccelerated mode with a 68000-based machine, the PowerBase I lets the Mac process the image. To speed up screen redraw, the PowerBase I has an accelerated option for color Macs that reduces the number of screen updates—by continues
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External SCSI Monitors

WITH A BUILT-IN VIDEO ADAPTER, a SCSI monitor works like an external SCSI adapter. The only differences among the SCSI monitors we tested were the graphics processors and the SCSI communication methods the adapters used.

The Outrigger, ViewPort, and PowerPlay (all manufactured by Outbound) each have a built-in 20MHz 68000 microprocessor that handles all video processing. Sigma's PowerPortrait uses a specialized 40MHz Texas Instruments 34010 graphics processor and has more internal memory for displaying at higher resolutions. These two features enable the PowerPortrait to update screens more quickly than the others.

Your Speed May Vary

WE FOUND SPEED VARIATIONS BETWEEN external adapters that were due to their different designs. In most tests, the ScuzzyView ran faster than the PowerView. Because the ScuzzyView traps only QuickDraw routines (which take very few bytes each in most operations), it usually transfers less data across the SCSI bus than the PowerView, which transfers large bitmapped images—sometimes thousands of bytes per screen. For example, a standard 8-pixel-by-8-pixel color pattern for a 200-by-200-pixel square requires less than 50 bytes for processing with the ScuzzyView, whereas a similar operation on the PowerView sends 40K of processed data over the SCSI bus. But when sending huge amounts of data across the SCSI bus—specifically when redrawing the entire screen, when displaying a new picture, or when scrolling a page in which most of the screen needs to be redrawn—the PowerView came close to or even matched the ScuzzyView's speed. In some instances, the PowerView actually ran slightly faster, since it updated only changed areas of the screen.

Incompatibility Problems

ALTHOUGH TRAPPING QUICKDRAW calls (instead of letting the CPU process the image) speeds up the adapters, it can also cause incompatibilities. We found that many such adapters could not run applications that bypass QuickDraw and draw directly to the screen, such as Claris HyperCard, screen rendering in Aldus SuperPaint, the preview mode in Adobe Illustrator, QuickTime movies, a couple of operations in MacroMind Director, and some fast-action games like Spectre. The reason these applications write directly to the screen is usually speed—QuickDraw is too slow for their purposes. Some of the applications have options to use QuickDraw for screen-rendering instead, and most of the video-adaptor vendors either already have or are working on patches for the other applications. Technically, this problem is with the software, not the adapters. But because this method of boosting speed is so commonly used by software developers, vendors of video adapters need to plan accordingly.

Although the PowerView had problems with some operations in Macromedia Director 3.0 and games like Spectre, we found it to be more software-compatible than the other adapters. Its monitor support, however, was not as versatile as that of its main competitor—the ScuzzyView. For example, due to a limited amount of video RAM (a non-expandable 0.5MB), the PowerView couldn't drive a 19-inch monitor in 256-color mode (which requires 1MB).

Another drawback of the PowerView is its incompatibility with 68000-based machines; it supports only the PowerBook 140, the 170, and the Classic II. The ScuzzyView works with all Macs from the Plus up, and provides color to the Plus, SE, PowerBook 100, and Outbound notebooks. Although these machines are considered monochrome Macs, their ROMs have QuickDraw routines for displaying eight colors—red, green, blue, cyan, magenta, yellow, black, and white. The ScuzzyView software allows you to assign these eight colors to the Finder and to applications that support them.

We also ran into some compatibility problems with Computer Care's internal adapter, the BookView Imperial. Since the BookView Imperial allocates some of the PowerBook's unused memory space for video RAM and a color lookup table, it conflicts with the PowerBook's memory-management scheme. The version we tested, 1.0.7, supports neither System 7's virtual memory nor the Apple RAM Disk. The latest version, 1.0.8, fully supports virtual memory but not the Apple RAM Disk. Computer Care plans to include a RAM disk utility called RAM Disk+ in a future version of the BookView Imperial.

Because internal video boards let the Mac's CPU do all the processing and avoid the SCSI bus bottleneck, they provide the speediest screen updates. Despite their compatibility problems, most of the video adapters we tested provided greater flexibility than do the built-in video ports of the new PowerBooks—because the adapters typically support more and larger monitors. Nearly all are acceptable choices for moving beyond your Mac's small monochrome screen.
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Circle 123 on reader service card
THIS MONTH:
Photoshop Upgraded • Inexpensive PostScript Printer • Future Mac Processors • Timbuktu Controls Windows • Big PageMaker Upgrade

Health Care's Keyboard Can Be Modified to Reduce Hand Stress for Just About Any Typist.

An Ergonomic Keyboard
At last someone is developing an ergonomically designed keyboard that uses the standard QWERTY layout we all learned to type on. The only problem with Health Care Keyboard's Comfort Keyboard is the price: $675. For that you get a keyboard split into three parts—one for the right hand, one for the left, and one for the numeric keypad—all of which separate, rotate, and tilt to any number of positions to avoid the rigid and stressful position of hands, arms, and shoulders enforced by the flat QWERTY keyboard. At $675, the company must expect to find its market among the already-injured who have insurance or workers comp, but the keyboard could be equally attractive to those trying to prevent injury. Health Care Keyboard, 414/253-4131.—Ann Garrison

IBM Color Jetprinter
Lexmark International has introduced the IBM Color Jetprinter PS 4079, a 360-dpi color ink-jet printer that can work with Macs and DOS machines simultaneously. The printer includes a PostScript language emulation that was cowritten by Lexmark and Phoenix Technologies.

DEC PostScript Printer for under $1000
Computer giant Digital Equipment Corporation (DEC) has brought out the DEClaser 1152 Desktop Laser Printer, the least-expensive PostScript laser printer yet. The 4-ppm DEClaser 1152 will officially list for $1299, but DEC will publish rebate coupons that will bring the list price to $999. The one-to-a-customer coupons continue.

PageMaker's Big Upgrade
With PageMaker 5.0, Aldus is responding to QuarkXPress's encroachment in several key areas of desktop publishing.

First is text. PageMaker 5.0's FreeHand-like text capabilities support rotating text by hundredths of a degree; flipping, mirroring, and skewing text; and editing and kerning text after it is modified.

Second is color. Process-color separations can be printed from inside PageMaker; objects can be set to overprint or knock out underlying color; at least 7 (maybe 12) color spaces will be supported; and colors from imported EPS graphics can be applied to elements in the PageMaker document.

Third is printing. Version 5.0 can print discontinuous page ranges and add printers' marks and document information to output, and Aldus claims that the new version's printing speed is eight times greater than version 4.2's.

PageMaker 5.0 supports dragging elements between multiple open documents and searching their text with the story editor. Aldus is bundling numerous Additions to extend PageMaker's features, including a tracking tool and a simplified imposition tool. List price remains $795. Aldus, 206/622-5500.—D.L.
Imagine you could design your own personal computer. What would it be? It would be fast, of course. Faster than your basic 486 machine. Fast enough to handle the rendering, animating, design and analysis jobs that often require a workstation. It would have immense storage and memory capacity. And it would have features like high-performance networking and accelerated video support built in.

You would make it flexible enough to run any kind of application. Affordable enough to put on every engineer's desk. And as long as you're fantasizing here, you'd make it as easy to set up, easy to learn and easy to use as an Apple® Macintosh® personal computer.

But it's not a fantasy. It's a Macintosh Quadra®.

By any measure, the Macintosh Quadra 700 and 950 are two of the most powerful personal computers ever built. Both are based on the Motorola 68040 (rated at 20 and 25 MIPS, running at 25 and 33 MHz), which integrates the processor, math coprocessor and RAM cache all onto one chip. They're up to twice as fast as any of their forebears. Fast enough to beat the chips off comparably priced 486 computers from IBM, Compaq and Dell. And fast enough to make programs like AutoCAD, MicroStation Mac®, MacBRAVO! and VersaCAD perform at a level once seen only in dauntingly complex workstations.

High-performance subsystems provide built-in support across the board: Ethernet networking, accelerated 24-bit video support and faster SCSI and NuBus® slots.

You can add a 400MB hard disk to both
the 700 and the 950 to accommodate the largest CAD files. And the 950 even lets you add a CD-ROM drive or a removable cartridge drive, and a disk array or more than a gigabyte of internal hard disk storage.

You can increase the memory of the 950 to up to 64MB of RAM for handling compute-intensive applications like three-dimensional modeling and stress analysis.

Over your network, the unique Apple interapplication communications architecture lets you easily take advantage of features like distributed processing, allowing programs like RenderPro and BackBurner to utilize excess CPU cycles on other Mac computers or workstations for faster renderings.

And Macintosh Quadra fits in with the PCs you already own. The built-in Apple SuperDrive, used with Apple's new Macintosh PC Exchange software, allows you to share files easily with MS-DOS PCs via floppy disk or over a network. And with Apple's fully compliant version of UNIX™—A/UX™—you can even run UNIX, X Window, MS-DOS and Macintosh programs all at the same time.

It all adds up to the kind of power that moved PC Week to give the Macintosh Quadra its highest satisfaction rating in the categories of overall performance, price relative to performance, expansion capability and ease of installation and configuration.

Your authorized Apple reseller would be glad to show you all this and more. For the name and location of the one nearest you, call 800-538-9696, extension 200. And soon you'll discover the latest power of Macintosh personal computers. The power to start a revolution. The power to be your best.
PULLING ALL YOUR MEDIA TOGETHER REQUIRES SOME FANCY FOOTWORK.

Passport Producer

Integrating multimedia elements to create a spectacular presentation can be a bizarre, ritualistic dance. But with Passport Producer—media integration software for the Macintosh—it's simple and easy to keep complex multimedia presentations in step. Passport Producer serves as the master control for your entire production, synchronizing QuickTime movies, animation, graphics, text, digital audio and MIDI into one file. With Passport Producer, you integrate media elements on a visual "cue sheet" based on SMPTE time code that permits frame-accurate "cue" placement. By linking to programs that create multimedia elements, you can easily integrate and edit standard file types. When you need to edit your content, simply double-click on the cue and Passport Producer automatically opens the editor of your choice. Play back your presentation with the push of a button. It's that fast and simple. So if you feel that building a multimedia presentation requires a lot of tricky and cumbersome moves, get Passport Producer and you'll waltz your way through.

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Circle 271 on reader service card
SilentWriter 95fx

NEC Technologies has introduced the SilentWriter Model 95fx, a version of the company's SilentWriter 95 laser printer with the addition of an integrated PostScript fax board. The Model 95fx can send a fax compressed in Adobe's new PostScript fax format, which means that another similarly equipped printer can receive the file and produce a plain-paper fax that looks just like the original PostScript document. The PostScript fax format compresses the data so that the transmission is faster than for a standard fax.

The Model 95fx comes with NEC drivers that the company says allow it to work with almost any DOS, Windows, or Macintosh application. Any user on the network can access the fax capability, which includes normal directory, a time-delay feature, and multiple addressing.

The SilentWriter Model 95fx produces 6 ppm, includes PostScript Level 2 and an emulation of HP's PCL 5, and has 35 scalable typefaces. It lists for $2348 and is shipping now. NEC, 508/264-8000.—T.M.

Structured Publishing

Publishing jobs that require repeatedly reorganizing a document's contents or changing its appearance without changing its contents can overwhelm standard desktop publishing tools, but tools for the Mac based on SGML (Structured Generalized Markup Language) are finally making it possible to automate such tedious work.

SGML documents have precisely defined parts and relationships between parts—for example, a chapter might be defined as always containing at least two subheads. A tag identifies each part, and filters for SGML-savvy page-layout software can read tags to import and automatically format a document, or tags can become the parts' attributes in a document database.

SoftQuad publishes Macintosh SGML tools, including Author/Editor 2.1 ($995), where text is entered and tagged; and RulesBuilder 2.0 ($995), where a document's rules and tags are developed. Author/Editor is a solid text-editor in its own right; for SGML work it includes outline-like control over the display of nested levels of document parts, and a view showing the contents of a document with all the formatting assigned to tags. RulesBuilder performs such tasks as finding conflicting rules. SoftQuad, 416/239-4801.—D.L.

ReadySetGo Rises Again

Manhattan Graphics' ReadySetGo (RSG) was the Macintosh's first real desktop publishing software. After enduring Letraset's unsuccessful attempt to market the DTP package as DesignStudio, Manhattan Graphics reacquired the program, restored its original name, and set to work on version 6.

Version 6 has abundant left- and right-hand master pages (26 each); provides precise typographical control over such details as small-cap sizes and first-line leading; and has new text features including more page-number formats and can count words and characters. Objects can be anchored together with precise control over their offset.

ReadySetGo supports add-ons called annexes; version 6 will ship with several annexes, including one for separating color that has some trapping capability. RSG lists for $395. Near-future plans call for tools for creating tables and for generating indexes and tables of contents. Manhattan Graphics, 914/725-2048.—D.L.

CMS's High-Capacity Drives

Addressing the need for ever-more-capacious hard drives, CMS Enhancements has unveiled its Platinum II series of drives ranging from 660MB to 2.1GB. The storage devices have fast average access times, ranging from 8ms to 14.5ms.

CMS has begun shipping the Platinum II drives at list prices from $3995 for the 660MB model to $8990 for the 2.1GB model. CMS, 714/222-6000.—T.M.

ReadySetGo Version 6's Object-Anchoring Provides Precise Control over Objects' Position on the Page.

Turkey Shoot Design Flaws Noted

Microsoft Works 3.0 Works will allow itself to be installed only on your start-up volume (though it can be moved to a different volume after installation). Doesn't this sound like a good reason to throw away some junk on your hard drive?

FileMaker Pro 2.0's Data-Export Is it Mac, or is it Windows? When exporting data for a mail merge, blank spaces between words in the field names are mysteriously replaced with underlines. Nifty: now your mail merge templates can't read the data.

More FileMaker Pro mail merge mysteries: heaven forfend you should have blank fields in your database, because they'll come out the other side of the black box with double quote marks where once was void. Some word processors will read the quote marks as data and happily enter them in your mail merge; others will read them as extra fields and move your real fields over.

Macworld will send you a Turkey Shoot T-shirt if we shoot your turkey in this column. See How to Contact Macworld.
Looks like Mac users just got

The new generation HP LaserJet 4M printer.

The HP LaserJet 4M is the one for all Macintosh and PCs alike. This new generation provides superior output with 600 dpi, Resolution Enhancement technology, and microfine toner. 6MB built-in memory means that PostScript files and full-page graphics print out crisp, clear and fast.

At last, Hewlett-Packard introduces a laser printer built specifically for the Mac from the ground up—the new LaserJet 4M. A laser printer for Mac users with everything you expect. And, more importantly, everything you need. From built-in PostScript Level 2 software from Adobe and 6 MB of memory, to standard LocalTalk and optional EtherTalk. Features which make certain this new generation in laser printing is ready-made just for you.

The finest print quality in its class. In addition to complete Macintosh compatibility, the LaserJet 4M printer also delivers the finest print quality of any 600 dpi machine available—thanks to
HP's microfine toner, Resolution Enhancement technology, and an advanced engine expressly engineered for 600x600 dpi.

New generation features mean you will lose no time getting your work onto the page. A new RISC processor and 6 MB of standard memory accelerate formatting and I/O speeds, so complex PostScript language and graphics files are rendered faster and more clearly than ever before.

Greater flexibility. But this wouldn't be an HP-caliber breakthrough if the innovations weren't across the board. That's why, even though the new generation LaserJet 4M printer is built for the Macintosh, it will perform for DOS and Windows users as well... automatically. Automatic language switching (between PCL 5 and PostScript) and three hot I/O ports (serial, parallel, and LocalTalk) make sure users are able to share the printer simultaneously. Without waiting.

Also, because of the LaserJet 4M printer's two integrated paper trays (total capacity 350 sheets) and optional 300-sheet tray and power envelope feeder, you will save time, avoid paper-handling hassles, and gain flexibility.

HP quality and reliability. The new generation LaserJet 4M printer lets you enjoy the one particular no other Macintosh laser printer can offer—the renowned quality and reliability which comes with owning an HP peripheral. Not to mention our outstanding customer support, where information about how to get the most from your printer is never more than a phone call away.

Surprisingly affordable. Perhaps the most remarkable attribute of the new LaserJet 4M printer is the price—$2,999.* A breakthrough in its own right. So call 1-800-LASERJET (1-800-527-3753), Ext. 7135 to receive a print sample and comparison disk to see the quality for yourself! Or visit your nearest authorized HP dealer and see the printer built to add some polish to your Apple.

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Circle 142 on reader service card
Falcon Flies in Color

What if they gave a war and nobody came? Well, from the cockpit of your F-16 in Spectrum HoloByte's Falcon MC flight simulator, you could wage war against your own Mac. And you'd be ready if the enemy did challenge your air space by logging on across the office network or via modem.

In addition to multiseter capability, the new Falcon runs in color (in fact, it requires a color Mac), and its terrain is rendered in 3-D. It has new weapons and new missions; and for lovers of the martial life, the new version is packed with detail about the planes, your stable of pilots, mission briefings, and so on. Falcon MC will list for $69.95. Spectrum HoloByte, 510/522-3584.—D.L.

The Ultimate PIM?

No one quite agrees on what personal-information-management software is supposed to be, but ProVue's Power Team covers just about every possibility.

To the standard phone book, calendar, and to-do list, Power Team adds a checkbook manager, an expense-report generator, a mailing list and correspondence manager, and a calculator. Though each module is a separate database, information from each module is available in all other modules. Perhaps Power Team's most interesting feature is its text-parsing ability—for example, type "lunch with Sue on Friday" and Power Team creates an appointment at noon on Friday and puts Sue's name in it.

Power Team is $149.95. It uses the new version of ProVue's very fast database Panorama, which lists for $395. Version 2.1's new features are mostly aimed at high-end users, with calendar functions, improved text parsing, advanced printing controls, many new macro commands, and new template- and form-design features. ProVue Development, 714/892-8199.—D.L.

Radius Board Speeds Photoshop

The Radius DSP Booster is a piggyback board for the Radius Rocket accelerator that speeds the filter processing of Photoshop by as much as 800 percent on a Quadra 950, according to the company. Intended for users who regularly manipulate files of 20MB or more, the DSP Booster board contains two digital signal processor chips that compute up to 66 million floating-point math operations per second.

The DSP Booster, which works with Photoshop 2.5, comes with modules for Unsharp Mask, Sharpen, Sharpen More, Find Edges, Blur, Blur More, and Gaussian Blur. It was expected to ship by February and list for $899. Radius, 408/434-1010.—T.M.

DESKTOP LIBRARIAN

Books for the Macintosh Reference Shelf


* Macworld Music & Sound Bible, by Christopher Yavelow (1992, $37.95). This even more enormous volume (1398 pages) starts with the basics of Macintosh music and sound, then covers sound generation, organization, and editing; composition; notation; live performance; postproduction; film, video, and synchronization; multimedia; and education. Appendices cover other reading materials, MIDI, and manufacturers of sound and music equipment, among other topics. Includes an index. IDG Books Worldwide, 415/312-0650.—T.M.

68060 to Overpower the PowerPC

While attention has been focused on the prowess of the upcoming PowerPC RISC processor, Motorola has been working quietly on a powerful successor to the 68040, the 68060, that will outperform the first PowerPC to be released, the PowerPC 601. Motorola's 68060 will perform in the range of 100 million instructions per second (MIPS), compared with the 29 MIPS of a 68040 with a 33MHz clock rate. Because the 68060 will be faster than the PowerPC 601, the 601 will be relegated to a midrange Mac, while the 68060 will get a glamour job in a line of high-end Macs in early 1994, according to industry sources. The 68060 employs super-scalar execution, that is, the ability to perform two instructions per clock cycle. Motorola plans volume shipments of a 50MHz 68060 in early 1994, with a 66MHz chip to follow. Motorola skipped development of a 68050 in favor of the more radical 68060 design.—JONATHAN CASSELL

First Silicon on PowerPC

IBM and Motorola recently produced the first working prototypes of the PowerPC 601, which will be the first model in the PowerPC line of RISC microprocessors that will be the brains of a future generation of more powerful Macintoshes. The two companies began working together on the project a little more than a year ago, when Apple-IBM-Motorola alliance was announced.

The PowerPC 601 microprocessor is considerably more powerful than Motorola's existing 68040 microprocessor, which is used in Apple's Quadra models. The 50MHz PowerPC 601 performs at a very preliminary SPECcpu89 (Systems Performance Evaluation Cooperative floating-point) rating of 60, and at a SPECCmp89 (integer) rating of 40. The 66MHz version of the same chip operates at a preliminary SPECcpu89 of 80 and SPECmpint89 of 50, according to an IBM spokesperson.

IBM and Apple are both examining and testing the early chips now, according to spokespeople for both companies. IBM expected to come out with a non-Mac system using the new processor by the end of 1993, while Apple said its first PowerPC-based Mac should appear in early 1994. Other companies will also design systems around the new chips. IBM and Motorola are working on three more members of the PowerPC microprocessor family that will be even faster.—T.M.
StatView® 4.0 is Here!
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StatView 4.0 was developed using the latest object-oriented technology. This allows Abacus Concepts to deliver new statistical and graphing features as modular extensions. StatView 4.0 is just the beginning!

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StatView 4.0 lists for $595 (U.S.). Academic discounts are available. To learn more, please call Abacus Concepts at 1-800-666-STAT.

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**Long-Distance LANs**

In the past, companies needing to connect remote offices have resorted to using poky 2400-bps or 9600-bps modems over dial-up lines. But Metropolitan Fiber Systems has been busily laying fiber-optic cable that connects 14 of the nation's largest urban areas, and the company's subsidiary MFS Datelnet is leasing room on the fiber, making it possible for Macs and other computers in different buildings—or different cities—to connect as if they were all in the same office. Ethernet or token ring networks (or AppleTalk through an Ethernet network) can hook up through Datelnet's High-Speed LAN Interconnect (HLI) and transmit at their regular speeds.

HLI pricing depends on configuration, but a typical situation might cost $1000 per building for a one-time hookup charge, $2000 per building for monthly access charges, and $8500 per month for unlimited traffic at Ethernet speed. Slower speeds are available at less per month. MFS Datelnet, 408/975-2200. -D.L.

**Beta Wait**

**Long-awaited products**

**ACIUS'S 4D Server**


**FoxPro/Mac**

Fox Software discussed publicly winter 1990/91. Microsoft acquired Fox earlier in 1992, and says it will ship FoxPro/Mac "when it's ready."

**Interleaf 5**

Discussed publicly October 1990. No ship date projected.

**Claris's MacWrite Pro**


**Portable Fax Modems**

For the world travelers among us, two companies have recently introduced high-speed external fax modems for PowerBooks and other Macs. The products are the PM14400FX Pocket modem from Practical Peripherals and the aptly named WorldPort 14,400 Fax for the PowerBook from U.S. Robotics. Both small devices send and receive data at a base rate of 14,400 bps, but can achieve a maximum rate of 57,600 bps by using the included V.42bis data-compression and V.42 error-correction protocols. The PM14400FX Pocket can also send and receive faxes at 14,400 bps, however, few existing fax modems support this fax transmission rate, so it may not be easy to take advantage of the greater speed. The WorldPort fax modem sends and receives faxes at the standard 9600-bps transmission rate. WorldPort comes with fax software and MicroPhone communications software. The WorldPort lists for $699.

The PM14400FX Pocket comes with QuickLink II Fax software and has six pages of online help in ROM. The modem recognizes phone-credit-card prompting tones, making autodialing software more convenient. The Pocket modem lists for $529.

Both fax modems were slated to ship in December. Both operate from batteries or through an included AC adapter. Practical Peripherals, 805/497-4774; U.S. Robotics, 800/342-5877. -T.M.

**Plain-Paper Color Printers**

Tektronix has introduced the Phaser 200e and Phaser 200i, two thermal-wax printers that use new technology to print on plain paper with excellent results. The new technology involves first laying down a primer coat that evens out the ridges and valleys in ordinary printer paper. The printers place the primer coat only on the parts of the paper that will be printed on later. Both printers output 2 pages per minute.

The Phaser 200e has a 16MHz 29000 RISC processor; comes with 4MB of RAM expandable to 8MB; and includes PostScript Level 2, 17 Adobe fonts, and HPGL. The 200e lists for $3995. The Phaser 200i has the same features but with a 24MHz version of the processor, 6MB of RAM expandable to 14MB, 39 Adobe fonts, and a SCSI port. The 200i lists for $5995. Both printers incorporate a serial port, a parallel port, and an AppleTalk connector; and both can be expanded to support TCP/IP and DECNET. The 200i can support an optional EtherTalk expansion. Tektronix scheduled first shipments of both printers for January 1993. Tektronix, 503/682-7377. -T.M.
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RealWorld has already made a world of difference in over 350,000 businesses, and we can make a difference for you. To learn more about VISUAL Accounting from RealWorld, call us at 1-800-678-6336.
Photoshop Gets Faster

Adobe is upgrading its photo-editing tool Photoshop to version 2.5, giving it much greater speed for many common tasks and a set of new features.

Two factors contribute to greater speed: a rewritten engine and what Adobe calls subsampling, which lets users experiment on a low-resolution version of an image, applying a complete transformation only once.

In the new-feature department: dodge and burn tools to lighten and darken selected parts of an image; support for using any tool to create a selection and generate a mask; collapsible tool palettes; support for an unlimited number of brush shapes; strokable and editable paths; a channel-editing dialog box; and Photo CD and JPEG support.

Photoshop’s price is unchanged at $895. Adobe, 415/961-4400.-D.L.

Animated Electricity

The high-end animation and rendering package ElectricImage Animation System (EIAS) is being upgraded to version 1.5. New rendering capabilities include shadow casting from multiple lights, transparency and environment mapping, along with tubular, foggy, and several kinds of glow lights for lighting scenes. The animation module adds many high-end features including a choice between a spreadsheet or a time-line interface; motion triggered by events; support for hierarchically linking lights and cameras to moving objects; and the ability to link objects temporarily—useful, for example, to animate a person picking up an object and then setting it down. A new project window is designed for editing animations by frame or by time.

EIAS lacks a modeler, so users must create objects in another program and import them (EIAS imports almost anything). EIAS is copy-protected and costs $7495 from Electric Image, 818/577-1627.—D.L.

In Control’s Calendar

When the first version of In Control shipped it was resolutely anticalendar and totally unlike anything calling itself a PIM (personal information manager). Instead, it merged an outline’s usefulness in planning with the control over information provided by the row-and-column structure of a flat-file database.

Between versions 1 and 2, Attain Software realized that people have not only things to do but times to do them: In Control 2 merges a calendar and to-do list into the outliner/database. The new version also adds FileMaker-like scripts, more control over the report-generator’s printing capabilities, and improved searching.

In Control’s price remains $129.95. Attain Software, 617/776-1110.—D.L.

Stacking SCSI Drives

Envisio’s SmartStack is a new approach to adding up to seven external SCSI drives without cluttering your desk with a lot of boxes, SCSI cables, and power cords. The subsystem is built on the SmartSource base unit, which contains a fan, a 120-watt power supply, and two 50-pin SCSI connectors. The power supply drives all the devices in the SmartStack. The SCSI connectors plug into the first drive module, which has its own pass-through SCSI connectors for the next drive to plug into. A cover unit contains a cable that links the two connectors on the highest drive to each other, closing the SCSI loop. The cover unit also contains a second fan for more cooling.

The first SmartStack modules will include hard drives, erasable optical drives, and DAT drives (one device per module). Envisio is working on modules for devices such as modems, SCSI-to-Ethernet controllers, and CD ROM drives. The first hard drive modules will range in capacity from 105MB to 1GB. The SmartSource base unit and cover will retail for $249. A 127MB module will list for $699, while a 1GB module will be $2649. SmartStack was slated to begin shipping in January. Envisio, 612/339-1008.—T.M.
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This is not your average mouse...

Meet MVP Mouse™ from Curtis.

One look tells you, MVP Mouse is not just another trackball. Its ergonomic 3-button design responds to your every impulse as if it were an extension of your hand. Its 200 DPI resolution and automatic acceleration give you pinpoint cursor control plus the ability to "jump" across the screen with just a short, quick movement of your fingers. And its powerful control panel lets you select preset tracking and double-click speeds...or create your own! And it gives you dozens of button functions to choose from, including a Custom Command that simulates any 86-letter keyboard command.

You can assign any command to any button, quickly and easily on-screen. Optional Foot Switch acts as 4th command button.

Take MVP Mouse for a spin. Visit your nearest Curtis dealer for a hands-on demonstration.

#MVP-1 Retail $49.95

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Circle 20 on reader service card
Using Your TV as a Monitor

Lapis Technologies has unveiled its L-TV, an NTSC interface board that lets LCs, LC II's, and Performa 400s use a standard television set as a monitor. The company uses convolution software to prevent the flickering of 1-pixel-thick lines that normally occur when transferring a noninterlaced digital image to the interlaced analog display of a television. Lapis also includes its TV-Show presentation software, which lets a presenter control the presentation with an Apple 12-inch RGB display while using a television for the presentation itself.

The L-TV board works in 1-, 2-, 4-, 8-, and 16-bit modes at resolutions up to 640 by 480. It offers a socket for a 68882 math chip. It connects to the television with a standard coaxial cable that can be up to 25 feet long, according to the company.

First shipments of the NTSC interface board began in November. The L-TV board has a suggested list price of $349. Lapis, 510/748-1600.—T.M.

Learning to Market

American Demographics magazine has published SMART-disk, or Strategic Market Analysis Resources and Techniques, a $189 primer on market analysis.

Topics covered in the primer include how to use demographics to segment and target certain markets; how to choose advertising media based on consumers' life-styles; and where to open a new retail or service business.

SMARTdisk also looks at long-term consumer trends that affect marketing, and provides a list of sources for demographic data, computer-based market-analysis systems, and books (with ready-to-print order forms) on marketing topics including how to market to the elderly or to the environmentally conscious and how to prepare for long-term real estate trends. American Demographics is at 607/273-6343.—D.L.

Virus Watch

CURRENT VIRUSES, TROJAN HORSES, AND WORMS

T4-A, T4-B
TYPE: Virus
FIRST LISTED IN VIRUS WATCH: 10/92
INFO: Initially discovered in a game called GoMoku
IMPACT: Both versions of T4 damage system files and applications

ChinaTalk
TYPE: Trojan Horse
FIRST LISTED IN VIRUS WATCH: 10/92
INFO: ChinaTalk is an INIT that comes with a read-me file that claims it provides a female voice for Macintosh
IMPACT: Destroys files and changes file and folder names and attributes to random garbage

Code 252
TYPE: Virus
FIRST LISTED IN VIRUS WATCH: 8/92
INFO: Displays a message telling the user it is destroying contents of hard drive
IMPACT: After displaying message, it deletes itself without causing damage; infected Macs may behave erratically

Envisio Dock for Duos

Designed to provide portable expansion capability for PowerBook Duo systems, the Dynamic Duo from Envisio is a very small and inexpensive docking station. The main feature of the Dynamic Duo is its 16-bit color graphics adapter, which supports 32,000 colors on 12-inch or 13-inch monitors and 256 colors on 16-inch monitors. It is compatible with Apple monitors measuring from 12 inches to 16 inches diagonally, and with the Radius Color Pivot monitor. The Dynamic Duo also works with VGA monitors and LCD projection panels.

The docking station, which is about the size of a deck of cards and weighs about 5 ounces, adds 16-bit stereo sound capability to a Duo notebook system. An optional NTSC television adapter can be added to the Dynamic Duo. Slated to ship in January, the Dynamic Duo will carry a list price of $600. Envisio, 612/339-1008.—T.M.

Trebek Talks to Windows

Trebek allows you to look over a network to watch a remote Mac's screen, transfer files back and forth, use the remote Mac's printers, or even take control over it, using your mouse on its screen. Trebek version 5.0 lets Macs and machines running Windows perform all those functions.

Trebek manages file naming for transferred files. It runs on any AppleTalk-compatible network, including Ethernet and token ring. Version 5.0 comes as a disk accessory for System 6 and as an application for System 7. Under System 7, connection files can be saved and reused to automate log-ons.

Trebek 5.0 lists for $199 per machine; pricing is less per unit for multiple copies. Farallon, 510/596-9100.—D.L.

Great Plains New Plans

Great Plains is making a big move for the stodgy accounting software business: It is bringing out a new product line with a graphical user interface.

The new Great Plains Dynamics products divide up accounting into small, specific modules. For example, the financial series starts with a general ledger and has add-ons for cash, multiple currencies, financial analysis, and consolidating subsidiaries. Other series provide inventory, payroll, sales, and purchasing modules. A report writer is built in, and users can alter a form's appearance without breaking its underlying logic. Programming tools for real developers can produce Mac- and Windows-compatible systems. Pricing for Dynamics modules varies widely.

Great Plains says it will maintain its traditional character-based products and plans to publish version 7, a major upgrade of Great Plains Accounting, sometime in mid-1993. Great Plains Software, 701/281-0550.—D.L.

News
If this reminds you of your PowerBook after an hour or so, make its battery charge last up to twice as long with The Norton Essentials™ for PowerBook. It increases battery charge, makes your PowerBook easier to use, and keeps files synchronized—all without sacrificing performance. To learn more, dial FAST FAX 1-800-554-4403.*

Inventing Medicine

Stumbling upon new medicines has long been a matter of a chemist’s intuition and some lucky guesswork, but new software called Catalyst is intended to make inventing medicines a systematic process.

Catalyst can import a 2-D model of a molecule from standard chemical databases and show it in both 2-D and 3-D views. Chemists can click and drag to add atoms and reconfigure the molecule, while Catalyst validates the new molecule’s bonds and structure and makes sure its folding fits biological constraints. Catalyst can search a 2-D database for molecules whose 3-D configurations fit into a certain receptor the chemist is trying to match, or the program can perform searches based on abstract criteria such as “greasiness” and charge.

A workbench metaphor emulates a chemist managing a laboratory’s work flow, and a special command can clean up sloppily constructed molecules for publication. Catalyst runs on Mac-Silicon Graphics networks; the SGI machine does the serious number-crunching. Catalyst is $30,000 per user from BioCAD, 415/903-3900.—D.L.

Software Hooks

PowerBooks to Nets

Farallon Computing has come up with two related software products for linking AppleTalk devices to Ethernet networks or token ring networks without an expensive router. LocalPath works with AppleTalk devices in general, while PowerPath lets you connect a PowerBook to a network.

With LocalPath, you can connect a net of up to eight LocalTalk devices to a host Macintosh. LocalPath runs in the background while accessing an Ethernet or token ring network. The host Macintosh slows slightly, but can still be used for normal applications, according to Farallon.

The PowerPath application works the same way, but it’s intended for adding a single PowerBook to the network. Both LocalPath and PowerPath use forwarding software technology, essentially a forwarding engine that eliminates routing tables and other network-management overhead.

LocalPath lists for $199 and PowerPath lists for $149 including connectors. Both products began shipping in November. Farallon, 510/596-9100.—T.M.

Survey: Desktop Publishing

What types of graphics do you use in your DTP files?

<table>
<thead>
<tr>
<th>Graphic Type</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clip art</td>
<td>69%</td>
</tr>
<tr>
<td>Charts/graphs</td>
<td>65%</td>
</tr>
<tr>
<td>Line art</td>
<td>63%</td>
</tr>
<tr>
<td>Photographs</td>
<td>49%</td>
</tr>
<tr>
<td>Other</td>
<td>20%</td>
</tr>
<tr>
<td>None</td>
<td>4%</td>
</tr>
</tbody>
</table>

How do you output your DTP files?

<table>
<thead>
<tr>
<th>Output Method</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Laser (PostScript)</td>
<td>84%</td>
</tr>
<tr>
<td>Color</td>
<td>25%</td>
</tr>
<tr>
<td>Dot matrix or impact</td>
<td>21%</td>
</tr>
<tr>
<td>Imagesetter</td>
<td>20%</td>
</tr>
<tr>
<td>Ink jet</td>
<td>19%</td>
</tr>
<tr>
<td>Laser (non-PostScript)</td>
<td>12%</td>
</tr>
<tr>
<td>Plotter</td>
<td>5%</td>
</tr>
</tbody>
</table>

Based on 381 respondents to a 1992 Macworld reader survey who use publishing software on a Macintosh. Multiple responses were allowed.

BUG REPORT

Aldus Persuasion 2.12 Text can move out of place when files are converted from version 2.0 to version 2.1. Aldus says this is caused by switching from line-based leading to more accurate point-based leading, and cannot be fixed.

Now Utilities 4.0 Now Menus disables menus in some applications. The problem is fixed in version 4.01, available free online or for $5 by mail to registered users on request.

Microsoft Excel 4.0 The add-in function RANDBETWEEN is supposed to generate evenly distributed random integers, but it generates too few of the lowest integers in the range. If you save an Excel file as a text file, numbers in any column with a width of zero disappear (but letters in zero-width columns survive). Microsoft says it has no immediate plans to release a bug-fix for Excel.

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

TREND

Stripping: The Final Frontier

Stripping—positioning the film for individual pages so that signatures are printed, folded, bound, and trimmed correctly—is the most labor-intensive and most computer-resistant step in the prepress process. Ultimate Technologies’ goal with Impostrip is to bring stripping into the modern era, out of the darkroom and onto the Mac, to eliminate tedious and time-consuming hand labor.

In Impostrip’s job-setup window you describe how many pages a print job is, the trim size, the binding, and so on, and in the signature-setup window you describe the press size, margins, gripper area, and other details. Impostrip then im-
MacRecorder Sound System Pro. Turns your Mac into a complete audio workshop! Record, edit and play back live or recorded sound to add enormous impact to multimedia presentations, training materials and documents with voice, music and sound effects. Nothing makes an audience like great sound - it keeps them right there! The MacRecorder Sound System Pro digiter features a built-in microphone, external microphone jack, line input jack and input level control. Just plug the digiter into your Mac's printer or modem port, open the mic and start recording! The software included, called SoundFinder Pro, acts as your mixing board to create soundtracks, voice-over narrations and great sound effects. The sound appears on your screen as a waveform for easy editing. Cut and paste sound clips (just like cutting and pasting) and modify sounds with a host of creative tools to create intriguing effects. Mix multiple tracks of music, sound effects, and voices to produce pro-quality, multi-track soundscapes for your presentations, interactive applications and more.

Magic - Multimedia Made Easy! Magic is appropriately named. Creating pro-quality multimedia productions is almost automatic! Create objects with MacDraw-like simplicity, make them move along paths that you draw in seconds - lines, curves, circles and rectangles. Click and drag to change paths for custom movement. Great for annotated bar, line and area charts and procedure flows. When you want to see what the animation looks like, just click "play". And Magic enables you to create run-time versions of your productions to distribute to others, along with a 2-disk ClipMedia sampler that includes music, backgrounds and animations.

NEW! DIRECTOR 3.1] Macromedia has packed a host of new features into this new feature-rich version 3.1, including enhancements to importing, interactive playback and exporting of QuickTime movies. Version 3.1 runs smoother than before, thanks to a new version of Macromind Director Accelerator included FREE - formerly sold separately for $99. Macromind Accelerator also smooths out animations. There's also an expanded Object Sensitive Help system. With QuickTime, Director 3.1 really explodes with opportunities. New features enable you to easily integrate QuickTime movies into interactive Macromind Director productions - edit, playback and export QuickTime movies from Director files without any additional hardware, and import QuickTime movies as cast members.

MacRecorder Sound System Pro

THE BILLION-COLOR SCANNER! When the UMAX scanners arrived here at Tiger, their reputation had preceded them. We knew that top designers, architects, artists, pre-production houses and commercial printers had UMAX flatscans. A few of us had even seen a UMAX in action. What surprised us was the price. This thing!!!

After plugging in the awesome UMAX UC1200S, and scanning a couple of magazine covers, posters, posters, a snapshot of somebody's baby, a 35mm slide of trip to The Ryman and our color matching chart -- we knew why so many pros use the UMAX. They deliver one-stop, pre-production-quality scans at 1200 dpi. Drenched colors, razor-sharp detail. But the price... How can a product with such a reputation carry such a modest price tag? UMAX scanners come in a variety of flavors, from a compact, 600 dpi speedster to the top of the line, 1200 dpi broadband that delivers blistering colors - it recognizes a billion colors! Boasts the legendary drum scanning technology - at hundreds of thousands less! Color, black & white, grayscale, halftone... - do it all with the amazing UMAX flatscans. For office use, the UMAX black & white scanners pump out 600 dpi images. Feature for feature, nothing outclasses or outperforms UMAX's advanced technology. Great for OCR, desktop designer design.  

INCLUDES FREE Adobe Photoshop

Extraordinary photo-retouching, image editing, and color painting software. Adobe Photoshop excels as an image editor.  

An $895 Value - FREE UMAX SCANNERS

acludes the optional transparency adapter
The Contact Management Choice Of Professionals.

Do you want to be successful? Do you want to handle your clients and prospective clients like a pro? Do you want to keep your own personal information organized and at your fingertips? The Contact Management Choice Of Professionals is here to help you.

ACT! is the best-selling contact management software (fully System 7 compatible) that puts you squarely in control of clients, vendors, friends and associates. That's what the pros demand. ACT! includes a Contact Manager, Activity Scheduler, Word Processor, Report Generator, To-Do List Manager and Auto Dialer - all rolled into one very sleek, very fast and very easy to use program.

Let's get specific. First, ACT!'s Contact Manager is dBASE compatible, so you can use existing information with no problem at all. Each record contains 70 customizable fields and you can quickly schedule an unlimited number of calls, meetings and to-dos (without typing), and be reminded even if you're in another program.

ACT! is the best software I've seen for managing contacts and activities. If you are dealing with people in your day-to-day activities, you need ACT! ACT! is easy to use and has the flexibility to help me take control of my business day.

-Russell Cooper, Federal Express

New! STAR TREK; The Screen Saver! From The Makers Of After Dark.

Here is Star Trek (fan) A screen saver that pans out stunning images right from the TV series: Captain Kirk, The Enterprise, crew members and these fabulous Tribbles, from that unforgettable episode. Prevent burn-in with new Star Trek: The Screen Saver.

Features • Over 15 incredible Star Trek displays • Runs all After Dark displays, and • Screen-locking security system

Also see After Dark, the Ultimate Screen Saver Collection, Over 30 displays including Flying Turtles and Fish! With sound, password protection, logo and message displays, MultiModule and System ( ) performance maximus Plus, More After Dark - Over 23 incredible new displays for After Dark. Features custom winners Movin Man, Tunnel, GraphSlate, and beautiful new tiles. Both the Ritten and Lucente. Fun game module helps save your screen from phosphor burn-in (Requires After Dark software.)

Run MS-DOS Software On Your MAC!

A last! The gap that existe between Mac and DOS compatibility has been removed - for good. As users of both Mac and DOS computers, we know the pros and cons. Macs are friendly and advanced, but the DOS world has more people creating more specialized software. Plus, today's office environment uses a mix of DOS and Mac computers. This is a solution that solves forever the problem of Mac & DOS incompatibility. Need to use a co-worker's DOS floppy with their DOS 1-2-3 file on your Mac? No problem. Simply slip it in and watch as that DOS floppy appears just like any Mac floppy - complete with icons and folders. Amazing! But that's not all. Double-click on that DOS floppy to open it and save it, automatically and loads that DOS file! You can make changes, save it, give it back to your DOS-using co-worker and then chuckle as he looks like the file with your changes.

Read DOS Disks, Floppies and External Drives!

Here's a solution that solves forever the problem of Mac & DOS incompatibility. Need to use a co-worker's DOS floppy with their DOS 1-2-3 file on your Mac? No problem. Simply slip it in and watch as that DOS floppy appears just like any Mac floppy - complete with icons and folders. Amazing! But that's not all. Double-click on that DOS floppy to open it and save it, automatically and loads that DOS file! You can make changes, save it, give it back to your DOS-using co-worker and then chuckle as he looks like the file with your changes.

SoftPC is the ultimate answer to Mac and DOS compatibility.

DOSnode Another Ingenious Solutions breakthrough is Softnode - the perfect solution for running Novell Netware PC client software on any Mac. With the addition of the Softnode add-on, both Universal SoftPC and SoftAT can run off-the-shelf and customized MS-DOS programs on any Mac.

DAFADNOS INCLUDES FREE

FormTool (For DOS) $99.00
Lotus Agenda (For DOS) $99.00
Personal Law Firm (For DOS) $99.00
A $393 Value FREE!

FormTool, Lotus Agenda and Personal Law Firm FREE With the Purchase of Universal SoftPC and SoftAT Only.

Get the latest news and information on The Contact Management Choice Of Professionals from ACT! by calling 1-800-666-2562.
The right add-ons can transform your notebook Mac into a complete desktop system.

Thanks to notebook-size Macintoshes, you can take your computer—and your work—across the street, across the country, or around the world. But a notebook need no longer be a secondary Mac used only for travel; with the recent availability of a host of add-ons, now it can be your main computer. As you build your portable office, you'll be confronted by a wide array of products that promise to make your life easier both at the office and on the road. Some products live up to their billing; others should be left by the wayside. A battery of subjective evaluations by *Macworld* editors and objective tests by Macworld Lab separate the must-haves from the need-nots.

**EXPANDING YOUR POWERBOOK**

Before you choose from a selection of tools, you must first identify which tools you need. This can be difficult, given the newness of portable peripherals and the variety of notebook Macs. For example, three types of options are available to connect external video to the first-generation PowerBooks—the 100, 140, 145, and 170. While the second-generation PowerBooks—the 160 and 180—don't need video options because they have built-in video ports, they still benefit from some of the other portable options, like fax modems and portable printers. The Outbound Notebook Systems notebook Macs, from Outbound Systems, are similar to the first-generation PowerBooks, except that the Outbounds support fewer video options but have more-flexible upgrade capabilities (see *Reviews, Macworld*, September 1992). And the new Apple subnotebooks—the PowerBook Duo 210 and 230—have an entirely different set of options because of their unique docking-station design. One size definitely does not fit all.

Use our "Notebook-Compatibility Guide" to see which tools work with which types of notebook Macs.

*By Tom Negrino*
The wide variety of PowerBook add-ons makes the portable office a reality. Owners of PowerBook 140s, 145s, and 170s can create a high-powered office-to-go by adding a 16-inch monitor like Apple's, shown here. Computer Care BookView Imperial video adapter (inside the PowerBook), APS Companion 120 battery-powered hard drive (lower left), and GCC Technologies WriteMove II ink-jet printer (lower right).
FOR ANY NOTEBOOK MAC, CONSIDER 8MB TO 16MB.

BE THE MINIMUM RAM CONFIGURATION

Second, buy based on price. As long as you get the right kind of RAM for your notebook and it has a lifetime warranty, search for the lowest price. For example, a survey of prices advertised in recent issues of industry magazines showed a range of $199 to $299 for a 6MB memory board for the first-generation PowerBooks. Check publications like Macworld, Computer Shopper, and regional computer papers, as well as your local dealers, for the best prices. Factor in the charge for having your local Apple dealer install the RAM; typical fees range from $30 to $75.

Third, if you have a PowerBook or an Outbound, get your dealer to do the upgrade—neither Apple nor Outbound recommend user installation (although it is easy to do on an Outbound). If you have a Duo, you can upgrade the RAM yourself, powered through a standard AC plug, via a battery, or through the notebook's ADB port. We looked at external drives that have either battery or ADB-power options. There are two fine internal drive mechanisms to which you can upgrade, and more are coming soon. Quantum's 2½-inch Go drives come in 80MB and 120MB sizes, and either one is a good choice. Several vendors sell the Go drives under their own label, including APS Technologies, FWB (415/474-8055), La Cie, Mass Mi-

Designing a Portable Office

A notebook Mac with its standard array of features could suffice as your primary Mac—after all, it comes with a screen, keyboard, trackball, hard drive, floppy drive, and standard Mac connectors. But the truth is, it's probably not enough.

For start, you're likely to want more RAM than your notebook came with. Bump your machine's RAM up to 8MB, because the advantages far outweigh the expense. You're also likely to want more disk space than the 40MB that most first-generation PowerBooks came with. You can upgrade the internal drive or add an external one. Which option you pick depends on whether you travel and want to keep your archives safely at your desk instead or take them with you on the road.

Unless you have a 170 or 180, with an active matrix LCD screen, you'll quickly find that the passive matrix screen is tiring to use over the long term. So you should definitely get an external monitor. Even if you like your notebook's screen, you still may want a video connection option so you can hook your Mac to a color monitor. (Note that the PowerBook 100 or an Outbound is limited to eight colors because these notebooks use older Mac ROMs, ones without color QuickDraw.)

A modem—either internal or external—completes the list of standard features for a portable office. Spend the extra money for a fax modem—even if you have a fax machine—since you can use the fax capabilities on the road, either for traditional faxing or last-resort printing.

Chances are that you can take advantage of more than just basic equipment. If you travel, you may want a portable printer. If you work half the time on the road and half the time at the company's offices, or if you move from one branch office to another, you'll want to be able to connect to your company's network and peripherals directly through an AppleTalk or Ethernet network. And thanks to the SCSI, ADB, and serial ports available on all notebook Macs except the Duos, you can connect to any standard Mac peripheral, whether it be a CD ROM drive, mouse, or modem. For the Duos, the revolutionary docking stations add flexible, convenient connectivity.

There are also a host of odds and ends a notebook office might contain, such as carrying cases, batteries, battery chargers, numeric keypads, and locks. David Pogue covered many of these options in "The Case (etc.) for the PowerBook," The Desktop Critic, Macworld, September 1992. Other such products are reviewed in Macworld's new PowerBook Notes column, which debuts in this issue.—GALEN GRUMAN
crosystems, and Microtech (203/468-6223). Macworld Lab tests show minimal differences in performance among the drives tested (since their mechanisms are the same), so base your Go drive buying decision on price and service. By the time you read this, Fujitsu and Conner Peripherals should also have drives available for vendors to package into portable drives.

Outbound owners have more capacity options—up to 220MB—as well as the option of using new removable drives that let you share a notebook among several people while keeping each person's applications and data separate and secure.

External drives give you the same separateness and security as removable drives, plus they work with any Mac. The La Cie PocketDrive is a good example of an external drive. Small enough to fit into a shirt pocket (hence the name), the PocketDrives come in 40MB ($348), 80MB ($598), and 120MB ($998) sizes. They plug into one of two SCSI connectors: the included T-Connector, which attaches directly to the SCSI port on the back of a desktop Mac, or La Cie's $99 PocketDock, which has a SCSI cable that lets you keep the dock where it's more accessible. Both connectors have a pass-through SCSI port so you can chain more SCSI peripherals.

Mass Microsystems and Mirror Technologies also sell portable external drives. Mirror also offers the $199 PowerDock battery-charger stand for its drives.

Power to the La Cie and Mass Microsystems drives is supplied by a connector to the ADB port or by an AC adapter. Because of the PowerBooks' limited power supply, La Cie recommends that its PocketDrives be used with an AC adapter (an additional $59) when used with a PowerBook. Mass Microsystems offers no AC adapter.

Drives based on the Go 80 are particularly susceptible to inconsistent performance when powered through an ADB connector. The Go 120 does not have this problem, and Quantum has recently developed the new Go 80 GRS that works reliably with the ADB's power output.

We liked the La Cie PocketDrive 120MB a lot. Weighing only about a pound, the PocketDrive and PocketDock fit into a briefcase without a bulge.

For drives that carry their own power, consider the Companion 80 ($499) and 120 ($599), battery-powered drives from APS Technologies. Housed in a slim case the same color as the PowerBook, these drives use the type of rechargeable battery found in radio-controlled model cars to power a Quantum Go 80 or Go 120 drive for up to six hours. Liberty Systems configures its 20 Series of drives with built-in batteries ($998 for the 80MB unit and $1198 for the 120MB unit). The Liberty drives let you daisy-chain other SCSI devices from them; APS drives must be the last or only external device on the SCSI chain.

**Video Options**

The biggest drawback to the first-generation PowerBooks is that they lack a video-out port. While Apple has provided video output on the PowerBook 160 and 180 (and, via docking stations, on the PowerBook Duos), there are still about 350,000 older-PowerBook owners who need to turn to third-party options if they want to use a bigger or color screen, or an LCD projection panel.

Although the PowerBook 160 and 180 provide a video-out port, they are limited to 8-bit color on a 16-inch screen and cannot drive a 19-inch or 21-inch screen at all. Expect third parties to step in and beef up the video-output power of both of these machines by adding video RAM. At press time, Computer Care is planning a product that would let the PowerBook 160 and 180 produce 8-bit color on 19-inch monitors. The Aura Systems ScuzzyView video adapter also offers this functionality.

True to Apple's historical support for multiple-monitor display, all notebook video options let you have the notebook's screen and an external display, to form a larger virtual screen. This is particularly helpful when you are making presentations: you control the presentation from your notebook, and your audience sees the same image as the external monitor. The PowerBook 160 and 180 and the Duos also support a video mode called mirroring, where the external video monitor shows the same image as the internal screen. This lets you and your audience see the same screen image, which is particularly helpful during demos.

Video options fall into three classes. First, there are monitors that hook directly to the SCSI port. Next come the SCSI video adapters, which work with a variety of regular monochrome and color monitors. These two types of video options can be used with the Outbound notebooks, as well as with the PowerBooks, and in fact,
We tested four SCSI monitors: the $949 Outbound Systems Outrigger, the $999 Generation Systems PowerPlay, the $749 Mirror Technologies ViewPort, and the $749 Sigma Designs Power Portrait. All have two SCSI plugs, to allow for daisy-chaining additional peripherals. Hooking up all of these monitors is a snap: you plug the SCSI cable into the Mac and into the back of the monitor, drag a system extension to the System Folder, and restart. From then on, you deal with the second monitor in the usual way, using the standard Monitors control panel.

The Outbound, Mirror, and Generation Systems monitors are all manufactured by Outbound Systems, so performance and operation are virtually identical for the three units. Unfortunately, that performance is mediocre. The units weren’t especially fast in Macworld Lab’s scrolling tests. And subjectively, the display was disappointing, as the picture tube has a marked, annoying curvature. The top and bottom edges of some screens we looked at had a noticeable bend called pincushioning—this was severe on some evaluation units but not on others.

We also had some odd problems with Outbound-based displays. Occasionally buttons in some application windows wouldn’t appear until we passed the cursor over them, and sometimes the picture on the display would freeze, requiring a restart (see Lab Notes, this issue).

The Sigma Designs Power Portrait fared better both in the lab and in everyday use. The monitor has a flatter screen that makes it much easier on the eye. The screen phosphor was also whiter and thus more comfortable to read. You can set the screen resolution to 72 dpi, 80 dpi, or 88 dpi; the two higher resolutions let you fit more on the screen. There is no smooth mode, but the unit’s inherently smooth scrolling means none is needed. The Power Portrait also has a hardware pan/tilt feature that creates a virtual two-page display with up to 1024 by 1024 pixels of display area. The Power Portrait is the best choice of the SCSI monitors tested.

### SOME OF OUR SCROLLING TESTS TOOK TWICE AS LONG IN SMOOTH MODE AS IN NORMAL MODE

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### PERFORMANCE SUMMARY

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The PowerBook Duos introduced revolutionary docking stations, including E-Machines’ PowerLink DeskNet (top), which adds Ethernet connections; E-Machines’ PowerLink Presenter (right), which adds extensive video connections; and Apple’s MiniDock (left), which offers standard Mac connections.

RasterOps began shipping the ClearVue/SD21 monochrome 21-inch display at press time. We looked at a unit and came away believing that $1799 for a 21-inch black-and-white display is not a worthwhile investment (see Reviews, this issue).

SCSI video adapters If you want color display on your notebook and are put off by the $3500 to $5000 price tag of the active matrix color screen replacements offered by Newer Technology (316/685-4904) and Envisio (612/339-1008), you might consider an external SCSI video adapter. These adapters take a video signal from a Mac’s SCSI port and translate it into a standard video signal, which is sent to any standard monitor through a standard video port (see “Breaking the PowerBooks’ Video Barrier”). These adapters let you use existing monitors—whether at home, at your office, or at someone else’s office. Some also support VGA video ports used by DOS PCs, so you don’t need to worry if the office you’re visiting uses Macs. But like SCSI monitors, these adapters are limited by the inherent sluggishness of SCSI.

We tested the $599 Radius PowerView and the $695 Aura Systems ScuzzyView, both of which support color display, and the $599 Lapis Technologies PowerBase I, which supports only monochrome display. (The $699 PowerBase II, which supports color, was scheduled to ship by the time you read this.) The color adapters were slower than the SCSI monitors—because color takes even longer to display than black and white—and much slower than the one internal video board we evaluated. The monochrome Lapis adapter was acceptable, partly because it supports only monochrome and partly because Lapis uses blind SCSI transfer, which is faster than the standard SCSI transfer mode. (The standard SCSI mode is purposely slow, to be backwardly compatible with the Mac Plus’s slow SCSI bus. If you use the PowerBase I on a Plus, you can set the adapter to run at the slower speed.)

Coming from a company with such a good reputation for video products, the Radius PowerView was a real disappointment. It was the slowest unit overall in our tests. It supports 8-bit color or gray scale on monitors up to 16 inches, but only monochrome on 19- and 21-inch displays. Radius’s technical-support department told us that the company tested PowerView compatibility only with Radius and Apple monitors, and that it would not support the PowerView’s use with other products.

The PowerView allocates some of the Mac’s system memory—as much as 542K, depending on the screen size—for its internal use, so you won’t want to use it on a bare-bones notebook. And the unit was very sensitive to the PowerBook’s nonstandard SCSI termination, especially in a daisy-chain of additional SCSI devices. The PowerView caused errors in other SCSI devices when we did not terminate the first device in the SCSI chain (which you should do in a PowerBook). Other SCSI video adapters that weren’t terminated did not create this problem. The PowerView could not support Outbound notebooks, although other adapters could.

The Lapis PowerBase I supports monochrome output on 12- to 21-inch displays, with fair performance. The PowerBase handles SCSI termination inelegantly: to remove termination, you have to take off the PowerBase’s cover and remove terminating resistors. The termination should be external or switchable.

The Aura Systems ScuzzyView turned out to be the best video adapter of the bunch. It was faster than the others, its images had the best color fidelity, and compatibility was not a problem, even with VGA displays. (It supports monitors as large as 19 inches at 8-bit color or gray scale.) But it lacks mirroring mode, which detracts from its usefulness in demos.

All the SCSI-based video solutions share a potential problem: they may not work correctly with applications that do not follow Apple’s video standards. The Radius PowerView was the most compatible of the SCSI video products tested (see Lab Notes, this issue).

Due to the relatively poor performance of all of these units, you should pass them by in favor of an internal video board. If you decide that the advantages of a SCSI adapter—most notably, cost and the ability to be moved among Macs—warrant purchasing one, choose the ScuzzyView.

Internal video adapters The best option we found for video was the $1399 ComputerCare BookView Imperial. This board installs in the PowerBook’s RAM-expansion slot and has 6MB of RAM, which brings your PowerBook up to its...
## Notebook-Compatibility Guide

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* = yes, O = no. Technical-support ratings are based on a series of calls made by Macworld staffers posing as customers to each company to gauge the accessibility, helpfulness, and accuracy of their support technicians. Macworld uses a point system, including bonuses and demerits, to derive the final rating. Ratings are for companies, not individual products, and we call only those companies whose products Macworld Lab tests. 


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Macworld uses a 1-point system, including bonuses and demerits, to derive the final rating. Ratings are for companies, not individual products, and we call only those companies whose products Macworld Lab tests.
8MB maximum. Although the PowerBooks’ RAM sockets were not designed to handle video, crafty engineers figured out how to make it possible. The advantage is fast video transfer (unlike the SCSI-based solutions) and an inconspicuous video hookup (no external adapter boxes or cabling needed). Of all types of video options, the BookView Imperial was the fastest in our tests by a wide margin.

Because its video chips are software-programmable, Computer Care will be able to support new monitors with different resolutions simply by updating the control panel. (It now supports 16.)

We evaluated the board with a wide variety of monitors. In all cases, performance was excellent. Screen redraw speeds were virtually indistinguishable from those of a desktop computer, and the color was good, especially in graphics programs such as Adobe Photoshop. Another plus is software support for mirroring, so you can run a presentation on your notebook and have the audience see the same display on the external monitor.

As good as its performance is, there are a few problems with the BookView Imperial. At press time the board was incompatible with virtual memory and the PowerBook’s RAM disk. Computer Care promises a software fix for virtual memory, and will provide an alternative RAM-disk program. The video connector you install with the BookView board is a small, flat plug that comes out of one of the PowerBook’s hinge covers and sticks to the rear of the PowerBook with double-sided tape—hardly a confidence-inspiring setup. Computer Care said it is working on a modified hinge cover that would enclose the video connector. The actual hookup to the monitor is a flat-ribbon cable that ends in a standard 15-pin Mac female video connector, but the cable mates to the PowerBook’s video-out connector with a friction fit, which is easily dislodged. (You need an adapter to connect the BookView to a VGA monitor.) Furthermore, the BookView works better with VGA connectors than with Mac connectors on some monitors (such as those from NEC) and LCD panels (such as those from Proxima and nView). A more serious incompatibility is that the BookView Imperial can cause 120MB Quantum Go drives to behave erratically, because the BookView and Go 120 together draw too much power. The BookView is also not compatible with the popular shareware drive-formatter SCIS Director, nor, when used on an external drive, FWB’s formatter.

Still, the BookView is a decent solution for video, providing fast redraw, good color output, and broad compatibility. The board costs $1169 for the PowerBook 100 and $1399 for the other first-generation PowerBooks (including 6MB of RAM).

Another popular internal video board has been the Envisio Notebook Display Adapter (see Reviews, Macworld, September 1992). The Envisio boards range from $795 to $1595, depending on the amount of RAM included on the board. Envisio recently discontinued this product.

After our lab testing deadline, Mirror Technologies began shipping a relabeled Envisio unit under the PowerVision name (see Reviews, this issue). We strongly preferred the Mirror board because of its lower price and broader software compatibility, even though it supports fewer monitor sizes than the BookView Imperial.

Also coming soon are 16-bit video adapters for the first-generation PowerBooks from both Computer Care (the BookView Imperial 16 for $1349) and Envisio (the ColorBook 16 for $1295 to $1895, depending on how much RAM is included). These adapters are promised to support 16-bit color (32,738 colors) on monitors as large as 16 inches and 8-bit color (256 colors) on 19-inch monitors.

Staying in Touch

HANDY FOR DESKTOP MACS, MODEMS ARE practically essential for notebook use so you can stay in touch with clients or the main office. The market for internal data/fax modems is dominated by two companies: Global Village Communication, which sells the PowerPort series, and PSI Integration, with its PowerModern line. Both companies offer modems in a variety of speeds. They all work in all the

Breaking the PowerBooks’ Video Barrier

The PowerBook 100, 140, 145, and 170 lack built-in support for external monitors. To add this support, some vendors add an external SCSI adapter; others add an internal RAM adapter. In both cases, the vendors route the video image intended for external display through a nonvideo part of the PowerBook’s hardware. They also use an INIT to tell the PowerBook how to send the video image over these nontraditional video routes.

External SCSI Adapters

Most vendors supply an INIT that intercepts the QuickDraw commands that describe a video image; the INIT then sends a copy of the commands over the SCSI port to the external adapter (1). A processor on the adapter’s own logic board translates the QuickDraw commands into the video image (2) and stores the resulting screen bitmap in VRAM (3) within the adapter. The adapter then sends the image for display on the external monitor (4).

Because the Radius PowerView has no processor, it relies on the PowerBook’s processor to translate the QuickDraw commands. Because SCSI is inherently slow, SCSI video adapters are slow.

Internal RAM Adapters

Some vendors supply an INIT that intercepts the QuickDraw commands that describe a video image; the INIT then sends a copy of the commands to the adapter board (1), which plugs into the PowerBook’s RAM slot. A processor on the adapter’s own logic board translates the QuickDraw commands into the video image (2) and stores the resulting screen bitmap in VRAM (3). The adapter then sends the image over a special dealer-installed connector for display on the external monitor (4). Vendors whose adapters have no processor follow the same process but rely on the PowerBook’s processor to translate the QuickDraw commands.
first-generation PowerBooks, as well as in the 160 and 180. And all are both data modems and send/receive fax modems.

Global Village's PowerPort Bronze is a $299 2400-bps data/9600-bps fax modem; the $429 PowerPort Silver is a 9600-bps data/9600-bps fax modem; and the $499 PowerPort Gold is a blazing 14,400-bps data/9600-bps fax modem. The PowerPort line is also completely internal to the PowerBook, unlike Global Village's discontinued PowerPort V.32, which required a separate telephone interface.

PSI's PowerModem line consists of the $195 PowerModem, a 2400-bps data/9600-bps fax unit; the $295 PowerModem II, which adds V.42bis data compression and MNP Class 10 error-correction for faster throughput; the $395 PowerModem III, a 9600-bps data/9600-bps fax unit; and the $495 PowerModem IV, which transmits data at 14,400 bps and is the only PowerBook modem available that can transmit and receive at the new 14,400-bps fax speed. At press time, PSI was previewing optical character recognition (OCR) for received faxes, which would let you scan faxes into a word processor. PSI also plans to offer fax broadcast, which is a service that, with a long-distance phone company such as AT&T or MCI, lets you upload one copy of a fax, along with a distribution list, to a central fax server. The phone company's fax server then sends the fax to everyone on the list.

At press time Apple had announced but not shipped the PowerBook Express Modem, a $319 internal modem for the PowerBook 160 and 180. This will be a V.32bis, 14,400-bps data/9600-bps fax unit. A unique feature of this modem will be its reliance on the CPU for some functions, such as data compression. Applied Engineering had also announced but not shipped a modem called the DataLink PB. This 14,400-bps data/fax/voice modem fits into the first-generation PowerBooks and has a $299 optional interface for cellular phones, so you don't need a phone line.

Many companies sell external modems, with and without fax capability. If you're a notebook owner you should consider them if you need to share one modem among Macs, and if you don't mind carrying a separate unit. Examples of modems that need no AC adapter include the $745 QBlazer modem from Telebit Corporation (408/734-4333), which is tiny (a 2-inch cube), fast (runs at 9600 bps), and requires only a 9-volt battery to operate. Outbound has the $379 PocketPort Fax, an ADB-powered, 2400-bps data/9600-bps fax modem the size of a pack of playing cards. Which modem to buy depends mainly on whether you plan to use AppleTalk Remote Access to hook up to your computer or your company's network while on the road. AppleTalk Remote Access lets you access an AppleTalk network over the phone lines (see "Remote Possibilities," Macworld, January 1993). For remote access, a 9600-bps or 14,400-bps modem is a must, because, with a 2400-bps modem, the most basic remote operations—opening a Finder window, for example—aren't as fast. Another reason to get a high-speed modem is if you will often transfer data with other computers, or with online services or bulletin board systems that support high-speed data transmission. If you don't intend to use the modem much for either AppleTalk Remote Access or large-volume data transfer, but are looking mainly for a fax modem, both the PSI PowerModem and the Global Village PowerPort Bronze are excellent choices.

For those who want to be up-to-date no matter where they are, Motorola has announced the Embarc NewsStream wireless messaging system that connects to a PowerBook. The $395 device gives you access to your E-mail system, as well as to information services such as stock quotes and news for a monthly fee.

Integrating with Other Macs

Even if a NoteBook Mac is your primary computer, you may want to plug into a network or directly into another Mac to quickly exchange large numbers of files. All notebook Macs let you connect to a network via the serial port or modem, but there are other direct-connect methods.

The simplest is to plug the notebook into another Mac's SCSI port, which makes that Mac think the notebook is simply another hard drive. Unfortunately, in the first crop of Mac notebooks only the PowerBook 100 and Outbound offered this capability (through optional adapters). But the new PowerBook 160 and 180 and the Duo 210 and 230 support this feature (again, through an optional adapter).

Another handy integration technique is a docking station—a box into which you plug desktop peripherals on one side and a notebook on the other. Voilà, instant desktop Mac, with everything preconfigured and no bewildering array of cables to deal with. Unfortunately, the original Mac notebooks weren't designed with this in...
Dock, has the same RGB-video-output capability as the PowerLink Presenter and adds a thin (10Base2) or twisted-pair (10BaseT) Ethernet port to the package. You also have stereo audio in and out, ADB, external floppy drive, serial, and SCSI ports. The PowerLink DeskNet is a better choice than the Apple Duo MiniDock; for only about $100 more, the DeskNet has what the MiniDock does (except for the modem pass-through connector), plus Ethernet.

Envisio (612/339-1008) has announced the Dynamic Duo, a small docking station due in January, with 16-bit-video and stereo-sound capabilities. No price had been set at press time.

Hard Copy on the Road

IF YOU NEED TO PRINT WHILE YOU'RE traveling, you have several options. The first works if you're visiting a site that has a Mac-compatible printer. You should carry a serial cable or an AppleTalk-compatible network connector along with your PowerBook, so you can hook into the office's network and print. If there aren't any printers in sight, but you have a fax modem in your notebook, plug into a phone line and fax your pages to the office's fax machine. While the result is just 200-dpi output, it's better than no output at all.

We also looked at two portable printers, the $899 GCC Technologies WriteMove II and the $459 Eastman Kodak Diconix 180s, both of which can be battery-operated. The new WriteMove II is tiny, lightweight, easy to use, and offers high resolution (360 dpi). The Diconix is heavier and has coarser resolution (192 dpi). Both print at about a half page per minute and require that each sheet be hand-fed. And both come with Adobe Type Manager and a selection of fonts.

The 2½-pound WriteMove II is a winner. The printer uses thermal-ribbon technology to produce crisp, dark black with its single-strike ribbon. The drawback of this ribbon is that it is only good for about 20 pages, then you must replace it. For longer ribbon life, but lesser quality, use the multistrike ribbon, which prints up to 100 pages before it is exhausted.

The Diconix 180s inkjet-printer is larger and heavier than the WriteMove II. Its print quality is inferior to that of the WriteMove II's single-strike ribbon and roughly equivalent to that of the multistrike ribbon.

Should you get one of these printers? Not unless you must always have a printer on the road. If so, get the WriteMove II. Otherwise, get an inexpensive StyleWriter for your home office if you're short on cash, or an inexpensive laser printer if you have a bit more money (see "Personal Printers," Macworld, September 1992).

Customize Your Office

THE CORNUCOPIA OF PORTABLE PERIPHERALS gives you wide latitude in building a portable office. Whether you need large amounts of storage, fast communications, flexible display options—or all three—you can tune your system so that the tools you need most while on the road are at your fingertips. And you can easily reconfigure or grow your portable office by upgrading or replacing components as needed. The portable Mac office is now a reality—take advantage of it.

TOM NEGRINO is a Macworld contributing editor.
hello mr. modem...
CD ROMs and online services bring a wealth of stock images to your Mac

Need a soothing image of a sunset? A still from Casablanca? A news photo from the 1992 presidential election? If so, chances are you can find it using your Macintosh to search through a growing number of CD ROM and electronic-bulletin-board photography collections.

Stock photo agencies—which sell publication rights to the thousands of pictures in their catalogs—have been supplying prints and transparencies to graphic designers and picture editors for decades. In 1993, digital photo libraries based on those stock agency collections are poised to take off. Major stock photo agencies such as AllStock, FPG International, and The Stock Market have recently released CD ROM catalogs; and new dial-up services from Eastman Kodak and Picture Network International, a consortium of stock photo agencies, are expected to be available later in 1993.

But the emergence of digital photo collections poses many questions. How do the cost and procedure of using a photo from a CD ROM or bulletin board compare with the traditional methods of dealing with a stock photo house? What kinds of images are available? What rights do you get—and not get—with a digital photo? What software do you need for maneuvering through image libraries? And perhaps most important, how do you determine if the image quality offered by a particular CD ROM or online service meets your needs?

How It Works

Typically, when you buy a stock photo, you phone in a research request to an agency that represents large numbers of photographers. The agency researcher then sends you, by messenger or overnight mail, a variety of prints and transparencies that fit your photo request. You pay a research fee—typically $50 to $75—and negotiate a usage rate for the images ultimately selected for publication.

The usage rate is determined by the size of the photo as it appears in your publication, as well as by the nature and distribution of the publication (nonprofit newsletter, national magazine, and so on).

by Ronnie Shushan
During the selection process, you’re liable for a $1500 fee if you lose or damage any piece of original art that the agency sends you for consideration.

Digital photo catalogs are helping to streamline the process of using stock photos. You can browse through image thumbnails in a CD ROM or bulletin board, much as you would flip through a printed catalog. But with these digital picture libraries, you can also zero in on the types of images you want through an electronic search—grouping all the thumbnails of horizontal landscapes or couples on a beach, for example. Having the images in digital form makes it easy to see how they’ll look in your electronic layout, and the process greatly reduces the amount of original art that’s sent through the mail.

Who's It For?

DIGITAL PHOTO COLLECTIONS ARE TARGETED AT TWO TYPES OF BUYERS. FOR THE GROWING COMMUNICATIONS MARKET—THE BUSINESSES AND NONPROFIT ORGANIZATIONS THAT DESKTOP COMPUTERS HAVE TURNED INTO PUBLISHERS—DIGITAL-IMAGE COLLECTIONS PROVIDE A SOURCE OF PREVIOUSLY UNAFFORDABLE PHOTOS.

These digital photos can cost as little as 50 cents each, but like clip art, they don’t generally measure up to the quality of stock photo originals, which cost from $50 to thousands of dollars per image. That’s because, in many cases, what you’re getting from a CD ROM is a scanned image with only 72-dots-per-inch resolution, which can’t compare in quality to an original, continuous-tone photograph or transparency. But for many publishers on a tight budget, low-resolution photos selected from a digital image collection can add life and color to a publication, at the right price.

For the higher-level media market—the designers and publishers of books, magazines, newspapers, advertisements, and slick corporate promotions—access to digital image catalogs is likely to change the way in which photo buyers preview and select images from stock agencies.

With some CD ROMs and online bulletin boards, you choose the image you want from among the low-resolution scans, then contact the stock agency to obtain a high-resolution scan of that image or, most likely, an original print or transparency for reproduction purposes.

Images on CD ROM

CD ROMS, WITH THEIR CAPACITY TO STORE LARGE AMOUNTS OF DATA (JUST OVER 600MB), ARE BECOMING A POPULAR WAY TO DISTRIBUTE DIGITAL PHOTO CATALOGS. IT'S IMPORTANT TO REMEMBER, HOWEVER, THAT A STOCK PHOTO HOUSE'S PRIMARY BUSINESS IS SELLING PHOTO RIGHTS, NOT CD ROMS. AS A RESULT, MANY CD ROM PHOTO PRODUCTS SERVE AS A GUIDE TO THE IMAGES AVAILABLE THROUGH A STOCK AGENCY, RATHER THAN AS AN ACTUAL PHOTO DATABASE.

For example, the images offered on three new high-profile CD ROM products—the CD-Stock series, The Westlight Sampler 1, and The Image Bank Catalog 12 (due for release in January)—are all 24-bit color files with resolutions of 72 dpi. The low resolution means these images are best used for screen display or for the presentation layouts that designers call comps, but not for most reproduction purposes (see “Digital Photo Sources!” for a sampling of the stock photo CD ROMs and online services available). You can easily select an image you need and test it in an electronic layout, but you must request original art from the photo agency for reproduction-quality photos and negotiate a usage fee.

CD ROM photo catalogs offer a variety of images, packages and prices, file formats, and usage rights.

The CD-Stock set of four discs is a cooperative venture between 3M, Mirror Technologies, and four of the top stock photo houses—AllStock, FPG International, The Stock Market, and Tony Stone Worldwide. Priced to appeal to the many designers who don’t yet own CD ROM drives, the $995 introductory package includes Mirror’s CD ROM drive, 3M’s CD-Stock image-management software, and four discs with a total of 20,000 photos.

The discs provide a wide variety of images, typical of the diverse collections of those agencies. Nonetheless, each of the four collections shows only a fraction of the agency’s photos; some agencies have up to 600,000 images in their collections, while others offer several million photos.
D’Pix
D’Pix Folio 1 Print Pro’s backgrounds and textures add an inexpensive but striking design element to a page.

Comstock, one of the largest commercial stock photo agencies and the first to release a photo CD ROM, last fall released the first of five volumes in Comstock’s Encyclopedia of Desktop Photography. Unlike the CD-Stock, Westlight, and Image Bank CD ROMs, the Comstock discs include the right to use the 72-dpi images for noncommercial, in-house use, such as a company newsletter or a teaching aid, as well as for comps.

WestStock provides the images for PhotoDisc’s series of five CD ROMs. Although the images can’t be used in a product for sale (whether editorial, such as a book or magazine, or commercial, such as a greeting card or T-shirt), they can be placed in advertisements, presentations, business, and broadcasts.

Discs with less-restricted use tend to have fewer images and a tightly focused selection. For example, Gazelle Technologies’ Swimsuit CD offers nothing but pictures of women in bathing attire. But before you snicker, consider the nonprofit publisher who uses this $199 CD ROM as an inexpensive source for head shots to illustrate women’s health stories.

**Bulletin Boards**

BLAZING THE TRAIL FOR ONLINE SERVICES is PressLink (a Knight-Ridder subsidiary), a dial-up network of electronic bulletin boards that offers text, graphics, and photos from more than two dozen news organizations and a few photo agencies.

**NEWS**

By dialing up PressLink, you can download the latest news photos, from Madonna’s decolletage (Reuters) to Bill Clinton’s victory speech (KRT).

**Image Quality**

With the exception of CD ROM photo catalogs—whose images are intended for layout position only rather than for reproduction—almost every CD ROM collection of digital photos is promoted as having high-resolution scans. But if you compare file sizes, you’ll realize that’s not the case.

A truly high-resolution digital photo, one that you’d find in *Sports Illustrated*, for example, can be anywhere from 12 MB (for a 4-by-5-inch image) to 70 MB (for a two-page-spread photo). The CD ROM photo collections currently on the market have files ranging in size from 500K to 22 MB.

To determine if the vendor’s definition of high resolution is sufficient for your purposes, you need to know the resolution of the scans on the CD ROM and the line screen to be used in printing your publication.

Image resolution, the amount of information in a digital file, is measured in dots per inch. Screen frequency, the density of the lines of dots used to print a continuous-tone photograph, is measured in lines per inch. Newspapers typically use a coarse line screen of 85 lpi; in-house publications, 100 to 120 lpi; and glossy magazines, 133 to 155 lpi.

In general, optimal image resolution is twice the line screen: optimal dpi = 2 X lpi. But size is an important factor, too. When you reduce an image, you increase the effective resolution; when you enlarge the image, you decrease the resolution. So if you’re resizing the original scan for use in your publication, the formula to use is dpi = 2 X lpi X percent of original size.

Consider a CD ROM image that’s 300 dpi and 5 by 7 inches. You plan to print it at 65 percent of the original size, using a line screen of 133 lpi. In this case, the optimal resolution is 173 dpi (2 X 133 X 0.65), and the 300-dpi original provides more resolution than you need to successfully print the image.

If the CD ROM image is only 72 dpi, however, you don’t have enough information in the file for good reproduction (remember that the optimal resolution is 173 dpi). The printed image is likely to lose detail, with some jagged edges where there should be smooth curves, or to appear posterized, with rough gradations in tone and unacceptable levels of contrast. (For more information on halftones see “Halftones Demystified,” in this issue.)
PressLink’s primary market is small-to-medium-circulation newspapers, which use the service to access photos from a Mac or PC rather than installing a satellite dish. You don’t have to be a newspaper to subscribe, however. And while PressLink charges monthly, online, and data-transmitting costs, most news and stock photo agencies that offer images through PressLink offer the choice of a monthly fee with unlimited use or a fee-per-download pricing structure. This second option makes the service affordable to organizations with less-demanding photo needs than newspapers have.

As of this writing, PressLink offers roughly 30,000 photos online, which are accessed through an easy-to-use, menu-driven interface. Among its suppliers are such news agencies as Reuters, Knight-Ridder, and Agence France-Presse; AllSport, a stock agency specializing in sports photography; The Bettmann Archives, the agency many turn to for historical and background pictures; and even the United States Army, which offers, at no cost for editorial use, pictures of generals, new weapons, and assorted military activities.

PressLink’s scans are JPEG-compressed and optimized for a newspaper halftone screen of 85 lines per inch. But their large image size (12 by 18 inches is not uncommon) enables anyone who publishes pictures at smaller sizes to increase the resolution for finer line screens (see “Image Quality”).

**A DIGITAL PHOTO GALLERY (continued)**

**HISTORY**

The Bettman Archives

Bettman has a wealth of historical photos, including Churchill during World War II and San Francisco after the 1906 earthquake.

**PEOPLE**

Gazelle Technologies

The Swimsuit CD specializes in beautiful women. Gazelle offers other specialty people discs, including People at Leisure and People in Business.

**DIGITAL PHOTO SOURCES**

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**ONLINE SERVICES**

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*For position only. †Price includes a CD ROM drive from Mirror, CD-Stock software from 3M, and four discs. The reproduction, request original art or high-res scan and negotiate the reproduction fee as usual.
SPORTS/ATHLETICS

AllSport

Images of athletes, such as these from the AllSport PressLink bulletin board, are often used for business publications to convey competitiveness.

BUSINESS/INDUSTRY

FPG International/PhotoDisc

Traffic jams are a popular way to illustrate stagnation—bottlenecks and logjams—in business situations (FPG), while an airplane in flight suggests upward motion (PhotoDisc).

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four discs without the CD-ROM drive cost $650. 1 Each of the four discs in this package contains 5000 images. 2 Other charges apply as well. 3 For commercial
A DIGITAL PHOTO GALLERY (continued)

NATURE/ANIMALS

AIRStock
The animal kingdom is a popular subject for stock photography. Among discs with digital nature images are AIRStock and Cantrell's Photos on Disc series.

Meanwhile, Comstock is now offering some 12,000 images online, in addition to its CD-ROM series. The images—24-bit TIFFs at 72 dpi—are intended for layouts, presentations, and noncommercial in-house use. For commercial reproduction, you must request the original transparency (or a high-res scan, which the agency sends on a SyQuest cartridge) and negotiate the reproduction fee as usual.

Most of Comstock's compressed images are 40K to 60K and take 4 to 7 minutes to download at 9600 bps. The images have been compressed using Kodak's ColorSqueeze utility; when you double-click on a file icon, the image decompresses to around 350K. You can save the file in TIFF or PICT format.

Image Management

WITH THE PROLIFERATION OF DIGITAL photo collections, image management becomes a critical issue. You need to be able to view thumbnails, create your own minicatalogs, conduct sophisticated keyword searches that quickly locate suitable images, and index images according to your own criteria.

LightBox, the software used by 21st Century Media for its PhotoDisc CD-ROM series, is a full-featured application, enabling you to view thumbnails (and to customize the thumbnail layout), search for images by keywords (and use Boolean descriptors such as AND, OR, and BUT NOT), edit the keyword list for any image, and paste images from one PhotoDisc catalog into another.

You can mark thumbnails, view and print only the marked files, and save the marked files to your hard drive as a mini-catalog—a useful feature when you need to review preliminary photo selections with colleagues. You can also sort images by photographer, file name, catalog ID number, and so on.

At press time, several image-management products had been announced but were not available for review, among them were Aldus's Fetch, Nikon's ImageAccess, Kodak's Shoebox, and 3M's CD-Stock. All of these products were scheduled to ship before the end of 1992.

The ultimate success of CD ROM catalogs as a design tool may well depend on how easily designers can create their own custom catalogs of images from a variety of vendors. Aldus hopes its Fetch application, with the ability to catalog files in almost all standard Mac formats, will become the standard image-management program, creating a need for other image-management programs to be compatible with Fetch. But whether you'll be able to move images and the information attached to them (photo credits, keyword lists, and so on) from one management program to another remains to be seen.

In general, the less-expensive discs with fewer restrictions on usage (such as those produced by Gazelle Technologies) provide a HyperCard browser for viewing PressLink Access, the software used to view the images, assembles all the thumbnails in a given folder into the equivalent of an on-screen contact sheet. When you decide which images you want to use, you download the full-resolution files of those images using PressLink 2000, a communications and file-transfer utility; downloading takes 4 to 12 minutes at 9600 bps.

You can print a 72-dpi CD ROM stock photo (top), but scanning a transparency at high resolution (254 dpi, below) provides a better image. CD ROM image and transparency are from PFG international.

SCIENCE/MEDICINE

PhotoDisc
An image of surgeons at work can be used to convey precision and skill, while this microscopic enlargement of a sugar crystal could work as an abstract texture.
thumbails. The search function is limited to one or two descriptive words, the indexing provided by the publishers is rarely adequate, and you can't edit the keyword list. You can mark the files, but you can't save the markings when you close the file, even if you save the file to a hard drive. You can get by with this sort of casual browsing if you use an occasional photo from one or two discs, but it's totally inadequate for managing large numbers of images in a production environment.

Legal Issues

USAGE RIGHTS FOR DIGITAL PHOTOS vary tremendously, so it's important to read all licensing agreements closely.

For example, PhotoDisc advertises "unlimited use for print, presentations, brochures, newsletters, and ads," but the actual license agreement adds "as long as the images are not used to create a product for sale." So if your newsletter goes free to an alumni group, that's OK, but if you sell a newsletter by subscription, it's not.

Some vendors allow "noncommercial" use, but the definition of noncommercial can be confusing. Comstock considers photos that illustrate an in-house training manual to be a noncommercial use, but photos used by a consultant hired to do an in-house training manual for a corporation are considered commercial use. The difference is that in the latter scenario, the consultant is using the photos to sell a service, thereby constituting commercial use.

Not understanding the copyright regulations that protect an image can get you into trouble, too. For instance, many consumers think it's okay to use an image if they alter it sufficiently. That's not the case, though—if any image, or part of an image, is recognizable as being derived from another image, you need permission from the copyright holder. In addition, some licensing agreements specifically prohibit image manipulation.

It's best to play it safe. If the usage you need falls outside the restrictions in the licensing agreement, you must negotiate a usage fee with the vendor, just as you would if you were buying a traditional stock photo. And if you're uncertain about what is or is not protected by copyright, don't assume—ask.

The Future of Digital Photos

WHILE THERE'S BEEN A GREAT DEAL OF progress in the digital photo market recently, the best is yet to come.

CD ROM photo collections should continue to gain in popularity, as CD ROM drives become more prevalent, thanks to the anticipated acceptance of Kodak's Photo CD format. But accessing images with a modem is, in many ways, going to be more promising than owning a collection of discs.

Kodak has announced Picture Exchange, a network on which a keyword search will enable you to preview low-resolution images from a variety of agencies. Picture Exchange—currently set to debut by mid-1993—will forward the user's selection to the respective agency, which will then negotiate usage fees and provide prints, transparencies, or in some cases, high-resolution scans.

Another group, Picture Network International (PNI), plans to make available both preview and reproduction-quality images on its photo network, set to go online in late 1993. AllStock, Black Star, Contact Press Images, Stock Boston, and Woodfin Camp are expected to contribute photos to the 250,000-image database.

License arrangements for print use will be handled by the individual agencies, while rights for electronic media use will be negotiated directly by PNI on a uniform rate basis, thus simplifying the procurement of rights by multimedia publishers who need large numbers of images.

By the mid-1990s, fiber-optic phone lines—capable of transmitting huge amounts of data quickly—are expected to be much more widely available, giving users the ability to connect to enormous image databases.

With all this activity, the problem with digital photo libraries may soon be one of too many choices. As problems go, though, that's a nice one to have. m

RONNIE SHUSHAN is a partner in Broadview Media, an editorial and graphic design firm in Woodstock, New York, and coauthor of Desktop Publishing By Design (Microsoft Press, 1989).
Security problems have become almost as commonplace as desktop computers. A disgruntled city employee, trying to get back at the boss, digs into the mayor's personal files and sends damaging information to the press. A woman asks her computer-expert husband to recover an accidentally deleted budget file; he recovers not only that file, but purposely deleted letters to an illicit lover. Or a major corporation loses critical financial data to an industrial spy who dialed in to a company file server.

Most of us have some computer-security vulnerability. Fortunately, software solutions can address mild concern through outright paranoia. Some security products will keep your kid brother from reading your files. Others will prevent a Mac guru from reading your files. Still others will bar the best Macintosh programmers in the industry from reading your files. Finally, some software will probably keep the spy agencies of large nations or the industrial spies of multinational corporations from reading your files.

How strong are the software locks on 24 security products?

BY BRUCE SCHNEIER
I was able to break all but the strongest encryption programs

Security software is based on the concept of a key—usually a series of keyboard characters used by programs to decide whether to grant access to a computer, folder, or file. Without the correct key, you're locked out. Unfortunately, in most cases anyone sufficiently determined and skilled can find the key.

I tried to break 24 security programs by examining their code for weaknesses. I tried getting around their security measures by using disk utilities, file editors (such as ResEdit), and a debugging tool (such as MacsBug). In extreme cases I disassembled the code. I was able to break all but the strongest encryption programs—usually with ease (see "Breaking the Code").

By the way, I have no intention of providing a cookbook for any of my cracking methods or making my programs public. I have no intention of providing a cookbook for any of my cracking methods or making my programs public. They are not available on any bulletin board; I won't send you a copy. I hope software vendors whose programs I cracked will take it as a challenge to write better security software.

Access Control

Almost all security programs control access to a hard drive. Many, such as Magna's Empower series, usrEZ Software's ultraSecure, Casady & Greene's A.M.E., ASD Software's FileGuard, and Kent Marsh's NightWatch II can partition a hard drive and grant individual passwords to several users. That feature is also part of some hard drive utility packages, including Symanite's Norton Utilities for Macintosh, Casa Blanca Works' Drive?, La Cie's Silverlining, FWB's Hard Disk ToolKit, and AISoft's Power Utilities.

Kent Marsh's NightWatch II, ultraSecure, and A.M.E. offer the option of a key disk. This is a special floppy disk that a user must insert (in addition to typing a password) to access the hard drive. ASD Software's FileGuard has a similar option: it works with ASD's $349 MacAccessCard magnetic card reader.

Many security programs have an optional screen-locking feature that protects the computer even after it has been turned on. The screen lock can be set to engage after you move the mouse to a particular location, when you hit a hot key, or after a specified period of inactivity. Someone walking up to a machine with a locked screen can't use it without the password. All such programs except CPU, from Connectix, and FileGuard support background tasks, such as printing and network access, while the screen is locked.

Another critical feature is the audit log, as kept by Kensington MicroWare's PassPro, FileGuard, Datawatch's Citadel with Shredder, NightWatch II, FolderBolt (also from Kent Marsh), Empower, Praxitel's Passport, ultraSecure, Fifth Generation Systems' DiskLock, and A.M.E. This log records all attempts to access the sys-

How Files Are Encrypted

**Proprietary Encryption**

Proprietary encryption programs generate a key by using the binary bits of a password typed by the user. The key is then added to a text block—a small part of the data file—to create an encrypted block; when combined, those blocks become an encrypted text file. The relatively simple mathematical encryption formula offers less security than DES encryption does.

**DES Encryption**

DES encryption generates a key in the manner of proprietary programs. But with DES, the bits within the key and text blocks are then mixed and shuffled 16 times, using a complex algorithm. Encrypted blocks are then recombined to create an encrypted file that for nearly all practical purposes cannot be broken.
Network Security

If security on a stand-alone Macintosh has you tossing and turning at night, think of security on networked Macs as a nightmare. AppleTalk was designed for ease of use, not security.

People who use file sharing without thinking leave their files easily vulnerable. You have to be selective about what files you open and to whom.

The Mac system doesn't inform users when someone else is accessing their files, but users can find out by using Nok Nok, a $49.95 program by Tril (800/766-0356). Nok Nok notifies users when someone initiates a remote connection, keeps a log of the activity, and can disconnect outside users after a specified period.

AppleShare 3.0 supports some password security, but there are many ways to get around it. Anonymous (guest) log-ons, automatic log-ons, and alias files can all be used to gain unauthorized access to a file server.

Guest log-ons allow people without passwords to access parts of a file server; the process works fine only if the system administrator carefully restricts such privileges to selected files or folders. Similarly, in a system that uses automatic log-ons and alias files without a secure access configuration, anyone can automatically log on to the server. Or if someone leaves a Mac unattended after logging on (without a screen-locking security program), anyone can access the server.

Another problem involves network traffic interceptions. AppleTalk does not encrypt data passing across the network. Packet sniffers—hardware and software packages that read data as it travels across the network—can view all traffic, no matter whom messages are addressed to. No existing product encrypts data as it travels across the network (be it AppleTalk, Ethernet, FDDI, or any other).

Routers are a way to improve security by segmenting sections of the network. Unfortunately, many of them can be reconfigured over the network. They are password protected, but often not very well. A snoop can reconfigure a router to collect all kinds of interesting information for a packet sniffer on the other end. Even worse, someone can buy a new router and stick it on the network.

A network administrator at the University of Illinois says that every so often new routers appear on the network. He watches for the problem, but people who don't are vulnerable.

A network may not be safe from off-site intruders. Most AppleTalk networks are wide open to remote users. Some routers offer zone or resource-hiding features; selected printers, file servers, or even entire parts of the network can be hidden from remote users.

Tracking Users

ALL OF THE PROGRAMS THAT OFFER AN audit log, except Citadel with Shredder, and FileGuard, protect that log with a password to prevent an intruder from modifying it. NightWatch and PassProof go so far as to encrypt the audit log. DiskLock automatically alerts legitimate users of unauthorized attempts to access the system. All of the programs that support the log, except ultraSecure and Passport, let you print the audit log; all except Citadel with Shredder, and Passport let you export the audit log to a word processing program.

Even after you type in your password, one program keeps on working. FileGuard, Empower II, ultraSecure, and A.M.E. allow customized access. Some users may be able to read and copy data files, but not delete or modify them. Others may read, modify, or copy files, but may not delete applications. This can be a boon in schools whose labs are used by different classes throughout the day.

Empower II also allows custom limits on the use of applications, Apple menu items, and control-panel items. Empower II and ultraSecure optionally allow guest users, who can log on to the machine and use unprotected programs and data.

Empower Remote (which has all the features of Empower II) enables you to manage all of this remotely over a network.

One security administrator can manage an entire network of Empower-protected Macs from one workstation. ultraSecure has everything from a simple screen locker to a complex, multilevel security program. The system administrator can configure the security at the desired level.

FileGuard and ultraSecure can modify applications so only password-holders can launch them. If you fear software pirating, FileGuard can also modify applications that are removed from the hard drive with a “suicide pill,” which disables the removed application either immediately or after a specified period of use.

Empower, ultraSecure, and Citadel with Shredder can disable the floppy drive after start-up; this can prevent both unauthorized copying of software and the introduction of computer viruses. ultraSecure works with System 7 aliases; it can even allow access to an alias while denying access to the underlying program. This prevents unauthorized deletion or pirating. You can hide applications in a protected folder, and aliases still work transparently—even across the network.

Kent Marsh products take a modular approach to security. Each individual product provides a portion of the comprehensive security you get with a single package from some other vendors. NightWatch protects access to a hard drive, FolderBolt protects the desktop, and Kent Marsh's MacSafe II encrypts files. You only have to
buy the security you need, but if you need all the features, everything works together and works well. Kent Marsh sells the three products together as its Executive Security Kit, for $269.

It's also worth considering the relative convenience of password procedures. FileGuard, Empower, and ultraSecure work in the background—just enter your password once when you log on and that's it. DiskLock separates the access control and the encryption functions, requiring a password at log-on and again to encrypt or decrypt. A.M.E.'s convoluted interface requires the password at various points.

The Encryption Edge

IF YOU'RE WORRIED ABOUT SOPHISTICATED hackers or major intelligence agencies, encryption functions, requiring a password at log-on and again to encrypt or decrypt. But it can be slow—up to an hour for a 1MB file, depending on the speed of your Mac and the product used. Because encryption changes a file's bits, an error in encryption or decryption could effectively destroy a file. And if you lose the key, you're out of luck. Symantec recently received a call from a police department, which lost its encryption key for the Norton Utilities DES module and couldn't recover the data. There was nothing Symantec could do to help. Always back up data—including encrypted data and keys.

The security of any encryption program depends on the strength of its encryption algorithm. Cryptographers spend years coming up with algorithms, only to have them broken by colleagues. Algorithms that seem foolproof can have hidden mathematical tricks that reveal fatal flaws. Governments have buildings full of people with more degrees than a thermometer working to develop encryption algorithms. Don't expect the same effort from a software vendor.

When a security program claims to have a proprietary encryption algorithm, you should immediately be suspicious. Proprietary algorithms are generally designed to be fast and the product, not secure. Nearly all such algorithms—including those offered by DiskLock, Norton Utilities, A.M.E., MacSafe II, and Empower (which also offer DES options); those in Hard Disk Toolkit and FileGuard (which do not offer DES options); as well as the built-in algorithms in WordPerfect, Microsoft Excel, and Informix's Wingz—are mathematically similar to one the Union Army broke during the American Civil War. It was secure then, but today a cryptographer with a computer can break it in five minutes. MacSafe II's alternate proprietary algorithm, LightningCrypt, varies significantly from that archaic approach—and it's only slightly more secure. The proprietary-algorithm options in usrEZ's ultraSecure and Camouflage are better, but not as strong as DES.

While programs with proprietary encryption algorithms may discourage unsophisticated but nosy coworkers, I don't recommend using such products. Password-protection programs will keep out all but experienced Macintosh programmers. Anyone skilled enough to break the best password-protection scheme will also be able to break a proprietary-encryption algorithm.

Two companies already sell products that break passwords for Excel, Wingz, and WordPerfect. AccessData (800/658-5199) offers Wpass for WordPerfect, and Xlpass for Excel, $185 each; NewVision (405/523-1639) has MasterKey ($165) for Excel, WordPerfect, and Wingz.

Too many encryption programs leave the key under the mat

Audit Log  ultraSecure allows you to keep an audit log of specific user activities. This lets you keep track of which users log onto the computer, and what applications and documents they use.

Password Help  Empower can be configured to prevent users from choosing simple passwords. Here, passwords must be at least eight characters long and must include at least one nonalphanumeric character.

ACCESS-PROTECTION PROGRAMS

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<tr>
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<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
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<tr>
<td>Provides screen locking</td>
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<td>☐</td>
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<tr>
<td>Allows background tasks with screen locked</td>
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</tr>
<tr>
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<td>NA/NA</td>
<td>NA/NA</td>
<td>☐/☐</td>
</tr>
</tbody>
</table>

* = yes; ☐ = no; NA = not applicable. * Allows one password per partition.
Breaking the Code

Every password-protection program for the Macintosh can be broken. The easier ones, like Passport and CPU, can be bypassed simply by booting from a floppy disk. (If the program says it prevents this, hold down option-shift-control-delete when booting—that has always worked in the programs I've tried it on.) Some programs, like Trend Micro Devices' SafeLock, lock the hard drive and make files invisible. Almost any hard drive utility can undo this. FolderBolt and NightWatch II move files to a location that only the security program can detect—effectively tricking the Finder into thinking the file doesn't exist. But Norton Utilities can diagnose and circumvent that scheme. ultraSecure and Empower also use similar—though more elaborate—ways to trick the Finder, but an experienced programmer with a sector editor, such as those provided by Norton Utilities for Macintosh, MicroCom's 911, and MacTools by Central Point, can reset the correct file tree.

Most security products, such as FileGuard, Disklock, Empower, A.M.E., ultraSecure, and NightWatch II, modify the SCSI driver so that it won't work without the correct password. Updating the SCSI driver bypasses that.

More-reliable encryption programs use the DES algorithm—developed, in part, by NSA—which has withstood attacks by some of the world's best cryptographers for more than ten years.

While all DES programs are secure enough for everything but the most-demanding security needs, there is a catch. For the most dependable results, DES should be used in its most secure mode. Only Citadel with Shredder, and MacSafe II offer that mode; the other DES products—Empower, Norton Utilities for Macintosh, ultraSecure, and Camouflage—use another DES mode that is easier to implement.

Homemade DES variants offer less security than DES. DES is a very fragile algorithm; minute changes can significantly reduce its reliability. In addition to DES, Citadel offers 1/2-DES and 1/4-DES—faster, but less-secure adaptations of DES. ultraSecure and Camouflage, both from usxEZ Software, offer a double-DES option, where a file is encrypted twice with two different keys. This has been mathematically proven to be no more secure than any of the standard DES modes, but encryption takes twice as long.

While the faster variants are secure from everyone except the most sophisticated adversaries, I don't recommend using any of them. Any encryption takes time, so you might as well get the security for your investment.

Key Management

IF USING DES WERE ENOUGH, THERE would be a multitude of good security packages available. However, I can read files that have been DES-encrypted with Empower (Auto Key option only) and DiskLock. (I could do likewise with A.M.E. version 2.1, though version 3.00 shipped too late to test in this way.) I don't break DES; I look for the key. Consider the lock on your front door. It can be unpickable and unbreakable, but anyone can open it if...
ENCRYPTION PLUS ACCESS-PROTECTION PROGRAMS

<table>
<thead>
<tr>
<th>General</th>
<th>A.M.E. 2.1</th>
<th>Citadel with Shredder 1.10</th>
<th>DiskLock 2.12</th>
<th>Empower I 4.08</th>
<th>FileGuard 2.79</th>
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<th>Norton Utilities for Macintosh 2.00</th>
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<tr>
<td>Company</td>
<td>Cassidy &amp; Greene</td>
<td>DataWatch</td>
<td>Fifth Generation Systems</td>
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<td>Telephone</td>
<td>408/484-9228</td>
<td>919/490-1277</td>
<td>504/291-7231; 800/873-4384</td>
<td>408/282-0900</td>
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- = yes; O = no; NA = not applicable. 1 Empower II ($296) adds complete file-access control and auto-encryption. Empower Remote ($396) adds those features plus remote-access abilities. 2 Version 2.0 was cracked; version 2.1 arrived too late for testing. 3 Company offers magnetic card reader at extra cost. * Allows one password per partition.
implement DES according to one of the federally approved modes. Although all ancillary features—such as screen, folder, and disk locks—can readily be broken, any encrypted files are safe from prying eyes.

File Erasure

WHEN YOU DELETE A FILE, THE MAC deletes only the file name from the directory; many Mac utilities can recover the deleted file. To erase a file so this software cannot read it, you have to overwrite all the bits on the disk that contained that file. The Department of Defense (DOD) recommends overwriting a deleted file three times. File-reconstruction experiments conducted by the National Institute of Standards and Technology with electron-tunneling microscopes suggest that even three times might not be enough.

Most of the programs that advertise file erase follow the DOD's triple-overwrite guidelines. Look for a program—such as ultraSecure, Citadel with Shredder, and Norton Utilities for Macintosh—that overwrites files, entire disks, and that can overwrite all of the free space on a disk. Two specialized products, Viper ($49.95) from Systematic Computer Services (513/275-9476) and Trash Guard ($79), from ASD (714/624-2594), also offer triple-overwrite erasure.

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The Best Data Guardians

IF YOU’RE INTERESTED ONLY IN PASSWORD protection, there are a number of good programs you should consider. Both PassProof and NightWatch II provide multiuser hard drive and screen locking, and keep an audit log of log-on attempts. PassProof also comes with hardware locks and is half the price, making it a much better value.

ultraSecure and Citadel with Shredder take top honors. ultraSecure does almost everything I can think of, offers an easy-to-use interface, never crashed on me, was the only automatic-encryption program I couldn’t break—and it was also the fastest DES product. At a reasonable $149.95, Citadel with Shredder is also a standout program, but for different reasons. It does not have file-access controls, but does have easy-to-use manual-key encryption—the most secure option available—and the best file-erase features on the market. Disk-Lock, FileGuard, and Empower II are also strong programs, but lack ultraSecure’s file-erase mode and offer fewer options for file, folder, and drive protection. If you want to secure a number of machines on a network, though, Empower Remote is hard to beat.

To secure your files against the most sophisticated intruder, choose a key yourself and use a manual-encryption product, copy the file to a clean disk, and burn the old disk with the unencrypted file on it. Or lock the data in a safe; that’s the way they do things in the government.

BRUCE SCHNEIER, an independent computer-security consultant in Oak Park, Illinois, has worked in security for both public and private concerns. His book, Cryptography in C, will be published by John Wiley & Sons in the summer of 1993.

MW EDITORS’ CHOICE

Economy Program

PassProof This program gives you a lot for your money—multiuser password protection, a screen locker, and an audit log of users. It also comes with locks for the floppy drive and serial port. Company: Kensington Microwave.

List price: $64.95.

Full-Featured Programs

ultraSecure This fast program smoothly integrates access control, file encryption, audit trail, file erasure, and screen locking into a single package. Company: usrEZ Software.

List price: $239.

Citadel with Shredder This is the cheapest way to get secure encryption and file erase. Company: Datawatch Corporation.

List price: $149.95.
by Charles Seiter

24-bit

Macworld Lab tests 18 graphics boards that deliver photo-realistic color—and sometimes more

You almost want to touch the image on your screen, thanks to the incredible realism provided by 24-bit-color video-display boards. A must for color publishers and artists, 24-bit video-display boards also appeal to the larger set of users who simply want the best display they can get.

Most 24-bit video-display boards are accelerated through special on-board chips that speed up common video-display tasks, but not all 24-bit video-display boards come with acceleration. So when do you want video acceleration? If you're using 24-bit color a lot, particularly with a large monitor, in programs like Adobe Photoshop and QuarkXPress, you definitely need all the hardware help you can get.

If your main consideration is scroll speed and drawing response when working with 24-bit color images in a paint program, you can find an accelerated video-display board for about $1000 (or much less, at street prices). For most basic graphics uses, this gives you more speed for the money than a CPU accelerator; most CPU accelerators that will double your speed on scrolling cost more than an accelerated video-display board. All you have to check is that the board supports the resolution you need for your monitor size (see "Comparing 24-Bit Video-Display Boards").

That's what Macworld Lab concluded when it evaluated 24-bit video-display boards designed to work with an array of standard Mac monitors—from vendors like Apple, E-Machines, NEC Technologies, Radius, Sony, and SuperMac Technology, as well as from many companies better known for their DOS VGA monitors. (For an evaluation of large color monitors, see "The Bigger Picture," Macworld, September 1992.)

Why doesn't the Mac's built-in video processing work fast enough for 24-bit images in the first place? The Mac's hard-
24-bit video-display boards are accelerated. The most common method is QuickDraw acceleration, which generally makes common applications run three to ten times as fast.

The principle is simple: QuickDraw commands normally handled by the Mac's logic board are intercepted by the video-display board. A special-purpose hardware decoder executes the commands faster than the Mac's CPU can. QuickDraw commands, which take only a few bytes each, are the Mac's native language for describing display operations (like filling a rectangle with color); these commands must be translated to the pattern of bits that makes up the image on screen. (These patterns can take hundreds or thousands of bytes.) The video-display board uses accelerated hardware and removes the translation burden from the Mac's CPU to bring about the speedup.

Today's accelerated video-display boards have come a long way from the first QuickDraw accelerators, which only processed QuickDraw commands, and which required a separate video-display board. This hindered speedup because the image data had to move from the QuickDraw accelerator to the video-display board over the Mac's comparatively slow NuBus.

Quick on the Draw . . .

Because most people using 24-bit color work with large images on large monitors in high-end programs, most 24-bit video-display boards are accelerated. The most common method is QuickDraw acceleration, which generally makes common applications run three to ten times as fast.

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... But Slow on the Uptake

Special hardware can execute a QuickDraw command 100 times faster than can the Mac's CPU. But you won't see that kind of speedup in everyday use. Why not? Because several factors slow things down along the way.

First, the really big speed improvements are mostly on operations on large areas of an image, rather than on lines or small elements. Video processing involves two steps: image setup and image generation. Acceleration affects only image generation, so display of a graphic that requires a lot of setup cannot be sped up very much compared with a graphic that requires little setup. For example, to display a color fill in a rectangle, the CPU makes a modest investment in setting up the rectangle's coordinates; the QuickDraw-acceleration chip on the video-display board does 98 percent of the work of filling in the rectangle's color. Thus, you'll see significant speedup here. But in drawing a large set of small lines, the CPU takes much more time to set up than to generate the video data for the lines, so almost no acceleration results.

A lot of what people do involves working with small elements like lines and text, not with large image areas.

Second, some applications, including Photoshop, Macromedia's Swivel 3D Professional, and Autodesk's AutoCAD, bypass many common QuickDraw commands, using either uncommon QuickDraw commands or the application's own special commands instead. This means that the amount of acceleration you get from a particular board depends on the application you use: if

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### MULTIFUNCTION BOARD OPTIONS

<table>
<thead>
<tr>
<th>Company</th>
<th>Product</th>
<th>Price</th>
<th>Product Based On</th>
<th>Ethernet</th>
<th>Photoshop Acceleration</th>
<th>JPEG Compression</th>
<th>Video Frame Capture</th>
<th>Video Frame Output</th>
<th>Stereo Audio</th>
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</table>

- = yes; 0 = no. 1 Requires two slots. 2 Optional; $1999 for JPEG, $999 for Photoshop.
the application uses common
QuickDraw commands a lot, you’ll see more acceleration
than if it uses less common
QuickDraw commands or its
own commands.

Finally, video accelerator
designers implement only a few
QuickDraw commands in their
acceleration chips (called
ASICs, or application-specific
integrated circuits), so the
acceleration process slows
down every time the application
makes a QuickDraw call
that isn’t executed in the video-
display board’s ASICs. There
are hundreds of QuickDraw
commands, but only a dozen or
so are used routinely by popu-
lar applications. Rather than
writing algorithms to speed
each QuickDraw command
(which is time-consuming and
expensive), video accelerator
designers have analyzed popu-
lar applications to see which
QuickDraw commands they
use routinely and then have
focused on getting the most
acceleration possible for these
commands. This approach
keeps costs down while provid-
ing good overall video acce-
leration. But it also means that
the speedup you see will be differ-
ent from what someone else
sees. “Gauging Video Speed”
shows these differences be-
tween real-world and theoreti-
ical acceleration.

In testing video-display
boards’ speeds, Macworld Lab
used a variety of QuickDraw
commands to see exactly what
commands each board acceler-
ates. The lab results show
extreme speed enhancements
for some QuickDraw com-
mands.

8, 16, or 24?

Although 24 bits, for 16.7 million colors, is considered
a standard for “true color” or photo-realistic
color, it’s a standard that’s overkill for visual
and printing reality. Ask yourself these ques-
tions. Can you perceive 2 million different
shades of yellow between orange and green
in a continuous rainbow spectrum? Do you
work with a printer that can give you 16.7
million colors? Do you think the folks at Pantone
give you 16.7 million choices for spot color?
If you answered no to any of these questions, you might
be able to live with 16-bit color, for about
65,000 colors on screen, as a lower-cost alter-
native to 24-bit color. What’s the real differ-
ence between 16.7 million and 65,000? Look
at the accompanying comparison of images
and decide for yourself. While 24-bit color is
strikingly superior to 8-bit for displaying pho-
tographs, its superiority is difficult to discern
over 16-bit color in a direct comparison.

Sixteen-bit color appears to be the wave of future video.
Already, Apple offers 16-bit color as a low-
cost option in the new Macintosh Ivx and Per-
forma 600 models, and the Quadras and new
PowerBooks support it in most resolutions.
Video-display-board makers are also reali-
zing this. For example, Radius lets you upgrade
its PrecisionColor BX from 8-bit to 16-bit oper-
ation, while Laps Technologies’ ProCol-
orServer series can run at 16 bits on moni-
tors as large as 21 inches; NuBus, Isis, and LC
versions are available. For LC owners, the PSI
Multicolor board from PSI Integration
(408/959-8544) costs $159, but it works only
with the Apple 12-inch monitor in 16-bit color.
For LCS, Envisio (612/339-1008) offers the
$595 Quick 16 board, which works with moni-
tors as large as 16 inches. You may even want
to run boards designed to run at 24 bits at
16 bits instead, to speed your screen scroll and
redisplay time even more.

If you have a Classic right now, or an LC running in
8-bit color, and are planning to step up in
the world of 24-bit graphics, you might want
to consider getting halfway there instead. A
Mac Ivx in 16-bit mode using the new Apple
15-inch color monitor for display produces
color that’s apparently good enough for Kodak
(it’s the standard for the Photo CD) and speed
that rivals the fastest 24-bit video-display
boards on a 19-inch display.

For many people, 24-bit color is overkill, both in
terms of what they see and what they pay. Com-
pare the same image in 8-bit, 16-bit, and 24-bit
color (from top to bottom). The 8-bit image is
decidedly inferior, but the 16-bit image is accept-
able for most uses. Those doing color trapping or
image editing will still want to work with 24-bit.
## Gauging Video Speed

### REAL-WORLD TESTS

In our real-world tests, the size of the monitor dramatically affects performance for line scrolls: bigger monitors are slower. However, bigger monitors can have an advantage for page scrolls, where all the data on

<table>
<thead>
<tr>
<th>Vertical Scroll (in seconds)</th>
<th>Horizontal Scroll (in seconds)</th>
<th>Page Scroll (in seconds)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average results for a series of up and down scrolls (one line at a time) in Excel and Word documents.</td>
<td>Average results for a series of left and right scrolls (one column at a time) in Excel documents.</td>
<td>Average results for a series of up and down scrolls (one screen at a time) in Word documents.</td>
</tr>
<tr>
<td>With 13-Inch Monitors</td>
<td></td>
<td></td>
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<tr>
<td>SuperMac Thunder/24</td>
<td>19.2</td>
<td>35.7</td>
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<tr>
<td>SuperMac Spectrum/24 PDQ Plus</td>
<td>21.6</td>
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<tr>
<td>SuperMac Spectrum/24 Series III*</td>
<td>28.1</td>
<td>35.7</td>
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<tr>
<td>Radius Ops 24X</td>
<td>33.3</td>
<td>35.7</td>
</tr>
<tr>
<td>Radius PrecisionColor 24Xk</td>
<td>33.3</td>
<td>35.7</td>
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<tr>
<td>Apple 8*24GC</td>
<td>95.4</td>
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<tr>
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<tr>
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<td>35.7</td>
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### LOW-LEVEL QUICKDRAW TESTS

Low-level tests of QuickDraw command processing show theoretical best performance. The Basic Commands group includes QuickDraw commands that all vendors accelerate. Radius and SuperMac accelerate some other commands, but our tests show that this does not change these boards' performance.

<table>
<thead>
<tr>
<th>All Commands</th>
<th>Basic Commands</th>
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<td>(speed compared to Apple B+24)</td>
<td>(speed compared to Apple B+24)</td>
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<tr>
<td>With 13-Inch Monitors</td>
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<td>SuperMac Thunder/24</td>
<td>3850%</td>
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<tr>
<td>SuperMac Spectrum/24 PDQ Plus</td>
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<tr>
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</tbody>
</table>

*With $499 piggyback board installed.*

Shorter bars are better. Longer bars are better.
Other Acceleration Techniques

IN ADDITION TO QUICKDRAW acceleration, some vendors tout the use of other techniques, such as RACE (redundant access cycle eliminator), GWorld, and NuBus block transfer. Should you seek out these alternatives? Not really.

For example, GWorld is useful only if you use GWorld-compatible software, of which there is not much. GWorld helps speed display by accelerating the switching between images in some draw programs (like Time Arts’ Oasis), but it doesn’t count for much as a general video-acceleration technique.

NuBus block transfer—which speeds up the transfer of image data across NuBus by sending it in bursts—was a big deal before all 24-bit accelerated video boards had their own video RAM; but NuBus block transfer hasn’t been a selling point since 1991, because on-board VRAM is now typical.

The same is true for RACE, which promises to speed up a standard video board by about 1.2 times by handling video computations more efficiently. But inexpensive QuickDraw acceleration chips are widely available, providing better acceleration at hard-to-beat prices.

All these video-acceleration methods might offer some benefit if used with QuickDraw acceleration, but typically none are advantageous enough to justify the extra expense compared with a QuickDraw-only accelerated video-display board.

Time Is Money

THE TEST DATA, FOR BOTH the real-world tests and raw QuickDraw tests, reveal several issues to consider when choosing 24-bit accelerated video-display boards. For one, the stately progress of the acceleration for larger monitors is so predictable that, given the data for 14-inch and 19-inch monitors, Macworld Lab nearly wasted its time running benchmarks on 16-inch monitors. A 19-inch monitor has about twice the display area as a 14-inch monitor, and an accelerator takes about twice as long to redraw or scroll a 19-inch screen as a 14-inch screen. A 16-inch monitor has about one-third more area than a 14-inch monitor, so an accelerator will take about 1.3 times longer to redraw or scroll its screen compared with a 14-inch screen. Use these ratios to gauge the effects on your display: if you see an accelerated board used with a 14-inch monitor and you’ll be using that board on a 16-inch monitor, expect the speedup to be three-quarters of what you see on the 14-inch monitor.

Another finding is that newer designs beat older designs by a large margin, an almost inevitable conclusion in the computer business. SuperMac’s accelerated Spectrum/24 Series III hardly beats a number of older boards, and is in turn left in the dust by SuperMac’s own, newer Thunder series.

Finally, in line with the proverb that time is money, a look at “Comparing 24-Bit Video-Display Boards” will show you that faster boards just cost more, as you would expect. Comparing two of the best-known companies in the Mac graphics business—Radius and SuperMac—the very fastest board, SuperMac’s Thunder/24, costs $2000 more than the fastest Radius board (the PrecisionColor 24X3). But the Thunder/24 is in fact impressively faster—to get the most performance for the least price your best approach might be to shop aggressively for the best deal on a Thunder/24.

Beyond Acceleration

THE FIRST ROUND OF 24-BIT accelerated video-display boards a few years ago offered improved screen-display speeds, but not much else. Now the extra features and different expansion options on today’s boards may be their most important selling points. Special hardware for accelerating Adobe Photoshop, chips for JPEG compression/decompression, and interfaces to video equipment—just to name some common possibilities—may turn out to be more important to you than a 15 percent speed difference between comparably priced boards.

Two manufacturers—SuperMac and RasterOps—let you use plug-in boards that go into the video-display boards’ piggyback slots to add such features, as “Comparing 24-Bit Video-Display Boards” shows. This saves you from using a NuBus slot on the Mac for the features.

Photoshop Acceleration

Simple QuickDraw acceleration isn’t going to buy you...
much speed for bitmap-oriented applications like Photoshop. You'll need either a more expensive board that includes both video acceleration and Photoshop-filter acceleration (like the $3699 ThunderStorm Pro from SuperMac), or a cheaper board with no video acceleration but hardware support for Photoshop speedup (like the $999 SuperMac ThunderStorm).

Common Photoshop operations (sharpen, unsharpen, blur, Gaussian and motion blur, and resize) pick out a block of pixels and perform arithmetic on the whole block. This means, for example, that a Gaussian blur can call for 20 million operations on a 1MB picture—and the operations aren't QuickDraw calls, so an accelerated video-display board won't help speed things up. But all these filtering tasks have been familiar for decades to companies that design digital signal processing (DSP) equipment, and several off-the-shelf chips are ideal for these computations. Several vendors claim their boards improve Photoshop filter speed from 5 to 20 times.

**JPEG Compression** If JPEG is important in your work, you will also need either a dedicated JPEG board or a multipurpose DSP board (see “Image Compression Matures,” *Macworld*, March 1992). Once again, plain QuickDraw acceleration won't speed up JPEG compression/decompression.

It also happens that the same DSP chips are also just right for speeding up JPEG compression/decompression, so you'll find that boards that can accelerate Photoshop filters nearly always accelerate JPEG jobs. Some of the original chips and software developed by the JPEG pioneers at Storm Technology now appear in SuperMac's $999 ThunderStorm boards. The $895 Lightning Effects DSP board from Spectral Innovations (408/727-1314) not only accelerates Photoshop and JPEG jobs, but ColorStudio and QuarkXPress as well. Newer Technology (316/685-4904) offers the Image Magic board ($995 for NuBus, $895 for Quadras) based on the same DSP chip used in the Lightning Effects board but with different filters. DayStar Digital (404/967-2077) recently announced a version of the Storm Technologies board that uses DayStar's own filters.

**QuickTime Options** Finally, if you do lots of QuickTime work, you are not only out of the world of big monitors but also out of the domain of the video-display boards reviewed here (for a definitive article on Mac video, see “The Full-Motion Macintosh,” *Macworld*, January 1993). There are 24-bit video-display boards with QuickDraw acceleration that specialize in motion; “Multifunction Board Options” lists the capabilities of several. The video-display boards we tested are aimed at users of still images, such as graphic artists, engineering designers, and desktop publishers.
Speedup Strategies

SUPERMAC'S THUNDER OFFERS the fastest 24-bit video-display boards you can buy. The boards cost more, but the marketing people at SuperMac appear to have successfully targeted an audience of affluent and very impatient graphics professionals. The second-fastest board tested, for $1000 less, is the SuperMac Spectrum/24 PDQ Plus. And the third-fastest is the SuperMac Spectrum/24 Series III.

If these prices are too rich for your blood, you might consider a less-foxy strategy in which you compensate for slightly slower display speeds by using a smaller monitor—a 15-inch or 16-inch monitor makes an intrinsically slower board seem considerably better. Furthermore, a perusal of mail-order ads in Macworld reveals a nearly 30 percent discounted price for all these accelerated video-display boards, so in comparing speed results in “Gauging Video Speed” and the prices in “Comparing 24-Bit Video-Display Boards,” you need to write in your own best-case street price before making a purchase. Because the Macworld Lab results show a fairly direct link between speed and price, you should insist on seeing a demonstration of a video-display board—Mac combination running your typical applications to find a speed you think is acceptable and match it to your budget.

And if you want 24-bit color for less-ambitious uses, should you consider an unaccelerated board like those from Apple, Generation Systems, Lapis Technologies, or Xceed Technology? Maybe so, if your main focus is reviewing rather than editing or retouching color images. Acceleration is expensive and not always meaningfully faster—for occasional 24-bit-image work, 3-times faster scroll speed probably won’t change your life.

No matter which board you pick to meet your need for video speed, don’t worry about the color quality. The monitor will make the difference there; the video-display boards aren’t a factor because they all use the same component (a Brooktree digital-to-analog converter) calibrated the same way to determine the color values sent to your monitor.

CHARLES SEITER is a Macworld contributing editor who designs graphic displays for scientific imaging applications.

Macworld Lab testing supervised by TIM WARNER.

<table>
<thead>
<tr>
<th>SUPPORTED RESOLUTIONS (AT 24-BIT COLOR)</th>
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<th>640 × 480</th>
<th>832 × 624</th>
<th>1024 × 768</th>
<th>1152 × 870</th>
<th>On-the-Fly Resolution Switching</th>
<th>Tech-Support Rating</th>
<th>Consumer Contact: Toll-Free</th>
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and accuracy of their support technicians. Macworld uses a point system, including bonuses and demerits, to derive the final rating. Ratings are for companies, not individual available for SE/30 and LCs ($799). ' Supports this resolution at 16-bit color. ' Restart of Mac required. ' Null bus block transfer. ' Version also available for SE/30 ($599).
Software
Secretaries

PUT YOUR LIFE IN ORDER WITH ONE OF THESE
PERSONAL
INFORMATION
MANAGERS

BY FRANKLIN N. TESSLER

remembering all the details of day-to-day life used to be easy—addresses, appointments, and phone numbers came to me effortlessly, and I wouldn’t think of taking a shopping list to the store. With middle age creeping up, though, I sometimes need help remembering the time of the next staff meeting or what my wife asked me to pick up on my way home. And judging by the thriving sales of paper-based personal organizers like Day Runner and Franklin Planner (no relation), I’m not the only one who finds it hard to keep a handle on a hectic schedule: Day Runner Corporation estimates that it has sold more than 6 million units since 1982, and sales continue to climb.

As always, software vendors want us to believe that what paper can do, computers can do better. In just a couple of years, their efforts have created a market for a new type of software called personal information managers, or PIMs. For this article, I took a comprehensive look at the current crop of PIMs for the Macintosh. As you’ll see, I discovered that despite their many rough edges, PIMs can still be very handy to have around.

What’s in a PIM?

UNFORTUNATELY, EXPERTS DO NOT AGREE on what a PIM is—vendors conveniently base their definitions on the capabilities of their products, not on any widely held opinion. In preparing for this article, I examined a diverse array of Macintosh applications and desk accessories (DAs).

To keep things manageable, I narrowed the scope to include software that incorporates three major functions: keeping track of contacts (names, addresses, and other information about people), calendar and event planning (organizing and viewing schedules), and to-do management (maintaining lists of tasks). Eight programs meet these criteria: ACT for Macintosh, Connections, DateBook/TouchBase (a combination desk accessory and application), DayMaker, Info-Mation, OfficeMaster, The Nine to Five Office, and Shortlist.

In addition to examining major features, I compared flexibility in viewing data; printing; importing and exporting; speed; and overall reliability (see “PIM Roundup”). In the spirit of the
EVEN DIE-HARD COMPUTERPHOBES WILL CONCEDE THAT COMPUTERS ARE IDEAL FOR MAINTAINING ADDRESS LISTS

EVEN DIE-HARD COMPUTERPHOBES ARE USUALLY WILLING TO CONCEDE THAT COMPUTERS ARE IDEAL FOR MAINTAINING ADDRESS LISTS. IF YOU ARE LIKE MOST PEOPLE, 

though, typing information about business associates, friends, relatives, and other personal contacts is about as pleasant as filling out a tax return. Fortunately, good software design can help make the job easier, if not enjoyable.

All the PIMs but DayMaker include an entry screen for contacts, with defined spaces for names, addresses, phone numbers, and other information. DayMaker requires you to enter contact data as free text, so it doesn’t distinguish between a person’s last name and company, for example. Although that’s not a problem if you’re just browsing, it does make it difficult to export contact data to a database or print out a formatted address list.

In PIMs, contact management runs the gamut from simple to complex. Some address books, like the one in Info-Mation, are so brimming with fields and pop-up menus that they are difficult to read. At the other extreme, Shortlist’s simple setup doesn’t let you customize data entry at all, so you can not modify any of the fields to suit your needs. TouchBase strikes a sensible balance between flexibility and ease-of-use—TouchBase’s entry form provides 5 custom fields in addition to 14 standard ones (see “Great Contacts”). ACT, with more than 70 fields, is even more flexible. In addition to changing field names, you can lock any field to prevent users from entering information, or hide a field from view entirely.

Automatic formatting and data entry, features common to high-end database applications, can help cut down on keystrokes. For example, TouchBase can form at telephone numbers and capitalize names for you the instant you finish typing them in. ACT lets you create lists of predefined entries to choose from as you enter data, and you can specify default values for any field. Unfortunately, none of the PIMs do an ideal job of inspecting for missing or incorrect data, an area that’s begging for improvement.

Most PIMs provide special fields that let you categorize contacts, useful for preparing mailing lists. For example, if you assign a unique identifier to all your business associates, you’ll have an easier time printing a set of personalized announcements for the company picnic. Most PIMs also let you browse through your address book and mark selected records (usually by clicking on a check box), a handy way to temporarily segregate a subset of contacts.

Another helpful function lets you link events (like telephone calls and meetings) to specific contacts. Connections implements this feature especially well: when you dial a contact’s phone number, a comprehensive log sheet pops up on your screen. If the line is busy, you can automatically schedule a reminder to make a follow-up call by clicking on a button. Shortlist also lets you link events to people: when you schedule an event, you can select associated contacts from a scrolling list, a workable solution as long as the size of your address book remains manageable. ACT actually requires you to associate activities with one or more contacts, a restriction I found bothersome.

Because TouchBase (a DA) and DateBook (an application) are separate programs, they’re not as well integrated as the other PIMs. And since they communicate by sending Apple events, linking is available only if you’re using System 7. For example, you can search for contacts in a TouchBase data file without leaving DateBook, but you can only scan by first name, last name, or company. When you schedule an event in DateBook, you can transfer selected information about the event (such as time and description) into TouchBase records that meet your search criteria.

Calendars and Events

OF ALL THE ARGUMENTS IN FAVOR OF USING A PIM, activity planning may be the most compelling, especially if you often shuffle meeting times and dates. A well-designed PIM should let you examine your event

Great Contacts  Info-Mation’s address book is flexible, but I found the layout made it confusing to read (top). TouchBase’s contact entry form (bottom) includes five fields you can customize to store information that the standard fields cannot handle.
PIMs at a Glance

To make your PIM shopping easier, here are thumbnail sketches of the eight PIMs reviewed in this article, as well as several PIMs that weren’t available in time to be included. This section also features brief descriptions of a few programs that don’t meet my criteria for PIMs, but are often described as personal organizers. (Other organizers abound; for a look at address books, see The Desktop Critic in this issue; calendar programs will be the subject of a future Macworld article.)

Reviewed in this article.

Meets article’s definition of a PIM (contact database, calendar, and to-do list), but wasn’t available in time for review. Description is based on information provided by manufacturer.

Doesn’t meet article’s definition of a PIM, but is commonly referred to as a PIM.

ACT for Macintosh 1.0 (Contact Software International; 214/919-9500, 800/365-0606; $395)

ACT is a full-featured PIM that integrates contact-management, scheduling, and word processing. It has more contact fields than its competitors do, and gives you a wide variety of options for viewing the contact database. ACT also has several unusual features, including a macro recorder as well as links to a separate product called GeoQuery that works with ACT to let you display contact information on maps.

Active Memory 2.0 (ASD Software; 714/624-2594; $199)

Active Memory is an activity planner with a spreadsheet-like format and multiple pop-up menus to speed data entry. Network support lets you coordinate projects among multiple users. (See Reviews, Macworld, August 1992.)

Ascend 3.0 (Franklin Quest; 801/975-9992, 800/877-1814; $195)

Ascend incorporates calendar, contact, and to-do features in an application geared for users of the paper-based Franklin Planner organizer. You can attach notes to contacts in the program’s address book, assign priorities to items in a to-do list, and print out pages for the Franklin Planner.

Connections 2.1 (Centrix Technology; 415/358-8600; $199)

This HyperCard-based PIM includes daily and monthly calendars, a telephone directory, and a reference library, which lets you archive text (such as correspondence). You can customize the telephone directory by modifying, adding, deleting, or moving fields. The program also offers an optional link to the Sharp Wizard.

Date-Aras 1.0 (Numa Technology; 203/256-1973; $59)

Numa’s PIM combines a calendar, contact management, and to-do management in a low-cost package. The free-form contact section lets you set up custom categories. Assemble Activities view shows current to-do items by category, and a notes module lets you store miscellaneous information.

Data-Book 1.5.1 and TouchBase 2.0 (After Hours Software; 818/780-2220; $125 each; $169.95 for both)

Although DataBook (a calendar application) and TouchBase (a contact-management DA) are separate programs, they can share information under System 7. (After Hours Software bundles the programs.) DataBook lets you view your schedule in daily, weekly, or monthly format, and its support for recurring events is top-notch. TouchBase is an address book with five customizable text fields and automatic formatting of text and phone numbers during data entry.

DayMaker 1.01 (Pastel Development; 212/941-7500; $99.95)

DayMaker focuses on schedule management by helping you organize items (which can be activities, to-dos, or contacts) in a hierarchical fashion. It offers multiple options for display and output, including Gantt charts, as well as flexible event-scheduling and handling of uncompleted to-dos. Printing options support popular paper-based planners.

DayMaker 2.0 ($129.95) This version of DayMaker, which shipped too late to review, adds support for recurring events, a separate to-do view, and disk-based file storage to minimize RAM usage.

First Things First 3.0 (Visionary Software; 503/246-6200, 800/877-1832; $79.95)

This system extension lets you categorize and schedule tasks and set reminders. First Things First displays a clock on your desktop; an alarm sounds for one-time or recurring reminders. (See Reviews, April 1992.)

In Control 1.1 (Attain Corporation; 617/776-1110; $129.95)

In Control lets you manage to-do items using an outline that’s organized in rows and columns. The program offers powerful search and sort capabilities. (See Reviews, May 1992.) Version 2.0 will include a calendar view, check boxes for completed to-do items, and scripts to automate common actions.

Info-Mation 1.1g (Info-Mation; 510/599-4211, 800/444-4746; $189)

This HyperCard-based PIM includes an address book, contact log, calendar, and a group scheduler. Info-Mation’s project planner module enables you to organize all the activities associated with a project, while the group scheduler is useful for comparing the schedules of several users.

InTouch 2.0.4 (Advanced Software; 408/773-0745; $99.95)

The newest version of InTouch is built around an address book that lets you enter contact information as free text, rather than using defined contact fields as many competitors. InTouch also provides calendar and schedule management. (See Reviews, March 1992.)

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InTouch 2.0.4 (Advanced Software; 408/773-0745; $99.95)

The Nine to Five Office 2.0 (Nine to Five Software; 303/443-4104; $99.95; $19 through Sept. 1993)

This HyperCard-based PIM incorporates contact and calendar management. With Nine to Five’s $19 special offer, The Nine to Five Office is ideal for users who want to explore a PIM at a bargain-base- ment price. The program includes a map view that lets you look up contacts by region.

OfficeMaster 2.0.4 (Comice Software; 714/985-8323; $195)

The personal version of OfficeMaster includes a contact manager, a reminder system, and a calendar with weekly and daily schedule views. Comice’s main product, however, is the multifuser version of OfficeMaster—in addition to all the features in the single-user program, it lets you manage event calendars for several people and send electronic memos over a network.

PowerTeam 1.0 (Provue Development Corporation; 714/892-8199; price unavailable)

Based on Provue’s Panorama database application, the PowerTeam PIM includes the requisite calendar, contact, and to-do features, as well as some unusual features such as a checkbook, expense report form, and calculator.

Shortlist 1.0.1 (Brainchild; 513/831-8451; $149)

Shortlist incorporates a simple contact manager along with a system for scheduling meetings, mail, phone calls, and to-dos, as well as a daily agenda and multi-day calendar view. Shortlist is ideally suited to PowerBooks and other portable Macs, and according to Brainchild, the software is designed to maximize battery life.

ThoughtPattern 2.0 (BananaFish Software; 415/929-8135, 800/552-5939; price unavailable)

This upgrade adds calendar functions and a field-oriented address book to ThoughtPattern’s free-form note-taking and file-linking capabilities.

TimeVision 1.0 (Powercore; 815/468-3737; $99)

Focusing on time management, TimeVision offers monthly, weekly, and daily schedule views, and also includes a Note Card file for storing addresses and other text. You can assign up to 64 custom categories to events, and attach alarms to them for reminders.
If you use a PIM for business and personal schedules, choosing from a limited number of categories (calls, meetings, mail, and to-dos in the case of Shortlist; calls, meetings, and to-dos in ACT).

All the PIMs let you schedule events that have specific dates, times, and durations, although their approaches differ. Usually you pick a day and starting time for the event and type in a brief description. Connections and Info-Mation also let you change event times and durations by dragging bars along a time line, an option that some users may prefer. Scheduling events in The Nine to Five Office is especially awkward—you enter the event's description next to its start time, select the text, drag until you reach the end time, and click on a button—it is more cumbersome than typing start and end times.

I found DateBook's event-scheduling function the easiest to use of all the PIMs. For each new event, you type a description, a summary, a start time, and an end time or duration. (You only have to enter the end time or the duration, and DateBook calculates the other one for you automatically.) The only drawbacks are DateBook's lack of support for events that have no predetermined duration (like visits to the dentist). DayMaker provides more flexibility in event scheduling than DateBook does, but I found its interface less intuitive and harder to master.

Some PIMs let you book recurring events like birthdays and mortgage payments. Overall, I found DateBook's recurring-event function the most practical: you can schedule events to occur at specific intervals (every four days), on specific dates (the tenth of the month), or on specific days of the month (the third Thursday of every month). When you alter any aspect of a recurring event (the description, for example), you're given the option of applying the changes to as few or as many of the posted events as you like.

Of course, scheduling an appointment with your boss to ask for a pay raise (another good example of a recurring event) is only half the battle: you have to remember to show up for the meeting, which is why an efficient alarm system is vital. For maximum effectiveness, reminder alarms should go off no matter what you're doing on the Macintosh, even if your PIM isn't up and running. All the PIMs with pop-up alarms use INITS—system extensions if you're running System 7—to make reminders appear on your screen. Only DateBook gives you the option of setting alarms to ring at a given date and time or at a specified interval before the event; reminder functions in the other PIMs aren't quite as flexible. When a DateBook alarm appears, you can cancel it forever or postpone it an arbitrary number of minutes, hours, or days, just the way you use the snooze button on an alarm clock.

What to Do

If you're like most busy people, your desk and refrigerator are constantly cluttered with lists of things that need attention. Unlike events, which typically have a specific date and time, to-do items (like painting the garage) are often free-floating: you get to
them whenever you find the time. Fortunately, a PIM can help by nagging you until you take care of the chore or give up and delete it entirely.

Most personal information managers treat to-do items as special types of events. In DateBook, for example, to-dos have a date but no starting time or duration. Uncompleted to-do items are automatically carried over to succeeding days, and they remain on your calendar until you get rid of them. (All the PIMs let you retain completed to-dos for later review, however.) As with events, you can set an alarm to ring before an item becomes due. DayMaker is even more flexible, letting you push uncompleted to-dos forward one day, one week, or one month at a time, in addition to setting advance warnings.

Other Considerations
AS WE'VE ALREADY SEEN, MULTIPLE CALENDAR formats are essential for managing a busy schedule. Similarly, flexibility is also important when it comes to displaying lists of contacts or events. For example, TouchBase lets you browse through your address book entry by entry, or you can view any subset of your contacts in a multicolumn format. In similar fashion, DateBook enables you to display events and to-dos sorted by category, a good way of prioritizing your schedule. A handy view found only in The Nine to Five Office lets you find contacts by clicking on a map of the United States, as well as look up zip and area codes.

For the truly compulsive, DayMaker provides an impressive array of display options, ranging from simple text notes to Gantt charts. You can assign multiple hierarchical tags or categories to events and notes to help you organize them. It's a highly effective system if you're willing to make the effort to use it. ACT also includes multiple layouts for viewing contact information, calendars, and tasks.

If you've invested time compiling an address book using a database manager or other program, import and export capabilities are an important consideration. Fortunately, all the PIMs I reviewed let you import and export contact data as tab-delimited text files, a format that's compatible with most word processors, databases, and spreadsheets. It's not as convenient as importing data directly, but it's a lot easier than retyping hundreds of names and addresses.

Flexible printing options are essential if you use a paper-based daily planner in addition to the PIM in your Mac. If the pages in your organizer are smaller than standard letter size (and they usually are), it's important to cram as many pages as possible onto each

### PIMs on the Go

Paper-based planners are attractive for people who want to stay organized away from the desktop: they're cheap, widely available, and you can use them almost anywhere. Still, a paper organizer can never provide the functionality of a software PIM—try to find all your appointments with Bob Cratchit during the upcoming year and you'll see what I mean.

For several years, an intermediate solution has been available in the form of hand-held organizers from companies like Sharp, Casio, and Oregon Scientific. While they're not as sophisticated as the Newton Personal Digital Assistant announced by Apple last spring, hardware PIMs can be very effective for managing contact lists, notes, and schedules.

For almost two years, I've been using Sharp's OZ-8000 Wizard organizer to keep track of my contacts and appointments. With a little effort, it fits into a shirt or coat pocket, and the durable case has held up well. The 40-character LCD display is quite legible, although it lacks backlighting. Unlike some other hand-held PIMs, the 8000 series organizers sport QWERTY-style keyboards.

Connections and TouchBase enable you to share data with the Wizard through a special interface cable that plugs into the Macintosh serial port (the cable is available separately from Sharp). Connections allows two-way data transfer between the Wizard and the Macintosh; TouchBase lets you export contact information only to the Wizard, and can not import data directly. Several PIM vendors I spoke to hinted that enhanced connectivity may be incorporated in future updates to their software.

Sharp also has introduced a new version of its Macintosh software that's designed to work with its series of electronic organizers. While it's not a full-fledged PIM, Organizer Link II does let you import data, edit it, and export it back to the organizer with a minimum of bother. Schedules and other data are displayed on the Macintosh exactly as they appear on the organizer's screen. For now, it's the best way to back up and archive data.
printed sheet to avoid wasting paper. If you buy specially perforated sheets (available from some PIM vendors and office supply stores), you can avoid the chore of cutting the pages apart once they’re printed (see “Paper Output”).

Output capabilities range from Shortlist’s printed duplication of on-screen information to DayMaker’s sophisticated printing options, which let you customize the size and layout of multiple tiny “virtual pages” on each sheet of paper. DayMaker comes with predefined settings for Filofax and Franklin Planner organizers. DateBook and TouchBase also include settings for several paper organizers, including Filofax, Day Runner, and Day-Timer.

Although speed and reliability are critical to any type of software, they’re especially important with personal information managers. You might tolerate short pauses when you’re working with a word processor or spreadsheet, but a PIM should serve up phone numbers or appointments the instant you need them. With few exceptions, PIMs do their job without much fuss or delay.

To gauge their speed, I ran the PIMs under a variety of conditions, ranging from heavy CPU loads with multiple background processes, to less-demanding situations. Overall, the HyperCard-based PIMs (Connections, Info-Mation, and The Nine to Five Office) fared the worst. Even under relatively light conditions on a Macintosh IIx, they often felt sluggish, especially when switching between modules or views. And while DayMaker was generally very fast, there was a noticeable delay as the data file was loaded into memory each time I opened it.

I tested reliability by running the PIMs on a stable system loaded with a moderate number of extensions, and found all of them to be acceptably dependable. I encountered a few glitches in Connections’ directory module, but they weren’t consistently reproducible. According to Concentrix Technology, scripting problems that plagued earlier versions of Connections have been eliminated from the current release. (For an alternative opinion, though, see Reviews, Macworld, November 1992.)

Remember that an extensive list of features may not be the primary consideration if you’re choosing a PIM for a PowerBook. Despite the newer models’ larger memory capacities and hard drives, you should still look for programs that use RAM efficiently and take up little disk space. Conserving precious power also is essential to maximize battery life when you’re far from an AC outlet, and that means minimizing disk access. While Shortlist wasn’t my favorite choice for desktop use, its speedy performance made it seem right at home running on my PowerBook 170.

Strategies for Success

Despite their impressive feature sets, PIMS aren’t for everyone. While PIM software can help you work more efficiently, you may be perfectly happy with the paper-based organizer you’re using now. And the word processor, outliner, or flat-file database that you already own may be sufficient for keeping track of contact information, agendas, and notes. But if your

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NA = Not applicable. * Independent of application ** See “PIMS at a Glance” for information on version 2.0, which arrived too late to review.
paper organizer is so jammed with addresses, appointments, and to-dos that it’s impossible to follow, or if you find yourself missing important meetings, then it’s time to consider a computer-based personal information manager. (If you’re budget-conscious, The Nine to Five Office is available through September 1993 at the unbeatable price of $19.)

Once you’ve settled on a PIM, the next step is to devise a strategy for making the most of it. If you run the PIM on a single desktop computer at home or at the office, you’ll need some way to carry information with you when you’re away from the Mac. The cheapest approach is to print addresses, appointments, and notes on pocket-size pieces of paper or index cards. A slightly more expensive solution is to print on pages that fit into a compact daily planner like Day Runner. If you can afford them, hardware PIMs like the Sharp Wizard and the Casio BOSS also offer portability (see “PIMs on the Go”).

If you have two or more desktop Macintoshes to contend with, or if you use a desktop machine and a notebook Macintosh, the biggest hurdle is making sure that the data at both ends is always up-to-date. PIM files are likely to change often during the course of a busy day as appointments and deadlines come and go. Although it’s possible to reconcile data files manually (by using floppies, for example), you’re courting disaster unless you’re very careful. Several companies, including Inline Design, offer utilities that automatically synchronize files on several machines to keep data current.

The most efficient way to use a PIM is to have it load at start-up and keep it running in the background under MultiFinder or System 7—you shouldn’t have to launch an application or open a DA every time you need to find an address or schedule a meeting. You should also count on adding RAM to your system (aim for 8 megabytes or more, especially if you’re using System 7). And even though most PIMs don’t make heavy demands on hard drive space, expect at least a couple of megabytes for the software and data files, more if the PIM requires HyperCard.

Down the Line

TO SOME PEOPLE, THE IDEAL PIM WAS PORTRAYED in Apple’s Knowledge Navigator video of a few years ago. In that scenario, a fresh-faced “agent” named Phil on the desktop of a notebook-size computer played secretary to a busy college professor, taking phone calls, arranging meetings, and being generally helpful. Although I found Phil a bit hard to take, the video provided an intriguing glimpse at one possible form PIMs might take in five or ten years.

For the time being, though, even the best PIMs can’t take the place of a competent secretary. All of the PIMs I evaluated were lacking in some areas, but the TouchBase/DateBook duo came closest to filling my needs. My schedule hasn’t become any less busy since I started using a PIM, but I now have a fighting chance at keeping one step ahead of the chaos.

FRANKLIN N. TESSLER, a radiologist who is struggling to keep his life organized, is a Macworld contributing editor.

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<td>Events can be scheduled graphically.</td>
<td>yes</td>
<td>Multiple customized reports</td>
<td>HyperCard-based.</td>
</tr>
<tr>
<td>Easy to use. No support for open-ended events.</td>
<td>Can set to ring at given time or interval before event.</td>
<td>Multiple options, easy to customize. Can opt to print business days only.</td>
<td>Excellent interface. Limited data sharing with Touchbase requires System 7.</td>
</tr>
<tr>
<td>NA</td>
<td>NA</td>
<td>Multiple options, easy to customize. Can print Day Runner or Filofax format. Outputs to Sharp Wizard.</td>
<td>Fast. Limited data sharing with DateBook requires System 7.</td>
</tr>
<tr>
<td>Very flexible, but interface can be difficult to learn.</td>
<td>yes</td>
<td>Can print Filofax, Franklin Planner, and other popular planner formats. Easy to customize.</td>
<td>Powerful, but takes time to master. Good choice for use with PowerBooks.</td>
</tr>
<tr>
<td>Events can be scheduled graphically.</td>
<td>yes</td>
<td>Includes up to 7 predefined print formats.</td>
<td>HyperCard-based.</td>
</tr>
<tr>
<td>Event scheduling awkward.</td>
<td>no</td>
<td>Easy to customize reports. Includes built-in word processor with mail merge capabilities. Can print Day Runner or Filofax format.</td>
<td>HyperCard-based.</td>
</tr>
<tr>
<td>No direct support for recurring events.</td>
<td>no</td>
<td>Supports Sharp Wizard.</td>
<td>Networked version supports multiple users and includes email.</td>
</tr>
<tr>
<td>Six predefined event types. No direct support for recurring events.</td>
<td>no</td>
<td>Can print any view. Includes mail merge feature.</td>
<td>Fast and very easy to use, but less flexible than others. Good choice for use with PowerBooks.</td>
</tr>
</tbody>
</table>
A guide to the best tools for diagnosing
It's 1:15 on a Friday. As you return from lunch, a frantic, frustrated marketing manager meets you at your office door. "I have a brochure that has to go out to the West Coast today," he explains, "but I can't get it to print. What's wrong?"

"Are you trying to use the color printer upstairs?" you ask calmly. He says yes.

"OK, I think I know what the problem is," you say, reassuringly. You turn to your facilitator while the marketing manager peers nervously over your shoulder. After a few minutes, you've solved the problem. "Go try it again," you say.

The marketing manager looks relieved but still confused. An hour later, he's back in your office, having printed and mailed the urgent document. "How did you do it?" he wonders.

"Simple," you respond. First, you knew the network router was down even before you returned to the office because your pocket pager sounded an alarm as you drove back from lunch. Then, you simply reset the router and confirmed that it was back online. Voilà, another network emergency defused, thanks to that invaluable genre of software applications, the network-management utility.

Each step involved in handling this network crisis du jour—including the call to your pager—was accomplished using network-management and diagnostic utilities. Equipped with the proper software tools, you can learn which devices are running on a network; check whether the devices are communicating properly throughout the network; find out which software packages, graphics boards, SCSI devices, and monitors are installed on the computers linked by the network; and see which version of the operating system a particular Mac is using, among other things. In short, these utilities can help ensure your status as the company's official Network God or Goddess, and in this economic climate, who couldn't use a little extra job security?

Making a List
YOUR FIRST TASK AS A NETWORK MANAGER is to get a precise picture of what's on the network. To help you accomplish this, most management utilities include a simple list function. Open the application, or initiate a network scan, and you get a list of all devices connected to the network.

A list typically includes a network device's name and type, address (network number, node number, and socket number), and zone (usually a department within a company). A node is any addressable network device—a Mac, a printer, a file server. A socket is any addressable entity in a node that corresponds to software applications and that interacts with the network, such as electronic mail, a shared database, or a remote backup application. Each socket has its own number, which is its network address.

The end result is that network-management (and diagnostic) software with a listing feature gives you a detailed inventory of the computer equipment on a network and many of the applications running on each device.

Generally, lists can be sorted by device, address, and zone. For example, you can compile a list of all the printers on a network. You can view a list on screen, print it, or export it to a spreadsheet or database; by saving the printed lists, you get a written history of the network devices.

A few network-management packages—some in the form of a desk accessory—specialize in listing. Typically, the specialized software automatically updates lists by performing dynamic network scans as devices come and go on the network; by contrast, many full-fledged network-man-

by Shelly Brisbin

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How a Network Utility Talks to a Pocket Pager

1. This network's dedicated E-mail server, a Macintosh SE/30, has gone down because the E-mail application has unexpectedly quit.

2. The network administrator has a network-management utility on a Mac, and has programmed the utility to automatically check on the status of the E-mail server every five minutes. The program checks on the device by sending a Name Binding Protocol (NBP) lookup packet to the SE/30.

3. Once the network-management utility has determined that the SE/30 is down, the utility displays an alarm message on the administrator's Mac monitor and sends a message, via Apple events, to a paging-server program (such as E-Machines' Notify) that resides on the administrator's Mac. The message includes the text (such as "E-mail server in production dept. down") that is to be transmitted to the pager.

   The paging-server program receives the error message; the program then checks its database to see which paging system the administrator uses, what the pager ID number is, and what protocol is needed to transmit to that paging system.

4. The paging-server program uploads the error message (using a modem and telephone lines) to the paging service's host computer (usually a mainframe). The paging service's computer receives the message and broadcasts it via a radio transmitter and antenna directly to the network administrator's pocket pager.

5. The service transmits 7-bit ASCII text to the pager. The text message appears on the screen of the LCD pocket pager carried by the network administrator, who must cut short the afternoon's stress-management session.
Don't assume everything is hunky-dory with a node just because it shows up on a list.

Inter Poll also provides some configuration information and includes a separate test for printers, which don't respond to echo packets (printers don't use the network protocol that's required to produce echo packets).

Inter Poll doesn't monitor your network or tell you when problems arise, but it points you toward the culprit. The product's greatest strengths are its variety of options and attractive price ($129). Learning how to use it effectively may require a look at the manual, but the effort is well worth it.

**Alarming News**

An **other way** to keep your finger on a network's pulse is by having your computer let you know—via an audible or visible alarm—when something's amiss. Alarm functions offer various notification options: all network-management tools send a screen message or a sound to the administrator's Mac; most, including AG Group's Net Watchman and Caravelle's NetWorks, notify a pager (see "How a Network Utility Talks to a Pocket Pager"), and one—NetWorks—sends an E-mail message.

Alarm software tells you which devices are up or down and allows you to prioritize notifications by individual node or class of device—Mac Plus, LaserWriter, file server, and others. Given a large network, you might find it useful to limit your alarm requests to file servers, printers, or routers. And if you want additional job security, place a higher priority on your boss's laser printer, making sure you're notified whenever trouble brews.

NetWorks is the best alarm package available—it offers the largest array of alarm functions, sits comfortably in the background (it uses only 500K of RAM), is extremely flexible, and features a colorful graphical display.

**Drawing the Lines**

Every book on networking—and almost every magazine article—advises administrators to make a map of the devices and wiring associated with their internet. (An internet is a collection of two or more networks, connected by routers and accessible by all users on each network.) Good advice, but such maps quickly become outdated unless maintained religiously.

Networking utilities offer the ability to produce iconic representations of a network's nodes. Mac nodes look like Macs—most mapping packages can distinguish a compact Mac from a modular Mac—routers look like routers, and so on.

Non-Mac network devices such as Novell file servers are represented by icons as well. Network diagrams also identify cable segments that lie between all devices.

In addition, a **logical** network map enables you to show network structures in a form more easily grasped by those who aren't network know-it-alls. A logical network map displays the network structure;
a network topology editor, on the other hand, indicates the actual location of a device or wiring segment.

CSG Technologies' Network SuperVisor is my pick among network mapping utilities. SuperVisor makes life as a network manager a great deal less painful because it lets you integrate mapping with network lists, alarms, and device filtering (selecting nodes to be mapped based on type or address) and because it gives you complete control over how a network diagram is drawn.

Traffic Control

JUST LIKE A CITY STREET, A NETWORK can bear only a certain amount of traffic; that amount depends on the bandwidth—the width, efficiency, and capacity of the network pipeline. Knowing how much bandwidth your network has, and how much of it is available given the size of your Internet, can simplify the process of planning and allocating network resources.

You can keep an eye on available bandwidth with a graphically oriented network traffic analyzer. This type of software acts as a voyeur, watching every packet as it goes back and forth between nodes. A network analyzer reports the number and type of packets and displays this information on the network manager's screen, often in graphical form. You can export packet information to spreadsheets for further analysis. A network analyzer also tracks errors—for example, when a packet is prevented from reaching its destination.

If you experience repeated problems with printing or other communications, you can use a network analyzer to isolate data collisions and other errors that are likely to be the cause. Should insufficient bandwidth be the problem, you may learn enough from your analysis to make decisions about shortening network cables or moving problem devices to the quieter side of a router or bridge.

Farallon's TrafficWatch II is the most complete network analyzer that I tested. It tracks each packet's source and destination, as well as glitches that occur during transfer. The display is graphical, and information can be exported to a Microsoft Excel macro (which comes with the program). You can export TrafficWatch data to the macro, then create charts that display each device's activity and error patterns.

TrafficWatch doesn't support all types of Ethernet network adapter boards, however. Farallon says TrafficWatch supports boards that—like its own products—are based on a National Semiconductor chip. The Cabletron E6119 network board I used in my tests wasn't supported by TrafficWatch. A call to Farallon's technical support line yielded an offer to sell me a Farallon Ethernet board for $100 (compared with the normal $200-to-$300 price of such an adapter), rather than a solution to the incompatibility problem.

Packets and Protocols

A SIMPLE COUNT OF PACKETS ISN'T always enough to tell you what's happening on the network. That's when a protocol analyzer, also called a packet analyzer, comes in handy (a protocol defines rules and procedures for transmitting information).

A software protocol analyzer captures the complete contents and attributes of each packet. It tells you which network protocol is associated with each packet, as well as the source and destination information. It generally allows you to specify...

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### NETWORK UTILITIES AT A GLANCE

<table>
<thead>
<tr>
<th>Company</th>
<th>Product Name</th>
<th>Features</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>TC Microsystems</td>
<td>NetWorks</td>
<td></td>
<td>$99</td>
</tr>
<tr>
<td>CSG Technologies</td>
<td>Network SuperVisor</td>
<td></td>
<td>$149</td>
</tr>
<tr>
<td></td>
<td>Network SuperVisor Jr.</td>
<td></td>
<td>$149</td>
</tr>
<tr>
<td></td>
<td>Network SuperVisor TE</td>
<td></td>
<td>$149</td>
</tr>
<tr>
<td>Dartmouth College</td>
<td>Monitoring</td>
<td></td>
<td>$69</td>
</tr>
<tr>
<td>Datascope Communications</td>
<td>Network Vital Signs</td>
<td></td>
<td>$49</td>
</tr>
<tr>
<td>Advanced Technologies</td>
<td>TalkManager</td>
<td></td>
<td>$49</td>
</tr>
<tr>
<td></td>
<td>TalkSpy/TalkStat</td>
<td></td>
<td>$49</td>
</tr>
<tr>
<td>Farallon Computing</td>
<td>NetAdvisory</td>
<td></td>
<td>$69</td>
</tr>
<tr>
<td></td>
<td>PhoneNet CheckNet</td>
<td></td>
<td>$69</td>
</tr>
<tr>
<td></td>
<td>TrafficWatch II</td>
<td></td>
<td>$69</td>
</tr>
<tr>
<td>MacVerge USA</td>
<td>NetCrisis</td>
<td></td>
<td>$49</td>
</tr>
<tr>
<td></td>
<td>NetMailer LocalTalk</td>
<td></td>
<td>$49</td>
</tr>
<tr>
<td></td>
<td>NetMailer EtherTalk</td>
<td></td>
<td>$49</td>
</tr>
<tr>
<td></td>
<td>RouterChek</td>
<td></td>
<td>$49</td>
</tr>
<tr>
<td>On Technology</td>
<td>Status Mac</td>
<td></td>
<td>$49</td>
</tr>
<tr>
<td>SelfWriters</td>
<td>Version Territory</td>
<td></td>
<td>$49</td>
</tr>
<tr>
<td>Sonic Software</td>
<td>Radar</td>
<td></td>
<td>$49</td>
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<tr>
<td>TechWorks</td>
<td>GraceLAN Asset Manager</td>
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<td>$49</td>
</tr>
<tr>
<td></td>
<td>GraceLAN Network Manager</td>
<td></td>
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</tr>
<tr>
<td></td>
<td>GraceLAN Update Manager</td>
<td></td>
<td>$49</td>
</tr>
<tr>
<td></td>
<td>Network Utilities</td>
<td></td>
<td>$49</td>
</tr>
<tr>
<td>Trink</td>
<td>NetDistributor Pro</td>
<td></td>
<td>$49</td>
</tr>
</tbody>
</table>

- = yes; O = no; NA = not available. The table includes network management and diagnostic utilities only. Utilities included in this table do not require specific hardware for base configurations; the size of base configurations can vary. In most cases, site licensing is available.

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Just like a city street, a network can bear only a certain amount of traffic

which packets will be captured and which events or protocols will trigger the capture. This sophisticated level of analysis isn’t for everyone. For one thing, you have to be able to read packet headers and identify the relationship of protocols to network-traffic patterns. Novell file servers, TCP/IP-based Unix workstations, and Mac-to-mainframe communications, for example, all use different communications protocols. Such detail is probably more than you need if your network consists of only a few types of machines.

The two leading protocol-analyzer vendors offer separate versions of their software for Ethernet and LocalTalk networks. Neon Software’s NetMinder LocalTalk (and NetMinder EtherTalk) and AG Group’s LocalPeek (and EtherPeek) have similar capabilities. Each captures and decodes some or all packets traveling along a network; each can be configured to begin captures when certain packets appear, or to filter out packets not currently of interest. Both programs can send packets of varying size to networked devices to ascertain the devices’ status and ability to accept and transmit information without error.

Both programs stand up well against hardware protocol-analyzers, which are more expensive. The edge goes to LocalPeek and EtherPeek, which are simpler to use and full of little extras, such as the ability to graph packet activity, and a customizing function that allows you to modify any captured packet and retransmit it to the network.

Taking Stock

The proliferation of Mac models, peripherals, and software has made it difficult to manage resources on a network. To the rescue come software utilities called profilers, which are designed to gather highly detailed information about the computers on a network.

A profiler enables you to update your inventory of computers, software, and peripherals; determine whether or not a machine’s configuration is adequate (you might discover an older Mac II that doesn’t have, but should have, an accelerator board); and even perform some minor troubleshooting.

Typically, a profiler offers details about the kind of Mac (SE/30, IIsi, Quadra, and so on); the System and Finder versions, printer driver, and AppleTalk versions installed; the number and type of video boards, SCSI devices, and monitors attached; the names and versions of applications and system extensions present and/or running; the amount of RAM installed; and much more. By comparison, a utility with a listing feature, as mentioned earlier, provides details only on a network device’s name and type, address, and zone.

NetOctopus, an all-in-one network-management package from MacVonk USA, digs deeper than most profilers, offering such details as the size of a Mac’s system heap (the amount of memory set aside for the operating system) and the amount of parameter RAM (a section of memory that keeps track of the Mac’s clock settings and what devices are connected to the Mac’s serial ports).

But GraceLAN Network Manager, from TechWorks, is the best among general-purpose analyzers. Because of its low overhead—it requires only 1 MB of RAM, while others typically need at least 2.5 MB to 3 MB—the program can retrieve a vast amount of information at an acceptable speed. GraceLAN Network Manager has a useful on-screen viewing format, providing its configuration information in a scrollable display that can be sorted by any visible parameter; a menu choice brings forth an individual display for each Mac.

In addition, GraceLAN Network Manager works smoothly with GraceLAN Asset Manager, a stand-alone database built on ACTUS’s 4th Dimension. The value of network inventory data depends, naturally, on your ability to use it in meaningful ways, and GraceLAN Asset Manager’s inclusion of fields for supplies, accessories, software, and catalogs of common Mac hardware makes it a full-featured winner among network profiler databases.
package capable of installing fonts and desk accessories directly into a designated Mac's System file. The easy-to-use package employs a combination of icon-rich scripts and useful plug-in modules to accomplish the task.

Should You Buy a Bundle?
Several vendors bundle their most popular network-management packages—in some cases this is a good deal, but you should be careful not to buy more than you need.

For example, AG Group's LocalPeek, EtherPeek, and Net Watchman are sold separately at $495, $795, and $295, respectively. AG's Net Patrol Pack 1 bundle, which combines the three, costs $1395. That's a fairly high price to pay, and the savings ($190) isn't terribly significant; but if you're certain you can use all three utilities, then why not save $200?

Farallon's bundle, PhoneNet Managers' Pack, is relatively expensive ($995), but it's the most complete package available. The bundle includes Traffic-Watch II, NetAtlas, PhoneNet CheckNet, two copies of the Timbuktu screen-sharing software, the StarCommand hub-management utility, and ten copies of Dantz Development's Retrospect Remote, a backup package.

Selecting Features
Bundling issues aside, most network utilities perform more than one function, though not always equally well (see "Network Utilities at a Glance"). The challenge, then, is to find the package that offers just the features you need.

If your network is large and diverse—with hundreds of nodes and routers and several computer platforms—you're usually better off investing in a variety of software utilities or desk accessories that focus primarily on a few functions. Hand-picking network software can become expensive, but more often than not, utilities that are dedicated to certain tasks give you a higher level of control and information than the all-in-one programs. If you go this route, try to buy as many utilities from the same vendor, as they're more likely to work together smoothly.

Managers with smaller, more Mac-centered networks of less than 100 nodes should consider full-featured packages, such as MacVonk USA's NetOctopus, the jack-of-all-trades network package. Although the functions might not be as complete as those offered by dedicated applications, in the long run these programs can offer the better value for the small network.

Coming Up
Increasingly, network administrators are finding themselves responsible for a variety of computer platforms, spread out over an ever-expanding internet. With that in mind, Apple is supporting a growing set of multivendor standards; chief among them is SNMP (Simple Network Management Protocol).

SNMP is a software protocol designed for open network management and is now widely used for TCP/IP networks. Networked devices that support SNMP employ an agent, a piece of software that provides network-configuration information to the network manager. This means you'll be able to manage routers, bridges, file servers, Macs, PCs, Unix workstations, and other networked nodes from one network-management workstation. While this is currently possible through sets of proprietary management tools, SNMP's emphasis is on open network management.

SNMP promises to deliver a whole new level of management to the Mac-based administrator. But at this writing, SNMP is in its infancy in the Macintosh arena. A few router vendors currently support SNMP, and many others are expected to follow suit in the coming months. Apple has promised to deliver SNMP-compatible products in 1993, but details haven't been made available. Once the hardware is in place, you should start to see SNMP-compatible software utilities on the shelves as well.

All of this means that your job as a network administrator should become easier this year. You'll still have to deal with the frustrated marketing managers who can't print their color brochures at the last minute—but that's what job security is all about.

Shelly Brisbin is a writer based in the San Francisco Bay Area.
People often say that the world would be a pretty boring place without color. But imagine if there weren't even any gray—if everything were just black or white. That's where we'd be in the world of printing presses, laser printers, and imagesetters if we didn't have halftoning, the...
HALFTONES DEMYSTIFIED

PHOTOGRAPHIC HALFTONES

Photographic halftoning is the heart and soul of the printing process. Let's start by clearing up a common misconception (I'll address several in this article). Halftoning is not just for photographs. Any time you print gray on a page—a gray box or tinted type, for instance—you're using halftoning. It's essential, because printing presses, laser printers, and imagesetters can't print gray just black. So how can black ink (or toner) give the impression of gray?

The following table gives several examples of this formula in action.

<table>
<thead>
<tr>
<th>Resolution</th>
<th>Screen Frequency</th>
<th>Gray Levels</th>
</tr>
</thead>
<tbody>
<tr>
<td>300 dpi</td>
<td>100 lpi</td>
<td>10</td>
</tr>
<tr>
<td>600 dpi</td>
<td>75 lpi</td>
<td>65</td>
</tr>
<tr>
<td>1200 dpi</td>
<td>100 lpi</td>
<td>145</td>
</tr>
<tr>
<td>1200 dpi</td>
<td>150 lpi</td>
<td>65</td>
</tr>
<tr>
<td>2400 dpi</td>
<td>120 lpi</td>
<td>401</td>
</tr>
</tbody>
</table>
Halftoning: Key to Gray-Scale Printing

To print a continuous-tone image (for example, from a photographic negative), you must break the image into tiny spots. These spots vary in size and shape and are arranged in a grid. When viewed from normal reading distance, the spots in the printed image simulate the various gray shades in the original image.

Photographic Halftoning

Screening an Image
In conventional halftoning, you project light through a continuous-tone film image. Depending on the opacity of the various areas of the image, different amounts of light pass through the film and hit a screen (usually a plate of glass with a grid etched into it). Each square in the grid focuses light onto an area on another piece of film below. The density of the grid is measured in lines per inch and determines the frequency of the halftone screen. Newspapers use very coarse screens, around 85 lpi; some magazines use screens up to 300 lpi for high-quality printing.

Screened Film Image
Spots on the screened film vary in size according to the amount of light that passes through the screen. Intense light passing through a relatively transparent part of an image creates a large spot. Subdued light, from nearly opaque sections of an image, creates a small spot. In this way a replica of the original image is formed. Up close, conventional halftone spots are smooth and uniform in shape. Spot size can vary almost infinitely, limited only by the grain of the film receiving the light.

Digital Halftoning

Scanning an Image
As with photographic halftoning, digital halftones begin with a continuous-tone image. But in this case, light is passed through (or bounced off of) the image using a scanner instead of a screen. For digital halftoning, photosensitive cells measure the varying intensities of light passing through (or reflecting off of) the image. Each cell converts the light energy to an electric charge commensurate to the amount of light that hits the cell. Each signal is then converted to a gray value.

Activating the Dots
The output device groups black dots into halftone spots to create the halftone from a scanned image. The PostScript interpreter in the output device matches the scanned gray-scale image against the halftone grid and determines the number of dots to be turned on in each spot.

Up close, the limitations of digital halftones become apparent. Unlike the infinite variations seen in photographic spots, each digital halftone spot can vary only by how many dots there are per spot—in this case, 50 different grays are possible per spot. To get more flexibility out of the halftone spot, it must be larger—made up of more dots—thereby allowing more gray levels.
Several factors affect the screen frequency you choose for a job. This table depicts several scenarios, with the factors that limit what screen frequency can be used highlighted in bold.

<table>
<thead>
<tr>
<th>Output Resolution</th>
<th>Output Medium, Method</th>
<th>Reproduction Method</th>
<th>Paper Stock</th>
<th>Screen Frequency</th>
<th>Gray Levels</th>
</tr>
</thead>
<tbody>
<tr>
<td>300</td>
<td>paper, laser</td>
<td>laser</td>
<td>laser paper</td>
<td>53</td>
<td>33</td>
</tr>
<tr>
<td>300</td>
<td>paper, laser</td>
<td>photocopy</td>
<td>bond</td>
<td>53</td>
<td>33</td>
</tr>
<tr>
<td>500</td>
<td>paper, laser</td>
<td>offset</td>
<td>coated</td>
<td>75</td>
<td>65</td>
</tr>
<tr>
<td>1000</td>
<td>paper, laser</td>
<td>laser</td>
<td>coated</td>
<td>100</td>
<td>101</td>
</tr>
<tr>
<td>1000</td>
<td>paper, laser</td>
<td>photocopy</td>
<td>coated</td>
<td>85</td>
<td>200</td>
</tr>
<tr>
<td>1200</td>
<td>photographic paper, imagesetter</td>
<td>offset</td>
<td>coated</td>
<td>85</td>
<td>200</td>
</tr>
<tr>
<td>1200</td>
<td>photographic paper, imagesetter</td>
<td>offset</td>
<td>coated</td>
<td>85</td>
<td>200</td>
</tr>
<tr>
<td>2400</td>
<td>photographic paper, imagesetter</td>
<td>offset</td>
<td>coated</td>
<td>75-85</td>
<td>&gt;256</td>
</tr>
<tr>
<td>2400</td>
<td>photographic paper, imagesetter</td>
<td>offset</td>
<td>coated</td>
<td>90-100</td>
<td>&gt;256</td>
</tr>
<tr>
<td>2400</td>
<td>photographic paper, imagesetter</td>
<td>offset</td>
<td>coated</td>
<td>120-150</td>
<td>&gt;256</td>
</tr>
</tbody>
</table>

The Rule of 16

That simple fact brings us to the best tip in this article, which I call The Rule of 16 (it works because 16 is the square root of 256, but you don't need to know that to use the tip). This tip tells you how high the output resolution needs to be for a given screen frequency to avoid losing gray levels. You can express it in two different ways:

maximum screen frequency = output resolution + 16

or (I find this one more useful):

required output resolution = screen frequency × 16

The first one is helpful if you know your output resolution (you're using a 1200-dpi imagesetter, for instance) and are trying to decide what frequency to use. The second one is useful if you know your target screen frequency. For example, your printshop says to produce a job with a screen frequency of 100 lpi, because that's what the press and paper can handle. You multiply that by 16, and start shopping for a laser parlor that has a 1600-dpi (or better) imagesetter.

Setting Screen Frequency

Telling you to talk to your printshop to find out what screen frequency to use is sometimes good advice, but suppose you take your job to a local quick printer, and the counterperson (fresh out of high school) thinks screens are what you use to keep the flies out. How do you know what frequency to use? There are several interdependent factors to consider.

• Dot Gain Most of the problems of screen frequency revolve around dot gain—a slight spreading, or size increase, of the half-tone spots so they start to merge. It causes halftones to clog up and look dark and muddy. Dot gain is more of a problem at higher screen frequencies, since the spots are closer together. For a table of recommended screen frequencies for different situations, see “Choosing Screen Frequency.”

• Reproduction Method How are you going to print copies? If you’re using a laser printer or photocopier, don’t plan on more than about 85 lpi; at higher frequencies the halftones clog up. With offset printing, you can normally use up to a 150-line screen. Talk to your printshop for offset work.

• Reproduction Stock If you’re printing on newsprint, anything over about 85 lpi clogs up. Uncoated stock is limited to about 120 lpi (sometimes even 100 lpi, especially with less-than-white stock). Coated stock, depending on the quality, brightness, and printing method, can hold up to 300 lpi and still look good. Many printshops have trouble handling more than 150 lpi, however, even on high-quality coated stock.

• Output Method and Resolution Laser printers, no matter how high their resolution, have trouble printing good-looking grays. It’s the nature of toner-based devices. Plan on using a 75-line screen or lower, though you may eke out good results at up to 110 lpi with higher-resolution and enhanced-resolution laser printers. Imagesetters, since they use light to expose photographic paper or film, can produce very fine screens.

• Output Medium If you output to paper, even on a top-of-the-line, 3000-dpi imagesetter, you’re limited to about 100 lpi. The printshop has to photograph the paper to make film in order to produce printing plates, and shooting from paper originals results in significant dot gain. If you want more than a 100-line screen, you need to output directly to film. This also brings up a tip for users of Apple's PhotoGrade and other high-res laser-printing methods: print page masters (from which plates are made) on acetate instead of on paper to reduce dot gain and therefore make the output more reproducible on press.

• What You’re Printing If your publication contains no photographs or graduated tints, you may not need the whole gamut of 256 gray levels. In that case, consider going to a higher screen frequency even if you don’t have the resolution to support it under The Rule of 16. If you use only 2 or 3 or 4 different gray levels for tints in your publication, it doesn’t matter if only 24 gray levels are available.

Controlling Screens in Software

So how do you control screen frequency? It depends on what programs you’re using, and in what combinations. Most desktop publishing, image-editing, and illustration programs provide means to control the halftone screens—frequency, angle, and spot shape—for the documents they produce (see “Setting Screens”). If you’re using a single program and a single screen specification for the whole publication, setting the screens is pretty straightforward. But to create parts of your publication in one program and then place them on a page in another, there are some special fac-
Digital Quality Trade-Offs

Digital halftone spots are made up of printer dots. The number of dots in each spot corresponds to the number of gray levels the spot can represent. The larger the spot, the more dots—and the more shades of gray that can be represented, at the cost of a coarser screen at a given output resolution. A finer halftone screen creates smaller spots composed of fewer dots. This may sharpen details, but reduces the number of gray levels that can be represented. This results in posterization, creating a stair-step effect in moving from one shade to the next.

At 300 dots per inch, a 53-lpi per-inch screen yields 33 shades of gray (including white). Each halftone spot is made up of 32 printer dots. This relatively small number of gray levels is not aesthetically jarring in such a coarse image.

A finer halftone screen, when used on a laser printer, reduces the number of gray levels. Here, 300 dpi with a 133-lpi screen yields only 6 shades of gray. Although the image is more detailed, the finer screen creates abrupt shifts in shade.

Higher-resolution output devices, such as imagesetters, employ higher screen frequencies without sacrificing as many gray shades. Because printer dots are smaller, more dots can fit into a smaller halftone spot. At 1200 dpi with a 150-lpi screen, we get 64 shades of gray.

Increasing the output resolution increases the number of gray levels. Here, 2400 dpi at 150 lpi yields 256 shades of gray—eliminating posterization.

Special Effects Using Spot Shape

Common Halftone Screens

Below are a variety of halftone spot shapes and screen angles. At finer screen frequencies (133 lpi and up) screen differences are barely noticeable. At coarser frequencies (85 lpi and down, as shown below) the screen becomes visible, and using a different spot or angle has an obvious aesthetic effect. Screening options vary from program to program.

Custom Halftone Screens

A few programs, such as Adobe Photoshop, Letraset ColorStudio, and Aldus FreeHand, allow you to create custom halftone screens. The image below was screened using a custom pattern created in Photoshop.

Custom patterns in Photoshop can be any size. The larger the pattern, the more random it will appear in the final halftone.
Dots versus Spots: A Glossary

One problem with understanding halftones is the fast-and-loose way that most people use the terminology—one word can mean several things. Here’s a rundown of generally accepted definitions.

Dots: The marks that laser printers and imagesetters make on a page. Prepress experts always refer to the resolution of these devices in dots per inch (dpi), so this is a natural and inescapable term.

Torors to understand. You should also consider these factors if different elements on a page use different screen settings (flat tints use one screen, for instance, while scanned images use another).

• Using the Device Default With most applications, if you simply create a document and print it on a PostScript device, you get the device’s default screen settings. On 300-dpi laser printers, for instance, that’s generally a 45-degree, 53-line, round-spot screen. You can experiment with your laser printer to determine its defaults, or ask your service bureau to determine the defaults for their devices.

• Setting the Publication Default Most publishing and illustration programs let you set up a publication default screen setting that overrides the device’s default settings. The application applies its default setting to every element for which the screen isn’t otherwise controlled. If you want everything in your document to print with a 75-line, 45-degree screen, you set that up as the publication default.

• Overriding Settings for Selected Items Some programs give you the option of setting screens for individual items in a document. PageMaker and QuarkXPress, for instance, let you set the frequency, angle, and spot shape for imported bitmaps. FreeHand lets you set frequency, angle, and spot shape for any element. This object-level setting overrides the publication default, but only for that item. It’s useful for special-effect screening (applying a 20-lpi, 45-degree line screen to a box, for instance), and for controlling screening for all your scans independent of other tints in the document.

• Saving Settings in EPS Files If you create a scan or illustration and save it as an EPS file, you can include screening instructions in that file. When you place that EPS image on a page in another application, the screening settings in the EPS file override the publication’s defaults and even the item-level overrides you set in that application. EPS is the only file format that allows you to include screening instructions.

• Overrides within Overrides One final subtlety: Suppose you create an illustration in FreeHand, and set the screening for some of the elements in the illustration, but not all. Then you save the illustration as an EPS file and import it into QuarkXPress. The items within the illustration that have screening instructions set will use those settings. The other elements will print with the QuarkXPress default settings.

There’s a whole lot more to know about halftoning and digital halftoning, some of which I’ll be covering in an upcoming article on producing high-quality output from scanned images. For the time being, however, the basic rules and formulas laid out in this article will take you a long way toward that elusive goal—mastering the black art of getting good grays.

STEVE ROTH is coauthor of Real World PostScript (Addison-Wesley, 1988) and Real World PageMaker 4 (Bantam Computer Books, 1990), and editor of Real World FreeHand and The QuarkXPress Book (both from Peachpit Press, 1991).
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IN THIS ISSUE: ElectricImage Animation System, Action, Power Portrait, Microsoft Works, Magnet, WideWriter 360, SimLife, Inspiration 4.0, Sketcher 1.0, Insanity, and more

Microsoft PowerPoint 3.0

PROS: Automated templates; extensive system of master layers; comes with OLE software architecture; reliable cross-platform compatibility; includes Equation Editor; screen-show capabilities include QuickTime support, flying bullets, smooth color transitions, and on-screen annotation.

CONS: Small collection of predefined templates; can't blend between two custom colors when defining gradient background; limited zoom options; can't embed TrueType fonts.


Since December 1988, when Microsoft shipped PowerPoint one month after the release of Aldus Persuasion 1.0, PowerPoint has remained frozen in time. To put it in perspective, the cold war ended, Iraq invaded and then fled Kuwait, the Bush administration came and went, and Microsoft PowerPoint shifted from version 2.01 to 2.01f. Short of bribery, PowerPoint was bound to rank dead last in any survey of Macintosh presentation programs. That's why the newest update is so remarkable. Though occasionally stingy in the flexibility department, PowerPoint 3.0 offers more features per kilobyte than any other presentation program for the Macintosh.

Making Up for Lost Time

Thanks to the long hiatus, Version 3.0 expends much of its energy playing catch-up with the former presentation kingpin, Aldus Persuasion. Like Persuasion, PowerPoint now offers automated templates for managing the appearance of your slides. You can change color schemes, text formatting, and slide backgrounds by simply importing a new template. You can even use an existing presentation file as a template. But whereas each Persuasion 2.1 template contains several master layouts so you can vary the slides' appearance while maintaining a consistent design scheme, PowerPoint offers only one master layout per template. And stocked with only 40 designs, its ready-made template collection is pretty darn paltry.

As if to make up for its middling templates, PowerPoint provides outstanding organizational options, matching Persuasion item for item. Not only can you use a master slide to position repeating background elements and specify the formatting of titles, body text, and bulleted items, but you can also establish master layers to aid in the printing of outlines, speaker notes, and handouts. You can open multiple files, rearrange your presentation in a slide-sorting window, check spelling, and search and replace key phrases. A text ruler enables you to specify up to five levels of indentation. You can assign each level a special bullet by selecting a symbol from a table that shows every character in the current font.

PowerPoint's color capabilities surpass Persuasion's for convenience and ease of use. In PowerPoint, you can give a new color scheme to a single slide or an entire presentation at will. If you're not comfortable with setting up your own color scheme, PowerPoint breaks with Persuasion and walks you through the process. For example, after you select one of 90 background colors, PowerPoint brings up a sampling of text colors that go well with the selected background.
Then, based on the color you selected for your text, the program displays several palettes of miscellaneous colors that go with both background and text. Even if your tastes run toward avocado appliances against cornflower blue wallpaper, you can't go wrong. In typical fashion, PowerPoint supports 24-bit color and enables you to import PICT, TIFF, and EPS scans and artwork. You can also create gradient backgrounds, though this feature could stand some rethinking (PowerPoint lets you blend between any color and a lighter or darker version of that same color only; you can't blend between two custom colors, nor can you create radial gradations).

The Microsoft Way
IN TERMS OF CONVENIENCE FEATURES, PowerPoint has Persuasion beat. PowerPoint takes the guesswork out of opening presentations and templates by providing a fast-displaying thumbnail preview of any file you select. The tools and icons that create the presentation window let you quickly access formatting options, drawing tools, and magnification settings. (I would be willing to trade some of this convenience for a more extensive collection of zoom options. Currently, PowerPoint's zoom levels jump from 66 to 100 to 200 percent with no variations in between.) From the desktop publishing arena, PowerPoint borrows the Smart Quotes option, which replaces generic straight quotes with meaningful curly quotes. Finally, as in any self-respecting Microsoft product, you can drag selected text in an outline rather than having to rely on the Clipboard to rearrange words and paragraphs.

Snubbing System 7's Apple events, PowerPoint is the first product on the Mac to include Microsoft's OLE (Object Linking and Embedding) software. Ported from Microsoft Windows in the form of 100K worth of system extensions, OLE acts like publish and subscribe—which PowerPoint also supports—without the hassle of having to save a file to disk. You can copy data, text, and/or graphics from an OLE-compatible server and then paste it as an embedded object into an open presentation.

To edit the embedded object from inside the presentation file, simply double-click on it. PowerPoint launches the embedded object's application and displays the object in a new window. After you make your changes, close the window—no saving required—to return to PowerPoint and see the updated object in the presentation. You can also use the Insert command to access the self-running Equation Editor and Microsoft Graph applications, both bundled with PowerPoint. Using OLE, I experimented with embedding objects using formatted text from Word's 5.0a and a 3-D chart from Excel 4.0. The Excel chart was unable to create a worksheet, preventing me from editing the data, but otherwise OLE worked like a dream—better, frankly, than other techniques I've seen performed with Apple events, and better than publish and subscribe.

As if to strengthen its footing on the Mac, PowerPoint ships with a slew of TrueType fonts, most of which are no more than renamed versions of well-known classics. Arial is TrueType for Helvetica, Book Antique equals Palatino, Century Gothic takes the place of Avant Garde Gothic. Only Wingdings is unique, this being the symbol font responsible for the controversy surrounding the New York Post's "Program of Hate" article. (In case you don't know what I'm talking about, typing NYC in this font creates a poison symbol followed by a Star of David followed by a thumbs-up. Microsoft claims that any such relationship between letter keys and symbols is purely coincidental; very possibly it is, in light of the fact that the font has symbols for Christianity and Islam as well as a spectrum of other common icons—but it reportedly ruffled some feathers in the Big Apple and elsewhere.)

If your business requires a lot of file-swapping between Macintoshes and DOS machines, PowerPoint surpasses Persuasion, but only just barely. PowerPoint includes 16-color versions of its templates so you can prepare your presentation for display on a VGA monitor. The Macintosh and Windows versions of PowerPoint share the same menu commands, tools, and icons, and have similar key-board equivalents and nearly identical native file formats. This allows PowerPoint to retain TrueType fonts and embed OLE objects when you switch platforms. However, QuickTime movies and 24-bit images are not retained when you switch to Windows. You should also note that while PowerPoint for Windows can embed TrueType fonts so that all text appears in the correct font even when played on a different machine, PowerPoint for the Macintosh lacks this capability.

Screen Display
POWERPOINT'S 35MM SLIDE-printing capabilities are nothing to write home about. Though software is included that enables you to prep files and download them to a Genographics service bureau, PowerPoint provides no inherent printing advantages over Persuasion. Where PowerPoint does raise the stakes is in the on-screen presentation department. Like Persuasion 2.1, PowerPoint lets you embolden your screen shows with QuickTime movies. While Persuasion provides a more versatile build feature—enabling you to assign text blocks and images to separate layers and then display layers sequentially—PowerPoint provides better transition effects. For example, you can animate bulleted items by flying them in from off the screen. You can even preview transition effects and specify the speed at which transition effects occur independently of the CPU speed.

When you have to rely on an 8-bit monitor or lower, PowerPoint automatically dithers 24-bit images and gradient backgrounds and dynamically adjusts the palette to include the optimal collection of colors. To eliminate flickering when you're moving between different-color slides, PowerPoint animates color adjustments to coincide with the transition effect. If you run your presentation on a machine that lacks some of the fonts you've used, PowerPoint provides a dialog box that lists your presentation fonts and suggests alternatives that you can substitute for them. Finally, you can annotate a slide by drawing on screen, much as you might embellish an overhead projection with a felt-tip marker (see "Doodling on the Slide").

I encountered only one performance problem. If you rely on ALSoft's Master-Juggler type-management utility, you'll continue.
need to disable it when using PowerPoint. If you don’t, PowerPoint can take several seconds to perform simple actions like selecting text blocks and choosing commands. On the bright side, if you rely on an extensive font library, you’ll be gratified to know that PowerPoint supports Adobe Type Reunion, even inside dialog boxes.

Like other Microsoft products, Word and Excel among them, PowerPoint is a program with obvious though not extensive deficiencies—problems that could be cleaned up with a minor upgrade. Based on the past performance of the product, this comes as no surprise. What does surprise me is that PowerPoint also joins the ranks of Word and Excel in dominating its class. For the first time since Persuasion’s debut four years ago, Aldus no longer owns the presentation market.

—DEKE McCLELLAND

Macromedia/Animation Program

Macromedia Director 3.1

PROS: Imports, edits, and exports QuickTime movies; new Lingo commands; includes Macromedia Director 3.1 Accelerator.

CONS: Complex interface; can’t import TIFF images; Accelerator cannot accommodate bit-depth incongruities; overpriced.

COMPANY: Macromedia (415/252-2000).

REQUIRES: Mac Plus, 2MB of RAM; hard drive; System 6.0.7. Recommended: 8MB of RAM; color monitor.

LIST PRICE: $1195.

MW ★★★

If you’ve ever used Macromedia Director, you know it to be a powerful and versatile multimedia authoring tool with an extremely daunting interface—hardly the thing for the casual user but just the ticket if you’re a multimedia enthusiast who’s grown frustrated with the limitations of traditional presentation and 2-D animation programs. Director also satisfies disenchanted HyperCard users with Lingo, a scripting language, and an integration of XObjects, the latter enabling you to add drivers and other coded routines to the resource fork of a Director file. You can even integrate HyperCard-compatible XCMD and XFNCN resources into Director scripts, as long as these resources do not call on commands and capabilities specific to HyperCard.

In addition to fixing a long list of problems throughout the program, Director 3.1 expands on its predecessor’s capabilities in three key areas: the new version adds 23 scripting commands; it lets you import and edit QuickTime movies; and it includes Macromedia Accelerator, a utility that compiles movies into a faster playback format. But while the expanded capabilities are fine, they come at a price. At a list price that is $200 more than Director 3.0, this is one update that previous owners of the program—especially those who purchased Accelerator separately—can afford to miss.

QuickTime Gets Quicker

Unlike some other products that have added QuickTime support, Director 3.1 allows you to do more than play a movie and adjust its volume. In fact, most of the program’s new capabilities revolve around QuickTime. As with any other castmember—whether it’s a graphic, text block, or sound—you can create scripts that modify a movie’s behavior. Of Director’s new Lingo commands, nearly half of the commands enable you to program adjustments to QuickTime castmembers, find out the duration of a movie, play the movie backward, specify the frames at which the movie starts and stops, and so on.

Even though Macromedia Director was not specifically designed for this purpose, it suffices as a QuickTime movie editor. It can play a movie over a specified duration of frames—just like a sound—while it animates other castmembers in front of and in back of the movie. You can cut away frames if a movie is too long. You can also combine two different movies by copying frames from the first movie and pasting them into the second. When you have finished integrating text, graphics, and sounds with your QuickTime castmembers, you can export the whole thing to the QuickTime format. If you like, Director can crop or scale your file down to the 120-by-160-pixel QuickTime 1.0 standard.

Accelerator 3.1 also supports QuickTime movies, though it strips the movie—as it does the rest of a Director file—of any sound. As always, Accelerator performs a remarkable job of compiling Director files for play at speeds of 30 frames per second and greater. You can also make simple tempo adjustments to a file. My only complaint with Accelerator is an old one: the utility requires that the bit depth of your monitor match the bit depth of your Director file. For example, if you want to compile an 8-bit movie, then you have to set your screen depth to 256 colors. I allocated 10MB of application RAM to Accelerator under System 7.1 and then tried to accelerate a 1.3MB 8-bit movie while the monitor was set to millions of colors. Five minutes later, Accelerator gave up because the image was too complex, and then the program unexpectedly quit. With the monitor set to 256 colors, Accelerator compiled the file in about two minutes with only 4MB of RAM.

18 Percent Annual Inflation

Director offers a few other minor enhancements, including support for the Microsoft Windows media-control interface and a Lingo command that interprets large, double-byte character sets, such as the ones used in international alphabets and Apple’s System 7.1 WorldScript. But the most significant enhancement is Director’s new price tag. What began as a $695 product four years ago—not counting a previous $295 incarnation as VideoWorks—increased to $995 with version 3.0. No more than a minor update, version 3.1 adds a whopping $200 to the price tag ($149 for registered users of Director 3.0). Granted, that barely covers the $195 Macromedia charges for the Accelerator utility on its own, but now you have to buy the utility whether you like it or not.

Go ahead, call me Ebenezer. Say I pinch pennies so hard they give up and become dimes. After all, there’s no denying that Director 3.1 is twice the product it was back in its $695 days. But so are leading applications in every other class of software: QuarkXPress, Microsoft Word, Aldus Persuasion. The difference is that not one of these programs has added so much as a dollar to its price tag over the years, much less nearly doubled it. Macromedia’s persistent attention to its bottom line greatly diminishes the value of a strong piece of software.

—DEKE McCLELLAND

The Many Windows of Director

Macromedia Director can now accommodate QuickTime movies as castmembers. As with sounds, you can play a QuickTime movie simultaneously with animation created inside Director.
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WHEN I REVIEWED DATEBOOK 1.0 (Macworld, Reviews, October 1992), the program had many strengths but suffered from the version 1.0 curse: some features were poorly implemented, and there were bugs. Version 1.5.1 fixes those bugs, improves some old features, and adds some welcome new features.

DateBook's printing has been improved. DateBook 1.5.1 now lets you include the Description field when you print views, and you can now correctly print weekly views in day-planner formats. The major printing bugs, which included problems with background printing and incorrect text scaling, have been fixed. After Hours has also added a page in the manual that shows, with diagrams, how to print double-sided day-planner pages.

The program's multiuser feature has been included in this version. I was able to share the calendar data file with three Macs using System 7 file sharing with no problem. I also had no problem accessing information across the AppleTalk network. In order to keep network traffic to a minimum, each client has control over how often his or her view of the calendar is updated. Like DateBook 1.0, version 1.5.1 lets you associate an alarm with an event or a to-do item. At a specified time, the alarm pops up a reminder dialog and plays a sound. In single-user mode, however, alarms apply only to the user who sets them; you can't set one alarm to go off for all users.

Most welcome in DateBook 1.5.1 is the improved handling of recurring events. In DateBook 1.0, when you set a recurring event, all occurrences are saved as separate events, with no link between them. If you want to change the time of a recurring event, you have to change each event separately. In the new version, if you change one event of a recurring chain, DateBook asks if you want to apply the change to some or all of the other events in the set.

After Hours has also added some new features. The program now handles events that overlap in time (see "Years and Dates"). You can display the text of events and to-do items in each day in the calendar views. Other new features include a Today button at the top of each view that takes you to the current date in one click; a faster way to reach any date (option-clicking on the Date Selector pop-up menu brings up a calendar window showing the entire year); improvement to the Holiday schedule (holidays now show up in the views); and the addition of keyboard commands.

DateBook 1.5.1 is a more stable product than the original version. I experienced no crashes and found only one screen redraw problem, and that occurred only on PowerBooks. (The company plans to fix this problem in the next version.) Integration with TouchBase, After Hours' address manager, has also been improved. This integration feature looks up address and telephone information from the TouchBase data file and inserts it into a DateBook event or to-do record. You can also post information from DateBook to TouchBase.

DateBook still has some room for improvement. I'd like to see it implement the calendar-updating capabilities of Now Software's Now Up-to-Date; Now users can have their own personal calendar, which updates when the user connects to the network calendar server. One of DateBook's most appealing features is that you don't need to have the program open to work with your events or to-dos; the program has a small window that pops up in the Finder that lets you view or change your schedule. I wish you could also add alarms from this Finder palette the same way you can add and modify events and to-dos. But these features would be icing on the cake. With the improvements in DateBook 1.5.1, I can now recommend the program wholeheartedly to anyone who needs a personal time manager.—TOM NIGRINO

**TypeReader 1.0**

**PROS:** Straightforward interface; supports HP's AccuPage technology; excellent manual; good format-recognition features. **CONS:** Stiff hardware requirements; limited formatting features in editing window; no support for publish and subscribe or Apple events; no training features. **COMPANY:** Expervision (408/428-9988). **REQUIRES:** Mac II; 4MB of free RAM; 9MB of hard drive space; SuperDrive (800K disks available by request); System 6.0.5. **LIST PRICE:** $695.

**A LARGE SELECTION OF OCR (OPTICAL character recognition) programs are available for the Mac, but most don't do a good job of translating page scans into editable text files. In Macworld Lab tests performed last year, only Caere Corporation's OmniPage Professional and Xerox Imaging Systems' AccuText delivered acceptable accuracy across a wide range of documents (see "From Page to Pixel," Macworld, July 1992).

OmniPage and AccuText have company now. Expervision recently released a Macintosh version of TypeReader, an OCR package that debuted under the Microsoft Windows environment for DOS PCs. Although TypeReader doesn't do everything its competitors—particularly OmniPage Professional—can do, it does combine speed and excellent accuracy with a straightforward operating style. It's a major contender among high-end OCR programs.

Like its competitors, TypeReader has hefty hardware requirements, starting with 9MB of hard drive space and 4MB of RAM. (That's 4MB of free RAM, not a 4MB Mac. If you're running System 7, you need an 8MB machine to run TypeReader.) If you have an original Mac II, you must trade TypeReader's high-density disks for 800K floppies. The TypeReader box doesn't list this requirement; it is mentioned in a text file on one of TypeReader's disks, but you can't read the file unless you have a SuperDrive.

TypeReader supports most of today's popular scanners, including models from Apple, Abaton, Dest, Hewlett-Packard, La Cie, and Microtek. Like OmniPage Professional and AccuText, TypeReader continues...
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also supports HP's AccuPage technology, which allows the OCR program to adjust the brightness and contrast of the scan in order to better capture text printed on shaded backgrounds.

TypeReader can also open TIFF and PICT image files created by other scanning software. Unlike OmniPage Professional, TypeReader provides no image-editing capabilities. You cannot, for instance, touch up a damaged character or erase a coffee stain.

One way an OCR program streamlines the OCR process is to automatically identify blocks of text on a page. TypeReader's page-decomposition features match the competition's. You can tell the program to automatically locate text blocks, or you can designate blocks manually by enclosing them in a frame (see "Recognizing Text"). You can change the order in which TypeReader recognizes blocks, and if you routinely scan similarly formatted documents, you can create templates that describe the location of text zones. You can also specify that TypeReader treat text as snaking columns (newspaper-style) or as tabular columns.

Recognizing and Editing

**THE RECOGNITION PHASE IS THE MOST IMPORTANT STEP IN ANY OCR JOB.** It's when the OCR program applies a battery of complex shape-analysis techniques to identify the characters. In most of the tests run by Macworld Lab, TypeReader was more accurate than AccuText and ran neck and neck with OmniPage Professional (see "OCR Results"). It even did a respectable job on faxes. As for recognition speed, TypeReader was always faster than AccuText, and usually faster than OmniPage Professional.

TypeReader automatically retains character-formatting attributes such as boldface and italic. It even lets you assign a font to serif, sans serif, and monospaced (nonproportional) text. For example, you can tell the program to format all sans serif text in Helvetica, all serif text in Baskerville, and all monospaced text in Courier.

Like AccuText and OmniPage Professional, TypeReader recognizes text in the background under MultiFinder or System 7. TypeReader also provides a deferred-recognition option that enables you to scan a stack of pages but postpone recognition.

Unlike AccuText and OmniPage Professional, TypeReader does not provide a training feature—for teaching the program how to read a character that otherwise stumps it. As a result, TypeReader might not be the best choice for recognizing certain troublesome documents, such as those created on a typewriter with damaged keys.

TypeReader does provide an excellent spelling checker that also includes dictionaries for common geographical, legal, and medical terms. (Caere sells its medical and legal dictionaries separately.) Like AccuText and OmniPage Professional, TypeReader provides a pop-up verifier window that lets you compare a suspect word against a magnified version of the word as it appears in the scan.

Like OmniPage Professional, TypeReader provides a text-editing window that lets you read and polish recognized text before saving it. TypeReader's editing window falls short of OmniPage Pro's, however. There's no ruler for changing line spacing and indents, nor can you mix and match fonts and type sizes. (TypeReader limits you to just one serif or sans serif font.) Worse, there isn't even a standard word-wrap feature—a line simply gets longer or shorter as you add or remove text. TypeReader users will definitely want to use a separate word processor for fine-tuning.

As for exporting, TypeReader can save text in all popular formats, including Word, MacWrite, WordPerfect, WriteNow, RTF (rich text format), and Excel.

**Where to Turn**

OMNIPAGE PROFESSIONAL HAS SOME TALENTS that TypeReader lacks. One is support for System 7's publish and subscribe data-exchange mechanism; another is the ability to transmit recognized text directly to another program using System 7 Apple events. I don't consider either omission significant, since you can use text files or the Mac's Clipboard to move text from TypeReader into another program.

If you need training features, you should consider OmniPage Professional or AccuText. If you want glitzy System 7 data-exchange features or a text-editing window with more formatting features, go with OmniPage Professional. But if you want excellent speed and accuracy, thorough documentation and online help, and ease of use, check out TypeReader. But before you buy, try to visit a dealer that will let you audition a few programs using the types of documents you plan to scan. That's the best way to accurately determine how well a program will read what you throw at it.—JIM HEID

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### OCR Results

All tests were performed using a Mac IIci with a cache card, 8MB of RAM, 32K RAM cache enabled, in back-and-white (1-bit) and in 32-bit modes.

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<thead>
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<th>CHALLENGING DOCUMENTS</th>
<th>MULTIGRAM DOCUMENTS</th>
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<tr>
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<td>98.8%</td>
<td>100.0%</td>
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</tbody>
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194 February 1993 MACWORLD
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TWO OF APPLE'S THREE NEW NOTEBOOKS go a long way in making the PowerBook the all-in-one Mac. With the addition of video-out ports and the ability to have up to 14MB of RAM installed, the PowerBooks 160 and 180 have what it takes to do serious computing, both on the road and back at the office.

The new PowerBook 145 is an updated version of the discontinued 140. It's essentially the same machine, except that the CPU is a faster, 25MHz 68030, compared with the 140's 16MHz 030. Otherwise, it has the same limits as did the first-generation PowerBooks: memory expansion limited to 8MB, hard drive capacity limited to 80MB, no video-out port, and a black-and-white display. For occasional users—those who need a notebook only while traveling—the 145 has appeal as the lowest-cost PowerBook. But for most people, the few hundred dollars more for the 160 is a wiser investment.

The 160 and 180 are the notebooks of choice for most Macintosh users. (The 160 and 180 both replace the 170, offering the same or better processing speed but with more expansion options.) The essential differences between the 160 and 180 are in processing ability and in video-display quality. All their other features—software, interface, ports, and other hardware options—are identical.

### Processing Power

**FOR PROCESSING, THERE ARE TWO SIGNIFICANT DIFFERENCES BETWEEN THE 160 AND 180. First, the 180 has a faster processor: a 33MHz 68030, compared with the 160's 25MHz 030. Second, the 180 has a built-in 68882 math coprocessor; the 160 has no such coprocessor nor any option to add one later. Few business applications take advantage of the coprocessor, however, whereas the 180's faster processor will appeal to users running complex applications or working with large files.**

Although the 180 is the fastest Apple notebook, it is not the fastest Mac notebook. Two other notebooks—the 33MHz 2030S and the 40MHz 2030V from Outbound Systems (303/786-9200)—surpass the 180's overall speed. But the Outbound notebooks—while more upgradable and faster than the Apple PowerBooks—don't have built-in video or support color display on external monitors, which are critical considerations if you intend to use a notebook with a standard monitor.

**Expect Outbound's notebooks to remain the speed champs for some time, since the 68040 processor that would give Apple the speed edge is not available in a low-power-consuming version, and the regular 68040 takes so much power that a notebook wouldn't last more than about 45 minutes before draining the battery in everyday use. Motorola is rumored to be working on a low-power 68040, but until it is released, Mac notebooks will continue to be based on the 68030 processor.**

Though the 030 processors in the 160 and 180 are sufficient for today's more complex applications, the ability to expand the RAM to 14MB is welcome. Just having System 7, one major application, plus a few INIT's running can easily surpass the 4MB of RAM that's standard on most PowerBooks. Indeed, the review units I looked at all came with 4MB, and I constantly got messages telling me I was out of memory, even though I had only Excel plus Adobe Type Manager, or Fractal Design Painter alone, loaded. Make sure you get 8MB of RAM, whichever notebook you buy.

### Display Differences

**LIKE THE 145, THE 160 HAS A PASSIVE MATRIX DISPLAY, WHICH IS ADEQUATE FOR ON-AND-OFF USE but not for all-day use. The nature of passive matrix technology means you can expect to see ghosting, to have slow screen updating as you move elements, and to be limited in the angle at which you can view the display—if you get too far afield, the image starts to disappear. The 180's active matrix display, by contrast, can be viewed from nearly any angle and offers crisp images and fast refresh times. But that beautiful display adds about $1000 to the price. This is due to the nature of the technology used, not price-gouging on Apple's part. If a notebook is to be your main Mac, spend the extra money for the active matrix display—your eyes will thank you.**

The 160 and 180 are the only Mac notebooks to offer gray-scale displays. The 16 levels of gray offered are inadequate if you expect to do detailed work with Photoshop or Fractal Design Painter or a page-layout program, but no liquid crystal display (LCD) currently available can provide the levels of gray an artist would need; but 16 levels are fine for preview graphics. And for the many users who run nongraphics applications, the 16 levels provide a nicer display than a monochrome LCD (as in the 145).

The shades of gray (actually, a steel blue) are pleasing to the eye and give the menus and folders and icons a soft, inviting touch, as "Display Comparison" shows.

The passive matrix and active matrix technologies do have an effect on the gray's display, however. On the 160's passive matrix LCD, the grays are muddier, the whitest white is not very white, and the blackest black is not very black. In photo-editing terms, the 160's grays cluster around the midtone values. By contrast, the 180's active matrix display shows very dark blacks and very light whites, but the midlevel grays are less subtle, and there is noticeable banding on images that have a full range of grays. Also, the contrast controls work differently on the passive matrix and active matrix screens—you get the best contrast on the 160 by placing the slider at its midpoint, while on the 180 you place the slider at the far left for best contrast.

You'll see many DOS notebook vendors advertising 64—or even more—levels of gray. By that yardstick, the Apple PowerBooks look to be downright dowdy. But there's less to those claims than meets the eye. LCD technology limits the numbers of grays (or colors) that the crystals can display. Many DOS notebooks advertise a higher number than their LCDs are really capable of—they either state the LCD's theoretical capabilities or the number of colors available from the note-

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**Notebook Macs**

**PowerBook 145**

**PROS:** Most inexpensive PowerBook; moderately fast processor. **CONS:** No built-in video port; limited RAM and hard drive expansion capability; RAM upgrade requires dealer installation; cannot be attached to a desktop Mac as a SCSI device. **COMPANY:** Apple Computer (408/996-1010). **LIST PRICE:** $2149 to $2499.

**PowerBook 160**

**PROS:** Built-in video port; moderately fast processor; sophisticated battery-management software; fairly large RAM expansion capability; provides 16 levels of gray. **CONS:** Limited hard drive capacity; video port is not standard Mac video port; RAM upgrade requires dealer installation. **COMPANY:** Apple Computer (408/996-1010). **LIST PRICE:** $2429 to $3149.

**PowerBook 180**

**PROS:** Active matrix display; built-in video port; fast processor; sophisticated battery-management software; fairly large RAM expansion capability; provides 16 levels of gray. **CONS:** Limited hard drive capacity; video port is not standard Mac video port; RAM upgrade requires dealer installation. **COMPANY:** Apple Computer (408/996-1010). **LIST PRICE:** $4109 to $4469.
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book's palette, not the number that can be displayed simultaneously. By contrast, Apple is conservative in its claims of gray levels—a refreshing approach to marketing. (Of course, some DOS notebooks—particularly those from better-known vendors—can display more than 16 levels of gray, as many as 64.)

An important addition to the PowerBook 160 and 180 is built-in video support. You can now hook up an external monitor without an expensive adapter. The PowerBooks give you two modes in which to run the external monitor: normal dual-display mode; or mirroring mode, where the same image is shown on both screens. Mirroring is helpful if you are showing an audience step-by-step how to accomplish a task. (Use the PowerBook Display control panel to select mirroring mode.)

The external video is simple to enable: Plug the monitor into the adapter cable that comes with the PowerBook and restart the PowerBook. But be warned that the PowerBook must be plugged into an electrical outlet for the monitor to work. The PowerBook will not run an external monitor if it is using battery power, since the extra video processing needed to drive the external monitor consumes battery power quickly.

If you have a VGA monitor or LCD projection panel, you need a Mac-to-VGA adapter, which you can get from the monitor maker, an electronics supply store, or James Engineering (510/525-7350). However, not all adapters are alike. We tested three adapters, and two resulted in a purple cast over the entire screen. The third adapter gave us the true, unadulterated colors we expected.

When you have an external monitor connected, you'll notice that the screen seems to be shorter than a 14-inch monitor's standard 640-by-480-pixel screen when running in mirroring mode. Because of how LCDs are made, they are limited to 640-by-400-pixel screens, and since mirroring mode duplicates the LCD screen display, the result is 80 fewer pixels vertically on the external monitor. The effect on an external monitor is like watching a classic movie like Lawrence of Arabia in letterbox format on your TV.

In either mirroring mode or dual-monitor mode, the display quality meets Apple's usual high standards—the color (256 maximum on 16-inch and smaller monitors) is superb, and the screen refresh is quick.

Odds and Ends
APPLE HAS ADDED A FEW SUBTLE BUT nice touches to its 160 and 180. First, these PowerBooks support SCSI disk mode, which means you can attach them via a SCSI cable to another Mac and see their drives' contents as if they were standard SCSI devices. Sony designed that feature into the PowerBook 100 (all the Outbounds offer it as well), but these are the first (and only) Apple-designed notebooks to have it. This feature is not free—it costs $39 for the special SCSI connector needed. Still, it's a welcome addition, since it makes file transfer a snap. Too bad the 145 didn't add this feature.

Apple has enhanced the battery-management software on the 160 and 180 to give you more options. One option is a slider bar in the PowerBook control panel that lets you determine the trade-off between battery life and overall performance. To increase battery life, you can make the hard drive spin down when inactive. Other options include dimming the screen after user-defined intervals of inactivity, and slowing down the processor to 16MHz (which is fine for text-oriented applications and moderately complex operations).

These options extend the life of the PowerBook's battery—which is important, since a PowerBook 160 or 180 has only enough power for about 45 to 50 minutes of continuous, full use, according to Macworld Lab's tests. The Macworld Lab tests use the screen at full brightness, with the dim option off, the power-to-conservation trade-off at 75 percent, and the hard drive constantly in use. For everyday usage patterns, this translates to about 1½ hours of usage.

Finally, Apple added a Kensington MicroSaver security device ($59.95, 415/572-2700) to the back panel. This device lets you lock your PowerBook to a chair or desk. The Kensington device is also found on several popular DOS notebooks, so it's likely this device will become a standard, making it easier to find extra security cables.

Usability Quibbles
DESPITE THE MANY WELCOME ADDITIONS in the PowerBook 160 and 180, I still quibble with some of the ergonomics choices Apple has made. I realize that the many chips on a Mac, compared with the fewer chips on a DOS computer, give Apple less flexibility in laying out the components in the notebook's cramped space, but I believe some better choices could have been made. After all, Outbound's notebooks offer more flexibility in the same confines. For example, the Outbound notebooks use standard SIMMs, and their RAM, hard drive, and even their processor are easily upgradable (even by a proficient user, not just by dealers).

Other things on my wish list are implemented in better DOS notebooks but in no Mac notebooks. One request is that Apple use a standard Mac video port on its notebooks. The current port on the 160 and 180 requires an intermediate cable—basically an adapter—which is one more thing to lose. (The cable does have a locking mechanism, so at least it won't pull out of the PowerBook.) Also, the restart button is not easily accessible—it's behind the ports panel at the back of the notebook. A restart button near the keyboard would be much more convenient, and it could be designed to avoid risking accidental restarts.

The Apple keyboard could be improved. First, the keys are slightly too close together, making touch typists reorient their finger motions when moving to or from another Mac. DOS notebooks have the same keyboard spacing as DOS (and Mac) desktops, so do the Outbound notebooks. The PowerBooks' arrow keys are arranged in the unintuitive

REVIEWS

February 1993

MACWORLD
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or other obstacle. The best DOS note­
book has the floppy eject from the front, where the worst that can happen is that it will fall in your lap.

How about adding status lights (again, like most DOS notebooks) so you know when caps lock is on, whether the battery is charging, if the power cord is plugged in, and what speed the processor is running at.

Last, Apple should follow other notebook leaders and add PCMCIA (Personal Computer Memory Card Industry Association) slots. Such slots let third­party vendors add memory, hard drives, modems, and other expansion options via small cards—about the size of a credit card folded in half. These slots are destined to become a standard, and the cards do not require dealer installation.

Despite these complaints, I like the new 160 and 180. They now have the connectivity and RAM capabilities a business user expects in a notebook, plus all the interface niceties that users expect in a Mac. A few improvements, and they’d be perfect.—Galen Gruman

**Presentation Software**

**Action 1.0**

**PROS:** Broad variety of transitional effects; creates gradient and patterned backgrounds; includes basic drawing tools; templates included.

**CONS:** Imports only PICT-format graphics; can’t import text; playback degrades rapidly as presentations grow more complex; choppy performance on slower Macs. **COMPANY:** Macromedia (415/442-0200). **REQUIRES:** Mac LC; 4MB of RAM; System 6.0.7; 32-bit QuickDraw. Recommended: Mac LC; 8MB of RAM; color monitor. **LIST PRICE:** $495.

---

Creating a multimedia production can be a daunting task, especially if you’re using higher-end presentation software packages such as Macromedia Director and trying to combine numerous color graphics, digitized sounds, animations, and QuickTime movies.

Action, an entry-level multimedia-integration program from Macromedia, offers a less intimidating introduction to multimedia production. Action’s straightforward interface makes turning out high-quality presentations with sound and motion a surprisingly easy process.

You start by importing graphics, movies, and sound objects you’ve created with other applications and positioning them against a backdrop in Action’s main Presentation window. The backdrop—called the Stage—can be a solid color, an imported PICT graphic, or a two-color pattern or gradient created within Action. Imported sounds and images must be in one of five standard formats: AIFF, SoundEdit, PICT, PICS, or QuickTime movie.

Next you configure each graphic object’s attributes through the Edit Object dialog box, including its entrance and exit time and the transitional effect that will be used to make it appear and vanish. Action offers an excellent variety of 30 transitions, such as Fine Dissolve, Checkerboard, and Horizontal Blinds. You can also instruct objects to enter from off screen or to travel along a path you define.

Action’s button and linking features enable you to give viewers control over the flow of the presentation. You can designate any object to be a button and set it to perform a task such as Pause or Go to First Scene.

Though primarily designed to use objects created in other applications, Action provides a number of basic drawing tools to create circles, rectangles, polygons, lines, and arcs. There’s also a text tool for adding formatted titles and other text to presentations. The text tool isn’t just a convenience; it’s a necessity; you can’t import text files into Action.

One of Action’s best features is that it lets you view and edit your work-in-progress from several different standpoints. The Content List displays an inventory of all the objects and events making up each scene. Double-clicking on any object’s name in the list gives you instant access to the object for editing. You can edit text objects from within the Content List simply by selecting the text and retyping. The Scene Sorter window displays a tiny image of each scene in the presentation and lets you rearrange the sequence by dragging scenes into a different order. In the Timeline window, each object in a scene is represented by a bar on a time line. You can lengthen, shorten, or drag the bars to change any object’s entrance, exit, or duration within the scene.

All of this makes for extremely easy editing. But before attempting anything too fancy, you should know that Action—like any multimedia program—requires a fast Macintosh with plenty of memory. You need at least an LC with 2MB of RAM to run the program, and Macromedia recommends doubling the application’s standard partition to 4MB and using at least a PII with 8MB of RAM for best results. Even with that configuration, movies and transitional effects become choppy and uneven if you combine more than just a few transitions, sounds, and movies within a scene.

Once your production is complete, you have a variety of playback options. You can use the Run Presentation command for immediate full-screen playback. If you have a VCR and an RGB-to-NTSC video converter, you can use the program’s Print to Video command to transfer presentations to videotape. Or distribute presentations to other Mac users along with the runtime player application, included with the program.

Macromedia promises that by using the program’s well-designed templates you’ll have your first presentation completed in 10 minutes. That’s a bit too optimistic; it takes somewhat more practice to create polished presentations. But of the half-dozen multimedia-integration programs now available in the $500 to $600 price range, Macromedia’s Action gives you the richest selection of features and is one of the easiest to master.—Joseph Schorr.
Walking into a presentation today loaded down with overheads and slide trays is suicide. If you really want to blow an audience away, it takes animated graphics. Live action video. And the kind of high resolution images you see every day on your computer screen. Only bigger. An LCD projection device from nVIEW can give you all that. A seamless, computer-based presentation. In over 250,000 true, saturated colors. From up to four video sources (computer or television video) using a standard overhead projector. Or, better yet, through the Luminator, our new multiple source LCD projector with its own built-in light source. For killer presentations, we have the weapon. And we'll put it up against any overpriced, oversized 3-gun CRT projector any day. Arrange for a demonstration before your competitor does.

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ElectricImage Animation System 1.5.1

**PROS:** Vastly improved documentation; rendering capabilities include shadow casting, transparency and environmental mapping, and special lighting effects; intuitive project window lets you control all aspects of animation from single location. **CONS:** Expensive; hardware copy protection; no modeler; must convert models before importing. **COMPANY:** Electric Image (818/577-1627). **REQUIRES:** Mac II with math coprocessor; 8MB of RAM; 80MB hard drive; 1.4MB floppy drive; color monitor; System 6.0.8; 3-D modeling program. Recommended: Mac IIfx or Quadra; 32MB of RAM; 32-bit video board; System 7. **LIST PRICE:** $7495.

**MW ★★★★★**

ElectricImage is the kind of program you'd expect to see on a shelf in Steven Spielberg's home on an episode of "Lifestyles of the Rich and Famous." It retails for the price of a European vacation for two, it lacks modeling capabilities, and it's copy-protected with a hardware device to discourage the riffraff. But ElectricImage is also the most powerful animation program available for the Mac. You've no doubt seen a few by-products of this fantastic application. Teeny-boppers will recall the titles to "Beverly Hills 90210" and the fantastic creatures from MTV's Liquid Television hit "The Adventures of Thomas and Nardo." For the why-read-the-book-when-you-can-wait-for-the-movie crowd, there's the titles to Scott Turow's made-for-TV Burden of Proof and a whole slew of special effects for the upcoming big-budget Spielberg rendition of Michael Crichton's Jurassic Park. Other credits include the family of TV-heads for the "Nick at Nite" identification (see "1991 Macintosh Masters Showcase," Macworld, April 1992), the theatrical trailer for Encino Man, and the nuclear annihilation of downtown L.A. from Terminator 2.

Some of these fantastic sequences were created using the newest version of the program, ElectricImage 1.5.1. Free to registered users of previous versions—"This will be the only free upgrade we offer," warns a press release—the update ships with a substantially improved manual that offers a more comprehensive description of the product, better explanations of texture mapping and other complex topics, tips for rendering realistic surfaces, and a well-rounded introduction to the video-animation process. The index is awful, but otherwise the documentation is a phenomenal improvement over the previous effort.

**The Beauty of the World**

**ELECTRICIMAGE 1.5.1 ENABLES YOU TO**

create extremely realistic environments for animated objects. For one, you can cast antialiased shadows using spot, radial, and parallel light sources. You can even shine many lights onto a single object to create overlapping shadows of different shades and colors. The manual recommends that your system be equipped with at least 32MB of RAM to cast shadows; and even then scenes with shadows take approximately 25 percent longer to render than scenes without shadows, but the difference is easily worth the wait. If you're short on time and memory, however, you can reduce the size of the shadow buffer, but you lose quality.

Version 1.5.1 has also improved on the program's transparency and reflection capabilities. The original ElectricImage was limited to 16 levels of opacity. As a surface became more transparent, highlights and reflections also faded, flattening the appearance of objects. The upgraded program offers 256 levels of opacity and maintains the intensity of reflections and highlights to enhance the perception of reality. Furthermore, you can increase the opacity of the edges of an object to make it appear hollow. (Hold an empty drinking glass up to the light and you'll see that it becomes less transparent around its edges.)

To imitate reflections, ElectricImage provides what it calls environmental mapping. Instead of performing ray tracing, which the documentation dismisses as unnecessarily time-consuming, ElectricImage wraps a 360-degree view of a scene around an object by projecting the reflection in six different directions—up, down, right, left, forward, and backward. Incidentally, this is an improvement over traditional reflection mapping, in which a scene is projected onto a model in only one direction. While the effect falls short of ray tracing, in which a program calculates the behavior of every single beam of light in a scene, environmental mapping is hundreds of times faster, requiring minutes instead of days to render.

ElectricImage adds two moody lighting effects—glow and fog—either of which would be perfectly at home in a bit of film noir. The glow effect surrounds a transparent light beam with a luster that fades outward from the beam to a specified depth. If you apply a glow to a spotlight, you get a searchlight effect. Apply a glow to the new tube light source—which produces a linear, laserlike beam of light—to achieve a neon effect. The fog effect is similar to the glow effect, but the light beam is opaque and sheds no light on the background, as if the light were inching its way through a pea-soup fog. Combined with a radial light, the fog effect lends itself to the bare-bulb-in-a-smoky-room effect, ideal when you want to render some dogs playing poker.

**The Paragon of Animation**

POSSIBLY THE BEST—AND CERTAINLY THE most intuitive—new feature is the project window, which enables you to control virtually every aspect of an animation from a central location. The project window lets you specify the movement of any light, camera, or object in the current scene with respect to key frames in the animated sequence, individual frames, or increments of time. You can even switch back and forth between different animation modes with no loss of accuracy; this encourages experimentation and enables you to fine-tune an animation from several different perspectives. You can also independently adjust specific attributes of an object, including position, rotation, scale, and color. If that's not enough, you continue...
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Call 800-942-3321, for the name of your nearest GCC dealer, or 800-122-7777, ext. 905 to order the WriteMove II direct. In Canada, call 800-263-1405.
can attach objects to each other so that if you move one object, the attached objects move in kind. For example, you might attach two spotlights to the front of a car to create headlights. Or, you can have two objects move independently while forever facing each other, like a spotlight following an actor on stage. These options and more are within easy reach from the project window.

But while this program is exceptional in many ways, I do occasionally wish for more. For example, ElectricImage provides no means for storing texture maps to a library. Though you can save textures and their settings to the Scrapbook, a library feature with texture palettes would be much more convenient. Furthermore, ElectricImage doesn't provide you with a link between a texture map and objects, meaning that you cannot edit a texture and automatically update objects mapped with that texture, as in Alias Sketch, StrataVision 3D, and half a dozen other programs. Finally, ElectricImage can only import models stored in its native Fact format. To bring in other models, you have to first convert them one at a time by using the laborious Transporter utility.

These minor complaints aside, ElectricImage Animation System 1.5.1 is a rare piece of software that blurs the borders between souped-up Macs and dedicated graphics workstations. You can argue that at $7500, this program is cheaper than the next-best alternative, which is to invest tens of thousands of dollars in Unix-based software like Alias or Wavefront. But if you're a typical student or graphic artist trying to convert your skills from traditional techniques to computer art, ElectricImage is quite simply out of your reach. ElectricImage does supply the occasional money-saving trick. For example, folks who want to render to videotape can write an animation file to an Exabyte tape-backup system in the Abekas A-60 format and then restore the file to an A-60 at a service bureau, thereby saving the $60,000 an Abekas machine would cost. And this is wonderful news for corporate users.—DEKE McCLELLAND

**Power Portrait**

**PROS:** User-configurable resolution; built-in QuickDraw acceleration. **CONS:** Incompatible with some software; SCSI ID and termination hard to change. **COMPANY:** Sigma Designs (510/770-0100). **REQUIRES:** Any Mac with built-in monitor and SCSI port. **LIST PRICE:** Platinum $899; granite $949.

The Power Portrait is a 15-inch portrait-style monochrome display for Macs with built-in screens, like the Classic and PowerBook. Because these models lack provision for external monitors, the Power Portrait gets its signal from the Mac’s SCSI port. The monitor has a tilt-and-swivel base and comes in both platinum and dark gray. SCSI devices can be frustrating to set up, especially if you have more than one. Sigma provides external SCSI ID and termination controls, but they’re not as convenient as they should be. To change the SCSI ID number, for example, you have to rotate a miniature dial that is recessed into the back of the monitor. I found it hard to see what I was doing. And to turn SCSI termination on or off, you have to press 24 tiny rocker switches. Still, it’s better than cranking open the case.

The Power Portrait sports two 25-pin connectors instead of the more-common 50-pin connectors. If you have additional hardware, it’s easiest to hook the Power Portrait directly to the Mac and daisy-chain other devices to the monitor. Although you can place the Power Portrait anywhere the SCSI cable reaches, Sigma recommends locating it to the right of the Mac to avoid the computer’s power supply.

On Macs with the 68000 processor, you can use the Power Portrait by itself or alongside the Mac’s internal screen; you set display options in Sigma’s control panel (or cdev). On Macs with 68020 or 68030 processors, like the PowerBook, the internal display remains active, and you control the Power Portrait via the Monitor’s cdev. Either way, you can set the monitor’s screen resolution to 72, 80, or 88 dots per inch, as well as turn hardware panning on and off. With panning enabled, the Power Portrait displays a small portion of a larger virtual screen of up to 1024 by 1024 pixels (about two ½-by-11-inch pages side by side); hidden portions scroll into view when the cursor reaches the edge of the screen.

Brightness and contrast are easy to adjust using knobs on the front of the monitor. Three dials at the rear let you tweak the position of the display on the CRT screen. Once I set the controls, text and graphics were crisp, and the background was adequately bright. Although I couldn’t verify the claimed refresh rate of 97Hz, there was no noticeable flicker, and I worked with the Power Portrait for extended periods without eyestrain.

In the past, SCSI-based monitors have been criticized as being too poky to be practical. To overcome the SCSI bottleneck, Sigma incorporates QuickDraw acceleration into the Power Portrait’s hardware. On average, display speed was similar to that of my PowerBook 170’s built-in screen. However, the Power Portrait doesn’t work with software that bypasses QuickDraw, including certain After Dark modules, many games, and HyperCard (Sigma’s installer adds an XCMD to HyperCard to make it compatible). A Read Me file disk lists known incompatibilities and workarounds, but doesn’t mention Aldus Persuasion, which had minor problems displaying graphics.

At first, I was skeptical about the value of an external display for my PowerBook. After a while, though, I began to appreciate the larger display area. The Power Portrait is also an acceptable option for users of compact Macs, like the Classic. Before you buy, though, check with Sigma to make sure that your software is compatible.—FRANKLIN N. TESSLER

**Rendered Aghast** Rich Fernald achieved this traditional depth-of-field effect for his animated TV series “The Adventures of Thomas and Nardo” by rendering his “computer cutout” characters in several different passes and compositing the images in ElectricImage’s Projector utility.
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OF THE TWO APPROACHES USED BY vendors to add external video ports to the first-generation PowerBooks—the 100, 140, 145, and 170—the better approach is the internal video adapter, which connects to the PowerBook's memory slot, since this type of adapter provides the fastest display possible on the second monitor. (The other approach is a slower SCSI video adapter, covered in "Expanding Your PowerBook," in this issue.) While the new PowerBook 160 and 180 have this video-out circuitry built in, there are more than 300,000 first-generation PowerBook owners who could benefit from a video adapter.

Two top choices for internal video adapters are Mirror Technologies' PowerVision and Computer Care's BookView Imperial. The trade-off between the two is monitor support: the PowerVision supports 12-inch and 14-inch color monitors, as well as 15-inch portrait gray-scale and black-and-white monitors, which covers most of the monitors people use every day. The BookView Imperial supports these plus 16-inch and 19-inch color monitors (at 8-bit color).

The PowerVision and BookView Imperial differ in other ways, too. The most striking is in their RAM configuration. The BookView Imperial comes with 6MB of RAM, which brings the PowerBook to its maximum of 8MB (the PowerBook 140, 145, and 170 come with 4MB of RAM, 2MB of which are soldered onto its logic board). By contrast, the PowerVision comes in three configurations: with 0MB, 2MB, or 4MB of RAM. Those who pick the 2MB version are generally limited to running one large application (such as Excel) and a few INITs, since System 7 and these applications take up a lot of RAM. The 4MB version brings the PowerBook up to 6MB, which is adequate for many users.

But business users will want a full 8MB (which requires 6MB of RAM on the PowerVision). They can get that RAM by adding a third-party 2MB RAM board onto the PowerVision's expansion connector, but Apple warns that such expansion approaches can cause trouble. If the combined dimensions of the stacked boards exceed the PowerBook's specifications, the boards could cause a short circuit. The BookView Imperial is a better choice for users who are concerned about this.

In either case, keep in mind that the video adapters reserve RAM for their own use. The BookView Imperial takes 2MB of system RAM, leaving just 6MB for the System and application. Computer Care promises that future versions of the BookView Imperial will let applications use some of this RAM when it's not needed for video processing. In contrast, the PowerVision has separate VRAM, so the memory that comes with the board is completely available for the System and application. This makes the PowerVision a much less expensive product in terms of processing hang for the buck.

The PowerVision's video-out port is also sturdier than the BookView Imperial's. Instead of requiring an intermediate adapter to be attached between the video-out connector and the monitor's cable, as the BookView does, the PowerVision's video-out connector is a standard Mac adapter. This means there's one less thing to fall off or get lost.

For software, the BookView and PowerVision are more evenly matched. Both support the two types of display modes: mirroring, where the external and internal displays show the same image, and dual-display, where the two monitors make up one virtual screen (the standard Mac treatment of multiple monitors). And both require a restart to switch modes. The PowerVision does not support virtual memory or Apple's RAM disk, while the BookView Imperial supports virtual memory but not the RAM disk. Computer Care has announced plans to include a shareware program called RAMDisk+ to address that need. And Mirror says it is now shipping a software upgrade to make the PowerVision compatible with both virtual memory and the RAM disk.

The two products are evenly matched in terms of video display speed. Macworld Lab tests showed that the two products performed within a few hundredths of a second of each other on all scroll and redisplay tests—a statistical tie.

But the PowerVision is easier to install. While installing a PowerVision voids your PowerBook warranty (and Mirror recommends you hire a dealer to install the PowerVision), Mirror provides a well-done installation video that a technically proficient person can follow. Plus, Mirror provides the hard-to-find Torx screwdrivers needed to open the PowerBook and install the PowerVision. There's even an antistatic wrist strap. A lot of care and thought went into the installation package, and it shows.

The BookView Imperial is the better bet if you intend to use a 16-inch or 19-inch monitor. But for the vast majority of users, who use 14-inch monitors, it's basically a tie. You'll have to decide whether the RAM options and slight differences in software give one product the nod over the other for your needs.

Galen Gruman and Mark Hurlow

Small Business Accounting

Business Sense 1.6

PROS: All-in-one program; uses double-entry bookkeeping method; includes training videos.
CONS: Payroll tax tables should be simplified; documentation needs to be reorganized.

COMPANY: Business Sense (801/963-1389).

REQUIRES: Mac Plus; hard drive; System 6.0.7. LIST PRICE: $199.

If longevity is any indicator of success, Business Sense is successful. I first encountered the program in 1987 when it was called Turbo Mac Accounting, published by Digital, Etc. At the time it impressed me as a fairly competent accounting package. Business Sense, the program's new publisher, has updated the code to make the application run faster under System 7. Business Sense is still a competent program, with a reasonable $199 price and a one-year money-back guarantee. The company also includes two video training tapes on how to use the program, free with Business Sense.

Business Sense 1.6 uses conventional electronic versions of double-entry paper forms. It is a comprehensive all-in-one package offering general ledger (G/L), accounts payable (A/P), accounts receivable (A/R), and payroll.
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Although it has no inventory module, the application accepts data from a separate product called ShopKeeper (from ShopKeeper Software). If you run a service business, you can also import data from the Timeslips application (from Timeslips Corporation), for billing purposes. Business Sense imports and exports data in text or tab-delimited format; and the Claris XTND translator, for moving text into MacWrite and MacWrite II, is included.

Business Sense's Chart Of Accounts is numeric (you must identify departments by numbers, not names), and like that of most accounting packages, includes budgeting capabilities. It enables you to create separate departments as profit centers or job-tracking units, and lets you budget for these groups separately. Business Sense allows for 2000 customer accounts and 1500 vendors; the payroll function handles 100 employees with up to 10 withholding categories, plus tips and fringe benefits.

The program also provides all the standard reports needed in small businesses (trial balance, income statement, balance sheet, and so on), with many reports available in graphic format. The A/R module warns you when you approach your credit limit, calculates and applies finance charges and discounts, handles partial payments, and tracks sales commissions by customer. The A/P module tracks bills by invoice date, due date, and discount date, and automatically applies vendor discounts based on the information you enter when you set up your vendor list.

Business Sense keeps the books open for a whole business year, which some bookkeepers see as an advantage; others don't like this feature because you can change a previous month's data reports after the fact.

Business Sense works from a simple main screen, with menus for functions, accounting activities, and reports (see "Business Sense Main Screen"). Assuming you haven't rearranged the icons, you set up books using the icons in the first two rows on the main screen: Company Info, where you enter information about your company (name, address, and federal ID number, for example); Chart Of Accounts; Customers; Vendors; Departments, if any; Employees; Tax Tables; and Recurring Entries (those that occur every month). The setup process is covered in detail, occupying approximately half of the user manual. The main screen also has a Help icon and an icon for making entries in the General Journal.

Most of the actual bookkeeping entries are made in the bottom row of icons: Sales/AR, where you enter your sales; Purchases/AP, for purchases; and two Checking icons (one for making deposits and one for writing checks). For these processes Business Sense uses standard double-entry forms familiar to people who have worked with manual business books and ledger cards.

All A/P, A/R, disbursement, and deposit entries are basically made the same way, directly into the ledgers' (the General Journal) double-entry format. For example, to handle a payables purchase, you make one entry crediting A/P and a second, balancing, entry debiting the category of the purchase, such as rent.

To assist you in these entries, the Chart Of Accounts, Vendors, and Customers modules all contain a Transfer button that lets you automatically move a selected item onto your ledger form. For the payables purchase, for example, you open Vendors, scroll through the list, select the vendor you want, and click on the Transfer button—that vendor name and number is automatically copied onto the ledger sheet. You then open the Chart Of Accounts, click on the expense category (rent), then click on Transfer, and the balancing entry appears on the next line in the ledger as a rent expense.

Of course, the program doesn't let you close the ledger if information is missing or the entries don't balance. You must either complete the entry or select Line Delete from the Edit menu to remove unbalanced entries.

As a general rule, data entry is much easier in other all-in-one packages, such as Teleware's M.Y.O.B., Peachtree Accounting for Macintosh (formerly at Once), CheckMark's MultiLedger and Payroll, and SoftSync's Accountant, Inc. The file-cabinet metaphor and work-flow diagrams in M.Y.O.B., and CheckMark's logically ordered menus, are much easier to work with than Business Sense. Also, the competitive all-in-one packages use windows with scroll boxes to automate data entry, rather than making you manually open vendor lists or charts of accounts. The other packages also hide the double-entry ledger sheets, so you don't have to be concerned with balancing debits and credits, except when you make General Journal entries.

The Business Sense payroll function, like that of virtually all other products, requires that you enter a Social Security number, address, telephone number, and the hours worked directly into each employee record. CheckMark's payroll function is the only exception, giving you a separate screen for entering all employee hours. If employees have variable hours each period, such as in a small retail store or service business, the CheckMark approach makes entry of these hours much easier.

M.Y.O.B. differs from Business Sense by not offering a payroll segment; and CheckMark and Accountant cost more because they have integrated Inventory modules not included in Business Sense.

In terms of competition, Business Sense goes head-to-head with the Peachtree package, and Peachtree's Mac interface and data entry are better.

Business Sense's main fault, however, lies in its payroll tax tables. The program would be much improved by using annualized tables rather than separate detailed listings for Single/Married, Weekly, Biweekly, Semiweekly, and Monthly. Although you can update these tables yourself, it takes a massive amount of time (not to mention disk space) if you have different pay periods. You will probably want to buy the federal tables that Business Sense makes available each year. The company does not, however, sell state tax tables (except for California), so you could have quite a job revising your state tables each year. Peachtree does not allow you to update its tables in any way, thus forcing you to purchase them each year. But at least it sells both federal and state tables.

Business Sense uses the previous version's documentation with an addendum. While it does a good job of guiding you through setup, the manual could have more details and continuity, especially in describing the processes of entering payables and receivables. The documentation needs to be reorganized to match the actual work processes performed by the user.

Business Sense is a competent, single-user all-in-one bookkeeping program—adequate for keeping the books for a small company. It is not as easy to use as its most direct competitor, Peachtree Accounting for Macintosh, but if Business Sense would simplify the tax tables and reorganize the manual, it would be a much more formidable competitor.—ALAN SLAY
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**WideWriter 360**

**PROS:** Good output quality on cut sheets as large as 17 by 22 inches; excellent printer-driver software and manual; supports serial or LocalTalk connection. **CONS:** On the slow side, does not support PostScript; ink is water soluble.

**COMPANY:** GCC Technologies (617/789-0880). **LIST PRICE:** $1699.

**MW**

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Large-Format Ink-Jet Printer

**WideWriter 360**

**Big Output, Small Package**

**THE WIDEWRIITER 360 MAY THINK BIG,** but it isn’t big. The printer measures 5.4 inches high, 23.3 inches wide, and 14.9 inches deep. With the included sheet feeder attached, the WideWriter weighs less than 25 pounds. The printer is easy to set up: remove the packing tape that secures its plastic lids, unlock the print head, and slide the sheet feeder home.

The WideWriter 360’s single rear-panel connector has a dual personality. Attach the included cable to the Mac’s modem or printer port, and you have a fast, serial connection like that used by an Apple ImageWriter II, StyleWriter, or Personal LaserWriter LS. Attach a LocalTalk or PhoneNet network connector instead, and you can share the WideWriter among numerous Macs. When switched on, the printer senses which connection scheme you’ve used and configures itself appropriately.

Every printer needs driver software, which translates the generic printing commands all Mac programs use into the commands required by a specific printer. The WideWriter’s driver is based on the one used by GCC’s Personal LaserPrinter series, WriteMove II portable ink-jet printer, and ColorFast film recorder. The advantage of this family resemblance is reliability and compatibility; the PLP driver technology has been around since 1987. The disadvantage is that it doesn’t support PostScript, so you can’t print illustrations from PostScript draw programs such as Aldus FreeHand or Adobe Illustrator. If you’re willing to go through a two-step printing routine, however, you can get PostScript output by using TeleTypesetting Company’s (617/734-9700) T-Script Deluxe PostScript-emulation software. Another popular PostScript emulator, Freedom of Press from ColorAge (formerly Custom Applications), does not support the WideWriter. The WideWriter includes the Adobe Type Manager utility and 21 Type 1 fonts. TrueType fonts work fine, too.

The WideWriter 360 driver provides High, Medium, and Draft print-quality settings; the latter two produce faster output and use less ink than the first. You also get some convenience options that even Apple’s drivers don’t provide, including detailed online help, a Preview button that lets you see how a document will appear before printing, the ability to specify up to 15 custom page-sizes, and an edge-to-edge printing option that lets you print to the edges of the page (print quality degrades a bit at the edges). The driver also supports background printing under MultiFinder or System 7.

GCC sells a second sheet feeder for $149 that lets you mix and match paper sizes. The WideWriter Print dialog box lets you print the first page of a document from one feeder and subsequent pages from the other.

**It’s No Laser Printer**

**THE WIDEWRIITER’S OUTPUT QUALITY** is excellent, but it still isn’t in the laser printer league (see “WideWriter 360 Close-Up”). Character edges have a slightly fuzzy appearance, especially if you use cheap bond paper. (GCC recommends a minimum cotton content of 25 percent.) Moreover, the WideWriter’s ink is water soluble—take a WideWriter blueprint out in the rain, and it’s likely to smear. (You can work around this by photocopying the output.) The WideWriter is no speed demon, either, but it is faster than most pen plotters.

If the WideWriter 360 sounds appealing but a bit pricey, you might consider combining Canon’s DOS PC-oriented BJ-330 ink-jet printer with GDT Softwork’s driver-and-cable package, PowerPrint. The Canon BJ-330 uses the same print mechanism as the WideWriter and often discounts for about $700, including a sheet feeder. The combination isn’t as elegant as the WideWriter—PowerPrint can’t compare to GCC’s driver—but does cost considerably less.

The WideWriter 360 isn’t for everybody. Publishers who want to produce camera-ready tabloid output will be better served by a laser printer such as the QMS-PS 1700 or 860 (see “Workgroup Printers,” Macworld, January 1993). And anyone who needs large-format color output for drafting will want to stick with pen plotters. But for proofing large-format publications or printing black-and-white architectural or technical drawings—and for banner buffs—the WideWriter is an excellent choice.

—JIM HEID

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**The quick brown fox jumped**

WideWriter 360 Close-Up The 360-dpi WideWriter’s output (top) is very good, but it still falls short of 300-dpi laser printer output (bottom). Note the somewhat jagged character edges caused by ink seeping into the paper’s fibers as it dries.

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**We’re the Nation’s MAC Specialists!**
ACT FOR MACINTOSH—ONE OF THE newest business applications to make the transition from the PC world to the Macintosh—is a contact manager that combines an extensive personnel database with scheduling and word processing modules. But while ACT provides some features not found in competing products, the poorly conceived reference manual makes learning ACT a frustrating experience.

With more than 70 customizable fields, ACT’s contact manager is more comprehensive than most Macintosh address books (see “Keeping in Contact”). In addition to changing a field’s on-screen labels, you can lock a field to prevent users from entering data into it or you can conceal a field from view. You can set up a field to accept any text, or you can restrict the field to accept only dates, times, numbers, dollar amounts, or phone numbers. ACT formats telephone numbers automatically as you enter them, and an autodial feature lets you dial calls through a modem.

ACT incorporates several other features that are designed to cut down on keystrokes when you’re entering contact information. You can specify default values for any field, and you can define sets of alternative entries (which Contact Software calls Pick Lists) to use for entering data into fields whose contents are limited to certain values. For fields that store coded information like state abbreviations, the Pick List can display both expanded and shorthand versions for each entry. If you’re using System 7, you can program balloon help to prompt users during data entry. Finally, ACT’s macro facility lets you record sequences of frequently repeated actions (including typing and mouse clicks) for later replay.

ACT provides 18 different views for displaying contact information, accessible from the View menu. Although ACT’s default layouts should be adequate for most users, it would be nice if you could customize the position, order, and font of contact fields. Controls at the top left corner of the contact-view window enable you to browse the database one record at a time (either forward or backward) or jump directly to the first or last entry. ACT also includes a tabular list view, which displays all the records in the contact database. The list view lets you tag selected contacts, but it doesn’t let you delete items.

Search capabilities in ACT are more than adequate. Menu commands let you find records based on a single attribute (name or company, for example). To perform more-detailed searches, ACT’s Query module lets you enter lookup criteria on a screen that resembles the standard contact view. You can also program complex searches by typing the field names and values you’re looking for into a special window, an option that users with a flair for programming might prefer. The ability to add frequently used queries to the Lookup menu by saving them in a special folder is useful, but it’s not as simple as customizing menu commands in Microsoft Word.

Because ACT’s scheduling functions are centered around its contact manager, you have to associate activities with a particular contact or group of contacts, which is an annoyance if you want to book an event that doesn’t involve anyone but you. (You can get around this restriction by associating an event with your own contact record.) To schedule a new activity, you enter the date, time, duration, and a brief description, and then choose the type of event (meeting, phone call, or-to-do item) and priority (high, medium, or low) from pop-up menus. Strangely, ACT’s scheduling dialog box accepts invalid times and dates without complaint (99999 is interpreted as 8 a.m., for example).

Unlike After Hours Software’s DateBook, ACT cannot calculate an event’s duration from the beginning and ending times. However, ACT does flag schedule conflicts, giving you the choice of accepting or rescheduling them. You can also schedule “timeless” activities, such as items on a to-do list that have no starting time or length. You can schedule recurring events, although this doesn’t work as flexibly as in DateBook. You also can set an alarm to remind yourself of an upcoming event, but the alarm appears on your monitor only if ACT is running in the foreground.

ACT lets you view your schedule in daily, weekly, or monthly format. You can turn off display of timeless activities in the day and week views to make extra room for scheduled events. The monthly calendar shows the names of contacts associated with each day’s events; clicking on a date brings up a complete list of that day’s calls, meetings, and to-dos. Alas, all three schedule windows are fixed-size, so you can’t adjust them to fit your monitor. And their modal design prevents you from toggling between the contact and schedule views.

ACT’s word processing module sports all the usual functions, including a spelling checker, and you can import and export documents using the supplied Claris XTND file-translation filters. Unfortunately, the word processor is relatively poky at scrolling through long documents. When you create a new document, you can base it on a template that specifies which contact fields to incorporate. ACT ships with templates for letters, fax cover sheets, and envelopes, and you can supplement these with your own new templates. Templates can be programmed to ask whether to import data from a single contact or a group of contacts, a handy way of sending a memo to several people at once.

Although most Macintosh users dislike reading manuals, old hands have learned to appreciate a manual’s role in revealing the fine points of a program. Unfortunately, ACT’s User’s Guide, although well organized, doesn’t go far enough. Many important features are covered only in the abysmal Reference Guide that is organized alphabetically rather than by function—even patient readers are sure to be frustrated by numerous cross-references. ACT for Macintosh has several laudable features, but I’m afraid that its poor documentation and a few rough edges prevent me from awarding it a higher rating.

—FRANKLIN N. TESSLER
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Microsoft Works 3.0

PROS: Easy to learn and use; good manual and help system. CONS: Sluggish performance, especially on 68000 Macs; mediocre integration between modules; some bugs. COMPANY: Microsoft Corporation (206/882-8088).

REQUIRES: Mac Plus; modem; System 6.0.5.

LIST PRICE: $249.

For years, Microsoft Works was the dominant integrated-software package for the Mac, chiefly because Works was the only major integrated package available. After version 2.0 was released in 1988, the program's development languished, with only minor maintenance releases in the next four years. Serious competition for Microsoft Works arrived in 1991 from Symantec's GreatWorks and Claris's ClarisWorks, prompting many users to switch. Finally, a completely rewritten Microsoft Works has arrived, and while longtime loyalists aren't likely to desert the ship, the new Microsoft Works probably won't make many new converts. Works 3.0 has significant performance problems and some bugs, and it falls short of ClarisWorks and GreatWorks in integration between modules (see "All-in-One Programs," Macworld, June 1992).

Microsoft Works 3.0 consists of five modules: word processor, database, spreadsheet with chart, draw, and telecommunications. The draw module is new; previously, drawing tools were a part of the word processing module. The program's interface has undergone a welcome face-lift; Under System 7 it sports an attractive 3-D look. Each module now has a floating tool palette that lets you use the mouse to accomplish many tasks. There is a good help system, and balloon help is also available. Other System 7 features supported include TrueType fonts and the Apple Communications Toolbox, and Microsoft says the program is 32-bit clean. Works doesn't support publish and subscribe or Apple events.

Installing Microsoft Works is easy; an included installer program copies Works and installs system resources as needed. A small annoyance for people with more than one hard drive is that the installer requires that you put the program on your start-up drive. A complete installation, with dictionaries, help files, and sample documents, requires almost 5MB of hard drive space. I tested Works using the program's 1MB default memory partition.

Microsoft Works 3.0 is immediately familiar to users of previous versions. Although the program has several new features, there are fewer than might be expected for an update that was four years in the making. The new version has improved headers and footers for all documents; better support for color, with a new 256-color palette; and better internal memory management, which allows you to have more windows open simultaneously. And if you use Microsoft Mail, you can use Works to send and receive E-mail messages. The word processor now supports footnotes and endnotes; improved mail merge; and a better spelling checker and thesaurus. Unfortunately, you can't convert custom user dictionaries from the 2.0 version, which I think is a major oversight.

The database allows you to name and save record-selection criteria, save up to 16 forms, and print labels and envelopes from within the database. In the spreadsheet module, charts are now a layer over the spreadsheet, rather than a separate document. The new draw module includes linked text columns for desktop publishing, object rotation, and automatic 3-D and shadow effects. The completely new telecommunications module is based on Apple's Communications Toolbox and has the usual dialog boxes for modem speed, setup, and file-transfers. File-transfer protocols include Xmodem and Kermit; there are no Ymodem or Zmodem tools available from Microsoft, although such tools are available at extra cost from Seaguest Software (503/531-0252). The phone numbers and settings for each BBS or online service you call are saved in a separate communications document. You can record a series of keystrokes and responses, and store them as an automatic log-on sequence. You can also use Works' macro feature to automate other online actions. An on-screen status bar can tell you how long you've been online or how much the session is costing you in online charges. The telecommunications module is adequate, although I'd like to see a Zmodem tool included with the program.

Microsoft Works uses file-translation technology from DataViz, maker of the MacLinkPlus translation package. In addition to the file translators included with Works, you can buy translators from DataViz that will translate files from a wide range of Mac, Windows, and DOS programs to and from Works. While Microsoft includes a selection of translators, it doesn't include translators for Microsoft Word 3.0, or for Excel 4.0 for the Mac. There are, however, workarounds for both of these.

Works 3.0 is easy to learn and use. The tutorial supplied with the program steps you through basic document creation, and the manual is adequate. The word processor, which is the heart of any integrated program, can easily handle most business correspondence. You probably shouldn't try to write a book with Works, but it should be fine for most writing projects. The same goes for the spreadsheet and database modules; they're capable, but not spectacular.

Microsoft Works 3.0 has a number of bugs and problems, ranging from incompatibilities with common third-party extensions, to odd design choices, to outright crashes. The program is incompatible with and crashes with Super Boomranger, part of the popular Now Utilities package from Now Software. I experienced other occasional, unexplained bombs, even when I had all extensions turned off. In the database module, 36-L previously toggled between the List view and the Data view; now it goes to the List view and stays there. The database also deals oddly with reports—for example, if you make a character change (font, style, or size) in a report, that same change is reflected in the List view (and vice versa). This doesn't make much sense, as part of the idea of being able to save different report formats is being able to customize reports for different purposes. These changes, among others, have brought complaints from several users on the online networks.

Performance in Works also needs some improvement. Scrolling was very slow in the draw mode, running on an
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Circle 43 on reader service card
SE/30 in 8-bit color and a color monitor. The database module is slower in some find and sort operations than in Works 2.0, although to be fair, saving a database is much faster in version 3. People with 68000-based Macs, such as a Mac Plus or Classic, may be better off to stick with Works 2.0 until Microsoft improves the new version.

With Works 3.0, Microsoft delivers marginally improved functionality to a large installed base of users. The problem is that the world has changed in the past four years; Works is no longer the only kid on the block. ClarisWorks and GreatWorks take fresh approaches to the integrated-software problem and deliver more capability for the same price. I recommend Works 3.0 for longtime Works 2.0 users who have many documents in the old version; it would be difficult for these users to make the switch to a new product. But if you're shopping for an integrated package for the first time, you should take a look at the other packages before you write a check. —TOM NEGRINO

**REVIEW**

**Magnet 1.0**

**PROS:** Searches by file attribute or content; requires no scripting; file-synchronization feature; can automatically log on to remote volumes using AppleTalk Remote Access. **CONS:** No Boolean search operations. **COMPANY:** No Hands Software (415/321-7340). **REQUIRES:** Mac Plus; 2MB of RAM; System 7. **LIST PRICE:** $129.95.

**REVIEWS**

**A**lthough computers make routine work of jobs that would be impossible to perform manually, most computerized tasks still demand a good deal of human interaction. For years, computer visionaries like Alan Kay have predicted that someday smart software "agents" would go about their business independently. Magnet, billed as the first intelligent agent for the Macintosh, automates the laborious task of file management on a local disk or over a network. User-specified events trigger Magnet's agents (also called magnets); in response, and operating unattended, the magnets scavenge designated volumes looking for files and folders to copy, move, or alias.

Creating a magnet is a straightforward process. Unlike UserLand Frontier, which provides many more capabilities but forces you to learn a scripting language, Magnet lets you control the Mac Operating System via a system of pop-up menus. The first step uses an interface similar to System 7's Find command to tell Magnet what files and folders you want to look for. Magnet's filters let you scan by name, kind, location, date, label, or size. You also can search for files containing specified text strings, something you can't do with the Finder. Magnet doesn't support Boolean search operations, though, so you can't look for files that contain Clinton AND Bush, for example.

When you finish specifying your criteria, you can manually scan to test your search parameters. As Magnet works, files and folders that meet your specifications appear in a scrolling list. You can select items from the list one at a time, and open, locate, copy, move, create aliases for them, or put them in the Trash, but you can't shift-click to select multiple items.

The next step is to indicate when the magnet should run. Magnets can be set to activate on a given date and time, or to repeat regularly (say, every Friday at 5 p.m.). You also can direct magnets to launch whenever the Mac is idle, or just before shutdown. The program's most powerful feature lets you instruct a magnet to trigger whenever a particular volume is mounted, either locally or on a network. For example, you can create a magnet that automatically backs up certain files whenever you insert a particular floppy disk or cartridge. If you use AppleTalk Remote Access, you can even have a magnet log on for you, mount and search a remote volume, and log off—all without supervision. (For security, you can lock and password-protect magnets.)

The last step before saving the magnet is to tell it what action to perform on the items it finds. (The magnet's location determines where found files and folders will be copied, moved, or aliased. The term "magnet" refers to the agent's ability to "attract" files and folders to its location.) If a found item already exists in the destination folder but has been changed since the last time the magnet ran, Magnet moves the older version into a special Conflicts folder instead of overwriting it, a wise safety precaution. Magnet's Sync function creates a pair of magnets that automatically makes the contents of any two folders identical by copying the most recent versions of all the files into both folders. Although this feature is intended primarily for users who want to reconcile a desktop and a portable Macintosh, it works equally well with any set of folders, even across a network.

Magnets can activate automatically only if the Magnet application is running and the Magnet extension is loaded. Magnet's Control window, accessible from the application, shows the triggers, status, and location of all your magnets, and lets you disable or run them manually; a separate Activity Log keeps track of what happens each time a magnet runs.

No Hands Software trumpets Magnet as a replacement for manual file-management utilities like On Technology's On Location. Scanning by file name, Magnet compares favorably with On Location, easily outperforming the Finder. Because Magnet doesn't use indexes, though, it can't match On Location at searching by content. (Note: If you use Salient Software's AutoDoubler, be sure to get Magnet 1.01. Because of conflicts in the way the two programs process background tasks, Magnet 1.0 cannot scan for text within AutoDoubler-compressed files.)

Magnet's agents are relatively primitive, and the range of triggers and actions should be expanded in future releases. But while Magnet is easy to learn, its concept is so novel that its potential uses may not be immediately obvious to many users—Tinkered for over a week before I discovered just how helpful Magnet could be, automatically cleaning up unwanted files and other housekeeping chores. Magnet's requirement that the application be running for agents to trigger is a potential pitfall, but fortunately, Magnet issues a warning before it quits.

Fault-tolerance also is critical for success. In my tests, magnets always triggered reliably, and problems encountered during execution never caused the application to crash. While single-volume users might prefer other utilities for manual file-management, anyone who routinely works with multiple disks will find Magnet invaluable. —FRANKLIN N. TESSLER
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Circle 72 on reader service card
Poetry in Motion

PROS: Effectively combines text and video; clear interface; flawless operation. CONS: None.
COMPANY: The Voyager Company (310/451-1383). REQUIRES: Mac II; 4MB of RAM; color monitor, QuickTime-compatible CD ROM drive; hard drive; System 6.0.7. LIST PRICE: $29.95

Poetry in Motion, based on a film of the same name, juxtaposes performance videos of contemporary poets with the texts of their poems and with taped interviews. The result is a unique presentation that combines the excitement and emotion of the stage with the more reflective appeal of the page. The 22 authors featured in Poetry in Motion are a culturally and stylistically diverse group, but they share the quality of being performance-oriented and accessible rather than academic. Whether it's beat poets like Allen Ginsberg; pop personalities like Jim Carroll; or writers not primarily known for their poetry, such as Ntozake Shange or William Burroughs, the writers in this selection are as likely to be found in a nightclub or coffee house as in the pages of the Atlantic.

Poetry in Motion is easy to install and use. You can read the poems with or without video accompaniment, either as they were performed or as published. I tried the disc on two computers. On a Quadra, the video looked fairly smooth and sound synchronization was convincing. On a Flex, the visuals were jerky, but they still provided a feeling for the performer's style and personality.

It's not just the videos that make this disc come alive, it's the voices. Voices that bring out the hidden structure and rhythms of a poem, that sing or wail, that color one line ironic, another wistful. Anyone who enjoys poetry will value this disc. But the drama and interpretive power the performances bring to the verses make Poetry in Motion especially valuable for teachers and librarians trying to inspire new audiences (though some pieces do contain profanity).

It's hard to imagine anyone who has seen this work wondering "but what's the point?" That makes Poetry in Motion a rarity among multimedia projects available today. Better still, it's one of a handful of discs that go beyond providing online instruction or entertainment, offering instead moments of moving beauty, pathos, art.—JOE MATAZZONI

600-dpi Laser Printer

HP LaserJet 4M


Printing complex images using an older HP LaserJet with a PostScript cartridge was just too slow. Thanks to technology, everything about the new HP LaserJet 4M from Hewlett-Packard improves upon the LaserJet III.

The 4M comes standard with 6MB of RAM (expandable to 34MB); is PostScript Level 2-capable; and has LocalTalk, parallel, and serial interfaces. It comes with the standard 35 Adobe Type 1 faces that Macintosh users have come to expect in a laser printer, as well as 35 Intellifont and 10 TrueType fonts for the DOS world.

The printer can interpret HP's PCL (Printer Control Language) and PostScript, and it can accept input from a DOS machine and a Mac at the same time without the user having to set any switches or upload any wires! This autoswitching is a must in a mixed-platform office. One user can print a Mac document via LocalTalk while another user can print a document from a DOS workstation without either user resetting the printer.

The 4M has an Intel 18960 RISC processor—a big improvement over the 68000 processors used in many of today's printers. Printing times are less for complex graphics from Aldus FreeHand and Adobe Illustrator, for example, and for documents containing many fonts in a variety of sizes. At 300 dpi, print speed is equal to that of Apple's LaserWriter IIg. You will notice a vast difference in performance speed when you compare the 4M at 600 dpi with others at the same resolution, such as the QMS-PS 1700, Xante's Accel-a-Writer, or the Lexmark LaserPrinter 10A (see "Workgroup Printers," Macworld, January 1993).

The 4M is also one of the first printers to use the new Canon LBP-EX engine, capable of printing at a true 600 dpi. That means you get four times as many dots per inch as you would at 300 dpi without interpolation. The engine is rated at the standard 8 pages per minute for 300-dpi printing and also for printing simple, single-font documents at 600 dpi. Macworld Lab test results show little discrepancy between the 300-dpi and 600-dpi print time for a 20-page single-font Word document—a mere two seconds!

The people at Canon have done away with the corona wires and replaced them with a roller that actually makes contact with the paper. With all other existing engines, the corona wire is charged and attracts toner from the drum to the paper. This process can result in characters with fuzzy edges, since the wire sometimes produces a stray charge. By making physical contact with the paper, the 4M can print sharper, more-controlled characters. With the new engine comes microfine-toner—toner whose particles are roughly 20 to 30 percent smaller than previous toner particles. When you combine the new printing method with the microfine toner, 600-dpi resolution, and HP's Resolution Enhancement Technology, the result is clean, sharp output.

The LaserJet 4M is a definite winner when compared with its predecessors. The switch to a RISC processor has accelerated printing complex images and even documents with a lot of fonts. The new print engine and toner guarantee smooth curves and crisp characters. And its allports-active feature makes the 4M one of the most flexible printers on the market today.—DANNY LEE

All times are in seconds. For detailed information on the documents used for the tests, see the chart "Rating Printer Performance" on page 136 of Macworld's January 1993 issue.
High Performance Storage For The Macintosh Quadra 900/950
MicroNet’s Raven • 040 Internal Disk Arrays

MicroNet's RAVEN brought unbeatable disk array performance to the Macintosh II. Now there's a more powerful Macintosh. The Quadra 950! It's based on 68040 technology and it's fast. The performance of the Quadra can be greatly increased by use of a MicroNet RAVEN-040 disk array.

The RAVEN-040 is a two-drive array employing FAST-SCSI-2 technology. With sustained data transfers of 9.2 MBytes/sec, average access times as low as 4 ms, these new storage systems are six times faster than standard hard disk drives. Available as internal or external systems with capacities from 642 to 5,560 MBytes.

The RAVEN-040 was designed to use the built-in SCSI ports of the Quadra 900/950. The PDS and all five NuBus slots remain open for other use.

The RAVEN-040’s built-in performance makes it ideal for graphics, animation, pre-press, digital sound, multimedia, and CAD/CAM, where speed and capacity are paramount.

The RAVEN-040 is the ultimate data storage system for Quadra 900/950. No one can match the power of the RAVEN-040.

Call a MicroNet sales engineer today for additional information and the name of your nearest reseller. 1-714-581-1540.
**Sketcher 1.0**

**PROS:** Excellent reproduction of traditional drawing tools. **CONS:** Can't export record sessions; icons should be smaller. **COMPANY:** Fractal Design Corporation (408/688-8800).

**REQUIRES:** Mac II; 2.5MB of RAM; hard drive; System 6.0.5; 32-bit QuickDraw. **LIST PRICE:** $149.

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**PhonePro 1.0.3**

**PROS:** Flexible protocols; icon-based programming; includes database and connection to Microsoft Mail and CE QuickMail. **CONS:** More suited to developers than end users. **COMPANY:** Cypress Research Corporation (408/752-2700).

**REQUIRES:** Mac Plus; 4MB of RAM; hard drive; System 7. **LIST PRICE:** $950.

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**Packing is Not Usually Grist for Reviewers, but Sketcher's Is so Novel, You Can't Miss It. And You Shouldn't.** The program comes in a facsimile of a cigar box, complete with a drawing-pad-like manual. Sketcher, a grayscale paint and image processing program, is wonderful.

Similar in style to Painter, its 24-bit color version, Sketcher offers a multiplicity of effects reproducing the styles and techniques of traditional drawing tools. However, Sketcher is more straightforward, faster, and simpler to operate than Painter.

Sketcher uses floating palettes. The smallest one holds generic tools, such as a magnifying glass and marquee, as well as tools for applying friskets (masks) and importing TrueType and PostScript fonts for textured text. Other palettes let you customize brush sizes, define fills, edit friskets, and access different paper surfaces.

Drawing implements, such as pencils, charcoal, pens, crayons, and water, are organized by icon in the Art Supplies palette. You select individual tools (Variants) from the Art Supply pop-up menu. All variants can be fine-tuned for penetration (how tools interact with paper surfaces) and concentration (how tools interact with previous strokes), making them infinitely modifiable. In addition, many variants respond to pressure-sensitive input, such as used by Wacom digitizing tablets.

You can tear variants off the floating palette for repetitive use (Painter could use this feature), and you can save customized variants, but you can't name them or add them to the pop-up menu; nor can you have two customized versions of a variant activated simultaneously. Smaller art-supply icons would also be an improvement. This palette dominates small screens, and torn-off tools can quickly clutter the work area. Still, Sketcher's interface is well designed, logical, and adaptable.

Sketcher's brightness, contrast, sharpening, softening, and posterization effects can be applied to an entire image, selections, or friskets. Sketcher also lets you apply artistic effects to photos as their clones.

If you enjoy dazzling your friends, you'll love Sketcher's Record Session feature. Turn it on, and Sketcher keeps track of every brush stroke and command. Play it back to see an animation of your creative process. Currently, Sketcher cannot export these animations as PICT files or QuickTime movies. Maybe next version.

The manual is concise, thorough, and peppered with examples, but there are no sample files. However, Sketcher is easy to learn. Doodling and trying out all the interactions is the best way. For all its technological prowess, Sketcher is at heart an artist's tool that encourages creativity. If you draw for a living, or simply like to dabble, you'll find Sketcher irresistible.

—Carlos Domingo Martinez

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**Telephony Software**

**PhonePro 1.0.3**

**PROS:** Flexible protocols; icon-based programming; includes database and connection to Microsoft Mail and CE QuickMail. **CONS:** More suited to developers than end users. **COMPANY:** Cypress Research Corporation (408/752-2700).

**REQUIRES:** Mac Plus; 4MB of RAM; hard drive; System 7. **LIST PRICE:** $950.

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**What, You May Ask, Is Telephony?** Telephony rears its modern but not entirely attractive head when you dial a number expecting to talk to someone and get "if you wish to speak to customer service, press 1" and you press 1 and then hear "if you're calling about WonderWidget version 3, press 4," and so forth. PhonePro is an application that makes it relatively easy to set up this sort of system on a Mac. Fortunately, it's not simply a tool for driving people crazy. In fact, it's advanced enough to make better and friendlier versions of this apparently necessary evil.

PhonePro includes a 9600-bps, single-line modem with a headset connection and a headset/microphone. You use this setup to record outgoing messages as digitized sound on the Mac; incoming voice messages are likewise stored and compressed on the Mac's hard drive (a 20-second message takes about 85K of drive space). For managing these messages and storing them in order, PhonePro software presents you with palettes of icons that represent different possible program operations: pick up phone, play message, receive tone signal, pick another message in response to signal, and so forth. You drag these icons to the workspace and connect them to set up a protocol; a simple answering machine protocol takes seven icons simply connected in a straight line (Go, Pick Up, Play Msg 1, New Record, Take Incoming Msg, Play "thank you," Hang Up).

The point of PhonePro, though, is really to construct fancier stuff. If you don't have much programming experience (PhonePro strongly resembles the icon-programming schemes in Odesta's Helix, Scrius's Scrius, and National Instruments' LabView, for example), there are sample scripts that cover PhonePro's two main uses: branched multiple-question scripts and voice-mail operations. PhonePro provides some nice touches for branching scripts. You can generate different outgoing messages from a Word Table, you can make a system that finds a human for desperate callers to talk to instead of dead-ending at a voice mailbox, and you can store caller information in a database (each database record has eight fields) that date/time stamps each message. PhonePro supports a protocol that lets callers punch in a contact's name if they don't know the extension; it's as complete as the best commercial systems. You can use PhonePro not only as your main voice-mail system (it can send messages over a local network as well), but also to forward voice-mail messages to CE Software's QuickMail and Microsoft Mail (there are icons for automated log-on and log-off from these services). And of course you can mobilize all this firepower for outgoing calls too, using it to direct automated telemarketing at people who are simply trying to eat dinner in peace.

PhonePro makes programmed telephony as easy as it's going to get; I set up a multiple-level voice-mail system for a small retailer in a few hours, but I was calling on years of experience in icon-based programming in LabView. If you have no programming background, you might be stuck making only small modifications to the scripts supplied by Cypress—extending PhonePro's capabilities using Apple events, for example, is not an ideal sport for beginners. But PhonePro is a good product, lives up to its claims, and promises the beginning of voice-mail systems with more humane and engaging "personalities" than we've seen in the past.

—Charles Seiter

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**Artistic Impression** Sketcher offers a wonderful combination of natural drawing effects and computer editability.
DON'T CALL ORKIN.*

When the Mac first came around, everybody loved its *little rodent*. No cursor up.

No cursor down. Man, what a handy device. Then people got into graphic arts.

Whoops. *Mousetrap!* INTRODUCING ARTZ.* The flashy, jammin', way cool ADB graphics tablet from Wacom.

ArtZ simply **plugs into your ADB port** and lets you create graphics using a cordless, batteryless, pressure-sensitive stylus, about the size and weight of a fine pen. Now, creating art on a computer is as **natural** as creating art on a note pad, a canvas, or even a subway. To see just how flashy and way cool the ArtZ is, **TAKE THIS SIMPLE TEST:**

1. Cut out the mouse at the top of the page. Blow it up if you like.
2. Trace it with the mouse on your computer.
3. Print it.
4. Scurry on down with both to your local Wacom dealer. Don't know where one is? Just call 1-800-922-6613. When you get there, trace the mouse on an ArtZ. **Feels good,** doesn't it? Now print it and compare the two. OK? Now pull out your pocketbook. You've been doing *mickey mouse art* long enough.

*For the mice that run on a Mac, you can't call for pest control. But for the mice that run on top of a Mac, and under a Mac, and in the cupboards and stuff, call these guys: Orkin Exterminating.*

WACOM

Putting technology in its place.
**Educational Game**

SimLife 1.0

**PROS:** Educational; variety of scenarios.

**CONS:** Difficult to learn. **COMPANY:** Maxis Software (510/254-9700). **REQUIRES:** Mac SE; 2MB of RAM; hard drive; System 6.0.2. **LIST PRICE:** $69.95.

**Educational Game**

SimLife is a megalomaniac's dream come true. The simulation gives you tools to create mountains, oceans, and deserts; populate your world with fish, fowl, and plants; change climate or terrain at will; invent new species; or unleash natural disasters such as floods, plagues, and comets. What other program gives you a Simtaste command? (Well, Microsoft Word might—I'm not yet familiar with all its features.)

Anybody can summon a comet; in SimLife, the hard part is creating a well-balanced, functioning ecosystem. Certain plants need cold weather to germinate; carnivores must have other animals to eat; animals must survive long enough to mate and pass on their genes. Fortunately, SimLife's life-forms can evolve, by means of mutations, into plants or animals more suited to a particular environment. As a session goes on, you can see how various species adapt to ever-changing conditions. The manual suggests several scenarios to try out, such as an isolated island community reminiscent of the Galápagos, or the introduction of a destructive alien species into an established ecosystem. You don't have to be a passive observer—you can alter various factors as a simulation progresses. (My major gripe is that you can reintroduce a species once it's become extinct.)

You view your world through a series of windows, graphs, and status reports. The Map window shows you a bird's-eye view of an ecosystem in action; zoom in to the Edit window to watch individual plants and animals, represented by animated icons. (You're subjected to constant audio feedback, with a spicy "ooh-la-la!" indicating mating, and a sad little "ooh!" signaling a creature's demise.) In the Biology Lab window you specify traits such as intelligence, habitat, diet, and number of offspring. You can check on each species in several Census windows, which include population statistics, a history of mutations and extinctions, and a report on who's eating who. SimLife's complexity is both a blessing and a curse. Let's face it, life itself is complex. However, one look at, say, the Animal Genome window, with its 23 sliders, 20 buttons, and 4 pop-up menus, is enough to make a budding biologist flee in terror. It'll take you several days to learn SimLife. But it isn't just a video game; each simulation produces different results, based on a sophisticated set of rules. Building a successful simulated world isn't easy, but the reward is an increased understanding of the complex interrelationships that sustain life in the real world.—ERFERT FENTON

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**REVIEWS**

**Fax and Data Modem**

Sportster 14,400 Mac & Fax

**PROS:** On-screen help; high-speed throughput; front-mounted volume control; modem cable included. **CONS:** Complicated documentation; data communications occasionally garbled despite error controls. **COMPANY:** U.S. Robotics (708/782-5001). **LIST PRICE:** $999.

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Our goal at NEC is the complete integration of computers and communications. The Silentwriter Model 95fx is just one of many innovative products that help us to realize this goal. For example, we not only developed the first notebook computer with a built-in phone and fax, we make satellite dishes capable of sending data worldwide.  

Once upon a time, all faxes looked the same. Bad. But with the Silentwriter® Model 95fx multifunction printer/fax, nothing gets lost in the transmission. Imagine PostScript™-language-quality faxes from your printer. It's no fairy tale. Now you can send and receive documents in all their original glory. You'll see beautiful fonts and graphics with none of the dirt and glitches, the jaggies and imperfections, that can turn a wonderful story into a tragedy. Why send a facsimile when you can send an original? Get the NEC Silentwriter Model 95fx multifunction printer/fax and live happily ever after.  

The Silentwriter Model 95fx Printer/Fax

And these facts.

1. A state-of-the-art 6 PPM laser printer equipped with Adobe's PostScript™ Level 2 and HP's PCL5.

2. Send and receive faxes in either conventional or PostScript-language formats.

3. Patented Sharp Edge Technology delivers 600 DPI-equivalent clarity.

4. Automatic interface switching supports both Macs and PCs.

5. Under $2,349 (MSRP). Far less than you'd pay for any printer/fax multifunction combination.

Because ↑ is the way you want to go. NEC

To upgrade your existing Silentwriter Model 95 printer with fax capability (U.S. only), or for more information about the Silentwriter Model 95fx, call NEC at 1-800-325-5500.

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The Kodak ColorSense Color Manager helps you match printer output to the original image.
Introducing the Kodak ColorSense Color Manager. For true color balance across your entire Macintosh Computer System, in one complete and affordable solution.

To get the colors you want out of your color desktop peripherals, you want the Kodak ColorSense Color Manager.

It's a software tool that balances your color desktop peripherals so they all speak the same color language. It's also a hardware tool that calibrates your monitor for consistent screen display over time.

The result? Balanced, accurate color from start to finish. What you see is what you get. No more guesswork. No more surprises. So now, when you want to present or sell a graphic idea, you'll have the color you want. Instead of a poor excuse.

You'll also generate fewer reprints as you work. Saving you time, material, and wear and tear on the printer.

Thanks to an easy-to-use interface, the ColorSense Color Manager is a cinch to set up and use. Just select the devices (scanners, Photo CD disc, monitors, printers) and the ColorSense Color Manager does the rest.

Call 1 800 242-2424, Ext 56, today for an information kit on the Kodak ColorSense Color Manager. And experience accurate color like never before.

Even visionaries need to see reality
**REVIEWS**

**Inspiration 4.0**

**PROS:** Elegant interface and easy-to-customize formats; diagram and outline modes are well integrated. **CONS:** Brainstorming capabilities are only as good as the user. **COMPANY:** Inspiration Software (503/245-9011). **REQUIRES:** Mac Plus; second disk drive; System 6.0.4. **LIST PRICE:** $295.

I ADMIT IT. FOR YEARS, IF AN OUTLINE was required, I constructed one after the fact. I persisted in the cut-paste-and-rewrite school of composing. Finally I pirated from a train mate a great technique for visualizing ideas. Rather than starting with a rigid, linear outline, the gentleman across the aisle summarized each thought in a word or two, circled it, and linked it to another topic; sometimes he set related ideas in orbit around a circled thought. A topography of the overall concept began to emerge.

The beauty of Inspiration is that you watch your ideas evolve in both a text-based Outline mode and in a dynamic Diagram mode. In the latter, you begin by typing your central concept into the Main Idea symbol. You add topics by typing a word or two into one of 63 predefined symbols; you can also import or draw custom symbols. To annotate a topic idea, you call up a symbol's Notes Text window; each window holds up to 15K. (I do wish the cursor appeared at the end rather than at the beginning of previous text when you reopen a Notes Text window.) Customizing a diagram with color-coded symbols and a medley of links is just as easy as choosing from a palette.

Whether you are developing a freeform diagram or a well-defined flowchart, space constraints may convince you that it's time to Adopt a Child—Inspiration argot for opening a file linked to a topic; the child file makes the selected topic the Main Idea.

Take a Note To annotate any symbol, call up its Notes Text file and record up to 15K of data. (That's nearly five times the length of this review.)

**Geography Software**

**MacGlobe 1.3**

**PROS:** Great assortment of maps and statistics; just about ideal for high-school-level projects; can export graphics. **CONS:** Performance problems on low-end hardware and small monitors. **COMPANY:** Broderbund Software (415/382-4400). **REQUIRES:** Mac Plus; hard drive; System 6.0.4. **LIST PRICE:** $99.95.

TEN YEARS AGO, COMPUTER MANUFACTURERS and educators assumed that computers would revolutionize and accelerate education in the United States. It's safe to say that the bright hopes in this area have not been realized, and the problem has been a lack of high-quality, imaginative software. One significant bright spot in education is the best-selling lineup of products from Broderbund, the people who made Carmen Sandiego a household name. Recently the company acquired MacGlobe, outfitted it with some modifications and a new manual, and dropped the price.

MacGlobe's atlas of the world was correct in early 1992: there's just one Germany, the parts of the former Soviet Union are correctly represented, and what was formerly Burma with its capital at Rangoon is now called Myanmar administered from Yangon; but Bosnia is still part of the Yugoslav Federation. Because it's on disk, it's easily updated (updates cost $25), and updates include not just map changes but also changes in tabulated data.

The quantity of information in MacGlobe is impressive. Besides maps and little bits of fun (the program displays flags and plays national anthems), MacGlobe offers complete demographic and economic data (birth and death statistics and projections, age distributions, health and educational data, exports, imports, tourism, GNP). The data is presented not just in standard bar charts but also as thematic maps—in thematic maps color codes or patterns indicate numerical values for parameters such as literacy or infant mortality. MacGlobe also computes distances between map points, converts currencies, and computes time differences around the globe. The documentation of data sources is exceptionally thorough, so students using MacGlobe for school projects can find the original documents.

This program faces some problems common to all Mac-based atlases. First, the 72-dpi standard display means that the Apple 12-inch monitor, ubiquitous atop LCs in classrooms, gives pretty grainy maps. Another problem is that graphs are saved as PICT files for easy Clipboard export to word processors or page-layout programs. Most of the data presented in charts would be more useful in compact form as tabbed text for import into other graphics, statistics, or spreadsheet programs. Finally, this program tests the usefulness of scrolling lists as a selection device: scrolling through 200 countries with only 5 entries visible is fairly annoying.

But the high-quality data selections and flexible mapping make this program a necessity for schools and a fascinating intellectual adventure for home use. It could stand some improvement in data export, but it's the best geography program currently available for the Mac.—CHARLES SEITER
Make it clear.
Make it colorful.
Make it happen.

The HP DeskWriter 550C
for the Mac.
$1,099.

Great things happen when you have a DeskWriter 550C printer from Hewlett-Packard. Because it's never been so easy to print high-quality black and white. And brilliant color.

The DeskWriter 550C prints true black at 300 dots per inch. Clean, crisp and sharp, for the kind of professional print quality you expect from HP.

For added impact, the DeskWriter 550C makes it easy to add color to your work. The black and color cartridges are built in and work together, giving you access to millions of colors.

You can get an HP DeskWriter 550C, or the DeskJet 550C for PCs, for a suggested list price of only $1,099.* So if you're looking for an affordable way to make a powerful impression, get a DeskWriter 550C printer. Then see what happens.

For another cost-effective way to get great-looking black and white and color, the HP DeskWriter C and the DeskJet 500C are now available for a low price of just $779.*

Call 1-800-552-8500, Ext. 7119 for the name of the authorized HP dealer nearest you. To receive information by fax call 1-800-333-1917, choose HP FIRST, document #9607.

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Make it happen.

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Trinitron 19" Color System $1998
- With 8 Bit interface $1998
- With 24 Bit interface $2598

Sampo 20" Color System 1398.00
- 8 Bit Color System $1398.00
- 24 Bit Color System $1998.00
- Mono System $698.00
- Grey Scale System $998.00

- The Sampo is a high quality dual pipe display without the high cost!
- Includes 1 bit, 8 or 24 bit Video board and cable
- 2 page display supports all Mac II's, the II, SE-30, SE and the LC

Trinitron 19" Color System
- 8 Bit System $1998.00
- 24 Bit System $2598.00

- This Trinitron 19" is a Sony OEM product and one of our best buys! True Trinitron color at a great price!
- Includes 8 bit or 24 Bit Video board and cable
- 2 page display supports all Mac II's, the II, SE-30, and the LC

NuDesign Full Page Grey Scale $398.00
- Plug compatible with the LC
- Plug compatible with the LC at 640x480

Sampo 20" 8 Bit Color System $1398.00
- With Photoshop

Trinitron 19" Color System
- With 8 Bit interface $1998
- With 24 Bit interface $2598

Umax UC-630 With Photoshop $1098.00
- Transparency/Slide Scanner Option $798.00
- Automatic Document Feeder $498.00

- Rated four mice by MacUser (Dec '91)
- "Boasts the highest vertical resolution..." Tamarack and Umax produced the best images..." MacUser
- "Tamarack and Umax excel in speed and color accuracy" MacUser

Umax UC-1200S With Photoshop $3298.00
- Transparency/Slide Scanner Option $898.00

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- Single- pass design increases scanning speed
- Includes Adobe Photoshop

Umax UC-630 With Photoshop Grey Scale Scanner $898.00

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Technical Service and Order Tracking (8:30-5:00) 312-664-8225

Circle 58 on reader service card
**Music Education on CD ROM**

**So I've Heard, Volume 1: Bach and Before**

**PROS:** Good summary of, and collector's guide to, early Western music; numerous musical excerpts; affordable. **CONS:** Omits some essential works; music stops when new card appears.

**COMPANY:** The Voyager Company (310/451-1883). **REQUIRES:** Mac Plus; 2MB of RAM. **LIST PRICE:** $269.95.

**CONS:**

**LIST PRICE:** $269.95.

**REVIEWS**

**NE THING THE CURRENT CROP OF music-education CD ROMs lacks is a bird's-eye view of the grand sweep of Western music. Warner Audio includes a history of the requiem as a musical form in Johannes Brahms, A German Requiem, and accurately; buttons are easy to customize.

**LIST PRICE:** $269.95.

**A DB Controller for Multimedia Applications**

**Media Control Station**

**PROS:** Optical wheel moves smoothly and accurately; buttons are easy to customize. **CONS:** Documentation is unclear in places. **COMPANY:** JL Cooper Electronics (310/306-4131). **REQUIRES:** Mac Plus; System 6.0. **LIST PRICE:** $269.95.

**FIRST, TO QUELL ALL INNUENDOS OF bias, I am not related (even distantly) to anyone presently or previously employed by JL Cooper. My people are honest barc- makers from Virginia. Now let's talk about the Media Control Station. If you work with Adobe Premiere, Macromedia's Macro- Mind Director, Digidesign's Sound Design- er II, or any application that manipulates temporal data, I recommend that you check out the Media Control Station (MCS).

The MCS is a small black box, the size of a skinny brick, that connects to the Mac through the ADB port (it has a second ADB port for chaining a keyboard and pointing device). On the top of the box are seven buttons (rewind, fast forward, stop, play, record, shift, and option), and a silver dollar-size wheel that has an indentation for turning it with your finger. The MCS comes with settings for four applications and includes an application for defining key sets for other Mac programs.

I first tried using the MCS with Adobe Premiere 2.0 (a tryout version of Premiere 1.0 comes with the MCS). Rather than using the mouse or keyboard to control the playback functions, I put the MCS to the test. Rotating the wheel clockwise or counterclockwise advances or rewinds a Quick- Time movie by one frame per step. This is similar to the way the jog/shuttle wheel on a professional video deck works. In jog mode, when you rotate the wheel, it moves the tape forward or backward in one-frame increments. I found using a wheel invaluable, especially when setting in-points and out-points in Premiere. Trying to move through movies precisely by pushing buttons with the mouse is a real pain.

The MCS wheel also allows shuttling, which involves moving through tape (or data) at a variety of speeds (such as half-speed, five times normal speed, or ten times normal speed) by turning the wheel left (for reverse) or right (for forward) of center and holding it there. The farther you turn the wheel, the greater the speed. JL Cooper offers shuttling for Sound Designer II; it is not available for Premiere.

Pressing combinations of buttons on the MCS invokes functions in Premiere that let you set an in or out point, move forward or backward five frames, and play or stop a movie. There are 20 different key combinations that have preset functions, or you can give them new functions by using the MCS application.

Four factory-preset combinations invoke the function keys found on extended keyboards. This is especially useful if you have defined these keys using a macro program such as Ce Software's QuicKeys.

Also included on the MCS disk are preset functions for MacroMind Director, Claris HyperCard, and Opcode's Vision. The device defaults to the settings for Premiere, but you can change the default using the MCS application. I found it easy to program my own commands for other applications, and once I deciphered the poorly written manual, modifying existing sets was a snap. The MCS is a versatile tool, and it's invaluable for looking through MIDI files, Director scores, and QuickTime footage like a pro.—EVAN COOPER
Address Book and Reminder DA

Intouch 2.0.4

PROS: Flexible output options; database is accessible while working in other applications.
CONS: Free-form data entry limits sort options; calendar's list view shows reminders, not events.
COMPANY: Advanced Software
REQUIRES: Mac Plus; System 6.0.3
LIST PRICE: $99.95.

Intouch 2.0.4 ADDS A REMINDER SYSTEM TO A FAST, EASY-TO-USE DATABASE FOR STORING ADDRESSES, PHONE NUMBERS, AND OTHER CONTACT-RELATED INFORMATION, WHILE RETAINING THE FREE-FORM APPROACH TO DATA ENTRY. UNLIKE ADDRESS BOOKS THAT PROVIDE SEPARATE FIELDS FOR NAMES, CITIES, PHONE NUMBERS, AND OTHER FACTS, INTOUCH LETS YOU ENTER CONTACT INFORMATION ANY WAY YOU LIKE.

Without fields, however, Intouch can't automatically capitalize names or format telephone numbers as you type. The lack of fields can also lead to unpredictable results when you try to sort the database. The manual suggests that you use a standard address format, so the company name would always go on line two of the address field, for example. For sorting purposes, Intouch distinguishes between the first, second, and last words in address lines, and it recognizes U.S. zip codes.

Intouch lets you assign records to groups—for example, all your friends in one group and relatives in another. (If you are friendly with a relative, you can assign that contact to more than one group.) You can also find records that contain (or don't contain) specified strings of text.

The Dial button lets you place a telephone call over your modem or through the Mac's speaker. To reach outside lines or long-distance services, you enter special sequences before and after the main number. Because there are no phone-number fields, Intouch's scheme to distinguish telephone numbers from other numeric data works well for standard North American number formats. Intouch also allows you to identify foreign telephone numbers.

Intouch offers four print options: envelopes, labels, address books, and fax cover sheets. All the formats are easy to customize: on envelopes, for example, you can specify the location and appearance of the address and return address, and you can add bar codes. However, if you move the return address by mistake, you must save the changed version under a new name.

The reminder function lets you schedule events for a specific date, for a point in time, or for a block of time. You can set alarms to notify you ahead of time; if the reminders control panel device is installed and turned on, alarms will pop up on your screen even if Intouch isn't running.

Unfortunately, Intouch fails short as a calendar planner: when you display reminders for any day, week, or month, the list shows only the advance alarms you've set, not the events themselves. There is a daily view that includes both alarms and events, but that's not sufficient to plan activities a week or a month at a time.

A control panel device called Snap lets you access Intouch while you're working in other applications. If you're using a word processor to write a letter, for example, you can select the recipient's name and search the Intouch database. Snap scans the address book and lists the matching entries; selecting one pastes the associated address into the document. You can also use Snap to add entries to the Intouch database, dial phone numbers, and print envelopes or labels, all without leaving your application.

Despite the free-form data entry, Intouch is a good choice if you need to look up names and addresses and print envelopes. The ability to search the database and print without leaving your word processor is a definite plus. But until Intouch provides more ways to view events, I can't recommend it as a calendar planner.

—FRANKLIN N. TESSLER

Stress-Relief Software

Insanity 1.0

PROS: Realistic sound effects; detailed animation; variety of modules.
CONS: Novelties wear off; installing modules is complicated; promotes violence in society.
NOTI COMPANY: UV Wave
REQUIRES: Mac Plus; 2MB of hard drive space; System 6.0.5; 32-bit QuickDraw.
LIST PRICE: $28.95.

uch as I love and appreciate my Mac, there are times when the computer so frustrates me that I'd just like to slap it upside the head. Then I realize that smacking an expensive, fragile box of bits is probably less prudent than it actually is. That's when I reach for Insanity.

Originally introduced as Madness-Rage from Me & John Software, Insanity has been improved and completely rewritten by the two-man publishing house of UV Wave. This cool little control panel (cdev for System 6) lets you harmlessly "shoot" the Mac whenever your blood pressure climbs or your trigger finger itches. Just click the mouse while pressing the user-definable 5-key combination, and Insanity's floating menu appears on the menu bar, displaying a list of the "weapons" at your disposal: sea pigeon, 12-gauge assault rifle, 20-gauge shotgun, .44 caliber magnum, BB gun, Bill the human cannonball, 9mm Glock pistol, Moof 45, and an Uzi machine gun.

Once you choose a module from the floating menu (or allow Insanity to pick one at random), the cursor turns into an appropriate gunsight. For instance, the cursor becomes a normal sight for all the pistols and rifles, a bird for the sea pigeon, a bull's-eye for Bill the human cannonball, and bovine buttocks for Moof the Dogcow.

To shoot, move the cursor anywhere on screen and click the mouse button or press the user-definable 5-key combination for the gun trigger. What happens when you pull the trigger depends on the module. As you might expect, each of the real weapons goes off with a distinctive bang (or in the case of the shotguns, resounding booms) and tears convincing bullet holes in the Mac's display. The Glock blows perfectly round holes with deadly accuracy, the shotgun perforates the screen with buckshot. If you prefer something a little more disgusting, check out Insanity's three non-weapons. The sea pigeon lets loose a sticky glob of white goo (sure to have the kids laughing hysterically), Moof deposits a cow pie that lands with a resounding thud, and Bill the human cannonball flies gracefully through the air until he splatters onto the desktop with the same disgusting result as a bug hitting a windshield at 70 mph. The animation is first-rate and looks great in monochrome as well as color (requires 32-bit Color QuickDraw).

When you're finished shooting up the place, or you've expended all of your ammo, press the return key to hang up your holster and resume work. Everything on screen returns to normal, with bullet holes and bird droppings cleaned up in a flash.

The default settings for each module accurately reproduce the characteristics of the actual weapon. For example, the standard Glock clip holds 15 rounds, each of which can be squeezed off individually in rapid succession. But sometimes it's more fun to tweak the performance. Using the Insanity control panel, you can set the total number of shots, shots per burst, and firing speed for each module.

Insanity is a fun program that lets you harmlessly blow off steam. After a while, however, the novelty of blasting the Mac to smithereens wears off. Still, Insanity is worth keeping around to entertain your friends and strike fear into the hearts of your enemies. My only real complaint is that enabling individual modules in the control panel is awkward and unnecessary. For simplicity's sake, all modules should be available simply by their presence in the System Folder.

—OWEN W. LINZMAYER
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Expert Landscape Design

PROS: Extensive toolbox, good scaling features; easy to learn. CONS: Awkward color and pattern tools; limited object libraries; few library objects are labeled; nonstandard Mac interface. COMPANY: Expert Software (605/947-9999). REQUIRES: Mac Plus; System 6.0.5; 32-bit QuickDraw. LIST PRICE: $49.95.

EXPERT LANDSCAPE DESIGN OFFERS amateur landscape artists an inexpensive, easy-to-use object-oriented graphics environment for designing gardens literally from the ground up—from ground cover, trees, and shrubs, to garden furniture. However, by neglecting to identify plant types or to facilitate precise drawing, the program fails to give budding gardeners a good tool for landscape design.

Expert Landscape Design creates a view of your garden from above, like a floor plan. You then design the garden using a combination of library objects and objects you draw yourself in the familiar Macintosh drawing environment of snap-to grids, layers, scalable rulers, and so on. The toolbox also contains several specialized features, such as fence- and wall-drawing tools, a vertex grabber (for editing polygons), replace and copy tools (used with library objects), and a measuring tool.

Expert Landscape Design uses several distracting cursors, including a crosshair and a pointing finger to indicate the direction objects are being moved in. The program also presents annoying phantom outlines of objects that follow the pointer cursor when you select and move multiple objects. And you must click on an empty area of the screen, rather than on another object, to deselect an object. The program also redraws very slowly. All these behaviors hinder the ability to draw. You can, however, import PICT files from other programs and use them in your on-screen garden plot. The program supports color, but in a somewhat roundabout way.

After you scale and draw the area of your garden using the ruler and the wall and fence tools, you select and arrange the plants and furnishings. The program has several libraries of plants and yard furniture with which to populate your landscape (don't expect to identify the plants stored in the library, though—none are labeled), and you can add your own hand-drawn plants, pools, and furniture to libraries. Placing objects is an un-Mac-like experience. You draw circles to receive objects, drag one object from the library into a circle, and then use the replace tool to duplicate that object in the other circles (the copy tool makes only one copy of an object). Then you drag the circles to where you want them in your garden, resize the objects to fit their designated spaces, and finally color them.

In sum, Expert Landscape Design provides a bare-bones drawing environment in which you can experiment with landscape design—moving images of plants and objects around a scalable area. The only instruction this program offers is a chapter at the back of the manual on elementary landscape design.—RITA LEWIS

ClearVue/SD21

PROS: Fast scrolling; uses little RAM. CONS: No mirroring mode; terminators difficult to access; does not display gray scale. COMPANY: RasterOps Corporation (408/562-4200). REQUIRES: Mac Plus; System 6.0.3 (7.0 for color Macs). LIST PRICE: $1799.

IMAGINE YOUR AUDIENCE IN RAFT attention to your presentation on a 21-inch display as you maneuver through your disk-based slide show or QuickTime movie from your PowerBook. That's the potential I envisioned for the RasterOps ClearVue/SD21 monitor, a monochrome display with a 21-inch screen that plugs into any Mac via the SCSI port (it's intended primarily for PowerBook users). Sadly, the reality is less than the potential.

The ClearVue/SD21 lets you display images in black and white, not gray scale, so you cannot use the monitor as a magnifying monitor for presenting text to an audience.

And even if it did let you do any of this, the ClearVue/SD21 does not support mirroring mode (also called presentation mode), in which the monitor displays the same image on the PowerBook screen as on the external monitor, so managing a live presentation is tricky unless you manage to position yourself so you can watch your PowerBook screen, the external monitor, and your audience.

Although the RasterOps monitor is nice, and the INIT that lets it run as a second, external monitor is easy to install and use, this product is limited in how it can be used. What can you do with it? Basically, you can work on large text files at a home or office setup where a PowerBook is your primary Mac. I don't think many word processing users need such a large monitor, and the number of Excel or Lotus 1-2-3 spreadsheets that need to be displayed at this size must surely be a small part of that universe.

The screen display is relatively speedy, thanks to the monitor's built-in graphics acceleration. I found the scrolling to be about as fast as that of a PowerBook 140's internal screen. Considering the amount of data that a large monitor must handle over a relatively inefficient path like SCSI, that's an accomplishment.

The INIT that controls the monitor takes only about 120K of RAM. In addition to intercepting the QuickDraw calls that are sent to the PowerBook's internal display, and sending calls on to the video board built into the ClearVue/SD21 monitor, the INIT can also be set to create an extended desktop, so you can pan across an even larger screen than can fit on a 21-inch monitor (see Lab Notes, this issue).

If only the ClearVue/SD21 supported gray scale, mirroring, and high resolution, many more users would benefit greatly from this monitor. With these additions, the $1799 ClearVue would be a good investment for graphic artists who want a portable Macintosh so they can take files to their clients, yet not be limited to a PowerBook's small screen while working on detailed artwork; or for businesspeople making presentations on the road or in a conference room. For use as a large, text-oriented screen, it would be hard to justify the investment, since you would pay about the same price for both a regular 19-inch grayscale monitor and an Aura Systems (619/438-7730) ScuzzyView SCSI video adapter (see the feature "Expanding Your PowerBook," this issue), which together give you 8-bit grayscale support, as well as color if you plug the adapter into a color display or LCD panel. (But, alas, no mirroring.)—GALEN GRUMAN
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Who can resist MACWORLD Expo? It's the original Macintosh-exclusive show—a paradise of new hardware, software and peripherals. Mac enthusiasts go there to feast on the latest Mac toys and indulge their lust for power (RAM, ROM and otherwise). They bask in the warm glow of 21" color displays and ask questions like, “Can man's fall from grace be animated on an FX?”

Qualified Macheads are on hand to show users the tricks of the trade, and there are plenty of Macs provided on-site for impromptu practice sessions. Users try out new software for home and office, separating the quick from the dead, and getting expert critiques on a wide range of applications. In fact, there are so many experts at MACWORLD Expo, it's like you're hearing the word of G... (well, uh, you know what we mean).

In the end, it's only natural that an event as big and exciting as MACWORLD Expo would be an irresistible temptation to over 100,000 Mac enthusiasts in North America. (And it's no surprise that companies would practically part with their ribs to exhibit.) True believers know that glory is never more than an upgrade (or two) away. And sticking with the same old program is almost a sin.

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Giants of Little Black Books

BY DAVID POGUE

As I see it, you haven't begun to use your Mac until you own two programs: a word processor and an address book. Oh, the bliss of little-black-book software! Oh, to dial a 93-digit credit-card sequence with one keystroke! To look up your client's kid's name before you've even finished saying "And how is little...?" To print mailing labels for only those deadbeats in zip code 10025 who owe you money!

There are two drastically different approaches to phone-book programs. Some show you a big blank card for each address. You can type information in any order, taking as much space as you want. One card might contain 11 phone numbers and no address at all; another might hold a recipe. This is the index-card model, the QuickDex protocol, the freeform database metaphor. These address books do everything fast: opening files, finding names, and saving changes.

The other kind of program has a separate fixed-length blank, or field, for each particle of info. First name. Last. City. State. Zip. Because the software knows precisely where each datum is socked away, it can perform stunts like sorting your entire phone book by car-phone number. Or printing labels for one specific state. Or alphabetizing your contact names. Field-based programs are slower, and you generally can't record information for which there's no preassigned blanket (a car-phone fax number, say). On the other hand, the index-card programs generally can't sort or select individual pieces of information, nor print labels or envelopes that include only the address.

I say generally can't, because both kinds of programs have recently exhibited some ingenious schemes for solving their characteristic drawbacks. Index-card programs now print labels that exclude phone numbers and notes; field-based programs now offer spare blanks where you can store miscellaneous data scraps. As you read the following reviews, consider your character. Decide whether you'd prefer a program that lets you color outside the lines, so to speak, or you would feel more secure with every data fragment filed in a field.

AddressBook 3.4.1

What do you call a program that lets you customize its color scheme, that automatically logs the amount of time you spend on each phone call, and that costs a third of what its rivals cost? You call it shareware—specifically, AddressBook. You get it from a user group or a dial-up network like America Online, try it out, and mail Canadian author Jim Leitch 30 bucks if you like his work.

AddressBook is both a program and a desk accessory (DA); both versions are fast and feature-rich. Its phone-directory main screen lists all your friends at once; double-click on a name to see a full screen showing address, phone number, and so on. If your phone is hooked to a modem (or to Sophisticated Circuits' Desktop Dialer), AddressBook's dialing smarts can handle preposterous touch-tone sequences (like credit-card access codes) with aplomb. (But like all programs except Advanced Software's Intouch and Casady & Greene's QuickDex, AddressBook maxes out when the dialing sequence exceeds 30 numbers, as my MCI card does.) AddressBook (the application, not the DA) prints great-looking labels, envelopes, and phone books. One feature in particular should embarrass the expensive commercial address books: automatic font resizing for addresses too large to fit on a label. You never ever get chopped-off mailing labels.

The burning question: Is AddressBook index-cardish or field-based? Happily, it's a clever hybrid. There are three blanks for each person (plus three phone-number blanks): one for the name, one for the complete address, and a third for miscellaneous notes. This scheme grants the incredible speed of index-card programs, while still isolating the stuff you wouldn't want printed on your envelopes (such as "chronic garlic breath").

Address Book Plus 2.0

Don't confuse Address Book Plus with AddressBook, its non-Plussed shareware namesake. This $99.95 program from Power Up Software takes full advantage of its field-based orientation: it sorts, selects, formats, and prints names and addresses in every conceivable way. You can assign contacts to a category ("Send Xmas Card") and print them all in a batch. Data entry is fast with typing shortcuts, such as autoexpansion of anything you start to type ("Ober") into its full form ("Oberubermorgau") and automatic capitalization.

By far the best aspect of AB+ is that you see on the screen precisely what you print—even the little binder holes in the paper (if you're printing Day Runner pages, for example). You get to spot problems before you print. AB+'s phone-dialing setup deftly handles multiple long-distance carriers and credit-card accounts, and automatically tacks on country codes when you're dialing overseas.

However, this what-you-see-is-what-you-get wonderworld is slow, especially when a file has more than 200 addresses. On a Mac IICl, it took 25 seconds to save a change to a 500-name file, and 30 seconds to switch from one layout display to another. On lesser-horsepower Macs, you might crave something quicker.

Dynodex 2.0.7

Great rivals of history: Capulet and Montague; Hatfield and McCoy; Dynodex and Address Book Plus. The last two have tried to out-feature each other for years; each manufacturer distributes a fact sheet pointing out its rival's shortcomings. Both programs are field-based. Both include a dialer/lookup DA. And both come with instructions for printing on both sides of pages so you can produce a pocket-size address book.

But Dynodex ($89.95; Portfolio Software) trades an attractive WYSIWYG screen display for speed. Where Address Book Plus gets sluggish for the sake of making WYS match WYG, Dynodex offers only an uneditable page preview just before you print. More annoying: you can't change the screen display typeface (the yucko Monaco font). And there's no balloon help to demystify the unlabelled tool icons. Still, speed is...
good; we like speed. Dynodex is fast in opening, searching, and saving.

I looked at a prerelease version of Dynodex 3.0, which should be available by the time you read this. The interface is in color, but you stare at the same old Monaco font; and mailing-label addresses, if Dynodex thinks they're too long, still get chopped off without warning.

**Intouch 2.0.4**

NEVER LET IT BE SAID THAT AMERICA IS losing its technological edge. This brilliant DA/control panel ($99.95; Advanced Software), neatly solves the index-card-versus-field-database problem by giving you true free-form fields (for more about Intouch, see Reviews, in this issue). In one, you type what you want to have appear on the envelope. In the other, you put phone numbers and notes. You get the speed of the free-form programs without sacrificing envelope-printing ability. For example, on a Mac, a 500-card file takes four seconds to open, and the program finds a name about half a second after you click. Intouch looks up the address behind the scenes, and, after about five seconds, plops the mailing address into your document. You can also dial somebody whose name you've highlighted in any program, or print an addressed envelope for that person. It's pretty spectacular, and no other program does it.

**MacPhonebook 3.06**

"BE MERCIFUL," SAID A SYNEX SPOKESMAN when I told him I'd be reviewing MacPhonebook. That's because this dialer/printer/address book program (and DA) is ancient and feature-poor. For mercy's sake, I'll simply mention that the new version in development, 4.0, is supposed to be polished and state-of-the-art.

**Mail Dex 1.0.2**

EVER HEAR PEOPLE SAY THAT WHEN they go to Andrew Lloyd Webber musicals, they walk into the theater humming the songs? You get that same sense of familiarity when you open Mail Dex, an index-card program ($59.95; Mission Accomplished Software Services). It's like QuickDex.

Anyway, despite Mail Dex's sole innovation—a nice envelope-layout view—I prefer the genuine article (QuickDex). I couldn't get Mail Dex to dial at all, and this DA from 1988 doesn't have nearly as many features or as much polish as its better-known, modern look-alike.

**MyMailList 4.0.0**

IMAGINE A WORLD WHERE YOU CAN'T drag through text to select it; where #6-period ($) doesn't cancel; where you can make font changes to highlighted text, but you don't see the change until you print; where the company's own copy of the software bombs on the phone technician's Mac. This is the world of MyMailList ($59.95; MySoftware Company).

It gets weirder: there's neither a command, nor a button, nor instruction in the manual for adding a new entry to your address file. And are you ready for this? After two free calls, the company charges $7 per call for tech support.

**PhoneBook DA 2.6.4**

WHEN I WAS GROWING UP IN OHIO, MY family kept its phone numbers in a spring-loaded gadget Mom called a Metal Directory. You slid a clickable pointer along the side until it pointed at, say, letter M; then you pressed a tab and the Metal Directory's lid popped open to the M card.

The closest you can come to this classic analog database is Tim Herzog's polished, extremely fast PhoneBook program. It's shareware; the desktop accessory version costs $35, and the application, PhoneBook Plus, and DA together cost $35. It works exactly like a Metal Directory—you click on a letter tab to pop to a screen of names beginning with that initial. It's more fun, though, to type the first few letters of somebody's name and watch the program zoom closer and closer to your target with each typed letter. It also does dialing and envelopes, creates beautiful phone-call logs, and can import 500 names-and-addresses in eight seconds.

**Rolodesk 3.3**

WHAT IS TIM ENDRES, SOME KIND OF saint? The guy writes a sweet, swift, 'swonderful QuickDex precursor with a witty title—and it's free. Download this index-card-style DA from a dial-up ser-
Address Book Plus, but it works similarly—it shows an editable WYSIWYG display of your printout—to be. If you add appropriate searchable keywords to the cards of your file ("Client," and so on), PrintDex can search, sort, and create subsets of your QuickDex database almost as flexibly as field-based programs do. Like the shareware AddressBook, PrintDex shrewdly shrinks the type on labels that would otherwise be too long to fit.

This'll take a whole paragraph, but I must describe one life-changing aspect of QuickDex's auto-dialer. Revel in its brilliance: if you type an X in a phone number, QuickDex stops dialing at that spot, waits for you to tap any key, then continues dialing. For example, my QuickDex card for Fed Ex's computerized pickup service reads 800-654-0920 * 9999-9999-9 * 10025 × 1. QuickDex dials the 800 number and stops; when I hear the greeting, I tap a key to make QuickDex blast away at my Fed Ex number (represented here by 9's). QuickDex pauses until I'm asked for my zip code (key tap), the number of packages (key tap), and if I'll be home (key tap). And consider the number of other times you're asked to dial touch-tones on cue: for phone extensions, bank-by-phone services, credit-card calls. QuickDex is the consumer's sole defense against Creeping Voice Mail in America.

The Upshot
If you need the powers of a bona fide database, choose Dynodex for its speed. Or consider a true database that dials, like ProVue's Panorama or Claris's FileMaker Pro.

I must admit, however, that I can't live with the rigidity of field-based programs. Today I wanted to write down, next to a phone number, "Fax/modem line—notify before faxing!" No field-based program allows such a notation. True enough, field-based programs can find subsets of your contacts by (for example) street address or state. Intouch and QuickDex can only search or sort by first name, last name, zip code, or category (or keyword). If that's enough for you, then the speed and flexibility of these desk accessories blow away all other filing systems.

Both QuickDex and Intouch also dial superbly, let you choose a font and layout for your contact information, and are fast. Intouch is more integrated (QuickDex's printing and sorting features are split off into a separate program). But give me QuickDex. Its auto-label-sizing, voice-mail-blasting, and speed advantage over all comers make it addictive and fun—which is something I rarely said about our Metal Directory.

How Butterflies Transform

The butterfly passes through several stages in its
glorious transformation from egg to egg to completed
creature in a spellbinding metamorphosis. The
adult butterfly, or imago, has wings and a stinger
and its own distinct identity. The larval stage is
distinguished by its blue or green body and
black and white-striped antlers. The butterfly
emerges from the cocoon and begins its
journey to adulthood. The mature butterfly,
beautifully colored, can fly in various
positions, either resting or in flight.

Butterflies must be handled with care
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survive manipulation. They are
protected by the cocoon, which
holds them safely until they are
ready to emerge.

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Circle 146 on reader service card
COMPANION 80 AND 120
External drives for the PowerBook that run up to four hours on their own batteries. Each drive comes with Companion INIT, which allows the drive to respond to the PowerBook's Sleep command. Drives also come with AC charger/adapter and SCSI cable. They store up to 80MB and 120MB of data, respectively. Companion 80 $599, Companion 120 $599. APS Technologies, 816/478-8300, 800/235-2752; fax 816/478-4596.

INT-128
Rewritable, removable internal optical drive stores up to 128MB of rewritable data on magneto-optical disks; one disk is included. Seek time is less than 45ms, and data-transfer rate is 640 Kbps, according to the company. $947. Image Network Technology, 818/454-1617, 800/334-6684; fax 818/454-1659.

DiamondColor Print 300PS
Color dye-sublimation printer produces photographic-quality output at 100 seconds per page, according to the company. Printer has color-correction controls on front panel, 32MB full-page buffer, 14MB of RAM, and a 40MB internal hard drive. Comes with 35 fonts and AppleTalk and provides EtherTalk ports as well as parallel and serial ports. $10,995. NipponShiki Electronics America, 714/220-2500, 800/843-2751; fax 714/236-6272.

Expans NB4 and Expans NB8
These two external expansion chassis house four or eight additional NuBus slots, respectively, for the Quadra 950. Both chassis connect to the Quadra via a NuBus interface board and cable and contain their own power supplies. Expand NB4 $1295; Expand NB8 $2295. Second Wave, 512/343-9661; fax 512/343-9663.

MultiVision 875 Plus
A 17-inch color monitor that has an on-screen programmable processor, 110V/220V power supply, side-panel user controls, and a two-year warranty. Monitor features 1200Hz bandwidth, dynamic beam focus, and horizontal and vertical scan circuitry. $1899. Taxan, 408/748-0900, 800/648-2926; fax 408/748-9599.

PB-10
External video adapter that connects PowerBook 140, 145, or 170 to LCD panel or other projection device. Converts PowerBook's 1-bit video to VGA. No software needed. $399. Power R, 206/547-8000, 800/729-6970; fax 206/285-0260.

Personal Color-Point PSE
Thermal-transfer color printer has 300-by-300-dpi resolution; 5MB of RAM, expandable to 21MB; and 17 fonts. Uses 16MHz Intel 80386 RISC processor. Prints standard 8½-by-11-inch letter and 8½-by-14-inch legal page sizes, postcard size, and 210mm-by-297mm (A4) size. Can print full-color pages in 2 minutes, 38 seconds, according to company. $3999. Seiko Instruments USA, 408/922-5900, 800/888-0817; fax 408/922-5835.

Mirror Quick
JPEG (Joint Photographic Experts Group) accelerator board compresses and decompresses images transparently for QuickTime applications. Mac IICX with board opens compressed 1.2MB Photoshop PIC in 1½ seconds that would take 21 seconds to decompress without board, according to the company. $599. Mirror Technologies, 612/633-4450, 800/654-5234; fax 612/633-3136.

MultiVision 875 Plus
A 17-inch color monitor that has an on-screen programmable processor, 110V/220V power supply, side-panel user controls, and a two-year warranty. Monitor features 1200Hz bandwidth, dynamic beam focus, and horizontal and vertical scan circuitry. $1899. Taxan, 408/748-0900, 800/648-2926; fax 408/748-9599.

PowerPlay
A 15-inch monochrome portrait display that connects to a PowerBook via the SCSI port; no special video adapter required. Designed with built-in 20MHz 68000 microprocessor and on-board QuickDraw acceleration. Also features a screen-refresh rate of 72Hz, resolution of 640 by 480 pixels at 80-dpi, two SCSI ports, and external SCSI-address and SCSI-termination switches. Also connects to Mac Plus or Classic. $599. Generation Systems, 612/633-5222, 800/325-5811; fax 612/633-1083.

PowerSwap
PowerBook accessory enables users of the 140, 145, 160, 170, and 180 to swap batteries without having to shut down the computer; device allows a standard 9V alkaline battery to power the Power-Continues
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NEW PRODUCTS

PowerVision

This internal video adapter enables user to connect a PowerBook 140, 145, or 170 to a standard 12-inch, 13-inch, or 14-inch color monitor or to a 15-inch gray-scale monitor. Display-detection circuitry deactivates the video board when monitor is disconnected. Includes installation video and tools. Without RAM $499; with 2MB of RAM $699; with 4MB of RAM $999. Minor Technologies, 612/633-4450, 800/654-5294; fax 612/633-3136.

ViperDrive

Floptical drive that reads and writes to 3.5-inch flopticals, high-density (1.44MB) Ata or DOS disks, and two-sided DOS disks. Internal configurations support the Mac II family, the LC and LC II, and the SE and SE/30. Also available as an external floppy drive. Ships with SCSI cable and floptical disk. Internal $349; external $399. Second Wave, 512/343-9661; fax 512/343-9663.

Wacom UD-0608

Pressure-sensitive ADB graphics tablet that has the ability to distinguish 120 levels of pressure, twice that of the original Wacom tablets, according to the company. The tablet also recognizes more than 100 data-input points per second, as compared with top input speeds of 50 to 60 points per second for conventional ADB tablets, according to company. $449. Wacom Technology Corp., 206/750-8882, 800/922-6613; fax 206/750-8924.

SOFTWARE

Accents & Borders 2

Modular clip-art collection that includes more than 300 decorative and representational images, some of which were inspired by historical motifs, such as Native American and Celtic art. There are five categories: borders, which are designed to be scaled, cropped, duplicated, and linked together; frames, designed for proportional scaling when imported into a page-layout program; ornaments, which can be used alone or duplicated to create borders and frames; symbols, made up of several images that can be separated and used independently; and tiles, designed to be repeated horizontally and vertically to create continuous background patterns. 2MB recommended. $149.95. 3G Graphics, 206/774-3518, 800/456-0234; fax 206/771-8975.

Bestbooks by Teleware

Entry-level bookkeeping program for small businesses. Provides sample data files covering almost every type of business: check, deposit, invoice, and purchase-entry screens; automatic entry balancing; both item and service invoicing; and integrated draw program to customize checks, invoices, statements, and mailing labels. Product is data-compati ble with M.Y.O.B. accounting soft ware. 1MB min. memory. $99. Teleware, 201/586-2200, 800/322-6962; fax 201/586-8885.

Bridge 7.0

Bridge-playing program deals the opening hand, bids and plays out a hand, recognizes Blackwood and Stayman conventions, lets the player choose weak or strong two bids, saves and replays hands; the Hand Editor lets the player set up, swap, or modify hands. The hint button suggests bids along with a reason for making bids. Player can set bidding style to be more aggressive or conservative. Players can also choose to play contract or duplicate bridge or whist. 1MB min. memory. $49.95. Artworx Software, 716/385-6120, 800/828-6573; fax 716/385-1603.

Christmas Pack

Collection of 15 games with a holiday theme; includes picture puzzles, word searches, matching games, and strategy and memory games for one or two players. Rather than pulling down menus, users access each game by clicking on presents or stockings in a holiday picture on screen. Sound is a part of each game as well. 1MB min. memory. $59.95. Nordic Software, 402/488-5086; fax 402/488-2914.

ClickArt Artistry & Borders

Clip art collection of more than 325 EPS images. Consists of more than 60 borders; people, business, flower and animal pictures; labels; and initial capital letters. 2MB min. memory. $129.95. 1/Modeler Company, 415/962-0195; fax 415/962-0201.

Clippets Volume 5 Borders

Collection of more than 300 EPS clip art border styles including art deco, art nouveau, calligraphic, certificate, contemporary, and Victorian. 1MB min. memory. $129.95. DreamMaker Software, 303/762-1001, 800/876-5665; fax 303/762-0762.

Cogito

Player must restore a geometric figure of marbles, which are randomly mixed by the computer, to its original shape by moving rows and columns on the board. Game has 120 levels of difficulty. In color with optional background music. 2MB continues.
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Tokyo
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February 10, 1993

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For additional information, contact Sumeria at 415/904-0808. Fax 415/904-0888.

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QuickTime Film Festival is a registered trademark of Sumeria, Inc.
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The Complete Stories, Volume 1
Expanded book for PowerBook brings 46 of Isaac Asimov's stories to the laptop. Users can annotate passages, mark text, search references, and set bookmarks. Requires HyperCard 2.1. 2MB min. memory. $19.95. The Voyager Company, 310/451-1383, 800/446-2001; fax 310/394-2196.

Contractor's Dream
Construction-estimate program has database for labor-and-material costs, sorts by task or material description, gives the contractor four types of bids, calculates bids, saves jobs, and calculates percent waste. Works in feet, inches, fractions of an inch, and pitch; and can update bids or database by percentages. Includes 30-minute tutorial tape cassette. 2MB min. memory. $475. Workphones, 303/279-8551, 800/777-2477; fax 303/279-0411.

Country Club Art
Over 175 images of golf- and tennis-related clip art in HyperCard and MacPaint formats. Requires HyperCard or MacPaint. 1MB min. memory. $44.95. FYI Publishing, 817/772-1921; no fax.

Datica
Tool for converting physical measurements; allows users to convert between English and metric systems and independent units. The program can solve 50 fundamental equations with variables in any unit. Includes periodic table with the 10 most-used properties for each of 103 elements; a library feature allows user to add data about other measurement types. 512K min. memory. $65. By Design, 414/648-3712, 800/527-7472; fax 414/648-3712.

Dear Diary
Journal program that enables user to take extensive notes and organize them in a database-like way; includes a built-in personal information manager, appointment calendar, to-do list, and date-stamping capability; designed particularly for the purpose of tracking telephone and in-person conversations. 1MB min. memory. $69.95. Purfect Software, 602/967-0097; no fax.

The Educator's Time Source
Computerized grade book, database, search-and-report generator, assignment-key generator, and test-scoring and grade-posting program. Helps educators keep track of grades and associated clerical work. Tracks up to 50 student per class, and up to 15 classes. 1MB min. memory. $125. Missing Link Technologies, 503/259-2882, 800/833-5790; no fax.

EduClip Images 1, 2, & 3
EPS clip art for use in materials relating to education. EduClip Images 1 includes clip art images for school sports, classrooms, holidays, and various curriculum areas. EduClip Images 2 includes alphabet with different images for each letter and the numbers 0 through 10. EduClip Images 3 includes logos for different curriculum areas and symbols for subjects such as biology, chemistry, health, music, literature, foreign languages, and geography. 2MB min. memory. $39.95 per title. Teach Yourself by Computer Software, 716/381-5450, 800/724-4091; fax 716/427-7628.

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Generates objective-based math exams, tests, and worksheets for grade levels 4 through 12. Algorithm bank attaches an algorithm to each predefined curriculum objective and then generates as many problems for that objective as teacher requires. Teacher can also enter questions. Questions can be multiple choice or free response. Titles include Basic Math, Applications in Basic Math, Pre-Algebra, Algebra I Skills, Algebra II Skills, Geometry, Pre-Calculus and Calculus. 1MB min. memory. $499 per title. Chancy Software, 604/294-1228, 800/999-9931 ext. 180; fax 604/294-2225.

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sorts on 11 criteria, and finds across all fields; lets the user view a database by any field, add graphics, and do quick cut and paste from word processors; and offers online help, postal information, and wide-area bar codes. The Open House feature searches a hard drive for previous tidy addresses and enters them in the Human Envelopes database. Program can import 19 different file formats, including Word 3 and 4, Works, MacWrite 5.0 and II, and WordPerfect. 1MB min. memory: $124.95. We, 415/368-0828, 800/452-2635; fax 415/858-2598.

Imploader 2.0
External development system for 4th Dimension database applications; compresses data up to 85 percent, according to the company, without any modification or removal of data from image file or document. 2MB min. memory. $249. Component Software Industries Corp., 609/497-4501, 800/633-4252; fax 609/497-4008.

Jam Session
Program includes 20 popular songs, such as Peter Gabriel's "Sledgehammer," Ritchie Valens' "La Bamba," Elton John's "Crocodile Rock," and Garth Brooks' "Rodeo"—all without vocals. Users can change a sound's instrumentation and jam along, even record alongside, with their own MIDI instrument or with an on-screen keyboard. 1MB min. memory. $59.95. Bogas Productions, 415/592-5129; fax 415/592-5129.

Japanese Word Torture
Program drills user on 2014 Japanese words, based on the list of essential words formulated by the Japanese Language Institute. Learner builds vocabulary by typing in hiragana or katakana without running the KanjiTalk operating system. The program does not display Japanese words in romaji. 2MB min. memory. $49.95. HyperGlot Software, 615/558-8270, 800/726-5087; fax 615/586-6569.

The Modern Concrete Estimator
Templates and databases that use Microsoft Excel 4.0 for concrete estimating for residential through light industrial construction. Areas for concrete estimation include foundations, cast-in-place structures, and flat work. Templates can handle information to calculate materials, labor, and indirect labor costs. Has ability to report on material cost per yard, labor cost per yard, material cost per square foot, and time remaining to completion. 2MB min. memory. $150. Rock St. Software, 805/653-5462; fax 805/652-0742.

Orchids
Program designed to manage the flow of medical clinic data. Features include formats for entering medical history or notes of physical examinations and follow-up visits; picture files for patients' photo, X rays, surgical photos, and medical sketches; customized scrolling checklists for histories and physicals; customized automated letters generated from the checklists; a contact log for identifying and reviewing interactions with patients; a chart-review format for cross-referencing information; a report generator for extracting and relating data and performing statistical analyses; and password protection. 5MB min. memory. $4995. CapMed, 206/881-8620; fax 206/883-9717.

The Pelican Brief
A mystery story by John Grisham in Expanded Book form, designed for the Powerbook. A law student uncovers clues leading to the assassination of two Supreme Court justices. Users can mark passages, write notes, set bookmarks, and search text for specific references. Requires HyperCard 2.1 or later. 2MB min. memory. $19.95. The Voyager Company, 310/451-1383, 800/446-2001; fax 310/394-2156.

Real Answer
Shareware math application includes algebraic calculator that supports trigonometric and transcendental functions, and named variables. Flex-Cal feature allows the user to modify an expression previously submitted for evaluation and to receive an answer without disturbing the historical record of mathematical query and response. Also solves sets of simultaneous linear or nonlinear algebraic equations. 512K min. memory. $20. ARSoftware, 301/459-3773, 800/257-0073; fax 391/459-3776.

ReOpt
Electronic encyclopedia of remedial-action options for hazardous-waste containment; features summary descriptions of 88 remedial-action technologies and 214 synonymous terms. Lists about 500 previous applications of cleanup technologies, including the company performing the cleanup and the status of the operation. Automatic technology selection allows user to choose appropriate technologies based on site characteristics. 5MB min. memory. $2500. Sierra Geophysics, 205/822-5200, 800/826-7644, ext. 120; fax 206/827-8983.

Sailor Song
Fiction by Kim Kosey; this Expanded Book designed for the Powerbook focuses on the inhabitants of a Alaskan town who have to deal with the environmental changes that are brought on by a Hollywood production company filming a children's story. Users can search text to find and annotate passages, mark passages, and set bookmarks for future reference.

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252 February 1993 MACWORLD
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SymArt Pro
Software designed to administer prepress production of bar-codes. Enables user to design custom bar-code formats with up to five lines of text in any position and in any font, to store and name formats in a database, and to save bar codes in a print queue and print them simultaneously without opening them in other applications. 2MB min. memory. $299. Bar Code Systems, 404/399-5921, 800/883-8300; fax 404/399-7837.

Target Tones System
Adobe Photoshop plug-in that helps user select and specify duotones, tritones, and quadtones. Guidebook offers more than 120 multitone variations; user selects reference number by sample in guidebook that corresponds to appropriate curve in Photoshop. 2MB min. memory. $99.95. Graphic Systems Technology, 606/283-9750, 800/528-1851; fax 606/283-9769.

The Tines
Tines, which are mischievous, hairy beings from the planet Sklumph, are coming to Earth to play some practical tricks. Player has to find the Tines and maneuver them back into their sleep pods. Game has more than 100 difficulty levels. 2MB min. memory. $59.95. Inline Design, 203/435-4995, 800/453-7671; fax 203/435-1091.

Trivial Pursuit Daily Planner
Sports edition tests users’ knowledge of sports trivia daily in such categories as nicknames, football, all-stars, hockey, baseball, and numbers. Program keeps score of successful answers throughout the year. Comes with a Genus edition of the trivia game, for which user answers questions in the categories of science and nature, art and literature, history, geography, entertainment, and sports and literature continues.
MACWORLD Expo/Tokyo 1993

MACWORLD Expo/Tokyo attracts the biggest Macintosh crowd on earth! 90,000 Macintosh enthusiasts will get a look at new or pre-release products from more than 200 exhibitors from all over the world. And in addition to exhibitor booths, MACWORLD Expo/Tokyo 1993 will feature the first-ever CD-ROM Software Library, where visitors can sample the new world of disks, as well as the Hands-On Corner, where software products will be available to try. At the conference sessions, a full program of world-famous Mac experts from the US and Japan will speak on the new frontiers for Macintosh.

Don't miss the big show in Tokyo.

- Date: February 10th (Wed.) - 13th (Sat.), 1993
- Place: Nippon Convention Center at Makuhari Messe, Tokyo
- Special Support: Yokogawa-Hewlett-Packard
- Special Cooperation: SONY Corporation
- Management Office (For general information): IDG World Expo/Japan

The Japan Industrial Journal, Nippon Broadcasting System
The Sankei Shimbun, Fuji Television Network

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IDG World Expo/Japan
Ichibancho First Bldg., 3F, 15-1 Ichibancho, Chiyoda-ku, Tokyo 102 Japan
phone: 81-3-5276-3751 fax: 81-3-5276-3752

- Number of Exhibitors: 215
- Booth Spaces: 956
- Expected Attendees: 90,000

General Sessions - U.S. Speakers

2/10 (Wed.)
13:00 Keynote: Macintosh, Multimedia, PDA & Beyond
John Sculley, Chairman & CEO, Apple Computer Inc.
15:00 Keynote: Future Technologies
David Nagel, Senior Vice President, Apple ATG
16:30 Special Session
Jerry Borrell, President, SUMERIA

2/11 (Thu.)
10:30 Consumer PDAs
Gaston Baslesons, Vice President & General Mgr., Apple PJE
13:00 DTP, Graphics and Design
Rick Smolan, Photographer/Publisher, Against All Odds
14:30 System Software and Future OS
Roger Heinen, Vice President, Software, Apple Computer Inc.
16:00 Apple in Japan
Senior Vice President & General Mgr., Macintosh Architecture Div.

2/12 (Fri.)
10:30 Multimedia & QuickTime
Net Golstain, President, Kieda Labs, Inc.
13:00 Future Operating System
Fred Forsythe, Senior V.P., Macintosh Systems Div., Apple Computer Inc.
15:00 Networking & Business
New Style Communications to be announced

2/13 (Sat.)
10:30 Multimedia & QuickTime
Christopher Yavabow
13:00 Multimedia & QuickTime
New CD-ROM Titles
14:30 DTP, Graphics and Design
Super User Tips

General Sessions - Japanese Speakers

2/11 (Thu.)
10:30 Collaboration and Networks
Tsuyoshi Sasaki, Professor, Osaka University
13:00 Business Work Integration
Mitsuhito Myazaki, AXIS
14:30 Design
Design Advances (Tentative)
16:00 TV & Press
Yui TV, The Sankei Shim bun, Nippon Hora (Tentative)

2/12 (Fri.)
10:30 PowerBook
Kazutoshi Otsu, Macintosh Evangelist
13:00 Multimedia & Music
Staff Training Program/Sales and Multimedia
14:30 DTP
3D Illustration/Macintosh and Animation
16:00 Networked Databases
DTP Advances during 1992

2/13 (Sat.)
10:30 Business & Customization
Kichi Ikemichi, Chiyoda Corporation
13:00 Business & Customization
Customizing Applications for Your Office
14:30 Education
Macintosh for Education to be announced

Sessions may be changed without advance notice.

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| Ticket Type                  | Price
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Trivial Pursuit Daily Flavour

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Zen and the Art of Motorcycle Maintenance & Lila
These two novels by Robert Pirsig in an expanded book for the PowerBook format combine quirky characters with contemporary philosophy. Format allows readers to take notes and mark pages on the computer screen. 2MB min memory. $19.95. The Voyager Company, 310/451-1383, 800/446-2001; fax 310/394-2156.

CD ROMS

Battle Chess
Animated chess pieces engage in a short struggle with each capture, accompanied by audio music, character voices, and battle sound effects. Current version features 30-minute animated tutorial on chess tactics and the history of each piece. Product includes opening library of 30,000 moves, provides ten levels of play against the computer, and allows you to play another human—either on the same Mac, over a network, or with a modem connection. 2MB min. memory. $79.95. Interplay Productions, 714/953-6659; 800/969-4263; fax 714/252-2820.

Hi Res Audio Vol. 1
A set of 42 royalty-free music clips for use in multimedia productions. Length of each track ranges from 10 seconds to 1 minute 30 seconds. Disc includes 20 sound effects. User can choose between 22kHz and 11kHz sound quality. Musical styles include new age, orchestral, rhythm and blues, funk, rock, and pop. 3MB min. memory. $149.95. Presto Studio, 619/689-4985; fax 619/689-4985.

Images with Impact CD-ROM
Library of modular clip art has over 1100 images in EPS and PICT formats. Contains all images from five 3G Graphics clip art collections: Accents & Borders 1 and 2, People 1, Business 1, and Graphics & Symbols, along with an additional 450 color images. 2MB min. memory. $499.95. 3G Graphics, 206/774-3518, 800/456-0234; fax 206/771-8975.

The Journeyman Project
Interactive computer game in which player jumps back in time to prevent someone—or something—from sabotaging history. Player clicks on arrows to navigate through scenes, and clicks on objects to interact with them. Also has message screens and an inventory window. Has three-dimensional graphics and full sound track. 5MB min. memory. $99.95. Presto Studios, 619/689-4985; fax 619/689-4985.

A Poke in the Ear with a Sharp Stick (Volume II)
Alternative sound library has over 1800 samples in either 16-bit linear mono or stereo AIFF (audio interchange file format) files sampled at 44.1kHz. Consists of hard-edged industrial samples and ambient textures. Contains 150 rhythmic loops, 170 ambient textures, more than 500 percussion sounds, and more than 800 melodic sounds. 2MB min. memory. $199. OSC, 415/252-0460; fax 415/252-0560.

URW TypeWorks Collection
Contains 3000 PostScript Type 1 fonts and Kernus, a kerning utility. The fonts are style variations—regular, outline,
inline, relief, drop shadow, and rounded—of 500 popular faces. Fonts are from URW’s type library, which includes contemporary designs and classics licensed from sources such as ITC. Each font includes about 1000 kerning pairs. All the fonts are unlocked and available for instant access. 512K min. memory. $89.5; 1000-page specimen book $49.95. URW, 603/882-7445, 800/205-8791; fax 603/882-7210.

Who Built America
A survey of American history presenting a populist view of past and present by the American Social History Project. Includes QuickTime movies, audio bites, newspaper accounts, and reproductions of historical documents. 2MB min. memory. $24.95 per volume. The Voyager Company, 310/451-1383, 800/446-2001; fax 310/394-2156.

Who Killed Sam Rupert?
Interactive murder-mystery game created with color video, sound, and animation. To solve the crime, the player has to check the validity of various types of information, but each activity chosen to help solve the crime comes at a time penalty. Game includes a view of the murder scene, where the player can examine objects in detail; a battery of forensic tests; an alibi section, for cross-referencing evidence and alibis; a video press conference, in which the player addresses the media; and a case notebook, where the player can keep key facts, make observations, and keep other material. 4MB min. memory. $39.95. Creative Multimedia Corp., 503/452-5921, 800/776-9277; fax 503/452-9930.

You Can’t Get There from Here
Clips from films made between 1946 and 1960 discuss how to act on a date, how to behave at dinner, the benefits of electricity, and the soothing effects of prescription drugs. QuickTime movies are accompanied by written commentary on the period and the purpose behind the film. 4MB min. memory. $29.95. The Voyager Company, 310/451-1383, 800/446-2001; fax 310/394-2156.

ACCESSORIES
Padware
Three products—the Mouse Cover, Mouse Pad, and Wrist Rest—have ergonomic benefits, according to company. Mouse Cover slips over mouse to add curve to surface. Mouse Pad has 20cm diameter and is circular. Wrist Rest has a rounded, sloping edge and an edge that tucks under keyboard. All three products are available in green, blue, black, and red. Mouse Cover $8.95; Mouse Pad $12.95; Wrist Rest $14.95. Padware Ergonomic Technology, 617/849-7210; fax 617/848-7310.

BOOKS ANDVIDEOS
CWUG’s Public Domain Catalog

Microsoft Excel 4 Companion
Guide to Microsoft Excel 4.0. Teaches novice users how to create, edit, and format an Excel worksheet; incorporate formulas; link spreadsheets; use built-in functions; and print presentation-quality reports. Intermediate to advanced users learn how to create, customize, and enhance charts, including how to incorporate graphic objects in worksheets. Appendix describes the nine built-in toolbars, showing each tool bar and including a chart of tools and their locations. By the Cobb Group: Douglas Cobb and Judy Myhiner with Mark Dodge, Craig Stinson, and Chris Kinata. 564 pages; $19.95. Microsoft Press, 206/882-8030, 800/677-7377; fax 615/793-3915.

The Mac Shareware Emporium
Reviews over 450 shareware and freeware programs—games, educational products, business applications, system extensions, and control panel devices. Each entry has product name, author, contact information, cost, description, and sample screen illustration. Book also has information on how to evaluate products and sources for quality, support, and virus protection, plus a sampler disk with over 50 shareware programs. Written by Bernard J. David and Maria L. Langer. 4MB recommended. 388 pages; $34.95. Brady, 317/573-2500, 800/428-5331; fax 317/573-2583.

To have your product considered for inclusion in New Products, send an announcement with product name, description, minimum memory, peripherals required, pricing, company name, and phone number to New Products Editor, Macworld, 501 Second St., San Francisco, CA 94107. Macworld reserves the right to edit all product announcements.

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Questions and Tips from Macworld Readers

BY LON POOLE

SYSTEM 7.1, RELEASED LAST October, makes it easier than ever to install multiple languages on a Mac (as described in Quick Tips, September 1992). It's the first Mac system software that requires no major reengineering to work with languages that read from right to left, languages whose characters change according to their context, and languages with large alphabets that require two bytes of memory per character (such as Japanese, Chinese, Hebrew, and Arabic). Systems 7.0, 7.0.1, and 6.0.7 work with European languages that use the Roman or Cyrillic script systems, and these system versions have been translated into some of the more complex languages. Two system extensions give System 7.1 its international capabilities. WorldScript I handles bidirectional and contextual script systems, and WorldScript II handles script systems with large alphabets.

Once you've installed WorldScript, how easy is it to use multiple languages? Steven P. Hassman of Garmisch, Germany, wonders whether one can type right-to-left Hebrew in today's Macintosh word processors, and whether a language script's rules for text sorting make it possible to sort foreign language word lists in the correct order for that language, which may differ from the English A to Z.

I tried prerelease versions of System 7.1 and several language scripts—Hebrew, Greek, Cyrillic, and Arabic—with MacWrite II 1.1v2, Microsoft Word 5.0, WordPerfect 2.1, and the word processor in ClarisWorks. All were able to change languages on the fly. For example, I could type some text in English, choose Hebrew from the Keyboard menu (which appears between the Help menu and Application menu when you install multiple languages), choose a Hebrew font from the Font menu, and start typing in Hebrew. The English typing progressed from left to right, and the Hebrew typing went the opposite direction, as it should.

Sorting was another story. Both WordPerfect 2.1 and Word 5.0 have Sort commands, but both alphabetized correctly only for English. Conclusion: The applications from installing multiple languages, but developers will have to revise applications (and you'll have to upgrade to those revisions) to take full advantage of System 7's WorldScript.

Changing the Application Font

Q. I personally dislike the Geneva font, which my Classic automatically selects. How can I reconfigure my Mac so that, for example, Times is automatically selected each time I open a MacWrite document?

A. David deCue
Saint Louis, Missouri

Many application programs and desk accessories use the Mac's standard application font by default. The Mac stores the identity of this font in its parameter RAM—a small amount of battery-powered memory that stores sundry system settings. You can override the application font setting in parameter RAM by installing the free utility software DeFont (available from user groups including BMUG, 510/549-2684) or It's Your Default (from the BCS Mac user group, 617/625-7080). DeFont and It's Your Default are control panels (known as cedels in System 6) that let you choose any installed font as the application font.

Some programs, including MacWrite II, Microsoft Word, and WriteNow 3.0, do not use the application font. DeFont and It's Your Default do not affect them. To change MacWrite II's standard font, create a new document, choose the font you want used, and choose Save As from the File menu. In the Save As dialog box, choose MacWrite II Stationery from the pop-up menu, name the document MacWrite II Options, and save it in the Claris folder inside the System Folder. (Before saving you can make other changes to the document's format and content; MacWrite II will apply them to all new documents you subsequently create.) You follow a similar procedure in WriteNow 3.0, using WriteNow’s Save As Default Document command instead of its Save As command. In Word 5, the Preferences command has a Default Font option.

Charging a Call

Q. Can the White Knight telecommunications program access an alternate long-distance carrier and charge the call to a phone credit card? GEnie, CompuServe, and America Online do not have local numbers for my area. I have to dial 1-800/877-8000 to access Sprint; wait for a tone; dial 0, the area code, and the GEnie access number; wait for another tone; and finally dial a 14-digit authorization code. Can the program do this?

A. Jeffrey A. Obrich
Abingdon, Virginia

White Knight (from The FreeSoft Company, 412/846-2700) and most other communications programs let you enter all the numbers you need to dial as one long string in the space provided for the telephone number, placing one or two commas wherever you need to provide a pause. For example, the 40 characters

18008778000,0703555
1212,12345678901234

would cause the modem to dial 1-800/877-8000, pause four seconds (two seconds for each comma), dial 0-703/555-1212, pause four more seconds, and dial 123/4567890-1234. The problem is that most modems cannot handle a dialing string longer than 38 characters, not counting blank spaces. If you enter a dialing string longer than a modem's limit, the modem reports an error. Some fax modem software gets around this length limit by providing separate spaces for you to enter the characters.
HOW TO/QUICK TIPS

WAYS TO WORK AROUND THIS LENGTH LIMIT WITH WHITE KNIGHT OR ANY COMMUNICATIONS PROGRAM THAT LETS YOU TYPE MODEM COMMANDS AT THE OTHER END OF THE PHONE LINE. YOU COULD TYPE THE DIALING STRING CITED IN THE DIALING COMMAND (ATDT FOR TOUCH-TONE)(AND 0-703-555-1212; ATDT 1-800-877-8000; ATDT 123-456-7890-1234)

OPENING AND CLOSing
Open the selected item. Press X- or X→
Open the selected item and close the active window. Press X- or X→
Open the folder or disk that contains the selected item. Press X- or X→
Close a window while opening an item in it. Press option while opening the item
Close all windows. Press option while opening the active window's close box

MANIPULATING OUTLINES OF FOLDERS
Expand or collapse the selected folder. Press X- or X→
Expand or collapse the selected folder and its nested folders. Press X- or X→
Expand or collapse all folders in the active window. Press X- or X→

MORE POWER METHOD
Begin editing the selected icon's name. Press return or enter, or click the name and immediately move the pointer slightly
Zoom a window to fill the screen. Press option while clicking the window's zoom box
Move a window without making it active. Press X while dragging the inactive window
Copy an item to another folder on the same disk. Press option while dragging the item to the folder or to the folder's open window
Copy an item to the desktop. Press option while dragging the item to the desktop
Dispose of Items in the Trash without warnings, and dispose of locked items. Press option while choosing Empty Trash
Align (or don't align) icons to invisible grid as you temporarily move them temporarily reverses the Views control panels' Always Snap To Grid setting)

See the path from the current window to the disk it's on. Press X while clicking the window's title

Erase a disk. Press X-option-tab at you insert the disk
Skip installation of all System extensions during one start-up. Hold down the shift key during start-up
Rebuild the desktop. Hold down X-option during start-up or when inserting a disk
Force the active program to quit (you should restart your Mac as soon as possible after doing this) Press X-option-esc

Power methods and keyboard equivalents for the Finder in System 7. Keyboard equivalents for menu commands aren't listed because you can review them on screen by pulling down the menus.

Unfortunatelv, neither of these methods works with custom communications programs that only provide space for entering a phone number, such as America Online versions 1.0 and 2.0 and AppleTalk Remote Access 1.0. You can use either method with AppleLink 6.1 by choosing Set Up Connection from the Network menu, and then in the dialog box that appears choosing Manual Connect from the Connection File pop-up menu. Upon connecting, with this setting in effect, AppleLink brings up a dialog box in which you can type modem commands. You click the Continue button in that dialog box when you hear the AppleLink modem's answering tone.

Stop First Page
A year ago or so I read in Quick Tips how to get my Personal LaserWriter NT to stop printing that annoying first page every time it's turned on. I've forgotten how to do it and can't find it in my back issues.

Luis Mraz
Los Angeles, California

Versions 7.0 and later of Apple's LaserWriter Utility can turn off (and on) the test page (also called the start-up page) on a LaserWriter with PostScript. You can get the latest version as part of System 7.1, which Apple is selling through retail channels.

ATM and Bitmap Fonts
Since I use Adobe Type Manager (ATM), can I remove all but one size and style of each of my bitmap (fixed-size) fonts that correspond to the PostScript fonts in my System Folder? For example, why should I install sizes 10 through 18 in four styles of Palatino when ATM creates for my screen whatever size and style I request if I have at least one bitmap Palatino size and style installed?

Peter Lind
Montreal, Quebec, Canada

Although ATM works fine if you have only one bitmap size and style installed for each PostScript font in the System Folder (or in the Fonts folder in System 7.1, or the Extensions folder in continues
Profit from our experience.

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Something new in desktop: A compact, high-quality color scanner from the most respected name in color imaging.

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This drum scanner has a standard SCSI interface for popular Macintosh® and Quadra® desktop systems. It can be installed in minutes right out of the box. Using the same scanning technology found in scanners costing 10 times as much, the DT-S1015 provides a full range of vibrant color and exquisite image detail while outputting a true cyan-magenta-yellow-black color format.

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Circle 35 on reader service card

Macintosh and Quadra are registered trademarks of Apple Computer, Inc.
System 7.0 or 7.0.1), there are a couple of reasons for installing multiple sizes and styles of bitmap fonts with ATM. One reason is that bitmap text displays faster than text displayed by ATM. The difference is more noticeable on slow Macs; you can make ATM faster by increasing the Font Cache setting in the ATM control panel. Adobe recommends 50K of cache for each PostScript font you use frequently, and there may be separate PostScript fonts for different styles of a single font that appears in the Fonts menu. If you use plain, bold, and italic Times, for example, then ATM needs the three PostScript fonts TimesRom, TimesBol, and TimesIta, and you should set your ATM Font Cache to 150K for best speed.

A more obscure reason for installing multiple sizes and styles of bitmap fonts with ATM is that documents created with bitmap fonts in screen-oriented programs such as HyperCard and Aldus Persuasion, where text must fit in fixed-width boxes, may not look right if later displayed with fonts created by ATM. For some sizes and styles of some fonts, ATM may create text whose width doesn't exactly match the corresponding bitmap text. Your choice: leave the bitmap fonts installed or resize text boxes in documents where ATM text doesn’t fit.

**Finder Power**

**TIP** Most System 7 users have discovered how to use the Views control panel to force icons to align to an invisible grid. If you want to drag an icon or group of icons and place them off the grid, hold down the ⌘ key while dragging.

*Tyler Guan
Winnipeg, Manitoba, Canada*

You can tap a great deal of hidden power by pressing the ⌘ and option keys, and much of what you can do with the mouse you can also do with the keyboard alone (see “Keys to the Finder”). — L.P.

**Measuring Cap Height**

**TIP** Say you want to set a headline and need the cap height (height of a capital letter) to measure 54 points. Because capital letters are smaller than the nominal point size, you can’t simply set the type size to 54 points. I’ve found an easy method to set type to the cap height; it works in QuarkXPress and could probably be adapted to other desktop publishing programs.

1. Enter the headline text on one line and press return at the end of the line.
2. Copy the line of text and paste it on the next line. You now have two copies of the headline text.
3. Select both lines and set the leading of both to the cap height you want.
4. Select the second line and increase the point size gradually, until the cap height of the second line touches the baseline of the type on the line above it (see “Cap Size”).

*continues*

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This method is much quicker and more accurate than other schemes I've used, such as measuring the height of the type with the ruler or the line tool, or endlessly printing and measuring the results.

Sam Jennings
San Francisco, California

Delete Forward

**TIP** After using an MS-DOS computer for a couple of years to do word processing at work, I became accustomed to deleting forward from the insertion point by pressing the decimal-point key on the keypad with number lock (Num Lock) off. When the company bought a couple of Macs, I found the handy delete-forward key was poorly placed on the extended keyboard, and was completely missing from the Classic’s standard keyboard. Instead of training my old fingers to do new tricks in Microsoft Word, I got around the keyboard difference with Word’s Commands command (see “Go Ahead and Delete”).

Jeffrey F. Grandon
Provo, Utah

Combining System Sounds

**TIP** The Sound control panel lets you record sounds but not edit them. You can edit and combine sounds from the Sound control panel using HyperCard’s audio palette. For example, repeating the Droplet sound that comes with System 7 makes the sound effect of a flying saucer.

First select the sound you wish to edit from the control panel and use the Copy command to place a copy of the sound on the Clipboard. Next open HyperCard, choose Audio from the Edit menu to bring up the audio palette, and click the Edit button in the audio palette to enable sound editing. Then choose Paste Sound from the Edit menu to paste the sound from the Clipboard into the audio palette; repeat to paste multiple copies of the sound end-to-end. Now choose Select All and Copy from the Edit menu to copy a portion of the compound sound on the Clipboard. Switch to the Sound control panel, choose Paste from the Edit menu, and name the compound sound when requested. The new sound is now part of your Sound control panel. If you quit HyperCard or close the audio palette without quitting, you do not need to save the new sound as HyperCard suggests.

Jeffrey F. Grandon
Provo, Utah

Go Ahead and Delete

If your keyboard doesn’t have a delete-forward key, you can designate one for use in Microsoft Word 4 or 5. In the dialog box for Word’s Commands command (under Edit in Word 4; under Tools in Word 5), select Delete Forward in the scrolling list, click the Add button in the Keys section, and press the key or key combination you want to make effective (shift-delete here). Then click the Close button.

Try this variation: In HyperCard, select only a portion of the sound by dragging across the audio palette’s close-up view of the waveform. Then copy and repeatedly paste this sound fragment. Another variation: One at a time, copy additional sounds from the Sound control panel and paste them into HyperCard’s audio palette.

Paul Hibbard
Houston, Texas

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**Personal Surprise**

**TIP** While you're using the eraser tool in Brederbund Software's Kid Pix, the Surprise icon (the question mark) lets you erase the picture to reveal not a white background but an animal or funny face. Kid Pix chooses the background surprise randomly. You can add your child's favorite picture (or maybe your own favorite) to the collection of surprises with a resource-editing program such as Apple's ResEdit. Use any picture in the common PICT format; if you can see the picture when you paste a copy into the Scrapbook, it will work.

Begin by making a duplicate copy of the Kid Pix program. Next open your picture with a graphics program, select the picture, and copy it to the Clipboard. Then open ResEdit and use its Open command to open the copy of Kid Pix. A window appears showing an icon for each type of resource in Kid Pix. Find the PICT icon and double-click to see a window full of numbered miniatures of Kid Pix's PICT resources. Scroll the window until you see the last animal, and note its number (a lion with number 518 in Kid Pix 1.2). Then choose Create New Resource from ResEdit's Resource menu, which opens an empty window for a new PICT resource. Paste your picture into this window. Next choose Get Resource Info from ResEdit's Resource menu, and in the resource info window that appears change the ID to the number you previously noted plus 1 (number 519 in version 1.2), as shown in "Surprise Eraser." Quit ResEdit, answering yes when it asks whether you want to save your changes. Now when you use the surprise eraser tool in your special copy of Kid Pix, it randomly selects the picture you added.

*Beckie Pack*

*Napa, California*

Kid Pix also uses that collection of PICT images to randomly display a picture when you start the program. You can get ResEdit from user groups, online information services, and APDA (Apple Programmer's and Developer's Association, 800/282-2732 U.S., 800/637-0029 Canada, or 408/562-3910 anywhere).—L.P.

We pay from $25 to $100 for tips published here. Send questions or tips on how to use Mac computers, peripherals, or software (by mail or electronically) to Quick Tips, Lon Poole, at the addresses listed in How to Contact Macworld at the front of the magazine (include your address and phone number). All published submissions become the property of Macworld. Due to the high volume of mail received, we're unable to provide personal responses.

Contributing editor LON POOLE answers readers' questions and selects their tips for this monthly column. His two most recent books are Amazing Mac Facts (Microsoft Press, 1991), a collection of the best published tips; and Macworld Guide to System 7 (IDG Books Worldwide, 1991).
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Memory-Maximizing Tips

BY JIM HEID

Are you getting the most out of your short-term memory? I refer not to your ability to recall what you ate yesterday, but to your Mac's random-access memory—its RAM—those chips that provide temporary storage for the Mac's system software as well as for the programs you use and the documents you're working on.

If you've been seeing "not enough memory" error messages lately—or if you've just bought a memory upgrade and you'd like to put that extra space to work—read on. Few of the Mac's components offer more opportunities for fine-tuning than memory. When you understand how the Mac uses memory, you can make a variety of adjustments to improve overall performance, increase the number of programs you can run simultaneously, or speed up a particular program. And none of these adjustments require you to open the Mac. You can fine-tune your memory from the comfort of your mouse.

You Must Remember This

Before looking at memory-maximizing specifics, let's step back for the big picture. Let's also make sure we're looking at the same scene, because many Macintosh newcomers confuse the Mac's RAM with its hard drive storage, probably because both are described using the same units of measurement: the kilobyte (K), or a thousand bytes (technically, 1,024 bytes); and the megabyte (MB), or 1 million bytes (actually, 1,048,576 bytes).

RAM is temporary storage space formed by a collection of chips soldered onto the Mac's logic board or installed in small, plug-in boards. When the Mac is turned off (whether by you or by a power failure), the contents of RAM disappear faster than punch on New Year's Eve. Most Macs come with between 1MB and 4MB of RAM, which you can expand—more about that later.

A hard drive, by contrast, provides permanent storage (or at least it's designed to—drives can fail, so a regular backup routine is essential). Most Macs include hard drives that can store up to 40MB or 80MB of data; much higher capacities are available.

In the Mac, as in other computers, RAM plays a few roles. RAM holds a large portion of the Mac's fundamental system software (called System 7, although many people are still using older, less-capable system software versions, such as System 6). When the Mac starts up and displays its "Welcome to Macintosh" message, it's loading this RAM-based system software from the hard drive.

During start-up, the Mac also loads system extensions, enhancements to the system software. You can tell when system extensions are being loaded—their icons appear along the bottom of the screen. Two popular system extensions include Berkeley Systems' After Dark screen saver (you've probably seen toast cars flying across someone's screen) and CE Software's QuickKeys, which lets you create keyboard shortcuts.

The final step in the start-up process involves loading the Finder, the program that gives you the desktop and Trash icons. In System 7, the Finder itself uses roughly 500K of RAM—almost four times the total amount of RAM built into the original Macintosh.

The point is that some of the Mac's RAM is filled right off the bat. You can find out how much RAM your system software and extensions use by choosing the About This Macintosh command from the Finder's Apple menu (in System 6, the command is About the Finder). A window appears describing how your Mac's RAM is being used (see "Window into Memory"). This window can be a memory maximizer's best friend.

Make Room for Programs

When you start an application program such as Microsoft Word or ClarisWorks, the Mac sets aside some RAM for the program and then copies the program from the hard drive into that memory. Actually, with most programs, only part of the program goes into RAM—the part that implements the program's most common features. When you choose a particular command for the first time since starting the program, you might notice a short delay as the Mac retrieves the required software routines from the hard drive. (If your hard drive has a front-panel light, it blinks.) When this happens, the Mac is loading one of the program's code segments from disk.

Most large programs are divided into numerous code segments. The Mac can load a given segment into memory when it's needed, and it can purge segments from memory to free up space. This scheme allows developers to create programs with smaller minimum memory requirements. On the downside, frequently accessing the hard drive slows performance, especially on a slower Mac such as a Classic. Later, I'll show how to minimize segment loading.

Part of the memory allocated to a program is reserved for the documents you have open as you work. Some programs store an open document entirely in RAM; common examples include integrated packages such as ClarisWorks and Microsoft Works and draw programs such as Adobe Illustrator, Aldus FreeHand, and Claris's MacDraw. With these programs, the maximum size of a document is limited by the amount of its program's free RAM. An example: When you start Microsoft Works 3.0, the Mac gives Works 1536K of RAM. Works' program code takes up about half that amount; roughly 750K remains free for the documents you'll work with.

Other programs don't store an open document entirely in RAM, but instead swap portions of the document to and from the hard drive, keeping in RAM only the portion you're working with at the moment. Most standalone word processors—Microsoft Word, WordPerfect, T/Maker's WriteNow—work this way, as do Aldus PageMaker and QuarkXPress and most database managers, including FileMaker Pro. This approach lets you create much larger documents, but moving around within a document can take longer (it's that relatively slow hard drive again).
G E T T I N G  S T A R T E D

Window into Memory System 7’s About This Macintosh window displays a bar graph for the system software and for each open application. Each bar shows how much memory is allocated to that program, the dark-colored portion of each bar shows how much of that RAM the program is actually using.

Whether a program stashes open documents entirely in RAM or swaps them between RAM and the hard drive may seem like a technical point, but it has important ramifications you may need to consider when fine-tuning your short-term memory.

Maximizing Techniques

YOU CAN MAKE FOUR BASIC MEMORY-related adjustments. Notice that each has a potential drawback—weighing each technique’s pros and cons is an important part of memory maximizing.

- You can use the Finder’s Get Info command to control how much memory a program receives when you open it. If you want to run two programs at the same time but you’re a little lean on RAM, you can reduce each program’s memory requirements to shoehorn both into memory. Each program is likely to run more slowly, since the Mac has to load and discard segments more frequently. And integrated packages and draw programs are limited to smaller documents. Conversely, if you want a program to run faster or you want to create larger documents with an integrated package or draw program, you can increase its memory allocation. When a program has more RAM to work in, it doesn’t have to go out to the hard drive to load code segments as frequently. But less free RAM is available for other programs. For advice on allocating memory to some popular programs, see “RAM Strategies.”

- You can use the Memory control panel to increase or decrease the size of the RAM cache. This is a part of the RAM allocated to the system software that holds information recently read from the hard drive. If this information is needed again, the Mac retrieves it from the cache instead of from the hard drive. A larger RAM cache can improve performance if you frequently switch between two programs or perform repetitive tasks. If you work sporadically—if you’re never sure which program, command, or document you might use next—a large RAM cache is less likely to boost performance. In addition, it leaves less free RAM for running other programs. Experiment with various cache sizes (you must restart the Macintosh after each adjustment to put your change into effect). If performance doesn’t improve, reset the cache to its original size—or even consider reducing its size to free up RAM for other uses.

- You can use the Memory control panel to activate System 7’s virtual memory feature. Virtual memory blurs the lines between hard drive and RAM storage by tricking the Mac into thinking that part of the hard drive is actually RAM (see “Visually Memory”). This lets you run more programs than would otherwise fit into RAM, but switching between programs takes longer than if you had the equivalent amount of real RAM. (Virtual memory doesn’t work on the Classic, SE, Plus, LC, or PowerBook 100. To use it on the original Mac II, you need a Motorola 68851 PMMU [Paged Memory Management Unit] chip, which costs roughly $200.) In theory, you can also use virtual memory to run a program that’s too large to fit into RAM. For example, if you want to run a program that requires 4MB of free RAM on a Mac that has only 3MB free, you could use virtual memory to make up the 1MB difference. In practice, however, this usually delivers painfully slow performance. If you have enough real RAM to accommodate the largest program in your software library, then when you start or switch to that program, it runs at normal speed; switching to or starting other programs is on the slowish side, though, since that’s when VM has to swap between RAM and disk.

- You can create a RAM disk to speed up a program and extend PowerBook battery life. Like virtual memory, a RAM disk is a software sleight-of-hand. But instead of treating part of the hard drive as RAM, a RAM disk sets aside some memory to act as a hard drive. Because RAM is faster than a hard drive, anything stored on a RAM disk opens at top speed. Most new Macs let you create a RAM disk using the Memory control panel. If your Memory control panel doesn’t contain a RAM disk option, use a utility program to create a RAM disk. My favorite is AppDisk, a $15 shareware program by Mark Adams, available through online services and user groups. Unlike most RAM disk utilities, AppDisk doesn’t require you to restart the Mac to remove the RAM disk or change its size. You can also configure AppDisk so that it automatically copies certain files to the RAM disk each time the RAM disk is created.

One drawback to a RAM disk is that the RAM it uses isn’t available for running programs. Another drawback is that you need to restore the contents of a RAM disk each time you start up the Mac, because—except on a PowerBook 100—a RAM disk’s contents vanish when the power goes.

What should you stash in a RAM disk? Ideally, a copy of the System Folder as well as copies of the application programs you want to run at top speed. Unfortunately, you need a few megabytes of RAM disk space just to hold System 7’s bloated System Folder—unless you pare it down to essentials. But don’t worry; when you need the extra capabilities, you can always restart from the System Folder on the hard drive. (For tips on paring down the RAM disk’s System Folder and using a RAM disk with a PowerBook, see PowerBook Notes, in this issue.)

If you’re using a PowerBook and you have a RAM disk large enough to accommodate a System Folder and an application program, use the Startup Disk control panel to specify that your Mac start...
up from the RAM disk. Then restart. When the desktop reappears, use the PowerBook control panel to put the hard drive to sleep. You can now run from the RAM disk and greatly extend the time between battery charges. You need to wake up the hard drive in order to save documents on it, though—you can save documents on a RAM disk, but if a system crash or power outage corrupts the RAM disk, you lose your work.

If you don’t have enough memory to create a RAM disk that will hold both the

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**RAM Strategies**

To change an application program’s memory allocation, select its icon and choose Get Info from the Finder’s File menu. Type the desired memory allocation in the Current Size text box (see “Allocating Memory”). You can also use AppSizer, a $19.95 shareware control panel from Peirce Software, to change memory sizes on the fly—that is, at the moment you start a program. This can be handy if you frequently alternate between various memory-allocation settings depending on the project at hand. AppSizer also allows you to temporarily change the memory allocation of a program located on a CD ROM drive—a feat beyond the Get Info command.

How much of a change should you make? Here are some guidelines for several popular programs.

**Microsoft Word 5.0** Word’s present memory allocation is 2048K (2MB), but the program will run in as little as 512K. (If you specify 512K, the Finder asks if you’re sure you want to set the memory size to less than the suggested minimum. Click on OK.) Performance will be sluggish and the grammar checker and other plug-in modules may not work. If you’re creating a stripped-down version of Word, remove unessential plug-in modules and file converters from the Word Commands folder (located within the Word folder). Word 5.1, recently released, offers a minimal installation option.

As for increasing Word’s memory allocation, you might want to boost it beyond 2048K if you compile large indexes or tables of contents, perform search-and-replace with long documents, or import large scanned images. Increasing or decreasing Word’s memory allocation does not affect maximum document length, although significantly decreasing its memory allocation may mean you’re unable to search-and-replace or compile indexes with long documents.

**ClarisWorks and Microsoft Works** These integrated packages store open documents entirely in RAM, so their memory allocation directly affects the size and quantity of the documents you can create. Both programs benefit from a larger RAM allocation by allowing you to create larger documents or open more documents simultaneously. ClarisWorks normally receives 900K, but will run in 768K. Microsoft Works normally receives 1536K, but will accept 675K. (Note that you may not be able to open a large document that you created before you reduced the program’s memory size. If this happens, restore the memory allocation to its larger size, open the document, and divide it into a number of smaller ones.)

**Aldus PageMaker and QuarkXPress** PageMaker 4.2 requires at least 1500K; QuarkXPress 3.1 requires at least 1700K. Reducing either program’s memory allocation slows performance and could compromise reliability; also, you may not be able to use some Aldus Additions or Quark XTensions (both add features to their respective programs). You can free up some RAM by removing any import/export filters you don’t use. Boosting either program’s memory allocation improves performance by reducing segment loading. Both programs provide a greeking option that displays text as gray lines; use this feature to speed up overall scrolling and page display.

**Claris MacDraw Pro** This draw program normally receives 3000K. On a compact monochrome Mac such as a Classic, you can run the program in as little as 1000K. For creating color documents, however, you’ll want to give the program at least 2000K—more if you have a large-screen monitor. See Appendix A in the MacDraw Pro manual for more memory tips.

**Adobe Type Manager** If you use this popular extension, you can improve the text-display speed of all your programs by opening the ATM control panel and increasing the size of the font cache.
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System Software and Memory

System 7's file-sharing features (discussed in last month's column) require nearly 300K of RAM. If you aren't using file sharing, turn it off with the Sharing Setup control panel. The Mac will run slightly faster, too.

If you're using one of the original versions of System 7—version 7.0 or 7.0.1—you might want to get a copy of Apple's System 7 Tune-Up extension, which continues...
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BY CARY LU

Building a Lean, Mean Machine

WHEN YOU SET UP A POWERBOOK computer, you can choose between two visions of what a portable computer can be—an extravaganza with nearly all the bells and whistles of a desktop computer, or a lean and mean machine that has just the essential tools.

If extravagance is your style, a PowerBook with sufficient extras will serve you well. One great advantage of the PowerBooks is that they are full-featured Macs, just as capable in most ways as a desktop Mac. You do have to pay for extra features and put up with such inconveniences as slow start-up, and desktop frills typically require extra hard drive space and RAM. You also need some tolerance for system crashes. The more things you run, the more likely some software will break. See the feature “Expanding Your PowerBook” in this issue if a PowerBook is your sole Mac and you want everything on it.

Personally, I tend to be a minimalist. Think of the PowerBook as portable; on the road, I want simplicity and an immediacy that disappeared long ago from my desktop Mac. I turn on my desktop Mac once a day; if it takes two minutes to start, I don’t really care. I want my PowerBook ready in an instant to take notes or retrieve information for a meeting. Therefore I forgo all the tricks of my desktop Mac in favor of the essentials. As a result, I can live with much less RAM and hard drive capacity in a PowerBook. But I am not a pure minimalist; I do add a few extras. This thing is a Mac, after all.

Getting Started

HOW MUCH RAM DO YOU REALLY NEED?

If your PowerBook has 2MB of RAM, add at least another 2MB. That’s usually enough for normal operation, and 4MB will support—just barely—a RAM disk. If you must run multiple applications simultaneously, though, 4MB won’t be enough. (PowerBook 100 users may be able to squeak by with only 2MB if they install System 6, as discussed later.)

With a desktop Macintosh, I can’t imagine that I will ever have a big enough hard drive. Yet for a PowerBook, even one of Apple’s discontinued 20MB drives can be sufficient if you plan carefully. See if you can live with the drive’s size before rushing out to replace the drive.

And make sure you can take advantage of all of your hard drive’s existing storage capacity. That means repartitioning the drive, because most Macintosh drives—desktop and PowerBook alike—have unused free space. See “How to Unlock the Hidden Storage on Your Hard Drive” for a step-by-step guide to freeing up that space.

Pruning the System Folder

TO BUILD A LEAN, MEAN POWERBOOK machine, you should cut the fat from the System Folder. Apple’s standard installation (Easy Install) of System 7 and 7.1 includes many files that aren’t necessary for operation. If you choose Customize and Min System, you get a few unnecessary files and some that you do need. By tossing out unnecessary files, you not only save some drive and RAM space but the PowerBook will start up faster as well.

Actually, you should copy these files to a floppy before you trash them, although you can always restore them from the System floppy disks. Not all these files are on all PowerBooks; use the Find command under the File menu in the Finder to search if necessary.

I’m assuming here that you have done either Easy Install or a standard System install for your Mac model. My trimming was done under System 7; 7.1 savings are in parentheses.

Starting alphabetically in the System Folder, you can toss several Apple menu items: Alarm Clock, Calculator, Note Pad, and Puzzle. (I’ve kept Key Caps, although you may not need it.) Total savings: 53K (59K in System 7.1).

You can also toss a surprising number of control panels without ill effects. Many are only necessary for setting parameters that you rarely if ever change—and when you need one, you can run it directly from a floppy disk. Map serves no real function. Easy Access helps only if you need to operate the computer one-handedly. Keyboard, Mouse, Labels, and Sound are only necessary to make a change. Similarly, you can remove Date & Time and Numbers, which come with 7.1. Startup Disk lets you start up from an external hard drive. Keep it if you will be using a RAM disk; otherwise, toss it.

Views is also dispensable. Monitors serves two functions. If you have a PowerBook 160, 180, 210, or 230, Monitors lets you set the gray levels on your display. If you...
you use an external monitor—either through a built-in video adapter or a docking assembly—Monitors lets you manage both displays. For the majority of PowerBooks in use today, Monitors serves no function. Similarly, Color can go unless you have an external display that needs it. The three control panels that deal with file sharing—File Sharing Monitor, Sharing Setup, and Users & Groups—are optional as well. Two more drastic cuts are General Controls and Memory, yet once you have established basic settings and are willing to accept default memory settings, you don’t need them. If you toss all these control panels, you can save 201K to 263K. (You can even cut the control panel for the Portable or PowerBook because it isn’t absolutely essential, but its control of automatic sleep mode and hard drive operation timing is truly valuable for PowerBooks.)

The Extensions folder contains many optional items as well. Chances are you no longer need Finder Help, the balloon help for Finder. If you need remote access to large computer databases, keep DAL; otherwise toss it (and DAL Preferences in the Preferences folder). Caps Lock (5K) isn’t essential, but I find a caps-lock-on indicator in the menu bar is handy, so I’ve left it on my PowerBook (some recent PowerBooks have an indicator light). Three extensions support file sharing: File Sharing Extension, Network Extension, and AppleShare. If you don’t share, you can toss all three, for a total savings of about 331K.

PrintMonitor supports background printing; you can print fine in the foreground without it, and many users rarely print from a PowerBook anyway. You can toss every printer driver except the one you use. You might need a different one if you are traveling and encounter another kind of printer, but you should be able to find any necessary driver on one of the Macs connected to that printer. You do not actually need any printer driver if you are not printing from the PowerBook, but you might want at least one because some applications check for the installed driver to set page margins and pagination. You could select the driver with the smallest size—ImageWriter (46K)—but because setting up on one type of printer and then printing on another sometimes results in changes to page breaks and other spacing, you should install the driver for the type of printer that you use most often. The LaserWriter driver is the most common choice, despite its 218K size.

Voila: a savings of nearly a megabyte in the Extensions folder alone.

The Font folder contains more dispensable items (it’s the Font folder in System 7.1; the System file itself in System 7). First, you can toss out all the sounds, thus saving 20K. When the Macintosh needs to alert you, it produces a beep instead of a distinctive sound—no loss. Standard installation of System 7 includes 1086K of fonts in TrueType format (1189K in System 7). You can certainly eliminate some of these, and if you principally work with PostScript...
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fonts, you should probably toss out every font except those needed by the System. This saves you at least 960K of space; you will need to add the PostScript fonts of your choice, however, so that your net savings will be smaller.

If you standardize on PostScript, you may want to add Adobe Type Manager, which takes up 121K of drive space (165K for ATM version 3, which is needed for 7.1) and at least 96K of RAM (the exact amount depends on the size you set for ATM’s font cache). You might try working without ATM first, and add it only if you need it. If you print with a PostScript printer, ATM only affects the legibility of scaled fonts on screen; printed text looks fine. If the printer does not have PostScript, then ATM is necessary for producing clean output from PostScript fonts, but in this case you might as well use TrueType fonts instead. On the other hand, you may print mainly on PostScript printers but occasionally on non-PostScript printers when you are traveling; then using ATM is better than mixing TrueType and PostScript fonts.

If you do mix TrueType and PostScript, you might want to keep Geneva and New York, TrueType fonts that have no PostScript equivalents. It is especially important to be sure that Times, Helvetica, Palatino, and Courier are not installed as TrueType on some Macs you use and as PostScript on others.

The result of all this pruning is a System Folder that can be as small as 1101K (1129K for System 7.1), compared with more than 3700K for Apple’s standard Easy Install System Folder. Now you probably won’t want to toss out every possible file and font; most of them do useful things, after all. But you should consider such a stripped-down System Folder if you are squeezed for space. This minimalist approach is also useful for setting up a RAM disk, an essential feature even for the PowerBook user who has everything else.

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**Speedier Computing**

A RAM DISK IS A PORTION OF RAM THAT IS set aside to behave like a disk drive; it’s created using the Memory control panel (see “Getting Started with Memory-Maximizing Tips” in this issue for more on RAM disks). To save power during battery operation, PowerBooks are normally set to turn off the hard drive after several minutes of inactivity. When it’s time to save a file or retrieve information, you may have to wait for the hard drive to spin up—and it consumes appreciable power in the process. To avoid this wait and save power, you should try a RAM disk, which is much faster than a hard drive.

Caution: RAM is volatile; a RAM disk’s contents disappear when the power is switched off or lost. Among the PowerBooks, only the 100 accepts a RAM disk gracefully because its batteries supply continuous power to the RAM even when the computer is shutdown. (That’s because the PowerBook 100 ROM was derived from the original Mac Portable, whose large battery also supplied continuous power to RAM.) For all other PowerBooks, the RAM contents disappear during shutdown, one reason to use sleep mode rather than to shut down, when possible.

You can store anything on a RAM disk that you can on a real disk—subject to storage capacity, of course. The ideal RAM disk contains a System Folder, applications, and documents, allowing you to bypass a hard drive altogether—or nearly so. For the safety of your data, copy your documents from the RAM disk to the hard drive from time to time. Battery life goes up considerably with
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a RAM disk—some people report up to five hours of computing when a screen’s back-light is also used sparingly.

If you have 6MB or more of RAM, you can easily create a RAM disk of 2.5MB to 3MB and operate the PowerBook from a System Folder on either the RAM disk or the hard drive. Use the hard drive System Folder when you’re plugged into AC power; this folder can have all the resources that you need. The System Folder on the RAM disk can usually be stripped down since you probably don’t need that many features during battery operation. You can use the control panel called Startup Disk to move between the hard drive and the RAM disk.

If you have just 4MB of RAM, you can still have a self-contained RAM disk, you just have to plan carefully. Create a 2112K RAM disk; this leaves 2028K available. Then install a completely stripped System 7 folder (from the System installation disks, select Custom and then Min System for your model). After you toss an extraneous file or two, you are left with 848K of RAM disk space under System 7 (803K under System 7.1).

What can you do in 848K of space? Word processing is the most popular application. Microsoft Word 5.0 just barely fits, leaving no room for documents or even saving a Preferences file, and Word 5.1 does not fit at all. So if you are a Word user and don’t want to switch to another program, then use Word 4, which needs 670K of disk space, leaving 180K for documents. The Word 4 file format is compatible with Word 5.

Maybe you should change programs; both WriteNow 3.0 (TMaker, 415/962-0195) and Nisus Compact 3.31 (Nisus Software, 619/481-1477) load completely into memory and do not need to be in the RAM disk at all. Once launched from a hard drive, neither program needs to go back to the drive except for documents. In practical terms, this means that you can use more space on the RAM disk for documents or other applications. WriteNow is smaller (287K on disk, minimum 325K memory partition) than Nisus Compact (370K on disk, minimum 499K memory partition) because WriteNow does not necessarily load a document completely into memory as Nisus does.

Whatever you do, think twice before you go out to buy a program just for RAM disk use; perhaps you should spend that money on more RAM instead.

And don’t forget that you can still run other programs, control panels, and Apple menu items (desk accessories) from the hard drive even if you start the PowerBook from a RAM disk. On the other hand, the only way to completely avoid turning on the hard drive is to throw the hard drive icon in the Trash (it will reappear after a restart).

If you have the space, you can keep a copy of your RAM disk on the hard drive so you can re-create the RAM disk quickly if necessary. But this means you will have duplicate files on your hard drive, and a duplicate System file can cause trouble. To solve that problem, you can create a folder with every RAM disk file except the System file. If you don’t have that much hard drive space, simply mark each component of the RAM disk with a Finder label for easy retrieval. If your System Folder is small enough, you can keep it on a floppy disk. Managing a RAM disk is much easier with System 7.1’s separate font folder than with System 7’s practice of storing fonts inside the System file itself.

**System 6**

If you have a PowerBook 100, another way to cut down the size of the System Folder is to install System 6 instead of System 7, on both the hard drive and a RAM disk. The readily available versions of System 6 do not handle power management.
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and the screen brightness correctly, however. System 6.0.8L, produced by Apple for sale outside the United States, fixes these glitches for the PowerBook 100 and adds support for the SCSI disk mode. Unfortunately, there’s no official way to get 6.0.8L inside the United States, although it’s available in Canada. A minimum System 6.0.8L folder takes up only 410K, some 700K less than a minimum System 7 folder. A full installation of 6.0.8L without printer drivers takes 876K.

You can combine the best of both worlds on a 4MB PowerBook 100 by installing System 7 on the hard drive and creating a 1.5MB RAM disk with a minimal System 6.0.8L. You still have 1MB of RAM disk space available and 2.5MB of main RAM, which is enough for many applications even under System 7. The two systems have no difficulty sharing files, but they cannot share System resources such as control panels.

If you have a PowerBook 140 or 170, in practice you cannot run System 6. A few accomplished system software people have converted KanjiTalk 6.0.7.1, a Japanese version of System 6, to be able to run English-language software on the 140 and 170. The conversion process is difficult and incomplete, although the result is operational. Originally this issue about System 6 came up because of delays in the release of System 7 KanjiTalk. KanjiTalk 7 is now available, so newer PowerBook models will not run System 6.)

Sleepy Time

IN ITS POWERBOOK MANUALS, APPLE offers much worthwhile advice on how to avoid trouble. But I find some of its advice too conservative.

Here’s one example. A PowerBook comes out of sleep mode much more quickly than it boots from a cold start. Apple says that PowerBooks should be shut down before moving them, and that sleep is suitable only for a stationary unit. The idea is that an accidental keystroke might turn on a sleeping computer during transit, and the hard drive might be damaged. Even so, many people have taken to carrying around their PowerBooks in sleep mode, and the Apple PowerBook managers I spoke to consider the advice overly cautious if not an outright error. (On the PowerBook 100, pressing any key turns on the computer anyway, from either an off state or sleep mode, so there is no difference in risk for accidental start-up with that model.) For safety’s sake, save important files to the hard drive before putting the computer to sleep. (And please don’t send me the repair bill if your computer gets damaged.)

Plugging In Peripherals

APPLE’S MANUALS ARE SOMEWHAT UNCLEAR about when you can connect devices to, and disconnect devices from, a PowerBook. PowerBooks have three states on, off, and sleep. You can connect or disconnect any device when your computer is turned off. According to sources I spoke to that make PowerBook peripherals, you can connect or disconnect the AC power adapter and serial port devices at any time, regardless of whether the computer is on, off, or in sleep. According to engineers who develop them, you can connect ADB devices, such as numeric keypads, during sleep; if the device is not a mouse, keyboard, or numeric keypad, you may need to restart the computer for it to recognize the device. Don’t plug in an ADB device while the computer is on—you run the risk of shorting the plug and blowing a tiny fuse in the computer. And if you go to an Apple dealer for repairs, you’ll have to replace the main logic board, an expensive proposition. A third-party repair shop can replace the fuse for much less money.

Virtually all my sources say to shut down the PowerBook before connecting or disconnecting floppy disk and SCSI connectors. Otherwise, you might have another potentially expensive repair. A few brave souls say that they routinely connect and disconnect SCSI devices without shutting down, only restarting the PowerBook to recognize the device. They do it to preserve the RAM disk—but I wouldn’t.

Airport Advice

THE APPLE POWERBOOK MANUAL SAYS “Do not allow your computer or any hard drives or floppy disks to pass through X-ray machines. Have security officials manually inspect your computers and disks.” As far as I can tell, there is no basis for this advice; X-rays do not appear to damage magnetic media or any other computer component. Some people suggest that the problem is not with the X-rays but with the magnetic field produced by the motor driving the conveyor belt through the X-ray machine. I can’t find any verifiable reports of damage, however. Engineers who work for computer and disk manufacturers routinely run their computers and disks through X-ray machines, and so do I.

If your experience is different, please share it with me, and any other tips or tricks that make your PowerBook more effective or fun. m

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| ★★★ ElectricImage Animation System 1.5.1, Electric Image, 818/577-1627, $7495. The most powerful animation program for the Mac improves its documentation and rendering, and adds an intuitive project window that allows you to control all aspects of animation from a single location. Unfortunately, it still retails for the price of a European vacation for two. Feb 93 |
| ★★★ Infini-D 2.0, Specular International, 415/549-7600, $995. Rich combination of 3-D modeling, rendering, and animation tools at a relatively affordable price. Visualization program works well; offers a nicely integrated approach to rendering; and is generally stable. Jan 93 |
| ★ MacRenderMan 1.0 (1.3), Pixar, 510/236-4000, $695. This dedicated renderer provides an extremely sophisticated, albeit sometimes difficult, way to generate 3-D images. Currently the most widespread rendering scheme, it uses algorithms to create textures, stumps, lights, fog, and practically every other element of an image. |
| ★ Motion Works Promotion 1.0 (1.02), Motion Works, 604/685-9975, $995. Inexpensive animation program consolidates a slew of tempting features, including flexible path tools and ambitious support for Apple events, but the capabilities are strong together with a weak and problem-ridden interface. Nov 92 |
| ★★★★ Ray Dream Designer 2.02 (2.04), Ray Dream, 415/960-0765, $895. Experienced 3-D aficionados will find this 3-D imaging software a welcome addition to their arsenal, and beginners may find it ideal for the leap from two dimensions to three. Improved text-handling and viewing capabilities would make it even better. Sep 92 |
| ★★★★ Showplace 1.1 (1.1.1), Pixar, 510/236-4000, $695. Straightforward graphics application organizes and rendering processes into five basic components. Beginners will like the simple interface, but the feature set is small for experienced users. Jun 92 |
| ★★★ Swivel 3D Professional 1.0 (2.0), MacroMedia, 415/252-2000, $695. Relatively unusual cross-sectional technique makes this 3-D modeling a great tool, especially for prototyping; it provides a quick and easy way to create a variety of shapes. |

### Accounting/Finance

| ★★★★ Business Sense 1.6, Business Sense, 307/877-2231, $199. Competent, single-user, all-in-one bookkeeping package will adequately help you keep the books for a small company, but it's not as easy to use as its competition. Feb 93 |
| ★★★ Components 1.0, Satori Software, 206/443-0765, $795 per module. Simple, flexible architecture sets a new design standard for Macintosh accounting software, but is not without its bugs and flaws. Sep 92 |
| ★★★ Great Plains Accounting 6.0 (6.1), Great Plains Software, 701/281-0550, $795. High-end bookkeeping software offers a first-rate lineup of dedicated modules. Different individuals or groups can easily use the various accounting functions. |
| ★★★ HyperTax Tutor 1991, SoftStream International, 508/991-4011, $99. If you're willing to put up with a design that's neither intuitive nor easy to use, this cross-referenced book contains extensive explanations, strategies, and examples of complex IRS tax laws. Apr 92 |
| ★★★ Job Cost/Time Billing 1.05, Satori Software, 206/443-0765, $1495. Professional billing software incorporates high-end job-cost and accounts-receivable features in one module, plus an excellent report function; but confusing elements, minor bugs, and inaccuracies in the documentation are weaknesses. Aug 92 |
| ★★★ MacInTax 1991, ChipSoft, 619/452-8722, $79.50. On-screen replicas of IRS forms ease the preparation of tax returns in this personal income tax software, but the help text (lifted from IRS documents) is unclear. Apr 92 |
| ★★★★ Managing Your Money 5.0, MECA Software, 203/256-5000, $79.95. An already strong financial-management program becomes easier to use and slightly more powerful with this upgrade. Jan 93 |

### Business Tools

| ★★★★ Atlas Pro 1.0.6 (1.5), Strategic Mapping, 408/985-7400, $795. Although this mapping software is not a complete geographic-information system, it boasts a rich feature set and competitive price. Nov 92 |
| ★★★ Claris Resolve, Claris Corp., 408/727-8227, $249. Advanced features come within easy reach of spreadsheet publications with this program. Anyone can learn how to use it in 10 minutes and how to customize it in 20. |
| ★★★ DataPivot 1.02 (1.1), Brio Technology, 415/961-4110, $299. Convenient and flexible report-generator includes fast formatting, automatic import, and almost every other item on the wish list of users who need report tables that emphasize cross-tabulation. May 92 |
| ★★★★★ Fair Witness 1.1 (1.2), Chena Software, 215/770-1210, $295. A valuable tool for planning any project, this software coherently integrates outlining, information charts, scheduling, and time charts. Oct 92 |
| ★★★★★ FileMaker Pro, Claris Corp., 408/727-8227, $399. Easier scripting, improved mailing labels and text-handling, and support for QuickTime and Apple events are the major new features of this upgraded, multiuser, flat-file database. Although it has some minor bugs, this is a strong upgrade to an excellent program. Jan 93 |
| ★★★★ GeoQuery 3.02, GeoQuery Corp., 708/357-0535, $395. Gain geographic perspective with this custom-map generator and data-analysis software that uses zip codes to create pushpin-style maps of files from your spreadsheet or database. Nov 92 |
| ★★★ Inspiration 4.0, Inspiration Software, 503/243-9011, $295. Watch your ideas evolve in a dynamic diagram mode and a text-based outline mode with continues |

**The Best and Worst Features of Products Reviewed in MacWorld**
**MACWORLD**

*Star Ratings*

this brainstorming tool. It works best as a vehicle for organizing and developing ideas.

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**Lotus 1-2-3**

- **3 stars**
  - Lotus Development Corp., 800/343-5414, $495.
  - Spreadsheet program from the other side holds its own against Mac competition.
  - It is one of the many strengths include graphing, well-implemented linking, compatibility with DOS version, and an outstanding Help system.
  - Apr 92

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**MacProject II**, Claris Corp., 408/727-8227, $599.

- Draw task boxes and connect them with lines that define project logic using this project-management software.
- As well as simple accounting for a multiuser environment, tables, but other programs offer more elaborate reporting and scheduling options.
- **4 stars**
  - Microsoft Excel 4.0, Microsoft Corp., 206/882-8080, $495.
  - Create impressive spreadsheets with this upgrade that includes all the features you wished for and more. It's slower, and now needs 24MB of RAM for practical use, but almost all users will want to upgrade.
  - Oct 92

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**Microsoft Project 3.0**, Microsoft, 206/882-8080, $695.

- An amazing range of functions, including new scheduling and formatting, are packed into this upgraded project-management software.
- The improved tool bar helps novices schedule tasks with push-button ease.
- Jan 93

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**Office Manager 2.1**, White Crow Software, 508/658-1270, $599.

- Simple contact- and project-management software.
- The tool bar helps novices schedule tasks with push-button ease.
- Jan 93

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**Lotus 1-2-3**

- **4 stars**
  - ArchiCAD 4.02 (4.1), Graphisoft USA, 415/737-8665, $4450.
  - The simple yet powerful 3-D interface in this CAD package builds on a construction metaphor.
  - The integrated product incorporates most features that an architect needs.
  - Jun 92

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- Customizable, bare-bones drafting upgrade partially implements a graphical user interface. Few add-ons are currently available.
- Dec 92

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**PowerPlay 1.0 (1.1)**, Cognos, 617/229-6660, $695.

- A good program for a very limited range of business-analysis tasks. The views of data and graphs are small and manageable, and the program tailors them in several colorful ways.
- Aug 92

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**CAD / DRAFTING**

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**Adobe Type Manager (ATM)**

- **4 stars**
  - Radically improve the quality of screen fonts and the versatility of QuickDraw printers with this font-optimizing utility that uses information from a printer font (also called an outline font) to produce accurate character representations on-screen.
- Aug 92

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**Fontographer 3.5**, Altsys Corp., 214/680-2060, $495.

- Versatile tools that allow you to edit PostScript typefaces or create your own are the highlight of this font-design software. But beware, some processes are technical and cumbersome.
- Nov 92

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**FrameMaker 3.0 (3.0.1)**

- **5 stars**
  - Frame Technology, 408/483-3311, $795.
  - Powerful and well-designed, this page-layout software is the best choice for scientific and technical publishing. It has a fine table editor and allows manual kerning, but its power demands commitment—and a Mac II-class machine.
  - Nov 92

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**Publish It Easy 2.12 (3.0)**

- **3 stars**
  - TimeWorks, 708/559-1300, $199.50.
  - Fast even on the slowest Macs, this page-layout program sports a comprehensive mix of features that may eliminate your need for a separate drawing or even database program. But some bugs and a daunting complexity may put this otherwise versatile program.
  - Jul 92

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**QuarkXPress 3.1**

- **5 stars**
  - Quark, 800/788-7835, $895.
  - Dozens of updated features and frustration-savers in this upgrade include new palettes and preferences, better zooming, and improved text-editing and formatting. The program, while still not perfectly behaved, is stable, well designed, and fully featured.
  - Jul 92

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**Renaissance 1.0**

- **5 stars**
  - Eastman Kodak, 800/433-2839, $695.
  - A mixture of power and oversight.
  - This page-design and layout software provides several slick features, including handling multiple page sizes simultaneously, but blantly ignores common Mac conventions, such as some keyboard shortcuts.
  - Dec 92

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**Spectacular 1.2**

- **4 stars**
  - FontHaus, 203/846-3087, $79.95.
  - Keep track of your fonts efficiently and effectively with this type-specimen generator. Printing specimen sheets is a cinch.
  - Jan 93

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**Typest ready 1.0**

- **4 stars**
  - Pixar, 510/236-4000, $299.
  - Typest enters the third dimension with this reasonably priced 3-D typographic effects and animation program.
  - There's room for improvement, but it's an exciting tool for designers, multimedia producers, and those who enjoy working with type.
  - Nov 92

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**DRAWING / ILLUSTRATION**

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**Adobe Illustrator 3.01**

- **5 stars**
  - Adopt transformation and reshaping capabilities and superb text-handling stand out in this object-oriented illustration program. It also includes features found in no other Mac draw program, such as tools to create line and bar graphs.
  - Nov 92

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**Aldus FreeHand 3.1**

- **4 stars**
  - Aldus Corp., 206/620-2320, $595.
  - A press release for FreeHand: this most remarkable new feature of this updated drawing program. Substitution for missing fonts is another good addition, but skinny text-editing tools and incomplete support for EPS continue to diminish its value.
  - Jun 92

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**CA-CricketDraw III 1.0**

- **5 stars**
  - Although not revolutionary, this draw program boasts some original implementations, including dramatically improved gradients.
  - May 92

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**Canvas 3.0 (3.0.6)**

- **5 stars**
  - Denohe Software, 305/596-5644, $399.
  - Discovering the composite natures of this draw program's immense feature list isn't easy, but it's well worth the effort. The precision-drawing functions in particular should appeal to many users.
  - Jul 92

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**IntelliDraw 1.0**

- **5 stars**
  - Aldus Corp., 206/620-2320, $299.
  - Crowd-pleasing features such as physical and dynamic links make this automated draw program a great environment for planning and presenting, although it's less satisfying as a free-form drawing tool.
  - Nov 92
** Math Shop, Math Shop Jr., Advanced Math Shop 1.0, Scholastic, 800/541-5513, $24.95.

- The normal workbook format is converted into humdrum bits and bytes with these mathematics education games.

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** Eco-Adventures in the Ocean, Eco-Adventures in the Rainforest 1.0, Chariot Software Group, 619/298-0201, $59.95. Explore the ocean or rainforest while avoiding pitfalls and predators in these educational adventure games. Imaginary landscapes that combine features found in different environments may confuse some students. Nov 92

** Headline Harry and the Great Paper Race 1.0, Davidson & Associates, 310/793-0660, $59.95. Travel through time and across the country as a journalist in this history/geography game. While not an educational masterpiece, it is lots of fun. Dec 92

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** Kid Pix 1.0 (2.0), Broderbund Software, 415/382-4400, $59.95. An entrancing, enhancing color paint program aimed at children but delightful for grownups, too. Hilarious sounds, hidden surprises, spectacular effects, zany and creative tools—it's a classic.

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** Picture It 1.0 (1.4), Penton Overseas, 619/569-1500, $29.95 to $69. Fun, educational game builds arithmetic skills through arcade action. Munchers gobble your choice of multiples, factors, primes, equalities, and inequalities, but the game can't accept custom data sets. Jun 92

** Spelunx and the Caves of Mr. Seudo, Broderbund Software, 415/382-4400, $49.95. Unanticipated giggles, rich graphics, entertaining sounds, and creative teaming activities fill this Interactive hyperworld. We recommend it, despite its tiny

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** StudyWare for the SAT 3.7N (4.0), Cliffs Notes, 402/423-5050, $49.95. Four full SATs, a TSWE (Test of Standard Written English), and a series of drills are included with this inexpensive SAT-training program. It doesn't provide a lot of tutorial assistance, but may be appropriate for students who need a quick brushup.

** Super Munchers 1.0, MECC, 612/569-1500, $49.95 to $69. From a kid's point of view, this educational arcade game offers long-lasting appeal. The player maneuvers a cartoon muncher around a game board, gobbling up words that fill target rules, such as Romanic compaorses or European countries. Jun 92

** Time Treks 1.0, Earthquest, 415/321-5938, $59.95. An eccentric archaeologist opens portals through time, and you must close them in this educational Card-based game. Slow response time and limited animation and color are somewhat disappointing, but overall it's a fun way to browse through history.

** Transparent Language 1.0486, Transparent Language, 603/465-2230, $139. Without an iota of gizmo or glammer (no sound, graphics, color, or buttons), this foreign-language reader is a superb tool for bolstering language skills through reading. Oct 92

** Where in the World Is Carmen San Diego? Deluxe Edition, Broderbund Software, 415/382-4400, $79.95. The V.I.L.E. Gang is at it again, stealing famous objects and fleeing to locations around the world. In this deluxe version of the well-known geography game, there are more crooks, more clues, and more countries to visit. Oct 92

** Word Munchers 1.0 (1.2), MECC, 612/569-1500, $29.95 to $69. Munch the words with matching vowel sounds in this educational game for grades 1 to 5. Dazzling color graphics stand out, but the repetitious cartoon sequences get tedium. Jun 92

** World Atlas 1.2, Software Toolworks, 415/883-3000, $79.95. Extensive, detailed maps of countries and regions are the highlight of this atlas software. In addition, descriptive headings report interesting fact-based demographic data. Apr 92

** MacDraw Pro 1.0v1 (1.5), Claris Corp., 408/727-8227, $399. The shallow array of integrated features in this draw program is perfect for the new or moderately experienced user, but compared with other programs in the same price range, it's slow and deficient.

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MACWORLD Star Ratings

simulator combine in this World War I flight game. Despite small annoyances, including too many dialog boxes to get to the simulation, this game will charm any aspiring ace.

Oct 92

★★★★ The Secret of Monkey Island 1.0, LucasArts, 415/721-3309, $59.95. A genuinely amusing, interactive tale of swashbuckling and daring deeds using splendid 256-color graphics and an original sound track. Low screen resolution and isosceles copy protection only slightly spoil the delight. Sep 92

★★ Shanghai: The Dragon's Eye, Activision, 310/207-4500, $49.95. Classic tile game is more addictive than ever; flashy enhancements include new tiles and layouts, as well as an entirely new game that's a variation on the Rene Magritte theme. Sep 92

★★★ Sherlock Holmes, Consulting Detective 1.0, Icon Simulations, 708/520-4440, $69.95. Accompany Sherlock Holmes and Watson as they investigate three CD-ROM-based mysteries. Primarily made up of video scenes, this game's only slightly more interactive than TV, and the picture's not as good. Aug 92

★★ SimAnt 1.0, Maxis, 510/254-9700, $59.95. Marauding red ants, ants, and even power mowers—an ant's life is likely to be short in this remarkably detailed simulation game in which the object is to leave black ants across territory in a suburban backyard. Aug 92

★★ SimLife, Maxis, 510/254-9700, $59.95. A megaton'smaller's dream come true, this amazingly intricate simulation game allows players to create and control ecosystems. It's not easy, but the rewards are an increased understanding of the complex interrelationships of life. Feb 93

★★ Spaceward Ho 2.0, Delta Tao Software, 408/730-9336, $59. A happy planet is a profitable planet in this absorbing, humorous strategy game of interstellar capitalism and imperialism. Aug 92

★★★ Spectre 1.0, Velocity Development Corp., 415/776-8000, $59.95. Fight enemy tanks in a 3-D arcade game that is at once basic and extremely addictive. When installed on a network, it's one of the great anti-productivity tools of all time. May 92

★★ Super Tetris, Spectrum HoloByte, 510/522-3584, $49.95. Teeny tiles are a very minor negative in this exceptional tile game that's more varied, more challenging, and more forgiving than the original. Oct 92

★★★ Surgeon 3, The Brain 1.0 (1.1), ISM, 410/560-0973, $59.95. Surgical-simulation game with realistic graphics and sound can be entertaining and educational, but it's overly intolerant of mistakes—not for the faint of heart or the easily frustrated. Sep 92

★★ Warlords, Strategic Studies Group, 904/494-9373, $59.95. A medieval fantasy world is the setting for this colorful game of strategy and conquest with beautiful graphics. Unfortunately, the computer opponents are not challenging enough for an experienced war-game, although human opponents may be. Dec 92

★★★ Worldtris, Spectrum HoloByte, 510/522-3584, $49.95. Tetris's falling blocks are letters in an arcade game for Scrabble lovers. Lots of variations, including modes for children, tournaments, and head-to-head play on a network, make it a super game. Jun 92

IMAGE EDITING/PAINT

Adobe Photoshop 2.0.1 (2.0.1), Adobe Systems, 415/961-4400, $95. With complete mastery of the bitmap, continuous-tone environment, this product is the industry standard for image manipulation. Although it's not perfect, it's so good that if you make your living in graphic art, it's worth the price of a Mac itself.

★★★ Aldus Gallery Effects 1.0 (1.5), Aldus Corp., 206/628-3320, $195. Unsparing collection of 16 image-editing filters has an unusually strong manual. Apr 92

★★★ Cachet 1.0, Electronics for Imaging, 415/742-3400, $59.95. The tools, interface, output, and documentation of this color-image editor are all quite impressive for a first version, but serious failings include slow speed and disappointing sharpening. Dec 92

★★★ Color It 1.0 (2.0), MicroFrontier, 515/270-8109, $119.95. A magic wand tool and antialiased brushes and text are among the high-end features found in this low-end color paint program. Occasionally mystifying and buggy, it's still a remarkable bargain. Apr 92

★★★ Expert Color Paint 1.0, Expert Software, 305/444-0080, $49.95. A wonderful value for novices, this color paint program offers a tidy collection of features for an astonishingly low price. Beware of low memory settings, though, or it gets buggy. Jun 92

★★★ Fractal Design Painter 1.3, Fractal Design Corp., 408/688-8800, $349. An expanded collection of paper textures and four new watercolor brushes add appeal to an already strong set of painting tools. Minor complaints include unsophisticated gradient and fill capabilities and an insensitive Undo command. Aug 92

★★★ MacPaint 2.0, Claris Corp., 408/727-8227, $125. Easy-to-use black-and-white paint program takes up very little RAM, but it adds few capabilities beyond those it offered eight years ago.

★★★ ScanMatch 1.0.1 (2.0), Savitar, 415/243-3030, $159. Basically half a color-calibration system. Software quickly and easily adjusts color scan files for screen display, with somewhat uneven results; those wishing to adjust images for print purposes need to use another application. May 92

★★★ Sketcher, Fractal Design, 408/688-8800, $149. A variety of effects reproduce the styles and techniques of traditional drawing tools with this wonderful gray-scale paint and image processing program. Feb 93

★★★ Smoothie 1.0, Peirce Software, 408/244-6554, $149. Create smoother screen images with this handy utility that antialiases the edges of on-screen artwork. Although it can't accommodate sound or accept imported QuickTime, it's a must for anyone who uses a Mac for presentations. Nov 92

★★★ Zeus 0.91 (0.92), Delta Tao Software, 408/730-9336, $49. Color paint program tries hard to match capabilities found in more expensive programs, not always successfully. It's trimmers with good ideas that are poorly implemented. Aug 92

MATHMATICS/STATISTICS

★★★ Data Desk 3.0, Data Description, 607/257-1000, $595. Users with limited formal backgrounds in statistics can perform better analyses with this statistics program than with others.

★★★ HQ 1.0 (1.1), Bimillennium Corp., 408/866-2010, $695. A script language, which exhibits an enticing, nonchaotic balance between data structures and typing of variables, is only one of the impressive features of this formidable numerical mathematics software. Oct 92

★★★ JMP 2.0 (2.05), SAS Institute, 919/677-8000, $695. You get lots of value for your money with this statistical-analysis program and its vast assortment of functions, including strong classical statistics and visualizations, 3-D spin features, quality-control statistics, and a manual that is a model of concise clarity.

★★★ Maple V, Brooks/Cole Publishing, 800/354-9706, $450. For functional scope and ease of use on a basic Mac (such as a Classic or Plus), this symbolic math software has no competitors. May 92

★★★ Mathematica 2.0 (2.1), Wolfram Research, 217/398-0700, $595. While its memory demands are high, this symbolic-math program offers a truly vast array of functions, including over 800 numerical and symbolic routines. The quality and quantity of its support literature are outstanding.

★★★ Miniblab 2.0, Miniblab, 814/238-3280, $695. These statistical-analysis tools are broad but not exhaustive. Still, they're easy to learn and easy to use, making Miniblab an excellent teaching tool. The graphics and output are unfortunately typewriter-like. Jun 92

★★★ Simulink 1.2, TheMathWorks, 508/653-1415, $599. If you hear the word body-pilot several times a week at work, this math-simulation software is designed to make your life wonderful. Little glitches and a command-line orientation are drawbacks. Dec 92

★★★ StatView 4.0, Abacus Concepts, 510/540-1949, $595. A nice mix of statistical prowess and operating convenience distinguish this statistical-analysis and presentation software. The printing options are outstanding. Nov 92

★★★ TeMath 1.0, Brooks/Cole Publishing, 800/354-9706, $39.95. For roughly the price of a textbook, this mathematical-exploration software provides all the help a student needs to understand what's really happening in differential and integral calculus. Apr 92

MISCELLANEOUS SOFTWARE

★★★ Aspects 1.0 (1.03), Group Technologies, 703/528-1555, $285 to $1295. Collaborative software allows up to 16 people to edit a project. Controlled access as well as individual and linked views are good features, but the lack of outlining and spreadsheet modules limits its usefulness. Jun 92

★★★ Audioshop 1.0 (1.03), Opcode Systems, 415/856-3333, $89.95. Audioshops will get a kick out of applying sound effects to any sound file on their Macs. You can also control the order of sounds or songs on an audio CD played on a CD ROM player. A number of quirks may confuse new users. Sep 92

★★★ Bar Code Pro 1.0, Synex, 718/499-6293, $450. Easy-to-use dink accessory creates bar codes in EPS or PICT for use in desktop publishing or labeling programs. It does well what it sets out to do, but lacks automatic sequential coding and fails to catch invalid characters. Sep 92

★★★ CameraMan 1.0 (1.1), Vision Software International, 408/748-8411, $149. If you need to record continuous screen operations, this screen recorder is the best deal around. It handles 32-bit QuickDraw, takes advantage of QuickTime's long list of compression and playback capabilities, and even uses custom frame sizes. Sep 92

★★★ Cross Country 1.0 (2.0), T-34 Microsystems, 904/396-2785, $179.95. No unnecessary...
frills compromise this efficient, inexpensive instrument-flight
trainer. It doesn't have a true aerodynamic feel, but the
flaw's not critical. Jul 92

** GreatWorks 2.0, Symantec, 408/258-9600, $295. High marks to this integrated program for including
an outlining module and a color paint module. While the
integration may not be ideal, it's a solid program, worth a
close look.

** IdeaFisher 2.0, Fisher Idea Systems, 714/474-8111, $395. Inspiration never comes easily,
but this creativity tool with a question bank of 6000
questions and an idea bank of 61,000 words and 760,000
links might help get the juices flowing. Jan 93

** InstaNote 1.0, UV Wave, 318/868-9944, $28.95. Sheet your Mac with this cool panel de-
vice that offers a choice of nine weapons, ranging from an
Uzi to a pigeon. It has first-rate sound effects and detailed
animation, but the novelty wears off. Feb 93

** LinksWare 1.4 (2.0), LinksWare Corp.,
408/372-4155, $189. Although creating hyperlinks between
documents stored in nearly any format is relatively
simple using this utility, the navigational assistance may be
insufficient for complex projects. Aug 92

** Microsoft Works 3.0, Microsoft, 206/882-8088, $259. Capable but unspectacular upgrade
delivers marginally improved functionality and a welcome
face-lift to this integrated program, but there are a number of
incompatibilities, odd design choices, and performance
flaws. Feb 92

** Notify 1.0, Ex Machina, 718/965-3009, $149. Innovative wireless transmitter uses Mac to send
messages to pager. It's a start on a new technology, but the
quirky product has a long way to go. Jun 92

** Personal Font, Signature Software, 408/ 458-0241, $179.95. Turn your handwriting into a
PostScript Level 3 or TrueType font. The results are good,
although not perfect—TrueType letters were not connected
on screen, but this should be corrected with TrueType 2.0.
Dec 92

** Poetry in Motion, The Voyager Com-
pany, 310/451-1383, $29.95. Performance videos of
contemporary poets are juxtaposed with the texts of their
poems and taped interviews in this intriguing CD ROM
that combines the excitement of the stage with the reflective
aspect of the appeal. Feb 93

** RateFinder 1.5 (1.6), Elefunct Software,
510/843-7725, $99. Numerous interface violations
don't change the fact that these all-inclusive shipping-rate
tables make the old-fashioned chore of checking mail rates
easier and more efficient. Jun 92

** So I've Heard, Volume 1: Bach and
Before, The Voyager Company, 310/451-
1383, $24.95. Engaging text by classical-music critic and
author Alan Rich describes nearly two millennia of
western music (up to the mid-eighteenth century) in this
CD ROM. It offers a unique and affordable opportunity to
sample 50 or so performances, styles, and compositions.
Feb 93

** SpedyCD 1.2.2 (1.2A), ShirtPocket
Software, 602/966-7667, $70. Get info gets faster
with this CD ROM-access accelerator that creates a data-
base of files from a CD on your hard drive. If you regularly
browse through the same CD ROM folders, this product
might save you enough time to be worth the $70.
Nov 92

** TypeReader 1.0, ExperVision, 408/
428-9988, $695. Speed and accuracy combine with a
straightforward operating style in this high-end optical char-
acter-recognition software that doesn't do everything its
competition does, but is a major contender nonetheless.
Feb 93

** UpDiff 1.0, KyZen Corp., 609/354-
3863, $169. Innovative program compares two versions of
a file, extracts the differences, and creates a difference
file that is typically smaller than the original and can be
used to update the older file. Dec 92

** WordScan, WordScan Plus 1.0 (1.01),
Calera Recognition Systems, 408/720-8300,
$295, $395. The idiogynic interface of these two OCR
programs is only a minor inconvenience considering their
relative accuracy and speed. Jun 92

** ZP 7 (10), Semaphore Corp., 408/
688-9260, $125. Clean up and standardize addresses
with this CD ROM, thereby reducing postage costs and
avoiding undeliverable mail; uses a licensed version of the
U.S. Postal Service's official database of every valid postal
address in America. May 92

MULTIMEDIA

** Adobe Premiere 2.0, Adobe Systems,
415/961-4400, $495. A dream command post for video
professionals, this QuickTime video-editing software pro-
duces stunning special effects with little effort. Only the
program's appetite for memory, disk space, and computer
horsepower prevent it from being the nonprofessional's
dream as well. Jan 93

** Cinematlon 1.0, Vvidus Corp., 415/494-
2111, $495. Easy-to-use program merges animation,
interactivity, and presentation features, but the image- and
text-handling capabilities are less than stellar. Jul 92

** Dlva VideoShop 1.0, Diva Corp.,
617/451-4147, $995. Instantaneous playback tests this green-
ful QuickTime editing software apart. Its simple beauty is
slightly offset by a few rough edges, a busy manual, and
an occasionally clumsy interface. Jul 92

** HyperCard 2.1, Claris Corp., 408/727-8227,
$199. Ease of use has made this multimedia-authoring
software a tool for the masses. Although color is awkwardly
implemented, more-on-demand products have been developed
for this than for any other multimedia program.

** MacroMind Director 3.1, Macromedia,
415/252-2000, $1195. This minor update to a pow-
erful and versatile multimedia authoring tool adds 23 scripting
commands, QuickTime importing and editing, and a utility
that compiles movies into a faster playback format—but
the whopping $149 addition to the price makes it an up-
grade most users can afford to miss. Feb 93

** Magic 1.0 (1.1), Macromedia, 415/252-
2000, $395. Outstanding editing features make this multimedia-presentation software easy to master. Many of
the features of more-complex programs are missing, but
what it does, it does well. Aug 92

** Morph 1.0, Gryphon Software Corp.,
619/454-6836, $149. With patience and practice, you
can become a high-tech special-effects wizard using this
movie utility that "melts" one image into another. While
using it is simplicity itself, you can only morph still images,
and the program suffers from some first-release glitches.
Nov 92

NETWORKING/CONNECTIVITY

** AIX 3.0, Apple Computer, 408/996-
1010, $709. Hybrid-operating-system package imple-
ments the Stone Age, type-one-line-at-a-time text inter-
face of Unix in a way a Macintosh user might actually like.
Nov 92

** AccessPC 2.0, Insignia Solutions, 415/
694-7600, $99.55. Slick control over formatting mul-
tiple types of DOS media is the major advantage of this file-
transfer utility. Oct 92

** Carbon Copy for the Mac 2.0 (2.04),
Microcem, 919/490-1277, $99 or $299. Screen-
sharing utility is convenient and economical for occasional
use but because it competes for RAM on attended low-
memory Macs, it isn't efficient enough to use as a global
solution for remote machine support. Apr 92

** CompuServe Information Manager
2.0.1, CompuServe, 614/457-8600, $49.95. The
good of this product is to give friendly information-access to
CompuServe for Macintosh users. An appealing color
interface and increased speed are signs of success, but there's
still room for improvement. Dec 92

** DataClub Classic, DataClub Elite 2.0,
Novell, 800/638-9273, $175, $1395. Fully distribu-
ted file servers allow users to pool the free space on their
drives into one virtual server. File sharing is transparent,
but when a participating Mac disconnects from the network,
users lose access to files stored on its hard drive. Aug 92

** DOS Mounter 3.0, Dayna Communica-
tions, 801/531-0600, $89.95. If you need to use
wild cards in extension mapping, this file-transfer utility is
the only option, although it's slower than other file-transfer
programs. Oct 92

** Macintosh PC Exchange 1.01, Apple
Computer, 408/996-1010, $79. For basic file trans-
fer, this control panel device allowing cross-platform file
exchanges is fine, but it's hardly state-of-the-art. Oct 92

** MicroPhone II 6.0 (4.0.2), Software
Ventures Corp., 510/644-3322, $295. Relfnements
are evident throughout this telecommunications software's
upgrade, but not everyone needs $295 worth of sophis-
tication. The impressive scripting facility is countered by poor
help features. Jul 92

** NetMounter 1.00 (1.01), Dayna Commu-
nications, 801/531-0600, $99. Reasonably
priced utility provides access to Netware file servers
without installing Netware for the Macintosh on the server.
It's not an ideal choice, but it is economical for mixed net-
worked with only a few Macs. Sep 92

** Network SuperVisor 2.0 (2.1), CSG
Technologies, 412/471-7170, $495. Fast and ac-
curate data collection is the strong point of this network-
management utility, but the interface isn't that intuitive.
Aug 92

** NetWorks 1.0.1 (2.0), Caravella
Networks Corp., 613/596-2802, $1195. Become
a network demigod with omnipresent capabilities over net-
work devices using this network-management and paging
utility. Macintosh's network manager loved it, calling it ver-
satile, flexible, and worth its weight in gold. Jun 92

** PacerForum 1.0, Pacer Software,
619/454-0565, $549. Any file server or undeveloped
networked Mac can host an online forum using this net-
continues

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work bulletin board system. The well-designed graphical interface stands out, although the display looks better on MACWORLD Internets, but too pricey for small networks. Oct 92

4 SoftPC 2.0 (2.5), Insignia Solutions, 415/694-7600, $399. A graceful implementation of the PC architecture on a Mac, this program emulates PC AT hardware through a powerful BIOS that romps Intel 80886 addresses to a Motorola 68000. The main drawback is the slow speed.

5 TechWorks Net Utilities 1.0, Technolgy Works, 512/794-8533, $129. Collection of five separate applications provides essential network-monitoring tools at a price that would please anyone. Dec 92

6 VersaTerm/Pro 3.1 (3.6.2), Synergy Software, 215/779-0522, $295. It's a great tool for working with VAXs or when you want Textronics-terminal emulation, but this communications software lacks the scripting many people use for working with RFIs or commercial information services.

7 Vicom Terminal Emulators (4.2), Vicom Technology, 604/684-9517, $195 to $3500. These bare-bones, British-designed terminal emulators lack many common U.S. modem configurations, but do support multiple simultaneous sessions. Aug 92

8 WhiteKnight 11 (11.14.0), The FreeSoft Company, 412/846-2700, $139. In the right hands, this product is the precision tool of communications software, but it does assume familiarity with telecommunications and with programming concepts.

** ORGANIZATION/PRODUCTIVITY

** ACT 1.0, Contact Software International, 214/919-9500, $395. While this contact manager has several laudable features, such as customizable contact views and an integrated word processor, learning how to use it is a frustrating experience. Feb 93

** Active Memory 2.0, ASD Software, 714/624-2594, $199. Personal organizer distinguishes itself by providing strong network support, although it may be overkill for a lone user. Aug 92

** Address Book Plus, PowerUp Software, 415/345-5900, $99.95. What you see is what you get with this field-based address-book software that sorts, selects, formats, and prints names and addresses in every conceivable way. The disadvantage is that the product is slow, especially with more than 200 addresses in a file.

** Agent DA 2.0 (2.1.1), TeamBuilding Technologies, 514/278-2010, $129. Simple, flexible calendar reminder program includes every obvious calendar function—easy navigation, extensive print options, adjustable displays, recurring events, and even a straightforward manual. Sep 92

** Amaze Daily Planners: Cathy, The Far Side, Word-A-Day (2.0) (1993), Amaze, 206/820-7007, $59.95. A cartoon (or word) a day makes scheduling more fun with these icon-based calendar/daily planners, but the graphics take up a lot of hard drive space, and the programs must be running in order for alarms to sound. Sep 92

** Connections 2.1, Concentrix Technology, 415/358-8600, $199. A wider range of scheduling features, new printing options, and improved networking capabilities don't change the fact that this HyperCard-based personal information manager is just too slow. Nov 92

** DateBook 1.5.1, After Hours Software, 818/780-2220, $125. Personal time manager offers a flexible approach to event scheduling and to-do-list management. This upgrade adds new features and fixes bugs that plagued the first version. Feb 93

** DayMaker 1.01 (2.0), Pastel Development Corp., 212/941-7500, $95.95. In spite of a few rough edges and missed opportunities, this personal organizer is a versatile tool for creating to-do lists, prioritizing tasks, and maintaining a calendar with alarms. Apr 92

** Dynodex, Portfolio Systems, 408/252-0420, $89.95. Raw speed is the trade-off for an unappealing screen display with this field-based address-book software. It's fast enough in seaching, opening, and saving to be a worthwhile investment.

** EasyAlarms 2.0.3, Essential Software, 914/889-8365, $99. Complex, flexible calendar, reminder, and to-do-list program includes scripting and sound recording among many other features. Nov 92

** First Things First 2.0 (3.0), Visionary Software, 503/246-6200, $69.95. The nifty on-screen clock that floats surreptitiously above your windows is the most appealing feature of this good but basic event-reminder utility. Apr 92

** Hello, Atelier Systems, 415/285-1233, $99. Unusual combination of contact management and word processing in a compact package. This first release is hampered by several notable flaws, such as test documents that must be linked to a contact name. Jan 93

** In Control 5.0 (1.1), Attain Corp., 617/776-1110, $129.95. Shrink an immense list down to a bare skeleton and expand it again using this to-do-list manager's clean interface and collapsible row-and-column format. May 92

** Nolo's Personal RecordKeeper 3.0, Nolo Press, 510/549-1976, $34.96. Hierarchically configured database organizes your personal affairs, including legal matters, financial records, insurance plans, family history, and more, but it is frustratingly inflexible. Jan 93

** Now Up-To-Date 1.0.1, Now Software, 503/274-2800, $99. The swift performance and logical structure of this network calendar program make it easy to use, but deficiencies, such as the lack of a to-do-list function, are frustrating. Oct 92

** PowerTrax 1.1 (1.2), Soft Solutions, 404/457-9400, $495. Consolided and repetitive data entry processes slow you down when they should speed you up in this indirect-information-management system. Apr 92

** TouchBase 2.0 (2.0.1), After Hours Software, 818/780-2220, $125. Entering data is quick and easy, and there are lots of useful printing options, but this personal information manager displays a few rough edges, such as not allowing you to copy the information in the Record Summary field. Aug 92

** Star Ratings

** PRESENTATION GRAPHICS

** Action 1.0, Macromedia, 415/252-2000, $495. Entry-level multimedia integration program offers, for its price, a rich selection of features, including an excellent variety of transitions as well as gradient and patterned backgrounds. It makes producing presentations with sound and motion surprisingly easy. Feb 93

** Aldus Persuasion 2.1 (2.12), Aldus Corp., 206/622-5500, $495. For slide presentations, this product provides an all-in-one studio where each element—outline entries, slides, notes, handouts, and charts—is dynamically linked to the others. It offers layered builds and automated templates, and has a proven track record.

** DeltaGraph Professional 2.0.1 (2.1), DeltaPoint, 408/648-4000, $295. A smooth interface and outstanding technical support are only two of the stellar features in this graphing and charting program. This upgrade adds a few chart types and a number of presentation capabilities. May 92

** FlowChart Express 1.0, Kaetron Software Corp., 713/890-3434, $149. Inexpensive, easy-to-use flowchart software readily meets the needs of most flowchart creators, although those with extensive requirements will still need a larger, more powerful feature set. Jan 93

** GraphMaster 1.31a (1.33), Visual Business Systems, 404/956-0325, $295. Excellent general-purpose charting and graphing program offers a number of unusual features, including pickpaths and 360-degree free rotation. A frequent inability to undo actions is the only serious irritation. May 92

** Microsoft PowerPoint 3.0, Microsoft, 206/882-8080, $495. This remarkable upgrade puts this presentation program ahead of the pack in terms of convenience and ease of use. Although the ready-made template collection is pretty paltry, the extensive system of master layers, reliable cross-platform compatibility, and strong on-screen presentation capabilities more than compensate. Feb 93

** PEmO Discovery 3.1.1, PEMO Education Group, 707/894-3668, $189. Unsupervised data-seach and retrieval routines, limited displays, and a weak manual restrict this graphical data-analysis software's usefulness. Apr 92

** SigmaPlot for the Macintosh 4.11, Jandel Scientific, 415/924-8640, $495. It's a short path from raw data to publishable graphics with this scientific graphing software. The Mac fundamentals need polish, but the program offers unique analytic capabilities. Jul 92

** PROGRAMMING

** EdScheme 3.4, Schemers, 305/776-7376, $49.95. This clear, elegant programming language is an excellent tool for learning good programming techniques, although it can't be used to create stand-alone applications. Nov 92

** Object Master 1.0.2, ACIUS, 408/252-4444, $395. Successful combination of the superior object-management facilities typically found in Smalltalk as well as a first-rate programmer's editor. Plus it works with the most popular languages: C, C++, and Pascal. Jan 93

** Prograph 2.5, TGS Systems, 902/455-4446, $495. Elegantly designed, object-oriented development environment simplifies Macintosh programming. The
graphic-based program is conceptually more advanced than traditional object-oriented programming. Jun 92

- **Serious Programmer 3.0, Serious Corp., 801/261-7900, $395.** The graphical interface of this application-design environment provides nonprogrammers with tools for creating custom software, but the documentation lacks critical explanations. Jan 93

- **Think C 5.0, Symantec Corp., 408/253-9600, $299.** Although not a radical improvement, this is a significant upgrade to an outstanding development tool. Beginners won't find the documentation helpful. Jul 92

- **Think Pascal 4.0, Symantec Corp., 408/252-3570, $249.** A remarkable achievement—a programming language and environment full-bodied enough for professional programmers while still inviting for neophytes. No weak points and dozens of strengths. Aug 92

- **UserLand Frontier 1.0 (2.0), UserLand Software, 415/369-6600, $249.** A robust scripting language distinguishes this ground-breaking desktop programming tool that can automate desktop functions, reflect data-management tasks, and more. Scripts can only be used on computers with copies of the program. Jul 92

**SCIENCE/ENGINEERING**

- **Caduceus Physics 1.0, Scientia, 617/776-3427, $159.95.** Giant HyperCard stack consists of carefully indexed cards covering small conceptual bits of physics; it's the first in a series of programs designed to prepare students for the Medical College Admissions Test (MCAT). Jan 93

- **Entrapq 3.0, Alatham Software, 415/824-2737, $149.95.** Low-end expert-systems shell is an excellent teaching tool, but the slow performance and HyperCard interface rule it out for practical implementation. Nov 92

- **Expert Astronomer 1.0, Expert Software, 305/444-0080, $49.95.** Draws maps of the sky from any location in the Solar System and learn about celestial objects with this astronomy software. Most effective in color, this is a great educational tool for beginners and a reference database for experts. Dec 92

- **Interactive Physics II 1.0 (1.01), Knowledge Revolution, 415/553-8153, $399.** Motion simulation software is an improvement over traditional classroom instruction in physics. This new version greatly expands the range of problems that can be solved, and adds support for QuickTime. Dec 92

- **MacBreadboard 1.1, Yercil Software, 919/644-1620, $59.95.** Useful educational software simulates with excruciating detail every aspect of a digital integrated-circuit breadboard trainer. It accurately replicates and even surpasses the behavior of a physical breadboard—without burning out IC chips. Dec 92

- **NueX 1.1 (1.3), Charles River Analytics, 617/491-3474, $295.** Lightweight introduction to artificial neural networks and knowledge-based expert systems has some merit, but cannot be considered a serious production tool. Oct 92

- **Sequencer 2.0, Gene Codes Corp., 313/769-7220, $2200.** While not implementing everything a DNA researcher could want, this software for manipulating DNA-sequence information does provide the things a researcher really needs. The single best feature is its raw speed. Dec 92

**UTILITIES**

- **After Dark 2.0, Berkeley Systems, 510/540-5536, $495.** Turn your screen into an aquarium or a window into a night skyline with this whimsical screen saver that includes more than 30 different modules.

- **ALSoft Power Utilities 1.0 (1.0.2), ALSoft, 713/833-4080, $129.95.** Buying this set of seven utilities is more economical than purchasing the included disk optimizer and resource manager (DiskExpress II and MasterLugger) separately; but the other five utilities are unimpressive. Aug 92

- **AutoDoubler 1.0 (2.0), Salient Software, 415/321-5375, $75.95.** Designed to operate transparently, this automatic file-compression utility is a practical solution for users short on disk space, but it's missing many of the features of dedicated file-compression utilities, and it provides only limited control over the process. Sep 92

- **BetterWriters 1.0 (1.0.3), GDT Softworks, 604/291-9121, $69.** Smart drivers teach your ImageWriter, StyleWriter, or DeskWriter laser printer tricks, letting it perform printing gymnastics such as inverting images and adding a variety of options for improving output. Minor incompatibilities with some common applications are inconvenient. Jul 92

- **CableShield 1.0, Cable TV, 415/849-1277, $149.95.** Simple, convenient set of system-security tools covers all the bases, including password protection, encryption, permanent erase, and more. Jan 93

- **Crash Barrier 1.0 (1.1), Cassidy & Greene, 408/484-9228, $79.95.** Control panel device is supposed to intervene during system crashes. It's a great idea but it only works for certain types of crashes. Apr 92

- **DiskDoubler 3.7 (3.75), Salient Software, 415/321-5375, $79.95.** With its impressive safety features, extremely tight compression, and respectable speed, this file-compression utility is a must-have for anyone who could use more hard drive space. Dec 93

- **DiskFit Pro 1.0 (1.1), Dantz Development Corp., 510/849-0293, $125.** Effective backup utility requires a time- and disk-consuming initial full backup, but subsequent incremental backups are simple and speedy. It does not support tape drives. Apr 92

- **Drive 7.2.3, Casa Blanca Works, 415/461-2227, $129.95.** Universal hard drive updater and formatter has an attractive, undultered interface that's so convenient and easy to use it makes hard drive maintenance almost relaxing. Jan 93

- **easyPrint 1.0, SF/O, 402/291-0113, $29.95.** Nifty utility lets you switch printers without using the Chooser. It's a bargain for network users and those who frequently change output devices. Oct 92

- **Exposure Pro 1.0 (1.02), Baseline Publishing, 501/682-9676, $139.95.** A floating palette in this screen-capture utility lets you edit your screen shots before you save them. It's a clever idea for those who don't own a paint program, but it only creates 72-dpi bitmaps. Sep 92

- **Fastback Plus 2.6 (3.0), Fifth Generation Systems, 504/291-7221, $189.** Even the most hardened shirker should be inspired to back up by the marvellously simple interface of this software. One warning—memory shortages can cause it to quit unexpectedly when running in the background. Apr 92

- **FolderBolt 1.0 (1.02), Kent Marsh, 713/522-5625, $129.95.** Three designated levels of folder protection, plus flexible options for password-handling among other actions, are the assets of this utility. File encryption, however, is not included. Jul 92

- **Gofer 2.0, Microlotics, 716/248-9150, $79.95.** Fooling around time is the trade-off for flexible text-search options without indexing by this file-finding utility. Our reviewer revised the trade. Jun 92

- **HAM 1.0, Microsends Publishing, 203/425-4995, $79.95.** Apple-menu enhancer adds submenus; allows reordering; and includes a folder of recently opened items in your Apple menu. Apr 92

- **Hard Disk Toolkit Personal Edition 1.1.2, FSB Software, 415/474-8055, $79.95.** The more arcane features of the heavy-duty Hard Disk Toolkit have been stripped out of this entry-level, non-power-user version, but everything you really need to format, update, patch, and manage your hard drive is still included. Jan 93

- **Kiwi Power Menus 1.0, Kiwi Software, 805/685-4031, $39.95.** Simple little utility adds flexibility to the Apple menu by adding an unlimited number of submenus and allowing you to change the font and size in the menus. Dec 92

- **Kiwi Power Windows 1.5 (1.5.2), Kiwi Software, 805/685-4031, $79.95.** Our skeptical reviewer found this system extension surprisingly handy. Its hierarchical menu lets all the open windows in the Finder and any applications. Jul 92

- **MacPalette II 2.2, Microsoft USA, 408/253-2000, $69. You can print images from 8-bit and 24-bit color programs when you use an ImageWriter II with a four-color ribbon and this new driver that approximates halftones by dithering. While the results are not less than state-of-the-art, so is the cost. Sep 92

- **MacTools 2.0, Central Point Software, 503/690-B090, $149.** The consistent, 3-D-style interface makes it easy for the inexperienced user to navigate this utility package, the automated hard drive and floppy disk repair capabilities and antivirus capabilities make it an asset for anyone. Oct 92

- **Magnet 1.0, No Hands Software, 415/321-7340, $129.95.** Automation aids the laborious task of file management with this software. It creates "agents" or "magnets" that trigger in response to user-specified events and automatically look for files and folders to copy, move, or alias. Feb 93

- **MasterFinder 1.2.1, Olduvai Corp., 505/670-1112, $149.** Ingenious finder utility provides rapid access to frequently used files and folders, permits operations on several files at once, and saves catalogs of offline volumes, but the many features require some effort to learn. Nov 92

- **More Disk Space 1.1 (1.2), Alysia Software Corp., 415/566-2263, $39.95.** Automatically compress and expand files with this utility. Although it doesn't identify compressed files, and must run as a start-up application to work automatically, it does offer a measure of control that similar utilities lack. Sep 92

- **NightWatch II 2.0.1b, Kent Marsh, 713/522-5625, $159.95.** Although skilful snips can override the screen-locker feature of this hard disk security utility, the password protection provides a flexible and safe method of restricting access to anyone turning on your hard drive. Nov 92
Nok Nok 1.0 (1.0.3), Trik, 617/933-8810, $49.95. Plug the security holes that System 7 file sharing created, with this effective file-share monitoring utility that logs people's attempts to connect to your Mac; alerts you when someone does connect, and sets time limits for file-share users. Oct 92
Norton Utilities 3.0.2 (4.0.1), Now Software, 503/274-2800, $149. Despite minor imperfections, this collection of utilities, including ten separate programs and a variety of sample and support files, provides lots of highly polished bang for your buck. Oct 92
On Location 3.0.1, On Technology, 617/876-0800, $129.95. Fast file-finding utility with improved functionality shows formatted files, and updates index in background. Alas, the initial indexing is time-consuming, and the search functions are incomplete. Jun 92
Retrieve It 1.0, MVP Software, 415/599-2704, $129. It's great that this nonindexed file-finding utility allows you to search by file name as well as by text, but it is definitely slower than indexed searching. Nov 92
Shredder 1.0.1, DLM Software, 619/426-2454, $149. Exchange pull-down menus for palettes in PageMaker or FreeHand with these cleverly conceived, modular replacements. Oct 92
Silverlining 5.4, La Cie, 800/599-3919, $149. Extensive and detailed testing is only one of many advanced functions offered by this hard drive–maintenance utility. The interface is labyrinthine and apt to confuse beginners. Jan 93
Snapback 1.0, Golden Triangle Computers, 619/279-2100, $129. For regular day-to-day backups, this network-backup software is a great choice. Its strength lies in its simplicity and its easy-to-use, one-window interface, but it requires a dedicated hard drive. Dec 92
SuperDuper 1.7, NeoConcepts, 408/899-4821, $79. If you're sick of duplicating disks with the Finder, this utility is an acceptable alternative, but there are other utilities that are better, cheaper, and do the same thing. Nov 92
Symantec AntiVirus for the Mac (SAM) (3.0.3), Symantec, 408/232-9600, $99. No-holds-barred virus-fighter monitors your Mac and alerts you when it sees suspicious activity. Advanced users and network managers will appreciate its customization features and extensive scanning options. Nov 92
TimeLog 1.01 (1.02), Coral Research, 702/588-9690, $97. Even jaded computer users will approve of the reporting options offered by this utility for recording program–usage information. No network features included. Jul 92
Voice Navigator SW 2.3, articulat3 Systems, 617/935-6556, $399. Talk back to your Mac (if it has built-in sound input) with this speech-recognition software. Defining macros that respond to voice commands can be frustrating, but the product is a real boon for disabled users. Jan 93
Wallpaper 1.0.1 (1.0.2), Thought I Could, 212/673-9724, $59.99. Terrific control-panel device lets you design, edit, import, and display repeating patterns on your Mac's desktop. Comes with fun, creative predesigned patterns. May 92
WatchDog 1.32 (1.53), ASD Software, 714/624-2594, $149. If your main concern is to track program and file use, this utility will handle the job nicely. Using it for time billing with numerous programs, however, may be a maintenance nightmare. Jul 92
WonderPrint 1.0, Delta Tao Software, 408/730-9336, $59. StyleWriters and DeskWriters produce halftones good enough for newsletters with this printing extension that improves the output of QuickDraw printers and accelerates printing of PostScript printers. Jan 93
Workspace 1.0, Ark Interface, 206/654-4127, $149. Although this novel desktop replacement is an intriguing first step toward improving the Finder, not enough functionality was added to satisfy our reviewer. Jul 92
Zephyr Palettes for PageMaker, FreeHand 1.0.2, Zephyr Design, 206/324-0292, $79.95. Exchange pull-down menus for palettes in PageMaker or FreeHand with these cleverly conceived, modestly priced utilities. A number of details could still be smoothed, but none are real stumbling blocks. Jul 92

VERTICAL MARKETS

ConstructionMac 1.2 (2.0), Rovular Software, 801/485-3291, $99. With a lot of work from you, this software will organize your construction or remodeling project. Oct 92
Desk 1.0, The Desktop Lawyer, The Open University, 407/649-8488, $99.95. The manual included with this collection of more than 300 legal-document templates provides an excellent overview of legal concepts; too bad the directions for filling out the forms are so unclear. Apr 92
Diet Balancer 1.0, Nutridata Software Corp., 914/298-1308, $69.95. Easy-to-use personalized weight-tracking program includes a database of nutritional values and standard serving sizes, and is useful for home diet-tracking. Dec 92
Grade Machine 5.0, Misty City Software, 206/828-3107, $79. Teachers' lives get easier with this software that quickly sets up a useful electronic grade book. Program includes networking capabilities plus dozens of options for printing reports. Dec 92
JobTracker 2.03, InfoSolutions, 814/355-2983, $985 to $844. Designed specifically for publication management, this scheduling and project-management software isn't completely polished, but it manages the job competently. Dec 92
Legal LetterWorks 1.0, Round Lake Publishing, 203/438-1048, $95.99. Any word processor can open the 165 legal-document templates included in this collection, and the modular form design is relatively versatile. Apr 92
Making the Grade 2.0, Jay Klein Productions, 719/591-8151, $99.95. The Macintosh version of the Apple II program, Grade Busters 1/2/3, this grade-book software with dozens of reporting options is easy to learn, but if you're already spreadsheet-illiterate, the friendly dialog boxes and reminders may get in the way. Dec 92
Nolo's Living Trust 1.0, Nolo Press, 510/549-1976, $79.95. Gracefully guiding users through the process of drafting a trust, this product is carefully thought out and a great value for simple trusts. Aug 92
Nutri-Calc Plus 1.2, Camdeo Corp., 602/926-2632, $225. Designed for knowledgeable and serious users, this powerful, flexible program manages nutrition information and analyzes diets. Dec 92
Stat-Ref 3.2a, Teton Data Systems, 307/733-9258, $595. Medical database on CD ROM lets you search by keyword. Because it provides access to limited sets of journal citations, it's not suitable for research, but it could effectively replace a small reference library in an office. Jan 93

WORD PROCESSORS

LetterPerfect for Macintosh 2.1, WordPerfect Corp., 801/225-5000, $149. Stripped-down version of WordPerfect measures up as a serviceable low-end word processor, with clean, accurate documentation and an uncluttered interface. Jan 93
Microsoft Word 5.0, Microsoft, 206/882-8080, $495. New features, including drag-and-drop editing, along with an enhanced set of familiar features, add up to a word processor that is kinder and gentler—as well as bigger and slower. Apr 92
Nisus Compact 3.3 (3.31), Nisus Software, 6/418-1477, $150. Inexpensive price and low disk-space requirements don't compensate for this word processor's many missing features, including mail merge, macros, and word count. Memory quirks are an additional problem. Aug 92
Taste 1.02 (1.02c), DeltaPoint, 408/648-4000, $149. The page-view, WYSIWYG orientation of this word processor with page-layout features makes it considerably slower than text-oriented word processors. Redraw and translator bugs are other problems. May 92
WordPerfect for Macintosh 2.1 (2.1.2), WordPerfect Corp., 801/225-5000, $495. Play QuickTime movies in your text files or publish and subscribe with this upgrade. It continues to provide the best desktop publishing and graphics capabilities of any word processor, but it lacks glossary- and table-creation features. Jun 92
WriteNow 3.0, T/Maker Company, 415/713-0195, $249. The streamlined approach of this low-end word processor will appeal to many Macintosh users, especially the storage-conscious. A nice mix of features includes impressive implementation of style sheets. Sep 92

WRITING TOOLS

Correct Grammar 3.0 (3.01), Wordstar International, 415/382-8000, $99. Logical and inappropriate recommendations are a hallmark of all grammar checkers, but this one also violates Mac conventions in irritating ways. Aug 92
Correct Letters 1.1 (1.0), Wordstar International, 415/382-8000, $49. In addition to more than 250 ready-made business letters, this HyperCard-based product boasts an excellent online Guide to Letter Writing. The disabled Find command is mystifying.
Correct Writing 2.0, Wordstar International, 415/783-8000, $49. For those who are unsure of the elements of style, this online reference is convenient and comparatively inexpensive, but it is far from complete.

DocuComp II 1.0 (1.03), Advanced Software, 408/733-0745, $179.95. Document-management utility compares text in two versions of the same file and reports the differences in a comprehensive, easy-to-follow format.

EndNote Plus 1.2 (1.2.1), Niles and Associates, 510/649-8176, $249. Reference database and tool for creating citations and bibliographies is now accessible from within Microsoft Word 5.0, representing a significant enhancement to this excellent product.

Plots Unlimited 1.04, Ashleywilde, 310/456-1277, $399. Peter loves Allison but she has a breakdown when he confesses to murder. Or maybe not. This writing tool's database contains 5600 plot twists, all linked. The interface is imperfect, leaving items in bold when they should be grayed out, and it requires too much mousing.

Pro-Cite 2.0, Personal Bibliographic Software, 313/996-1580, $595. Valuable bibliographic database program generates large, complex bibliographies. Some features aren't easy to use, but it does have 20 predefined and 6 user-defined forms, plus flexible sorting options.

StoryLine 1.02 (1.4), Truby's Writers Studio, 310/575-3050, $345. Fratulently and sometimes haphazard HyperCard-based program attempts to offer expert training in the craft of plot development. Aug 92

Thunder 1 0.5 (1.5), Baseline Publishing, 501/682-9676, $99.95. The speed, customizing options, and overall feature-set of this stand-alone spelling checker and thesaurus are admirable, but before you can trust it implicitly, it needs a dictionary with greater integrity.

A3 Mouse, Mouse Systems Corp., 510/656-1117, $134.95. A smooth ride and tight resolution characterize this optical device with three light-touch keys. Stornger software would have made it a more attractive package; the software's incompatibilities and limitations are a problem.

AccelGrap for Macintosh, AccoCAD, 408/655-1900, $149. It's the hands-down winner in the digitizing-tablet price competition, but although this product works well, it lacks some of the amenities of higher-end tablets.

DrawBoard II, Drawing Pad, CalComp, 800/932-1212, $645, $395. Two likeable features of these digitizing tablets are the transparent, hinged cover for securing artwork, and a menu strip with buttons for changing drawing modes and accessing menus. Stylist problems and CalComp's haphazard tech support are drawbacks.

Mouse-Trak, ITC Systems, 214/494-3073, $179. Well-positioned, easy-torotate trackball with a soft wrist-pad is comfortable to use, but must be disassembled to reconfigure the buttons.

MouseMan, Logitech, 510/795-8500, $129. Bear-paw-shape mouse with three programmable buttons is handsome and solidly made. It may be too big for some hands. Jun 92

The Bat, Infogrip, 504/766-8082, $495. Right and left-hand keypads start the little fingers down and the thumbs up, with built-in wrist rests. Our reviewer considered it the best ergonomic device she's seen; the downside is learning to type all over again. Oct 92

TrackMan, Logitech, 510/795-8500, $149. There's a right-hand bias to this trackball with three programmable buttons and a handy dick-lock feature.

Turbo Mouse 4.0, Kensington MicroSolutions, 415/572-2700, $169.95. The large buttons on either side of this trackball provide just the right measure of tactile feedback while the removable ball glides freely. The breakthrough feature, though, is the software that allows you to customize many of the trackball's functions.

Voice Express, MacSema, 503/757-1520, $399. Voice-recognition board lets you record words or phrases that trigger simple key sequences, but commands are limited to those with keyboard equivalents, and the system is weighed down by several quirky features.

Voice Navigator 2, Articulate Systems, 617/935-5656, $699. Stand-alone SCSI device offers an impressive full-featured set of tools for voice control of your Mac, but mastering them takes time and effort.

Z-Nix Cordless SuperMouse, Z-Nix, 714/629-8050, $99. Sleek and attractive cordless mouse works reliably and is attractively priced, but suffers from the same line-of-sight limitations as other infrared devices (such as TV remote controls).

ACS300 Computer Speaker System, Altex Lansing Consumer Products, 717/396-4434, $408. Glamor-shellhigh/midrange speakers come with a freestanding subwoofer and power supply. The sound is rich and smooth, but the cabling is nonstandard, and there is no on/off switch.

Bose RoomMate speakers, Bose Corp., 508/879-7330, $329. Shielded stereo speakers with a rich, bassy sound can double as regular stereo speakers. Unfortunately, they're heavy, expensive, and the highs are muddy.

MacSpeaker/M-1, Monster Cable, 415/871-6000, $229.95. Crystal-clear highs and a meaty midrange are the best features of these shielded stereo speakers. They're beautifully designed for close-up listening, but the bass sounds wimpy.

Media Control Station, JLCooper Electronics, 310/306-4131, $269.95. This versatile tool connects to the Mac through an AOB port and offers an easy and intuitive way to cue and edit QuickTime movies, MIDI files, multimedia playlists, and other dynamic data.

The Miracle Piano Teaching System 1.0, SoftwareToolswork, 415/883-3000, $499.95. Painstakingly crafted music and piano instructor comes with keyboard, software, and 120 songs, including classical, movie-theme, and rock. The program offers encouragement and advice, and ends every lesson with a synthesized orchestra accompaniment.

The Mouse Yoke, Colorado Spectrum, 303/225-6929, $34.95. Gadget turns an ordinary mechanical mouse into an aircraft-style steering wheel, or yoke, for use with flight simulators. Simple, elegantly executed concept uses quality materials, but isn't appropriate for driving or shooting games.

Organizer Link II (Model 02-893), Sharp Corp., 800/321-8877, $129.95. If you own a 5000-, 7000-, or 8000-series Sharp Wizard, this program and cable allow you to connect it to a Mac serial port to exchange data. It's functional, but does have some minor weaknesses.

Outbound Notebook System 20305, Outbound Systems, 303/866-9200, 440/6779, 8/00 $3299, 14/120 $3999. If raw power is what you're looking for in a notebook computer, this is the hands-down choice. It's lightweight, upgradable, and performs at a level between a Rial and a HX, but the screen is only adequate.

PowerKey 2.0, Sophisticated Circuits, 206/485-7979, $215. Ingenious, well-designed automated power supply has four surge-protected outlets that are controlled by the keyboard's on/off switch. The equally clever software can turn on your Mac, unattended, run a Quickcies macro (Quickcies Lile included), and shut down again.

Ringo LM, MacSema, 503/757-1520, $189.95. If your sole phone-line is doing double duty as a fax and voice line, this telephone-line manager device is the answer to your prayers.

A2 Mouse, Mouse Systems Corp., 510/656-1117, $134.95. A smooth ride and tight resolution characterize this optical device with three light-touch keys. Stronger software would have made it a more attractive package; the software's incompatibilities and limitations are a problem.

PowerModem, PSI Integration, 408/559-8544, $499. An otherwise solid fax/data modem for network use is hurt by an awkward process for distributing faxes, plus the need for a separate file server and fax server.

EtherPrint, Dayna Communications, 801/351-0600, $499. It's possible to connect a single LocalTalk printer to an Ethernet network using this device, but it's an expensive option.

EtherPrint Plus, Dayna Communications, 801/351-0600, $649. Support four LocalTalk products on an Ethernet network using this device that can also serve as an inexpensive AppleTalk router.

EtherWrite, Compatible Systems Corp., 303/444-9532, $695. Elegant and cost-effective device with excellent network-management software allows up to six LocalTalk products to connect to an Ethernet network. Dec 92

PathFinder, Dayna Communications, 801/351-0600, $899. For simple networks, this LocalTalk-to-Ethernet router is a great value, as well as a great timesaver for beginning network managers. It uses AppleTalk only.

PowerModem, PSI Integration, 408/
Some people put the homeless out of their minds. Christine Vigil put them on-line.

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MACWORLD

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Model Average Actual MAC Internal External Capacity Access Capacity
Go Drives 2.5" Low Profile for PowerBooks
80mb GO80 9ms 80mb  $329 $429
120mb GO120 9ms 120mb  $459 $559
ELS Drives 3.5" Low Profile & Low Power
42mb ELS42 9ms 40mb  $185 $245
65mb ELS65 17ms 65mb  $249 $309
127mb ELS127 17ms 127mb  $329 $389
170mb ELS170 17ms 170mb  $359 $419
LPS Drives 3.5" Low Profile & High Performance
240mb LPS240 6ms 240mb  $549 $609
525mb LPS525 10ms 525mb  $1089 $1149
PRO Drives 3.5" High Capacity & Performance
425mb PRO425 10ms 425mb  $699 $699
700mb PRO700 10ms 700mb  $1279 $1239
1.0GIG PRO1050 10ms 1.0GIG  $1659 $1629
1.2GIG PRO1225 10ms 1.2GIG  $1749 $1609
ELS LPR, and PRO drives have a TWO Year Warranty. GoDrive have a ONE Year Warranty.

Model Description AC1ual MAC Capacity Internal External
425mb M2623SA 3.5' Half Height 9ms 405mb  $899 $1029
520mb M2624SA 3.5' Half Height 9ms 496mb  $1029 $1095
1.2GIG M2266 5.25' Full Height 14ms 629mb  $1589 $1689
2.0GIG M5553 5.25' Full Height 14.5ms 1635mb  $2585 $2685

Model Capacity Internal External
C0• M2623SA 3.5' Half Height 9ms 405mb $899 $1029
1.2GIG M2624SA 3.5' Half Height 9ms 496mb $1029 $1095
Model Description AC1ual MAC Capacity Internal External
645mb ST4767N 5.25' Full Height 9ms 644mb $1529 $1629
1.2GIG ST41200N 5.25' Full Height 15ms 989mb $1579 $1679
1.6GIG ST41651N 5.25' Full Height 15ms 1350mb $1919 $2019
2.1GIG ST42100N 5.25' Full Height 12ms 1900mb $2149 $2249
1.6GIG ST41600N 5.25' Full Height 15ms 997mb $2089 $2189
2.4GIG ST42400N 5.25' Full Height 12ms 2050mb $2969 $3069
3.4GIG ST43400N 5.25' Full Height 12ms 2750mb $4149 $4249
Seagate Drives include a ONE Year Warranty.

Model Capacity Description Internal External
155mb Teac MT2ST/N50 Analog  CT500N $459 $489
600mb Teac MT2ST/F50 Analog  CT600F $699 $699
2.0GIG ARDAT DAT, DDS 4mm $1219 $1249
2.0GIG WangDAT 1300XL DAT, DDS 4mm $1299 $1329
3.0GIG WangDAT 3200 DAT, DDS-DC 4mm $1549 $1549
3.0GIG HP 35480A DAT, DDS-DC 4mm $1539 $1569
2.2GIG Exabyte EBX-2000 Digital/Helical 8mm $1949
5.0GIG Exabyte EBX-6500 Digital/Helical 8mm $2999

Maxtor Price Point and Performance

Model Capacity Actual MAC Capacity Internal External
120mb 7120XT 3.5' Low Profile 15ms 121mb $315 $375
207mb 7213 3.5' Low Profile 15ms 200mb $475 $535
330mb LXT-340 3.5' Half Height 15ms 324mb $675 $735
535mb LXT-535 3.5' Low Profile 12ms 510mb $999 $1059
645mb XT-8750 5.25' Full Height 16.5ms 638mb $1229 $1329
1.2GIG PO-12S 5.25' Full Height 13ms 997mb $1519 $1619
1.7GIG PO-11S 5.25' Full Height 13ms 1435mb $1759 $1859

TAPE BACKUP Systems Bundled with RetroSpect v.1.3c Backup Software

Model Capacity Media Internal External
Capacity Model Description Internal External
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600mb Teac MT2ST/F50 Analog  CT600F $699 $699
2.0GIG ARDAT DAT, DDS 4mm $1219 $1249
2.0GIG WangDAT 1300XL DAT, DDS 4mm $1299 $1329
3.0GIG WangDAT 3200 DAT, DDS-DC 4mm $1549 $1549
3.0GIG HP 35480A DAT, DDS-DC 4mm $1539 $1569
2.2GIG Exabyte EBX-2000 Digital/ Helical 8mm $1949
5.0GIG Exabyte EBX-6500 Digital/ Helical 8mm $2999
Includes RetroSpect v.1.3c Backup Software, One Tape and ONE Year Warranty.

All ClubMac Opticals include ONE cartridge and ONE Year Warranty.
Supra Modems

Supra Modems feature a 5-year warranty.

Supra Modems 2400: $429
Supra Modems 2400-Modem: $429
Supra Modems 33600: $429
Supra Modems 33840: $429
Supra Modems 33960: $429
Supra Modems 34800: $429

Ethernet

Ethernet cards include the following features:

- Fast Ethernet (10/100 Mbps) support
- Auto-Negotiation
- Auto-MDI/MDIX
- VLAN support
- Jumbo frame support
- IEEE 802.3u compatible

Modems

Modems are available in various models, including:

- XDSI (56K) modems
- V.90 modems
- ISDN modems

CosStar Printers

CosStar Printers offer the following features:

- CosStar Address Writer envelope and label printer
- CosStar Address Writer label printer
- CosStar Address Writer envelope and label printer (Plus)
- CosStar Address Writer envelope and label printer (Plus)

Tape Drives

Tape drives include the following models:

- QIC tape drives
- QIC tape drives (4mm)
- QIC tape drives (8mm)
- QIC tape drives (16mm)

Cost: $479

CosStar Address Writer envelope and label printer

Address Writer Printer

Address Writer Printer is a high-quality printer that supports Address Writer envelopes and labels.

Address Writer Printer features:

- Direct thermal printing
- High-speed printing
- Label feeding mechanism
- Automatic label feeding
- Easy-to-use software

Ethernet

Ethernet cards are available in different speeds:

- 10/100 Mbps Ethernet cards
- Gigabit Ethernet cards

Video Boards, Monitors and Packages

Video boards include a variety of models, such as:

- 20" Trinitron Monitor
- 20" Sampo Grayscale
- 14" Color Monitor

Supra Modems 2400-Modem: $429
Supra Modems 33600: $429
Supra Modems 33840: $429
Supra Modems 33960: $429
Supra Modems 34800: $429

Ethernet

Ethernet cards feature:

- Fast Ethernet (10/100 Mbps)
- Auto-Negotiation
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- Jumbo frame support
- IEEE 802.3u compatible

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- ISDN modems

CosStar Printers

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- CosStar Address Writer label printer
- CosStar Address Writer envelope and label printer (Plus)
- CosStar Address Writer envelope and label printer (Plus)

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- CosStar Address Writer label printer
- CosStar Address Writer envelope and label printer (Plus)
- CosStar Address Writer envelope and label printer (Plus)

Tape Drives

Tape drives consist of:

- QIC tape drives
- QIC tape drives (4mm)
- QIC tape drives (8mm)
- QIC tape drives (16mm)
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TWO INTERNAL HARD DRIVES

The MAX offers a second internal hard drive bay that allows installation of low profile and 3.5" half-height hard drives.

ENERGIZE YOUR LC

The MAX adds a supplemental 40-watt universal power supply, more than doubling the Mac LC's power capacity.

PLUG-AND-PLAY

Best of all, the MAX is a breeze to install - just unpack it and stack it. Assembly takes just seconds while the MAX snaps into place.

DGR's MAX SUPPORTS ALL APPLE-COMPATIBLE PDS EXPANSION CARDS, INCLUDING:

- Apple IIe Emulation Card
- Farallon
- Applied Engineering Fusion Data
- Asante Lapis
- Dayna
- Datatool SuperMac
- DayStar Digital Technology Works

$349

DGR's MAX INCLUDES:

- Supplemental 40-watt Power Supply
- Second Internal Hard Drive Bay
- 3-slot PDS Expansion

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Above all else, the MAX is an integrated solution designed to complement the aesthetic of Macintosh computing. Call DGR Technologies, and take your LC to the MAX.

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DGR Technologies, Inc.
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256MB $99

One Year Warranty
30-Day Money Back Guarantee

Circle 286 on reader service card
### Quantum

<table>
<thead>
<tr>
<th>Capacity</th>
<th>Price</th>
</tr>
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<tbody>
<tr>
<td>42MB</td>
<td>$199</td>
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<tr>
<td>85MB</td>
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### SyQuest

<table>
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<th>Capacity</th>
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<td>44MB</td>
<td>$379</td>
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<td>88MB</td>
<td>$449</td>
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#### Cartridges:
- **10 Pak-ea.:** $62
- **5 Pak-ea.:** $63
- **Singles:** $64

### MacLand

<table>
<thead>
<tr>
<th>Capacity</th>
<th>Price</th>
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<tr>
<td>42MB</td>
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<td>240MB</td>
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<tr>
<td>425MB</td>
<td>$999</td>
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All MacLand drives are pre-tested, pre-formatted, and come with our own installation and reference manual, DiskMaster Plus™ formatting utility software, cables, and two-year warranty. Internal hard drives also include bracket kits to fit your particular Mac.

All MacLand Removable Hard Drives come with our own installation and reference manual, DiskMaster Plus™ formatting utility software, cables, and a one-year warranty. Cartridge not included.

### Videos

<table>
<thead>
<tr>
<th>Software</th>
<th>Price</th>
</tr>
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<tbody>
<tr>
<td>$39 each</td>
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</table>

### MacAcademy

<table>
<thead>
<tr>
<th>Software</th>
<th>Price</th>
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<tr>
<td>4th Dimension Accountant Inc. Canvas 3.0 ClarisWorks Design &amp; Layout Delphi &amp; Sense Excel 3.0 Excel 4.0 FileMaker Pro 1.0 FileMaker Pro 2.0 Font Management FreesEye 3.1 Hyperscan 2.0 Illustrator 3.2 Lotus 1-2-3 MacDrawPro 1.0 MacPrint II 2.5 MacWrite II Macintosh 6.0 Macintosh 7.0 MacroMind Director Microsoft Works Networking Small PageMaker 4.2 Paints &amp; Draws Persuasion 2.0 Photoshop 2.0 PowerPoint 2.0 QuarkXPress 3.1 Quicken 3.0 Resolve SuperPaint 3.0 System 7 Utilities, CDEVS &amp; Inits Wingz 1.1 Word 5.0 WordPerfect</td>
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T/Maker

5308 WriteNow Workshop Bundle ........................................ $139.
5309 WriteNow Workshop Bundle Competitive Upgrade ...... $99.

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**Modems ordered before 1/1/93 will receive a free OCR software upgrade with registration. After that date, OCR is included with your modem.

PSI

5339 PowerModem IV, 14.4, V.32bis .................. $438.
5454 PowerModem III, 9600/V.32 .................. $329.
5455 PowerModem II, 9600/V.42bis .................. $248.

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5310 PowerBook 140/170 DRAM 6MB (pictured) .................. $279.

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  *No Hands Software
  4860 Magnet ............... $78.

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  DayMaker 2.0 is faster and filled with new features. A Recurring Events function schedules upcoming events with more flexibility. The "To Do" view organizes "to do" items. Reports can be previewed before printing and will be sharper with integrated DYN oPAGE. Network version capabilities include easy set-up, multiple access levels, and easy administration.

  *Pastel Development
  5261 DayMaker 2.0 ......................................................... $82.
  5263 DayMaker 2.0 Network 5-Pack .......................... $318.

- **The industry’s smallest high-speed Ethernet connector.**
  The DaynaPORT SCSI/Link combines speed and compact size to create the ideal Ethernet connector for PowerBooks. It includes two SCSI ports, a SCSI ID switch, and a built-in terminator. Order before January 31, 1993, and you’ll get NetMounter, Dayna’s versatile utility for connecting to Novell NetWare, free. (A $99 value!)

  *Dayna Communications
  4295 DaynaPORT SCSI/Link Thick/Thin ........ $298.
  4296 DaynaPORT SCSI/Link 10BaseT ................ $298.
  4297 DaynaPORT SCSI/Link Thick/Thin/10BaseT .... $348.

- **“The best case I have seen.” — MacUser**
  That’s high praise! The Computer Traveler holds your PowerBook securely and expands with an exterior zipper to hold a portable printer. It has a two inch wide shoulder strap with non-skid pad, a comfy leather handgrip, and lots of pockets for diskettes and more. It’s waterproof, rugged, easy to clean, and guaranteed for five years.

  *Tenba
  5580 The Computer Traveler ........................................ $94.

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  *SuperMac
  5579 SuperView ........................................... $699.
  5599 SuperView w/purchase of SuperMatch 17” monitor .......... $499.*
  4167 SuperMatch 17” monitor ................................... $998.

- **This internal modem receives wake up calls.**
  The SupraFAXModem 144PB gives you 14,400 bps fax and data communications on a card that fits inside your PowerBook. You can even send and receive faxes when your PowerBook is turned off. Wake Up mode turns your PowerBook on when the modem receives a call and, when combined with the included fax software, can send scheduled faxes when rates are lowest.

  *Supra
  5575 SupraFAXModem 144PB ............... $298.

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  This kit includes everything you need to get started with QuickTime – the QuickTime INIT, Movie Player, Movie Converter, PICT Compressor, and a CD-ROM full of QuickTime movies you can integrate into your work. It also includes a how-to manual on using QuickTime.
  
  Apple Computer
  4608 QuickTime Starter Kit ........................................ $158.

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Apple Computer
5248 Apple Font Pack .............................................. $68.

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Apple Computer
4609 Macintosh PC Exchange ................... $69.

- **System 7.1**
  The latest System 7 version, System 7.1, installs easily with one click of the mouse. A new font folder for central installation and storage and World Script support for complex character sets such as Japanese are new features. System 7.1 also includes all the fixes now included in the System 7 Tune-Up extension. And for a limited time, you get At Ease free with System 7.1.

After Hours Software
5255 System 7.1/At Ease .............................. $98.
5485 System 7.1 Multipack (10-user) ....................... $388.

- **At Ease**
  Put your mind at ease. You choose which applications you’ll allow others to access and put them on the At Ease desktop. Then those applications open with a single click and the rest of your hard disk is protected by a password. The At Ease desktop has no trash can, so all your files are safe. It’s great for homes with computers and children.

Apple Computer
5247 At Ease ........................................ $49.

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  Get organized with this bundle at a fantastic price. DateBook is the ultimate personal time manager. It combines calendar, scheduling, alarms, and To-Do lists to keep track of all your daily activities. And TouchBASE keeps all of your personal contacts at your fingertips. Together they form a powerful personal information manager.

After Hours Software
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  New Snooper 2.0, the desktop diagnostic for the Macintosh, performs over 200 tests and benchmarks on all hardware and identifies any problems. This revolutionary software not only saves you time and money, it increases your awareness of what’s going on inside your Mac. And for a limited time, Snooper comes with Virex anti-viral software for the Mac, free.

MAXA Corporation
5376 Snooper 2.0 w/Virex ........................................ $128.
5377 Snooper 2.0 - NuBus Card w/Virex ...................... $178.

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  SuperPaint does it all. And at a special low price. It combines painting, drawing, and image enhancement in one powerful, easy-to-use graphics program. With 24-bit color, textures, gradients, and full color TIFF and EPS graphics support, SuperPaint is ideal for anything from the simplest business illustrations to sophisticated full-color art. A six time winner of Macworld’s “Readers Choice Award!”

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Specular
4818 Infini-D 2.0 ........................................... $648.
5570 BackBurner ........................................... $370.
5574 BackBurner 5 Pack Add-on ............. $928.

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Get instant access to hundreds of pixel-perfect photographs! Each image is in spectacular 24-bit color, and shot by top-notch professionals. You’re free to use PhotoDisc images in all your advertising, newsletters, and multimedia presentations because they’re all model-released and licensed.

5522 PhotoDisc Multimedia Sampler .................. $37.

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Now the same special effects you’ve seen in television and film presentations can be created on your Macintosh. VideoFusion lets you add magic to your QuickTime movies, video productions, and presentations. Using standard Mac terminology like "cut," "copy," and "paste," you can apply the latest special effects from VideoFusion’s library or create your own. Four stars from MacWEEK!

VideoFusion
5165 VideoFusion ........................................ $448.

Morph
Morphing is the popular new special effect you’ve seen in feature films, music videos, and television commercials. This breakthrough application allows you to smoothly transform two or more images into each other creating QuickTime movies, PICS animations, and still images. Morph is fast, easy to use, and requires no special skills.

5513 Morph .................................................. $95.

Typestry
This exciting new software creates dimensional text from PostScript Type 1 and TrueType fonts. Typestry uses RenderMan to transform simple words into extraordinary pictures. It accurately simulates metals, woods, or other types of surfaces which can be used to decorate text. Users can also move, rotate, scale, and extrude words.

5123 Typestry ........................................... $184.
4554 ShowPlace/MacRenderMan 1.1.1 CD-ROM .......... $318.

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Hot new Photoshop filters! Series 1 Photography Filters are software filters for Photoshop that emulate 35mm camera optical filters. Now you can generate optical effects other than the painterly effects of Aldus Gallery Effects. These filters are perfect for both the graphic artist and the photographer creating ads, brochures, advertising, and video presentations.

5161 Series 1 Photography Filters .................. $79.

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Simulate the tools and textures of natural media with Painter, the remarkable 24-bit color paint program. Create original art or apply natural media effects to other artwork, including scanned images. Used with the ArtZ 6” x 8” Tablet, the effects are astonishing. The latest from the premiere tablet maker, ArtZ’s stylus is cordless, batteryless, and detects 120 levels of pressure.

4694/5355 Painter 1.2 /ArtZ 6” x 8” Tablet ...................... $508.

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Create realistic natural-media effects on your Mac with Sketcher, the affordable yet revolutionary program for creating grayscale graphics and retouching images. Sketcher duplicates the effects of traditional tools and textures. Use dozens of brushes, pens, chalks, and even paper grains and image processing tools to apply your artist’s touch to the desktop.

5052 Sketcher 1.0 .............................................. $98.

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InterCon
5195 WorldLink ........................................... $26.

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These are the most reliable drives around. Preformatted with the included DP Formatter Plus, they’re ready to use right out of the box. And they come with three more free utilities: MacTools 2.0, StuffIt SpaceSaver, and Kaboom! SE. Each also includes manuals, cables, a two- or five-year warranty, and technical support from Mac’s Place.

DataPlace
5277 DP+ 42MB Quantum External Drive ........................................... $328.
5278 DP+ 85MB Quantum External Drive ........................................... $422.

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The first and only telecommunications program with true multitasking that offers completely invisible file transfers. With a scripting language of unprecedented power, full protocols and terminal emulation, you’ll agree that MacIntercomm defines the new standard in telecommunications. Includes a SmartDial feature for traveling users, and many more features.

Mercury Systems
5111 MacIntercomm .................................................. $78.

StuffIt Deluxe & StuffIt SpaceSaver

Only StuffIt Deluxe 3.0 can solve all your compression needs from archiving to transparent compression. StuffIt will save you time and money on file transfers over your modem or network. It’s the standard for all electronic services and the most efficient compression product available. Also includes StuffIt SpaceSaver. Unlike other compression products, StuffIt SpaceSaver increases disk space with lightning speed and without effort on your part. Direct it to work while your Mac is idle or when you request.

SpaceSaver is the least expensive, most productive, and easiest-to-use compression product.

Aladdin Systems
4971 StuffIt Deluxe ........................................... $68.
4969 StuffIt SpaceSaver ........................................... $38.

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Save your data with confidence. SONY brings you innovative products to protect your information. Diskettes, data cartridges, and magneto optical disks give you durability and reliability. Call Mac’s Place to learn more about all the SONY products to meet your needs.

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3090 3.5" HD 10-pack ........................................... $15.
3687 Data Grade 90M 2 GB DAT Tape ........................................... $22.
4474 MO Rewritable 650MB 5.25" ........................................... $138.

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If you use drives from different manufacturers, you need to format them all with the same utility. Disk Café is a complete storage formatting utility that works with nearly every drive available. So it can prevent compatibility problems including data loss. And its advanced diagnostic tools detect and repair disk defects.

Bering Industries, Inc.
5121 Disk Café .................................................. $45.
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**GamePad Mac**
Perfect for all Mac games. Use the thumb-operated pad as a mouse or "point-and-click" games. The keystroke option gives you directional control for "keyboard only" games. Or screw in a joystick for hand-held control. Setup is a breeze. Works on Macs from the SE to Quadra, including PowerBook.

Advanced Graphics
5172 GamePad Mac .......................... $34.

**Bernoulli MacTransportable 90 PRO**
Get all the storage reliability you'd expect from Bernoulli for 40 percent less! The new MacTransportable doesn't require an interface kit. Everything you need to get up and running is in the box including a 90MB cartridge. Ask about the NEW Bernoulli MacTransportable 150.

JOMEGA
5012 Bernoulli MacTransportable 90 PRO ............................... $499.  
5609 Bernoulli MacTransportable 150 ............................... Call.

**Lemmings**
Lemmings for the Mac has arrived! Now Mac owners can demonstrate their game playing smarts and test their sanity, saving mobs of imperiled green-haired rodents from certain doom. Lemmings for the Mac brings you 120 levels of original and intellectually challenging gameplay.

Paynoms
5459 ........................................... $35.

**TimesTwo**
TimesTwo actually makes your hard disk bigger rather than making your files smaller! A one-time installation converts your hard disk to twice its original size in minutes, leaving your data unchanged. It's completely compatible with all Mac software and works with all SCSI and erasable optical disks.

Golden Triangle
5233 TimesTwo ........................................... $99.

**M4 Tank Simulator**
You and your buddies go for a ride. Only it's WWII, it's a long way to Germany, and your ride is on an M4 Sherman tank. Full color, sound, and voice-commands give this authentic simulation a dramatic realism.

Deadly Games
5360 M4 Tank Simulator (w/headphones, color) ................................ $34.  
3695 Battle of Britain II (color) ...................................... $34.  
3894 Bomber 2 (w/headphones) ......................................... $31.

**Virex**
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DataWatch
5234 Virex 4.0 .............................................................. $62.  
5235 Virex 4.0 10 Pack .................................................. $428.

**Universal PowerCache Card**
Award-winning PowerCache is a 68030 CPU accelerator that offers speed increases from 200% for a 125 to 1,000% for a Mac Classic. Universal PDS design supports 14 Macs, leaves NuBus slots empty. Guaranteed 100% compatible running at full speed. Adapters required for most installations may be swapped with DayStar at no charge. Classic and SE users may purchase adapters that support monochrome monitores.

DayStar Digital
3744 PowerCache 50MHz w/FPU ................................ $1398.

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**Leader Technologies**
Power Merge
5010 PowerMerge .................................................. $70.

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  *Microsoftr*
  
  5567 Microsoft Word 5.1 ........................................... $294.
  5571 Microsoft Works 5.1 version Upgrade ..................... $124.

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  *Strategic Mapping Inc.*
  
  5458 Atlas Pro ................................................... $498.

- **CA-Cricket Graph III/CA-Cricket Draw III**
  With CA-Cricket Graph III, you can convert text or data into a complete, professional-looking graph in seconds. Choose from scatter, pie, area, and many other options. CA-Cricket Draw III is the object-oriented bezier drawing program for all ability levels. It includes Postscript support, full-featured text processing, and special text effects like rotation.

  *Computer Associates*
  
  5001 CA-Cricket Graph III ........................................ $128.
  4218 CA-Cricket Draw III .......................................... $168.

- **LapTrack for the Mac**
  Great for PowerBooks! Record time and expenses more easily than ever before — whether you’re in the office or in the field. Reports include time and expense sheets, budgeting, productivity analysis reports and graphs. Address book feature allows you easy access to each client.

  *Timeslips Corp.*
  
  5110 LapTrack .................................................... $52.
  4096 Timeslips III V.2.1 ....................................... $192.
  3312 Timeslips Accounting Link ................................. $49.

- **Microsoft Works**
  Get the tools you need to combine words, numbers, and graphics any way you want. With a word processor, database with reporting, spreadsheet with charting, drawing, and communications, Works is the best-selling integrated software for the Mac. And now it’s even better. Version 3.0 is faster, easier, better integrated, and runs on all Macs, including the PowerBook.

  *Microsoft*
  
  5068 Microsoft Works version 3.0 ................................ $159.
  5071 Microsoft Works version 3.0 Upgrade ...................... $79.

- **Act! For The Mac**
  This unique, integrated contact and calendar management solution handles your hectic schedule. Act! schedules calls, meetings, and to-do’s; generates a variety of written correspondence; and automatically remembers every detail about each contact and activity. If you’re using another planning or contact program, you can switch to Act! for only $99! Call for details about the Competitive Trade-up offer.

  *Contact Software*
  
  4970 Act! For Mac ................................................ $258.
  5592 Act! Competitive Trade-up ............................... $99.

- **Hayes for the Mac**
  HayesConnect—Network serial device sharing software allows any serial device to be shared over a network from a server. SmartCom II V.3.3 — the most reliable easy-to-use Mac communication software. Ask about the $40 manufacturer’s rebate offer!

  *Hayes Microcomputer Products*
  
  1628 SmartCom II V.3.3 ......................................... $83.
  4314 Hayes Connect .............................................. $74.

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**Monitors and Cards (cont.)**

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<td>Spectrum 24 PDQ+</td>
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**Drives**

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**Internal Drive Kit**

- Road Runner 80 meg for Powerbook: $369
- Fujitsu 425 MB 5 year warranty: $1200

**Printers**

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<td>$1995</td>
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<td>HP III for Mac</td>
<td>$4639</td>
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<td>HP Deskwriter Ink Cartridge</td>
<td>$18</td>
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<tr>
<td>AppleTalk Connectors</td>
<td>$25</td>
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<td>HP Deskwriter 830C</td>
<td>$759</td>
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<tr>
<td>Newgen Turbo PS 400P (400x400 dpi)</td>
<td>$1695</td>
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<td>Newgen Turbo PS 880B (800x800 dpi)</td>
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<td>Newgen Turbo PS 440B (400 dpi 11x117)</td>
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<td>Newgen Turbo PS 660B (800x600 dpi 11x117)</td>
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<td>Color Printers</td>
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<td>NEC PS 40</td>
<td>$4395</td>
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**Scanners**

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<tr>
<td>Logitech Scanman 32</td>
<td>$279</td>
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<td>Microtek II</td>
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<tr>
<td>Microtek II XE (1200 dpi) with Photoshop</td>
<td>$1159</td>
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<tr>
<td>Microtek 185bs Slide Scanner</td>
<td>$1395</td>
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<tr>
<td>Umax UC-80 with Photoshop</td>
<td>$1129</td>
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<tr>
<td>Canon Typist</td>
<td>$459</td>
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**Software**

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<tr>
<td>Microsoft Word</td>
<td>$289</td>
</tr>
<tr>
<td>Microsoft Excel</td>
<td>$399</td>
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<td>Aldus PageGizmo</td>
<td>$497</td>
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<td>CallWord</td>
<td>$91</td>
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<tr>
<td>Adobe Photoshop 2.0</td>
<td>$529</td>
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<tr>
<td>Quark Express 3.0</td>
<td>$579</td>
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<td>Corel WinPaint</td>
<td>$499</td>
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**Modems**

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<th>Modem</th>
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<td>Modem with TeleFax 9600 PS</td>
<td>$95</td>
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<td>Modem with TeleFax 56K PS</td>
<td>$320</td>
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<td>Supra Fax Modem 14.4 v.32</td>
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<td>Supra Fax Modem 96B (ext.)</td>
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<td>PSI for Powerbook 140 &amp; 170</td>
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<td>Global Village Bronze 96/24 for Powerbook</td>
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<td>Global Village Silver 96/96 for Powerbook</td>
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<td>Global Village Gold 14.4 for Powerbook</td>
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**Accelerators**

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<td>Powerache 40 Mhz</td>
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<td>Radius Rocketshare</td>
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**Memory**

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<td>1 meg for LC/CISI</td>
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<td>4 meg for LC/CISI</td>
<td>$120</td>
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<td>Powerbook 140 &amp; 170 4 meg</td>
<td>$175</td>
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<td>Powerbook 140 &amp; 170 8 meg</td>
<td>$250</td>
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<td>Emac Powerbook Display</td>
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**CD-ROMS**

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<td>NEC CDR-74 Gallery</td>
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<td>NEC CDR-74</td>
<td>$676</td>
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<td>Smart &amp; Friendly with Cable and Classic CD Collection</td>
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<tr>
<td>Super CD Collection</td>
<td>$496</td>
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Overnight and Federal Express Shipping Available

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fax (714) 635-1752

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**Our New Prices Have the Competition Seeing Red!**

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14" Color Trinitron
14" display with 24-bit color card $399

**MICROTEK**

24-BIT

**COLOR**

Scannaker II with Photoshop LE
Fast 1200 dpi. Its 24-bit color for the price of grayscale!

**Macintosh**

LC II
4/40 (price is for cpu only)
LC II with 14" color display & keyboard $1,145

**Displays & Cards**

<table>
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<tr>
<th>Product</th>
<th>Price</th>
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<tr>
<td>Apple 12&quot;13&quot;14&quot;</td>
<td>399/499/569</td>
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<tr>
<td>Sony 1304/1604</td>
<td>Call/1049</td>
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<tr>
<td>Magnavox 14&quot;</td>
<td>Call</td>
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<tr>
<td>E-Machines T16 II/T19 II</td>
<td>1295/2395</td>
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<td>E-Machines Color Video Cards</td>
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**Printers**

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<td>SONY 13&quot;41014&quot;</td>
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<td>JVC 14&quot;</td>
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**Scanners**

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<td>QMS 4103/5MR/600</td>
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<td>Apple Laser Writer III/BIG</td>
<td>2395/2395</td>
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<td>JetFill HP/FHP high capacity</td>
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<td>JetFill Apple-Canon/HP Desktop</td>
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**Modems**

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<td>Quicknet Xebra 9634 Fax</td>
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<td>Receive</td>
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**Drivers & Storage**

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<td>PLI Removable 4/88</td>
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<tr>
<td>PLI Optical 3.5/7.25&quot;</td>
<td>1395/2895</td>
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<tr>
<td>PLI Floptical</td>
<td>399</td>
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<td>PLI Quick SCI</td>
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**Mac Systems**

**Mac Cpu's**

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<tr>
<td>Mac Classic II 4/40</td>
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<td>Mac LC II 4/40</td>
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<tr>
<td>Mac IIci 3/40</td>
<td>1395</td>
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<tr>
<td>Mac IIci 5/0</td>
<td>Call</td>
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<tr>
<td>NEW Mac IIs, 5/0</td>
<td></td>
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<tr>
<td>Mac Quadra 700/950</td>
<td>3395/NEW</td>
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<tr>
<td>PowerBooks</td>
<td>Call</td>
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**Mac**

LC II Color System
3/5MB RAM/800HD
Magna 14" Color Display, Apple Keyboard, Mouse, System 7 & Hypercard

$1,295

**Mac IIci System**

$2,995

**Networking**

<table>
<thead>
<tr>
<th>Product</th>
<th>Price</th>
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<tbody>
<tr>
<td>All products in stock at lowest prices CALL!</td>
<td></td>
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<tr>
<td>Asante 6K4 cards/10base1 Hub</td>
<td>139</td>
</tr>
<tr>
<td>Dayna Ethernet/Asante Print</td>
<td>340/369</td>
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Optical Drives

256 MB 3.5" Optical

Puma 128 MB 3.5" Drive $1399
Puma 256 MB 3.5" Drive $Call!

- Puma 256 reads & writes ISO/ANSI standard 128 MB cartridges and a true, non-compressed 256 MB
- Fast transfer rate up to 1.2 MB /second
- Fast 35 ms access time
- Optical reliability (10 year Data Life)

128/256 Meg 3.5" Cartridge $59/$99
600 Meg 5.25" Cartridge $105

All Puma Optical drives include one cartridge, a universal power supply, 12 mags of shareware, SCSI & power cables, and a one year warranty. Five Year Warranty available!

CD-ROM

NEC

CD-Express

*Includes CDR-25, 10 CD's and two speakers $429
CDR 37 w/ MultiSpin $379
CDR 74 w/ MultiSpin $569
CDR 74 w/ Gallery $849

TOSHIBA

Fastest CD ROM Available! $Call!

15Vms access!

Hard Drives

Falcon MICROPOLIS* Drives

<table>
<thead>
<tr>
<th>Capacity</th>
<th>Transfer Rate</th>
<th>Int.</th>
<th>Est.</th>
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<td>385 MB</td>
<td>4.4 ms</td>
<td>$1099</td>
<td>$1199</td>
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<tr>
<td>648 MB 3.5&quot;</td>
<td>10 ms</td>
<td>Call!</td>
<td>Call!</td>
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<tr>
<td>760 MB</td>
<td>4.6 ms</td>
<td>$1399</td>
<td>$1499</td>
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<tr>
<td>1.2 Gig</td>
<td>4.1 ms</td>
<td>$1999</td>
<td>$2099</td>
</tr>
<tr>
<td>1.2 Gig 3.5&quot;</td>
<td>10 ms</td>
<td>Call!</td>
<td>Call!</td>
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<tr>
<td>1.5 Gig</td>
<td>4.1 ms</td>
<td>$2299</td>
<td>$2399</td>
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<tr>
<td>1.6 Gig</td>
<td>&lt;1.5 ms</td>
<td>$2999</td>
<td>$3099</td>
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<tr>
<td>2.0 Gig</td>
<td>3.9 ms</td>
<td>$3399</td>
<td>$3499</td>
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<tr>
<td>2.4 Gig</td>
<td>&lt;1.15 ms</td>
<td>Call!</td>
<td>Call!</td>
</tr>
</tbody>
</table>

Super Capacity!

Prices valid 12/28/92 - 1/28/93

We also stock Ici, Ilsi, Ilx, PowerBook 210 & 230 models.

NETWORKING

Asante		| Dayna		| SupraFaxModem
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64k Cards (Nubus) $219 | DaynaPORT E/II-T $149
Asante Print $369 | DaynaPORT SCS $269
EN/SC PowerBook $368 | DaynaSTAR MiniHub $269
Cayman		| Shiva		| Powerbook 14.4/14.4 internal
GatorBox CS $1999 | LanRover/L $599
GatorPrint $399 | Netmodem/E $1479

MODEMS

SupraFaxModem V.32bis $349 | SupraFaxModem V.32 w/sh/dl $329 | SupraFaxModem V.32 w/sh/dl $399 | Powerbook 14.4/14.4 internal $Call!

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- Quadra 700 (with System Purchase!) $3499
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- Rocket 25: $159
- Rocket 33: $199
- RocketShare: $429

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  - Quadra 700/Overdrive: $329
  - Quadra 900/Overdrive: $329
  - Image Magic Quadra/PDS: $699

- Overdrive II
  - 44 Meg Cartridge: $44
  - 88 Meg Cartridge: $49

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- Eagle™ SyQuest
  - Buy an Eagle™ and get two 44 MB cartridges for only $89!

**MONITORS**

- NEC
  - MultiSync 3FGx $639
  - MultiSync 4FG $759

- SONY
  - 1604S 17" $1099
  - 1304 14" $649
  - 1320 LCD $399

- PrecisionColor 21 $1895
  - PrecisionColor 20 $2459
  - Color Pivit $1275
  - PrecisionColor 24Xp $499

- ThunderStorm $809
- SuperMatch 20" $1499
- 21" Platinum Monitor $999
- Spectrum/8 & 24 PDQ $849
- Monochrome Card $349
- VideoSpigot $399

**MACHINES**

- T16 II $1295
- T19 II $2395
- Futura Color Cards from only $399

**SIMMs**

- 4 Meg 80ns $115
- 1 Meg 80ns $35
- 2 Meg 80ns $62

**POWERBOOK**

- 6 Meg PowerBook Memory $259

**SALE!**

"...this is one on..." purchase you’ll never regret."

**POWERCARDS**

<table>
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<tr>
<th>PowerCard</th>
<th>40 MHz PowerCard 030 (IIc only)</th>
<th>50 MHz PowerCard 030 (II, IIx, IIC)</th>
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<tbody>
<tr>
<td>Price</td>
<td>$599</td>
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**POWERCACHES**

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**MONITORS AT A 19" PRICE**

- PrecisionColor 21 $1895
- PrecisionColor 20 $2459
- Color Pivit $1275
- PrecisionColor 24Xp $499

**E-MACHINES**

- T16 II $1295
- T19 II $2395
- Futura Color Cards from only $399

**SUPERMAC**

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- Spectrum/8 & 24 PDQ $849
- Monochrome Card $349
- VideoSpigot $399
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And that's our Bottom Line.

<table>
<thead>
<tr>
<th>Product Description</th>
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<tr>
<td>DAYNA ETHERPAINT / PLUS</td>
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<td>SILVA FASTPATH 5</td>
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<td>DAYNA PORT</td>
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<td>SILVA NETBRIDGE / TELEBRIODE</td>
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<td>DOTLA N TIMBUNTU REMOTE Access PACK</td>
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<td>APPLE ENMACHINES / NOTIONS</td>
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<td>PS/17 $1175 PS/55 $1399</td>
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<td>300 DPI Laser Printers</td>
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<td>NATIONAL POWERBOOK BOMER</td>
<td>$89</td>
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<td>PSI POWERMODERN IV</td>
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<td>RADIUS POWER MODERN</td>
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<td>GLOBE VILLAGE POWERPORT GOLDO</td>
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<tr>
<td>APPLE POWERBOOK BATTERY RECHARGER</td>
<td>$99</td>
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<tr>
<td>KENSINGTON POWERBOOK NUMERIC KEYPAD</td>
<td>$95</td>
</tr>
<tr>
<td>BADGE, CARRYING CASES, ACCESSORIES</td>
<td>CALL</td>
</tr>
</tbody>
</table>

**Product Descriptions:***

- **NEC SilentWriter 95**: 300dpi, Postscript Level 2, Auto PCL/Mac, switching, 6ppm, $1359
- **RastOps CorrectPrint 300**: 300 dpi, data, $699
- **QMS 669 HAMMERHEAD**: 600dpi, 8ppm, Tabloid 11x17, RISC, 12MB, RAM, $4025
- **HP DeskWriter 374**: HP 550C, $715
- **TI MicroLasers Turbo**: 9ppm, Postscript Level 2, RISC, $1474
- **GCCC PLP II**: 300dpi Laser Printers, $799

**Technical Specifications:**

- **FUTURE SX**: 24-bit color interface for 15" display.
- **FUTURE SX/J**: 32-bit color interface for 15" display.
- **FUTURE MIX**: 24-bit color interface for 15" display.
- **FUTURE LX**: 24-bit color interface for 21" display.
- **DUALCOLOR LX**: 8-bit color interface for 21" display.
- **DUALCOLOR LC**: 8-bit color interface for 16" display and 24-bit color interface for 21" display.
- **COLORLINK SX/T**: 32-bit color interface for 16" display.
- **COLORLINK SX/Y**: 32-bit color interface for color display and 16-bit display.
- **COLORLINK SX/Z**: 32-bit color interface for 16" display.

**Contact Information:**

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E Machines Complete Line CALL
Radius Pivot, Color Pivot CALL
Video Spigot Complete Line CALL

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Accelerators — 200 to 350% faster!
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Model Number Due by Manufacturer

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NuBus or IIsi/SE 30 Thick/Thin or 10T 209.00
LC Thin or LC 10T 159.00
LC Thin/10T 209.00
SE Thick/Thin 159.00
SE Thick/10T 209.00
SE Thin/10T 209.00
FriendlyNet LC or NuBus (w/Thick/Thin/10T Adapter) 209.00
FriendlyNet IIsi (w/Thick/Thin/10T Adapter) 239.00
FriendlyNet Adapters Thick/10T 89.00
SCSI EtherNet 10T 289.00
SCSI EtherNet 10T (PowerBook) 319.00
SCSI EtherNet Thick/10T 339.00
SCSI EtherNet Thick/10T (PowerBook) 389.00
Asante All to 10T Adapter 89.00
AsanteHub 1012 849.00
AsanteHub 1700 or 1900 Series CALL
Asante 10T Hub/8 285.00
Asante 10T Hub/12 559.00

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- 600 $2999.00
- 45 SS SyQuest w/cartridge $400.00
- 65 SS SyQuest w/cartridge $500.00
- DATdrive 28B $1395.00
- DATdrive 665 (two year warranty) $1695.00

Removable Media
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- OptiCal 600 (SUN) $2999.00

DISK DRIVES
- All of our DAT drives include Retrospect 1.3, one DAT cassette, one DAT cleaning cassette, and your choice of SCSI cable.
- SyQuest, Optical, and DAT available internally for the Quadra 950!

COMPARISON OF DAT DRIVE OPTIONS
<table>
<thead>
<tr>
<th></th>
<th>DATdrive 268</th>
<th>DATdrive 868</th>
<th>DATdrive 268 for Third Wave Drive</th>
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<tr>
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<td>$1395.00</td>
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<td>Third Wave</td>
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OPTICAL MEDIA
- Syquest 45 or 90 Ml cartridge $68.00 / $115.00
- DAT cassette 9 or 10 meter 17.99 / 19.00
- Optical cartridge 900 512 k/sector $118.00
- Optical cartridge 900 1024 k/sector $118.00
- Optical cartridge 120 M 39.00

MEDIA
- Adobe Photoshop 2.01 $449.00

POWERBOOK ACCESSORIES
- PowerBook Modem $209.00
- Global Village Baud FaxModem $299.00
- Global Village Silver/Baud FaxModem $399.00 / $499.00
- Apple PowerBook FaxModem $129.00

SCANNERS
- Agfa ARCUS 1200 dpi $309.00
- Agfa UNAX UC1200 $1099.00
- Agfa UNAX UC1200 $309.00

MEMORY UPGRADES
- 1MB, 2MB, 4MB SIMMs
- 16MB SIMM (list price: $680/650)
- 16MB SIMM (Quadra 700)
- PowerBook 2MB
- PowerBook 4MB
- PowerBook 8 MB
- PowerBook 100 MB
- PowerBook 16 MB
- Quadra 700/600 VRAM SIMM
- Quadra 950 VRAM SIMM
- LC 512K VRAM SIMM

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Circle 156 on reader service card

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Toll Free Tech Support Line: (800) 832-9283
### Hard Drives

<table>
<thead>
<tr>
<th>Capacity</th>
<th>Type</th>
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### Video

#### E-MACHINES

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<tr>
<td>15&quot; CRT Monochrome Monitor</td>
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<td>12&quot; RGB Monitor</td>
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<td>9&quot; RGB Monitor</td>
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<tr>
<td>14&quot; Monitor</td>
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<td>21&quot; Monitor</td>
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#### SII

<table>
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<th>Monitor Type</th>
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<tr>
<td>SuperMatch 17&quot; Monitor</td>
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<td>21&quot; Platinum Monitor</td>
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<td>20&quot; Color Dual-monitor Trinitron</td>
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<td>21&quot; Two-Page Monitor</td>
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#### Apple

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<th>Printer Type</th>
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<td>microLaser PS17 w/AT</td>
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<tr>
<td>microLaser PS35 w/AT</td>
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<td>microLaser Turbo w/AT</td>
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### Seagate

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<td>1.0 GB</td>
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<td>1.7 GB</td>
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### Hewlett Packard

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<td>630 MB</td>
<td>Hewlett Packard</td>
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<tr>
<td>1.0 GB 3.5&quot;</td>
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<td>873 MB</td>
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### Maxtor

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<td>212 MB (NEW)</td>
<td>Maxtor</td>
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<td>340 MB</td>
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<td>768 MB</td>
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<td>1.2 GB</td>
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<td>1.7 GB</td>
<td>Maxtor</td>
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### Fujitsu

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<th>Capacity</th>
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<td>425 MB</td>
<td>Fujitsu</td>
<td>$909.00</td>
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<td>520 MB</td>
<td>Fujitsu</td>
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<td>778 MB</td>
<td>Fujitsu</td>
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<td>1.2 GB</td>
<td>Fujitsu</td>
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<tr>
<td>1.7 GB</td>
<td>Fujitsu</td>
<td>$2578.00</td>
<td></td>
</tr>
</tbody>
</table>
It's a Vintage Year
For Data Compression

The ETC DataPress offers a robust bouquet of features that includes “real-time” hardware data compression, SCSI bus expansion, and more at a price that is pleasing to the palette.

The making of fine wine is a complicated and time consuming process that should be left to experts. Data compression on the Macintosh used to be just as difficult—until the invention of the DataPress™.

The DataPress, which ships with More Disk Space™ by Alysis, offers the fastest and most complete system for squeezing space out of your hard disk drive. And its speed is unparalleled. The DataPress doesn't use slow background software tricks. When it writes a file to your hard disk, the data is compressed—“real-time”—so that there is no chance of lost data or time.

Plus, it's easy to use. Just plug the DataPress into the SCSI port on your Macintosh, and install the software. From there, the DataPress can transparently compress and decompress any file anywhere on your SCSI chain—including those on your internal drive. Just save a file and it's compressed. It's that easy.

Besides data compression, the DataPress enables you to expand the capabilities of your SCSI bus. It is a gateway to another complete SCSI chain of seven additional devices.

And there's more. At the core of the DataPress is ETC's SmartPeripheral™ Engine, an innovation that brings dumb peripherals to life. Empowering them to do things they've never done before. In this engine we've used a Flash EPROM that allows you to add future SPE Options by “double-clicking” on an auto-installing icon.

What are SPE Options? These are programs that run on the DataPress to add features like: disk mirroring, super volumes, RAID, encryption, and continuous off-line storage of removable magnetic media.

So how do you choose the best data compression solution around? It's a lot less intimidating than choosing a good wine. Call 1-800-876-4ETC.
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Magic Toshiba CD-ROM (XT3401).....$699
Magic NEC CD-ROM (CDR74).........$699

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1MB SIMMs $29
4MB SIMMs $119

A Complete Line of Memory Upgrades for Macintosh Computers, Printers & Accelerators

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Magic AFX & Pkt FaxModems
2400bps modem, 9600bps, class 2, Group 2 & 3 fax, software $89, pocket version $119

Magic AFX-24/96 PowerBook FaxModem
2400bps modem, 9600bps send & receive, class 3 fax, internally in any Macintosh PowerBook, Group 3 class fax $149

Magic FX FaxModem
2400bps modem, 9600bps send & receive, class 2, Group 3 fax, software $139

Magic VFX FaxModem
2400bps modem, 9600bps, class 2, Group 3 fax, V.42bis & MNP5, software $189

Magic VFX V.32bis FaxModem
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**Magic Modems**

Magic AMX Modem
2400bps modem, 100% Hayes compatible $69

Magic VX Modem
2400bps modem with compression to 9600bps.
Hardware V.42bis & MNP5 $139

Magic VX V.32 Modem
9600bps modem with compression to 38400bps.
Hardware V.32/V.42bis & MNP5 $199

Magic VX V.32bis Modem
14400bps modem with compression to 57600bps.
Hardware V.32bis/V.42bis & MNP5 $259

All Magic Modems include 2 YEAR WARRANTY and 30 DAY MONEY BACK GUARANTEE.
### Magic Memory Upgrades

<table>
<thead>
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<th>Upgrade</th>
<th>Price</th>
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<td>1MB SIMMs</td>
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<tr>
<td>2MB SIMMs</td>
<td>$49</td>
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<tr>
<td>4MB SIMMs for 80, 160</td>
<td>$119</td>
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<tr>
<td>NEC SilentWriter 2 80</td>
<td>$119</td>
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<td>NEC SilentWriter Model 95</td>
<td>$139</td>
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<tr>
<td>QMS FS-410/815 4MB Upgrade</td>
<td>$239</td>
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<tr>
<td>TI Turbo 4MB RAM Upgrade</td>
<td>$399</td>
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<tr>
<td>NEC ilcenricc Model 95</td>
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<td>NEC ilcenricc 2 MB/400</td>
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<tr>
<td>LZR96 0/ Realcc h /Quic kor 8MB</td>
<td>$499</td>
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<tr>
<td>GCC PLP 11/ MB</td>
<td>$49</td>
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<tr>
<td>4MB Classic Upgrade</td>
<td>$99</td>
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<tr>
<td>LC VRAM</td>
<td>$99</td>
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<td>Quadra VRAM</td>
<td>$149</td>
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**All Magic Memory Upgrades Include a Full Lifetime Warranty**

### Magic Hard Working Tools For Your Macintosh

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<thead>
<tr>
<th>Tool</th>
<th>Price</th>
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<tbody>
<tr>
<td>Radius Precision Color 20&quot;</td>
<td>$2399</td>
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<tr>
<td>Mac PowerBook 145 4/80 2399</td>
<td>$2399</td>
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<td>DayStar PowerCache 50MHz with BBS 2399</td>
<td>$2399</td>
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<tr>
<td>Buy 10 and Get One Free 128MB or 256MB Optical Cartridges</td>
<td>$2399</td>
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### Magic O30 Accelerators

<table>
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<tr>
<th>Accelerator</th>
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<tr>
<td>Magic RailGun O30 Accelerator for Mac SE, Plus &amp; Classic</td>
<td>$199</td>
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<tr>
<td>Magic RailGun O30 Accelerator</td>
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<tr>
<td>Magic RailGun O30 Accelerator (for Mac SE)</td>
<td>$199</td>
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<tr>
<td>Magic RailGun O30 Accelerator (for Mac Classic)</td>
<td>$199</td>
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### Magic 030 Accelerators

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<tr>
<td>Magic RailGun O30</td>
<td>$199</td>
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<tr>
<td>Magic RailGun O30 Pro</td>
<td>$299</td>
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<tr>
<td>Magic RailGun O30 Pro (for Mac SE)</td>
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<tr>
<td>Magic RailGun O30 Pro (for Mac Classic)</td>
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**Printer RAM**

- GCC PLP 2/5 MB | $49
- LZR960/Realtech/Quickor 8MB Kit | $499
- NEC SilentWriter 2 80 2MB Upgrade | $249
- NEC SilentWriter Model 95 2MB Upgrade | $139
- QMS FS-410/815 4MB Upgrade | $239
- TI 1MB RAM Upgrade | $49
- TI Turbo 4MB RAM Upgrade | $399

**RailGun O30**

- Magic RailGun 16MHz | $399
- Magic RailGun 25MHz | $449
- Magic RailGun 33MHz | $499
- Magic RailGun O30 Pro (for Mac SE) | $299
- Magic RailGun O30 Pro (for Mac Classic) | $299

**Magic Accelerators**

- Magic LC/CC with CoProcessor | $199
- Magic Math Classic II CoProcessor | $199
- Magic Real Cache Card | $199

**Magic Accessories**

<table>
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<th>Product</th>
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<tr>
<td>MagicNet LocalTalk</td>
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<td>MagicNet 10-pack, ca.</td>
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<td>Magic EtherNet Ethernet NuBus Cards</td>
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<td>ThickNet</td>
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<td>ThinNet</td>
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<td>10base-T</td>
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<tr>
<td>Transceivers</td>
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<tr>
<td>SCSI Accelerator</td>
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<tr>
<td>Magic SCSI II &amp; Minor Card &amp; Cable</td>
<td>$499</td>
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**Magic Products USA**

<table>
<thead>
<tr>
<th>Product</th>
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<tr>
<td>Magic Products USA Magic Catalog</td>
<td>$100</td>
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**CALL FOR A FREE MACPRODUCTS USA MAGIC CATALOG.**

**MAC**

- **1800 622 8721**
- **608 WEST 22ND**
- **AUSTIN, TEXAS 78705**
- **KALALOYA Tel 505-734-7350**
- **JAPAN Tel 033-533-2182**
- **512-472-0881 ext 407**
- **512-472-8881 ext 407**
- **512-472-0881 ext 407**
- **512-472-8881 ext 407**

**TERMS & CONDITIONS:**

Corporate, educational purchase orders accepted. Returns subject to a restocking fee. Call for free MAC \# before returning merchandise. Information subject to change. Magic includes a 30-day money back guarantee or all Magic Products excluding original shipping. Prices subject to change.

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**Hard Working Since 1985**

**MAC**

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- **608 WEST 22ND**
- **AUSTIN, TEXAS 78705**
- **KALALOYA Tel 505-734-7350**
- **JAPAN Tel 033-533-2182**
- **512-472-0881 ext 407**
- **512-472-8881 ext 407**
- **512-472-0881 ext 407**
- **512-472-8881 ext 407**

**Circle 175 on reader service card**
You know the SyQuest 44 and 88. Together they are the transportable storage standard in the Macintosh market. True interchangeability has been the only problem in an otherwise idyllic transportable storage world. Now SyQuest's 5110c solves the problem. With both read and write compatibility with 44MB and 88MB cartridges*, you no longer have to wonder which SyQuest unit to buy.

**Quantum**

<table>
<thead>
<tr>
<th>MB</th>
<th>INTL</th>
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<td>425</td>
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<td>999</td>
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<td>525*</td>
<td>1149</td>
<td>1219</td>
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<tr>
<td>1225*</td>
<td>1899</td>
<td>1969</td>
</tr>
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</table>

**Fujitsu**

<table>
<thead>
<tr>
<th>MB</th>
<th>INTL</th>
<th>EXTL</th>
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<tbody>
<tr>
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<tr>
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<td>2.0G</td>
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Includes Fujitsu's 5-Year Warranty

**Toshiba**

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**Micropolis**

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<tr>
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<tr>
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Includes Micropolis' 5-Year Warranty

**Maxtor**

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</tr>
<tr>
<td>1.7G</td>
<td>1899</td>
<td>1999</td>
</tr>
</tbody>
</table>

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wild country to be
young in."
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as is still left, and as many
kinds . . . . It is important to
us . . . . simply because it is
there—important, that is,
simply as an idea."
WALLACE STEGNER

"The love of wilderness
is more than a hunger for
what is always beyond
reach. It is also an ex-
pression of loyalty to the
earth, (the earth which
bore us and sustains us),
the only home we shall
ever know, the only para-
dise we ever need—if
we had the eyes
to see."
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<tr>
<th>Model</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mac Plus</td>
<td>$359.00</td>
</tr>
<tr>
<td>Mac SE 1/20 (800 K)</td>
<td>$625</td>
</tr>
<tr>
<td>Mac II 2/0</td>
<td>$949.00</td>
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<tr>
<td>Mac Ilex 1/0 (800 K)</td>
<td>$1,279.00</td>
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<tr>
<td>Mac Portable 1/40</td>
<td>$799.00</td>
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**NEW**

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<tr>
<th>Model</th>
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<td>Mac Classic 2/40</td>
<td>$775.00</td>
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<td>Mac LC 2/40</td>
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<td>Mac Ilex 3/40 (800 K)</td>
<td>$1,049.00</td>
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<tr>
<td>Mac Ilex 5/0</td>
<td>$2,249.00</td>
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Call for latest pricing on:
- Mac Ilex
- Color Laser
- Powerbook, etc.

**Apple Accessories**

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<td>Portable Keyboards</td>
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<td>Mac Ile NuBus Adapters</td>
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<td>Mac LC Ile Adapters</td>
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<td>LocalTalk Board for PC</td>
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<tr>
<td>Hayes 2400B Int. Modem</td>
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<td>Apple Stand. Keybld</td>
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<td>Laser Toner - Savings</td>
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**Printers**

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### Apple Parts

**Power Supplies**

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<td>Mac Classic</td>
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<td>Mac LC/LCII</td>
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<td>Mac II</td>
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<td>Mac Ile</td>
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**Logic Boards**

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**Drivers**

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<td>80 MB Int.</td>
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### QMS

**QMS**

- **PS 815 Postscript Printer**
  - Demo - $2,749.00
  - New - $3,289.00
- **PS 820 Printer**
  - Demo - $2,599.00
  - New - $3,099.00

**APPLE**

- **Radius, RasterOps, SuperMac**
  - Turbo (Demo) - $2,599.00
  - Turbo (New) - $3,099.00

**QMS SPECIALS**

- **ColorScript 100**
  - Model 10
  - USED: $1,999 - 300 dpi Color Laser

**APPLE**

- **Mac Plus**
  - $85.00
- **Mac SE**
  - $85.00
- **Mac SE Analog**
  - $115.00
- **Mac Classic**
  - $125.00
- **Mac LC/CLCII**
  - $125.00
- **Mac II**
  - $275.00
- **Mac Ile**
  - $275.00
- **Mac Portable**
  - $850.00
- **Laser INT**
  - $279.00
- **Laser INTX**
  - $579.00

**NEW**

- **12" Mono**
  - $475.00
- **12" RGB**
  - $925.00
- **16" Hi-Res RGB**
  - $450.00
- **16" Two Page Mono**
  - $395.00
- **21" Color**
  - $1,999.00
- **Apple Univ. Mon. Stands**
  - $35.00

**APPLE**

- **Mac Plus**
  - $85.00
- **Mac SE**
  - $85.00
- **Mac SE Analog**
  - $115.00
- **Mac Classic**
  - $125.00
- **Mac LC/CLCII**
  - $125.00
- **Mac II**
  - $475.00
- **Mac Ile**
  - $750.00
- **Mac Portable**
  - $850.00
- **Laser INT**
  - $279.00
- **Laser INTX**
  - $579.00

**APPLE**

- **1 bit**
  - $80.00
- **4 bit**
  - $75.00
- **8 bit**
  - $85.00
- **Portrait Displ.**
  - $125.00
- **Radius, RasterOps, SuperMac, Silhoutte-Out**
- **20 MB Int.**
  - $115.00
- **40 MB Int.**
  - $150.00
- **80 MB Int.**
  - $225 MB - Savings

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Power!

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anteed, Keyboard extra)

UPGRADES
Ilc to Ilci..................................$799.
Ilc to Quadra 700.................2499.
Ilc to Quadra 700.................1999.
Mac 128,512 to plus........299.
Mac 512ke to plus............179.
SE 800k to FDHD (ROMonly)....99.

PARTS
Mac Plus ROMS ....$189.
1.44 floppy mech .......277.
Appletalk PC card .......49.
Plus logic board .......148.
LC logic board ...........449.
Mac II logic board .......549.
Token Ring Card .......199.
PC 5.25 Drive (no controller)49.

PRINTERS
Laswerwriter ..................$799.
Laswerwriter Plus ...........$999.
Laswerwriter Iln ......$1299.
Laswerwriter Ilnxt ........$2099.

Powerbook 140 Accelerator!!
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SYSTEMS
Plus..................................$379.
Classic 1/0..........................599.
Mac II O/0..........................999.
LC 2/0..............................699.
Iicx 0/0.............................1399.
IicI 0/0..............................1799.

VIDEO BOARDS
Apple 8-bit ......................$39.
Apple 1-bit ......................$39.
Apple Portrait .................$99.
Apple 2-page mono .........$99.
Fastercops 264 ............269.

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Department
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MACWORLD | February 1993 | 363
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**Catalog**

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1. **Service**
   - Work with a Mac pro, not an order taker.
   - Expert help ensures the right choices for your needs and budget.

2. **Selection**
   - Classic II or Quadra.
   - Custom or standard.
   - Apple or third party.
   - We'll help you build your system, your way.

3. **Safety**
   - Mac•In•Stock is the only dealer who will bench test your system, and use double boxes for safe shipment.

4. **Support**
   - Technical support is toll free.
   - Repairs or replacements are handled via Federal Express (in and out at our expense).

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<td>Powerbook 300-490400</td>
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<tr>
<td>Powerbook 300-495200</td>
<td>In Stock</td>
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</table>
The Macintosh Herald

EXTRA! EXTRA! Read All About It!

The Incredible Shrinking Macintosh

Austin, Texas - Recent Macintosh sightings have revealed smaller units with fewer NuBus slots. Observers note that this trend has become a real problem with the rapidly increasing expectations of Macintosh owners. The problem of NuBus slot shortages in Austin, Texas - A family of NuBus expansion chassis systems has solved the problem of NuBus slot shortages in your Macintosh, sources say. Four-slot and eight-slot expansion chassis for the Macintosh II, Performa, and Quadra models are now available. Call Second Wave at 512-343-5661 or write to us at 9430 Research Blvd., Suite 230, Austin, TX 78759-6451 for the rest of the story...

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160
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50/70 .... $2275
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50/270 .... $2750
50/280 .... $2875
50/285 .... $3095
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<thead>
<tr>
<th>MEMORIES</th>
<th>SIMM</th>
<th>SIZE</th>
<th>PRICE</th>
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<tr>
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<td>DRI Infinity 8/8/16</td>
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<td>DRI 256MB Optical</td>
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<tr>
<td>Optical (Fastest)</td>
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<td>4x8x90 FX/2x80</td>
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<table>
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**SYQUEST CARTRIDGES**

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<td>256K</td>
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**MISCELLANEOUS**

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<tr>
<td>Quadra Video RAM 256K</td>
<td>$31</td>
<td>Mac 101 Ext Keyboard</td>
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<tr>
<td>MACII/MC6885</td>
<td>$140</td>
<td>Kensington Turbo</td>
</tr>
<tr>
<td>Maxima 2.0</td>
<td>$49</td>
<td>Mouse 4.0 (Trackball)</td>
</tr>
<tr>
<td>Optima 32/Software</td>
<td>$49</td>
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<table>
<thead>
<tr>
<th>QTY 250</th>
<th>MIX &amp; MATCH</th>
<th>WITHOUT</th>
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<td>$.41</td>
<td>5.25&quot; CS/DD</td>
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<td>5.25&quot; CS/HD</td>
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<tr>
<td>$.99</td>
<td>3.5&quot; CS/HD</td>
<td>$.89</td>
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<thead>
<tr>
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<th>Annual Premium</th>
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</thead>
<tbody>
<tr>
<td>Up to $2,000</td>
<td>$49</td>
</tr>
<tr>
<td>$2,001-$5,000</td>
<td>$69</td>
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<tr>
<td>$5,001-$8,000</td>
<td>$89</td>
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<td>$8,001-$11,000</td>
<td>$109</td>
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<tr>
<td>$11,001-$14,000</td>
<td>$129</td>
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Expect to spend 40-80 hours playing one game.

GLIDER 4.0

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Try to keep the paper airplane flying from room to room without being blitzed by the wildest set of obstacles ever. Room editor included.

"The bottom line is that this game is a blast"
The Apple Source-RIMUG

MORE GLIDER!
Loved Glider 4.0 and want more? John Calhoun has built another house! All the fun, frenzy and madness that made Glider so much fun have been put into this brand new house. 64 new rooms form a convoluted maze!

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PARARENA 2.0

Vintage John Calhoun! Calhoun, author of Glider 4.0 (Mac World Hall of Fame Winner), has done it again. Pararena is steeped in Calhoun's tradition of attention to detail. From the unique sounds (the player's armor clinking, the roar of the crowd, stadium vendors hawking peanuts) to the physics of the hoverboards gliding over the stadium dish. Still the greatest of the Calhoun tradition, is ENDLESS FUN!

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NETWORKABLE CHALLENGING FUTURISTIC

NEW

FUN BUNDLE:
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14 Mice (collectively) - Mac User Magazine
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- Crystal Quest w/Critter Editor

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Circle 32 on reader service card
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Are you an occasional user? The Bronze is ideal. The TelePort/Bronze" fax/modem sends data at 2400 bps. It sends faxes at 9600 bps and receives them at 4800 bps. It even wakes up your Mac II series computer when someone calls.

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REPORT CARD

<table>
<thead>
<tr>
<th>Math</th>
<th>Reading</th>
<th>Spelling</th>
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<td>A+</td>
<td>A+</td>
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Most video games simply teach kids how to blow up spaceships and attack aliens with lasers. MacKids software gives them more than exciting games to play. It sharpens their skills in such areas as reading, spelling and math with programs like the Preschool Pack, Word Quest and Turbo Math Facts.

So if you want to make learning fun for your kids, give them MacKids. It's the weapon they need to zap low scores.

Invest in something with growth potential.

America's economic future depends on a motivated, educated work force. At a Boys & Girls Club, kids learn the life skills and job skills they need to grow into productive members of our American economy, as well as our society.

Please make a contribution to the Boys and Girls Clubs. You'll be investing in the growth of America.

Circle 248 on reader service card
We ROCKED the Macintosh and Windows™ paint markets with version 1.2. NOW we've loaded up our latest, Fractal Design Painter® version 2.0, with more realism and more surrealism, more control and more out of control. It is like no other application in history. Painter—the natural-media™ paint application.

Painter's brushes now include hot new Scratchboard tools, an airbrush that actually spatters, and the Cubist brush. Cool new effects allow you to apply lighting from single or multiple spotlights, apply a textured glass distortion, marbleize and more. Type 1 and TrueType® fonts can be imported.

Fractal Design

Painter 2.0

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Fractal Design Painter 2.0.
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1619: WRAPTURES ONE $179.95

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Publisher by Gazette Technologies, Inc.

1653 Wraptures One $95
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1990 Wraptures Two $95
NEW 130+ more textures.

Publisher by ForForm & Function

Circle 157 on reader service cord.
2047 Putt-Putt Joins the Parade....$49.95
Wax your car and buff your bumpers—it’s time for the Annual CarTown Pet Parade! Help Putt-Putt tackle the local car wash, rescue a lost puppy, put out a fire and more. All this before he takes his place in the parade! Over 30 different locations for your child to explore, along with captivating activities and logic puzzles. 100s of secret click-points explode with sound/animation. Designed to challenge 5-7 year old minds. Includes a handbook filled with activities.
Published by Humongous Entertainment

2094 The Iron Helix $69.95
The IRON HELIX is the CD-ROM you have been waiting for! A 3D virtual reality adventure game. Marked by seamless motion through a photo-realistic 3D environment, the Iron Helix is more like a movie than a game. Unlike any other CD-ROM, this fast paced 3D action experience is this year’s hottest science fiction thriller! Published by Drew Pictures

2070 Loops: Music for Multimedia $79.95
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1762 SpaceTime & Art $149.95
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1786 Boris Vallejo $199.00
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1776 L'afamme Venus $99.95
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1327 ExoticaROM 3.0 $199.00
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Published by Gazelle Technologies, Inc.

We’ll meet or beat any advertised price on CD-ROM products!
# Best-Sellers

**February 1993**

### Business Software

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<tr>
<th>#</th>
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### Entertainment Software

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<td>19 3</td>
<td>Beyond Dark Castle</td>
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<td>Sierra On-Line</td>
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### Utility Software

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### Network/Data Communications

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### Education Software

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<td>The Learning Company</td>
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<td>4 2</td>
<td>The Playroom</td>
<td>Broderbund Software</td>
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<td>Math Blaster</td>
<td>Davidson &amp; Associates</td>
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<td>1 4</td>
<td>The Oregon Trail</td>
<td>MECC</td>
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<td>29 5</td>
<td>Where in the USA is Carmen Sandiego?</td>
<td>Broderbund Software</td>
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### Add-In Boards

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<td>Pivot</td>
<td>Radius</td>
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<td>Macintosh II FDDU Upgrade</td>
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<tr>
<td>7 5 5</td>
<td>Spectrum/8 Series SuperMac</td>
<td>Apple Computer</td>
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### The AmCoEx Index of Used Mac Prices

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<tr>
<th>Machine/RAM/ Hard Drive</th>
<th>Average Sale Price</th>
<th>Monthly Change</th>
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<td>Mac SE/2MB/20MB</td>
<td>$675</td>
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*Source: Exclusive Audits & Surveys research from more than 250 Macintosh retailers and selected mail-order vendors. Covers sales during October 1992.*
Announcing a better mousetrap.
In 1992, the only monitor to snag the coveted five-mic e rating was an NEC monitor: the remarkable MultiSync 4FG. After running it and 13 others through the most rigorous technical evaluation they'd ever used for testing monitors, MacUser magazine concluded, "If you're looking for the sharpest display, the NEC MultiSync 4FG should be your top choice!"

What more can we say? Glad you asked. First, there's our AccuColor™ Control System, which prompted MacUser to make special mention of the "easy color adjustments." AccuColor lets you adjust on-screen colors, so if you're looking for mouse-tail pink, that's what you'll get. If, however, color control is not a priority for you, you'll be very happy with NEC's MultiSync 3FGx monitor, which shares almost all of the 4FG's award-winning features. Both monitors produce sharp, bright images, crisp graphics and vibrant colors. An Invar shadow mask provides increased brightness without loss of focus. And our high-contrast polished screen improves clarity.

Another big idea—the display area. The large 15" screen coupled with FullScan™ capability for edge-to-edge images gives you a considerably larger display area than typical 13" or 14" RGB monitors.

How do you make an NEC MultiSync monitor work with your Mac? Just plug it in, using NEC's free FG/Mac cable adapter. It works with the Mac's on-board video, so you won't need an add-in video board!

Both monitors are compatible with the Mac II family, Quadra™ series, LC's, PowerBooks™ and PC systems. So you can use just one monitor for both types of platforms. MacUser noted the "powerful and versatile controls make switching from a Mac to a PC a snap."

And to make these monitors as user-friendly as possible, we've included ergonomic features such as a tilt/swivel base and up-front user controls. Plus, our Reduced Magnetic Field™ technology meets the strict Swedish MPR II guidelines for magnetic field emissions.

There are lots of reasons for considering an NEC MultiSync monitor for your Mac—the sharp, bright images, the vibrant colors, the large display area, the flexibility, the compatibility—to name five. And the list could easily be expanded.

For more information on our award-winning monitors, call 1-800-NEC-INFO (in Canada: 1-800-343-4418). Or for information via fax, call NEC FastFacts™ at 1-800-366-0476, request #62234.

Because ↑ is the way you want to go. NEC

Circle 16 on reader service card
At NEC, we’ve developed hundreds of computer products expressly for Mac systems: from our highly-acclaimed MultiSync monitors, MultiSpin™ CD-ROM readers and Silentwires™ laser printers, to our Professional Graphics Series, which includes our new 27” MultiSync 4FG data monitor and MultiSync 6FG and 9FG Projection Monitors for images as large as 25 feet.

The NEC MultiSync 4FG: The ultimate monitor for your Macintosh:

"""
-MacUser Magazine
Aug. '92"""
Kensington introduces two new products for PowerBook® computers.

**Kensington NoteBook KeyPad**
Want to add full keyboard performance to your PowerBook? Want to enter numbers fast and accurately?

The Kensington NoteBook KeyPad is the answer.
Features include a calculator-style layout, mathematical function keys and an oversized Enter key. All keys are full-size. We even added the "5 Dot Home Key" for touch users.

What's more, 15 additional Function keys help reduce keystrokes and enable VAX/mainframe communication.

The Kensington NoteBook KeyPad has a small footprint, weighs just under 9 oz., plugs into any ADB port and is System 7 compatible.

**Kensington NoteBook Traveler™**
Now there's a traveling case designed just for PowerBook computers. It's rugged, yet lightweight. Stylish, yet functional. And it comes in three convenient sizes—the full featured Executive version, the ever popular Deluxe and the streamlined Compact.

All versions include an impact-resistant computer compartment with high density padding, numerous zippered compartments and handy utility pouches.

Our new Executive version features three separate compartments for maximum storage, handy elastic straps for securing accessories, an accordion-style compartment for files and an outside pocket for quick access.

Every case has a durable, water-resistant fabric shell, a removable shoulder strap, reinforced webbing and self-repairing zippers. What's more, our unique easy-carry handle combines the strength of rivet-reinforced nylon with the comfort of foam rubber.

For more information, call 800-535-4242. Outside the US, 415-572-2760. For information by fax, call 800-535-4242 and enter 82.

See us at MacWorld Expo, Booth #1041.